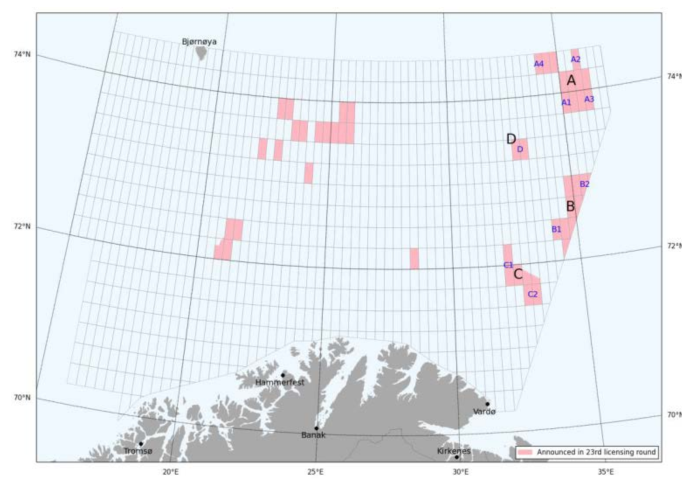
Fysisk miljø i Barentshavet sørøst

Barents Sea Exploration Collaboration (BaSEC) er et industrisamarbeid for å forberede leteoperasjoner i Barentshavet. Barentshavet har vært åpent for petroleumsaktivitet siden 1980, men industrien beveger seg nå inn i nye områder av dette havområdet. BaSECs siktemål er derfor å koordinere operatører og komme med anbefalinger om tiltak som kan danne grunnlag for sikker og effektiv letevirksomhet i Barentshavet. BaSEC har 16 medlemmer, alle operatører på norsk sokkel. BaSEC bygger sine rapporter på beste tilgjengelige kunnskap og på den brede erfaring disse 16 selskapene har fra operasjoner i Barentshavet, andre steder på norsk sokkel og i andre områder med tilsvarende forhold.

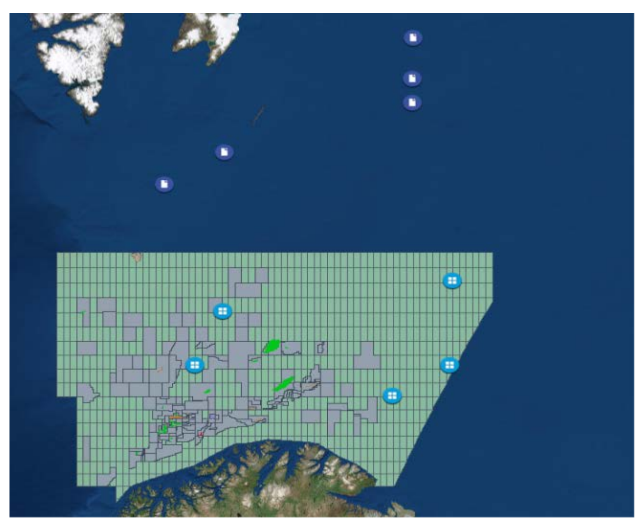
Dette er den første rapporten fra BaSEC sitt arbeid. Rapporten beskriver fysisk miljø i Barentshavet sørøst i et format som er skreddersydd for planlegging av offshore operasjoner. Rapporten inkluderer normale og ekstreme verdier for relevante vind-, bølge-, strøm-, luftforhold og sjøtemperatur. I tillegg inkluderer den sannsynlighet for forekomst av sjøis og isfjell i utvalgte områder. Dokumentet gir også grunnleggende informasjon om fenomen spesielt for områdene, slik som polare lavtrykk, marin og atmosfærisk ising og hvor mye snø som kan forventes. Dette er grunnleggende kunnskap for å kunne planlegge og gjennomføre både lete- og installasjonsaktiviteter. For operasjoner i Barentshavet er dette spesielt viktig både på grunn av lange avstander til land og for å sikre at de riktige problemstillingene tas hensyn til ved vurdering av risiko.



Figur 1: Kart over lisensene i 23. konsesjonsrunde og hvilke blokker rapporten omhandler

Historisk er det gjort mange antakelser om forholdene i dette havområdet. BaSEC rapporten dokumenterer hvilke faktiske forhold letevirksomhet i Barentshavet sørøst vil foregå under og vurderer også kvalitet på eksisterende data slik at operatører kan vurdere behov for risikoreduserende tiltak.

Rapporten er basert på de beste dataene som er tilgjengelig. Dette er både omfattende historiske datakilder og data fra nye datakilder. I figur 2 ser



Figur 2: Nye vær- og isobservasjonspunkter i Barentshavet

man et kart som viser nåværende observasjonspunkter for bølger, vind, strøm og temperatur innenfor det allerede åpnet område i Barentshavet. Figuren viser også lokalisering av 5 issensorer som er utplassert i den nordlige delen av Barentshavet. Disse nye observasjonspunktene bidrar både til bedre forståelsen av de operative forholdene i området, bedre værvarsler og økt kunnskap om is-karakteristikk i den marginale issonen (MIZ). Økt presisjon i værvarslingstjenester vil bidra til å øke sikkerheten til all virksomhet i havet. Målesensorene som benyttes er utplassert gjennom BaSMIN prosjektet som er et felles industriprosjekt (Barents Sea Metocean and Ice Network). De fleste selskap som deltar i BaSEC er også med på å finansiere BaSMIN.

Rapporten forholder seg også til allment kjente klimamodeller, men i praksis har disse modellene liten betydning for planlegging og gjennomføring av leteaktivitet i Barentshavet sørøst i nærmeste framtid ettersom konsekvensene beskrevet i modellene vil inntreffe lenge etter selve leteaktiviteten.

Hovedfunn

BaSEC konkluderer med at det er tilstrekkelig antall datakilder av god kvalitet til å gjøre vurderinger som dekker de behov man har under en leteboring. Videre konkluderes det med at:

- Forhold knyttet til strøm, vind og bølger er likt det som finnes i Nordsjøen. Det betyr også at forholdene (normale og ekstreme verdier) som regel er mildere enn i Norskehavet.
- Det er lav sannsynlighet for forekomst av sjøis og isfjell i de fem områdene som dekkes av den 23. konsesjonsrunden.
- Ekstreme minimums lufttemperaturer er betydelig lavere enn det man er vant med på andre deler av sokkelen
- Polare lavtrykk, snø og ising krever oppmerksomhet i planleggings- og gjennomføringsfasen av eventuelle leteoperasjoner vinterstid.

Sjøis

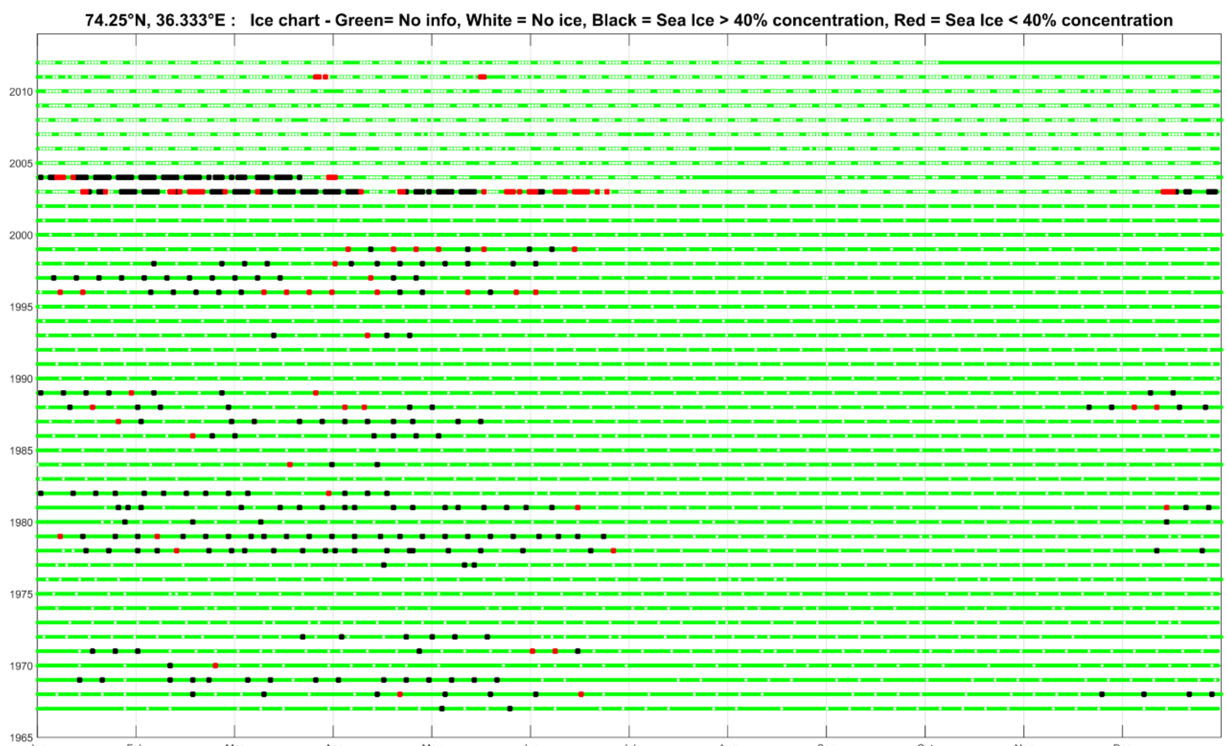
Sjøis er is som dannes når havflatens sjøtemperatur synker under frysepunktet (-1,9^{o}C for saltvann). Det er den type is som utgjør det som kalles den marginale issonen (også kjent som iskanten). Problemstillinger knyttet til sjøis, og da spesielt den marginale issonen, har vært gjenstand for diskusjon de siste par årene når spørsmålet om olje og gassaktivitet i Barentshavet er blitt adressert.

Det er lav sannsynlighet for forekomst av sjøis i de fem områdene som dekkes av den 23. konsesjonsrunden. Det forventes at eventuell sjøis i Barentshavet sørøst ikke dannes lokalt men driver inn fra områder lenger nord-nordøst. Årsaken til dette er dominerende havstrømmer som bringer varmt atlantisk vann inn i det sørlige Barentshavet. For at det skal komme is til disse områdene kreves det nord-nordøstlig vind over en lengre periode. Lokal dannelse av is i de nordligste blokkene kan imidlertid ikke utelukkes og bruk av værvarsler vil være viktig for å forutse eventuell lokal frysing.

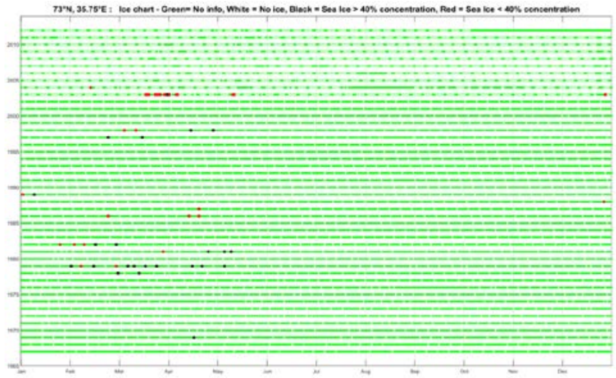
Data for forekomst av sjøis er basert på iskart fra istjenesten ved Meteorologisk Institutt (Værvarslinga i Nord-Norge). Iskart for perioden 1967 til 2012 er blitt benyttet. Figurene 3, 4 og 5 nedenfor viser hvilke år og når på året at man har hatt sjøis på ved den nordligste blokken utlyst i 23. konsesjonsrunde.

De svarte punktene i figurene representerer tilstedeværelse av is med konsentrasjon over 40 %. De røde viser også tilstedeværelse av is men for perioder det har vært mindre enn 40 % konsentrasjon. Tilstedeværelsen av is varierer også fra noen få dager i 2011 til 5-6 måneder for område A i 1978, 79 og 2003 – det siste er imidlertid en sjelden hendelse over den perioden der det finnes data. Tendensen i områdene er at det er stadig sjeldnere tilstedeværelse av is og at havområdene stort sett er åpne nesten hele året. Dette gjelder også i år hvor isen kommer inn på lokasjon. Rapporten konkluderer med at det historisk har vært is i område:

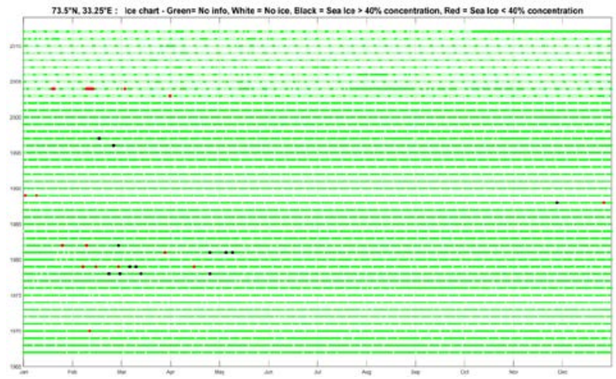
- A i løpet av 25 av de siste 46 årene og med isfrie måneder fra juli til midten av november
- B i løpet av 23 av de siste 46 årene og med isfrie måneder fra juni til desember
- C ingen observasjoner av is i perioden 1967 – 2015
- D i løpet av 11 av de siste 46 årene og med isfrie måneder fra mai til november



Figur 3: Illustrasjon av tilstedeværelse av is i område A



Figur 4: Tilstedeværelse av is i område B



Figur 5: Tilstedeværelse av is i område D

En viktig forutsetning fra myndighetene er at boring i oljeførende lag ikke skal forgå nærmere enn 50 kilometer fra dem marginale issonen. Myndighetene har definert den marginale issonen som overgangen mellom havområder som er dekket med 40 % is og åpent hav.

Det vil derfor ikke foregå leteboring hvis sjøis driver inn mot borelokasjon. I praksis håndteres dette ved overvåking av store havområder og monitorering av sjøis. Hvis sjøis nærmer seg en borelokasjon vil boreaktivitet stanses i påvente av at isen trekker seg tilbake til minimum 50 kilometer fra borestedet. Sjøis nærmere enn 50 kilometer vil innebære et avbrudd i en boreoperasjon og en forsinkelse i letevirksomheten. Statistikk om sjøisforekomst gjør det mulig å estimere hvor ofte slike hendelser kan inntre på utvalgte lokasjoner samt forventet ventetid før operasjoner kan gjenopptas.

Isfjell

Isfjell er ferskvannsis som stammer fra isbreer og som dannes ved at breene kalver i relativt dype fjorder. Isfjellene påvirkes av vind, strøm og bølger og driver normalt med en hastighet rundt 0,7 km\t. Den viktigste kilden til isfjell i Barentshavet sørøst er breene på Frans Josef land, som fra område A er en distanse på ca. 700 km. Normalt vil sirkulasjonen i Barentshavet føre isfjellene vestover mot østkysten av Svalbard, men enkelte år med nordlige vinder kan de drive relativt langt sør.

Isfjell forekommer i mange ulike former og størrelser og navn som bergy bits og growlers benyttes ofte om små isfjell[1]. Isfjell har historisk blitt observert så langt sør som 67.2 grader nord samt flere ganger ved Finnmarkskysten. Disse sydlige observasjonene stammer primært fra perioden 1880-1930 i en tid da klimaet generelt var kaldere og utstrekning av sjøis var større enn i dag. Dataene som er lagt til grunn for BaSEC sine analyser for isfjellforekomst er primært basert på sovjetiske isfjellobservasjoner – *The Abramov Atlas of Arctic Icebergs* – mellom 1933 og 1990 og ekspedisjoner gjennomført i perioden 2001-05. Usikkerheten i dette datamaterialet er kompensert ved å tredoble isfjellareal-tettheten, noe som gjør estimatene for frekvens av isfjellforekomst mer konservative enn det dataene i utgangspunktet tilsier.

[1] Growlers er mindre enn 5 m lang i vannlinjen og stikker opp mindre enn 1 m over vannet, mens bergy bits er mellom 5 og 15 m lang og mellom 1 og 5 m høy.

BaSEC har beregnet den statistiske muligheten for at isfjell vil kunne komme nær en installasjon innenfor forskjellige radiuser. I figur 6 nedenfor er en tabell som gjengir statistisk sannsynlighet for hvor ofte isfjell vil forventes å støte sammen med en installasjon med diameter på 100 meter, alternativt drive inn i en varslingssone på 8 kilometer fra borelokasjon.

Område	Frekvens sammenstøt	Innenfor en 8 kilometers sone
A	1 gang per 2000 år	1 gang per 35 år
B	1 gang per 4807 år	1 gang per 86 år
C	1 gang per 9615 år	1 gang per 177 år
D	1 gang per 6410 år	1 gang per 117 år

Figur 6: Hva er sjansen for et sammenstøt med isfjell?

Sannsynligheten for at et sammenstøt skal forekomme i løpet av en leteperiode, som vil strekke seg over noen måneder, er derfor svært begrenset. Ettersom frekvens av sammenstøt er estimert å være oftere enn 1 gang per 10 000 år må operatører i områdene likevel ta høyde for muligheten for et sammenstøt med isfjell. Alle BaSEC operatører anbefales derfor å etablere overvåking av havområdene rundt under sine operasjoner, kontinuerlig vurdere trusler fra isfjell og ha på plass operasjonelle prosedyrer som sikrer stans i boreoperasjon og at man ved behov kan flytte seg fra borelokasjon. Alternativt kan operatørene velge å buksere isfjell fysisk bort fra boreinnretning slik som gjøres på Grand Banks i Canada. Ved implementering av systemer for håndtering av isfjellrisiko vil risikoen for sammenstøt ytterligere reduseres med ca. 80-90 %. Et slikt system inkluderer monitorering ved hjelp av satellitter, vurdering av værforhold og vindretning. Slike tiltak vil gjøre at selskapene er godt forberedt før et eventuelt isfjell kommer i nærheten.

Vind

Rapporten gir en detaljert gjennomgang av vindretning og -styrke for alle 4 områdene hvor det er utlyst leteblokker i 23. konsesjonsrunde. Gjennomgangen er basert på data for perioden 1958-2014. Kvalitet på vinddata er dokumentert gjennom sammenligning med måledata fra flere ulike observasjonspunkter på norsk sokkel, inklusiv i Barentshavet. Dataene gjør at vi kan konkludere med at vindforholdene i Barentshavet sørøst er tilnærmet like de man finner i Nordsjøen. Operatører må derfor påregne venting på vær på samme nivå som i Nordsjøen. Polare lavtrykk vil kunne påvirke enkelte aktiviteter negativt da de medfører hurtig endring både i vindstyrke og retning. De har imidlertid begrenset effekt på en boreriggs evne til å holde posisjon og er mer kritiske for eventuelle senere installasjonsaktiviteter. Frekvens av polare lavtrykk er relativt lav og vil ikke påvirke selskapenes evne til å operere i Barentshavet sørøst.

Bølger

Bølgeanalyser er basert på data fra Norsk Meteorologisk institutt (1958-2014). Kvalitet på bølgedata er dokumentert gjennom sammenligning med måledata fra flere ulike steder på norsk sokkel, inklusiv Barentshavet. Gjennomsnittlig bølgehøyde for alle fire områdene er på omtrent 2 meter, med en ekstrem signifikant bølgehøyde på ca. 14 meter (100-års sjøtilstand). For enkeltbølger er det estimert en ekstrembølge på ca. 26 meter, mens ekstrem bølgekam er estimert til 15,5 m over stille vann. Dette er nivåer industrien allerede håndterer på norsk sokkel og lavere enn det som er beregnet fra Norskehavet. I likhet med for vindforholdene, så er det forventet korte og få forsinkelser som følge av bølger i Barentshavet sørøst.

Strøm

Strømanalyser er basert på modelldata fra Meteorologisk institutt for 1984 til 2012. Selv om kvalitet på modellerte strømdata ikke er på samme nivå som vind- og bølgedata, har sammenligning med målinger i Barentshavet vist at modelldataene er egnet for planlegging av leteoperasjoner. Også strømforholdene har liknende karakteristika som vest i Nordsjøen og vil derfor være forhold som industrien er vant med å operere under. Havstrømmene i Norskerenna og ved Troll-feltet er for eksempel betydelig mer dynamisk enn i Barentshavet sørøst.

Snø og ising

Tilgjengelige data for akkumulasjon av snø og ising er begrenset. Basert på tilgjengelige modeller har BaSEC likevel gjort generelle beregninger for hva som kan forventes. Erfaring fra tidligere leteoperasjoner gir en indikasjon om at vind i stor grad vil redusere mengden snø som samles på en rigg slik at også ekstreme snølaster forventes å være håndterbare. Det vil likevel være viktig for alle operatører å vurdere forebyggende tiltak som eksempelvis mekanisk eller termisk fjerning. Alle BaSEC selskaper er oppfordret til å sikre systematisk dokumentasjon av snø og isingshendelser under sine operasjoner i Barentshavet for å sikre data for etterprøving av eksisterende modeller for snø og ising.

Rapporten foretar en grundig gjennomgang av ulike former for ising, hvordan disse formene vil arte seg og påvirke en installasjon og hvilke forhold som derfor må hensyntas når man planlegger og gjennomfører en operasjon i dette havområdet. I forhold til atmosfærisk ising (f.eks. frysende regn/snø) vil dette spesielt kunne øke faren for skader fra fallende is. Is-ansamling fra sjøsprøyt vil kunne skje under bestemte klimatiske forhold knyttet til vindstyrke, vann- og lufttemperatur. Beregningen av muligheten for ising er knyttet til egenskapene til bestemte fartøy. Rapporten gir derfor anbefalinger om bruk av konstruksjonsspesifikke isingsberegninger framfor bruk av generaliserte verdier for teoretisk beregnet isingstykkelse.

Lufttemperatur

Temperaturdataene er basert på modell fra Meteorologisk Institutt og er fra perioden 1958-2014. Data er tilgjengelig både fra 2 og 30 m høydenivå og er tilgjengelige i tidsserier med 3 timers intervall mellom hver temperaturverdi. Dataene viser at svært kalde forhold kan opptre i ekstremhendelser i de nordligste blokkene. For vinteroperasjoner må temperaturer helt ned mot -30^{o}C til -34^{o}C kunne håndteres. Det er imidlertid betydelige variasjoner mellom de forskjellige blokkene som fremgår av tabellen i figur 7 under. BaSEC vil i senere rapportert foreslå konkrete måter å håndtere lave temperaturer på.

Område	Gjennomsnittstemperatur (°C)	Ekstrem minimumstemperatur (°C) (24 timer, 30 m høyde)
A	0	-34
B	1,1	-23
C	2,7	-18
D	1,3	-26

Figur 7: Gjennomsnitts- og ekstrem minimumstemperatur

Barents East blocks
Metocean Design Basis

ME2015_005

Statoil

Title:		
Barents East blocks **Metocean Design Basis**		
Document no. : **ME2015_005**	Contract no.:	Project:

Classification:	Distribution:
Restricted	**To be distributed within BaSEC companies and service providers working for BaSEC companies**
Expiry date:	Status **Final**

Distribution date:	Rev. no.:	Copy no.:
2015-11-25		

Author(s)/Source(s):	
Caroline Dezecot **Kenneth Johannessen Eik**	
Subjects: **Wind, waves, currents, temperatures and salinity** **Snow, icing, sea ice and icebergs** **Polar lows, wind chill**	
Remarks:	
Valid from:	Updated:
Responsible publisher:	Authority to approve deviations:

Techn. Responsible unit (Metocean):	Techn. responsible (Name):	Date/Signature:
TPD TEX SMT MMG MGE	Caroline Dezecot	26/11/2015 Dezecot
Techn. Responsible unit (Snow and ice):	Techn. responsible (Name):	Date/Signature:
TPD TEX SMT MMG AT	Kenneth J. Eik	25/11-2015 K.J. Eik
Recommended (Metocean):	Kenneth J. Eik	Date/Signature: 25/11-2015 K.J. Eik
Recommended (Snow and ice)	Sigurd H. Teigen	27/11-2015 Sigurd H Teigen
Approved by (Organisation unit):	Approved by (Name):	Date/Signature:
TPD TEX SMT MMG MGE	Torunn Bogenes	27/11-2015 Torunn Bogenes

Table of contents

Summary

Table 1 to Table 4 below give a summary of the estimated extreme wind, wave and currents.

Table 1 Summary of estimated extreme wind, wave and current at the Block A.

Parameter	Unit	Annual probability of exceedance			
		0.63	10^{-1}	10^{-2}	10^{-4}
Wind speed, 1hour,10 m	[m/s]	25.5	28.0	30.5	35.0
Wind speed, 10 min, 10 m	[m/s]	28.0	31.0	33.5	38.5
Significant wave height	[m]	9.8	11.8	13.8	17.5
Spectral peak period	[s]	15.0	16.5	18.0	20.9
Individual wave height	[m]	18.9	22.2	25.7	32.8
Crest height	[m]	11.3	13.4	15.5	20.0
Current speed, Surface	[cm/s]	66	73	79	90
Current speed, 70 m	[cm/s]	46	50	54	61
Current speed, 3 m a.s.b.[1]	[cm/s]	32	34	37	41

Table 2 Summary of estimated extreme wind, wave and current at the Block B.

Parameter	Unit	Annual probability of exceedance			
		0.63	10^{-1}	10^{-2}	10^{-4}
Wind speed, 1hour,10 m	[m/s]	25.5	28.0	30.5	35.0
Wind speed, 10 min, 10 m	[m/s]	28.0	31.0	33.5	38.5
Significant wave height	[m]	10.0	12.2	14.4	18.4
Spectral peak period	[s]	15.1	16.9	18.7	21.9
Individual wave height	[m]	19.6	23.1	26.7	34.3
Crest height	[m]	11.7	13.9	16.1	20.9
Current speed, Surface	[cm/s]	72	80	87	100
Current speed, 70 m	[cm/s]	53	58	63	72
Current speed, 3 m a.s.b.[2]	[cm/s]	45	50	55	63

Table 3 Summary of estimated extreme wind, wave and current at the Block C.

Parameter	Unit	Annual probability of exceedance			
		0.63	10^{-1}	10^{-2}	10^{-4}
Wind speed, 1hour,10 m	[m/s]	26.0	28.5	31.0	35.5
Wind speed, 10 min, 10 m	[m/s]	28.5	31.5	34.0	39.0
Significant wave height	[m]	10.0	12.3	14.5	18.8
Spectral peak period	[s]	14.9	16.7	18.3	21.5
Individual wave height	[m]	19.6	23.2	27.0	34.8
Crest height	[m]	11.7	14.0	16.3	21.2
Current speed, Surface	[cm/s]	76	84	91	105
Current speed, 70 m	[cm/s]	58	64	69	78
Current speed, 3 m a.s.b.	[cm/s]	52	57	62	70

[1] 250 m depth – lowest in BaSIC4 model for site A, C and D
[2] 200 m depth – lowest in BaSIC4 model for site B

Table 4 Summary of estimated extreme wind, wave and current at the Block D.

Parameter	Unit	Annual probability of exceedance			
		0.63	**10^{-1}**	**10^{-2}**	**10^{-4}**
Wind speed, 1hour,10 m	[m/s]	25.5	28.5	30.5	35.0
Wind speed, 10 min, 10 m	[m/s]	28.0	31.5	33.5	38.5
Significant wave height	[m]	9.9	12.0	14.1	18.0
Spectral peak period	[s]	15.5	16.9	14.1	22.0
Individual wave height	[m]	19.3	22.7	26.2	33.4
Crest height	[m]	11.5	13.6	15.8	20.3
Current speed, Surface	[cm/s]	63	70	76	87
Current speed, 70 m	[cm/s]	46	51	54	62
Current speed, 3 m a.s.b.	[cm/s]	37	41	44	50

1 Introduction

1.1 General

This document is only intended for use in exploration activities by the members in the "Barents Sea Exploration Collaboration" (BASEC). Even though data may form a good basis for early phase in future development projects, the content in this document shall not be applied directly in final design of offshore structures!

Metocean design basis documents prepared by Statoil do usually consist of two documents:

- Metocean Design Basis – (includes all data)
- Metocean Design Basis Guidelines report [1]

The Guideline report cannot be distributed to the BASEC members. Due to this, current document includes somewhat more guiding than an ordinary Statoil metocean design basis. Still, this document will refer to the guideline document and if there are needs for clarifications, the Statoil metocean group must be consulted.

1.2 Extremes

Extreme values are defined through their annual probabilities of exceedance here referred to as q - probability values. A q - probability value is the value corresponding to an annual probability of exceedance of q. The relationship between annual probability of exceedance, q, and return period, R, is given by:

$$q = 1 - \exp\left(-\frac{T}{R}\right) \qquad T = 1 \text{ year} \qquad (1)$$

It is seen that q = 0.63 for R = 1 year and that q is approximately 10^{-1} and 10^{-2} for R = 10 and 100 years, respectively.

1.4 Barents East blocks - Positions

The Barents East blocks announced in the 23rd licensing round are located in the Eastern part of the Norwegian Barents Sea, as shown in Figure 1-1. Four clusters are identified and defined as Block A, B, C and D. Positions representative of each area and water depth have been selected and used to compute the metocean parameters (Table 1.1). For planning of marine operations and structural analysis the exact depth should be verified.

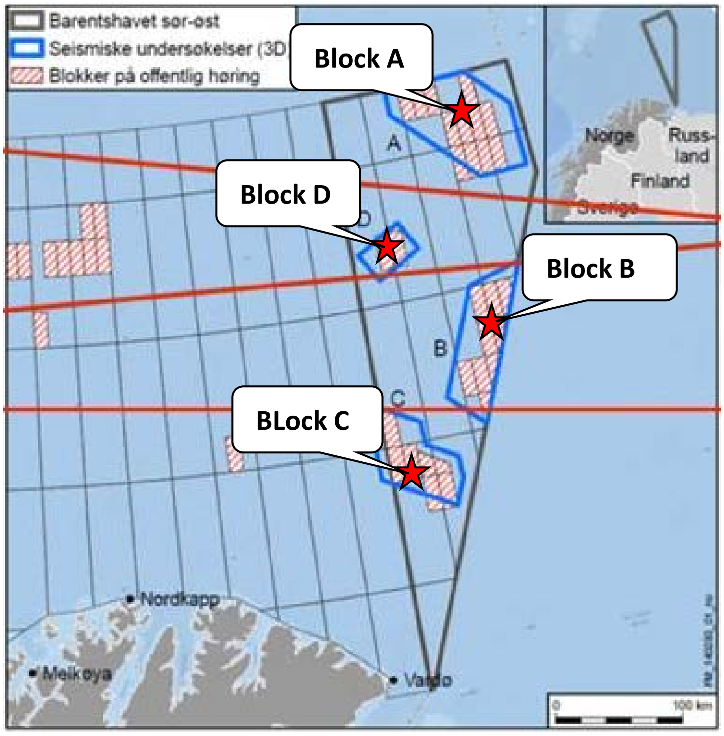


Figure 1-1 Map showing position of the Barents East blocks

Table 1-1 Positions representative for Barents East blocks and approximate water depths

Area Name	Position representative of the area	Water Depth [m]
Block A	74.00° N, 035.67° E	250
Block B	72.75° N, 035.00° E	220
Block C	71.75° N, 032.68° E	300
Block D	73.37° N, 033.00° E	230

1.5 Conventions and definitions

1.5.1 Units

Parameters and data values are (with some exceptions) given in the International System of Units (SI). Current, wind and wave directions are given in degrees [°] measured clockwise from north.

1.5.2 Directions

Wind

The wind direction, measured in degrees clockwise from north, is the direction from which the wind is blowing. Winds of direction 90° are coming from the east.

Waves

The wave direction, measured in degrees clockwise from north, is the direction from which the waves are coming. Waves of direction 90° are coming from the east.

Current

The current direction, measured in degrees clockwise from north, is the direction towards which the current is flowing. Currents of direction 90° are towards the east.

1.5.3 Seasons

Seasonal variations are given by month.

1.6 Climate change

The report “Klima i Norge 2100” [20] gives a description of the expected change in climate in Norway and surrounding waters through the 21st century.

The climate models predict little or no change in mean wind speed. The frequency of higher wind speeds is expected to increase, but this is uncertain.

The climate models predict a slight increase (about 2 %) of significant wave heights in the Barents Sea [20, p. 113].

Sea level rise due to climatic effects, e.g. thermal expansion of the oceans and melting of glaciers, is estimated to be about 0.7 m by the year 2100 [20, p. 115].

Both the thickness and the extent of the Arctic ice are expected to reduce during the 21th century. The Arctic may be free of ice during the summer from the middle of this century, but large inter-annual variations are to be expected [20, p. 70]

1.7 Methods of analysis

The Statoil recommended practice for the analysis of extreme environmental conditions affecting marine structures is given in the report “Extreme environmental conditions, Recommended practice” [7].

2 Wind

2.1 Wind data

Wind data are available from the Nora10 hindcast model operated by the Norwegian Meteorological Institute [14]. The data chosen for analysis are from 4 grid points as shown in Table 2-1 and cover the period 1958 – 2014 (57 years). The sample interval is 3 hours.

The Nora10 model has a spatial resolution of 10 km. The computed wind speed is considered to represent the 1-hour mean wind speed 10 m above sea level.

The Nora10 wind data are found to be of good quality for wind speeds up to about 15 m/s. Wind speeds higher than this are underestimated [16]. Consequently, wind speeds higher than 15 m/s have been adjusted (corrected) prior to analysis. The corrected wind speed, U_{Cor}, is computed from [27]:

$$U_{Cor} = U + p(U - U_{Min}) \qquad \text{for} \quad U \geq U_{Min} \tag{2}$$

where U is (the Nora10) wind speed, p = 0.20 and U_{Min} = 15.0 m/s.

2.2 Polar Lows

A polar low is a small and often intense low pressure phenomenon that can occur in open Arctic water. It is normally generated during situations with outbreaks of cold arctic air over sea. Energy to drive the system is provided as heat and moisture transferred from the sea and by energy transformation within the atmosphere.

Polar lows are relatively small, a few hundred kilometre in diameter (about one tenth the size of a normal low pressure system), and therefore difficult to observe.

The propagation speed of the polar low itself is normally within the range 8-14 m/s, the highest registered speeds are as high as 17 m/s. Occasionally, the polar low may be close to stationary.

In general, weather forecasts for the Barents Sea have lower skill than for the southern part of the Norwegian sector. This is partly due to lack of metocean observations and due to the small scale and rapidly changing weather phenomena. Until recent years the polar lows have been almost impossible to forecast. As images from polar orbiting satellites now are routinely transferred to forecasting centres, nowcasting and short-range forecasting have improved. However, the predictable time-scale for the simulated polar lows is still low. Forecasters tend to rely on models only for the first 12-15 hours of the forecasting range.

In the area between Northern Norway and Spitsbergen the typical annual number of polar lows is 5-10, with the highest probability of occurrence in November through March.

In a typical scenario the wind speed will increase 2 – 4 (5 – 15 m/s) levels in the Beaufort scale within a couple of hours due to the passing of a polar low. In addition, its presence will usually cause heavy snow, thunderstorms, icing and to a certain degree waves.

The strongest 10 min average wind at 10 m elevation measured during a polar low is 35 m/s. A significant wave height of 10.5m has been measured at Inner Haltenbanken, with hindcast data and synoptic charts indicating a polar low to be the sole contributor to the sea state. These events did not take place simultaneously. These field measurements reveal that present design values of wind and waves will not be changed due to polar lows.

2.3 Wind data analysis

Table 2-1 shows the NORA10 grid points used for the analysis of the 4 areas of interest in the Barents Sea.

Table 2-1 Position of Nora10 grid points for which wind data are chosen for analysis.

Area Name	NORA10 Position
Block A	73.99° N, 035.62° E
Block B	72.79° N, 034.93° E
Block C	71.79° N, 032.71° E
Block D	73.39° N, 033.00° E

2.3.1 Block A

Figure 2-1 and Figure 2-3 show the all-year and monthly wind roses from the Block A for the period 1958 – 2014. The wind rose shows the percentage of observations within each 30° sector.

Table 2-2 – Table 2-3 shows the annual directional and monthly sample distribution of non-exceedance of 1-hour mean wind speed.

Figure 2-2 shows the monthly mean and maximum 1-hour mean wind speed at Block A.

Table 2-4 – Table 2-6 show directional sample distributions of non-exceedance of 1-hour mean wind speed for each month.

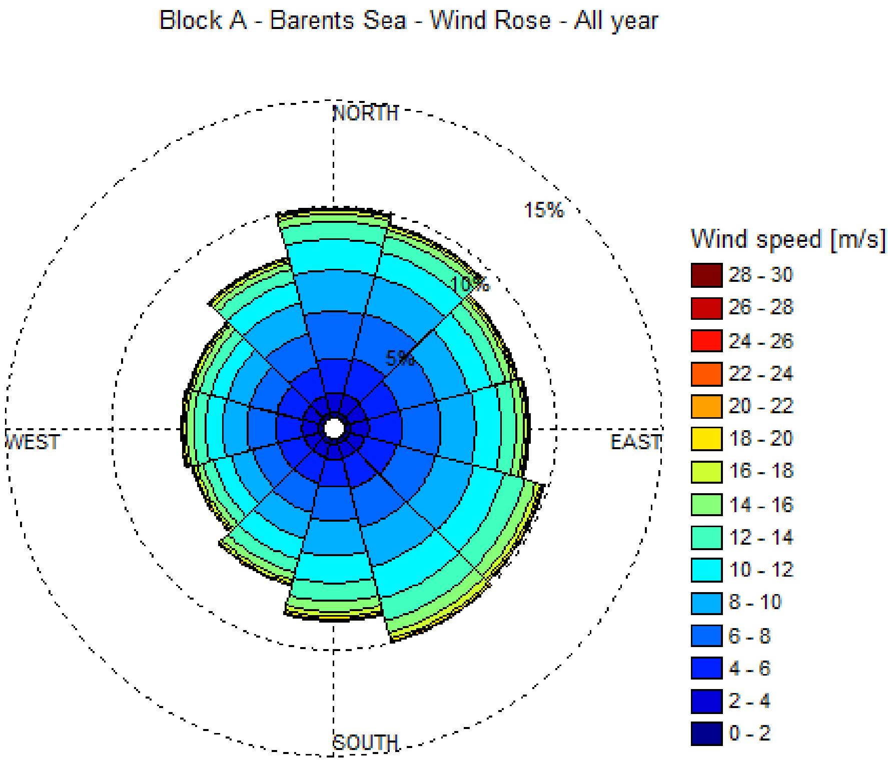


Figure 2-1 **All-year wind rose for the Block A for the period 1958 – 2014.**

Table 2-2 **Annual directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block A.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 2	0.30	0.26	0.23	0.27	0.25	0.23	0.26	0.26	0.20	0.27	0.25	0.22	**3.00**
< 4	1.17	1.21	1.11	1.15	1.03	0.95	0.99	0.92	0.95	1.03	1.04	1.08	**12.64**
< 6	2.79	2.94	2.69	2.72	2.56	2.43	2.31	2.19	2.20	2.26	2.31	2.48	**29.88**
< 8	5.02	5.12	4.50	4.55	4.46	4.36	3.91	3.63	3.44	3.63	3.62	4.09	**50.33**
< 10	6.98	6.96	6.08	6.20	6.36	6.28	5.58	4.93	4.52	4.77	4.73	5.57	**68.97**
< 12	8.43	8.17	7.21	7.41	7.79	7.84	6.89	5.95	5.34	5.58	5.51	6.59	**82.72**
< 14	9.27	8.95	7.88	8.10	8.80	8.90	7.77	6.63	5.87	6.15	6.06	7.21	**91.58**
< 16	9.65	9.30	8.20	8.47	9.34	9.49	8.24	7.00	6.17	6.47	6.37	7.50	**96.22**
< 18	9.81	9.45	8.36	8.62	9.58	9.78	8.49	7.18	6.33	6.62	6.51	7.68	**98.41**
< 20	9.88	9.51	8.44	8.69	9.69	9.92	8.62	7.25	6.39	6.70	6.59	7.76	**99.46**
< 22	9.92	9.53	8.48	8.71	9.74	9.98	8.67	7.27	6.42	6.72	6.62	7.79	**99.85**
< 24	9.93	9.54	8.48	8.72	9.76	9.99	8.69	7.28	6.42	6.73	6.64	7.80	**99.97**
< 26	9.93	9.55	8.49		9.76	9.99	8.70	7.28	6.42	6.73	6.64	7.80	**100.00**
< 28	9.93	9.55	8.49				8.70						**100.00**
< 30	9.93												**100.00**
Total	**9.93**	**9.55**	**8.49**	**8.72**	**9.76**	**9.99**	**8.70**	**7.28**	**6.42**	**6.73**	**6.64**	**7.80**	**100.00**
Mean	**8.2**	**8.0**	**8.1**	**8.1**	**8.7**	**8.9**	**8.8**	**8.3**	**8.1**	**8.0**	**8.0**	**8.1**	**8.3**
Maximum	**29.6**	**26.3**	**26.5**	**23.6**	**24.6**	**24.4**	**26.4**	**25.2**	**25.4**	**25.1**	**24.5**	**24.7**	**29.6**

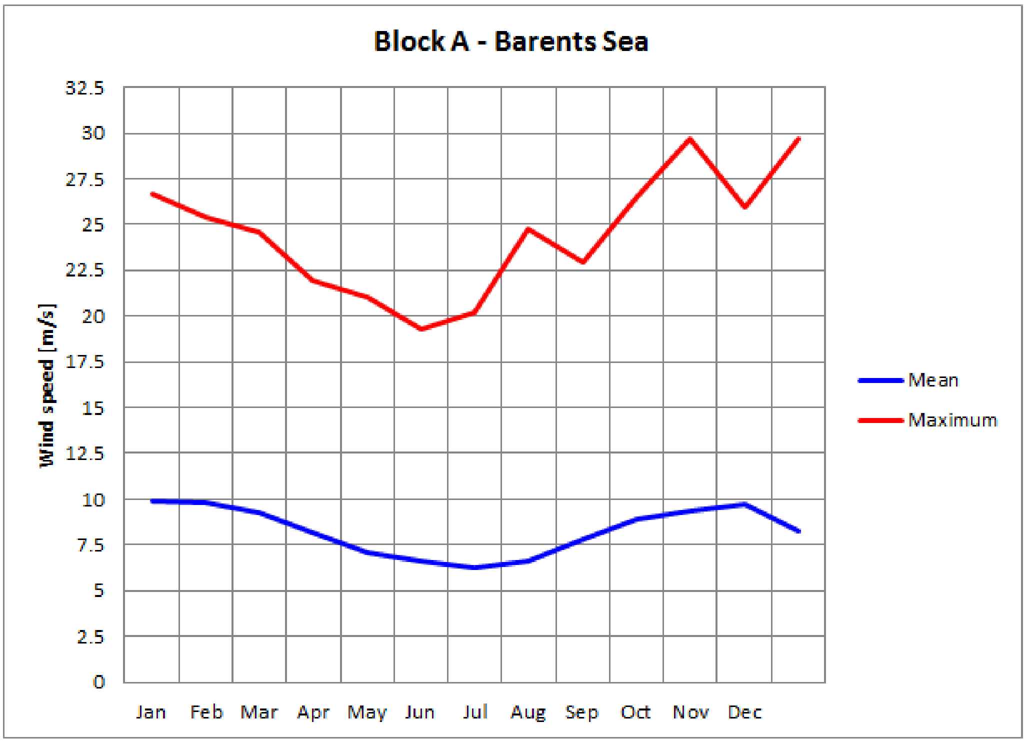


Figure 2-2 **Monthly mean and maximum 1-hour mean wind speed 10 m above sea level at the Block A.**

Table 2-3 **Monthly and annual sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block A.**

Wind [m/s]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 2	1.60	1.58	1.61	2.71	4.03	5.26	5.63	5.04	2.79	2.27	1.67	1.64	**3.00**
< 4	7.02	7.23	7.63	11.89	17.28	20.93	22.01	20.05	12.89	9.28	7.87	7.15	**12.64**
< 6	17.90	18.39	19.97	29.03	40.97	45.15	48.20	43.96	32.17	23.27	20.53	18.25	**29.88**
< 8	34.58	34.64	38.22	50.59	64.70	68.01	73.66	68.05	54.39	42.78	38.22	35.05	**50.33**
< 10	53.01	53.88	58.86	70.30	81.95	85.32	89.04	85.28	74.09	62.80	58.36	53.81	**68.97**
< 12	71.01	70.69	76.15	84.23	91.83	94.78	96.47	94.34	87.04	78.81	75.23	71.28	**82.72**
< 14	84.27	83.78	88.02	93.04	96.84	98.65	99.01	98.44	94.80	89.25	87.35	85.07	**91.58**
< 16	91.84	92.29	94.94	97.21	99.04	99.74	99.79	99.62	98.12	95.00	94.25	92.56	**96.22**
< 18	95.78	96.48	98.22	99.18	99.80	99.93	99.94	99.89	99.50	98.03	97.45	96.58	**98.41**
< 20	98.13	98.89	99.54	99.82	99.96	100.00	99.99	99.95	99.93	99.41	99.01	98.83	**99.46**
< 22	99.41	99.67	99.92	100.00	100.00		100.00	99.97	99.98	99.89	99.69	99.72	**99.85**
< 24	99.88	99.91	99.99					99.99	100.00	99.96	99.96	99.96	**99.97**
< 26	99.98	100.00	100.00					100.00		99.98	99.99	100.00	**100.00**
< 28	100.00									100.00	99.99		**100.00**
< 30											100.00		**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**9.9**	**9.8**	**9.3**	**8.2**	**7.0**	**6.6**	**6.3**	**6.7**	**7.8**	**8.9**	**9.4**	**9.8**	**8.3**
Maximum	**26.6**	**25.4**	**24.6**	**22.0**	**21.0**	**19.3**	**20.2**	**24.7**	**22.9**	**26.5**	**29.6**	**25.9**	**29.6**

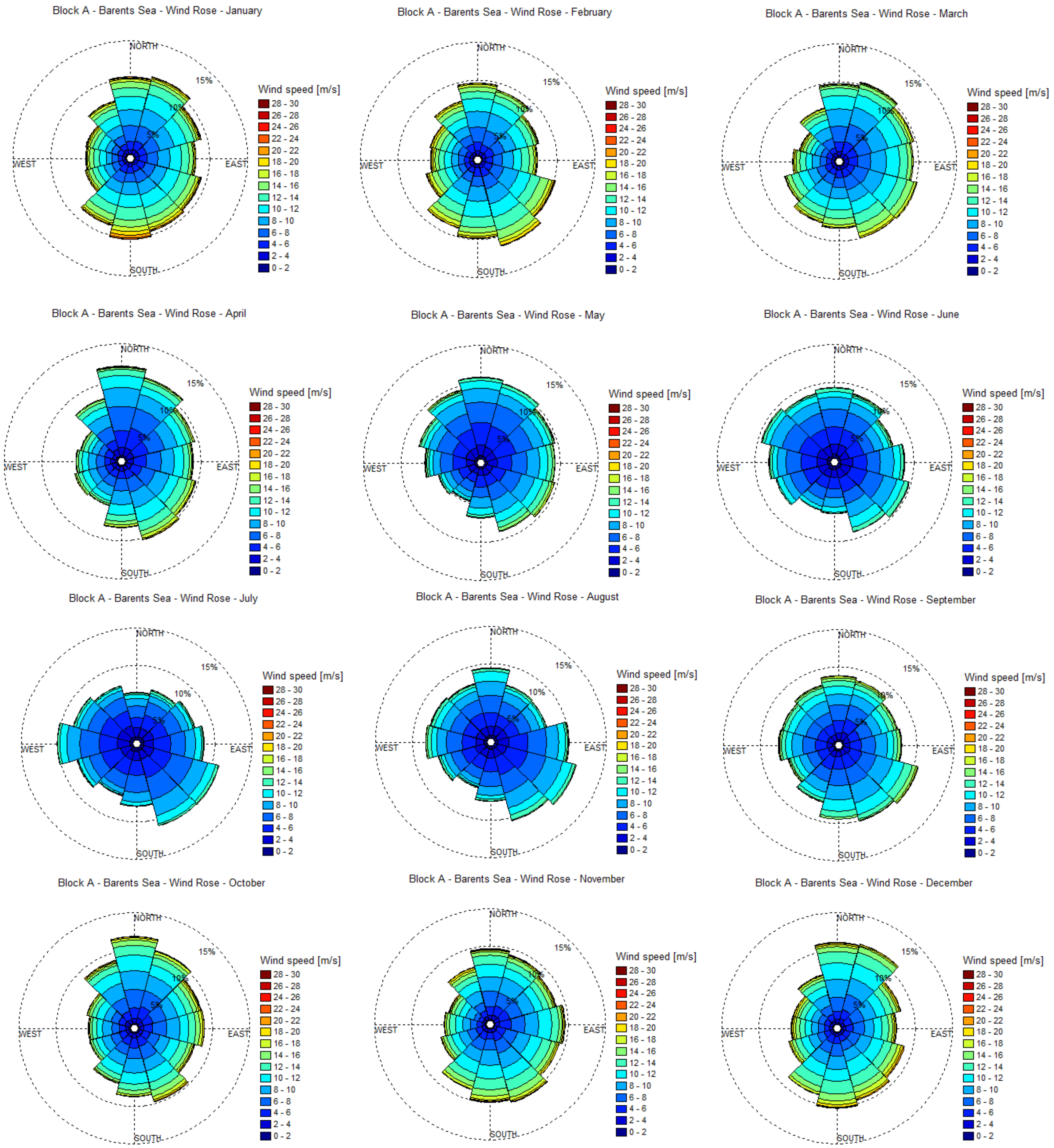


Figure 2-3 **Monthly wind roses for the Block A.**

Table 2-4 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months January – April at the Block A.**

Wind [m/s]	Wind direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
Month: January													
< 5	1.01	1.20	1.19	1.10	1.03	0.68	0.98	0.93	0.76	0.79	0.94	1.10	**11.70**
< 10	5.88	6.28	5.64	4.79	4.56	4.46	4.22	4.47	3.06	2.66	2.97	4.02	**53.01**
< 15	9.22	9.85	8.62	7.71	8.22	8.07	8.01	7.94	4.82	4.62	4.90	6.60	**88.60**
< 20	9.99	10.51	9.18	8.21	9.13	9.15	9.56	8.89	5.49	5.28	5.51	7.22	**98.13**
< 25	10.15	10.61	9.34	8.23	9.30	9.35	10.10	9.01	5.57	5.36	5.63	7.29	**99.96**
< 30	10.16						10.12	9.02					**100.00**
Total	**0.85**	**0.88**	**0.78**	**0.69**	**0.78**	**0.78**	**0.84**	**0.75**	**0.46**	**0.45**	**0.47**	**0.61**	**8.33**
Mean	**9.6**	**9.3**	**9.3**	**9.2**	**10.1**	**10.4**	**11.2**	**10.0**	**9.8**	**10.0**	**9.7**	**9.5**	**9.9**
Maximum	**26.6**	**24.5**	**24.7**	**21.7**	**23.6**	**24.4**	**26.4**	**25.2**	**21.5**	**24.8**	**23.4**	**24.7**	**26.6**
Month: February													
< 5	1.23	1.12	1.06	1.00	0.99	1.08	0.98	0.86	0.89	0.86	0.87	1.08	**12.00**
< 10	5.89	5.94	4.84	4.24	5.09	5.57	5.09	4.19	3.04	2.90	3.07	4.04	**53.88**
< 15	8.82	8.79	7.48	6.67	8.68	9.81	9.01	7.62	5.51	4.84	5.07	6.56	**88.87**
< 20	9.57	9.18	7.89	7.32	9.82	11.14	9.95	8.73	6.49	5.54	5.93	7.31	**98.89**
< 25	9.62	9.19	7.93	7.38	10.04	11.24	10.02	8.81	6.64	5.67	6.05	7.38	**99.98**
< 30	9.63								6.65	5.68			**100.00**
Total	**0.80**	**0.77**	**0.66**	**0.61**	**0.84**	**0.94**	**0.84**	**0.73**	**0.55**	**0.47**	**0.50**	**0.62**	**8.33**
Mean	**9.2**	**8.9**	**9.0**	**9.5**	**10.3**	**10.2**	**9.9**	**10.4**	**10.5**	**10.0**	**10.2**	**9.7**	**9.8**
Maximum	**25.4**	**24.5**	**21.8**	**23.4**	**24.6**	**23.6**	**22.2**	**22.3**	**25.4**	**25.1**	**24.4**	**23.3**	**25.4**
Month: March													
< 5	1.45	1.31	1.38	1.28	1.11	0.98	0.99	0.83	0.91	0.87	0.93	0.98	**13.03**
< 10	6.44	6.88	6.30	5.69	5.62	5.04	4.53	4.39	3.77	3.16	2.94	4.10	**58.86**
< 15	9.38	9.80	9.15	8.78	9.18	8.87	7.65	7.32	6.38	5.11	4.39	6.05	**92.08**
< 20	9.75	10.26	9.74	9.21	10.08	10.00	8.40	8.00	6.87	5.70	4.90	6.61	**99.54**
< 25	9.78	10.33	9.78	9.22	10.09	10.05	8.43	8.02	6.93	5.75	4.98	6.64	**100.00**
Total	**0.81**	**0.86**	**0.81**	**0.77**	**0.84**	**0.84**	**0.70**	**0.67**	**0.58**	**0.48**	**0.42**	**0.55**	**8.33**
Mean	**8.6**	**8.8**	**8.9**	**8.9**	**9.6**	**10.0**	**9.7**	**9.7**	**9.5**	**9.7**	**9.4**	**9.2**	**9.3**
Maximum	**23.4**	**24.6**	**24.4**	**22.0**	**20.3**	**22.0**	**21.1**	**21.4**	**23.4**	**20.5**	**22.2**	**20.6**	**24.6**
Month: April													
< 5	2.28	2.53	2.16	1.91	1.51	1.27	1.35	1.15	1.26	1.30	1.24	1.73	**19.70**
< 10	9.23	8.77	7.08	6.62	6.07	5.86	5.26	4.21	3.90	3.86	3.56	5.87	**70.30**
< 15	11.84	10.83	9.04	8.85	8.90	9.39	7.76	5.45	5.51	5.34	4.91	7.82	**95.64**
< 20	12.06	11.05	9.36	9.12	9.52	10.18	8.35	5.64	5.82	5.53	5.12	8.06	**99.82**
< 25	12.07	11.06		9.14	9.57	10.27					5.13		**100.00**
Total	**1.01**	**0.92**	**0.78**	**0.76**	**0.80**	**0.86**	**0.70**	**0.47**	**0.48**	**0.46**	**0.43**	**0.67**	**8.33**
Mean	**7.8**	**7.4**	**7.7**	**8.0**	**8.9**	**9.5**	**8.9**	**7.9**	**8.3**	**7.9**	**8.1**	**7.9**	**8.2**
Maximum	**20.4**	**21.7**	**19.4**	**20.9**	**21.4**	**22.0**	**19.3**	**18.4**	**19.0**	**19.4**	**20.3**	**19.8**	**22.0**

Table 2-5 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months May – June at the Block A.**

Wind [m/s]	Wind direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
Month: May													
< 5	3.41	2.95	2.89	2.66	2.05	1.95	1.91	1.51	1.85	2.25	2.37	2.79	**28.59**
< 10	9.27	9.10	8.16	7.29	6.96	6.52	5.48	4.32	4.49	5.81	6.63	7.92	**81.95**
< 15	10.76	10.43	9.48	9.19	9.25	8.69	6.77	4.85	5.23	6.71	7.82	9.19	**98.35**
< 20	10.77	10.47	9.61	9.30	9.68	8.95	6.82	4.89	5.31	6.87	7.93	9.37	**99.96**
< 25			9.62		9.68				5.32			9.38	**100.00**
Total	**0.90**	**0.87**	**0.80**	**0.77**	**0.81**	**0.75**	**0.57**	**0.41**	**0.44**	**0.57**	**0.66**	**0.78**	**8.33**
Mean	**6.6**	**6.6**	**6.8**	**7.2**	**8.1**	**8.0**	**7.1**	**6.5**	**6.6**	**6.7**	**6.8**	**6.9**	**7.0**
Maximum	**16.1**	**15.6**	**20.6**	**17.6**	**20.0**	**19.1**	**16.9**	**19.8**	**21.0**	**18.8**	**19.4**	**20.0**	**21.0**
Month: June													
< 5	2.91	2.92	2.53	2.96	2.80	2.69	2.27	2.38	2.59	2.90	3.25	2.79	**32.99**
< 10	8.06	7.70	6.20	7.35	8.21	6.99	5.50	5.60	6.51	7.09	8.32	7.81	**85.32**
< 15	9.36	8.72	7.34	8.72	9.82	9.04	6.39	6.15	7.38	8.17	9.39	8.82	**99.29**
< 20	9.38	8.89	7.50	8.77	9.88	9.05	6.42	6.15		8.23	9.43	8.93	**100.00**
Total	**0.78**	**0.74**	**0.62**	**0.73**	**0.82**	**0.75**	**0.53**	**0.51**	**0.61**	**0.69**	**0.79**	**0.74**	**8.33**
Mean	**6.6**	**6.6**	**6.8**	**6.8**	**6.9**	**7.2**	**6.4**	**5.9**	**6.3**	**6.4**	**6.5**	**6.6**	**6.6**
Maximum	**16.4**	**18.8**	**19.3**	**18.6**	**15.7**	**16.3**	**16.0**	**15.1**	**14.4**	**17.4**	**17.2**	**16.3**	**19.3**
Month: July													
< 5	2.43	2.55	2.87	2.96	2.85	2.68	2.73	2.77	2.91	3.38	3.34	3.01	**34.47**
< 10	5.61	6.19	6.69	7.49	9.15	9.59	7.51	6.44	6.95	8.97	7.51	6.93	**89.04**
< 15	6.39	6.95	7.48	8.59	10.72	10.99	8.10	6.75	7.58	10.20	8.28	7.54	**99.57**
< 20	6.43	7.01	7.51	8.64	10.75	10.99	8.11	6.77	7.63	10.24	8.33	7.58	**99.99**
< 25										10.25			**100.00**
Total	**0.54**	**0.58**	**0.63**	**0.72**	**0.90**	**0.92**	**0.68**	**0.56**	**0.64**	**0.85**	**0.69**	**0.63**	**8.33**
Mean	**6.3**	**6.3**	**6.1**	**6.4**	**6.8**	**6.8**	**6.1**	**5.6**	**6.0**	**6.5**	**6.0**	**5.9**	**6.3**
Maximum	**18.8**	**17.9**	**17.4**	**17.0**	**15.8**	**14.3**	**15.8**	**16.6**	**17.0**	**20.2**	**19.1**	**19.4**	**20.2**
Month: August													
< 5	2.58	2.44	2.56	3.20	3.12	2.76	2.58	2.43	2.67	2.32	2.38	2.48	**31.53**
< 10	7.73	6.61	6.20	8.58	9.47	8.69	6.78	5.45	5.91	6.81	6.49	6.56	**85.28**
< 15	9.48	7.53	7.07	9.84	11.31	10.43	7.61	5.86	6.70	8.18	7.82	7.51	**99.34**
< 20	9.52	7.55	7.08	9.93	11.36	10.48	7.61	5.89	6.78	8.26	7.91	7.57	**99.95**
< 25												7.62	**100.00**
Total	**0.79**	**0.63**	**0.59**	**0.83**	**0.95**	**0.87**	**0.63**	**0.49**	**0.57**	**0.69**	**0.66**	**0.63**	**8.33**
Mean	**7.1**	**6.5**	**6.3**	**6.5**	**7.0**	**7.1**	**6.3**	**5.9**	**6.2**	**7.0**	**6.9**	**6.6**	**6.7**
Maximum	**16.7**	**15.6**	**15.2**	**18.1**	**17.0**	**17.6**	**14.8**	**18.6**	**17.8**	**18.2**	**18.6**	**24.7**	**24.7**

Table 2-6 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months September – December at the Block A.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: September													
< 5	2.01	2.20	1.71	1.67	1.83	1.81	1.90	1.85	1.64	1.68	1.73	1.70	**21.73**
< 10	6.40	6.52	5.54	6.02	7.11	7.47	7.00	5.99	5.08	5.76	5.58	5.61	**74.09**
< 15	8.58	8.08	7.51	7.55	10.00	9.90	9.50	7.41	6.39	7.28	7.21	7.48	**96.88**
< 20	8.97	8.41	7.79	7.91	10.50	10.07	9.55	7.46	6.60	7.55	7.40	7.74	**99.93**
< 25	8.99				10.53							7.75	**100.00**
Total	**0.75**	**0.70**	**0.65**	**0.66**	**0.88**	**0.84**	**0.80**	**0.62**	**0.55**	**0.63**	**0.62**	**0.65**	**8.33**
Mean	**8.0**	**7.5**	**8.0**	**7.8**	**8.5**	**8.0**	**7.8**	**7.2**	**7.5**	**7.6**	**7.7**	**8.0**	**7.8**
Maximum	**21.1**	**18.5**	**18.7**	**19.9**	**22.9**	**19.9**	**16.1**	**18.7**	**19.0**	**19.7**	**18.8**	**21.0**	**22.9**
Month: October													
< 5	**< 5**	1.44	1.68	1.32	1.20	1.20	1.25	1.37	1.28	1.03	1.10	1.23	1.30
< 10	**< 10**	7.21	6.99	5.49	5.68	4.49	5.42	5.55	4.69	4.03	3.87	3.71	5.67
< 15	**< 15**	10.99	9.82	7.97	8.14	7.28	8.55	8.19	6.96	5.49	5.51	5.60	8.28
< 20	**< 20**	11.75	10.41	8.69	8.88	7.84	9.54	8.78	7.27	5.77	5.77	6.01	8.69
< 25	**< 25**	11.81	10.47	8.78	8.91	7.92	9.64	8.79		5.78		6.03	8.78
< 30	**< 30**		10.48	8.81									
Total	**Total**	**0.98**	**0.87**	**0.73**	**0.74**	**0.66**	**0.80**	**0.73**	**0.61**	**0.48**	**0.48**	**0.50**	**0.73**
Mean	**Mean**	**9.2**	**8.6**	**9.2**	**9.1**	**9.3**	**9.6**	**8.8**	**8.6**	**8.3**	**8.5**	**8.7**	**8.9**
Maximum	**Maximum**	**22.6**	**26.3**	**26.5**	**22.9**	**22.0**	**22.2**	**20.2**	**19.4**	**21.4**	**19.8**	**23.6**	**21.2**
Month: November													
< 5	1.32	1.40	1.54	1.56	1.10	1.10	0.92	1.06	0.96	0.90	0.75	0.96	**13.57**
< 10	5.99	6.02	5.72	6.03	5.19	5.59	5.01	4.72	3.88	3.22	2.85	4.11	**58.36**
< 15	9.19	8.63	8.01	9.04	8.43	9.24	8.86	7.88	5.77	5.20	4.69	6.58	**91.54**
< 20	9.58	9.14	8.55	9.52	9.11	10.26	9.88	8.63	6.28	5.69	5.08	7.30	**99.01**
< 25	9.66	9.25	8.65	9.61	9.14	10.37	10.02	8.65	6.33	5.70	5.21	7.38	**99.97**
< 30	9.69	9.25											**100.00**
Total	**0.81**	**0.77**	**0.72**	**0.80**	**0.76**	**0.86**	**0.84**	**0.72**	**0.53**	**0.48**	**0.43**	**0.61**	**8.33**
Mean	**9.0**	**9.0**	**8.8**	**8.8**	**9.5**	**9.8**	**10.2**	**9.5**	**9.1**	**9.2**	**9.7**	**9.7**	**9.4**
Maximum	**29.6**	**25.4**	**22.4**	**22.4**	**22.7**	**22.6**	**22.8**	**21.2**	**21.5**	**21.4**	**24.5**	**22.1**	**29.6**
Month: December													
< 5	1.14	1.39	1.14	1.15	0.83	0.92	1.01	0.96	0.90	0.86	0.83	1.08	**12.20**
< 10	6.00	6.52	5.04	4.48	4.36	4.10	5.02	4.58	3.56	2.94	3.08	4.12	**53.81**
< 15	10.02	10.60	7.73	6.78	7.64	8.13	8.81	8.11	5.68	4.88	4.87	6.27	**89.52**
< 20	10.82	11.24	8.35	7.42	8.65	9.33	10.07	8.81	6.28	5.60	5.50	6.76	**98.83**
< 25	10.95	11.28	8.45	7.49	8.85	9.49	10.21	8.83	6.30	5.74	5.58	6.83	**99.99**
< 30							10.22						**100.00**
Total	**0.91**	**0.94**	**0.70**	**0.62**	**0.74**	**0.79**	**0.85**	**0.74**	**0.52**	**0.48**	**0.47**	**0.57**	**8.33**
Mean	**9.7**	**9.3**	**9.4**	**9.3**	**10.3**	**10.6**	**10.3**	**9.7**	**9.5**	**10.0**	**9.7**	**9.2**	**9.8**
Maximum	**23.4**	**21.5**	**23.2**	**23.6**	**22.4**	**22.6**	**25.9**	**23.0**	**22.1**	**24.5**	**22.9**	**22.7**	**25.9**

2.3.2 Block B

Figure 2-4 and Figure 2-6 show the all-year and monthly wind roses from the Block B for the period 1958 – 2014. The wind rose shows the percentage of observations within each 30° sector.

Table 2-7 – Table 2-8 shows the annual directional and monthly sample distribution of non-exceedance of 1-hour mean wind speed.

Figure 2-5 shows the monthly mean and maximum 1-hour mean wind speed at Block B.

Table 2-9 – Table 2-11 show directional sample distributions of non-exceedance of 1-hour mean wind speed for each month.

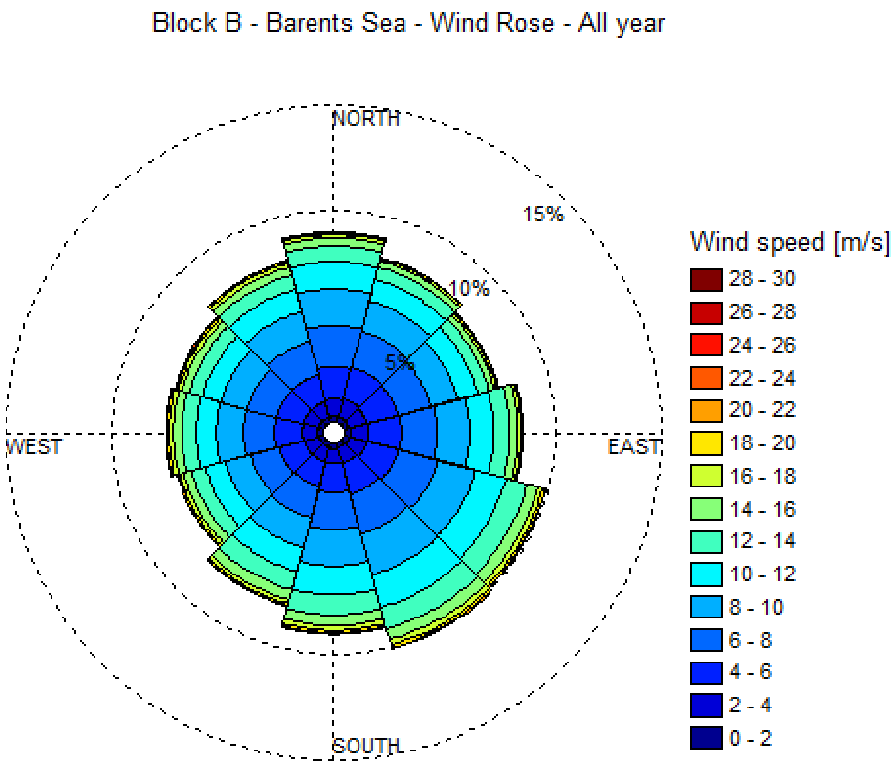


Figure 2-4 **All-year wind rose for the Block B for the period 1958 – 2014.**

Table 2-7 **Annual directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block B.**

Wind [m/s]	Wind direction											Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 2	0.26	0.26	0.23	0.30	0.25	0.21	0.25	0.22	0.22	0.27	0.26	0.25	**2.98**
< 4	1.10	1.15	1.11	1.18	1.12	0.99	0.98	0.94	0.95	1.02	1.03	1.02	**12.59**
< 6	2.64	2.69	2.64	2.67	2.66	2.52	2.34	2.14	2.19	2.31	2.31	2.34	**29.45**
< 8	4.55	4.43	4.27	4.40	4.59	4.47	4.12	3.69	3.56	3.78	3.77	3.95	**49.58**
< 10	6.29	5.94	5.60	5.92	6.41	6.48	5.87	5.15	4.79	5.06	5.04	5.39	**67.95**
< 12	7.57	6.99	6.56	7.05	7.90	8.08	7.24	6.35	5.76	6.01	5.97	6.47	**81.97**
< 14	8.32	7.61	7.11	7.79	8.92	9.13	8.22	7.25	6.45	6.70	6.61	7.16	**91.27**
< 16	8.72	7.91	7.39	8.15	9.45	9.66	8.70	7.72	6.84	7.10	6.97	7.56	**96.16**
< 18	8.87	8.01	7.49	8.31	9.69	9.93	8.95	7.92	7.02	7.30	7.16	7.75	**98.40**
< 20	8.95	8.06	7.56	8.37	9.79	10.06	9.06	8.00	7.10	7.40	7.26	7.84	**99.44**
< 22	8.97	8.07	7.59	8.39	9.83	10.12	9.11	8.02	7.13	7.44	7.31	7.87	**99.85**
< 24	8.99	8.08	7.59	8.40	9.84	10.12	9.13	8.03	7.14	7.45	7.33	7.88	**99.97**
< 26	8.99	8.08	7.59	8.40	9.85	10.12	9.13	8.03	7.14	7.46	7.33	7.88	**100.00**
< 28	8.99								7.14		7.33	7.88	**100.00**
< 30	8.99												**100.00**
Total	**8.99**	**8.08**	**7.59**	**8.40**	**9.85**	**10.12**	**9.13**	**8.03**	**7.14**	**7.46**	**7.33**	**7.88**	**100.00**
Mean	**8.2**	**7.8**	**7.8**	**8.1**	**8.6**	**8.8**	**8.8**	**8.7**	**8.4**	**8.4**	**8.3**	**8.3**	**8.4**
Maximum	**29.6**	**25.9**	**25.1**	**24.7**	**25.1**	**24.0**	**25.3**	**25.0**	**26.3**	**25.6**	**26.8**	**26.4**	**29.6**

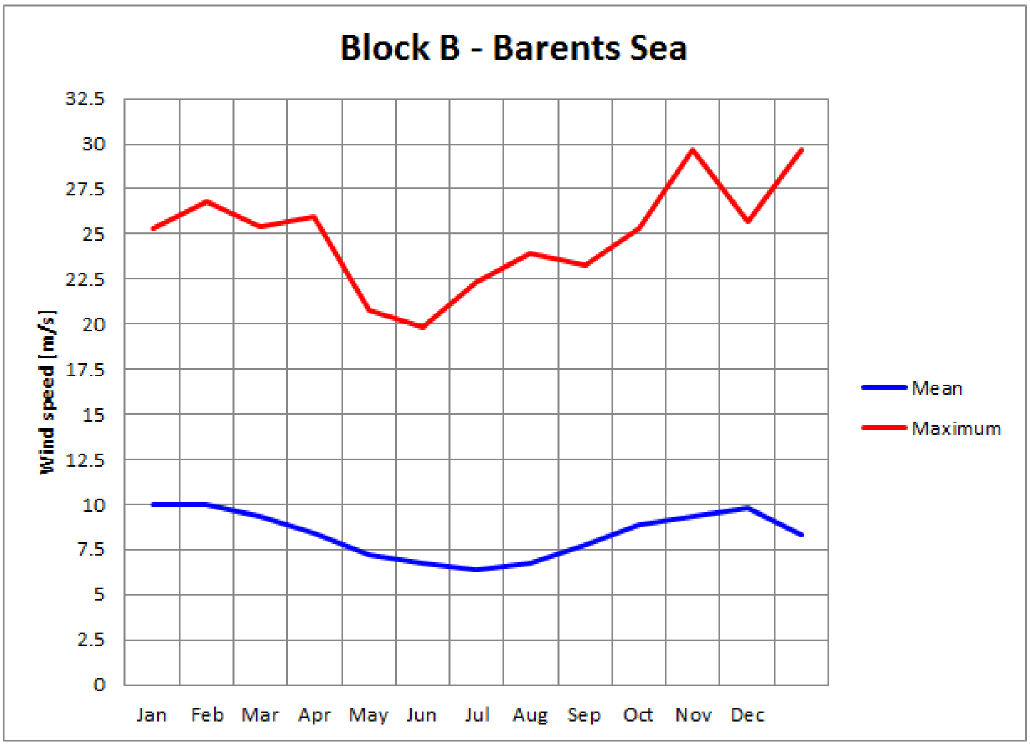


Figure 2-5 **Monthly mean and maximum 1-hour mean wind speed 10 m above sea level at the Block B.**

Table 2-8 **Monthly and annual sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block B.**

Wind	Month												Year
[m/s]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 2	1.58	1.49	1.75	2.43	3.73	5.20	5.60	4.59	3.47	2.22	1.94	1.66	**2.98**
< 4	7.34	6.79	8.26	11.26	16.11	20.16	21.92	19.13	13.67	10.17	8.46	7.41	**12.59**
< 6	18.21	17.74	21.15	26.92	38.92	43.16	46.99	43.00	32.37	24.21	21.43	18.48	**29.45**
< 8	33.76	33.47	38.87	47.94	62.22	66.70	72.30	67.31	54.58	43.30	38.86	34.49	**49.58**
< 10	52.04	51.89	57.93	67.77	79.56	84.62	88.37	84.39	74.36	61.98	58.16	53.27	**67.95**
< 12	69.38	68.70	75.04	83.12	90.56	94.30	96.25	93.91	87.86	78.27	74.88	70.56	**81.97**
< 14	83.01	83.15	87.56	92.39	96.68	98.44	99.01	98.20	95.02	89.08	87.80	84.47	**91.27**
< 16	91.06	91.91	94.86	97.16	99.12	99.75	99.75	99.65	98.05	95.18	94.24	92.96	**96.16**
< 18	95.51	96.34	98.25	99.10	99.79	99.98	99.92	99.87	99.39	98.11	97.42	96.98	**98.40**
< 20	97.98	98.68	99.43	99.85	99.98	100.00	99.98	99.94	99.88	99.60	99.04	98.92	**99.44**
< 22	99.42	99.60	99.89	99.99	100.00		99.99	99.96	99.99	99.91	99.70	99.73	**99.85**
< 24	99.90	99.84	99.96	99.99			100.00	100.00	100.00	99.98	99.95	99.96	**99.97**
< 26	100.00	99.98	100.00	100.00						100.00	99.99	100.00	**100.00**
< 28		100.00									99.99		**100.00**
< 30											100.00		**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**10.0**	**10.0**	**9.3**	**8.4**	**7.2**	**6.7**	**6.4**	**6.8**	**7.8**	**8.9**	**9.3**	**9.8**	**8.4**
Maximum	**25.3**	**26.8**	**25.4**	**25.9**	**20.8**	**19.8**	**22.3**	**23.9**	**23.3**	**25.3**	**29.6**	**25.7**	**29.6**

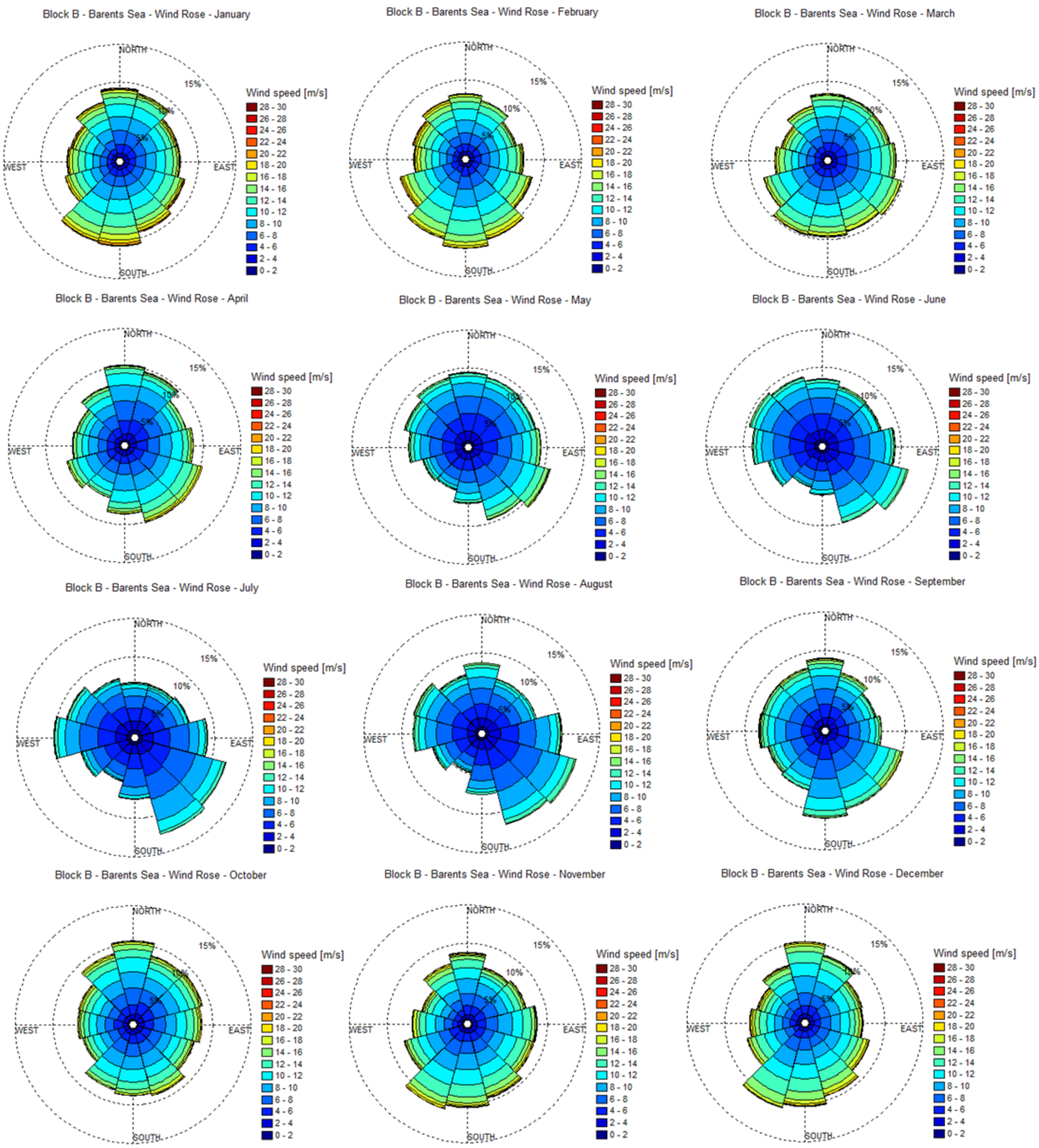


Figure 2-6 Monthly wind roses for the Block B.

Table 2-9 Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months January – April at the Block B.

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: January													
< 5	1.08	1.22	1.26	1.08	1.05	1.00	1.05	0.96	0.96	0.88	0.82	0.83	**12.17**
< 10	5.45	5.48	4.79	4.38	4.34	4.32	4.58	4.87	3.61	3.08	3.21	3.93	**52.04**
< 15	8.37	8.32	7.01	6.88	7.70	7.92	8.74	9.08	6.15	5.48	5.33	6.75	**87.73**
< 20	9.10	8.77	7.50	7.49	8.42	8.98	10.28	10.41	7.10	6.36	6.06	7.52	**97.98**
< 25	9.27	8.85	7.65	7.56	8.62	9.18	10.67	10.58	7.18	6.48	6.30	7.64	**99.97**
< 30	9.27						10.68			6.49		7.65	**100.00**
Total	**0.77**	**0.74**	**0.64**	**0.63**	**0.72**	**0.77**	**0.89**	**0.88**	**0.60**	**0.54**	**0.52**	**0.64**	**8.33**
Mean	**9.5**	**9.0**	**9.1**	**9.3**	**10.0**	**10.3**	**11.0**	**10.5**	**10.1**	**10.3**	**10.2**	**10.1**	**10.0**
Maximum	**25.1**	**23.4**	**24.4**	**22.6**	**23.4**	**23.9**	**25.3**	**25.0**	**22.4**	**25.3**	**24.2**	**25.3**	**25.3**
Month: February													
< 5	0.95	1.05	1.04	1.03	0.97	1.02	0.94	0.85	0.91	0.83	0.83	0.95	**11.37**
< 10	4.70	4.57	3.99	4.05	4.39	5.22	5.98	4.71	4.03	3.02	3.31	3.93	**51.89**
< 15	7.47	7.22	6.13	6.70	7.64	9.09	10.19	9.20	7.16	5.28	5.70	6.55	**88.33**
< 20	8.16	7.56	6.50	7.19	8.56	10.31	11.38	10.37	8.29	6.36	6.58	7.41	**98.68**
< 25	8.21	7.57	6.53	7.24	8.70	10.43	11.46	10.44	8.49	6.51	6.79	7.56	**99.95**
< 30					8.71				8.50	6.52	6.81	7.57	**100.00**
Total	**0.68**	**0.63**	**0.54**	**0.60**	**0.73**	**0.87**	**0.95**	**0.87**	**0.71**	**0.54**	**0.57**	**0.63**	**8.33**
Mean	**9.5**	**9.0**	**8.8**	**9.4**	**10.2**	**10.2**	**10.0**	**10.5**	**10.5**	**10.6**	**10.4**	**10.0**	**10.0**
Maximum	**24.4**	**20.2**	**20.3**	**22.8**	**25.1**	**24.0**	**21.6**	**25.0**	**26.3**	**25.6**	**26.8**	**26.4**	**26.8**
Month: March													
< 5	1.31	1.35	1.31	1.25	1.39	1.19	1.08	1.07	1.06	0.80	0.89	1.11	**13.80**
< 10	5.30	5.62	5.45	5.33	5.57	4.66	5.32	5.21	4.52	3.41	3.28	4.27	**57.93**
< 15	7.91	8.04	7.68	8.20	9.02	8.20	8.79	9.10	7.67	5.79	5.17	6.37	**91.92**
< 20	8.27	8.33	8.11	8.59	9.76	9.20	9.68	9.77	8.35	6.49	5.91	6.99	**99.43**
< 25	8.30	8.39	8.15	8.60	9.78	9.27	9.75	9.80	8.39	6.56	6.00	7.01	**99.99**
< 30	8.31		8.16										**100.00**
Total	**0.69**	**0.70**	**0.68**	**0.72**	**0.81**	**0.77**	**0.81**	**0.82**	**0.70**	**0.55**	**0.50**	**0.58**	**8.33**
Mean	**8.8**	**8.6**	**8.6**	**8.9**	**9.3**	**9.9**	**9.7**	**9.6**	**9.5**	**10.0**	**9.9**	**9.1**	**9.3**
Maximum	**25.4**	**24.4**	**25.1**	**20.6**	**20.4**	**22.0**	**21.6**	**20.9**	**21.5**	**24.1**	**22.3**	**21.2**	**25.4**
Month: April													
< 5	1.78	2.06	1.90	1.89	1.49	1.29	1.27	1.21	1.38	1.23	1.34	1.30	**18.14**
< 10	7.52	7.69	6.13	5.84	5.82	5.73	5.50	4.78	4.89	4.36	4.40	5.10	**67.77**
< 15	9.98	9.46	7.75	8.27	9.35	9.34	8.14	6.59	6.99	6.18	5.99	7.25	**95.28**
< 20	10.18	9.73	7.98	8.69	10.15	10.07	8.63	6.74	7.43	6.54	6.22	7.50	**99.85**
< 25	10.20	9.74			10.15	10.17	8.63				6.23		**99.99**
< 30		9.74											**100.00**
Total	**0.85**	**0.81**	**0.66**	**0.72**	**0.85**	**0.85**	**0.72**	**0.56**	**0.62**	**0.55**	**0.52**	**0.62**	**8.33**
Mean	**8.0**	**7.6**	**7.5**	**8.3**	**9.3**	**9.4**	**8.9**	**8.1**	**8.5**	**8.4**	**8.1**	**8.4**	**8.4**
Maximum	**20.6**	**25.9**	**18.7**	**18.8**	**21.6**	**22.2**	**20.2**	**17.6**	**19.6**	**19.9**	**20.4**	**19.6**	**25.9**

Table 2-10 Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months May – August at the Block B.

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: May													
< 5	2.67	2.67	2.57	2.37	2.12	1.75	1.80	1.84	1.75	2.08	2.31	2.47	**26.41**
< 10	7.95	7.76	7.51	6.81	7.28	6.83	5.63	4.89	4.73	6.02	6.83	7.32	**79.56**
< 15	9.30	9.07	8.84	8.93	10.43	9.33	7.05	5.45	5.54	7.32	8.21	8.86	**98.33**
< 20	9.36	9.08	8.96	9.13	10.80	9.59	7.10	5.46	5.65	7.48	8.38	8.99	**99.98**
< 25					10.82								**100.00**
Total	**0.78**	**0.76**	**0.75**	**0.76**	**0.90**	**0.80**	**0.59**	**0.46**	**0.47**	**0.62**	**0.70**	**0.75**	**8.33**
Mean	**6.8**	**6.6**	**6.7**	**7.5**	**8.3**	**8.2**	**7.2**	**6.3**	**6.8**	**7.1**	**7.1**	**7.1**	**7.2**
Maximum	**18.2**	**17.3**	**18.4**	**18.4**	**20.8**	**18.7**	**16.8**	**16.8**	**19.1**	**18.6**	**18.6**	**18.7**	**20.8**
Month: June													
< 5	2.87	2.56	2.60	2.54	3.08	2.61	2.05	2.00	2.59	2.89	2.88	2.81	**31.48**
< 10	7.22	6.70	6.43	7.91	8.89	7.88	5.30	4.75	6.07	7.62	8.05	7.79	**84.62**
< 15	8.39	7.76	7.50	9.15	11.14	10.16	5.99	5.11	6.76	8.83	9.42	9.09	**99.31**
< 20	8.44	7.88	7.57	9.25	11.21	10.21			6.77	8.89	9.50	9.17	**100.00**
Total	**0.70**	**0.66**	**0.63**	**0.77**	**0.93**	**0.85**	**0.50**	**0.43**	**0.56**	**0.74**	**0.79**	**0.76**	**8.33**
Mean	**6.5**	**6.6**	**6.6**	**6.9**	**7.2**	**7.4**	**6.3**	**5.8**	**6.1**	**6.6**	**6.8**	**6.7**	**6.7**
Maximum	**17.5**	**18.5**	**17.2**	**19.8**	**16.1**	**15.8**	**14.7**	**14.1**	**15.7**	**16.8**	**16.4**	**16.9**	**19.8**
Month: July													
< 5	2.45	2.69	2.65	2.93	3.16	3.00	2.54	2.51	2.69	3.08	3.33	2.82	**33.85**
< 10	5.91	5.95	6.30	7.96	9.90	10.87	7.24	5.22	6.11	8.58	7.60	6.71	**88.37**
< 15	6.66	6.61	6.85	9.01	11.68	12.66	7.77	5.44	6.70	9.97	8.76	7.43	**99.54**
< 20	6.69	6.69	6.87	9.08		12.66			6.72	10.06	8.87	7.46	**99.98**
< 25												7.48	**100.00**
Total	**0.56**	**0.56**	**0.57**	**0.76**	**0.97**	**1.06**	**0.65**	**0.45**	**0.56**	**0.84**	**0.74**	**0.62**	**8.33**
Mean	**6.2**	**6.0**	**6.0**	**6.4**	**6.8**	**7.0**	**6.1**	**5.3**	**5.9**	**6.7**	**6.4**	**6.2**	**6.4**
Maximum	**18.0**	**18.7**	**15.8**	**18.1**	**14.8**	**15.0**	**14.6**	**14.4**	**16.2**	**19.0**	**18.5**	**22.3**	**22.3**
Month: August													
< 5	2.48	2.24	2.57	3.18	3.15	2.90	2.54	1.99	2.30	2.31	2.58	2.25	**30.50**
< 10	6.95	5.89	6.28	8.44	10.09	9.90	6.92	4.49	5.21	6.86	7.14	6.23	**84.39**
< 15	8.72	6.72	7.01	9.77	12.28	11.86	7.65	4.82	6.02	8.38	8.60	7.33	**99.16**
< 20	8.80	6.73	7.03	9.88	12.34	11.88		4.85	6.13	8.45	8.78	7.43	**99.94**
< 25									6.13		8.81	7.44	**100.00**
Total	**0.73**	**0.56**	**0.59**	**0.82**	**1.03**	**0.99**	**0.64**	**0.40**	**0.51**	**0.70**	**0.73**	**0.62**	**8.33**
Mean	**7.1**	**6.4**	**6.3**	**6.6**	**7.1**	**7.1**	**6.2**	**5.8**	**6.4**	**7.1**	**7.1**	**6.9**	**6.8**
Maximum	**16.4**	**15.5**	**17.0**	**18.5**	**16.4**	**15.8**	**14.9**	**16.1**	**20.4**	**19.7**	**23.9**	**21.6**	**23.9**

Table 2-11 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months July - September at the Block B.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: September													
< 5	2.05	2.06	1.68	1.81	1.86	1.65	2.20	1.98	1.56	1.85	1.73	1.73	**22.17**
< 10	6.76	5.43	4.98	5.34	6.63	7.33	8.32	6.14	5.53	6.16	5.91	5.83	**74.36**
< 15	8.63	7.00	6.38	6.69	9.42	9.97	10.85	7.57	7.00	7.79	7.85	7.75	**96.89**
< 20	9.04	7.31	6.55	6.86	9.99	10.07	10.97	7.60	7.21	8.13	8.06	8.07	**99.88**
< 25	9.06	7.32			10.00				7.23	8.19		8.08	**100.00**
Total	**0.76**	**0.61**	**0.55**	**0.57**	**0.83**	**0.84**	**0.91**	**0.63**	**0.60**	**0.68**	**0.67**	**0.67**	**8.33**
Mean	**7.9**	**7.6**	**7.5**	**7.3**	**8.5**	**8.0**	**7.7**	**7.2**	**7.7**	**7.8**	**7.8**	**8.0**	**7.8**
Maximum	**21.5**	**20.8**	**19.3**	**17.8**	**21.4**	**18.5**	**17.9**	**19.8**	**20.8**	**23.3**	**19.7**	**20.3**	**23.3**
Month: October													
< 5	1.38	1.69	1.65	1.61	1.38	1.34	1.44	1.17	1.01	1.32	1.12	1.29	**16.41**
< 10	6.44	5.82	5.89	5.24	4.84	5.30	5.42	5.30	3.99	4.27	4.00	5.48	**61.98**
< 15	9.74	8.18	8.34	7.87	7.38	8.17	8.43	8.09	5.96	6.21	6.17	8.31	**92.83**
< 20	10.43	8.72	8.88	8.56	7.89	8.96	8.88	8.44	6.31	6.70	6.89	8.95	**99.60**
< 25	10.47	8.77	8.95	8.59	7.94	9.02			6.32	6.73	6.91	8.98	**99.99**
< 30	10.48												**100.00**
Total	**0.87**	**0.73**	**0.75**	**0.72**	**0.66**	**0.75**	**0.74**	**0.70**	**0.53**	**0.56**	**0.58**	**0.75**	**8.33**
Mean	**9.1**	**8.5**	**8.7**	**8.9**	**9.0**	**9.4**	**8.9**	**8.8**	**8.7**	**8.7**	**9.2**	**9.0**	**8.9**
Maximum	**25.3**	**23.4**	**24.1**	**22.1**	**22.4**	**21.2**	**19.1**	**19.1**	**21.1**	**21.5**	**23.4**	**20.6**	**25.3**
Month: November													
< 5	1.31	1.29	1.29	1.24	1.39	1.32	1.13	1.32	1.33	1.05	0.83	0.91	**14.39**
< 10	5.54	5.07	4.99	5.44	4.53	5.25	5.45	5.91	5.07	3.74	3.22	3.95	**58.16**
< 15	8.36	6.67	6.95	8.24	7.74	8.70	9.40	10.03	7.55	6.06	5.29	6.59	**91.59**
< 20	8.85	7.06	7.42	8.60	8.45	9.48	10.23	11.00	8.03	6.73	5.77	7.40	**99.04**
< 25	8.98	7.16	7.48	8.68	8.53	9.59	10.35	11.04	8.09	6.79	5.85	7.45	**99.99**
< 30	9.00												**100.00**
Total	**0.75**	**0.60**	**0.62**	**0.72**	**0.71**	**0.80**	**0.86**	**0.92**	**0.67**	**0.57**	**0.49**	**0.62**	**8.33**
Mean	**9.2**	**8.4**	**8.7**	**9.0**	**9.5**	**9.6**	**9.8**	**9.7**	**9.0**	**9.4**	**9.5**	**9.8**	**9.3**
Maximum	**29.6**	**24.1**	**23.3**	**24.7**	**23.2**	**22.9**	**22.4**	**21.7**	**21.7**	**21.7**	**23.8**	**23.3**	**29.6**
Month: December													
< 5	1.15	1.19	1.05	1.06	1.07	1.00	0.96	1.02	0.73	0.93	0.91	1.00	**12.07**
< 10	5.61	5.19	4.33	4.18	4.47	4.35	4.89	5.52	3.74	3.48	3.47	4.05	**53.27**
< 15	9.23	8.41	6.77	6.42	7.17	8.01	9.22	9.95	6.65	5.77	5.34	6.63	**89.55**
< 20	9.98	8.73	7.21	7.02	8.15	9.34	10.36	10.96	7.37	6.60	6.01	7.18	**98.92**
< 25	10.06	8.76	7.28	7.12	8.29	9.42	10.51	11.01	7.39	6.71	6.18	7.28	**99.99**
< 30												7.29	**100.00**
Total	**0.84**	**0.73**	**0.61**	**0.59**	**0.69**	**0.79**	**0.88**	**0.92**	**0.62**	**0.56**	**0.51**	**0.61**	**8.33**
Mean	**9.6**	**9.1**	**9.1**	**9.3**	**9.9**	**10.3**	**10.4**	**10.0**	**10.0**	**9.9**	**9.8**	**9.5**	**9.8**
Maximum	**22.8**	**24.1**	**21.7**	**22.4**	**23.2**	**21.1**	**24.1**	**23.0**	**20.6**	**24.0**	**24.8**	**25.7**	**25.7**

2.3.3 Block C

Figure 2-7 and Figure 2-9 show the all-year and monthly wind roses from the Block C for the period 1958 – 2014. The wind rose shows the percentage of observations within each 30° sector.

Table 2-12 – Table 2-13 shows the annual directional and monthly sample distribution of non-exceedance of 1-hour mean wind speed.

Figure 2-8 shows the monthly mean and maximum 1-hour mean wind speed at Block C.

Table 2-14 – Table 2-16 show directional sample distributions of non-exceedance of 1-hour mean wind speed for each month.

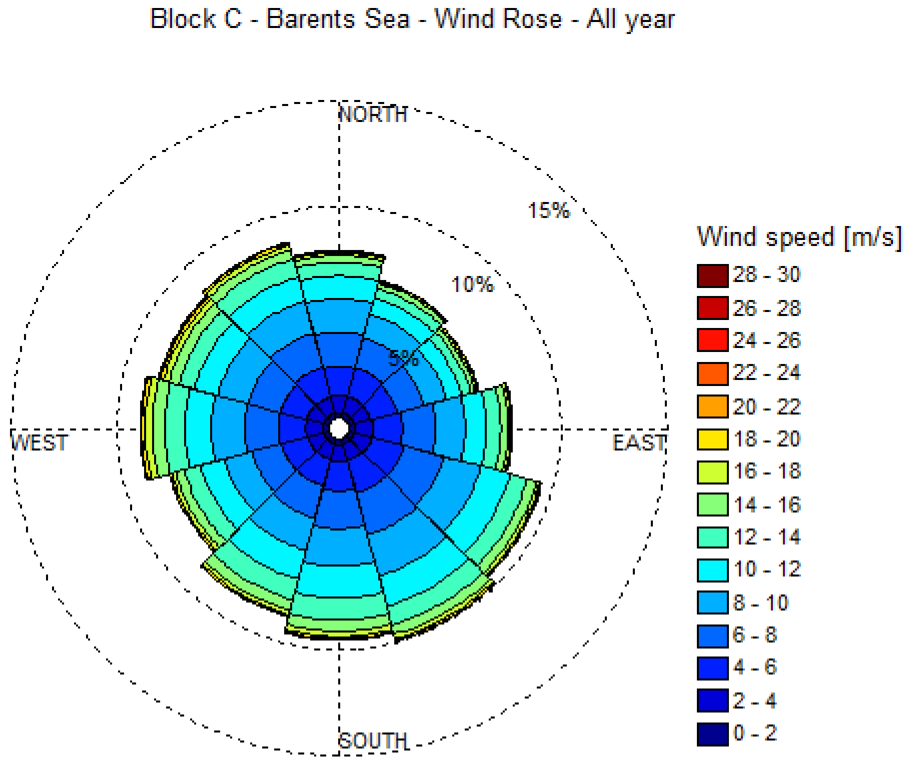


Figure 2-7 All-year wind rose for the Block C for the period 1958 – 2014.

Table 2-12 Annual directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block C.

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 2	0.26	0.26	0.24	0.27	0.28	0.24	0.27	0.25	0.26	0.24	0.25	0.25	**3.07**
< 4	1.07	1.06	1.05	1.11	1.12	1.06	1.07	1.01	1.03	1.06	1.06	1.03	**12.73**
< 6	2.40	2.45	2.36	2.49	2.70	2.67	2.47	2.30	2.34	2.37	2.36	2.47	**29.38**
< 8	4.05	3.89	3.68	4.06	4.62	4.74	4.27	3.90	3.77	3.95	3.95	4.13	**49.02**
< 10	5.61	5.09	4.79	5.41	6.41	6.76	6.07	5.51	5.12	5.51	5.46	5.68	**67.41**
< 12	6.73	5.90	5.52	6.39	7.80	8.26	7.57	6.91	6.27	6.75	6.60	6.88	**81.58**
< 14	7.38	6.37	5.96	7.07	8.64	9.17	8.61	7.92	7.07	7.72	7.37	7.75	**91.03**
< 16	7.71	6.61	6.18	7.42	9.07	9.63	9.12	8.44	7.49	8.33	7.85	8.20	**96.05**
< 18	7.83	6.69	6.28	7.54	9.24	9.84	9.38	8.65	7.68	8.66	8.13	8.44	**98.37**
< 20	7.90	6.73	6.33	7.60	9.33	9.94	9.48	8.74	7.78	8.81	8.28	8.55	**99.48**
< 22	7.93	6.75	6.35	7.62	9.35	9.97	9.54	8.75	7.81	8.86	8.34	8.59	**99.85**
< 24	7.94	6.75	6.35	7.63	9.35	9.98	9.54	8.76	7.81	8.89	8.36	8.60	**99.96**
< 26	7.94	6.75		7.63	9.35			8.76		8.89	8.38	8.61	**99.99**
< 28	7.95									8.89	8.38	8.61	**100.00**
< 30												8.61	**100.00**
Total	**7.95**	**6.75**	**6.35**	**7.63**	**9.35**	**9.98**	**9.54**	**8.76**	**7.81**	**8.89**	**8.38**	**8.61**	**100.00**
Mean	**8.1**	**7.6**	**7.6**	**8.0**	**8.3**	**8.5**	**8.7**	**8.7**	**8.5**	**9.0**	**8.7**	**8.6**	**8.4**
Maximum	**27.2**	**25.3**	**23.5**	**25.1**	**25.2**	**22.3**	**23.2**	**25.7**	**23.5**	**27.0**	**27.4**	**29.6**	**29.6**

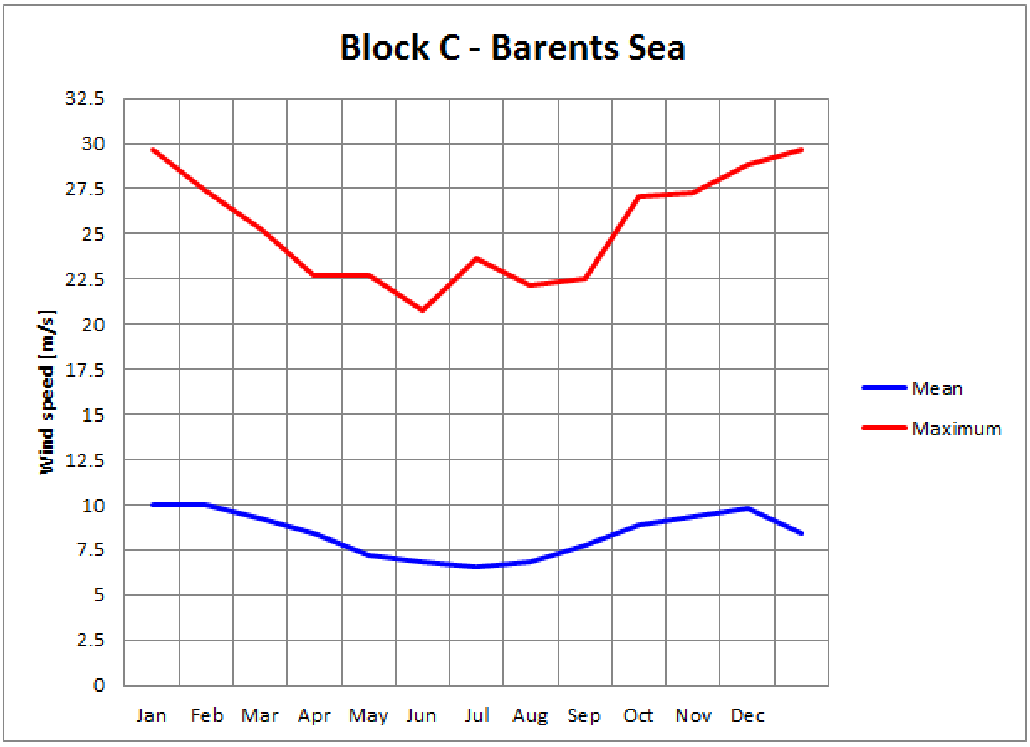


Figure 2-8 **Monthly mean and maximum 1-hour mean wind speed 10 m above sea level at the Block C.**

Table 2-13 **Monthly and annual sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block C.**

Wind [m/s]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 2	1.75	1.77	2.04	2.53	4.17	5.29	5.07	4.27	3.46	2.52	2.13	1.73	**3.07**
< 4	7.48	7.46	9.18	11.45	16.84	19.19	20.70	18.44	13.84	10.94	9.14	7.66	**12.73**
< 6	18.43	18.34	22.30	27.23	38.66	42.32	45.52	41.73	32.36	25.30	21.70	17.95	**29.38**
< 8	34.37	33.59	39.23	47.28	61.34	65.81	70.11	66.04	54.14	42.82	38.27	34.12	**49.02**
< 10	52.59	51.01	58.09	67.02	78.90	83.78	87.00	83.89	73.92	61.38	57.16	53.17	**67.41**
< 12	68.90	68.71	75.01	82.49	90.40	93.55	95.40	93.90	88.01	77.48	74.03	70.28	**81.58**
< 14	82.07	83.04	87.37	92.56	96.71	98.11	98.95	98.10	94.90	88.78	87.16	84.15	**91.03**
< 16	90.84	91.61	94.38	97.22	99.29	99.59	99.69	99.44	98.21	95.14	94.13	92.81	**96.05**
< 18	95.64	96.28	97.84	99.12	99.87	99.94	99.88	99.77	99.43	97.98	97.64	96.92	**98.37**
< 20	98.33	98.70	99.54	99.88	99.96	99.99	99.98	99.90	99.89	99.54	99.20	98.85	**99.48**
< 22	99.46	99.49	99.87	99.99	99.99	100.00	99.99	99.99	99.98	99.87	99.84	99.70	**99.85**
< 24	99.89	99.79	99.96	100.00	100.00		100.00	100.00	100.00	99.97	99.96	99.91	**99.96**
< 26	99.99	99.96	100.00							99.99	99.99	99.97	**99.99**
< 28	99.99	100.00								100.00	100.00	99.99	**100.00**
< 30	100.00											100.00	**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**10.0**	**10.0**	**9.3**	**8.4**	**7.2**	**6.8**	**6.5**	**6.8**	**7.8**	**8.9**	**9.3**	**9.8**	**8.4**
Maximum	**29.6**	**27.4**	**25.3**	**22.7**	**22.7**	**20.8**	**23.6**	**22.2**	**22.6**	**27.1**	**27.2**	**28.8**	**29.6**

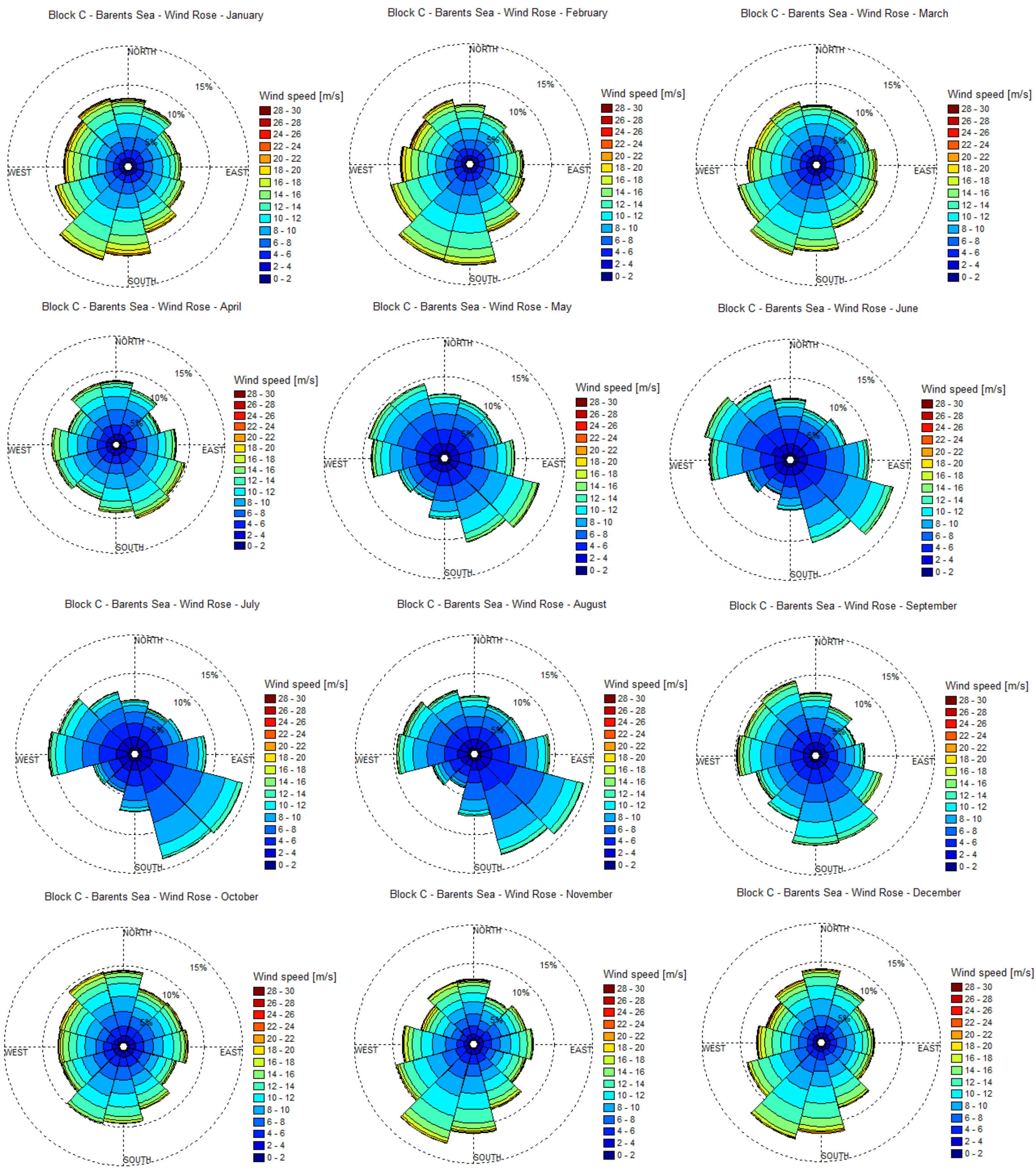


Figure 2-9 Monthly wind roses for the Block C.

Table 2-14 Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months January – April at the Block C.

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: January													
< 5	0.98	1.15	1.12	1.00	1.12	0.96	1.00	0.92	0.98	0.97	1.06	0.95	**12.22**
< 10	5.09	4.97	4.06	3.95	4.13	4.22	4.84	5.31	4.46	3.52	3.75	4.27	**52.59**
< 15	7.69	7.00	5.72	5.87	6.44	7.14	9.08	10.26	8.13	6.17	6.40	7.39	**87.28**
< 20	8.21	7.35	6.13	6.27	7.04	8.13	10.67	11.71	9.29	7.59	7.56	8.39	**98.33**
< 25	8.35	7.41	6.16	6.29	7.07	8.28	10.96	11.82	9.38	7.80	7.81	8.61	**99.95**
< 30				6.30							7.83	8.63	**100.00**
Total	**0.70**	**0.62**	**0.51**	**0.52**	**0.59**	**0.69**	**0.91**	**0.99**	**0.78**	**0.65**	**0.65**	**0.72**	**8.33**
Mean	**9.3**	**8.6**	**8.6**	**9.0**	**9.2**	**10.1**	**10.8**	**10.6**	**10.3**	**10.8**	**10.5**	**10.3**	**10.0**
Maximum	**24.0**	**22.6**	**22.4**	**25.1**	**22.0**	**22.3**	**23.2**	**24.7**	**23.2**	**23.5**	**26.0**	**29.6**	**29.6**
Month: February													
< 5	0.98	0.95	1.06	1.09	0.93	1.05	1.09	1.21	1.02	0.85	0.94	1.10	**12.27**
< 10	4.11	3.94	3.62	3.33	3.65	4.59	5.92	6.19	4.50	3.85	3.38	3.93	**51.01**
< 15	6.82	6.06	5.24	5.92	5.87	7.50	11.09	11.27	8.69	6.81	5.94	6.95	**88.16**
< 20	7.34	6.24	5.59	6.37	6.65	8.36	12.38	12.33	9.98	8.32	7.17	7.95	**98.70**
< 25	7.34	6.26	5.61	6.44	6.78	8.47	12.45	12.40	10.07	8.55	7.45	8.10	**99.92**
< 30					6.79			12.41		8.56	7.51		**100.00**
Total	**0.61**	**0.52**	**0.47**	**0.54**	**0.57**	**0.71**	**1.04**	**1.03**	**0.84**	**0.71**	**0.63**	**0.67**	**8.33**
Mean	**9.3**	**8.7**	**8.6**	**9.5**	**9.8**	**9.8**	**10.2**	**10.1**	**10.4**	**11.0**	**10.8**	**10.1**	**10.0**
Maximum	**24.0**	**24.4**	**20.5**	**25.0**	**25.2**	**21.5**	**21.2**	**25.7**	**23.5**	**27.0**	**27.4**	**24.4**	**27.4**
Month: March													
< 5	1.22	1.33	1.37	1.17	1.32	1.08	1.35	1.27	1.37	1.22	1.10	1.12	**14.93**
< 10	4.82	4.85	4.53	4.53	4.29	4.24	5.62	6.39	5.96	4.12	4.07	4.66	**58.09**
< 15	6.89	6.69	6.16	6.63	6.92	7.26	9.56	10.78	9.43	7.41	6.56	7.13	**91.43**
< 20	7.21	6.95	6.57	7.25	7.56	8.01	10.52	11.49	10.06	8.37	7.63	7.93	**99.54**
< 25	7.27	6.96	6.60	7.28	7.56	8.04	10.60		10.08	8.46	7.69	7.96	**99.99**
< 30		6.97								8.47			**100.00**
Total	**0.61**	**0.58**	**0.55**	**0.61**	**0.63**	**0.67**	**0.88**	**0.96**	**0.84**	**0.71**	**0.64**	**0.66**	**8.33**
Mean	**8.7**	**8.3**	**8.4**	**9.0**	**9.2**	**9.7**	**9.6**	**9.4**	**9.1**	**10.1**	**9.9**	**9.3**	**9.3**
Maximum	**24.2**	**25.3**	**23.5**	**21.1**	**21.0**	**22.0**	**21.6**	**19.9**	**21.2**	**25.2**	**24.8**	**21.6**	**25.3**
Month: April													
< 5	1.49	1.76	1.46	1.54	1.62	1.69	1.60	1.48	1.67	1.43	1.35	1.54	**18.64**
< 10	6.43	6.13	4.68	5.46	5.72	6.35	5.90	5.40	5.88	5.12	4.66	5.29	**67.02**
< 15	8.46	7.68	5.88	7.65	8.85	9.77	8.91	7.44	8.12	8.12	6.43	8.11	**95.42**
< 20	8.70	7.78	6.10	7.96	9.56	10.40	9.35	7.61	8.41	8.83	6.73	8.44	**99.88**
< 25	8.73			7.98	9.58	10.43				8.84	6.74	8.46	**100.00**
Total	**0.73**	**0.65**	**0.51**	**0.66**	**0.80**	**0.87**	**0.78**	**0.63**	**0.70**	**0.74**	**0.56**	**0.70**	**8.33**
Mean	**8.0**	**7.4**	**7.5**	**8.3**	**9.1**	**9.0**	**8.7**	**8.0**	**8.2**	**9.1**	**8.3**	**8.7**	**8.4**
Maximum	**22.7**	**19.4**	**19.4**	**20.5**	**20.5**	**21.4**	**19.3**	**18.6**	**19.6**	**20.3**	**20.5**	**22.2**	**22.7**

Table 2-15 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months May – August at the Block C.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: May													
< 5	2.16	2.70	2.38	2.18	2.25	2.07	2.04	2.03	2.18	2.17	2.40	2.48	**27.03**
< 10	6.57	6.39	6.25	6.30	7.85	7.83	6.43	4.81	4.92	6.45	7.58	7.52	**78.90**
< 15	7.79	7.36	7.19	8.33	11.56	10.63	7.43	5.25	5.58	8.55	9.28	9.39	**98.35**
< 20	7.84	7.41	7.21	8.49	11.96	10.84	7.47		5.62	8.86	9.54	9.47	**99.96**
< 25					11.98	10.85				8.87			**100.00**
Total	**0.65**	**0.62**	**0.60**	**0.71**	**1.00**	**0.90**	**0.62**	**0.44**	**0.47**	**0.74**	**0.80**	**0.79**	**8.33**
Mean	**6.8**	**6.4**	**6.5**	**7.6**	**8.4**	**8.0**	**6.8**	**5.9**	**6.2**	**7.8**	**7.3**	**7.3**	**7.2**
Maximum	**17.9**	**17.8**	**17.8**	**17.4**	**20.8**	**20.2**	**16.1**	**14.8**	**17.2**	**22.7**	**18.2**	**16.7**	**22.7**
Month: June													
< 5	2.46	2.30	2.39	2.94	2.81	2.50	2.24	2.19	2.35	2.30	2.98	2.70	**30.16**
< 10	6.34	5.42	6.08	8.29	10.24	8.56	5.52	4.12	4.84	7.72	8.74	7.91	**83.78**
< 15	7.40	6.24	6.92	9.54	12.87	10.75	6.11	4.25	5.19	9.64	10.75	9.48	**99.14**
< 20	7.50	6.27	6.94	9.63	13.02	10.75			5.20	9.82	10.94	9.55	**99.99**
< 25	7.51												**100.00**
Total	**0.63**	**0.52**	**0.58**	**0.80**	**1.08**	**0.90**	**0.51**	**0.35**	**0.43**	**0.82**	**0.91**	**0.80**	**8.33**
Mean	**6.7**	**6.3**	**6.4**	**6.7**	**7.6**	**7.3**	**6.1**	**5.1**	**5.5**	**7.4**	**7.2**	**6.9**	**6.8**
Maximum	**20.8**	**16.7**	**15.8**	**16.8**	**17.2**	**15.7**	**13.6**	**12.8**	**16.2**	**18.2**	**19.8**	**18.1**	**20.8**
Month: July													
< 5	2.61	2.45	2.40	2.53	3.12	3.09	2.65	2.54	2.26	2.91	2.79	2.77	**32.12**
< 10	5.81	5.21	5.55	7.80	11.53	11.92	6.69	4.64	4.52	8.32	7.98	7.05	**87.00**
< 15	6.49	5.68	5.92	8.74	13.77	13.84	7.22	4.73	5.03	10.25	9.80	7.96	**99.43**
< 20	6.52	5.72	5.94	8.76	13.79	13.85			5.04	10.43	9.96	8.01	**99.98**
< 25											9.97	8.02	**100.00**
Total	**0.54**	**0.48**	**0.50**	**0.73**	**1.15**	**1.15**	**0.60**	**0.39**	**0.42**	**0.87**	**0.83**	**0.67**	**8.33**
Mean	**6.0**	**5.8**	**5.8**	**6.5**	**7.1**	**7.0**	**6.0**	**4.8**	**5.7**	**7.2**	**7.2**	**6.4**	**6.5**
Maximum	**19.7**	**16.9**	**19.7**	**15.5**	**16.3**	**15.0**	**14.5**	**12.4**	**16.1**	**19.3**	**23.0**	**23.6**	**23.6**
Month: August													
< 5	2.23	2.09	2.42	2.82	3.29	2.84	2.31	1.79	1.99	2.57	2.33	2.39	**29.08**
< 10	5.79	5.55	5.52	7.70	11.59	11.25	7.02	3.88	4.41	7.43	7.10	6.65	**83.89**
< 15	7.16	6.15	6.18	9.07	14.12	13.23	7.72	4.11	4.97	9.42	8.83	8.00	**98.95**
< 20	7.21	6.21	6.23	9.14		13.27		4.12	5.04	9.58	9.10	8.18	**99.90**
< 25									5.05	9.59	9.16	8.18	**100.00**
Total	**0.60**	**0.52**	**0.52**	**0.76**	**1.18**	**1.11**	**0.64**	**0.34**	**0.42**	**0.80**	**0.76**	**0.68**	**8.33**
Mean	**6.9**	**6.3**	**6.2**	**6.7**	**7.1**	**7.1**	**6.4**	**5.5**	**6.1**	**7.4**	**7.5**	**7.1**	**6.8**
Maximum	**16.8**	**17.8**	**16.6**	**19.0**	**14.8**	**16.8**	**13.6**	**15.0**	**21.5**	**21.7**	**22.2**	**20.2**	**22.2**

Table 2-16 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months September – December at the Block C.**

Wind [m/s]	Wind direction											Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: September													
< 5	1.89	1.83	1.54	1.74	1.79	1.99	2.09	1.92	1.78	1.89	1.81	1.97	**22.25**
< 10	5.99	4.80	3.74	4.52	5.99	8.37	8.26	6.67	5.86	6.62	6.37	6.71	**73.92**
< 15	7.61	6.02	4.87	5.74	8.03	10.79	11.21	8.28	7.27	9.07	8.91	9.03	**96.83**
< 20	7.89	6.27	4.93	5.88	8.44	10.90	11.32	8.32	7.50	9.60	9.39	9.45	**99.89**
< 25	7.92								7.52	9.65		9.46	**100.00**
Total	**0.66**	**0.52**	**0.41**	**0.49**	**0.70**	**0.91**	**0.94**	**0.69**	**0.63**	**0.80**	**0.78**	**0.79**	**8.33**
Mean	**7.7**	**7.4**	**7.2**	**7.4**	**8.0**	**7.7**	**7.9**	**7.3**	**7.5**	**8.4**	**8.3**	**8.1**	**7.8**
Maximum	**22.6**	**19.2**	**18.6**	**19.9**	**19.9**	**17.3**	**19.1**	**16.2**	**21.0**	**22.2**	**19.9**	**20.2**	**22.6**
Month: October													
< 5	1.55	1.44	1.63	1.58	1.49	1.60	1.45	1.38	1.41	1.55	1.25	1.25	**17.56**
< 10	6.11	4.86	5.03	4.72	4.27	4.90	5.61	6.22	5.11	4.52	4.58	5.43	**61.38**
< 15	8.91	6.81	6.98	7.34	6.38	7.47	8.88	9.68	7.39	7.14	7.12	8.49	**92.57**
< 20	9.39	7.31	7.44	7.89	6.73	8.07	9.39	10.02	7.78	7.96	8.05	9.49	**99.54**
< 25	9.42	7.36	7.48	7.95	6.74		9.41		7.82	8.05	8.11	9.54	**99.97**
< 30	9.43									8.06			**100.00**
Total	**0.79**	**0.61**	**0.62**	**0.66**	**0.56**	**0.67**	**0.78**	**0.83**	**0.65**	**0.67**	**0.68**	**0.79**	**8.33**
Mean	**8.7**	**8.6**	**8.4**	**8.9**	**8.5**	**8.9**	**9.0**	**8.9**	**8.6**	**9.4**	**9.5**	**9.4**	**8.9**
Maximum	**27.1**	**23.6**	**21.7**	**22.0**	**21.4**	**19.9**	**21.2**	**17.8**	**22.9**	**25.9**	**23.8**	**23.0**	**27.1**
Month: November													
< 5	1.43	1.16	1.35	1.18	1.14	1.45	1.44	1.43	1.23	1.17	0.89	1.22	**15.08**
< 10	5.07	4.09	4.46	4.33	3.57	4.55	5.86	6.54	5.91	4.82	3.65	4.32	**57.16**
< 15	7.43	5.45	6.25	6.86	6.03	7.51	10.11	11.71	9.44	7.76	5.84	7.02	**91.42**
< 20	7.90	5.86	6.65	7.16	6.56	8.25	10.88	12.81	10.10	8.63	6.59	7.81	**99.20**
< 25	8.06	5.88	6.66	7.20	6.64	8.33	10.99	12.84	10.12	8.72	6.68	7.85	**99.97**
< 30	8.07											7.87	**100.00**
Total	**0.67**	**0.49**	**0.55**	**0.60**	**0.55**	**0.69**	**0.92**	**1.07**	**0.84**	**0.73**	**0.56**	**0.66**	**8.33**
Mean	**9.0**	**8.5**	**8.5**	**8.9**	**9.4**	**9.5**	**9.6**	**9.8**	**9.2**	**9.6**	**9.7**	**9.6**	**9.3**
Maximum	**27.2**	**21.1**	**21.7**	**21.7**	**23.9**	**21.2**	**21.6**	**21.0**	**21.1**	**22.6**	**24.1**	**25.8**	**27.2**
Month: December													
< 5	1.03	1.21	0.97	1.10	0.98	0.82	1.20	1.04	1.05	0.92	0.97	0.96	**12.25**
< 10	5.15	4.75	3.86	3.88	3.77	4.18	5.15	6.00	5.03	3.58	3.49	4.34	**53.17**
< 15	8.43	7.05	5.74	5.77	5.72	7.47	9.96	11.26	8.64	6.54	5.74	7.05	**89.38**
< 20	9.06	7.34	6.18	6.35	6.25	8.31	11.00	12.46	9.59	7.77	6.64	7.92	**98.85**
< 25	9.13	7.38	6.22	6.41	6.31	8.34	11.18	12.50	9.61	7.94	6.89	8.04	**99.95**
< 30											6.93	8.06	**100.00**
Total	**0.76**	**0.61**	**0.52**	**0.53**	**0.53**	**0.70**	**0.93**	**1.04**	**0.80**	**0.66**	**0.58**	**0.67**	**8.33**
Mean	**9.5**	**8.7**	**9.1**	**9.1**	**9.2**	**10.0**	**10.3**	**10.1**	**9.9**	**10.7**	**10.4**	**9.9**	**9.8**
Maximum	**22.3**	**21.6**	**21.8**	**22.4**	**23.0**	**20.8**	**22.4**	**22.7**	**21.7**	**24.4**	**26.9**	**28.8**	**28.8**

2.3.4 Block D

Figure 2-10 and Figure 2-12 show the all-year and monthly wind roses from the Block D for the period 1958 – 2014. The wind rose shows the percentage of observations within each 30° sector.

Table 2-17 – Table 2-18 shows the annual directional and monthly sample distribution of non-exceedance of 1-hour mean wind speed.

Figure 2-11 shows the monthly mean and maximum 1-hour mean wind speed at Block D.

Table 2-19 – Table 2-21 show directional sample distributions of non-exceedance of 1-hour mean wind speed for each month.

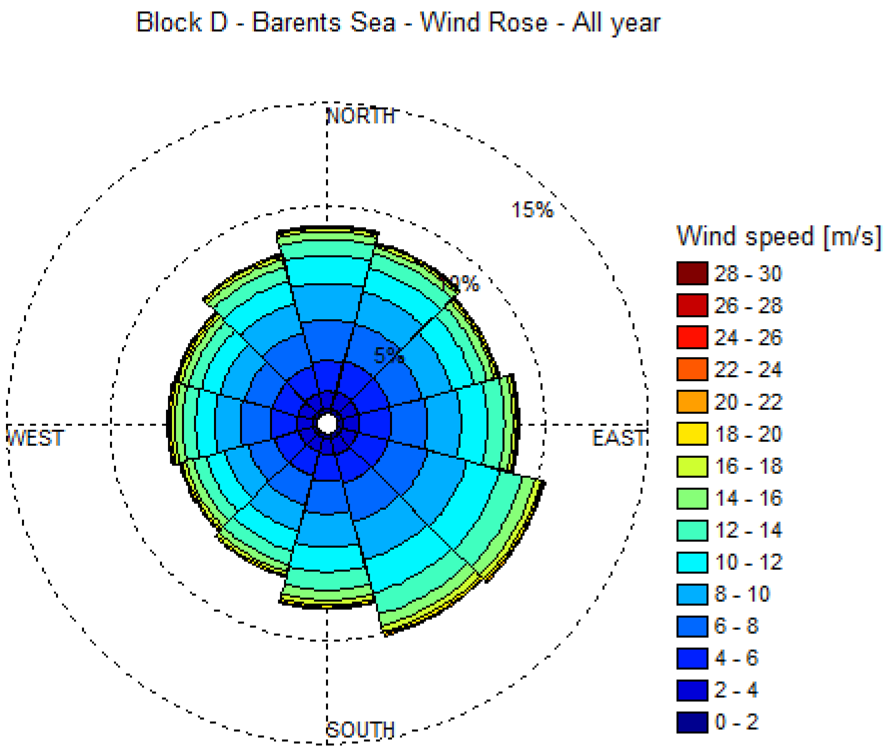


Figure 2-10 All-year wind rose for the Block D for the period 1958 – 2014.

Table 2-17 Annual directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block D.

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 2	0.24	0.24	0.25	0.26	0.26	0.25	0.26	0.23	0.22	0.25	0.24	0.23	**2.93**
< 4	1.05	1.10	1.08	1.06	1.03	1.05	0.98	0.92	0.93	0.98	1.00	1.01	**12.18**
< 6	2.51	2.61	2.64	2.57	2.55	2.48	2.29	2.13	2.14	2.27	2.27	2.34	**28.80**
< 8	4.49	4.49	4.25	4.31	4.55	4.42	3.90	3.62	3.46	3.73	3.67	4.00	**48.87**
< 10	6.28	6.10	5.73	5.90	6.48	6.36	5.53	4.92	4.60	4.95	4.90	5.45	**67.20**
< 12	7.62	7.28	6.85	7.18	8.10	8.03	6.74	5.95	5.55	5.87	5.81	6.56	**81.54**
< 14	8.39	8.01	7.49	8.00	9.25	9.10	7.63	6.63	6.18	6.51	6.45	7.26	**90.89**
< 16	8.77	8.35	7.84	8.40	9.84	9.66	8.11	6.98	6.56	6.87	6.80	7.64	**95.83**
< 18	8.94	8.49	7.98	8.58	10.12	9.96	8.35	7.16	6.76	7.07	6.98	7.82	**98.21**
< 20	9.02	8.54	8.07	8.66	10.26	10.11	8.48	7.24	6.84	7.17	7.08	7.90	**99.39**
< 22	9.05	8.57	8.11	8.69	10.30	10.18	8.54	7.25	6.88	7.21	7.13	7.93	**99.83**
< 24	9.06	8.58	8.12	8.70	10.32	10.19	8.55	7.26	6.88	7.22	7.15	7.93	**99.96**
< 26	9.06	8.58	8.12	8.70	10.32		8.56	7.26	6.88	7.23	7.15	7.94	**99.99**
< 28	9.06	8.59	8.13						6.88		7.15	7.94	**100.00**
< 30									6.88				**100.00**
Total	**9.06**	**8.59**	**8.13**	**8.70**	**10.32**	**10.19**	**8.56**	**7.26**	**6.88**	**7.23**	**7.15**	**7.94**	**100.00**
Mean	**8.3**	**8.1**	**8.1**	**8.3**	**8.9**	**8.9**	**8.7**	**8.3**	**8.4**	**8.3**	**8.3**	**8.3**	**8.4**
Maximum	**27.0**	**27.5**	**26.0**	**24.5**	**24.6**	**23.9**	**25.0**	**24.1**	**28.2**	**25.9**	**26.8**	**26.9**	**28.2**

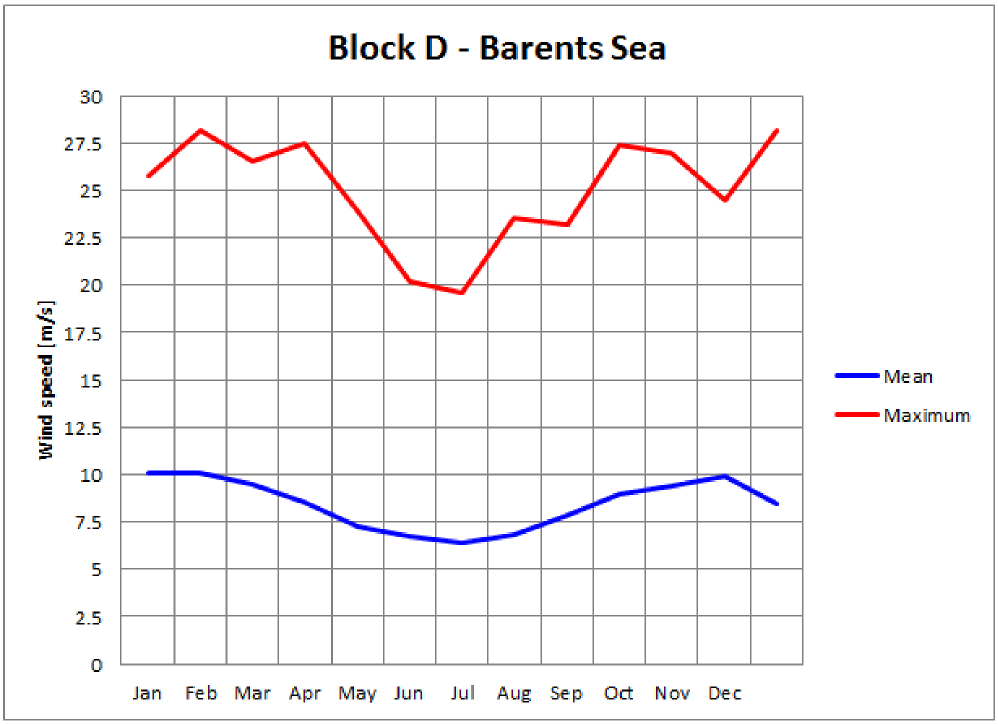


Figure 2-11 **Monthly mean and maximum 1-hour mean wind speed 10 m above sea level at the Block D.**

Table 2-18 **Monthly and annual sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level at the Block D.**

Wind [m/s]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 2	1.63	1.42	1.54	2.14	4.04	5.03	5.81	4.66	3.14	2.09	1.89	1.61	**2.93**
< 4	6.78	6.77	7.43	10.40	16.29	19.80	21.47	18.34	13.39	9.85	8.11	7.17	**12.18**
< 6	17.03	17.34	19.23	26.09	38.11	43.54	46.94	41.80	32.04	24.08	20.76	17.85	**28.80**
< 8	32.99	33.01	36.33	46.83	60.97	67.13	72.55	66.43	54.61	42.68	38.21	33.68	**48.87**
< 10	50.98	51.17	56.46	66.06	79.24	84.60	88.07	84.05	73.40	61.97	57.17	52.23	**67.20**
< 12	68.73	68.19	73.66	82.09	90.67	94.21	96.20	93.80	87.24	78.20	74.28	70.37	**81.54**
< 14	82.41	82.19	86.62	91.90	96.54	98.41	98.98	98.06	94.88	88.70	87.25	84.20	**90.89**
< 16	90.73	91.20	94.08	96.75	98.95	99.63	99.73	99.61	98.09	94.70	93.92	92.37	**95.83**
< 18	95.07	96.06	97.86	98.90	99.71	99.93	99.93	99.86	99.41	97.94	97.31	96.48	**98.21**
< 20	97.91	98.57	99.35	99.84	99.94	99.99	100.00	99.94	99.88	99.41	98.96	98.80	**99.39**
< 22	99.33	99.56	99.87	99.98	99.99	100.00		99.96	99.97	99.89	99.70	99.72	**99.83**
< 24	99.84	99.85	99.95	99.99	100.00			100.00	100.00	99.95	99.93	99.97	**99.96**
< 26	100.00	99.97	99.99	99.99						99.99	99.99	100.00	**99.99**
< 28		99.99	100.00	100.00						100.00	100.00		**100.00**
< 30		100.00											**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**10.1**	**10.1**	**9.5**	**8.5**	**7.3**	**6.7**	**6.4**	**6.8**	**7.8**	**9.0**	**9.4**	**9.9**	**8.4**
Maximum	**25.8**	**28.2**	**26.5**	**27.5**	**23.9**	**20.2**	**19.6**	**23.5**	**23.2**	**27.4**	**27.0**	**24.5**	**28.2**

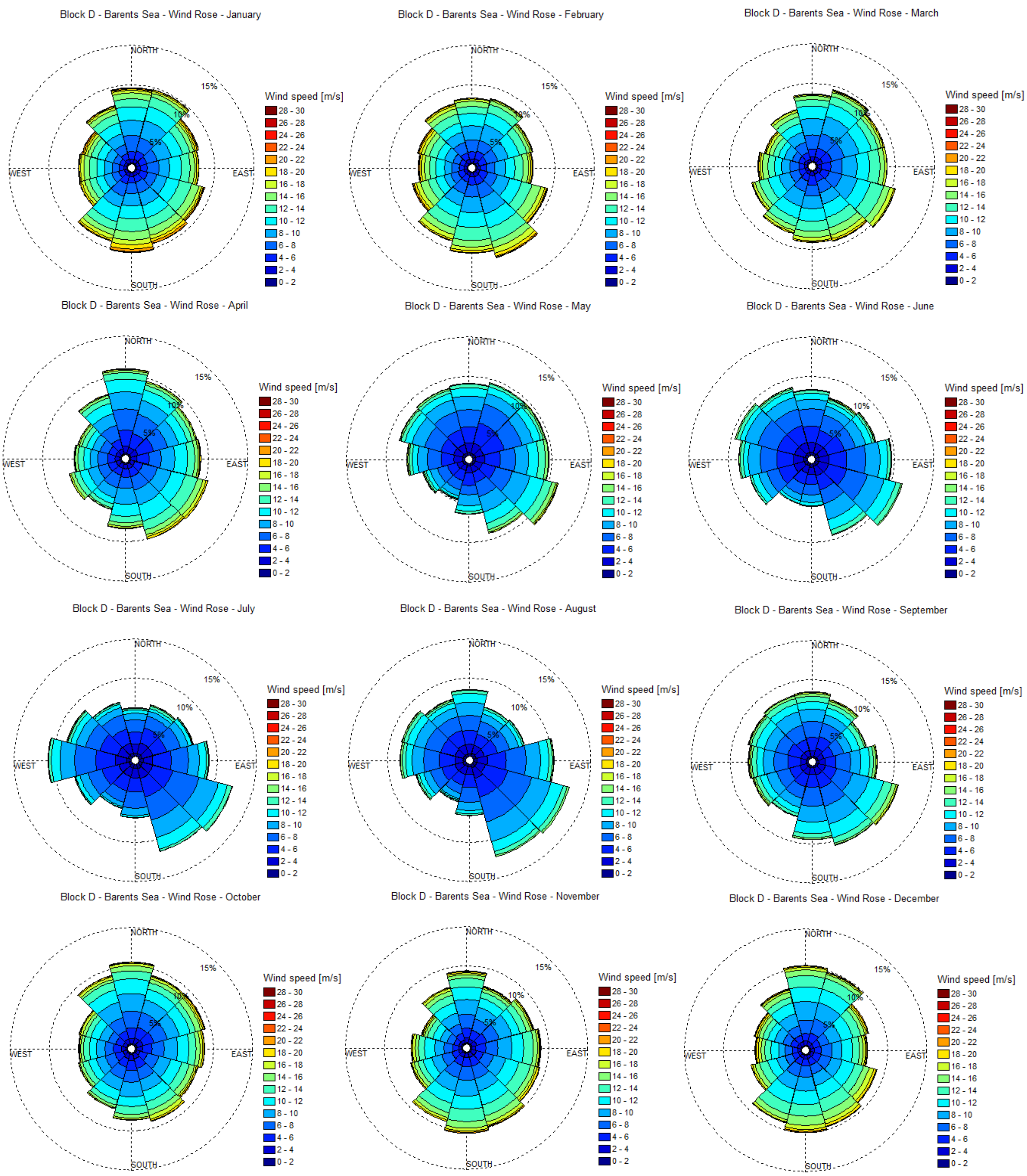


Figure 2-12 Monthly wind roses for the Block D.

Table 2-19 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months January – April at the Block D.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: January													
< 5	1.06	1.07	1.06	1.00	1.02	0.90	0.88	1.06	0.81	0.80	0.82	1.03	**11.51**
< 10	5.50	5.79	4.72	4.27	4.20	4.44	4.28	4.77	3.20	2.95	2.97	3.89	**50.98**
< 15	8.62	9.20	7.48	7.08	7.97	8.01	8.09	8.17	5.43	5.26	5.11	6.83	**87.22**
< 20	9.47	9.82	8.12	7.82	8.91	9.11	9.74	9.22	6.32	6.10	5.81	7.48	**97.91**
< 25	9.63	9.89	8.32	7.87	9.13	9.43	10.19	9.31	6.41	6.18	6.03	7.56	**99.95**
< 30		9.90	8.33							6.19	6.04	7.58	**100.00**
Total	**0.80**	**0.83**	**0.69**	**0.66**	**0.76**	**0.79**	**0.85**	**0.78**	**0.53**	**0.52**	**0.50**	**0.63**	**8.33**
Mean	**9.7**	**9.4**	**9.7**	**9.6**	**10.4**	**10.6**	**11.2**	**9.9**	**10.2**	**10.3**	**10.3**	**9.9**	**10.1**
Maximum	**24.7**	**25.2**	**25.1**	**22.2**	**23.6**	**23.9**	**25.0**	**24.1**	**22.8**	**25.8**	**25.2**	**25.7**	**25.8**
Month: February													
< 5	1.06	1.19	0.89	0.88	0.93	1.07	1.04	0.87	0.83	0.81	0.85	1.04	**11.44**
< 10	4.84	5.23	4.28	3.80	4.33	5.54	5.23	4.52	3.17	2.96	3.14	4.15	**51.17**
< 15	7.68	8.11	6.94	6.40	7.89	9.60	9.22	8.00	5.87	5.19	5.49	6.89	**87.29**
< 20	8.32	8.59	7.45	7.13	9.11	11.04	10.30	9.12	7.09	6.18	6.41	7.82	**98.57**
< 25	8.35	8.63	7.50	7.23	9.24	11.26	10.36	9.18	7.28	6.32	6.62	7.95	**99.94**
< 30									7.30	6.34	6.64	7.96	**100.00**
Total	**0.70**	**0.72**	**0.62**	**0.60**	**0.77**	**0.94**	**0.86**	**0.77**	**0.61**	**0.53**	**0.55**	**0.66**	**8.33**
Mean	**9.4**	**9.1**	**9.4**	**9.9**	**10.4**	**10.4**	**10.1**	**10.2**	**10.8**	**10.5**	**10.6**	**10.0**	**10.1**
Maximum	**24.5**	**22.1**	**21.7**	**22.8**	**24.6**	**23.2**	**22.3**	**22.6**	**28.2**	**25.9**	**26.8**	**26.9**	**28.2**
Month: March													
< 5	1.19	1.16	1.37	1.11	1.08	1.01	1.18	0.96	0.85	0.95	0.86	0.80	**12.51**
< 10	5.61	6.02	5.60	5.25	5.35	4.58	4.84	4.78	3.90	3.47	3.13	3.95	**56.46**
< 15	8.23	9.02	8.27	8.61	9.22	8.30	8.16	7.66	6.77	5.67	4.84	6.25	**91.02**
< 20	8.71	9.41	8.86	9.09	10.16	9.42	9.07	8.31	7.46	6.37	5.62	6.88	**99.35**
< 25	8.72	9.49	8.92	9.10	10.20	9.50	9.13	8.32	7.50	6.49	5.72		**99.98**
< 30	8.73	9.50	8.93										**100.00**
Total	**0.73**	**0.79**	**0.74**	**0.76**	**0.85**	**0.79**	**0.76**	**0.69**	**0.62**	**0.54**	**0.48**	**0.57**	**8.33**
Mean	**8.9**	**9.0**	**9.0**	**9.2**	**9.9**	**10.2**	**9.7**	**9.5**	**9.8**	**9.9**	**9.9**	**9.4**	**9.5**
Maximum	**25.4**	**26.5**	**26.0**	**20.6**	**22.0**	**23.2**	**22.0**	**20.8**	**21.0**	**24.7**	**22.0**	**19.8**	**26.5**
Month: April													
< 5	1.89	1.75	2.05	1.54	1.23	1.32	1.27	1.14	1.25	1.31	1.23	1.43	**17.41**
< 10	7.90	7.24	6.43	5.74	5.58	5.52	5.37	4.64	4.47	3.99	3.83	5.36	**66.06**
< 15	10.45	9.50	8.49	8.51	9.42	9.22	7.98	6.10	6.45	5.71	5.52	7.54	**94.88**
< 20	10.86	9.74	8.80	8.99	10.30	9.98	8.45	6.23	6.89	6.02	5.77	7.81	**99.84**
< 25	10.86	9.75		9.00	10.33	10.05	8.46				5.78		**99.99**
< 30		9.76											**100.00**
Total	**0.91**	**0.81**	**0.73**	**0.75**	**0.86**	**0.84**	**0.71**	**0.52**	**0.57**	**0.50**	**0.48**	**0.65**	**8.33**
Mean	**8.1**	**7.9**	**7.8**	**8.7**	**9.6**	**9.4**	**8.9**	**7.9**	**8.6**	**8.3**	**8.4**	**8.3**	**8.5**
Maximum	**22.3**	**27.5**	**19.6**	**20.2**	**22.8**	**22.0**	**20.3**	**19.1**	**19.4**	**19.4**	**21.2**	**19.4**	**27.5**

Table 2-20 **Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months May – August at the Block D.**

Wind [m/s]	Wind direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
Month: May													
< 5	2.62	2.82	2.66	2.43	2.13	1.80	1.98	1.56	1.64	2.15	2.39	2.45	**26.63**
< 10	7.56	8.14	7.96	6.99	7.58	6.39	5.52	4.35	4.55	5.89	6.94	7.37	**79.24**
< 15	9.10	9.46	9.41	9.42	10.75	9.03	6.58	4.80	5.33	7.02	8.39	8.77	**98.06**
< 20	9.12	9.51	9.57	9.61	11.17	9.28	6.61	4.86	5.45	7.24	8.57	8.95	**99.94**
< 25			9.59		11.19				5.47	7.25			**100.00**
Total	**0.76**	**0.79**	**0.80**	**0.80**	**0.93**	**0.77**	**0.55**	**0.40**	**0.46**	**0.60**	**0.71**	**0.75**	**8.33**
Mean	**6.9**	**6.7**	**6.9**	**7.7**	**8.4**	**8.2**	**6.9**	**6.4**	**6.9**	**7.1**	**7.1**	**7.1**	**7.3**
Maximum	**15.6**	**16.2**	**20.4**	**19.4**	**20.6**	**18.8**	**17.6**	**17.8**	**23.9**	**20.6**	**18.8**	**18.0**	**23.9**
Month: June													
< 5	2.65	2.38	2.70	2.71	2.94	2.44	2.11	2.04	2.74	2.73	2.84	2.88	**31.16**
< 10	7.07	6.48	6.65	8.04	9.12	7.48	5.03	4.88	6.37	7.51	8.25	7.71	**84.60**
< 15	8.24	7.42	7.81	9.44	11.35	9.55	5.57	5.29	7.48	8.68	9.44	8.89	**99.15**
< 20	8.29	7.60	8.00	9.48	11.43	9.59	5.58		7.49	8.72	9.52	9.01	**99.99**
< 25				9.49									**100.00**
Total	**0.69**	**0.63**	**0.67**	**0.79**	**0.95**	**0.80**	**0.47**	**0.44**	**0.62**	**0.73**	**0.79**	**0.75**	**8.33**
Mean	**6.6**	**6.7**	**6.7**	**6.8**	**7.2**	**7.3**	**6.1**	**5.9**	**6.3**	**6.6**	**6.7**	**6.6**	**6.7**
Maximum	**17.0**	**19.7**	**19.3**	**20.2**	**16.2**	**16.6**	**15.6**	**13.1**	**15.4**	**17.6**	**16.3**	**17.8**	**20.2**
Month: July													
< 5	2.43	2.89	2.67	2.93	3.01	2.89	2.67	2.59	2.79	3.33	2.87	2.70	**33.75**
< 10	5.55	6.02	6.43	7.72	10.43	9.86	6.70	5.61	6.73	9.18	7.39	6.47	**88.07**
< 15	6.23	6.78	7.07	8.90	12.25	11.69	7.02	5.84	7.43	10.63	8.52	7.13	**99.48**
< 20	6.29	6.84	7.12	8.97	12.25			5.84	7.48	10.68	8.64	7.17	**100.00**
Total													
Mean	**0.52**	**0.57**	**0.59**	**0.75**	**1.02**	**0.97**	**0.58**	**0.49**	**0.62**	**0.89**	**0.72**	**0.60**	**8.33**
Maximum	**6.2**	**6.1**	**6.1**	**6.5**	**7.0**	**6.9**	**5.7**	**5.4**	**6.1**	**6.6**	**6.5**	**6.1**	**6.4**
Month: August													
< 5	2.38	2.19	2.16	2.91	3.01	3.04	2.12	2.16	2.16	2.35	2.27	2.45	**29.21**
< 10	6.90	5.66	6.10	8.41	10.26	10.25	6.05	4.75	5.50	6.84	6.86	6.47	**84.05**
< 15	8.54	6.51	6.85	9.99	12.57	12.29	6.71	5.10	6.49	8.24	8.35	7.46	**99.09**
< 20	8.55	6.52	6.90	10.09	12.66	12.34		5.16	6.54	8.35	8.52	7.60	**99.94**
< 25									6.55		8.53	7.65	**100.00**
Total	**0.71**	**0.54**	**0.57**	**0.84**	**1.05**	**1.03**	**0.56**	**0.43**	**0.55**	**0.70**	**0.71**	**0.64**	**8.33**
Mean	**7.0**	**6.4**	**6.4**	**6.9**	**7.2**	**7.1**	**6.4**	**5.9**	**6.6**	**7.1**	**7.1**	**6.8**	**6.8**
Maximum	**16.2**	**15.8**	**16.6**	**18.6**	**15.8**	**16.4**	**14.6**	**17.5**	**20.0**	**19.6**	**23.2**	**23.5**	**23.5**

Table 2-21 Directional sample distribution of non-exceedance [%] of 1-hour mean wind speed 10 m above sea level for the months September – December at the Block D.

Wind [m/s]	Wind direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
Month: September													
< 5	1.64	2.05	1.58	1.67	1.83	2.00	1.79	2.00	1.81	1.72	1.74	1.70	**21.53**
< 10	6.29	5.69	4.79	5.61	7.08	7.70	7.28	5.60	5.61	5.82	5.84	6.09	**73.40**
< 15	8.14	7.33	6.56	7.43	10.26	10.47	9.48	6.83	7.16	7.43	7.76	8.03	**96.87**
< 20	8.47	7.70	6.70	7.73	10.85	10.56	9.56	6.87	7.45	7.70	8.00	8.26	**99.88**
< 25	8.49	7.73		7.74	10.86				7.46	7.73	8.03		**100.00**
Total	**0.71**	**0.64**	**0.56**	**0.65**	**0.91**	**0.88**	**0.80**	**0.57**	**0.62**	**0.64**	**0.67**	**0.69**	**8.33**
Mean	**8.0**	**7.7**	**7.7**	**7.8**	**8.6**	**7.9**	**7.7**	**7.0**	**7.7**	**7.8**	**7.8**	**8.0**	**7.8**
Maximum	**20.8**	**23.2**	**18.0**	**22.3**	**22.0**	**17.6**	**18.8**	**18.1**	**21.1**	**21.2**	**23.0**	**19.6**	**23.2**
Month: October													
< 5	1.32	1.55	1.62	1.42	1.02	1.38	1.55	1.26	1.20	1.26	1.07	1.22	**15.87**
< 10	6.54	6.04	5.88	5.41	4.65	5.15	5.68	5.01	4.25	3.99	3.78	5.60	**61.97**
< 15	9.79	8.56	8.44	8.11	7.58	8.09	8.23	7.17	6.20	5.79	5.79	8.43	**92.20**
< 20	10.58	9.20	9.13	8.79	8.21	9.09	8.69	7.47	6.55	6.23	6.42	9.03	**99.41**
< 25	10.64	9.26	9.27	8.83	8.30	9.16		7.48		6.26	6.47	9.07	**99.98**
< 30	10.65	9.27	9.28										**100.00**
Total	**0.89**	**0.77**	**0.77**	**0.74**	**0.69**	**0.76**	**0.72**	**0.62**	**0.55**	**0.52**	**0.54**	**0.76**	**8.33**
Mean	**9.1**	**8.8**	**8.9**	**9.0**	**9.5**	**9.5**	**8.6**	**8.4**	**8.6**	**8.7**	**9.2**	**9.1**	**9.0**
Maximum	**25.3**	**27.4**	**25.8**	**21.0**	**22.0**	**21.8**	**19.1**	**20.3**	**19.3**	**21.5**	**23.2**	**21.6**	**27.4**
Month: November													
< 5	1.34	1.17	1.54	1.23	1.14	1.32	1.23	1.26	0.96	0.93	0.81	0.94	**13.87**
< 10	5.71	4.94	5.53	5.30	4.66	5.18	5.65	5.38	4.12	3.60	2.98	4.11	**57.17**
< 15	8.66	7.21	7.74	8.22	8.36	8.90	9.33	8.60	6.18	5.85	4.96	6.75	**90.78**
< 20	9.21	7.66	8.31	8.85	9.11	9.85	10.28	9.44	6.84	6.50	5.42	7.50	**98.96**
< 25	9.31	7.79	8.38	8.95	9.20	9.96	10.41	9.45	6.92	6.56	5.52	7.54	**99.98**
< 30	9.32	7.80											**100.00**
Total	**0.78**	**0.65**	**0.70**	**0.75**	**0.77**	**0.83**	**0.87**	**0.79**	**0.58**	**0.55**	**0.46**	**0.63**	**8.33**
Mean	**9.1**	**9.0**	**8.8**	**9.3**	**9.8**	**9.7**	**9.8**	**9.4**	**9.3**	**9.5**	**9.6**	**9.6**	**9.4**
Maximum	**27.0**	**25.6**	**23.3**	**24.5**	**22.7**	**22.3**	**22.3**	**20.9**	**22.0**	**23.0**	**23.9**	**21.6**	**27.0**
Month: December													
< 5	1.16	1.10	1.00	1.00	1.02	0.96	0.91	0.94	0.74	0.87	1.08	1.06	**11.84**
< 10	5.79	5.84	4.29	4.11	4.32	4.18	4.75	4.73	3.32	3.03	3.63	4.24	**52.23**
< 15	9.61	9.42	7.17	6.62	7.58	8.18	8.64	8.41	5.94	5.09	5.44	6.73	**88.85**
< 20	10.34	9.84	7.80	7.29	8.85	9.49	9.91	9.19	6.64	5.91	6.18	7.36	**98.80**
< 25	10.42	9.92	7.90	7.40	8.95	9.59	10.09	9.22	6.66	6.08	6.32	7.44	**100.00**
Total	**0.87**	**0.83**	**0.66**	**0.62**	**0.75**	**0.80**	**0.84**	**0.77**	**0.56**	**0.51**	**0.53**	**0.62**	**8.33**
Mean	**9.7**	**9.3**	**9.7**	**9.5**	**10.2**	**10.6**	**10.5**	**9.8**	**10.0**	**10.2**	**9.6**	**9.4**	**9.9**
Maximum	**22.8**	**24.1**	**23.6**	**23.9**	**22.9**	**22.2**	**24.2**	**22.1**	**21.7**	**24.5**	**23.3**	**23.5**	**24.5**

2.4 Long-term wind statistics

The long-term distribution of wind speed is modelled in terms of a Weibull distribution as described in the Metocean Design Basis Guidelines, Appendix A.

2.4.1 Block A

Figure 2-13 shows the observed and fitted distributions of wind speed at the Block A.

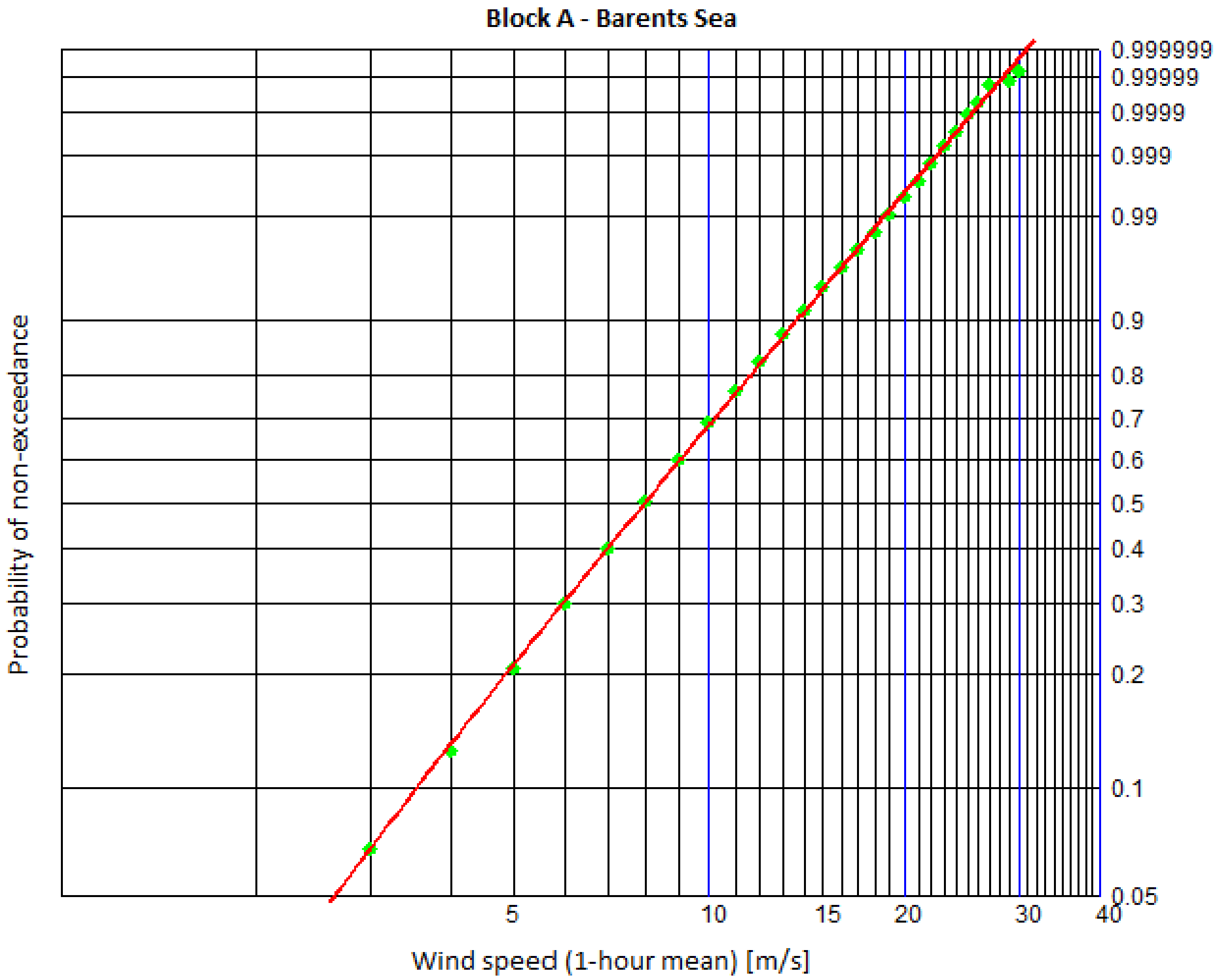


Figure 2-13 Observed (green dots) and fitted (red line) distributions of 1-hour mean wind speed 10 m above sea level at the Block A.

Figure 2-14 and Table 2-22 show directional Weibull parameters and corresponding extremes of 1-hour mean wind speed at the Block A. Figure 2-15 and Table 2-23 show monthly Weibull parameters and corresponding extremes. The extreme values are rounded off to the nearest 0.5 m/s.

For the use of directional extremes in calculating response extremes for a wind governed response quantity, see the Metocean Design Basis Guidelines [1].

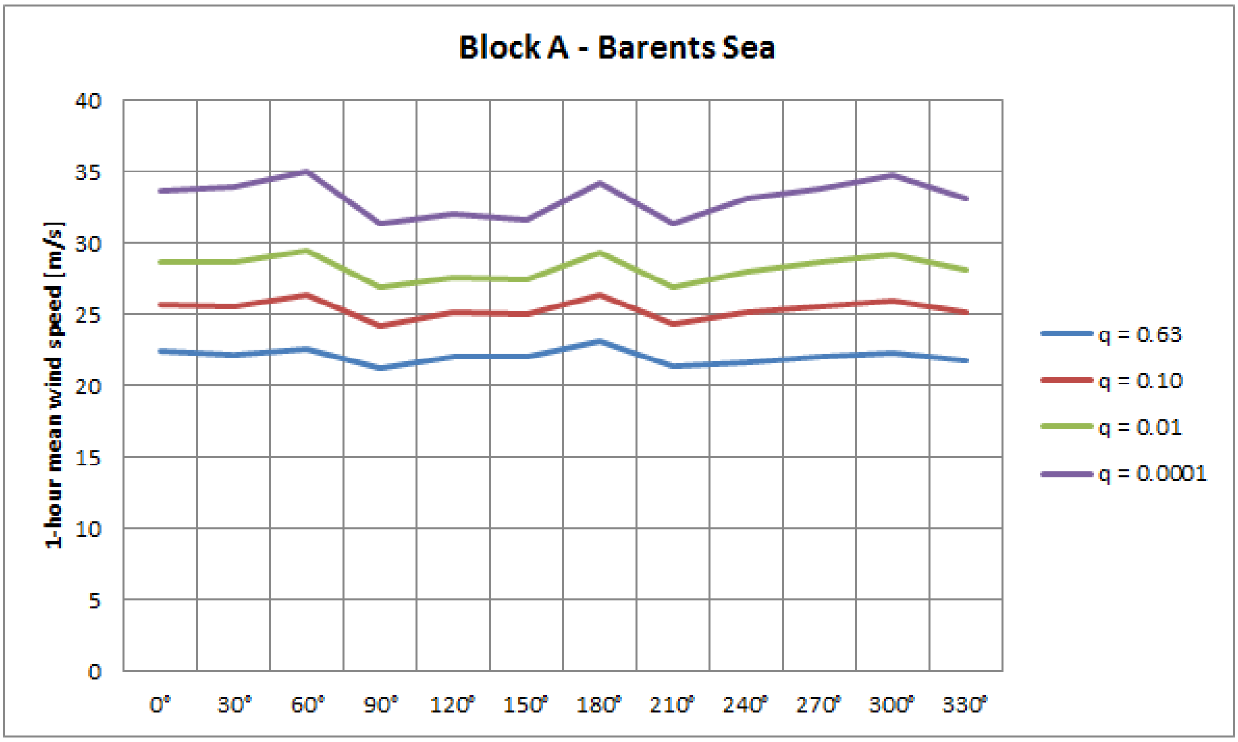


Figure 2-14 Directional extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block A.

Table 2-22 Directional and omni-directional Weibull parameters and corresponding extreme values* for 1-hour mean wind speed 10 m above sea level at the Block A. Duration of event is 1 hour.

Direction	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
0°	9.93	2.067	8.654	0.595	22.5	25.5	28.5	33.5
30°	9.55	1.991	8.248	0.738	22.0	25.5	28.5	34.0
60°	8.49	1.923	8.134	0.903	22.5	26.5	29.5	35.0*
90°	8.72	2.192	8.801	0.316	21.0	24.0	27.0	31.5
120°	9.76	2.320	9.620	0.217	22.0	25.0	27.5	32.0
150°	9.99	2.397	9.871	0.208	22.0	25.0	27.5	31.5
180°	8.70	2.214	9.766	0.158	23.0	26.5	29.5	34.0
210°	7.28	2.345	9.771	-0.293	21.5	24.5	27.0	31.5
240°	6.42	2.093	8.859	0.251	21.5	25.0	28.0	33.0
270°	6.73	2.074	8.967	0.134	22.0	25.5	28.5	34.0
300°	6.64	1.998	8.713	0.322	22.5	26.0	29.0	35.0
330°	7.80	2.053	8.503	0.599	22.0	25.0	28.0	33.0
0° - 360°	**100.00**	**2.156**	**9.002**	**0.366**	**25.5**	**28.0**	**30.5**	**35.0**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

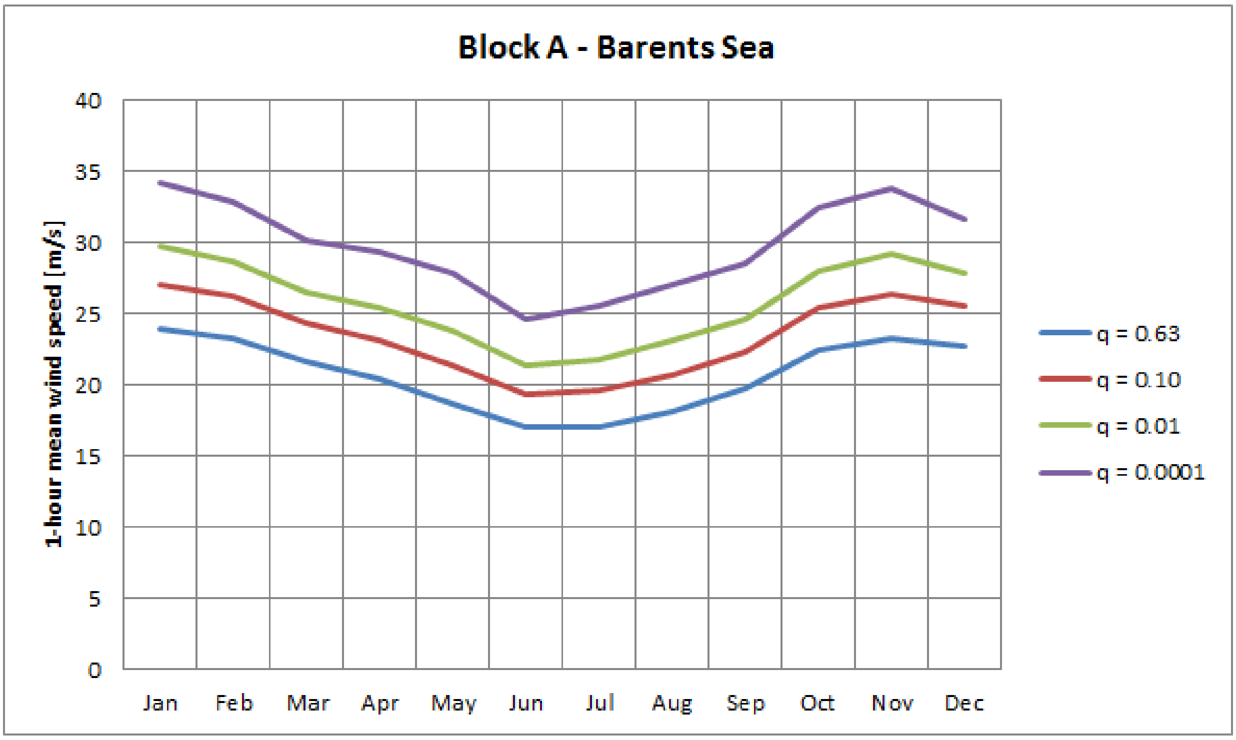


Figure 2-15 **Monthly extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block A.**

Table 2-23 **Monthly and annual Weibull parameters and corresponding extreme values for 1-hour mean wind speed 10 m above sea level at the Block A. Duration of event is 1 hour.**

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
Jan	8.33	2.387	10.608	0.510	24.0	27.0	29.5	34.0
Feb	8.33	2.557	11.176	-0.076	23.5	26.0	28.5	33.0
Mar	8.33	2.619	10.545	-0.031	21.5	24.5	26.5	30.0
Apr	8.33	2.390	9.244	0.053	20.5	23.0	25.5	29.5
May	8.33	2.128	7.514	0.418	18.5	21.5	24.0	28.0
Jun	8.33	2.386	7.832	-0.297	17.0	19.5	21.5	24.5
Jul	8.33	2.167	7.176	-0.035	17.0	19.5	22.0	25.5
Aug	8.33	2.169	7.567	0.004	18.0	20.5	23.0	27.0
Sept	8.33	2.333	8.678	0.195	19.5	22.5	24.5	28.5
Oct	8.33	2.327	9.831	0.272	22.5	25.5	28.0	32.5
Nov	8.33	2.320	10.147	0.404	23.5	26.5	29.0	34.0
Dec	8.33	2.625	11.114	-0.071	22.5	25.5	28.0	31.5
Year	**100.00**	**2.156**	**9.002**	**0.366**	**25.5**	**28.0**	**30.5**	**35.0**

* Since no adjustment is made of the predicted extremes to match the marginal extremes, they may all be smaller than the all-year extreme value.

2.4.2 Block B

Figure 2-16 shows the observed and fitted distributions of wind speed at the Block B.

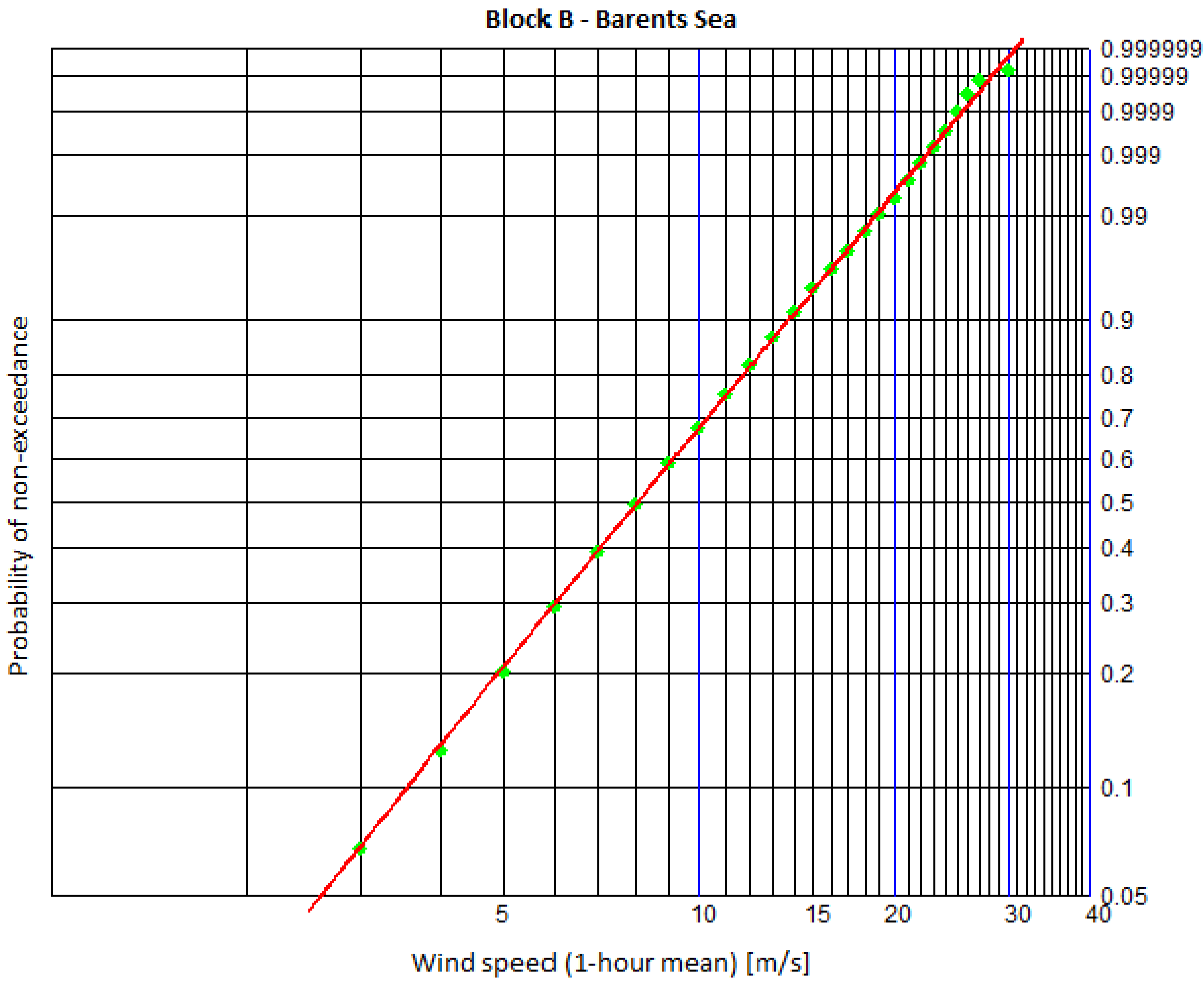


Figure 2-16 Observed (green dots) and fitted (red line) distributions of 1-hour mean wind speed 10 m above sea level at the Block B.

Figure 2-17 and Table 2-24 show directional Weibull parameters and corresponding extremes of 1-hour mean wind speed at the Block B. Figure 2-18 and Table 2-25 show monthly Weibull parameters and corresponding extremes. The extreme values are rounded off to the nearest 0.5 m/s.

For the use of directional extremes in calculating response extremes for a wind governed response quantity, see the Metocean Design Basis Guidelines [1].

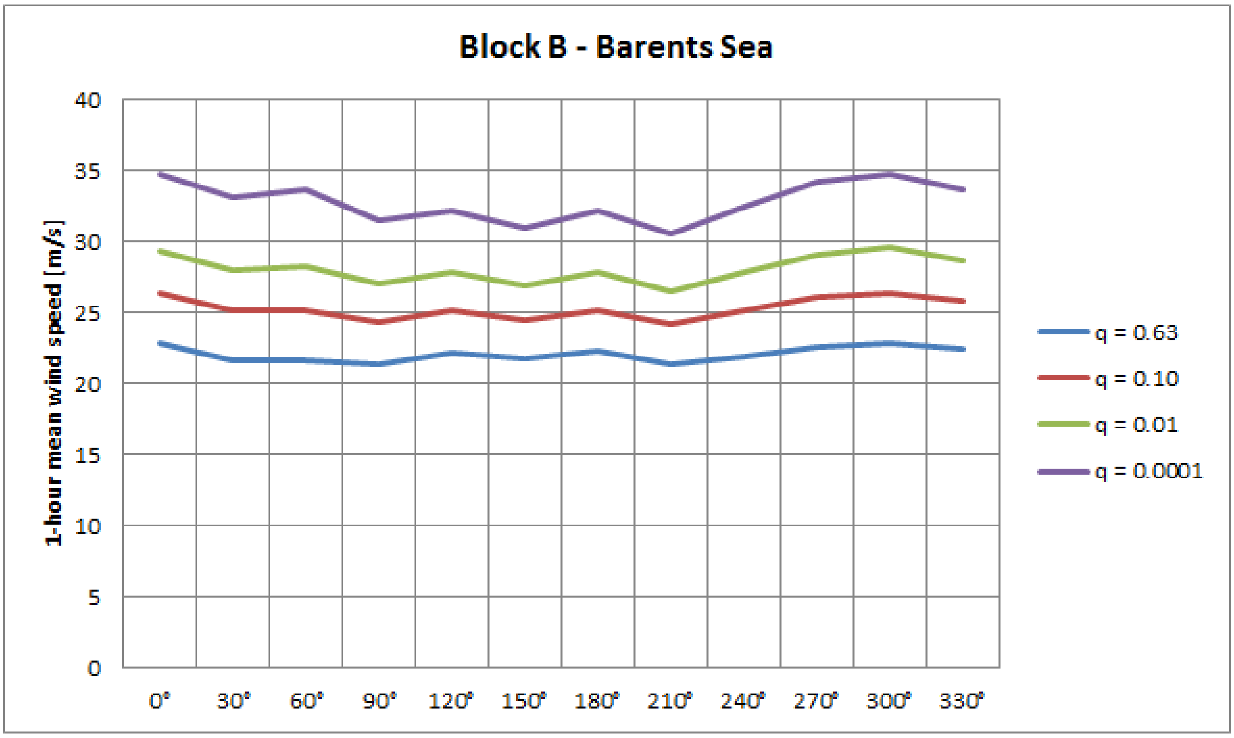


Figure 2-17 Directional extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block B.

Table 2-24 Directional and omni-directional Weibull parameters and corresponding extreme values* for 1-hour mean wind speed 10 m above sea level at the Block B. Duration of event is 1 hour.

Direction	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
0°	8.99	2.014	8.644	0.618	23.0	26.5	29.5	34.5
30°	8.08	2.034	8.436	0.407	21.5	25.0	28.0	33.0
60°	7.59	1.941	7.918	0.830	21.5	25.0	28.0	33.5
90°	8.40	2.245	9.244	-0.079	21.5	24.5	27.0	31.5
120°	9.85	2.322	9.767	-0.003	22.0	25.0	28.0	32.0
150°	10.12	2.396	9.652	0.292	22.0	24.5	27.0	31.0
180°	9.13	2.332	9.807	0.105	22.5	25.0	28.0	32.0
210°	8.03	2.543	10.527	-0.644	21.5	24.0	26.5	30.5
240°	7.14	2.268	9.702	-0.168	22.0	25.0	28.0	32.5
270°	7.46	2.132	9.383	0.099	22.5	26.0	29.0	34.0
300°	7.33	2.035	8.943	0.425	23.0	26.5	29.5	35.0*
330°	7.88	2.127	9.152	0.285	22.5	26.0	28.5	33.5
0° - 360°	**100.00**	**2.204**	**9.264**	**0.204**	**25.5**	**28.0**	**30.5**	**35.0**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

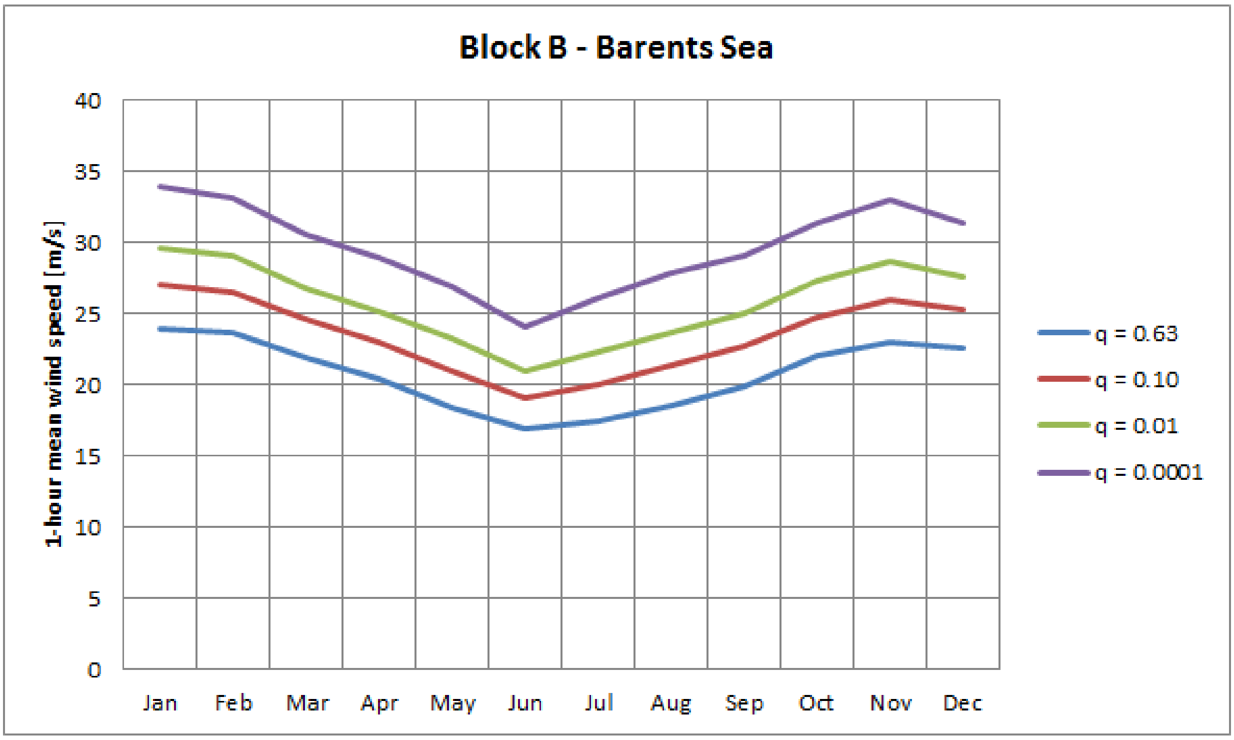


Figure 2-18 Monthly extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block B.

Table 2-25 Monthly and annual Weibull parameters and corresponding extreme values for 1-hour mean wind speed 10 m above sea level at the Block B. Duration of event is 1 hour.

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
Jan	8.33	2.499	11.212	0.070	24.0	27.0	29.5	34.0
Feb	8.33	2.584	11.440	-0.156	23.5	26.5	29.0	33.0
Mar	8.33	2.653	10.955	-0.393	22.0	24.5	27.0	30.5
Apr	8.33	2.516	9.712	-0.176	20.5	23.0	25.0	29.0
May	8.33	2.298	8.057	0.132	18.5	21.0	23.0	27.0
Jun	8.33	2.524	8.262	-0.578	17.0	19.0	21.0	24.0
Jul	8.33	2.163	7.321	-0.091	17.5	20.0	22.5	26.0
Aug	8.33	2.121	7.547	0.118	18.5	21.5	23.5	28.0
Sept	8.33	2.310	8.787	0.040	20.0	22.5	25.0	29.0
Oct	8.33	2.477	10.386	-0.257	22.0	25.0	27.5	31.5
Nov	8.33	2.416	10.513	0.038	23.0	26.0	28.5	33.0
Dec	8.33	2.728	11.570	-0.468	22.5	25.5	27.5	31.5
Year	**100.00**	**2.204**	**9.264**	**0.204**	**25.5**	**28.0**	**30.5**	**35.0**

* Since no adjustment is made of the predicted extremes to match the marginal extremes, they may all be smaller than the all-year extreme value.

2.4.3 Block C

Figure 2-19 shows the observed and fitted distributions of wind speed at the Block C.

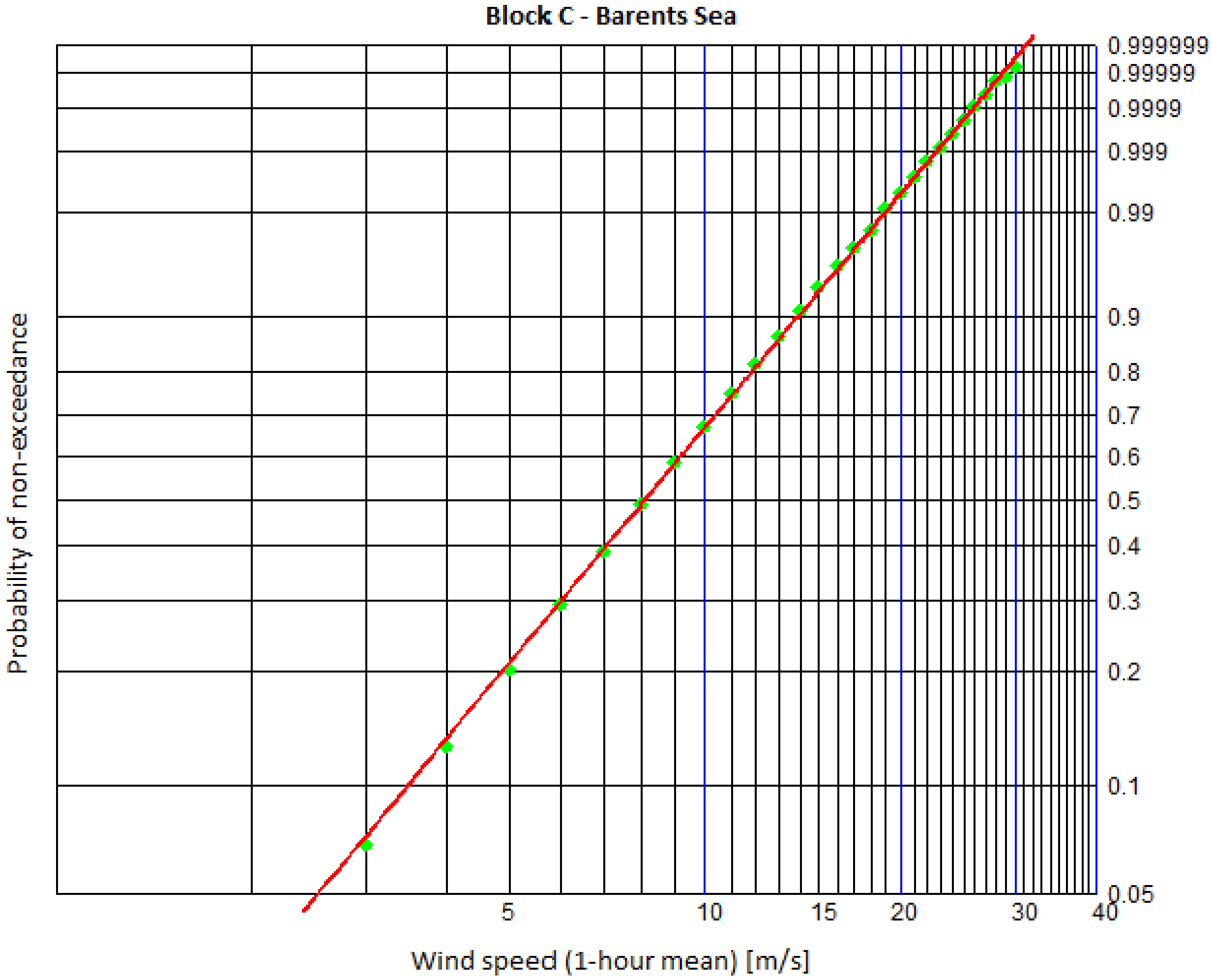


Figure 2-19 Observed (green dots) and fitted (red line) distributions of 1-hour mean wind speed 10 m above sea level at the Block C.

Figure 2-20 and Table 2-26 show directional Weibull parameters and corresponding extremes of 1-hour mean wind speed at the Block C. Figure 2-21 and Table 2-27 show monthly Weibull parameters and corresponding extremes. The extreme values are rounded off to the nearest 0.5 m/s.

For the use of directional extremes in calculating response extremes for a wind governed response quantity, see the Metocean Design Basis Guidelines [1].

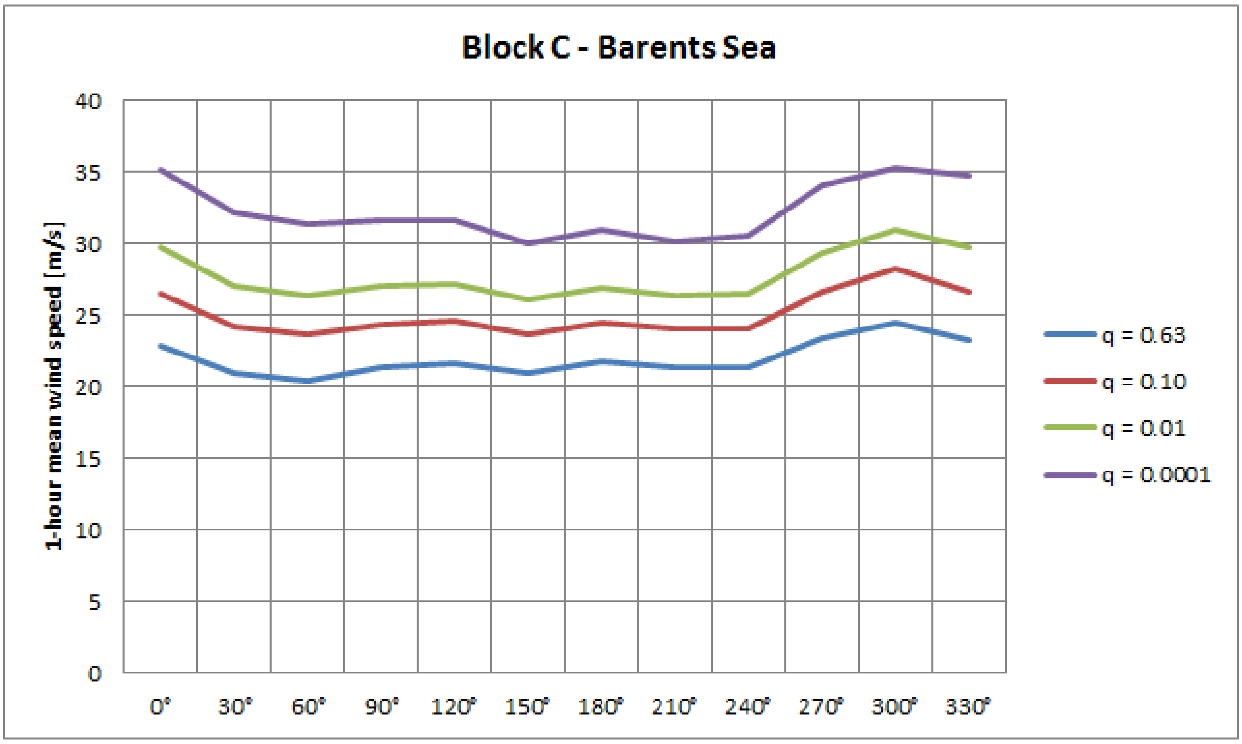


Figure 2-20 Directional extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block C.

Table 2-26 Directional and omni-directional Weibull parameters and corresponding extreme values* for 1-hour mean wind speed 10 m above sea level at the Block C. Duration of event is 1 hour.

Direction	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
0°	7.95	1.984	8.641	0.525	23.0	26.5	29.5	35.0
30°	6.75	2.029	8.211	0.381	21.0	24.0	27.0	32.0
60°	6.35	2.066	8.182	0.394	20.5	23.5	26.5	31.5
90°	7.63	2.229	9.221	-0.114	21.5	24.5	27.0	31.5
120°	9.35	2.281	9.377	0.034	21.5	24.5	27.0	31.5
150°	9.98	2.369	9.217	0.340	21.0	23.5	26.0	30.0
180°	9.54	2.507	10.367	-0.413	22.0	24.5	27.0	31.0
210°	8.76	2.658	11.004	-1.027	21.5	24.0	26.5	30.0
240°	7.81	2.487	10.299	-0.616	21.5	24.0	26.0	30.5
270°	8.89	2.339	10.574	-0.372	23.5	26.5	29.5	34.0
300°	8.38	2.008	9.386	0.453	24.5	28.5	31.0*	35.5*
330°	8.61	2.123	9.396	0.287	23.0	26.5	29.5	35.0
0° - 360°	**100.00**	**2.207**	**9.454**	**0.069**	**26.0**	**28.5**	**31.0**	**35.5**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

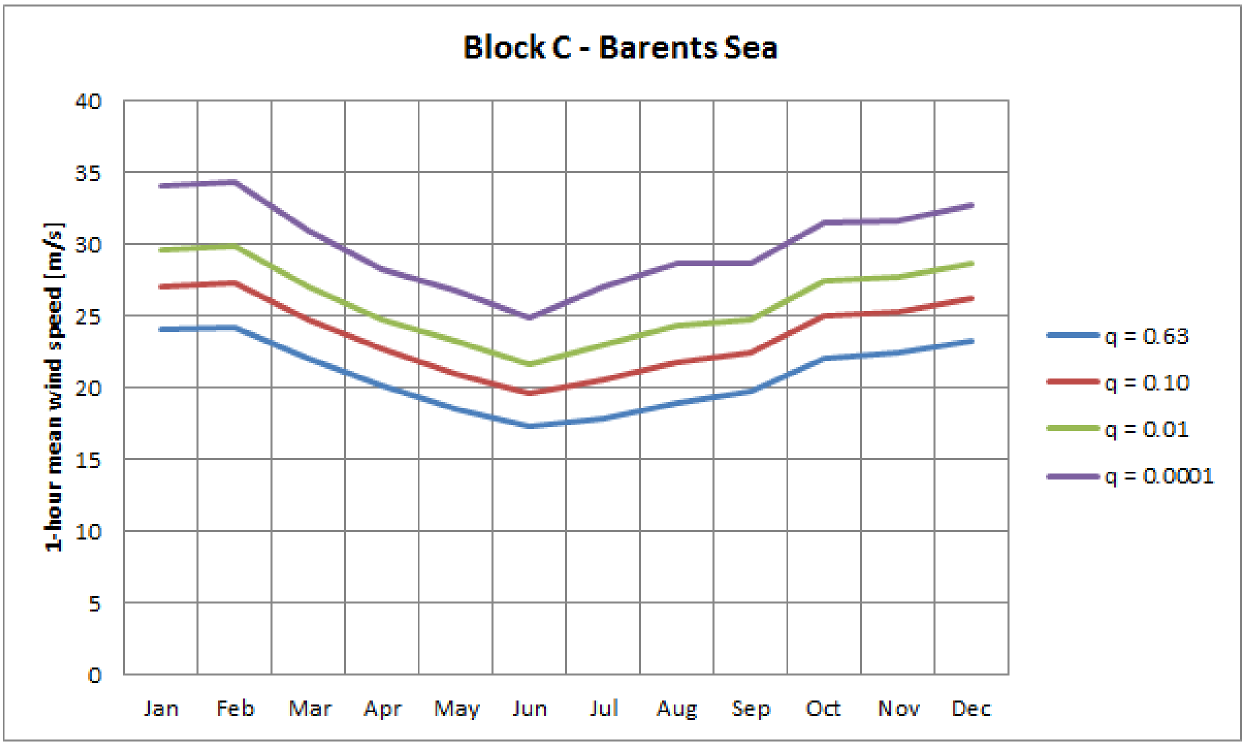


Figure 2-21 Monthly extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block C.

Table 2-27 Monthly and annual Weibull parameters and corresponding extreme values for 1-hour mean wind speed 10 m above sea level at the Block C. Duration of event is 1 hour.

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
Jan	8.33	2.529	11.466	-0.172	24.0	27.0	29.5	34.0
Feb	8.33	2.534	11.692	-0.389	24.0	27.5	30.0	34.5
Mar	8.33	2.678	11.270	-0.711	22.0	25.0	27.0	31.0
Apr	8.33	2.628	10.076	-0.489	20.0	22.5	25.0	28.5
May	8.33	2.394	8.570	-0.321	18.5	21.0	23.0	27.0
Jun	8.33	2.458	8.274	-0.487	17.5	19.5	21.5	25.0
Jul	8.33	2.124	7.347	0.049	18.0	20.5	23.0	27.0
Aug	8.33	2.073	7.511	0.244	19.0	22.0	24.5	28.5
Sept	8.33	2.370	8.987	-0.121	20.0	22.5	25.0	28.5
Oct	8.33	2.524	10.753	-0.582	22.0	25.0	27.5	31.5
Nov	8.33	2.621	11.284	-0.644	22.5	25.5	27.5	31.5
Dec	8.33	2.636	11.648	-0.506	23.5	26.0	28.5	32.5
Year	**100.00**	**2.207**	**9.454**	**0.069**	**26.0**	**28.5**	**31.0**	**35.5**

* Since no adjustment is made of the predicted extremes to match the marginal extremes, they may all be smaller than the all-year extreme value.

2.4.4 Block D

Figure 2-22 shows the observed and fitted distributions of wind speed at the Block D.

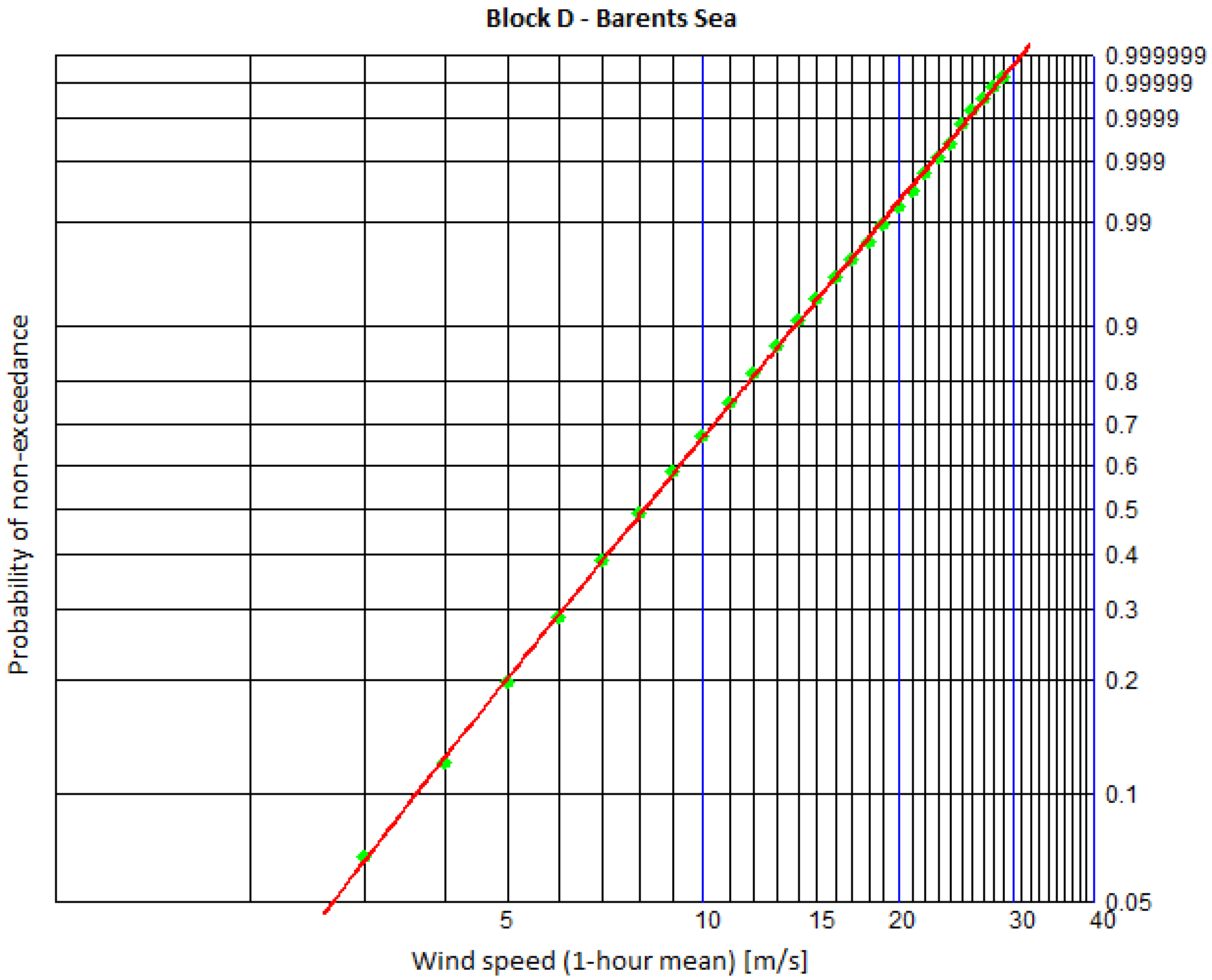


Figure 2-22 Observed (green dots) and fitted (red line) distributions of 1-hour mean wind speed 10 m above sea level at the Block D.

Figure 2-23 and Table 2-28 show directional Weibull parameters and corresponding extremes of 1-hour mean wind speed at the Block D. Figure 2-24 and Table 2-29 show monthly Weibull parameters and corresponding extremes. The extreme values are rounded off to the nearest 0.5 m/s.

For the use of directional extremes in calculating response extremes for a wind governed response quantity, see the Metocean Design Basis Guidelines [1].

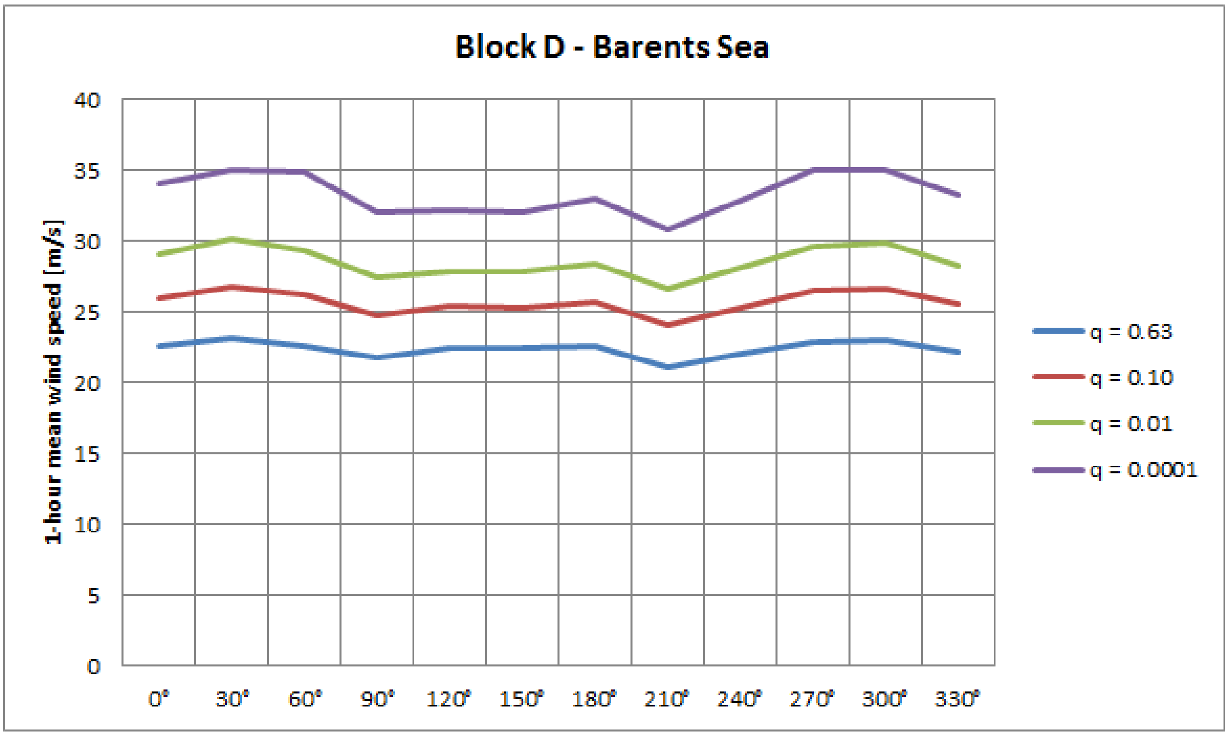


Figure 2-23 Directional extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block D.

Table 2-28 Directional and omni-directional Weibull parameters and corresponding extreme values* for 1-hour mean wind speed 10 m above sea level at the Block D. Duration of event is 1 hour.

Direction	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
0°	9.06	2.062	8.776	0.586	22.5	26.0	29.0	34.0
30°	8.59	1.914	8.302	0.794	23.0	27.0	30.0	35.0*
60°	8.13	1.957	8.337	0.778	22.5	26.0	29.5	35.0
90°	8.70	2.256	9.384	0.059	22.0	25.0	27.5	32.0
120°	10.32	2.387	10.070	-0.021	22.5	25.5	28.0	32.0
150°	10.19	2.395	10.030	0.063	22.5	25.5	28.0	32.0
180°	8.56	2.297	9.914	0.004	22.5	25.5	28.5	33.0
210°	7.26	2.373	9.742	-0.254	21.0	24.0	26.5	31.0
240°	6.88	2.233	9.625	-0.091	22.0	25.5	28.0	33.0
270°	7.23	2.051	9.083	0.320	23.0	26.5	30.0	35.0*
300°	7.15	2.010	8.920	0.465	23.0	26.5	30.0	35.0*
330°	7.94	2.138	9.070	0.320	22.0	25.5	28.5	33.5
0° - 360°	**100.00**	**2.199**	**9.274**	**0.274**	**25.5**	**28.5**	**30.5**	**35.0**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

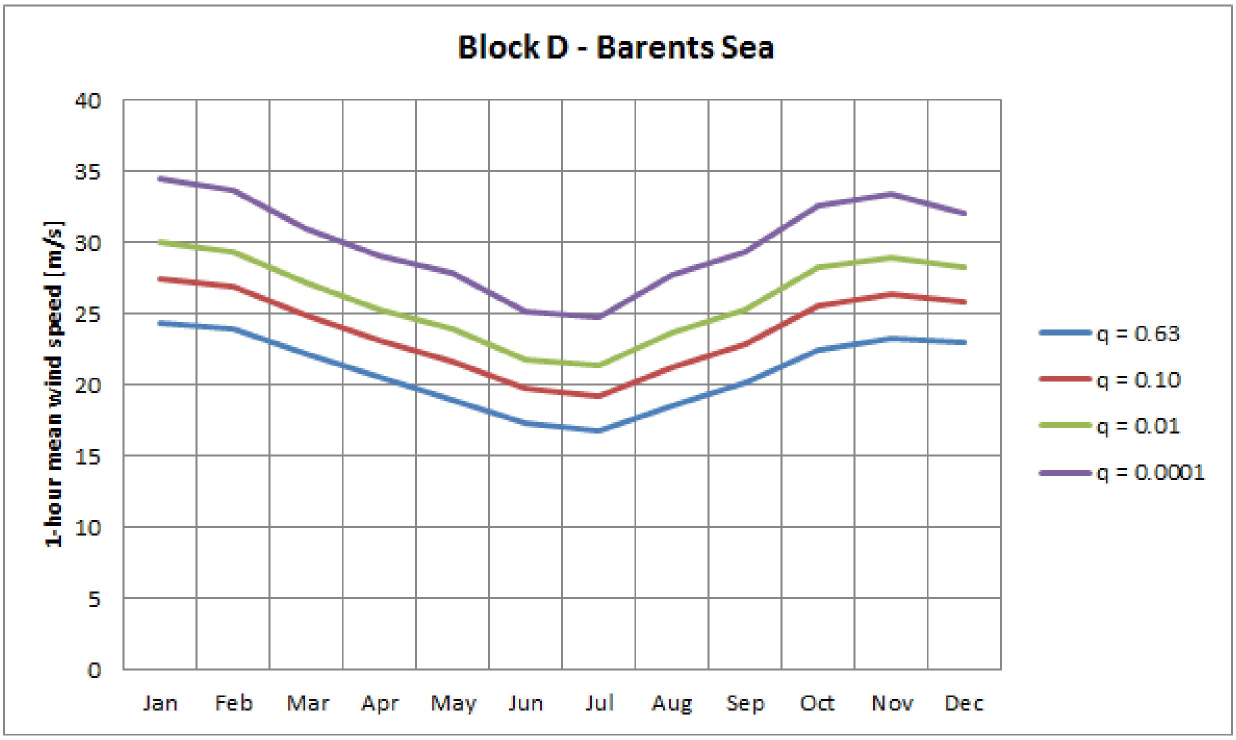


Figure 2-24 **Monthly extreme values of 1-hour mean wind speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} 10 m above sea level at the Block D.**

Table 2-29 **Monthly and annual Weibull parameters and corresponding extreme values for 1-hour mean wind speed 10 m above sea level at the Block D. Duration of event is 1 hour.**

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]	[m/s]
Jan	8.33	2.457	11.146	0.244	24.5	27.5	30.0	34.5
Feb	8.33	2.571	11.579	-0.194	24.0	27.0	29.5	33.5
Mar	8.33	2.636	10.924	-0.153	22.0	25.0	27.0	31.0
Apr	8.33	2.526	9.745	-0.076	20.5	23.0	25.5	29.0
May	8.33	2.264	8.204	0.038	19.0	21.5	24.0	28.0
Jun	8.33	2.361	7.918	-0.270	17.5	19.5	22.0	25.0
Jul	8.33	2.267	7.379	-0.133	17.0	19.0	21.5	25.0
Aug	8.33	2.145	7.629	0.115	18.5	21.0	23.5	27.5
Sept	8.33	2.303	8.842	0.053	20.0	23.0	25.5	29.5
Oct	8.33	2.349	10.043	0.114	22.5	25.5	28.0	32.5
Nov	8.33	2.399	10.531	0.110	23.0	26.5	29.0	33.5
Dec	8.33	2.672	11.544	-0.351	23.0	26.0	28.0	32.0
Year	**100.00**	**2.199**	**9.274**	**0.274**	**25.5**	**28.5**	**30.5**	**35.0**

* Since no adjustment is made of the predicted extremes to match the marginal extremes, they may all be smaller than the all-year extreme value.

2.5 Wind profile

Offshore wind profiles are described in the Metocean Design Basis Guidelines [1].

2.6 Turbulence intensity

Turbulence intensity at offshore locations is described in the Metocean Design Basis Guidelines [1].

2.7 Wind gust

The computation of wind gust is performed as described in the Metocean Design Basis Guidelines [1].

Table 2-30 – Table 2-33 show directional and omni-directional, monthly and annual extreme values for 10-minute average wind speed 10 m above mean sea level at the Block A, Block B, Block C and Block D.

Table 2-30 Directional and omni-directional, monthly and annual extreme values for 10-minute average wind speed 10 m above sea level at the Block A.

Direction	Annual probability of exceedance				Month	Annual probability of exceedance		
	0.63	10^{-1}	10^{-2}			0.63	10^{-1}	10^{-2}
-	[m/s]	[m/s]	[m/s]		-	[m/s]	[m/s]	[m/s]
0°	25.0	28.0	31.5		**Jan**	26.5	30.0	32.5
30°	24.0	28.0	31.5		**Feb**	26.0	28.5	31.5
60°	25.0	29.0	32.5		**Mar**	23.5	27.0	29.0
90°	23.0	26.5	30.0		**Apr**	22.5	25.5	28.0
120°	24.0	27.5	30.5		**May**	20.5	23.5	26.5
150°	24.0	27.5	30.5		**Jun**	18.5	21.5	23.5
180°	25.5	29.0	32.5		**Jul**	18.5	21.5	24.0
210°	23.5	27.0	30.0		**Aug**	20.0	22.5	25.5
240°	23.5	27.5	31.0		**Sept**	21.5	25.0	27.0
270°	24.0	28.0	31.5		**Oct**	25.0	28.0	31.0
300°	25.0	28.5	32.0		**Nov**	26.0	29.0	32.0
330°	24.0	27.5	31.0		**Dec**	25.0	28.0	31.0
0° - 360°	28.0	31.0	33.5		**Year**	28.0	31.0	33.5

Table 2-31 **Directional and omni-directional, monthly and annual extreme values for 10-minute average wind speed 10 m above sea level at the Block C.**

Direction	Annual probability of exceedance				Month	Annual probability of exceedance		
	0.63	10^{-1}	10^{-2}			0.63	10^{-1}	10^{-2}
-	[m/s]	[m/s]	[m/s]		-	[m/s]	[m/s]	[m/s]
0°	25.5	29.0	32.5		**Jan**	26.5	30.0	32.5
30°	23.5	27.5	31.0		**Feb**	26.0	29.0	32.0
60°	23.5	27.5	31.0		**Mar**	24.0	27.0	30.0
90°	23.5	27.0	30.0		**Apr**	22.5	25.5	27.5
120°	24.0	27.5	31.0		**May**	20.5	23.0	25.5
150°	24.0	27.0	30.0		**Jun**	18.5	21.0	23.0
180°	25.0	27.5	31.0		**Jul**	19.5	22.0	25.0
210°	23.5	26.5	29.0		**Aug**	20.5	23.5	26.0
240°	24.0	27.5	31.0		**Sept**	22.0	25.0	27.5
270°	25.0	28.5	32.0		**Oct**	24.0	27.5	30.5
300°	25.5	29.0	32.5		**Nov**	25.5	28.5	31.5
330°	25.0	28.5	31.5		**Dec**	25.0	28.0	30.5
0° - 360°	28.0	31.0	33.5		**Year**	28.0	31.0	33.5

Table 2-32 **Directional and omni-directional, monthly and annual extreme values for 10-minute average wind speed 10 m above sea level at the Block C.**

Direction	Annual probability of exceedance				Month	Annual probability of exceedance		
	0.63	10^{-1}	10^{-2}			0.63	10^{-1}	10^{-2}
-	[m/s]	[m/s]	[m/s]		-	[m/s]	[m/s]	[m/s]
0°	25.5	29.0	32.5		**Jan**	26.5	30.0	32.5
30°	23.0	26.5	30.0		**Feb**	26.5	30.5	33.0
60°	22.5	26.0	29.0		**Mar**	24.0	27.5	30.0
90°	23.5	27.0	30.0		**Apr**	22.0	25.0	27.5
120°	23.5	27.0	30.0		**May**	20.5	23.0	25.5
150°	23.0	26.0	28.5		**Jun**	19.5	21.5	23.5
180°	24.0	27.0	30.0		**Jul**	20.0	22.5	25.5
210°	23.5	26.5	29.0		**Aug**	21.0	24.0	27.0
240°	23.5	26.5	28.5		**Sept**	22.0	25.0	27.5
270°	26.0	29.0	32.5		**Oct**	24.0	27.5	30.5
300°	27.0	31.5	34.0		**Nov**	25.0	28.0	30.5
330°	25.5	29.0	32.5		**Dec**	26.0	28.5	31.5
0° - 360°	28.5	31.5	34.0		**Year**	28.5	31.5	34.0

Table 2-33 Directional and omni-directional, monthly and annual extreme values for 10-minute average wind speed 10 m above sea level at the Block D.

Direction	Annual probability of exceedance				Month	Annual probability of exceedance		
	0.63	10^{-1}	10^{-2}			0.63	10^{-1}	10^{-2}
-	[m/s]	[m/s]	[m/s]		-	[m/s]	[m/s]	[m/s]
0°	25.0	28.5	32.0		**Jan**	27.0	30.5	33.0
30°	25.5	30.0	33.0		**Feb**	26.5	30.0	32.5
60°	25.0	28.5	32.5		**Mar**	24.0	27.5	30.0
90°	24.0	27.5	30.5		**Apr**	22.5	25.5	28.0
120°	25.0	28.0	31.0		**May**	21.0	23.5	26.5
150°	25.0	28.0	31.0		**Jun**	19.5	21.5	24.0
180°	25.0	28.0	31.5		**Jul**	18.5	21.0	23.5
210°	23.0	26.5	29.0		**Aug**	20.5	23.0	26.0
240°	24.0	28.0	31.0		**Sept**	22.0	25.5	28.0
270°	25.5	29.0	33.0		**Oct**	25.0	28.0	31.0
300°	25.5	29.0	33.0		**Nov**	25.5	29.0	32.0
330°	24.0	28.0	31.5		**Dec**	25.5	28.5	31.0
0° - 360°	28.0	31.5	33.5		**Year**	28.0	31.5	33.5

2.8 Wind spectra

Wind spectra are described in the Metocean Design Basis Guidelines [1].

2.9 Operational data

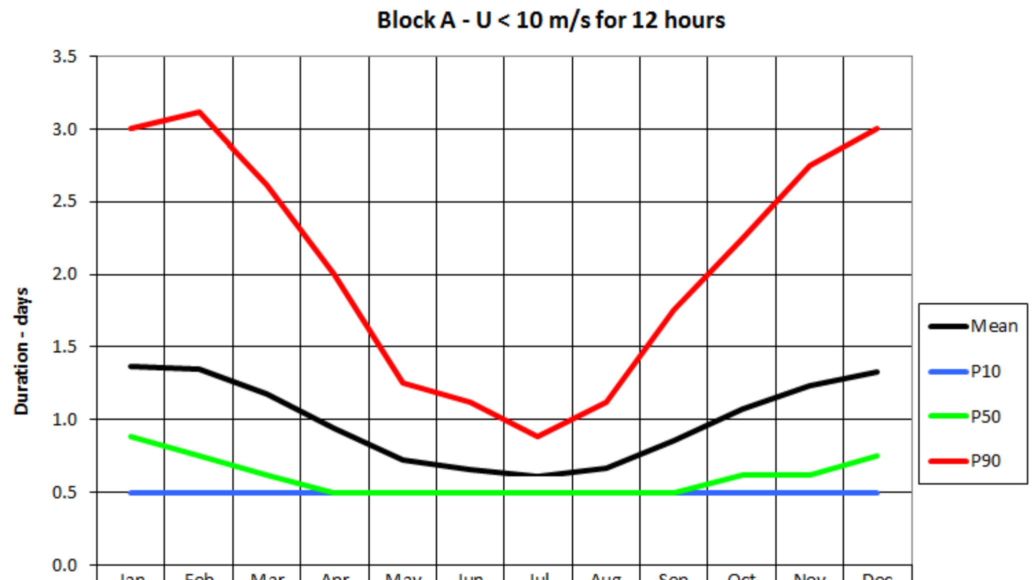
Marine operations which must be completed without break are called critical. Otherwise they are termed non-critical, see Metocean Design Basis Guidelines [1].

The duration statistics presented in this report is restricted to critical operations, only

Figure 2-25 – Figure 2-48 show characteristic durations of operations limited by wind speeds of 10 and 15 m/s for 12, 24 and 48 hours. The figures show the expected mean duration and 10, 50 and 90 percentiles.

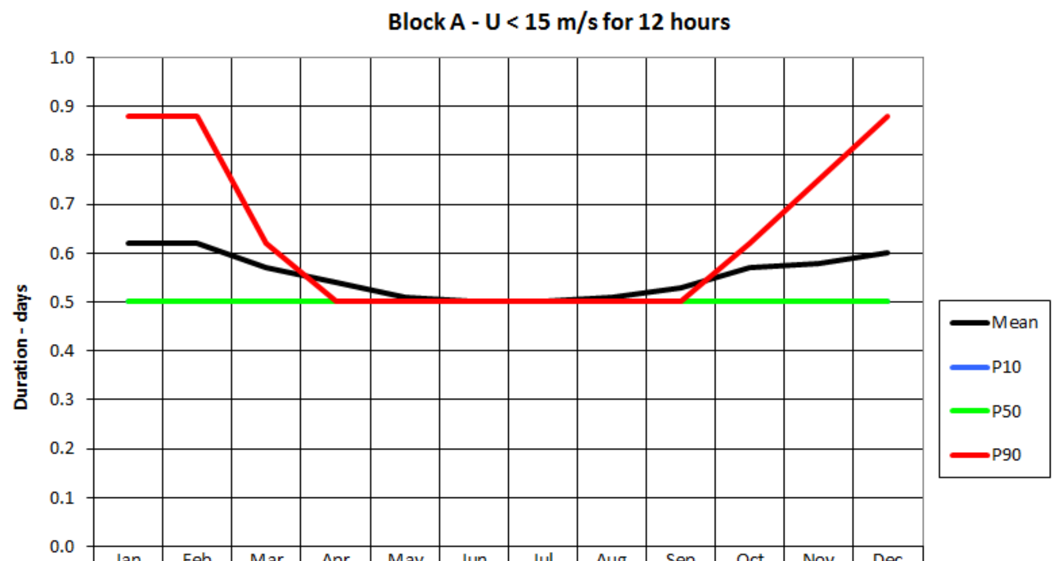
The figures show duration characteristics for completing a critical operation including waiting time. Duration is measured from the day the operation is ready for launching. The day of launching is assumed to be an arbitrary day within the relevant month.

Duration statistics for non-critical operations may be established upon request.



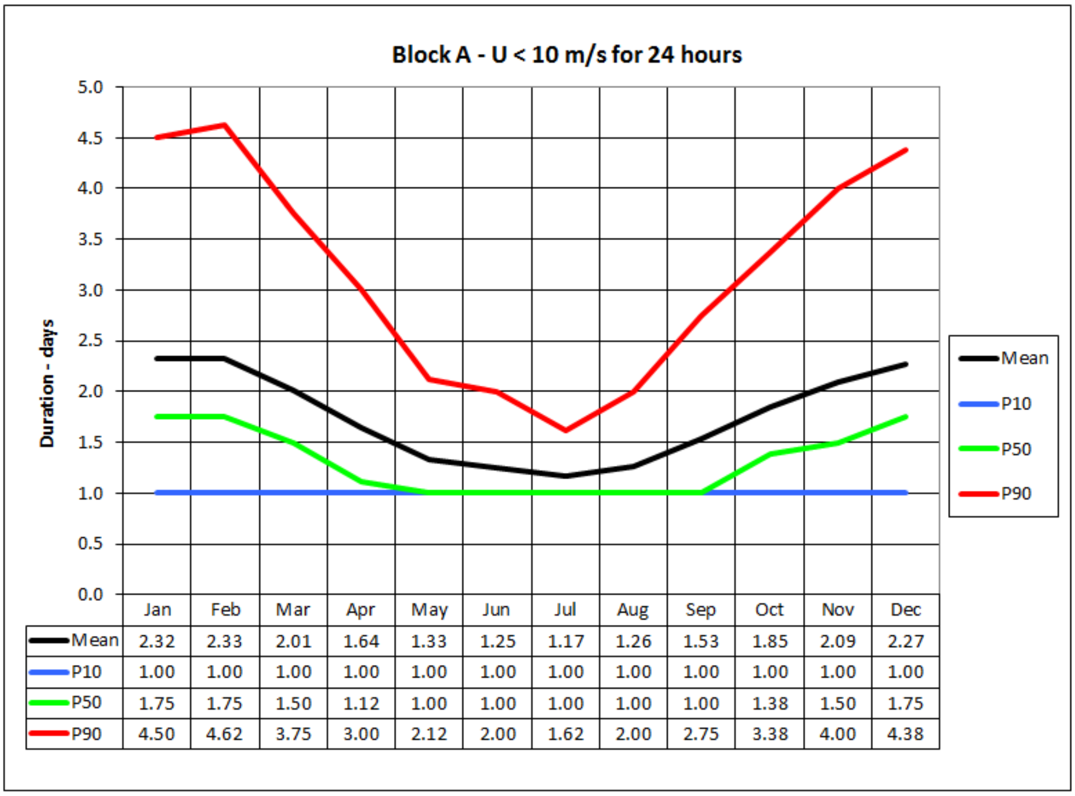
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.37	1.35	1.18	0.94	0.72	0.66	0.61	0.67	0.86	1.07	1.23	1.33
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.88	0.75	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.62	0.75
P90	3.00	3.12	2.62	2.00	1.25	1.12	0.88	1.12	1.75	2.25	2.75	3.00

Figure 2-25 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 12 hours at the Block A.**



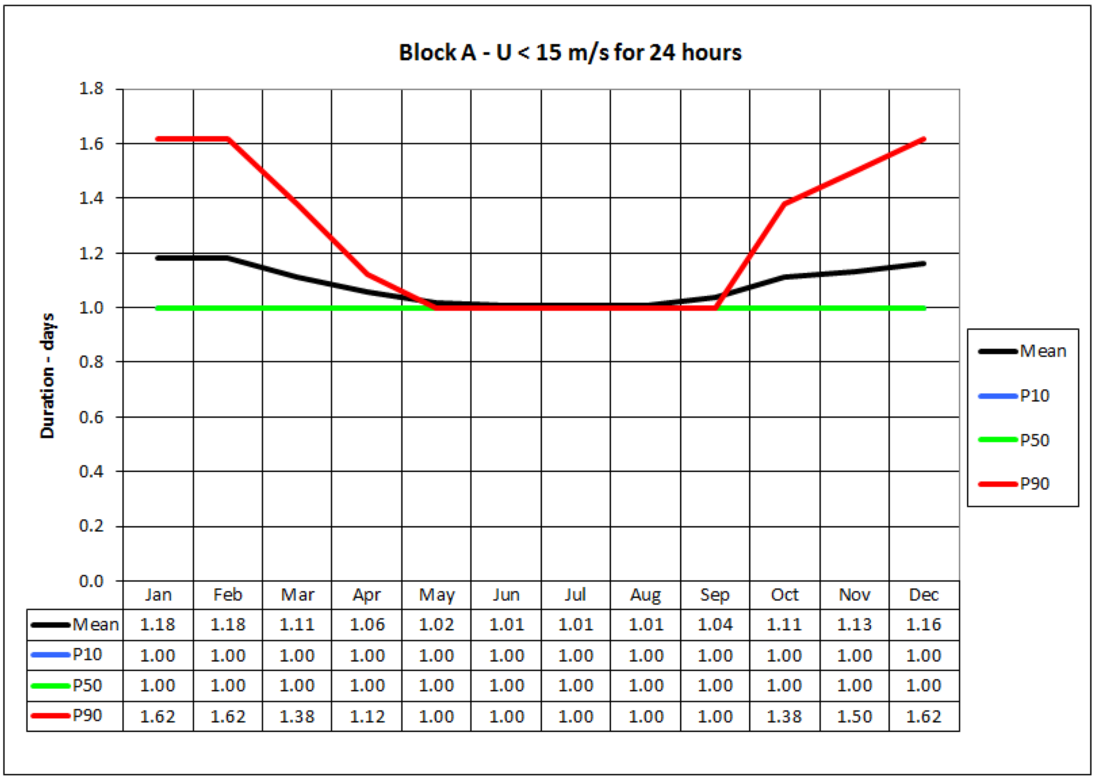
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.62	0.62	0.57	0.54	0.51	0.50	0.50	0.51	0.53	0.57	0.58	0.60
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	0.88	0.88	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88

Figure 2-26 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 12 hours at the Block A.**



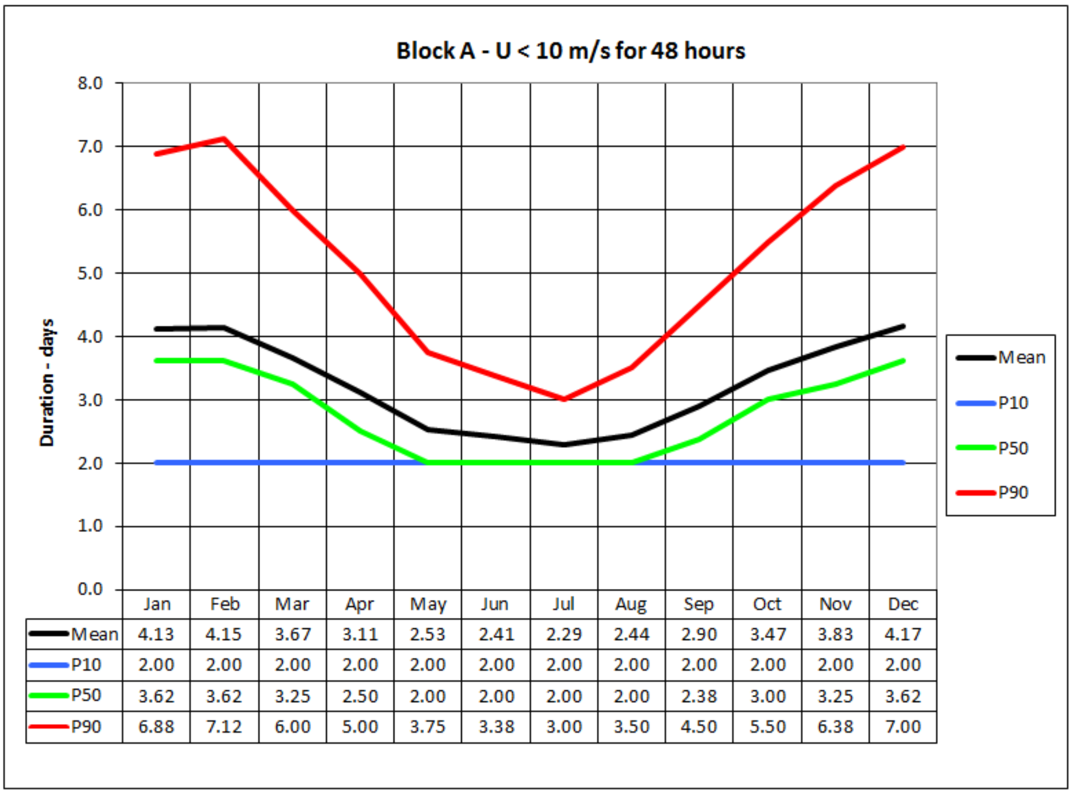
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.32	2.33	2.01	1.64	1.33	1.25	1.17	1.26	1.53	1.85	2.09	2.27
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.75	1.75	1.50	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.50	1.75
P90	4.50	4.62	3.75	3.00	2.12	2.00	1.62	2.00	2.75	3.38	4.00	4.38

Figure 2-27 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 24 hours at the Block A.



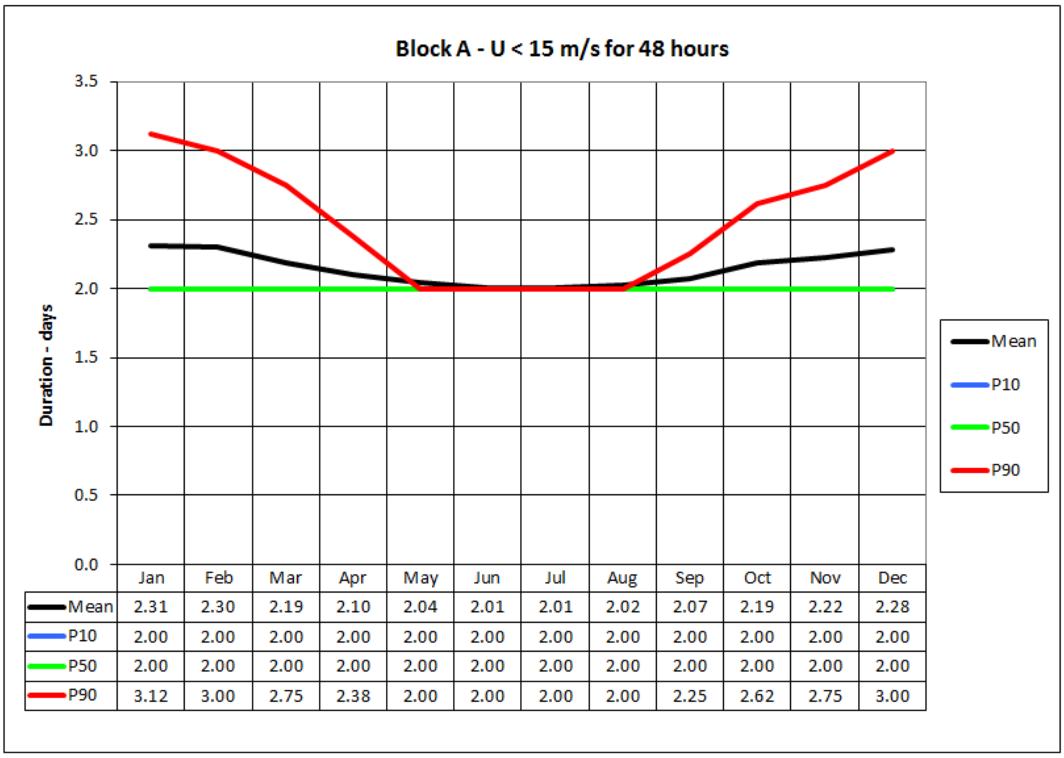
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.18	1.18	1.11	1.06	1.02	1.01	1.01	1.01	1.04	1.11	1.13	1.16
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	1.62	1.62	1.38	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.50	1.62

Figure 2-28 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 24 hours at the Block A.



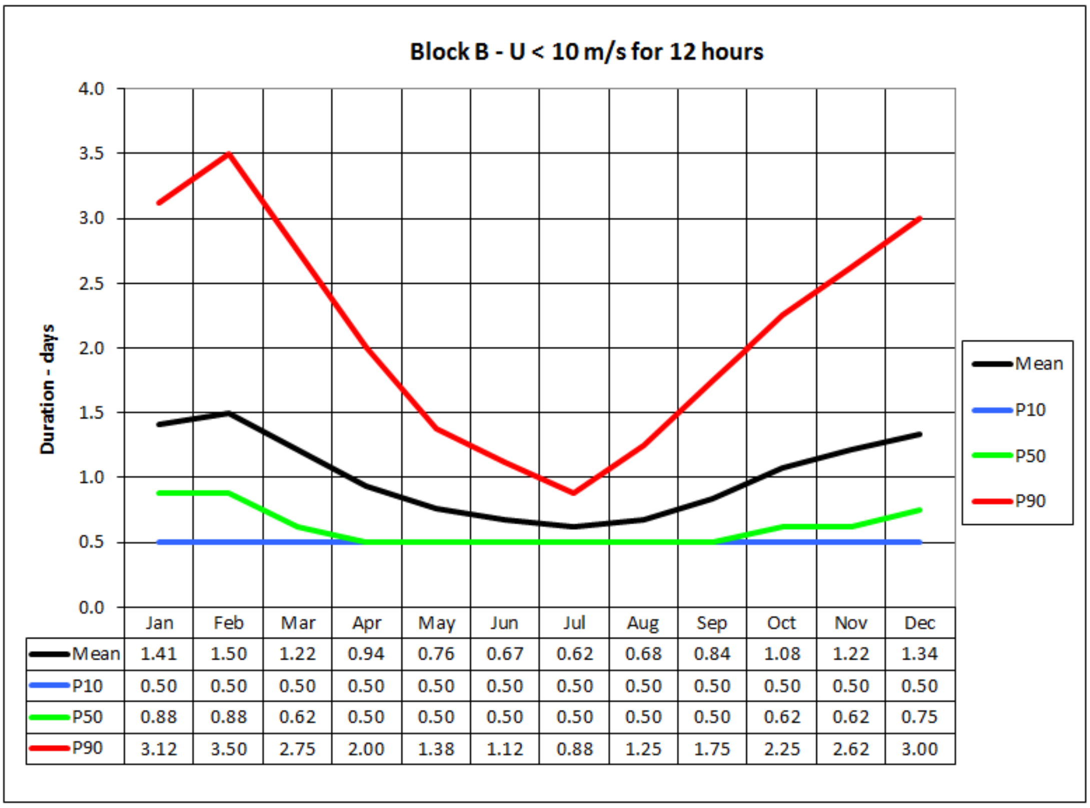
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	4.13	4.15	3.67	3.11	2.53	2.41	2.29	2.44	2.90	3.47	3.83	4.17
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	3.62	3.62	3.25	2.50	2.00	2.00	2.00	2.00	2.38	3.00	3.25	3.62
P90	6.88	7.12	6.00	5.00	3.75	3.38	3.00	3.50	4.50	5.50	6.38	7.00

Figure 2-29 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 48 hours at the Block A.**



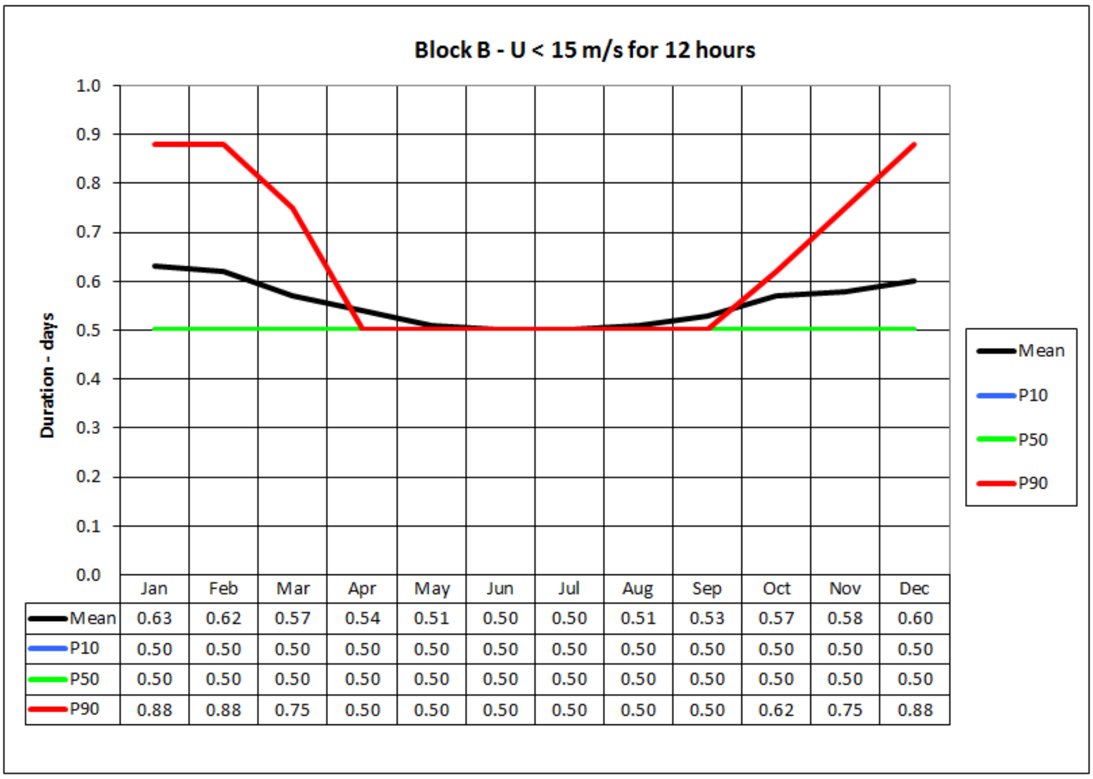
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.31	2.30	2.19	2.10	2.04	2.01	2.01	2.02	2.07	2.19	2.22	2.28
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	3.12	3.00	2.75	2.38	2.00	2.00	2.00	2.00	2.25	2.62	2.75	3.00

Figure 2-30 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 48 hours at the Block A.**



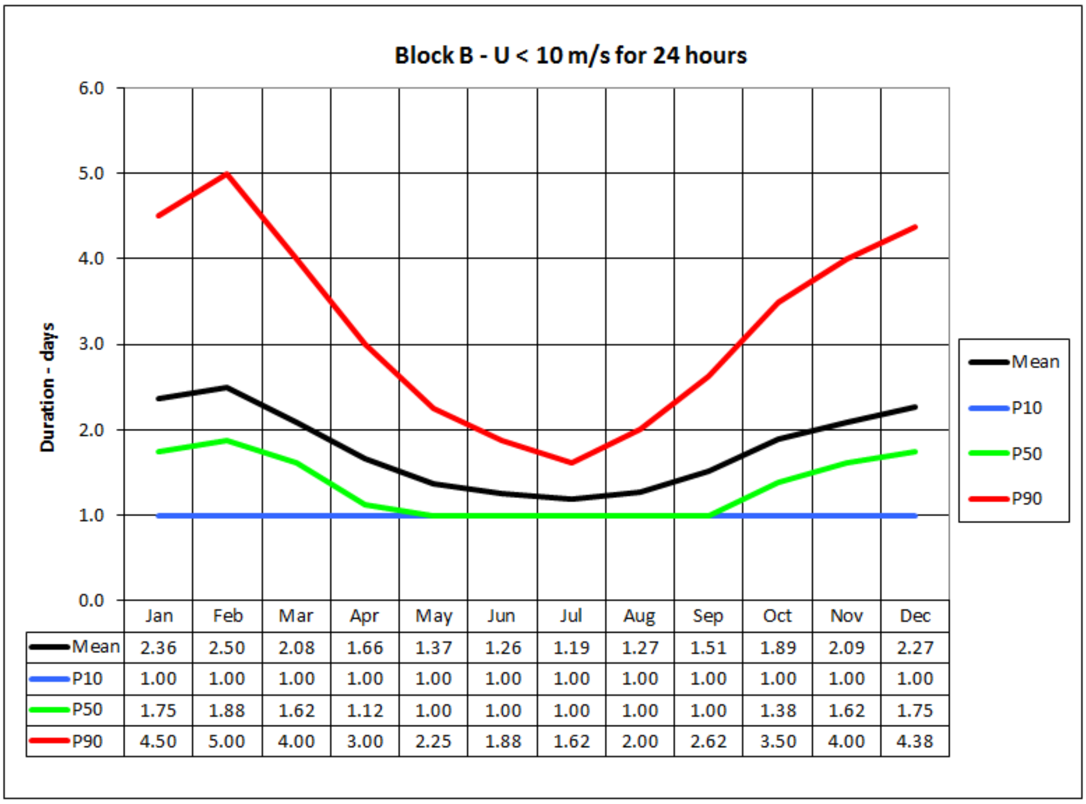
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.41	1.50	1.22	0.94	0.76	0.67	0.62	0.68	0.84	1.08	1.22	1.34
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.88	0.88	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.62	0.75
P90	3.12	3.50	2.75	2.00	1.38	1.12	0.88	1.25	1.75	2.25	2.62	3.00

Figure 2-31 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 12 hours at the Block B.**



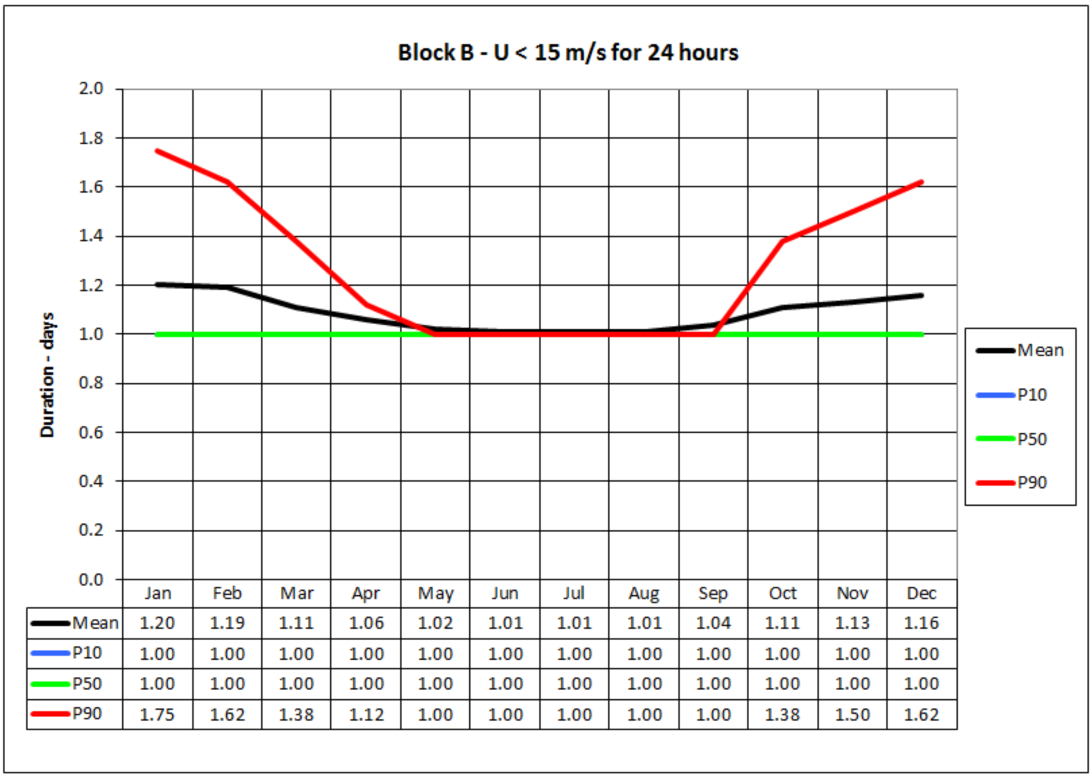
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.63	0.62	0.57	0.54	0.51	0.50	0.50	0.51	0.53	0.57	0.58	0.60
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	0.88	0.88	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88

Figure 2-32 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 12 hours at the Block B.**



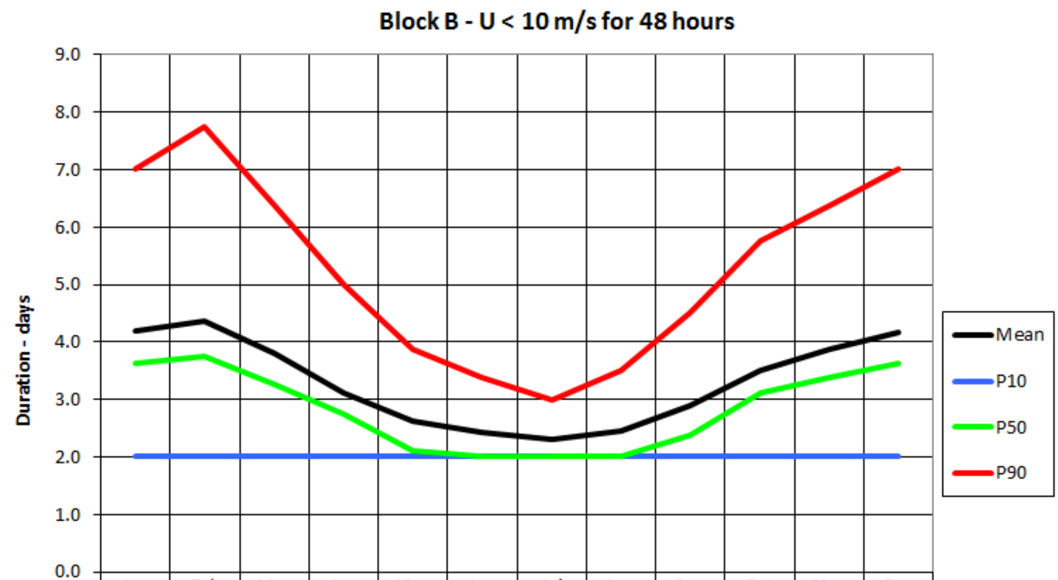
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.36	2.50	2.08	1.66	1.37	1.26	1.19	1.27	1.51	1.89	2.09	2.27
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.75	1.88	1.62	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.62	1.75
P90	4.50	5.00	4.00	3.00	2.25	1.88	1.62	2.00	2.62	3.50	4.00	4.38

Figure 2-33 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 24 hours at the Block B.**



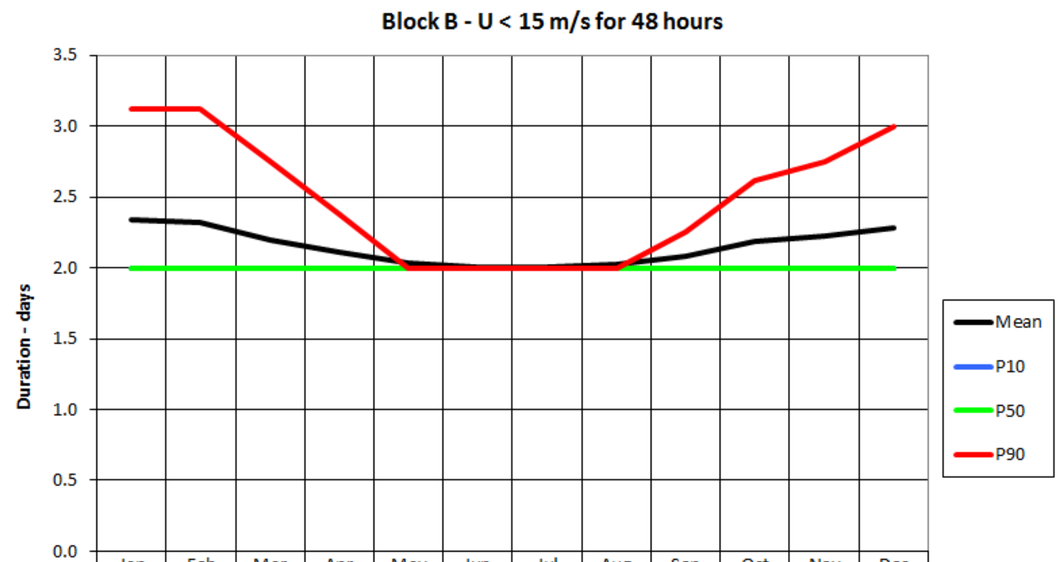
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.20	1.19	1.11	1.06	1.02	1.01	1.01	1.01	1.04	1.11	1.13	1.16
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	1.75	1.62	1.38	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.50	1.62

Figure 2-34 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 24 hours at the Block B.**



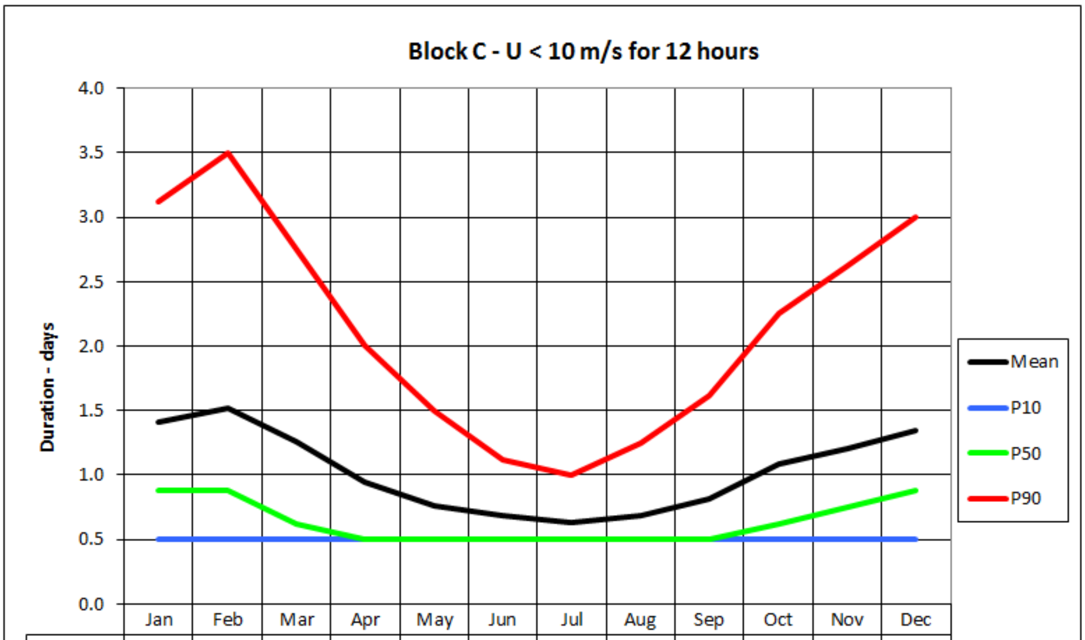
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	4.19	4.37	3.80	3.12	2.62	2.43	2.31	2.46	2.89	3.51	3.87	4.16
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	3.62	3.75	3.25	2.75	2.12	2.00	2.00	2.00	2.38	3.12	3.38	3.62
P90	7.00	7.75	6.38	5.00	3.88	3.38	3.00	3.50	4.50	5.75	6.38	7.00

Figure 2-35 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 48 hours at the Block B.**



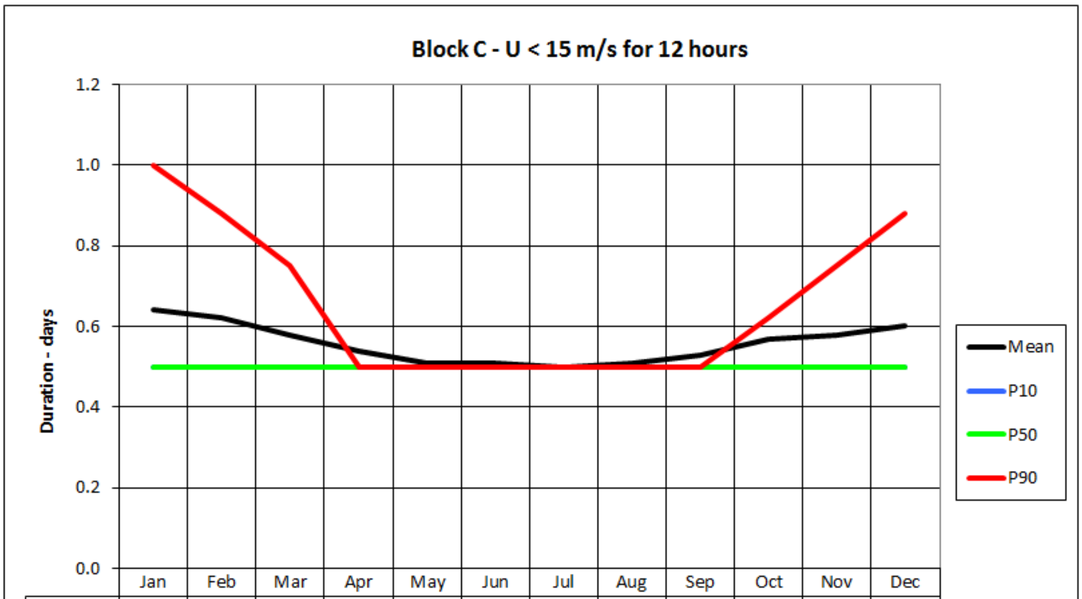
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.34	2.32	2.20	2.11	2.03	2.01	2.01	2.02	2.08	2.19	2.22	2.28
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	3.12	3.12	2.75	2.38	2.00	2.00	2.00	2.00	2.25	2.62	2.75	3.00

Figure 2-36 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 48 hours at the Block B.**



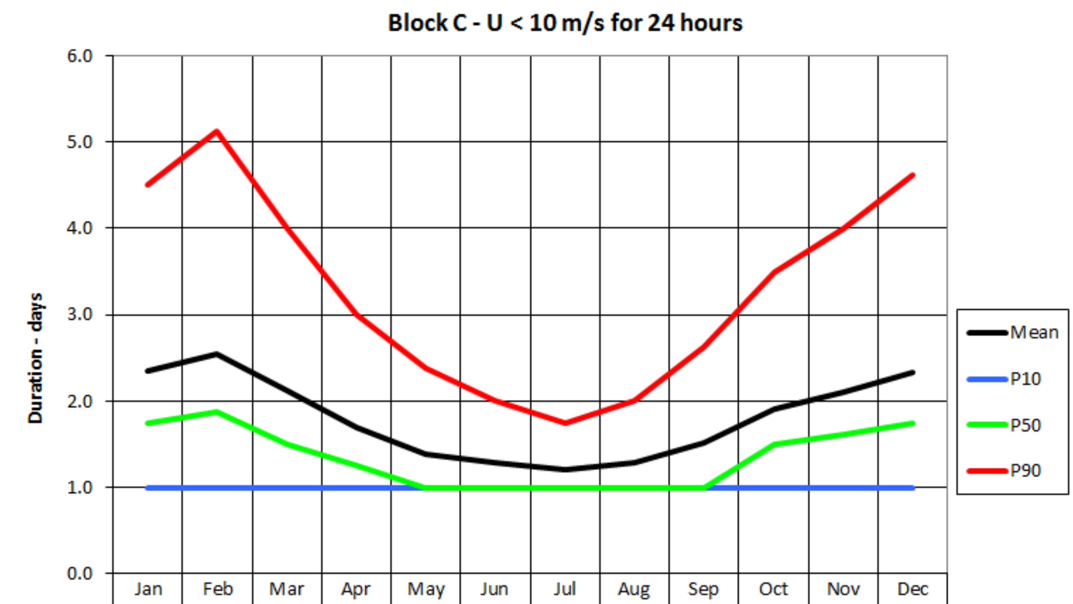
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.41	1.52	1.26	0.95	0.76	0.69	0.63	0.69	0.82	1.09	1.20	1.35
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.88	0.88	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88
P90	3.12	3.50	2.75	2.00	1.50	1.12	1.00	1.25	1.62	2.25	2.62	3.00

Figure 2-37 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 12 hours at the Block C.



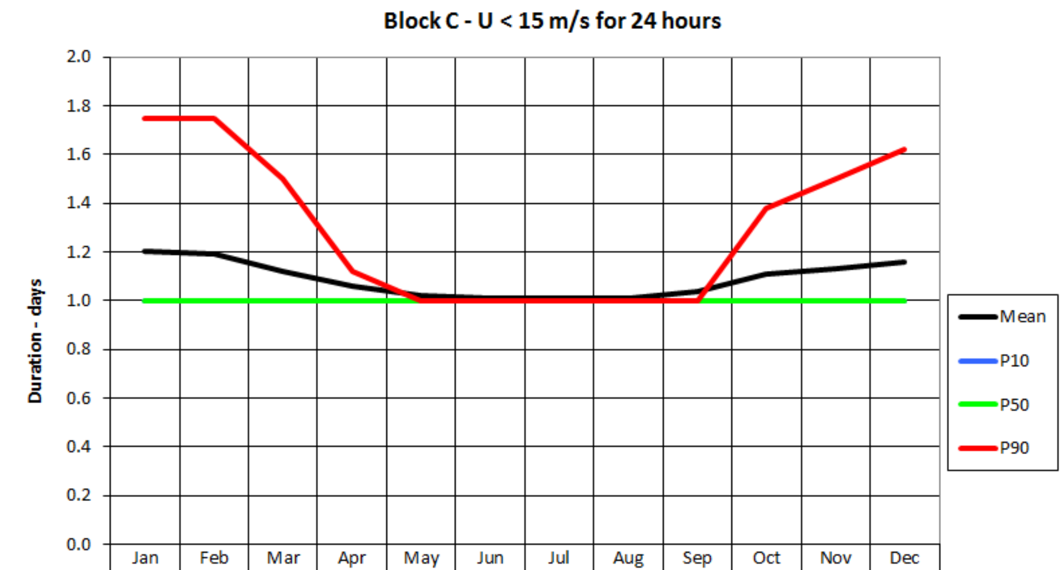
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.64	0.62	0.58	0.54	0.51	0.51	0.50	0.51	0.53	0.57	0.58	0.60
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.00	0.88	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88

Figure 2-38 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 12 hours at the Block C.



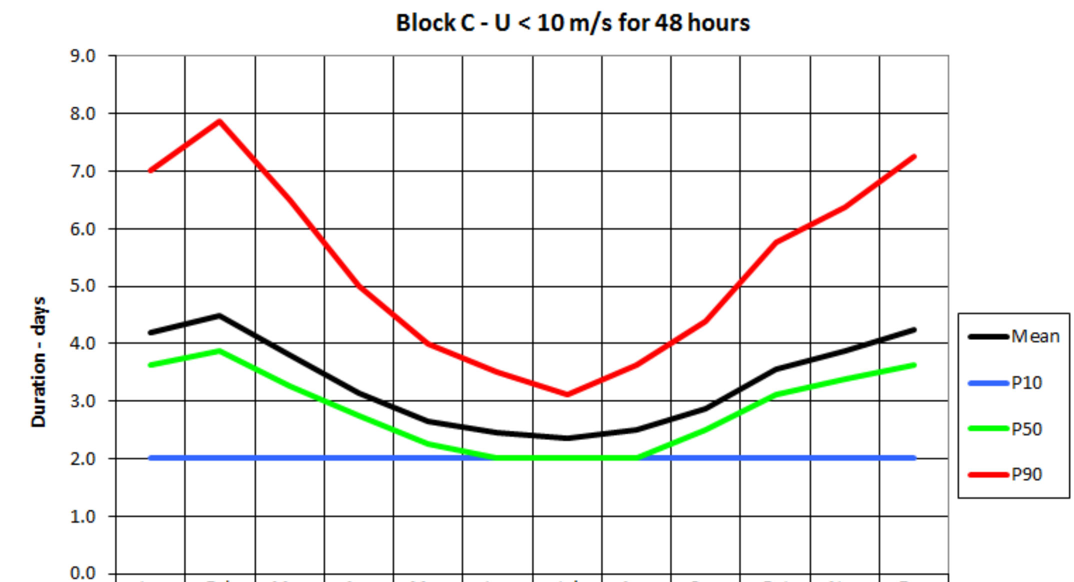
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.35	2.54	2.12	1.69	1.38	1.28	1.21	1.29	1.51	1.90	2.10	2.33
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.75	1.88	1.50	1.25	1.00	1.00	1.00	1.00	1.00	1.50	1.62	1.75
P90	4.50	5.12	4.00	3.00	2.38	2.00	1.75	2.00	2.62	3.50	4.00	4.62

Figure 2-39 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 24 hours at the Block C.**



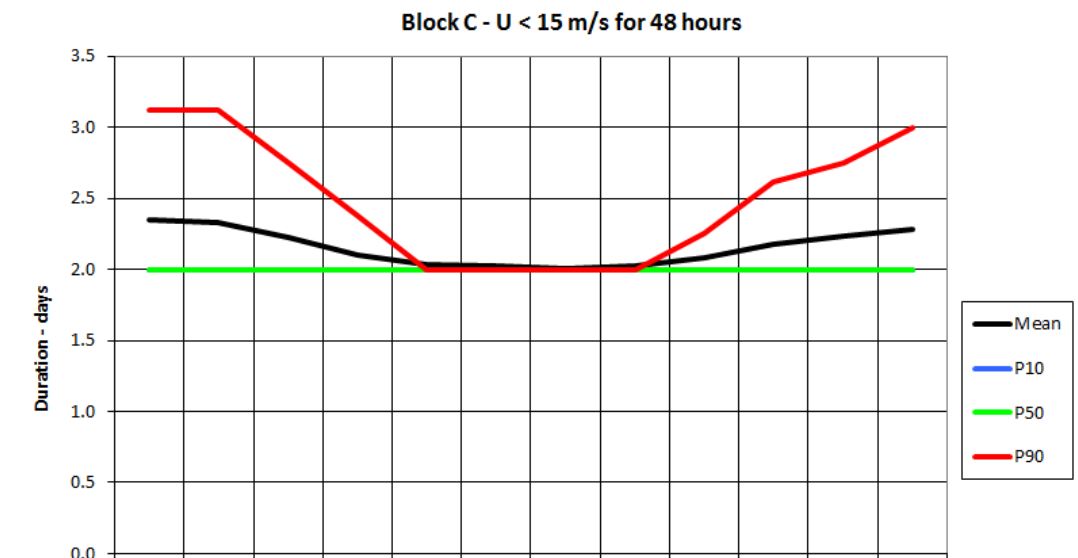
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.20	1.19	1.12	1.06	1.02	1.01	1.01	1.01	1.04	1.11	1.13	1.16
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	1.75	1.75	1.50	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.50	1.62

Figure 2-40 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 24 hours at the Block C.**



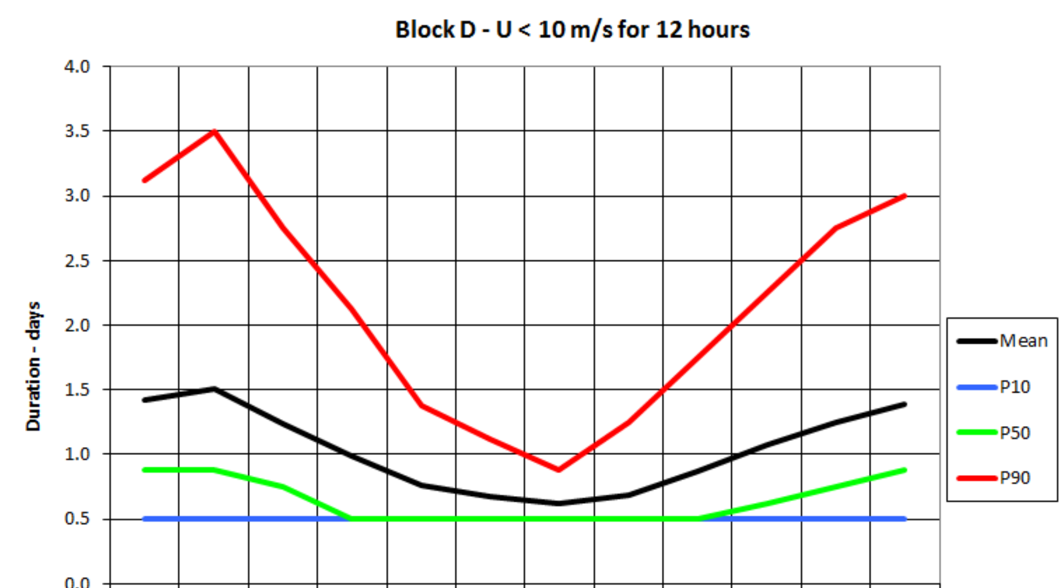
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	4.19	4.49	3.81	3.13	2.66	2.46	2.35	2.49	2.87	3.55	3.88	4.25
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	3.62	3.88	3.25	2.75	2.25	2.00	2.00	2.00	2.50	3.12	3.38	3.62
P90	7.00	7.88	6.50	5.00	4.00	3.50	3.12	3.62	4.38	5.75	6.38	7.25

Figure 2-41 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 48 hours at the Block C.**



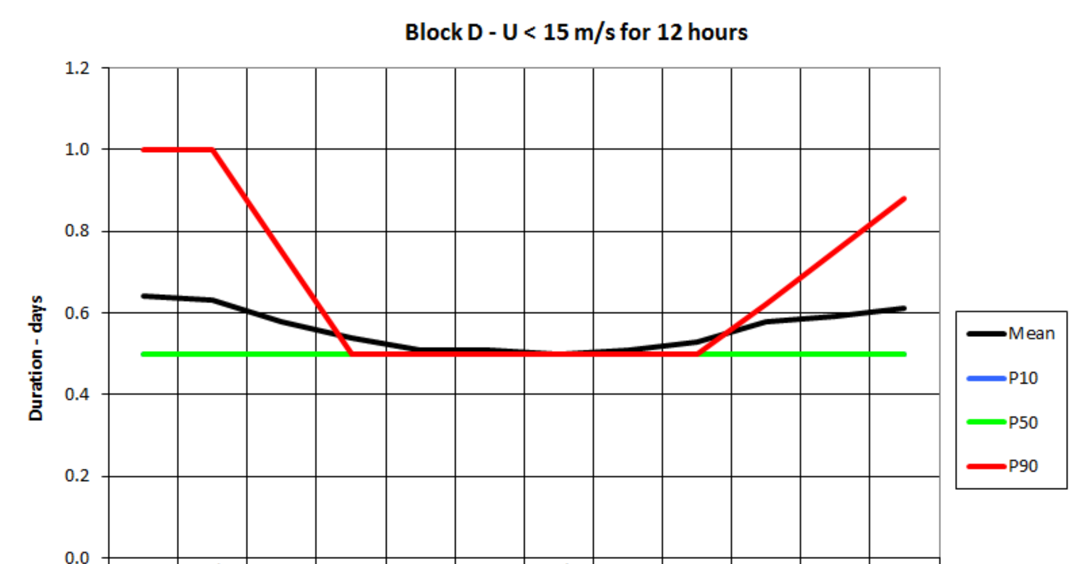
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.35	2.33	2.22	2.10	2.03	2.02	2.01	2.02	2.08	2.18	2.23	2.28
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	3.12	3.12	2.75	2.38	2.00	2.00	2.00	2.00	2.25	2.62	2.75	3.00

Figure 2-42 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 48 hours at the Block C.**



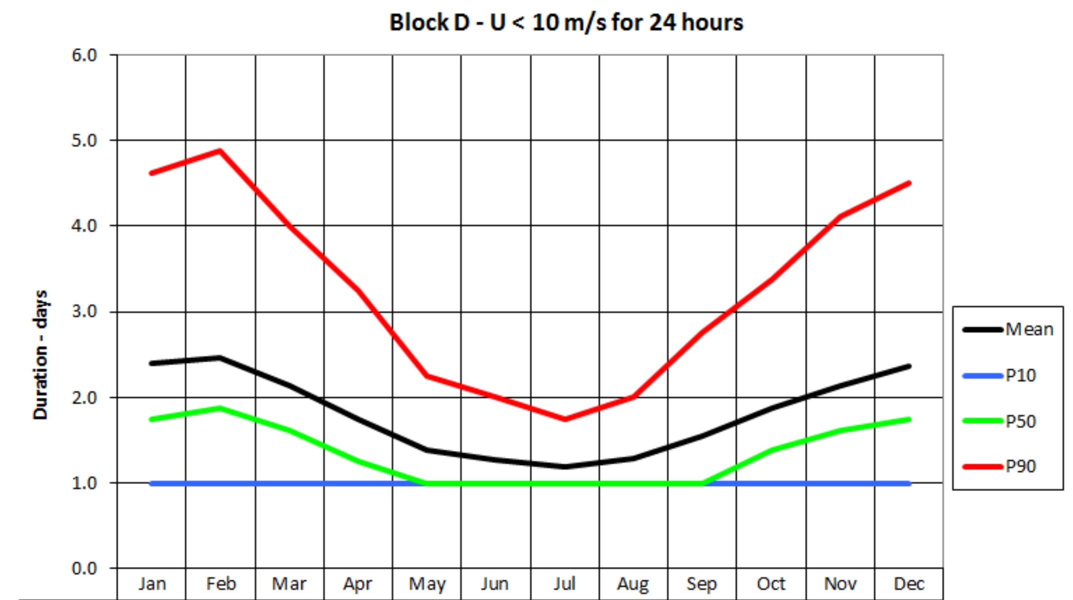
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.42	1.51	1.24	0.99	0.76	0.68	0.62	0.69	0.87	1.07	1.25	1.39
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.88	0.88	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88
P90	3.12	3.50	2.75	2.12	1.38	1.12	0.88	1.25	1.75	2.25	2.75	3.00

Figure 2-43 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 12 hours at the Block D.



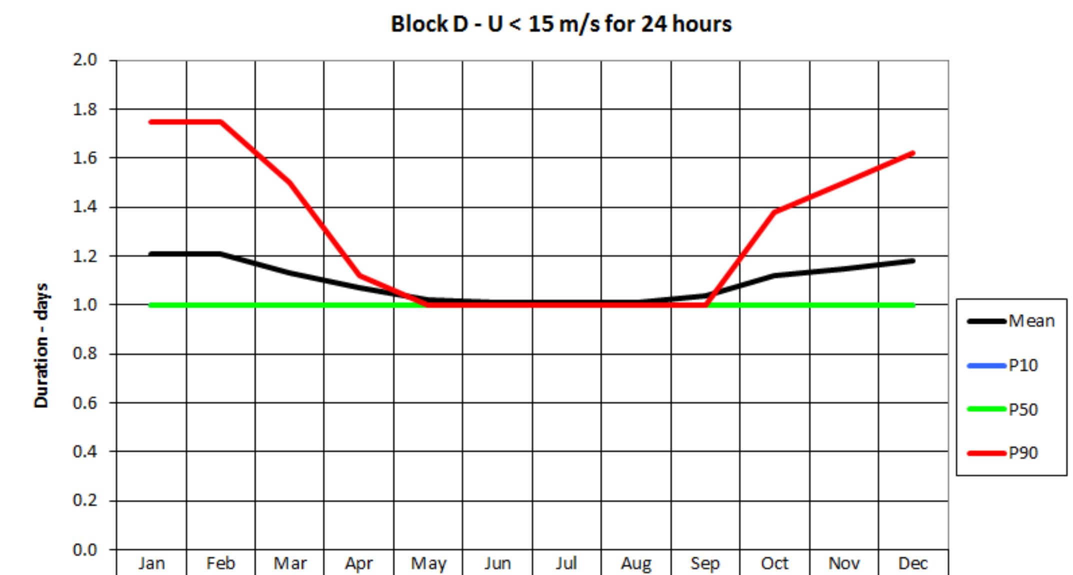
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.64	0.63	0.58	0.54	0.51	0.51	0.50	0.51	0.53	0.58	0.59	0.61
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.00	1.00	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.75	0.88

Figure 2-44 Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 12 hours at the Block D.



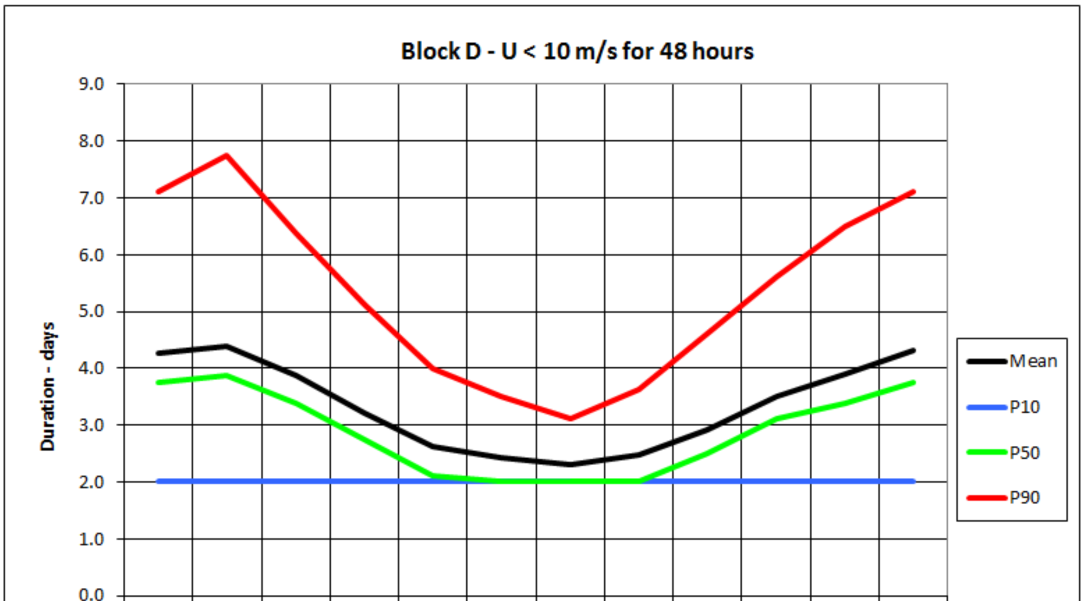
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.39	2.47	2.13	1.74	1.38	1.27	1.19	1.29	1.55	1.87	2.13	2.37
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.75	1.88	1.62	1.25	1.00	1.00	1.00	1.00	1.00	1.38	1.62	1.75
P90	4.62	4.88	4.00	3.25	2.25	2.00	1.75	2.00	2.75	3.38	4.12	4.50

Figure 2-45 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 24 hours at the Block D.**



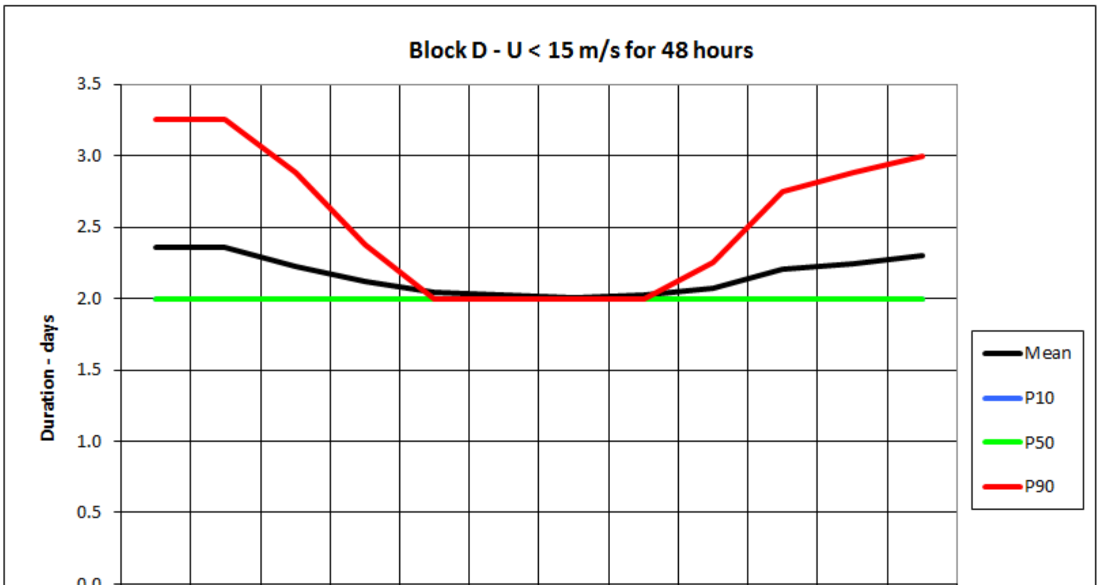
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.21	1.21	1.13	1.07	1.02	1.01	1.01	1.01	1.04	1.12	1.15	1.18
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	1.75	1.75	1.50	1.12	1.00	1.00	1.00	1.00	1.00	1.38	1.50	1.62

Figure 2-46 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 24 hours at the Block D.**



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	4.27	4.40	3.87	3.22	2.63	2.44	2.31	2.48	2.92	3.51	3.89	4.31
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	3.75	3.88	3.38	2.75	2.12	2.00	2.00	2.00	2.50	3.12	3.38	3.75
P90	7.12	7.75	6.38	5.12	4.00	3.50	3.12	3.62	4.62	5.62	6.50	7.12

Figure 2-47 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 10 m/s for 48 hours at the Block D.**



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.36	2.36	2.22	2.12	2.04	2.02	2.01	2.02	2.07	2.21	2.24	2.30
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	3.25	3.25	2.88	2.38	2.00	2.00	2.00	2.00	2.25	2.75	2.88	3.00

Figure 2-48 **Characteristic durations, including waiting time, in order to perform operations limited by a wind speed of 15 m/s for 48 hours at the Block D.**

3 Waves

3.1 Wave data

Wave data for Norwegian coastal waters are available from the Nora10 hindcast model operated by the Norwegian Meteorological Institute [14]. The data chosen for analysis are from 4 grid points as shown in Table 3.1 and cover the period 1958 – 2014 (57 years). The sample interval is 3 hours.

The Nora10 wave height data are found to be of good quality [16].

Nora10 spectral peak periods are represented by discrete frequencies, f_i, given by:

$$f_i = 0.042 \cdot (1.1)^{i-1} s^{-1} \qquad \text{for} \quad i = 1,...,25 \tag{3}$$

The spectral peak periods are adjusted (non-discretized) prior to analysis [27]. Adjustment ("non-discretization") is performed by recalculating the spectral peak frequencies with i' for i:

$$i' = i - 0.5 + x \tag{4}$$

in the preceding formula for f_i. The number x is drawn randomly from the uniform distribution on the interval [0, 1].

3.2 Wave data analysis

Table 3-1 shows the NORA10 grid points used for the analysis of the 4 areas of interest in the Barents Sea.

Table 3-1 Position of Nora10 grid points for which wave data are chosen for analysis.

Area Name	NORA10 Position
Block A	73.99° N, 035.62° E
Block B	72.79° N, 034.93° E
Block C	71.79° N, 032.71° E
Block D	73.39° N, 033.00° E

3.2.1 Block A

Figure 3-1 shows the all-year wave rose, i.e. the sample direction distribution of significant wave height, at the Block A.

Table 3-2 shows the annual direction sample distribution of non-exceedance of significant wave height.

Figure 3-2 shows monthly mean and maximum significant wave height.

Table 3-3 shows the monthly sample distribution of non-exceedance of significant wave height.

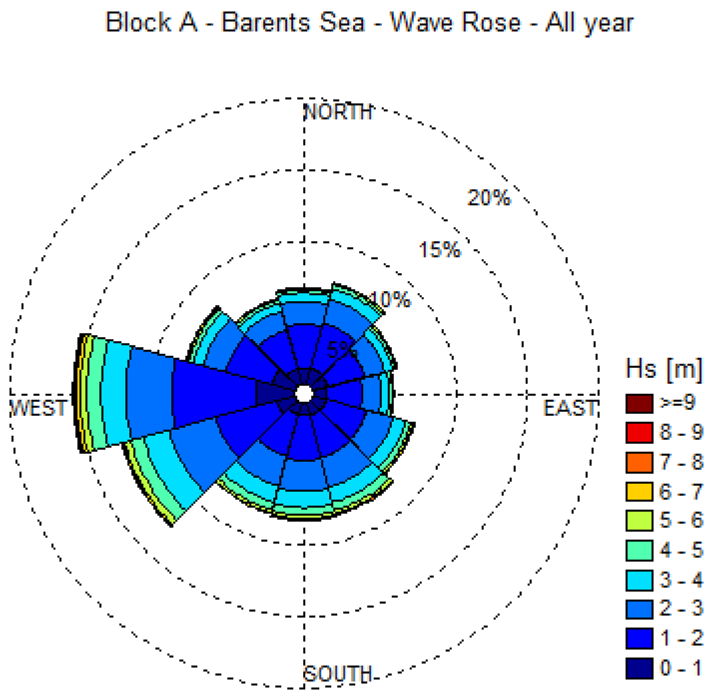


Figure 3-1 All-year wave rose for the Block A for the period 1958 - 2014.

Table 3-2 Annual directional and omni-directional sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block A.

H_S [m]	Wave direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 1	1.16	1.18	1.10	0.87	0.96	0.91	0.87	0.85	1.29	2.72	1.73	1.12	**14.75**
< 2	4.16	4.44	3.81	3.39	3.88	3.97	4.02	3.89	5.59	8.71	5.16	3.92	**54.95**
< 3	5.72	6.20	5.22	4.70	5.72	6.12	6.21	6.05	8.90	12.00	6.80	5.27	**78.92**
< 4	6.34	6.95	5.82	5.26	6.61	7.24	7.34	7.23	10.74	13.80	7.52	5.85	**90.69**
< 5	6.58	7.23	6.04	5.48	7.01	7.78	7.89	7.79	11.61	14.85	7.85	6.08	**96.18**
< 6	6.66	7.31	6.13	5.58	7.15	8.02	8.14	8.02	12.03	15.35	8.00	6.16	**98.54**
< 7	6.70	7.34	6.14	5.60	7.22	8.10	8.22	8.09	12.16	15.65	8.05	6.20	**99.46**
< 8	6.70	7.36	6.15	5.60	7.25	8.13	8.25	8.11	12.20	15.78	8.08	6.21	**99.83**
< 9	6.71	7.36	6.15	5.60	7.26	8.14	8.26	8.11	12.21	15.84	8.09	6.21	**99.95**
< 10	6.71		6.16	5.60		8.14	8.26	8.11	12.22	15.85	8.10	6.21	**99.98**
< 11	6.71		6.16						12.22	15.85			**99.99**
< 12	6.71								12.22	15.86			**100.00**
< 13	6.71									15.86			**100.00**
< 14										15.86			**100.00**
Total	**6.71**	**7.36**	**6.16**	**5.60**	**7.26**	**8.14**	**8.26**	**8.11**	**12.22**	**15.86**	**8.10**	**6.21**	**100.00**
Mean	**1.9**	**1.9**	**1.9**	**1.9**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**	**2.2**	**1.9**	**1.9**	**2.1**
Maximum	**12.0**	**8.6**	**10.2**	**9.5**	**8.6**	**9.2**	**9.4**	**9.1**	**11.8**	**13.7**	**9.8**	**9.2**	**13.7**

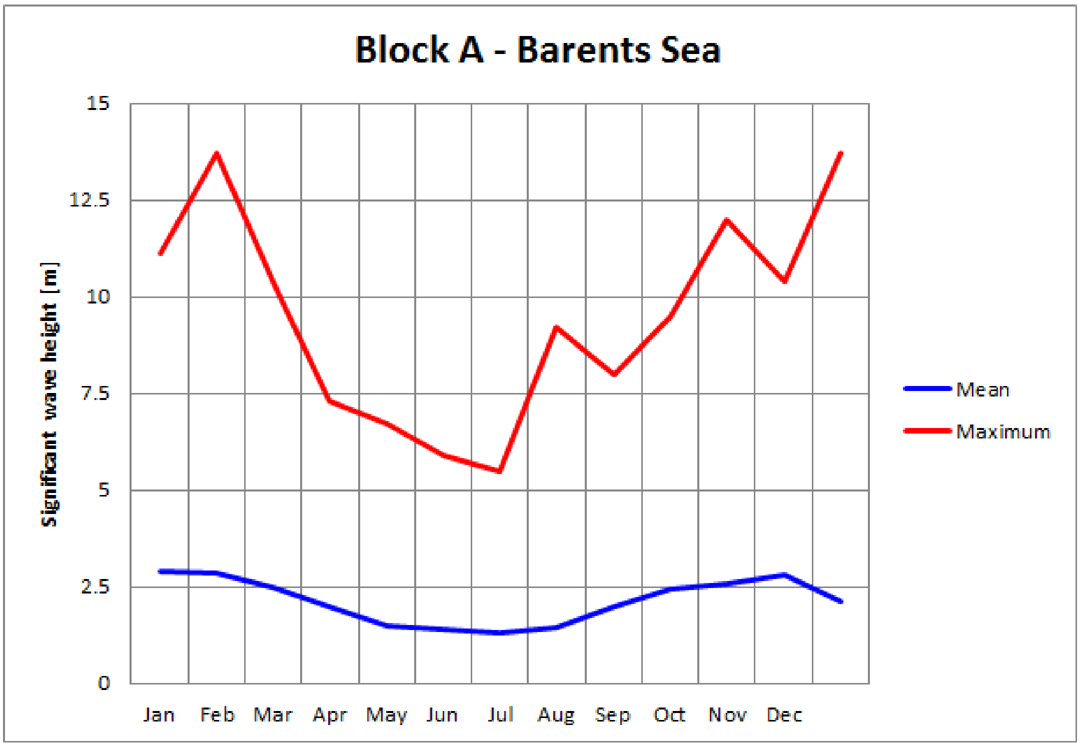


Figure 3-2 Monthly mean and maximum significant wave height at the Block A.

Table 3-3 Monthly and annual sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block A.

H_S [m]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 1	3.16	4.03	6.73	16.14	31.17	31.66	33.49	27.90	9.98	4.03	3.72	3.30	**14.75**
< 2	29.37	32.20	40.56	56.86	77.59	82.42	87.00	81.23	58.64	41.16	36.31	31.87	**54.95**
< 3	59.14	60.11	69.68	83.10	93.39	96.09	97.50	95.67	85.69	73.47	68.82	61.55	**78.92**
< 4	79.01	79.74	86.02	94.19	98.13	99.13	99.60	99.02	95.28	89.18	86.23	81.35	**90.69**
< 5	90.16	90.63	94.90	98.27	99.45	99.93	99.94	99.81	98.57	96.05	93.82	91.92	**96.18**
< 6	95.72	96.02	98.26	99.70	99.92	100.00	100.00	99.91	99.55	98.41	97.80	96.93	**98.54**
< 7	98.28	98.46	99.36	99.99	100.00			99.93	99.90	99.55	99.22	98.78	**99.46**
< 8	99.46	99.38	99.79	100.00				99.97	99.99	99.90	99.78	99.63	**99.83**
< 9	99.86	99.80	99.92					99.99	100.00	99.97	99.89	99.93	**99.95**
< 10	99.97	99.89	99.98					100.00		100.00	99.98	99.99	**99.98**
< 11	99.99	99.92	100.00								99.99	100.00	**99.99**
< 12	100.00	99.97									99.99		**100.00**
< 13		99.98									100.00		**100.00**
< 14		100.00											**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**2.9**	**2.9**	**2.5**	**2.0**	**1.5**	**1.4**	**1.3**	**1.4**	**2.0**	**2.4**	**2.6**	**2.8**	**2.1**
Maximum	**11.1**	**13.7**	**10.4**	**7.3**	**6.7**	**5.9**	**5.5**	**9.2**	**8.0**	**9.5**	**12.0**	**10.4**	**13.7**

3.2.2 Block B

Figure 3-3 shows the all-year wave rose, i.e. the sample direction distribution of significant wave height, at the Block B.

Table 3-4 shows the annual direction sample distribution of non-exceedance of significant wave height.

Figure 3-4 shows monthly mean and maximum significant wave height.

Table 3-5 shows the monthly sample distribution of non-exceedance of significant wave height.

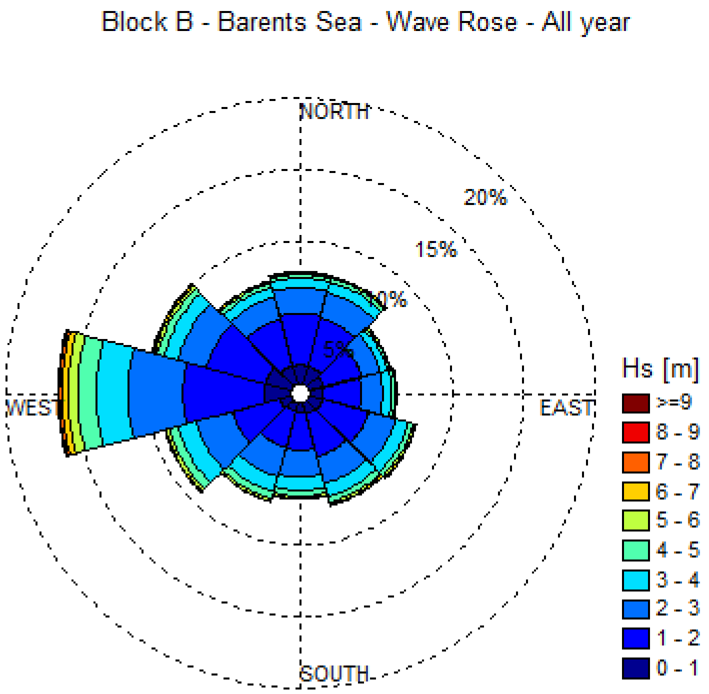


Figure 3-3 All-year wave rose for the Block B for the period 1958 - 2014.

Table 3-4 Annual directional and omni-directional sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block B.

H_S [m]	Wave direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 1	1.32	1.31	1.07	0.91	0.95	0.83	0.63	0.61	0.80	1.80	1.89	1.36	**13.47**
< 2	4.92	4.82	3.80	3.53	4.29	3.92	3.36	3.24	4.17	7.54	6.20	4.70	**54.49**
< 3	6.68	6.68	5.15	5.00	6.27	5.88	5.23	5.35	6.74	11.44	8.32	6.32	**79.05**
< 4	7.35	7.43	5.68	5.62	7.21	6.82	6.17	6.45	8.02	13.69	9.34	7.01	**90.78**
< 5	7.63	7.71	5.84	5.87	7.57	7.25	6.57	6.96	8.62	15.00	9.86	7.28	**96.15**
< 6	7.73	7.82	5.92	5.93	7.71	7.41	6.73	7.14	8.86	15.69	10.08	7.41	**98.44**
< 7	7.78	7.86	5.94	5.96	7.75	7.48	6.77	7.19	8.93	16.10	10.20	7.46	**99.41**
< 8	7.80	7.87	5.94	5.97	7.79	7.50	6.78	7.19	8.94	16.28	10.26	7.48	**99.80**
< 9	7.81	7.87		5.97	7.79	7.50	6.78	7.20	8.95	16.34	10.29	7.48	**99.93**
< 10	7.81	7.87			7.80	7.51		7.20	8.95	16.36	10.30	7.48	**99.98**
< 11	7.81								8.95	16.37	10.30	7.48	**99.99**
< 12	7.81									16.38			**100.00**
< 13	7.81									16.38			**100.00**
< 14										16.38			**100.00**
Total	**7.81**	**7.87**	**5.94**	**5.97**	**7.80**	**7.51**	**6.78**	**7.20**	**8.95**	**16.38**	**10.30**	**7.48**	**100.00**
Mean	**1.9**	**1.9**	**1.8**	**2.0**	**2.1**	**2.2**	**2.2**	**2.3**	**2.3**	**2.5**	**2.0**	**1.9**	**2.1**
Maximum	**12.7**	**9.0**	**7.6**	**8.4**	**9.3**	**9.1**	**8.2**	**9.5**	**10.3**	**13.6**	**10.8**	**10.5**	**13.6**

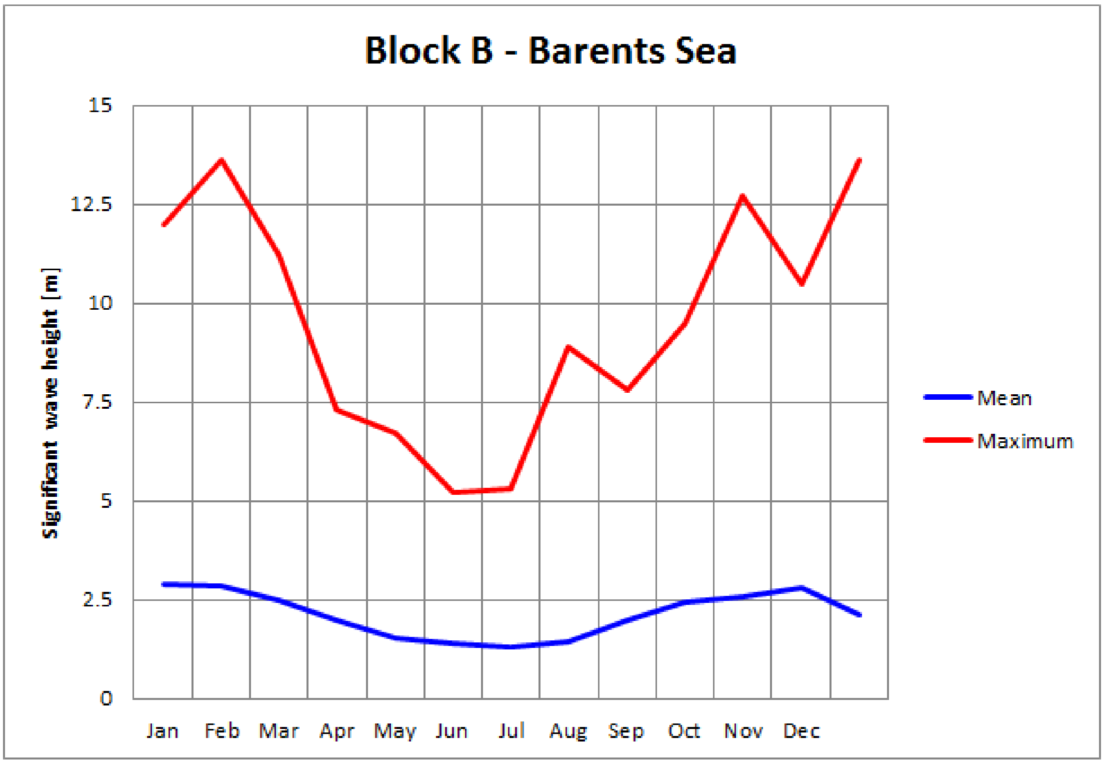


Figure 3-4 Monthly mean and maximum significant wave height at the Block B.

Table 3-5 Monthly and annual sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block B.

H_S [m]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 1	2.38	2.82	6.27	14.93	28.07	28.25	32.54	26.22	10.31	3.72	3.03	2.21	**13.47**
< 2	30.62	31.94	39.06	57.48	75.96	81.74	86.57	80.52	59.54	41.10	36.54	31.38	**54.49**
< 3	60.34	60.56	70.13	83.76	93.04	95.64	97.49	95.47	86.22	73.32	69.13	62.48	**79.05**
< 4	79.53	79.74	86.55	94.47	98.22	98.98	99.44	98.94	95.36	89.33	86.62	81.62	**90.78**
< 5	90.19	90.89	95.00	98.39	99.45	99.92	99.92	99.67	98.38	95.81	94.04	91.88	**96.15**
< 6	95.52	95.96	98.13	99.70	99.89	100.00	100.00	99.85	99.55	98.39	97.59	96.59	**98.44**
< 7	98.10	98.25	99.30	99.99	100.00			99.92	99.85	99.46	99.20	98.79	**99.41**
< 8	99.48	99.22	99.78	100.00				99.96	100.00	99.82	99.71	99.64	**99.80**
< 9	99.84	99.57	99.89					100.00		99.96	99.94	99.93	**99.93**
< 10	99.96	99.81	99.97							100.00	99.97	99.99	**99.98**
< 11	99.98	99.89	99.99								99.99	100.00	**99.99**
< 12	99.99	99.96	100.00								99.99		**100.00**
< 13	100.00	99.98									100.00		**100.00**
< 14		100.00											**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**2.9**	**2.9**	**2.5**	**2.0**	**1.5**	**1.4**	**1.3**	**1.5**	**2.0**	**2.4**	**2.6**	**2.8**	**2.1**
Maximum	**12.0**	**13.6**	**11.2**	**7.3**	**6.7**	**5.2**	**5.3**	**8.9**	**7.8**	**9.5**	**12.7**	**10.5**	**13.6**

3.2.3 Block C

Figure 3-5 shows the all-year wave rose, i.e. the sample direction distribution of significant wave height, at the Block C.

Table 3-6 shows the annual direction sample distribution of non-exceedance of significant wave height.

Figure 3-6 shows monthly mean and maximum significant wave height.

Table 3-7 shows the monthly sample distribution of non-exceedance of significant wave height.

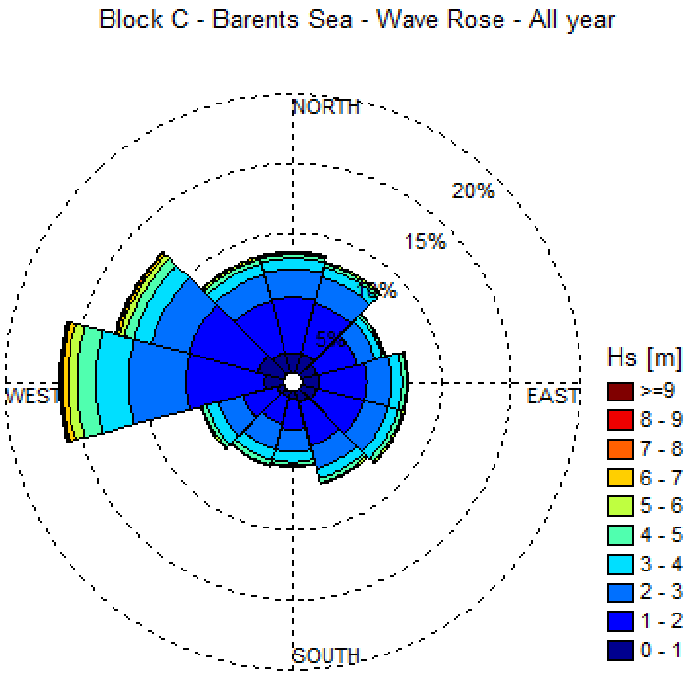


Figure 3-5 All-year wave rose for the Block C for the period 1958 - 2014.

Table 3-6 Annual directional and omni-directional sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block C.

H_S [m]	Wave direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 1	1.35	1.43	1.13	1.14	1.11	0.85	0.51	0.41	0.53	1.33	1.94	1.52	**13.25**
< 2	5.37	5.25	4.12	4.55	4.60	4.11	2.78	2.45	2.99	6.86	7.16	5.41	**55.64**
< 3	7.38	7.19	5.51	6.32	6.42	5.83	4.37	4.34	4.81	10.92	9.98	7.31	**80.38**
< 4	8.17	7.92	6.05	7.05	7.19	6.54	5.10	5.20	5.64	13.27	11.30	8.14	**91.56**
< 5	8.46	8.20	6.25	7.36	7.50	6.85	5.35	5.55	5.97	14.55	12.03	8.46	**96.53**
< 6	8.58	8.30	6.31	7.45	7.64	6.95	5.43	5.62	6.07	15.23	12.41	8.62	**98.61**
< 7	8.63	8.34	6.33	7.47	7.67	6.97	5.44	5.63	6.09	15.60	12.61	8.69	**99.47**
< 8	8.65	8.34	6.33	7.48	7.68	6.98	5.44	5.64	6.09	15.74	12.69	8.71	**99.78**
< 9	8.66			7.49	7.68			5.64	6.09	15.80	12.74	8.72	**99.91**
< 10	8.66				7.69					15.82	12.77	8.72	**99.96**
< 11	8.66									15.83	12.78	8.72	**99.99**
< 12	8.66									15.83	12.78		**100.00**
< 13										15.83			**100.00**
< 14										15.83			**100.00**
< 15										15.83			**100.00**
< 16										15.83			**100.00**
Total	**8.66**	**8.34**	**6.33**	**7.49**	**7.69**	**6.98**	**5.44**	**5.64**	**6.09**	**15.83**	**12.78**	**8.72**	**100.00**
Mean	**1.9**	**1.9**	**1.8**	**1.9**	**2.0**	**2.0**	**2.1**	**2.3**	**2.2**	**2.5**	**2.2**	**1.9**	**2.1**
Maximum	**11.4**	**7.7**	**7.4**	**8.9**	**9.4**	**7.2**	**7.1**	**8.5**	**8.5**	**15.4**	**11.6**	**10.1**	**15.4**

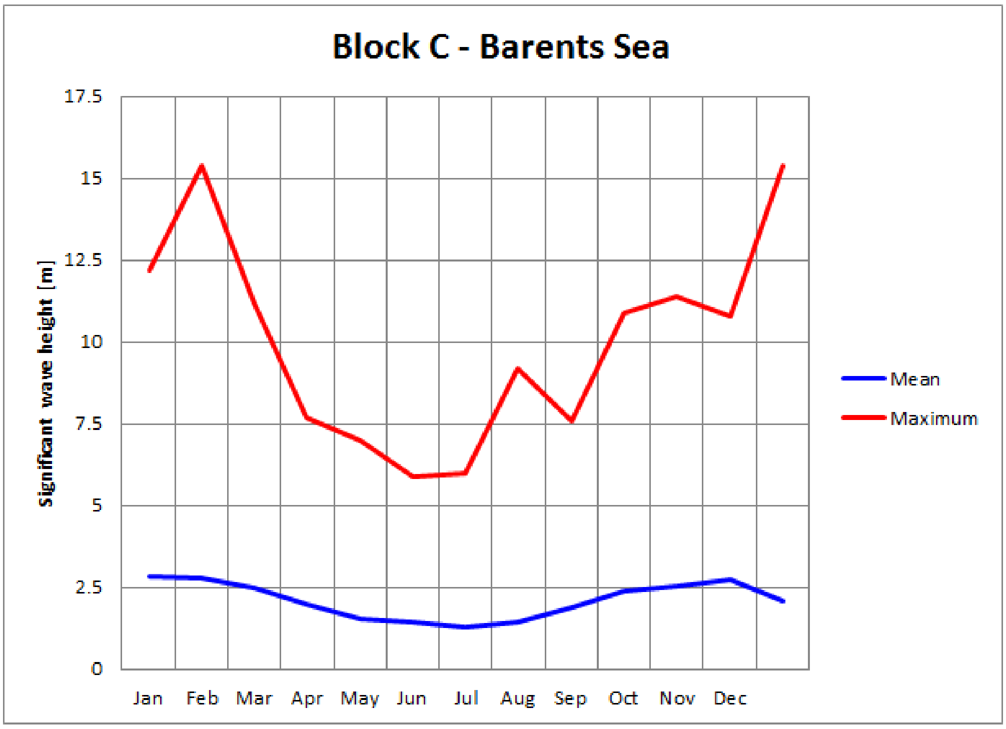


Figure 3-6 Monthly mean and maximum significant wave height at the Block C.

Table 3-7 Monthly and annual sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block C.

H_S [m]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 1	2.35	2.69	5.91	13.19	25.72	27.39	32.99	26.51	11.36	4.33	3.34	2.35	**13.25**
< 2	32.43	32.43	40.49	57.89	76.34	81.67	86.80	81.67	62.27	43.00	38.70	32.51	**55.64**
< 3	63.16	63.39	71.91	84.18	93.07	95.44	97.27	95.66	87.91	74.79	71.24	65.62	**80.38**
< 4	81.39	82.01	87.91	94.73	98.28	98.74	99.41	98.93	95.47	89.96	87.84	83.52	**91.56**
< 5	91.58	91.86	95.27	98.46	99.54	99.82	99.88	99.59	98.52	96.05	95.10	92.47	**96.53**
< 6	96.26	96.36	98.27	99.80	99.89	100.00	99.99	99.82	99.58	98.52	98.01	96.75	**98.61**
< 7	98.37	98.34	99.43	99.96	99.99		100.00	99.91	99.97	99.40	99.29	98.88	**99.47**
< 8	99.38	99.12	99.74	100.00	100.00			99.97	100.00	99.72	99.80	99.60	**99.78**
< 9	99.72	99.54	99.91					99.99		99.89	99.96	99.85	**99.91**
< 10	99.90	99.77	99.96					100.00		99.96	99.98	99.96	**99.96**
< 11	99.98	99.89	99.98							100.00	99.99	100.00	**99.99**
< 12	99.99	99.97	100.00								100.00		**100.00**
< 13	100.00	99.98											**100.00**
< 14		99.98											**100.00**
< 15		99.99											**100.00**
< 16		100.00											**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**2.8**	**2.8**	**2.5**	**2.0**	**1.5**	**1.4**	**1.3**	**1.4**	**1.9**	**2.4**	**2.5**	**2.7**	**2.1**
Maximum	**12.2**	**15.4**	**11.2**	**7.7**	**7.0**	**5.9**	**6.0**	**9.2**	**7.6**	**10.9**	**11.4**	**10.8**	**15.4**

3.2.4 Block D

Figure 3-7 shows the all-year wave rose, i.e. the sample direction distribution of significant wave height, at the Block D.

Table 3-8 shows the annual direction sample distribution of non-exceedance of significant wave height.

Figure 3-8 shows monthly mean and maximum significant wave height.

Table 3-9 shows the monthly sample distribution of non-exceedance of significant wave height.

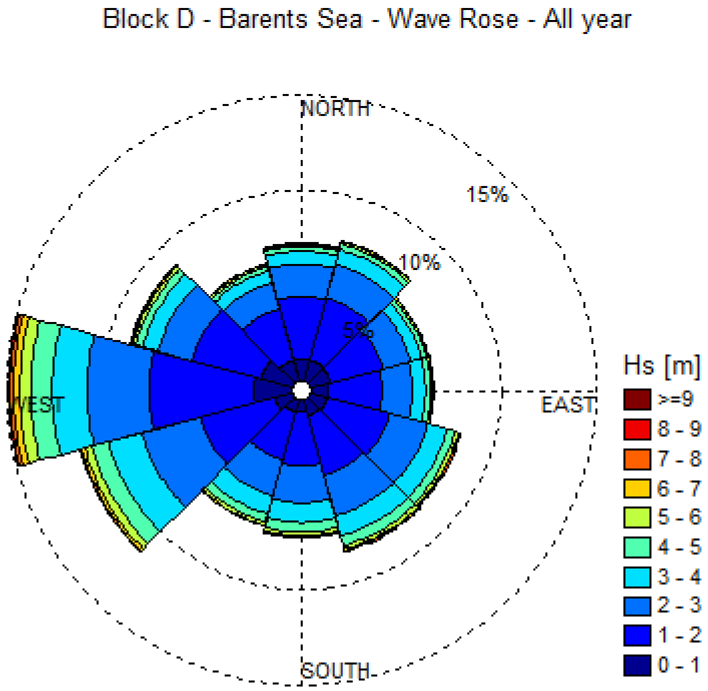


Figure 3-7 All-year wave rose for the Block D for the period 1958 - 2014.

Table 3-8 Annual directional and omni-directional sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block D.

H_S [m]	Wave direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 1	1.15	1.14	1.08	0.90	0.92	0.85	0.66	0.67	0.94	1.99	1.75	1.13	**13.21**
< 2	4.38	4.51	3.91	3.70	4.28	4.11	3.52	3.29	4.86	7.51	5.55	3.92	**53.56**
< 3	6.10	6.35	5.43	5.30	6.37	6.34	5.46	5.24	7.91	10.90	7.41	5.35	**78.14**
< 4	6.77	7.17	6.05	5.96	7.41	7.44	6.50	6.26	9.67	12.78	8.28	5.97	**90.25**
< 5	7.04	7.49	6.30	6.26	7.85	7.96	7.00	6.69	10.50	13.94	8.67	6.20	**95.91**
< 6	7.15	7.60	6.39	6.35	8.02	8.17	7.20	6.88	10.88	14.54	8.85	6.30	**98.34**
< 7	7.19	7.64	6.43	6.39	8.09	8.26	7.27	6.92	11.02	14.90	8.93	6.34	**99.37**
< 8	7.20	7.65	6.44	6.39	8.13	8.29	7.29	6.93	11.07	15.07	8.97	6.35	**99.78**
< 9	7.20	7.65	6.44	6.39	8.14	8.29	7.30	6.94	11.09	15.14	8.99	6.36	**99.93**
< 10	7.20	7.65	6.44		8.14	8.29			11.10	15.16	9.00		**99.97**
< 11	7.20	7.65							11.10	15.17	9.00		**99.99**
< 12	7.21								11.10	15.17			**99.99**
< 13									11.10	15.17			**100.00**
< 14										15.17			**100.00**
< 15										15.17			**100.00**
Total	**7.21**	**7.65**	**6.44**	**6.39**	**8.14**	**8.29**	**7.30**	**6.94**	**11.10**	**15.17**	**9.00**	**6.36**	**100.00**
Mean	**1.9**	**2.0**	**1.9**	**2.0**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**	**2.4**	**2.0**	**1.9**	**2.2**
Maximum	**11.2**	**10.6**	**9.7**	**8.4**	**9.5**	**9.3**	**8.2**	**8.9**	**12.3**	**14.3**	**10.7**	**8.6**	**14.3**

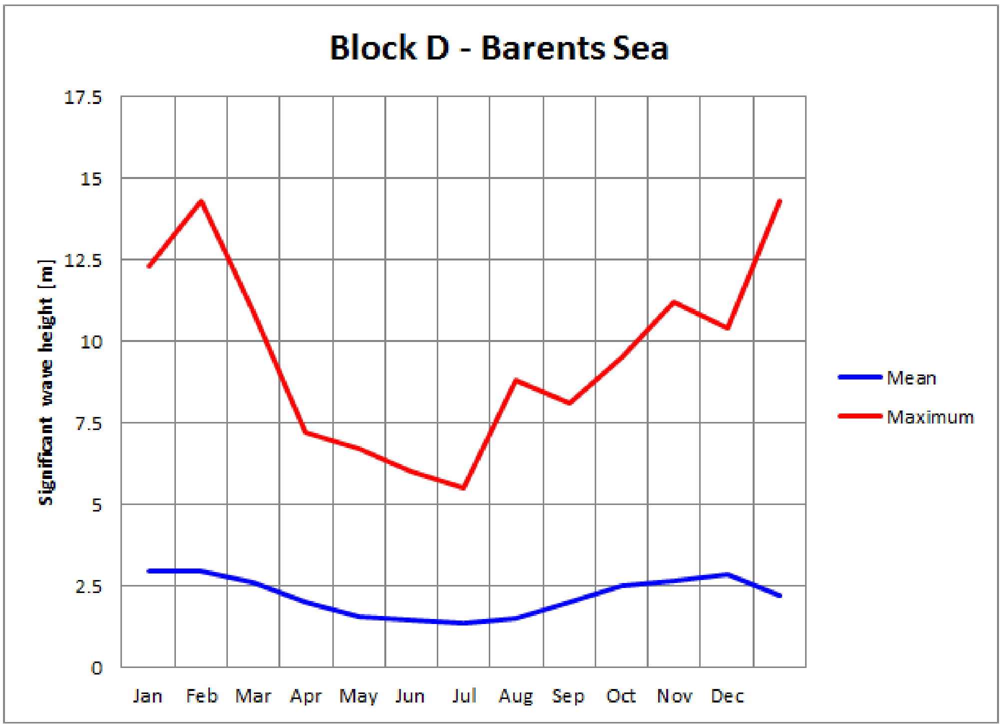


Figure 3-8 Monthly mean and maximum significant wave height at the Block D.

Table 3-9 Monthly and annual sample distributions of non-exceedance [%] of significant wave height (H_S) at the Block D.

H_S [m]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< 1	2.38	3.10	5.55	14.79	28.09	28.41	31.73	25.45	9.58	3.40	2.76	2.43	**13.21**
< 2	29.32	31.28	37.89	56.25	75.16	81.05	85.86	80.09	58.33	40.41	35.39	30.21	**53.56**
< 3	58.69	59.11	68.50	82.90	92.81	95.73	97.33	95.21	85.17	72.38	68.06	60.72	**78.14**
< 4	78.63	78.27	85.61	93.97	98.10	98.83	99.49	99.00	95.11	88.78	86.02	80.57	**90.25**
< 5	89.66	90.21	94.34	98.15	99.41	99.86	99.94	99.67	98.60	95.54	93.63	91.55	**95.91**
< 6	95.24	95.61	98.00	99.61	99.80	99.99	100.00	99.87	99.50	98.30	97.46	96.56	**98.34**
< 7	97.99	98.23	99.26	99.99	100.00	100.00		99.92	99.88	99.39	99.04	98.70	**99.37**
< 8	99.32	99.17	99.74	100.00				99.96	99.98	99.79	99.73	99.65	**99.78**
< 9	99.84	99.67	99.89					100.00	100.00	99.94	99.93	99.92	**99.93**
< 10	99.92	99.81	99.96							100.00	99.98	99.98	**99.97**
< 11	99.98	99.90	100.00								99.99	100.00	**99.99**
< 12	99.99	99.94									100.00		**99.99**
< 13	100.00	99.98											**100.00**
< 14		99.99											**100.00**
< 15		100.00											**100.00**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Mean	**2.9**	**2.9**	**2.6**	**2.0**	**1.5**	**1.4**	**1.3**	**1.5**	**2.0**	**2.5**	**2.6**	**2.9**	**2.2**
Maximum	**12.3**	**14.3**	**10.9**	**7.2**	**6.7**	**6.0**	**5.5**	**8.8**	**8.1**	**9.5**	**11.2**	**10.4**	**14.3**

3.3 Long-term wave statistics

The long-term distribution of significant wave height is modelled in terms of a Weibull distribution as described in the Metocean Design Basis Guidelines, Appendix A

3.3.1 Block A

Figure 3-9 shows the observed and fitted distributions of significant wave height at the Block A.

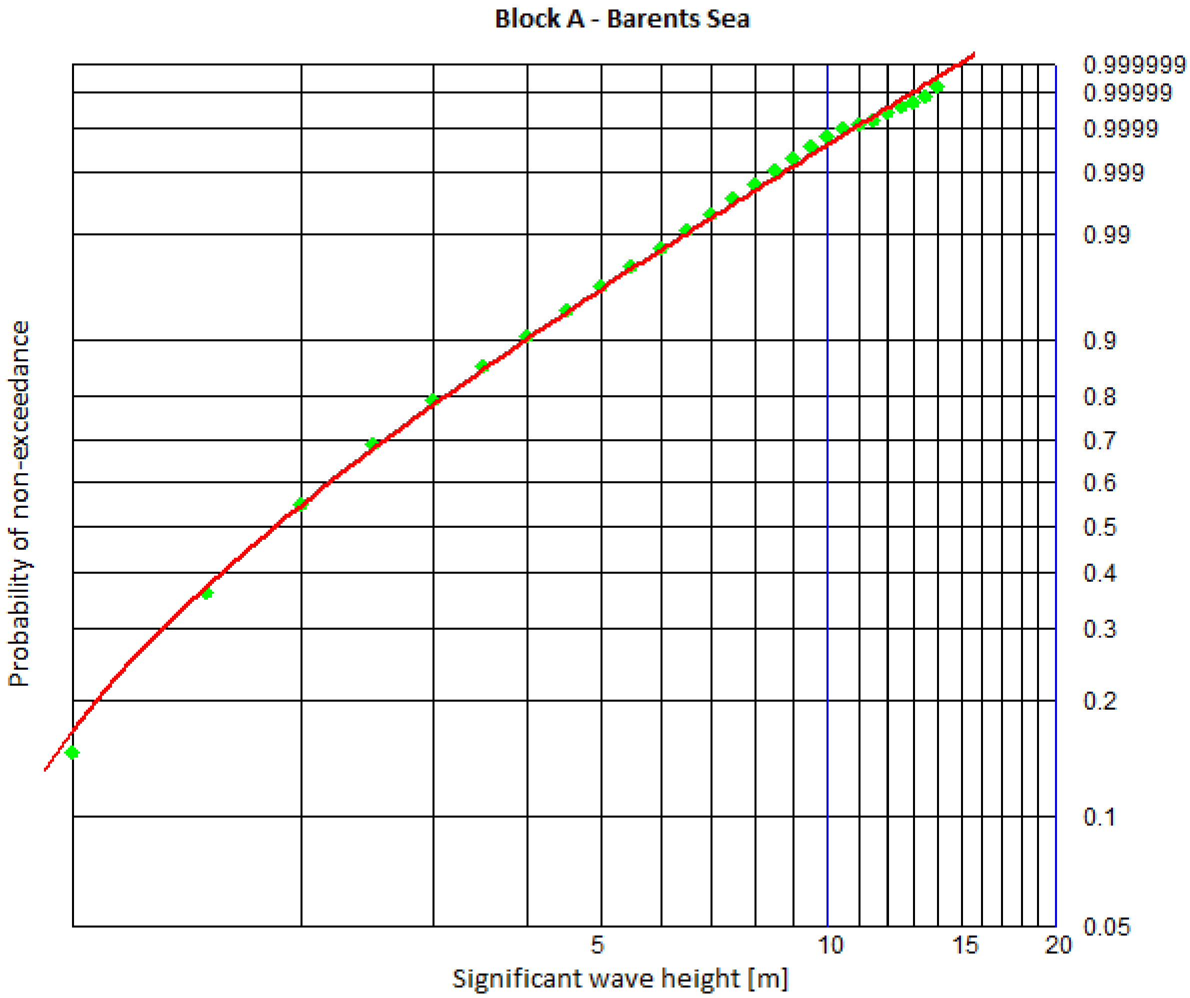


Figure 3-9 Observed (green dots) and fitted (red line) distributions of significant wave height at the Block A.

Figure 3-10 and Table 3-10 show directional and omni-directional Weibull parameters and corresponding extremes of significant wave height at the Block A. Figure 3-11 and Table 3-11 show monthly and all-year Weibull parameters and corresponding extremes.

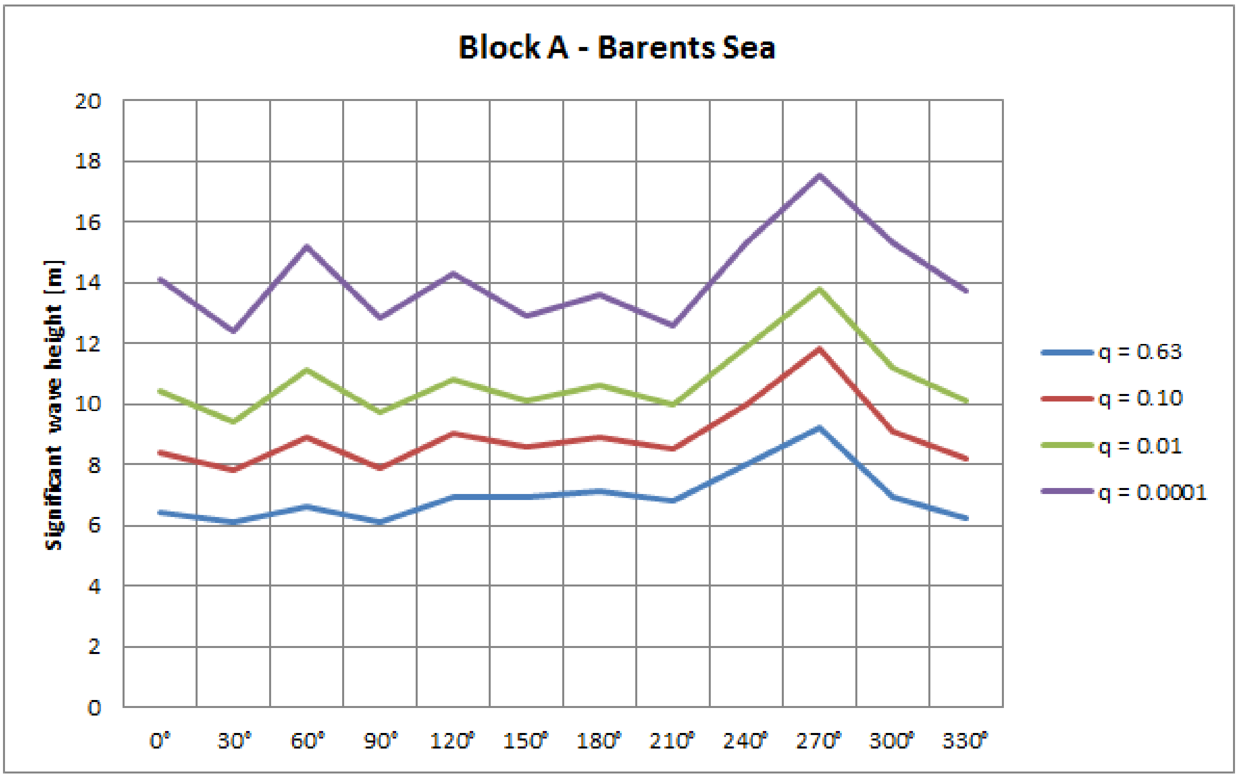


Figure 3-10 **Direction extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block A.**

Table 3-10 **Directional and omni-directional Weibull parameters and corresponding extreme values* for significant wave height at the Block A. Duration of event is 3 hours.**

Direction	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**
0°	6.71	1.185	1.409	0.622	6.4	8.4	10.4	14.1
30°	7.36	1.313	1.534	0.562	6.1	7.8	9.4	12.4
60°	6.16	1.148	1.432	0.599	6.6	8.9	11.1	15.2
90°	5.60	1.293	1.570	0.544	6.1	7.9	9.7	12.8
120°	7.26	1.298	1.744	0.587	6.9	9.0	10.8	14.3
150°	8.14	1.478	2.018	0.495	6.9	8.6	10.1	12.9
180°	8.26	1.424	1.986	0.528	7.1	8.9	10.6	13.6
210°	8.11	1.518	2.076	0.462	6.8	8.5	10.0	12.6
240°	12.22	1.384	2.079	0.519	8.0	10.0	11.9	15.3
270°	15.86	1.208	1.959	0.439	9.2	11.8*	13.8*	17.5*
300°	8.10	1.170	1.482	0.531	6.9	9.1	11.2	15.3
330°	6.21	1.216	1.458	0.576	6.2	8.2	10.1	13.7
0° - 360°	**100.00**	**1.252**	**1.754**	**0.545**	**9.8**	**11.8**	**13.8**	**17.5**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

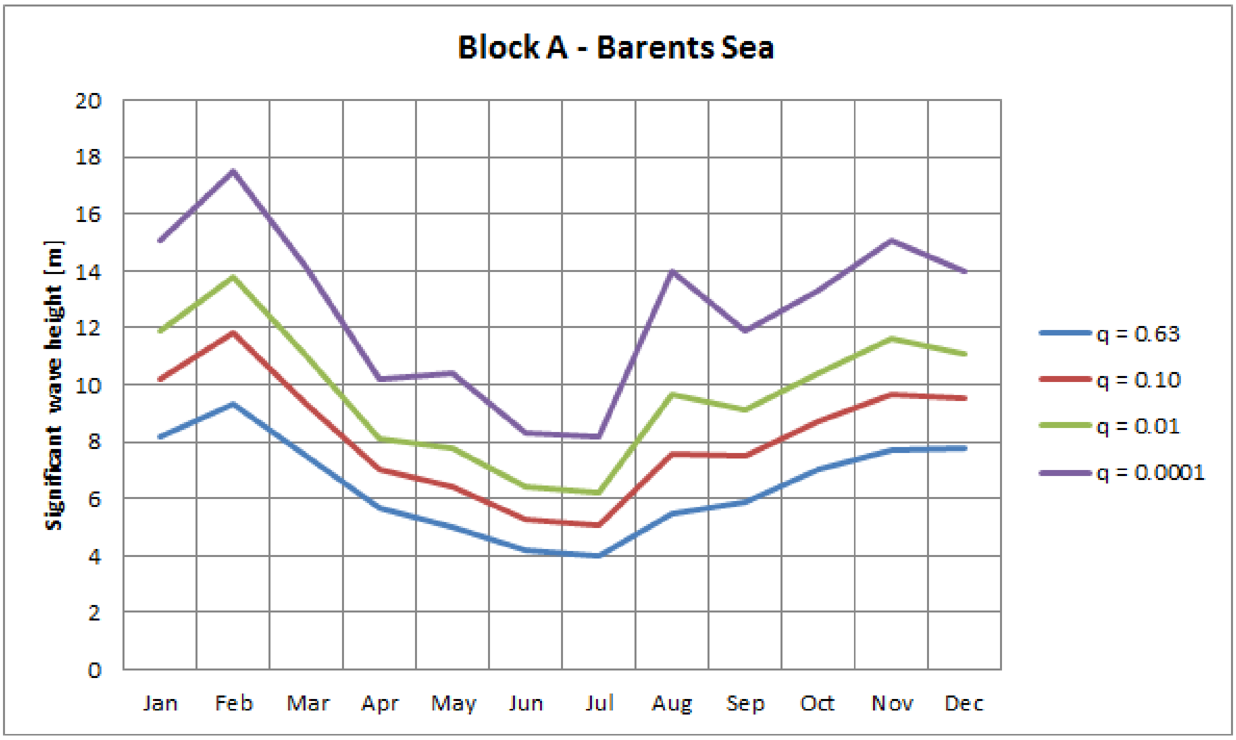


Figure 3-11 Monthly extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block A.

Table 3-11 Monthly and annual Weibull parameters and corresponding extreme values for significant wave height at the Block A. Duration of event is 3 hours.

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m]	[m]	[m]	[m]	[m]	[m]
Jan	8.33	1.519	2.435	0.764	8.2	10.2	11.9	15.1
Feb	8.33	1.311	2.311	0.796	9.3	11.8*	13.8*	17.5*
Mar	8.33	1.451	2.112	0.640	7.5	9.3	11.0	14.1
Apr	8.33	1.609	1.848	0.364	5.7	7.0	8.1	10.2
May	8.33	1.261	1.182	0.415	5.0	6.4	7.8	10.4
Jun	8.33	1.350	1.072	0.435	4.2	5.3	6.4	8.3
Jul	8.33	1.229	0.864	0.533	4.0	5.1	6.2	8.2
Aug	8.33	0.967	0.826	0.678	5.5	7.6	9.7	14.0
Sept	8.33	1.288	1.382	0.742	5.9	7.5	9.1	11.9
Oct	8.33	1.379	1.779	0.856	7.0	8.7	10.4	13.3
Nov	8.33	1.341	1.915	0.883	7.7	9.7	11.6	15.1
Dec	8.33	1.546	2.327	0.756	7.8	9.5	11.1	14.0
Year	**100.00**	**1.252**	**1.754**	**0.545**	**9.8**	**11.8**	**13.8**	**17.5**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

A short term sea state is for most practical purposes reasonably well characterized by the significant wave height, H_S, and the spectral peak period, T_p.

Table 3-12 shows the scatter table of H_S and T_p for a period of 100 years. Scatter tables for monthly and directional data may be provided upon request.

Table 3-12 Scatter table of significant wave height (H_S) and spectral peak period (T_p) at the Block A for a period of 100 years. Duration of sea state is 3 hours. The scatter is based on a statistical distribution. The number of sea states in each cell is rounded downward to nearest integer. The sums are calculated based on exact numbers and will not match exactly the sum of numbers provided in the cells.

H_S [m]	Spectral peak period (T_p) - [s]																			Sum
	2-3	**3-4**	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**	**9-10**	**10-11**	**11-12**	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**	**17-18**	**18-19**	**19-20**	**20-21**	
0-1	933	3420	5926	6740	6038	4689	3332	2237	1449	917	573	355	219	135	83	52	32	20	34	**37182**
1-2	177	2211	8375	16149	20759	20656	17374	13042	9051	5945	3756	2309	1393	829	489	287	168	99	140	**123208**
2-3	2	117	1189	4501	9197	12568	13081	11264	8475	5782	3672	2211	1280	719	396	214	115	61	68	**74910**
3-4		1	50	472	1842	3963	5647	6003	5158	3785	2468	1471	819	432	219	108	52	24	21	**32534**
4-5			1	20	187	768	1734	2544	2713	2277	1593	968	527	263	123	55	23	10	6	**13811**
5-6					8	81	349	819	1219	1282	1030	671	370	179	78	31	12	4	2	**6136**
6-7						3	35	156	376	558	566	427	253	124	52	19	6	2	1	**2579**
7-8							1	15	69	167	242	232	161	85	36	13	4	1		**1028**
8-9								1	7	31	72	99	88	55	26	9	3	1		**391**
9-10										3	13	30	38	31	17	7	2	1		**143**
10-11											1	6	12	14	10	5	2			**50**
11-12												1	2	4	5	3	1			**17**
12-13														1	2	1	1			**6**
13-14																				**2**
14-15																				**1**
15-16																				
16-17																				
17-18																				
18-19																				
Sum	**1111**	**5749**	**15540**	**27881**	**38031**	**42728**	**41552**	**36081**	**28517**	**20747**	**13986**	**8779**	**5162**	**2873**	**1537**	**806**	**422**	**223**	**273**	**291999**

The conditional distribution of spectral peak period (T_p) given significant wave height (H_S) is modelled by a log-normal distribution as described in Appendix A.

Table 3-13 shows the parameters in the log-normal distribution of T_p given H_S.

Table 3-13 Parameters in the log-normal distribution of T_p given H_S.

	Parameters					
Direction	a_1	a_2	a_3	b_1	b_2	b_3
0°	0.647	1.180	0.215	0.005	0.115	0.445
30°	0.022	1.801	0.151	0.005	0.084	0.388
60°	0.499	1.322	0.186	0.005	0.084	0.414
90°	0.425	1.405	0.171	0.005	0.110	0.539
120°	1.121	0.707	0.329	0.005	0.094	0.488
150°	1.153	0.671	0.338	0.005	0.138	0.580
180°	1.121	0.746	0.292	0.005	0.110	0.341
210°	1.590	0.420	0.385	0.005	0.168	0.319
240°	1.806	0.350	0.451	0.005	0.162	0.357
270°	1.757	0.386	0.411	0.005	0.141	0.386
300°	1.506	0.490	0.395	0.005	0.176	0.440
330°	1.311	0.575	0.348	0.005	0.195	0.527
0° - 360°	**1.481**	**0.468**	**0.419**	**0.005**	**0.162**	**0.363**

Figure 3-12 and Table 3-14 show spectral peak period as a function of significant wave height.

The apparent discontinuity in T_p at $T_p \approx 18.8$ s in the data-values (in Figure 3-12) is due to the discretization of frequencies used in the Nora10 model, and has not been fully resolved by the non-discretization procedure [1, Equation 3.2].

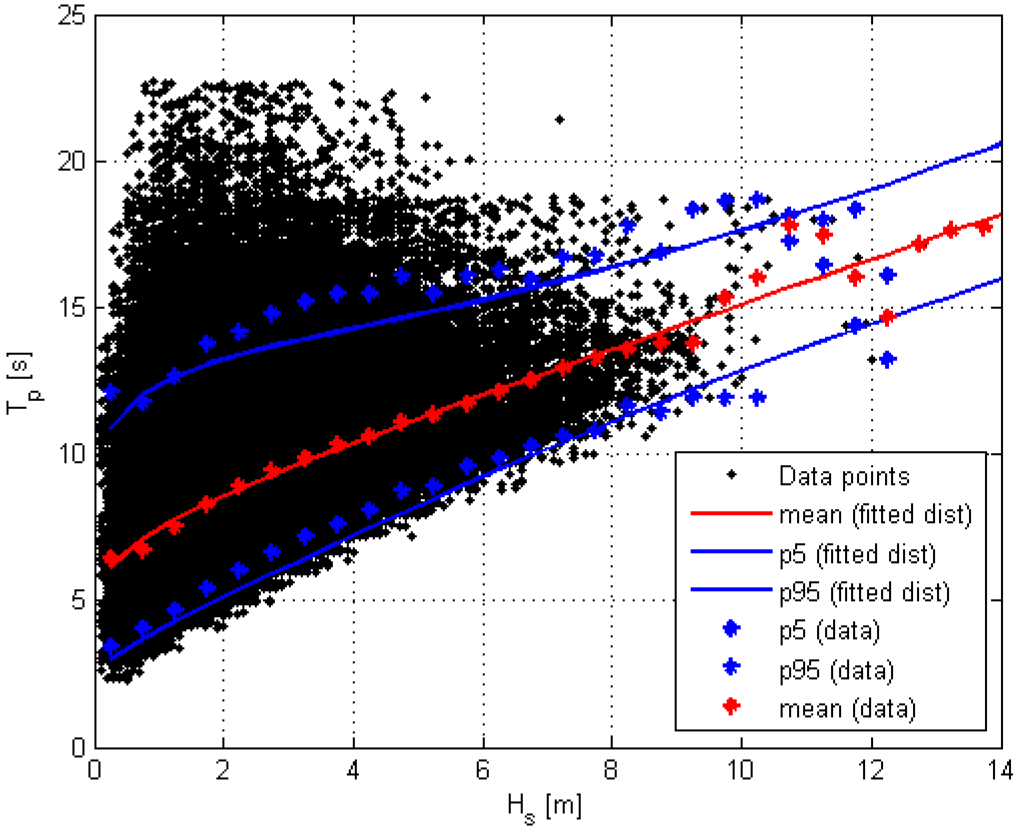


Figure 3-12 Spectral peak period for given significant wave height at the Block A.

Table 3-14 Spectral peak period T_p as a function of significant wave height H_S at the Block A; mean values and 90 % confidence bands.

Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
	P5	**Mean**	**P95**
1.0	4.0	7.5	12.3
2.0	5.1	8.6	13.2
3.0	6.2	9.5	13.8
4.0	7.2	10.4	14.3
5.0	8.2	11.2	14.8
6.0	9.2	12.0	15.3
7.0	10.2	12.8	15.8
8.0	11.1	13.6	16.4
9.0	12.0	14.3	17.0
10.0	12.8	15.1	17.6
11.0	13.6	15.9	18.3
12.0	14.4	16.6	19.0
13.0	15.2	17.4	19.8
14.0	15.9	18.2	20.6
15.0	16.7	18.9	21.4
16.0	17.4	19.7	22.2
17.0	18.1	20.5	23.0
18.0	18.8	21.3	23.9

Table 3-15 shows omni-directional extreme significant wave heights and associated spectral peak periods.

Table 3-15 Omni-directional extreme significant wave heights and corresponding spectral peak periods; mean values and 90 % confidence bands.

Annual probability of exceedance	Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
		P5	Mean	P95
0.63	9.8	12.7	15.0	17.5
10^{-1}	11.8	14.3	16.5	18.9
10^{-2}	13.8	15.8	18.0	20.4
10^{-4}	17.5	18.5	20.9	23.4

Table 3-16 and Table 3-17 show directional and monthly extreme significant wave heights and associated spectral peak periods. (See [1, Chapter 1.3.2] if directional extremes are to be used for design).

Figure 3-13 and Table 3-18 show q – probability contour lines of H_s – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves.

Table 3-16 Directional and omni-directional extreme significant wave height (H_S) and spectral peak period (T_p) at the Block A.

Direction sector	Sector probability	Annual probability (q) of exceedance							
		q = 0.63		q = 10^{-1}		q = 10^{-2}		q = 10^{-4}	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
0°	6.71	6.4	11.2	8.4	12.4	10.4	13.5	14.1	15.4
30°	7.36	6.1	10.9	7.8	11.9	9.4	12.8	12.4	14.2
60°	6.16	6.6	10.8	8.9	12.0	11.1	13.1	15.2	14.8
90°	5.60	6.1	10.4	7.9	11.3	9.7	12.2	12.8	13.4
120°	7.26	6.9	11.7	9.0	13.2	10.8	14.4	14.3	16.7
150°	8.14	6.9	11.6	8.6	12.8	10.1	13.8	12.9	15.6
180°	8.26	7.1	11.6	8.9	12.7	10.6	13.6	13.6	15.2
210°	8.11	6.8	11.9	8.5	12.9	10.0	13.7	12.6	15.0
240°	12.22	8.0	15.0	10.0	16.5	11.9	17.8	15.3	20.2
270°	15.86	9.2	15.0*	11.8	16.5*	13.8	18.0*	17.5	20.3
300°	8.10	6.9	13.0	9.1	14.6	11.2	16.1	15.3	19.1
330°	6.21	6.2	11.1	8.2	12.3	10.1	13.5	13.7	15.6
0°-360°	**100.00**	**9.8**	**15.0**	**11.8**	**16.5**	**13.8**	**18.0**	**17.5**	**20.9**

* Indicates when the associated period value presented has been adjusted to the omnidirectional value.

Table 3-17 Monthly and annual extreme significant wave height (H_S) and spectral peak period (T_p) at the Block A.

Month	Annual probability	Annual probability (q) of exceedance							
		q = 0.63		$q = 10^{-1}$		$q = 10^{-2}$		$q = 10^{-4}$	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
Jan	8.33	8.2	13.7	10.2	15.3	11.9	16.6	15.1	19.0
Feb	8.33	9.3	14.6	11.8	16.5	13.8	18.0	17.5	20.9
Mar	8.33	7.5	13.2	9.3	14.6	11.0	15.9	14.1	18.2
Apr	8.33	5.7	11.8	7.0	12.8	8.1	13.6	10.2	15.3
May	8.33	5.0	11.2	6.4	12.3	7.8	13.4	10.4	15.4
Jun	8.33	4.2	10.5	5.3	11.4	6.4	12.3	8.3	13.8
Jul	8.33	4.0	10.4	5.1	11.3	6.2	12.2	8.2	13.7
Aug	8.33	5.5	11.6	7.6	13.3	9.7	14.9	14.0	18.2
Sept	8.33	5.9	11.9	7.5	13.2	9.1	14.4	11.9	16.6
Oct	8.33	7.0	12.8	8.7	14.1	10.4	15.4	13.3	17.6
Nov	8.33	7.7	13.3	9.7	14.9	11.6	16.3	15.1	19.0
Dec	8.33	7.8	13.4	9.5	14.7	11.1	15.9	14.0	18.2
Year	**100.00**	**9.8**	**15.0**	**11.8**	**16.5**	**13.8**	**18.0**	**17.5**	**20.9**

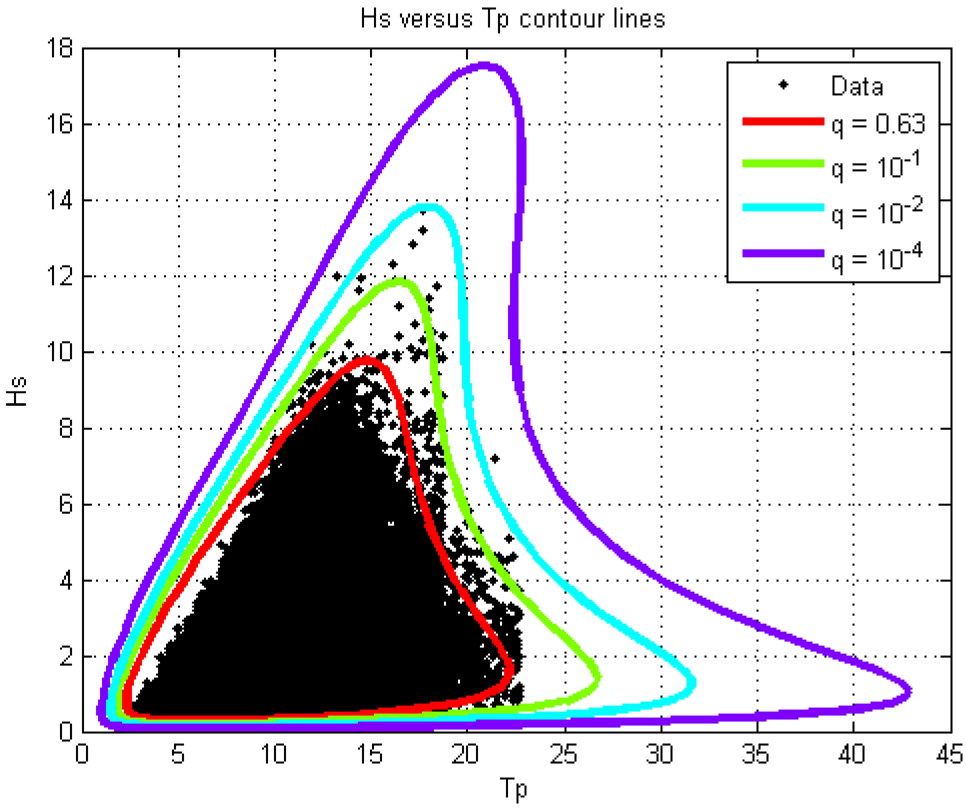


Figure 3-13 q – probability contour lines of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block A. Duration of sea state is 3 hours.

Table 3-18 q – probability contour values of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block A. Duration of sea state is 3 hours. T_{pL} and T_{pH} are lower and higher limits of T_p, respectively.

Annual probability of exceedance											
0.63			10^{-1}			10^{-2}			10^{-4}		
H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]
9.8	14.8	14.8	11.8	16.4	16.4	13.8	18.0	18.0	17.5	20.8	20.8
9.0	12.6	16.2	11.0	14.1	17.8	13.0	15.6	19.3	17.0	18.8	22.2
8.0	10.9	16.7	10.0	12.5	18.1	12.0	14.0	19.6	16.0	17.0	22.7
7.0	9.4	17.1	9.0	11.1	18.4	11.0	12.7	19.7	15.0	15.7	22.7
6.0	8.0	17.6	8.0	9.7	18.7	10.0	11.4	19.8	14.0	14.5	22.7
5.0	6.6	18.3	7.0	8.4	19.1	9.0	10.2	20.0	13.0	13.3	22.5
4.0	5.3	19.3	6.0	7.1	19.7	8.0	9.0	20.3	12.0	12.3	22.4
3.0	4.2	20.5	5.0	5.9	20.7	7.0	7.7	20.8	11.0	11.2	22.3
2.0	3.1	21.8	4.0	4.7	22.0	6.0	6.5	21.6	10.0	10.1	22.4
1.0	2.2	22.3	3.0	3.6	23.8	5.0	5.3	22.9	9.0	9.0	22.6
			2.0	2.6	25.9	4.0	4.2	24.6	8.0	7.9	23.1
			1.0	1.8	27.3	3.0	3.2	27.0	7.0	6.7	23.9
						2.0	2.3	30.0	6.0	5.6	25.2
						1.0	1.5	32.6	5.0	4.5	27.1
									4.0	3.5	29.9

3.3.2 Block B

Figure 3-14 shows the observed and fitted distributions of significant wave height at the Block B.

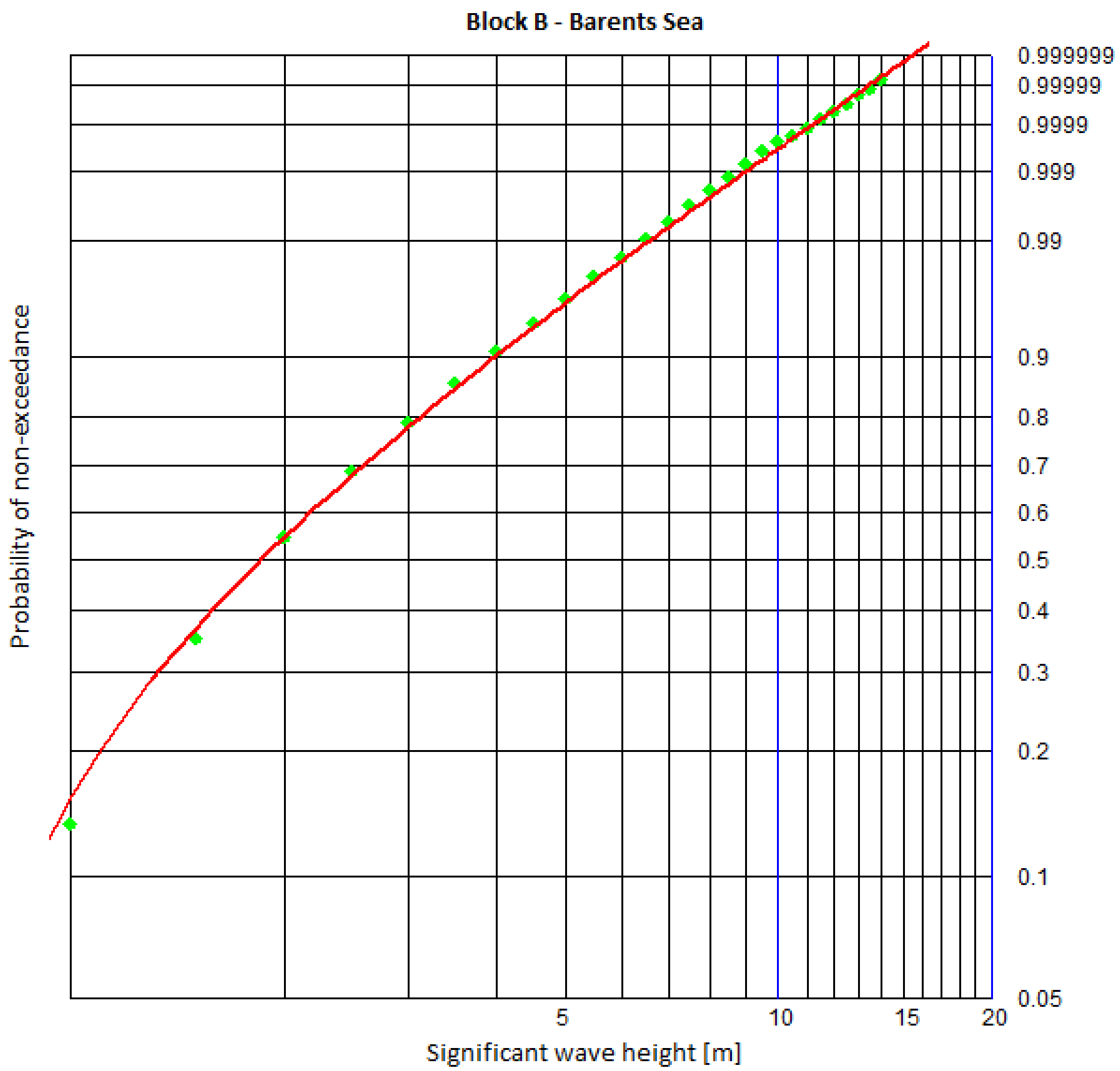


Figure 3-14 Observed (green dots) and fitted (red line) distributions of significant wave height at the Block B.

Figure 3-15 and Table 3-19 show directional and omni-directional Weibull parameters and corresponding extremes of significant wave height at the Block B. Figure 3-16 and Table 3-20 show monthly and all-year Weibull parameters and corresponding extremes.

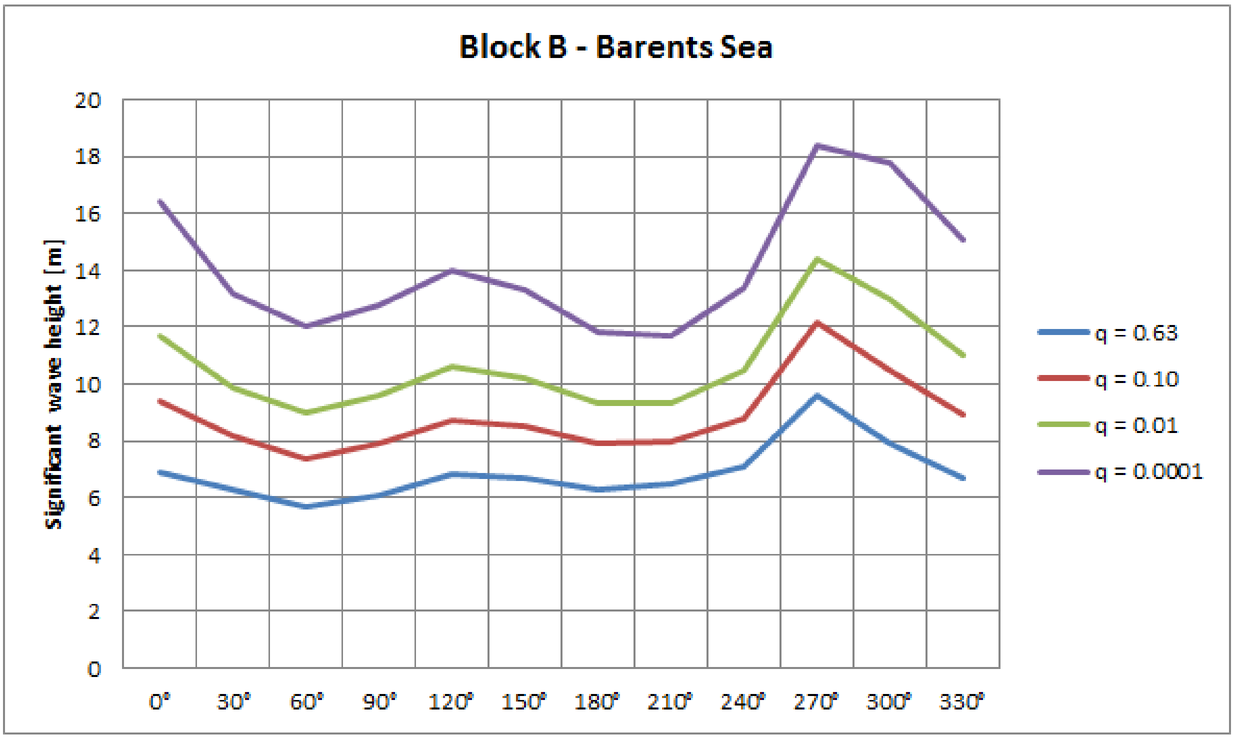


Figure 3-15 **Direction extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block B.**

Table 3-19 **Directional and omni-directional Weibull parameters and corresponding extreme values* for significant wave height at the Block B. Duration of event is 3 hours.**

Direction	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**
0°	7.81	1.077	1.296	0.701	6.9	9.4	11.7	16.4
30°	7.87	1.257	1.496	0.569	6.3	8.2	9.9	13.2
60°	5.94	1.282	1.427	0.560	5.7	7.4	9.0	12.0
90°	5.97	1.302	1.576	0.558	6.1	7.9	9.6	12.8
120°	7.80	1.267	1.605	0.657	6.8	8.7	10.6	14.0
150°	7.51	1.371	1.796	0.581	6.7	8.5	10.2	13.3
180°	6.78	1.512	1.926	0.533	6.3	7.9	9.3	11.8
210°	7.20	1.602	2.101	0.483	6.5	8.0	9.3	11.7
240°	8.95	1.432	1.956	0.574	7.1	8.8	10.5	13.4
270°	16.38	1.279	2.191	0.527	9.6	12.2	14.4*	18.4*
300°	10.30	1.132	1.581	0.570	7.9	10.5	13.0	17.8
330°	7.48	1.164	1.446	0.585	6.7	8.9	11.0	15.1
0° - 360°	**100.00**	**1.205**	**1.680**	**0.617**	**10.0**	**12.2**	**14.4**	**18.4**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

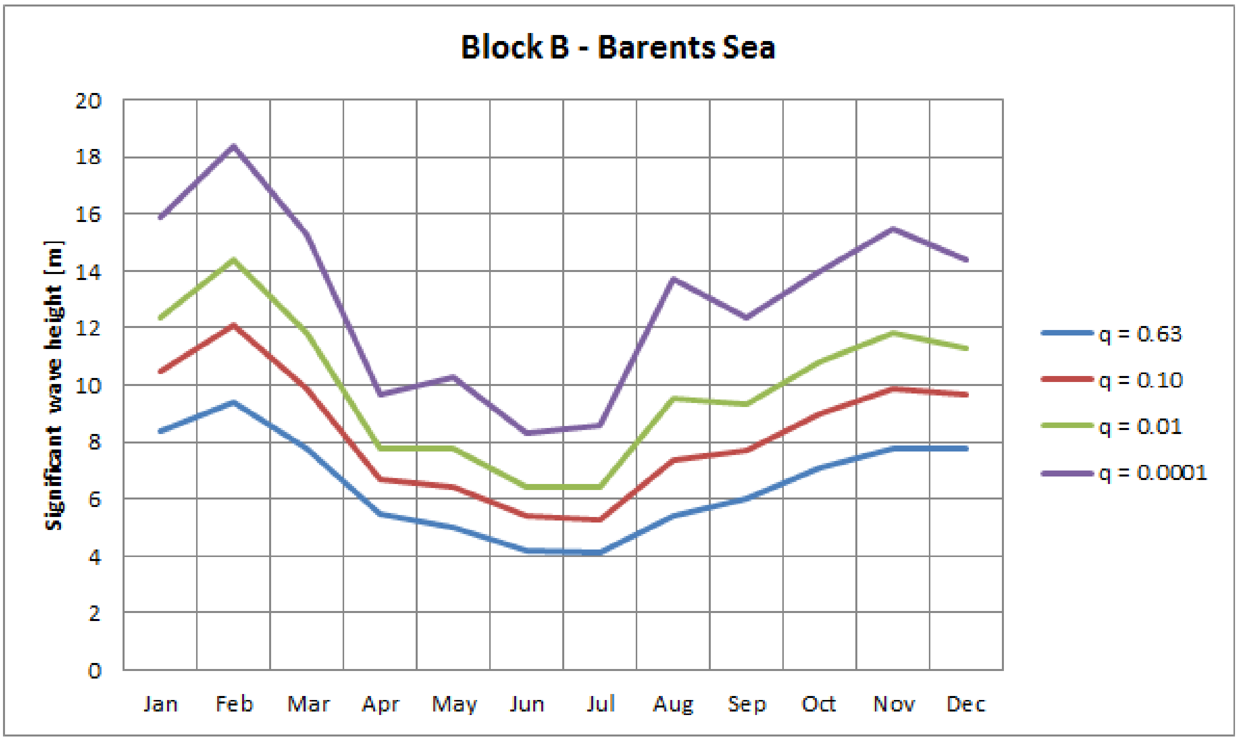


Figure 3-16 **Monthly extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block B.**

Table 3-20 **Monthly and annual Weibull parameters and corresponding extreme values* for significant wave height at the Block B. Duration of event is 3 hours.**

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m]	[m]	[m]	[m]	[m]	[m]
Jan	8.33	1.439	2.329	0.826	8.4	10.5	12.4	15.9
Feb	8.33	1.237	2.122	0.958	9.4	12.1	14.4*	18.4*
Mar	8.33	1.354	2.007	0.728	7.8	9.9	11.8	15.3
Apr	8.33	1.619	1.763	0.425	5.5	6.7	7.8	9.7
May	8.33	1.263	1.170	0.476	5.0	6.4	7.8	10.3
Jun	8.33	1.336	1.045	0.500	4.2	5.4	6.4	8.3
Jul	8.33	1.180	0.823	0.577	4.1	5.3	6.4	8.6
Aug	8.33	0.961	0.791	0.718	5.4	7.4	9.5	13.7
Sept	8.33	1.241	1.327	0.770	6.0	7.7	9.3	12.4
Oct	8.33	1.319	1.711	0.914	7.1	9.0	10.8	14.0
Nov	8.33	1.298	1.836	0.944	7.8	9.9	11.8	15.5
Dec	8.33	1.484	2.208	0.855	7.8	9.7	11.3	14.4
Year	**100.00**	**1.205**	**1.680**	**0.617**	**10.0**	**12.2**	**14.4**	**18.4**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

A short term sea state is for most practical purposes reasonably well characterized by the significant wave height, H_S, and the spectral peak period, T_p.

Table 3-21 shows the scatter table of H_S and T_p for a period of 100 years.

Scatter tables for monthly and directional data may be provided upon request.

Table 3-21 Scatter table of significant wave height (H_S) and spectral peak period (T_p) at the Block B for a period of 100 years. Duration of sea state is 3 hours. The scatter is based on a statistical distribution. The number of sea states in each cell is rounded downward to nearest integer. The sums are calculated based on exact numbers and will not match exactly the sum of numbers provided in the cells.

H_S [m]	Spectral peak period (T_p) - [s]																			Sum
	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	
0-1	1041	3661	6091	6662	5752	4314	2966	1931	1215	748	455	275	165	100	60	36	22	14	22	**35530**
1-2	150	2169	8787	17322	22138	21519	17480	12578	8326	5199	3117	1816	1037	584	326	181	101	56	70	**122956**
2-3	1	73	998	4449	9876	13879	14302	11872	8448	5377	3154	1741	919	469	234	114	55	26	24	**76011**
3-4			23	332	1681	4179	6337	6751	5561	3785	2233	1182	576	263	115	48	20	8	5	**33098**
4-5				7	109	634	1755	2829	3051	2430	1535	811	372	153	58	20	7	2	1	**13775**
5-6					2	40	268	815	1369	1460	1095	623	285	110	37	11	3	1		**6118**
6-7						1	16	119	385	655	673	463	231	89	28	7	2			**2669**
7-8								7	55	180	299	288	178	77	25	6	1			**1116**
8-9									3	26	83	130	114	62	23	6	1			**449**
9-10										2	13	37	53	42	20	7	2			**175**
10-11											1	6	16	20	14	6	2			**66**
11-12												1	3	6	7	5	2			**24**
12-13														1	2	2	1	1		**9**
13-14															1	1	1			**3**
14-15																				**1**
15-16																				
16-17																				
17-18																				
18-19																				
Sum	**1191**	**5904**	**15898**	**28772**	**39559**	**44565**	**43124**	**36903**	**28414**	**19863**	**12657**	**7370**	**3949**	**1977**	**950**	**452**	**219**	**110**	**123**	**292001**

The conditional distribution of spectral peak period (T_p) given significant wave height (H_S) is modelled by a log-normal distribution as described in Appendix A.

Table 3-22 shows the parameters in the log-normal distribution of T_p given H_S.

Table 3-22 Parameters in the log-normal distribution of T_p given H_S.

	Parameters					
Direction	**a_1**	**a_2**	**a_3**	**b_1**	**b_2**	**b_3**
0°	0.952	0.893	0.275	0.005	0.133	0.625
30°	0.922	0.895	0.289	0.005	0.082	0.518
60°	0.793	1.045	0.218	0.005	0.123	0.703
90°	1.069	0.751	0.312	0.005	0.139	0.732
120°	1.378	0.444	0.451	0.005	0.126	0.725
150°	1.429	0.376	0.503	0.005	0.172	0.863
180°	1.481	0.374	0.452	0.005	0.185	0.560
210°	1.742	0.213	0.587	0.005	0.197	0.429
240°	1.891	0.208	0.639	0.005	0.180	0.333
270°	1.889	0.269	0.506	0.005	0.143	0.427
300°	1.495	0.527	0.352	0.005	0.181	0.604
330°	1.133	0.793	0.260	0.005	0.159	0.535
0° - 360°	**1.431**	**0.492**	**0.416**	**0.005**	**0.164**	**0.430**

Figure 3-17 and Table 3-23 show spectral peak period as a function of significant wave height.

The apparent discontinuity in T_p at $T_p \approx 18.8$ s in the data-values (in Figure 3-17) is due to the discretization of frequencies used in the Nora10 model, and has not been fully resolved by the non-discretization procedure [1, Equation 3.2].

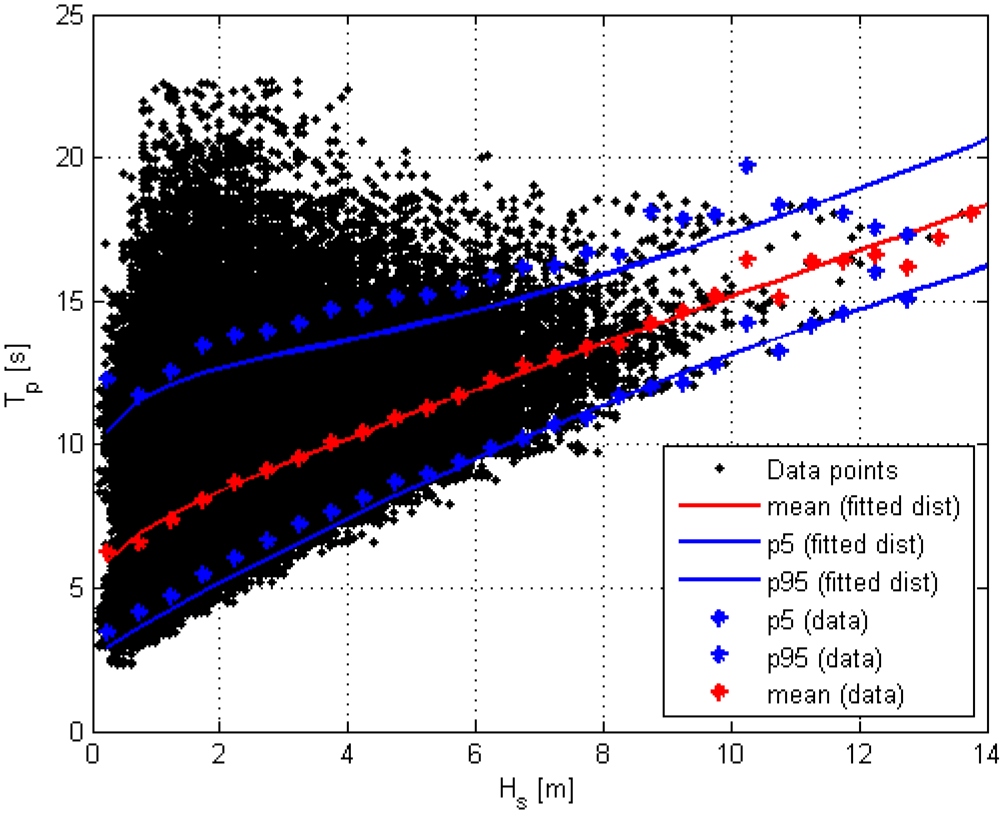


Figure 3-17 Spectral peak period for given significant wave height at the Block B.

Table 3-23 Spectral peak period T_p as a function of significant wave height H_S at the Block B; mean values and 90 % confidence bands.

Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
	P5	Mean	P95
1.0	3.9	7.2	11.9
2.0	5.1	8.4	12.6
3.0	6.3	9.3	13.2
4.0	7.4	10.2	13.6
5.0	8.5	11.1	14.1
6.0	9.5	11.9	14.7
7.0	10.5	12.7	15.3
8.0	11.4	13.5	15.9
9.0	12.3	14.3	16.6
10.0	13.1	15.1	17.3
11.0	13.9	15.9	18.1
12.0	14.7	16.7	18.9
13.0	15.5	17.5	19.8
14.0	16.2	18.3	20.6
15.0	16.9	19.1	21.5
16.0	17.7	19.9	22.4
17.0	18.4	20.8	23.3
18.0	19.1	21.6	24.2

Table 3-24 shows omni-directional extreme significant wave heights and associated spectral peak periods.

Table 3-24 Omni-directional extreme significant wave heights and corresponding spectral peak periods; mean values and 90 % confidence bands.

Annual probability of exceedance	Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
		P5	Mean	P95
0.63	10.0	13.1	15.1	17.3
10^{-1}	12.2	14.9	16.9	19.1
10^{-2}	14.4	16.5	18.7	21.0
10^{-4}	18.4	19.4	21.9	24.6

Table 3-25 and Table 3-26 show directional and monthly extreme significant wave heights and associated spectral peak periods. (See [1, Chapter 1.3.2] if directional extremes are to be used for design).

Figure 3-18 and Table 3-27 show q – probability contour lines of H_s – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves.

Table 3-25 Directional and omni-directional extreme significant wave height (H_S) and spectral peak period (T_p) at the Block B.

Direction sector	Sector probability	Annual probability (q) of exceedance							
		q = 0.63		q = 10^{-1}		q = 10^{-2}		q = 10^{-4}	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
0°	7.81	6.9	11.9	9.4	13.6	11.7	15.1	16.4	17.9
30°	7.87	6.3	11.6	8.2	13.0	9.9	14.3	13.2	16.6
60°	5.94	5.7	10.2	7.4	11.2	9.0	12.0	12.0	13.4
90°	5.97	6.1	10.9	7.9	12.2	9.6	13.3	12.8	15.4
120°	7.80	6.8	11.4	8.7	12.9	10.6	14.4	14.0	17.1
150°	7.51	6.7	11.2	8.5	12.6	10.2	14.0	13.3	16.7
180°	6.78	6.3	10.5	7.9	11.4	9.3	12.3	11.8	13.8
210°	7.20	6.5	10.9	8.0	11.8	9.3	12.6	11.7	14.1
240°	8.95	7.1	13.9	8.8	15.4	10.5	16.9	13.4	19.8
270°	16.38	9.6	15.1*	12.2	16.9*	14.4	18.7	18.4	21.4
300°	10.30	7.9	13.3	10.5	14.9	13.0	16.4	17.8	19.1
330°	7.48	6.7	11.5	8.9	12.7	11.0	13.7	15.1	15.6
0°-360°	**100.00**	**10.0**	**15.1**	**12.2**	**16.9**	**14.4**	**18.7**	**18.4**	**21.9**

* Indicates when the associated period value presented has been adjusted to the omnidirectional value.

Table 3-26 **Monthly and annual extreme significant wave height (H_S) and spectral peak period (T_p) at the Block B.**

Month	Annual probability	Annual probability (q) of exceedance							
		q = 0.63		$q = 10^{-1}$		$q = 10^{-2}$		$q = 10^{-4}$	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
Jan	8.33	8.4	13.9	10.5	15.5	12.4	17.1	15.9	19.9
Feb	8.33	9.4	14.7	12.1	16.8	14.4	18.7	18.4	21.9
Mar	8.33	7.8	13.4	9.9	15.1	11.8	16.6	15.3	19.4
Apr	8.33	5.5	11.5	6.7	12.5	7.8	13.4	9.7	14.9
May	8.33	5.0	11.1	6.4	12.2	7.8	13.4	10.3	15.4
Jun	8.33	4.2	10.4	5.4	11.4	6.4	12.2	8.3	13.8
Jul	8.33	4.1	10.3	5.3	11.3	6.4	12.2	8.6	14.0
Aug	8.33	5.4	11.4	7.4	13.0	9.5	14.7	13.7	18.1
Sept	8.33	6.0	11.9	7.7	13.3	9.3	14.6	12.4	17.1
Oct	8.33	7.1	12.8	9.0	14.3	10.8	15.8	14.0	18.3
Nov	8.33	7.8	13.4	9.9	15.1	11.8	16.6	15.5	19.5
Dec	8.33	7.8	13.4	9.7	14.9	11.3	16.2	14.4	18.7
Year	**100.00**	**10.0**	**15.1**	**12.2**	**16.9**	**14.4**	**18.7**	**18.4**	**21.9**

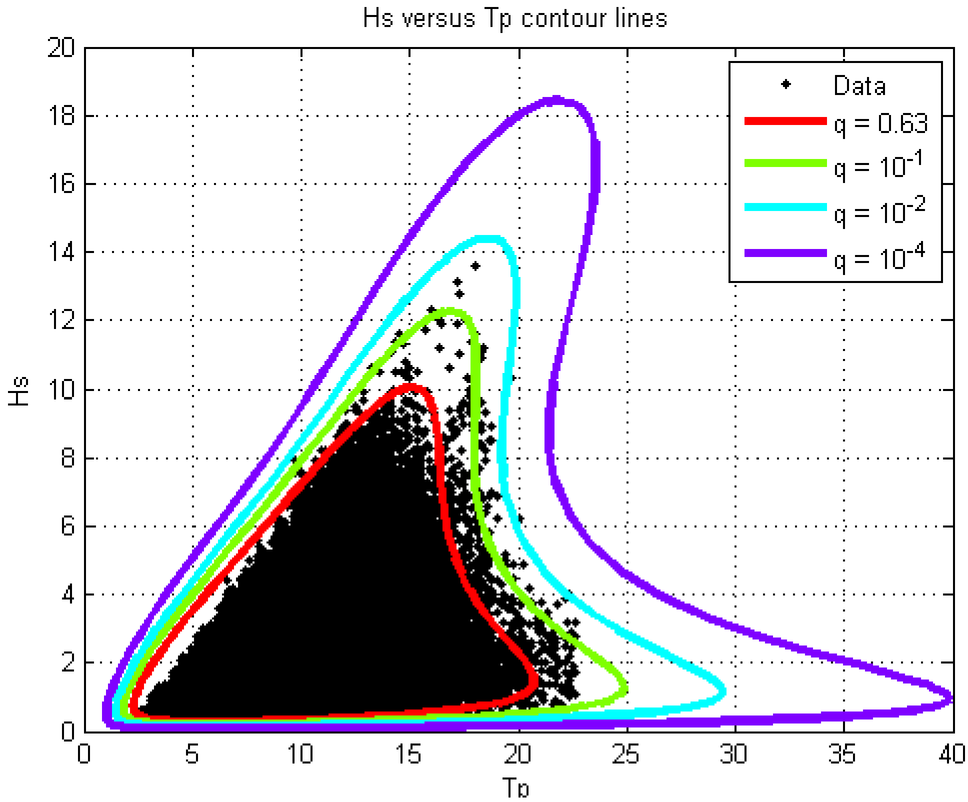


Figure 3-18 **q – probability contour lines of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block B. Duration of sea state is 3 hours.**

Table 3-27 **q – probability contour values of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block B. Duration of sea state is 3 hours. T_{pL} and T_{pH} are lower and higher limits of T_p, respectively.**

Annual probability of exceedance											
0.63			10^{-1}			10^{-2}			10^{-4}		
H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]
10.0	15.1	15.1	12.2	16.9	16.9	14.4	18.6	18.6	18.4	21.9	21.9
10.0	14.8	15.4	12.0	15.8	17.6	14.0	17.1	19.6	18.0	20.1	23.1
9.0	12.6	16.2	11.0	14.0	18.0	13.0	15.4	19.9	17.0	18.2	23.5
8.0	11.1	16.3	10.0	12.6	18.0	12.0	14.1	19.8	16.0	16.8	23.5
7.0	9.7	16.4	9.0	11.4	17.9	11.0	12.9	19.6	15.0	15.6	23.3
6.0	8.3	16.7	8.0	10.1	17.9	10.0	11.7	19.4	14.0	14.5	23.0
5.0	7.0	17.1	7.0	8.9	18.0	9.0	10.6	19.2	13.0	13.5	22.6
4.0	5.7	17.8	6.0	7.6	18.4	8.0	9.4	19.2	12.0	12.5	22.2
3.0	4.4	18.9	5.0	6.3	19.0	7.0	8.2	19.4	11.0	11.6	21.8
2.0	3.2	20.3	4.0	5.0	20.1	6.0	7.0	19.9	10.0	10.6	21.6
1.0	2.2	21.2	3.0	3.8	21.7	5.0	5.8	20.8	9.0	9.5	21.4
			2.0	2.7	23.8	4.0	4.5	22.2	8.0	8.4	21.5
			1.0	1.8	25.8	3.0	3.4	24.4	7.0	7.3	21.8
						2.0	2.4	27.4	6.0	6.1	22.7
						1.0	1.5	30.6	5.0	5.0	24.1

3.3.3 Block C

Figure 3.19 shows the observed and fitted distributions of significant wave height at the Block C.

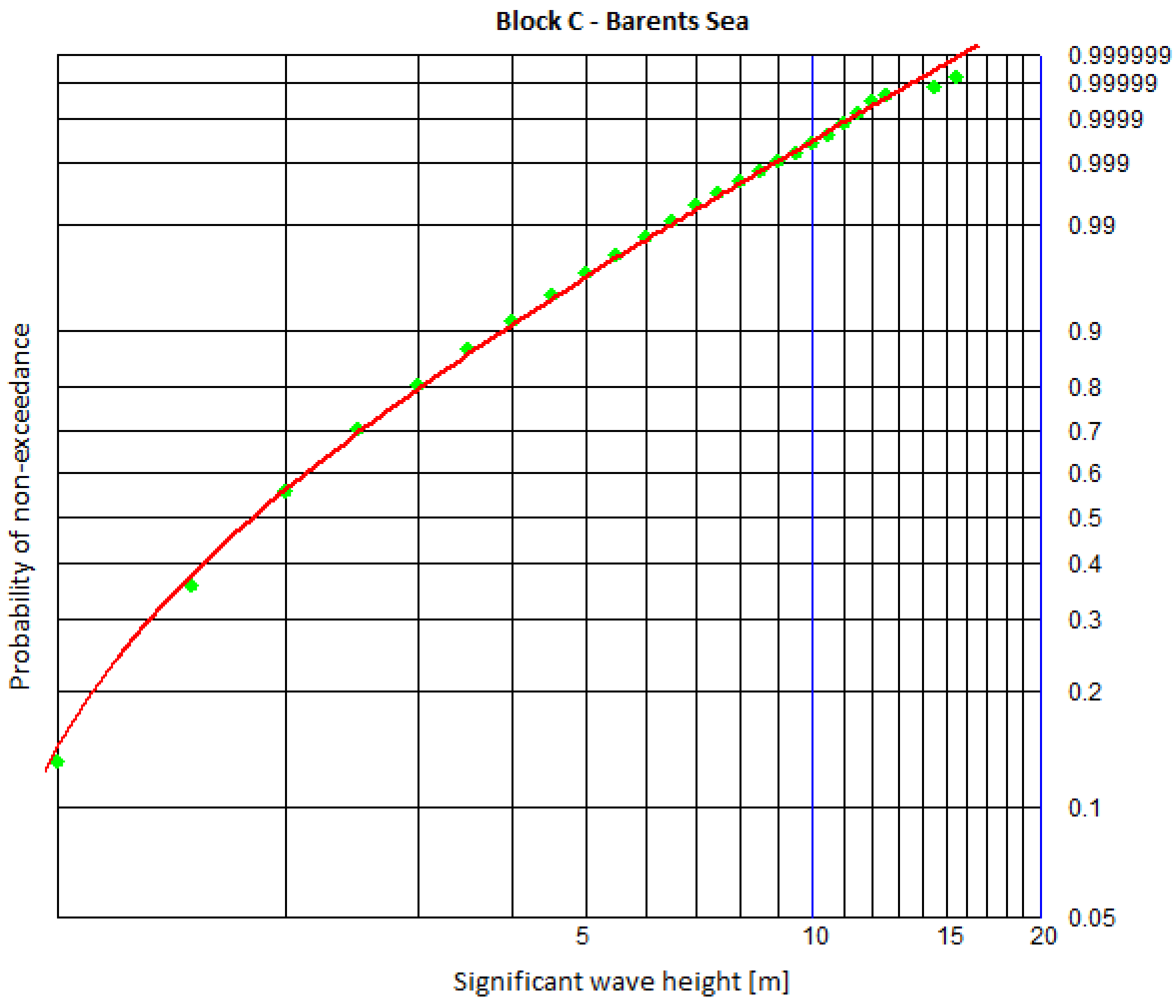


Figure 3-19 Observed (green dots) and fitted (red line) distributions of significant wave height at the Block C.

Figure 3-20 and Table 3-28 show directional and omni-directional Weibull parameters and corresponding extremes of significant wave height at the Block C. Figure 3-21 and Table 3-29 show monthly and all-year Weibull parameters and corresponding extremes.

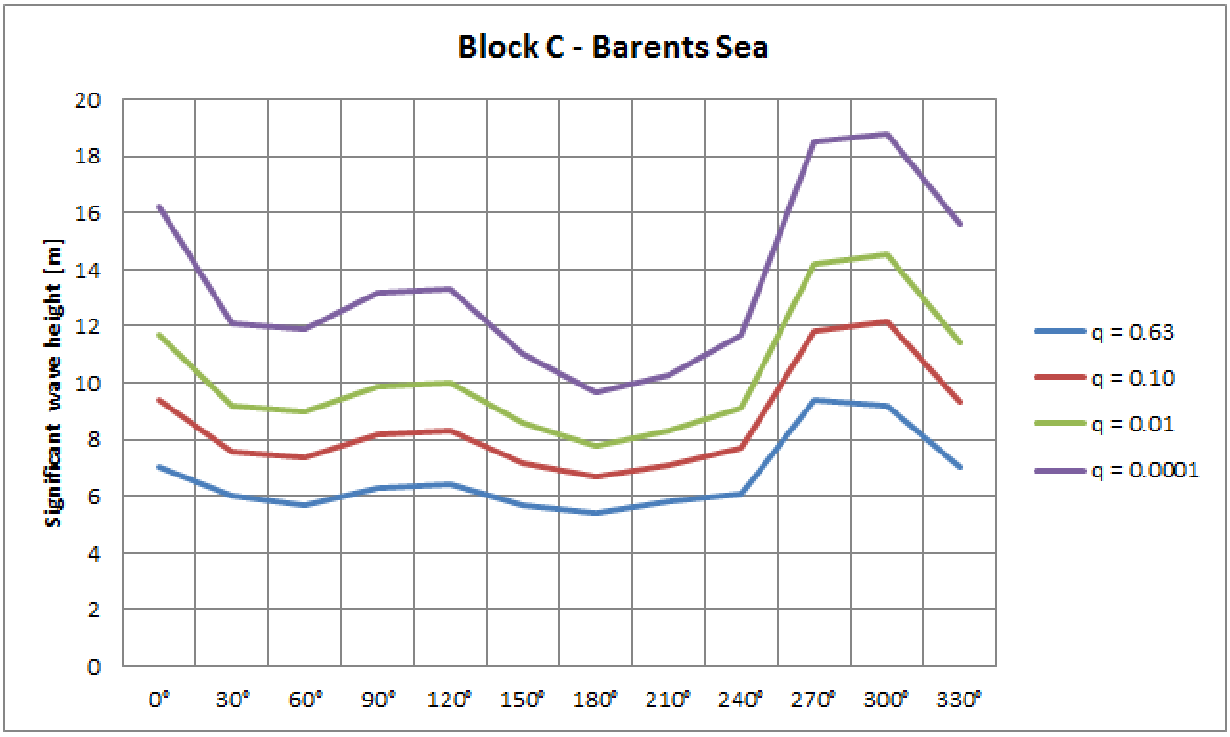


Figure 3-20 **Direction extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block C.**

Table 3-28 **Directional and omni-directional Weibull parameters and corresponding extreme values* for significant wave height at the Block C. Duration of event is 3 hours.**

Direction	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**
0°	8.66	1.086	1.297	0.723	7.0	9.4	11.7	16.2
30°	8.34	1.309	1.474	0.553	6.0	7.6	9.2	12.1
60°	6.33	1.289	1.431	0.550	5.7	7.4	9.0	11.9
90°	7.49	1.260	1.497	0.598	6.3	8.2	9.9	13.2
120°	7.69	1.262	1.518	0.610	6.4	8.3	10.0	13.3
150°	6.98	1.420	1.583	0.590	5.7	7.2	8.6	11.0
180°	5.44	1.672	1.868	0.497	5.4	6.7	7.8	9.7
210°	5.64	1.677	1.998	0.538	5.8	7.1	8.3	10.3
240°	6.09	1.472	1.813	0.597	6.1	7.7	9.1	11.7
270°	15.83	1.279	2.111	0.643	9.4	11.8	14.2	18.5
300°	12.78	1.084	1.664	0.630	9.2	12.2	14.5*	18.8*
330°	8.72	1.147	1.437	0.619	7.0	9.3	11.4	15.6
0° - 360°	**100.00**	**1.157**	**1.549**	**0.687**	**10.0**	**12.3**	**14.5**	**18.8**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

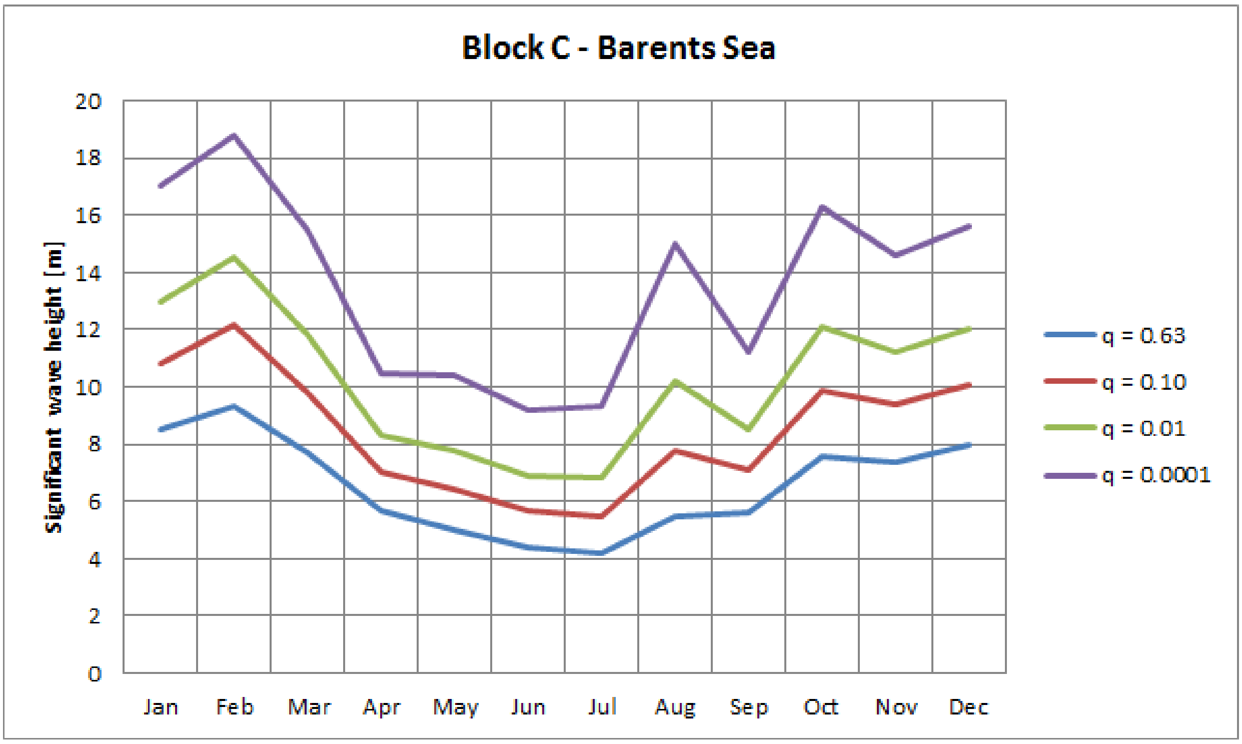


Figure 3-21 **Monthly extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block C.**

Table 3-29 **Monthly and annual Weibull parameters and corresponding extreme values* for significant wave height at the Block C. Duration of event is 3 hours.**

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m]	[m]	[m]	[m]	[m]	[m]
Jan	8.33	1.310	2.062	0.960	8.5	10.8	13.0	17.0
Feb	8.33	1.150	1.857	1.091	9.3	12.2	14.5*	18.8*
Mar	8.33	1.299	1.847	0.815	7.7	9.8	11.8	15.5
Apr	8.33	1.493	1.644	0.529	5.7	7.0	8.3	10.5
May	8.33	1.236	1.122	0.533	5.0	6.4	7.8	10.4
Jun	8.33	1.225	0.956	0.581	4.4	5.7	6.9	9.2
Jul	8.33	1.119	0.786	0.601	4.2	5.5	6.8	9.3
Aug	8.33	0.902	0.727	0.746	5.5	7.8	10.2	15.0
Sept	8.33	1.276	1.269	0.758	5.6	7.1	8.5	11.2
Oct	8.33	1.178	1.563	0.978	7.6	9.9	12.1	16.3
Nov	8.33	1.319	1.781	0.923	7.4	9.4	11.2	14.6
Dec	8.33	1.342	1.976	0.969	8.0	10.1	12.0	15.6
Year	**100.00**	**1.157**	**1.549**	**0.687**	**10.0**	**12.3**	**14.5**	**18.8**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

A short term sea state is for most practical purposes reasonably well characterized by the significant wave height, H_S, and the spectral peak period, T_p.

Table 3-30 shows the scatter table of H_S and T_p for a period of 100 years.

Scatter tables for monthly and directional data may be provided upon request.

Table 3-30 Scatter table of significant wave height (H_S) and spectral peak period (T_p) at the Block C for a period of 100 years. Duration of sea state is 3 hours. The scatter is based on a statistical distribution. The number of sea states in each cell is rounded downward to nearest integer. The sums are calculated based on exact numbers and will not match exactly the sum of numbers provided in the cells.

H_S [m]	Spectral peak period (T_p) - [s]																			Sum
	2-3	**3-4**	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**	**9-10**	**10-11**	**11-12**	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**	**17-18**	**18-19**	**19-20**	**20-21**	
0-1	986	3666	6263	6932	6004	4492	3070	1982	1234	751	451	269	160	95	57	34	20	12	19	**36498**
1-2	156	2213	8871	17432	22304	21764	17780	12882	8592	5409	3270	1921	1107	629	355	199	111	62	80	**125136**
2-3	1	93	1114	4600	9782	13475	13834	11574	8369	5446	3280	1866	1017	538	278	141	71	35	34	**75548**
3-4		1	36	413	1804	4108	5953	6253	5197	3633	2230	1241	640	312	145	65	29	12	9	**32082**
4-5				13	152	710	1717	2574	2707	2180	1432	805	400	181	76	30	11	4	2	**12994**
5-6					5	62	312	791	1203	1238	942	566	283	122	47	16	5	2	1	**5595**
6-7						2	28	147	381	574	564	395	211	91	33	10	3	1		**2440**
7-8							1	13	70	181	262	240	151	70	26	8	2			**1025**
8-9								1	7	34	84	114	95	53	21	6	2			**417**
9-10										4	17	38	47	35	17	6	1			**165**
10-11											2	8	16	18	12	5	2			**63**
11-12												1	4	7	6	4	1			**24**
12-13													1	2	3	2	1			**9**
13-14															1	1	1			**3**
14-15																				**1**
15-16																				
16-17																				
17-18																				
18-19																				
Sum	**1143**	**5972**	**16284**	**29390**	**40050**	**44613**	**42695**	**36216**	**27762**	**19451**	**12536**	**7464**	**4132**	**2152**	**1075**	**528**	**261**	**131**	**146**	**292002**

The conditional distribution of spectral peak period (T_p) given significant wave height (H_S) is modelled by a log-normal distribution as described in the Metocean Design Basis Guidelines [1].

Table 3-31 shows the parameters in the log-normal distribution of T_p given H_S.

Table 3-31 Parameters in the log-normal distribution of T_p given H_S.

	Parameters					
Direction	**a_1**	**a_2**	**a_3**	**b_1**	**b_2**	**b_3**
0°	1.059	0.844	0.267	0.005	0.130	0.617
30°	1.227	0.666	0.335	0.005	0.157	0.877
60°	0.285	1.567	0.159	0.005	0.079	0.463
90°	0.991	0.851	0.280	0.005	0.096	0.525
120°	1.075	0.720	0.328	0.005	0.065	0.389
150°	1.395	0.368	0.539	0.005	0.103	0.462
180°	1.492	0.292	0.572	0.005	0.226	0.605
210°	1.840	0.100	0.849	0.005	0.214	0.385
240°	2.039	0.083	0.895	0.005	0.172	0.218
270°	1.853	0.288	0.490	0.005	0.168	0.382
300°	1.603	0.444	0.382	0.005	0.194	0.593
330°	1.305	0.651	0.302	0.005	0.148	0.497
0° - 360°	**1.406**	**0.521**	**0.395**	**0.005**	**0.155**	**0.384**

Figure 3-22 and Table 3-32 show spectral peak period as a function of significant wave height.

The apparent discontinuity in T_p at $T_p \approx 18.8$ s in the data-values (in Figure 3-22) is due to the discretization of frequencies used in the Nora10 model, and has not been fully resolved by the non-discretization procedure [1, Equation 3.2].

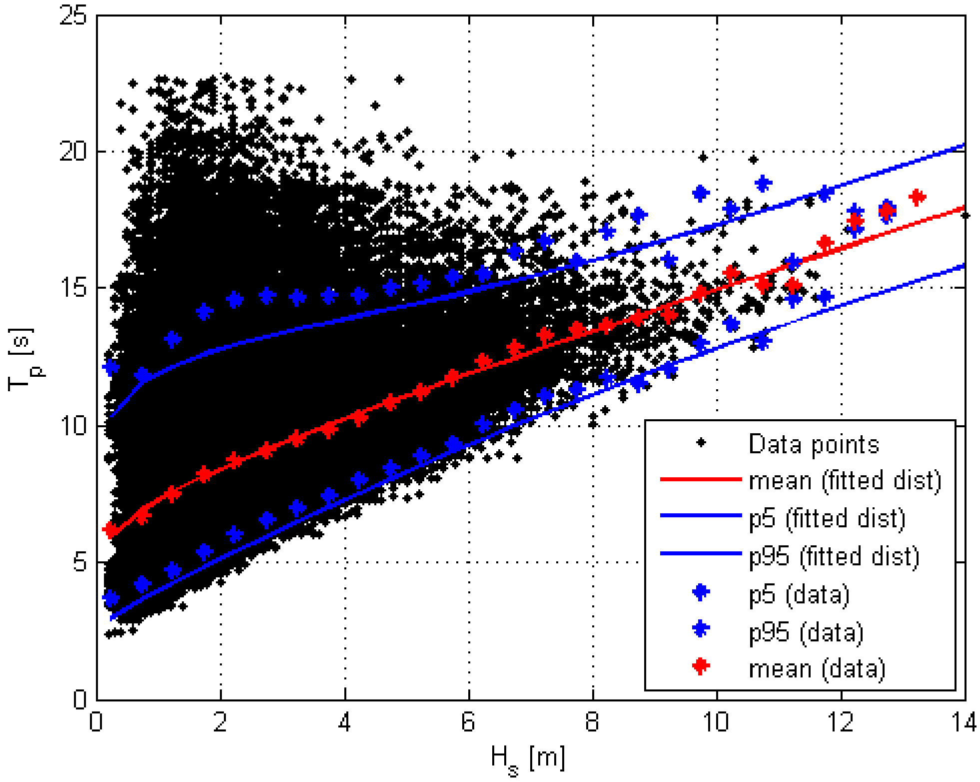


Figure 3-22 Spectral peak period for given significant wave height at the Block C.

Table 3-32 Spectral peak period T_p as a function of significant wave height H_S at the Block C; mean values and 90 % confidence bands.

Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
	P5	Mean	P95
1.0	4.0	7.3	11.9
2.0	5.1	8.4	12.8
3.0	6.2	9.4	13.4
4.0	7.3	10.2	13.9
5.0	8.3	11.1	14.3
6.0	9.3	11.9	14.9
7.0	10.2	12.6	15.4
8.0	11.1	13.4	16.0
9.0	12.0	14.2	16.6
10.0	12.8	14.9	17.3
11.0	13.6	15.7	18.0
12.0	14.3	16.4	18.7
13.0	15.1	17.2	19.5
14.0	15.8	17.9	20.2
15.0	16.5	18.7	21.0
16.0	17.2	19.4	21.8
17.0	17.9	20.2	22.7
18.0	18.5	20.9	23.5

Table 3-33 shows omni-directional extreme significant wave heights and associated spectral peak periods.

Table 3-33 Omni-directional extreme significant wave heights and corresponding spectral peak periods; mean values and 90 % confidence bands.

Annual probability of exceedance	Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
		P5	Mean	P95
0.63	10.0	12.8	14.9	17.3
10^{-1}	12.3	14.6	16.7	18.9
10^{-2}	14.5	16.1	18.3	20.6
10^{-4}	18.8	19.1	21.5	24.1

Table 3-34 and Table 3-35 show directional and monthly extreme significant wave heights and associated spectral peak periods. (See [1, Chapter 1.3.2] if directional extremes are to be used for design).

Figure 3-23 and Table 3-36 show q – probability contour lines of H_s – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves.

Table 3-34 Directional and omni-directional extreme significant wave height (H_S) and spectral peak period (T_p) at the Block C.

Direction sector	Sector probability	Annual probability (q) of exceedance							
		q = 0.63		q = 10^{-1}		q = 10^{-2}		q = 10^{-4}	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
0°	8.66	7.0	11.9	9.4	13.4	11.7	14.7	16.2	17.0
30°	8.34	6.0	11.5	7.6	12.7	9.2	13.9	12.1	15.9
60°	6.33	5.7	10.6	7.4	11.5	9.0	12.3	11.9	13.6
90°	7.49	6.3	11.3	8.2	12.6	9.9	13.6	13.2	15.6
120°	7.69	6.4	11.1	8.3	12.4	10.0	13.6	13.3	15.8
150°	6.98	5.7	10.4	7.2	11.8	8.6	13.1	11.0	15.5
180°	5.44	5.4	9.6	6.7	10.6	7.8	11.5	9.7	13.0
210°	5.64	5.8	10.0	7.1	10.8	8.3	11.6	10.3	13.0
240°	6.09	6.1	12.0	7.7	13.1	9.1	14.1	11.7	16.4
270°	15.83	9.4	14.9*	11.8	16.7*	14.2	18.3*	18.5	21.3
300°	12.78	9.2	14.0	12.2	15.8	14.5	17.1	18.8	19.4
330°	8.72	7.0	12.0	9.3	13.3	11.4	14.4	15.6	16.4
0°-360°	**100.00**	**10.0**	**14.9**	**12.3**	**16.7**	**14.5**	**18.3**	**18.8**	**21.5**

* Indicates when the associated period value presented has been adjusted to the omnidirectional value.

Table 3-35 **Monthly and annual extreme significant wave height (H_S) and spectral peak period (T_p) at the Block C.**

Month	Annual probability	Annual probability (q) of exceedance							
		q = 0.63		$q = 10^{-1}$		$q = 10^{-2}$		$q = 10^{-4}$	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
Jan	8.33	8.5	13.8	10.8	15.5	13.0	17.2	17.0	20.2
Feb	8.33	9.3	14.4	12.2	16.6	14.5	18.3	18.8	21.5
Mar	8.33	7.7	13.2	9.8	14.8	11.8	16.3	15.5	19.0
Apr	8.33	5.7	11.6	7.0	12.6	8.3	13.6	10.5	15.3
May	8.33	5.0	11.1	6.4	12.2	7.8	13.3	10.4	15.2
Jun	8.33	4.4	10.6	5.7	11.6	6.9	12.6	9.2	14.3
Jul	8.33	4.2	10.4	5.5	11.5	6.8	12.5	9.3	14.4
Aug	8.33	5.5	11.5	7.8	13.3	10.2	15.1	15.0	18.7
Sept	8.33	5.6	11.5	7.1	12.7	8.5	13.8	11.2	15.8
Oct	8.33	7.6	13.1	9.9	14.9	12.1	16.5	16.3	19.6
Nov	8.33	7.4	13.0	9.4	14.5	11.2	15.8	14.6	18.4
Dec	8.33	8.0	13.4	10.1	15.0	12.0	16.4	15.6	19.1
Year	**100.00**	**10.0**	**14.9**	**12.3**	**16.7**	**14.5**	**18.3**	**18.8**	**21.5**

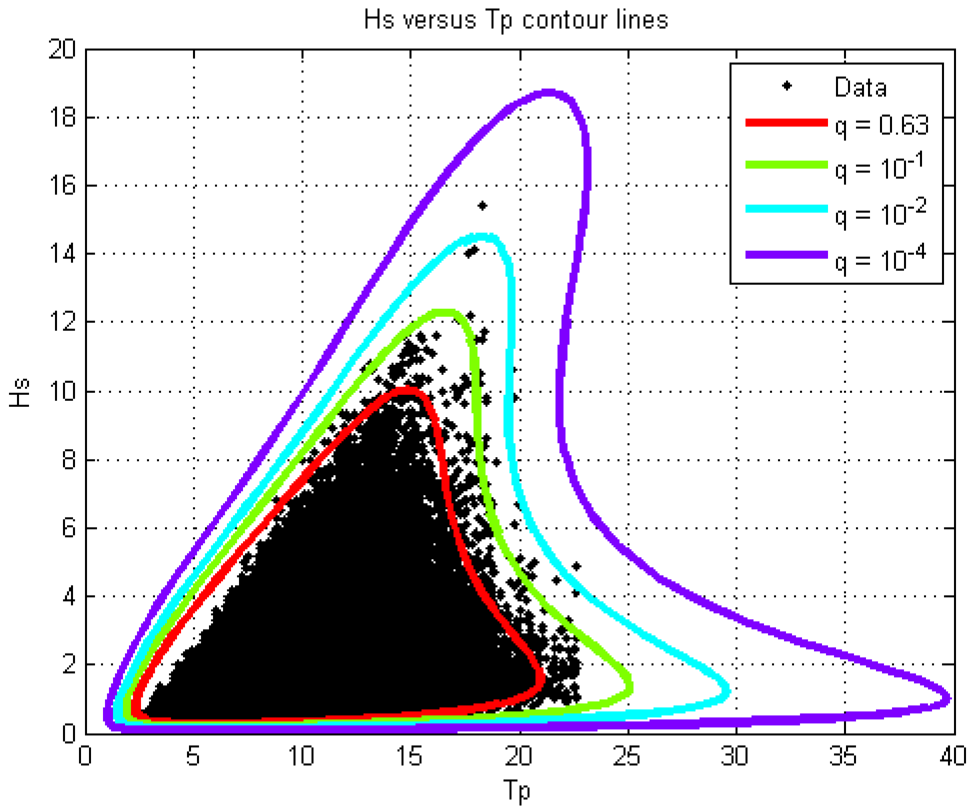


Figure 3-23 q – probability contour lines of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block C. Duration of sea state is 3 hours.

Table 3-36 q – probability contour values of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block C. Duration of sea state is 3 hours. T_{pL} and T_{pH} are lower and higher limits of T_p, respectively.

Annual probability of exceedance											
0.63			10^{-1}			10^{-2}			10^{-4}		
H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]
10.0	14.9	14.9	12.3	16.6	16.6	14.5	18.3	18.3	18.8	21.4	21.4
10.0	14.7	15.1	12.0	15.4	17.4	14.0	16.6	19.3	18.0	19.1	22.8
9.0	12.3	16.1	11.0	13.7	17.9	13.0	15.0	19.6	17.0	17.5	23.1
8.0	10.8	16.4	10.0	12.3	18.0	12.0	13.7	19.6	16.0	16.3	23.1
7.0	9.4	16.7	9.0	11.0	18.0	11.0	12.5	19.5	15.0	15.1	22.9
6.0	8.1	17.0	8.0	9.8	18.2	10.0	11.4	19.5	14.0	14.1	22.7
5.0	6.8	17.6	7.0	8.5	18.4	9.0	10.2	19.5	13.0	13.1	22.4
4.0	5.5	18.3	6.0	7.3	18.9	8.0	9.1	19.6	12.0	12.1	22.1
3.0	4.3	19.4	5.0	6.1	19.7	7.0	7.9	20.0	11.0	11.1	21.9
2.0	3.2	20.6	4.0	4.8	20.8	6.0	6.7	20.6	10.0	10.1	21.8
1.0	2.2	21.2	3.0	3.7	22.3	5.0	5.5	21.6	9.0	9.1	21.9
			2.0	2.7	24.3	4.0	4.4	23.1	8.0	8.0	22.1
			1.0	1.8	25.7	3.0	3.3	25.3	7.0	6.9	22.7
						2.0	2.3	28.0	6.0	5.8	23.8
						1.0	1.5	30.6	5.0	4.7	25.4

3.3.4 Block D

Figure 3-24 shows the observed and fitted distributions of significant wave height at the Block D.

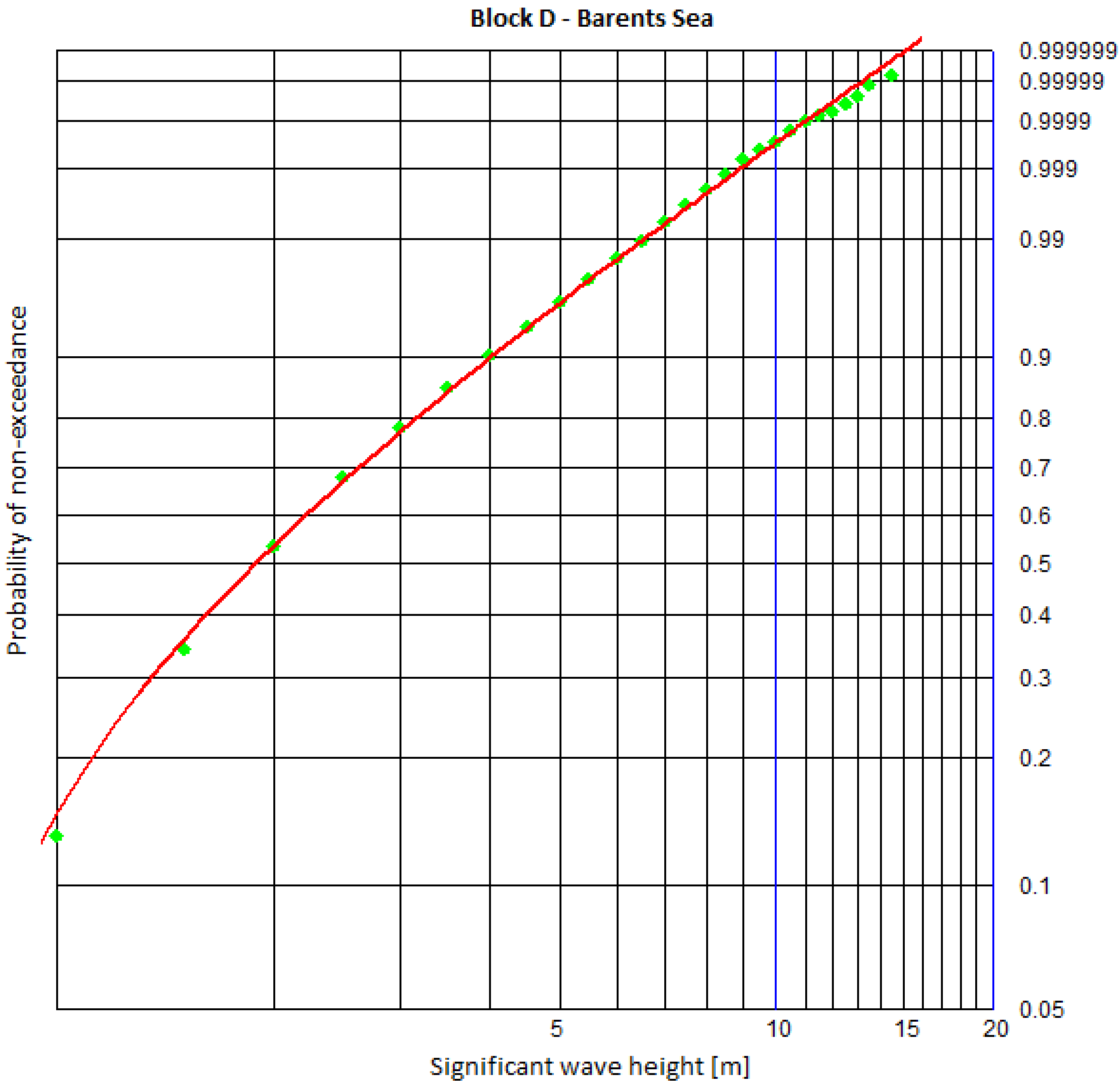


Figure 3-24 Observed (green dots) and fitted (red line) distributions of significant wave height at the Block C.

Figure 3-25 and Table 3-37 show directional and omni-directional Weibull parameters and corresponding extremes of significant wave height at the Block C. Figure 3-26 and Table 3-38 show monthly and all-year Weibull parameters and corresponding extremes.

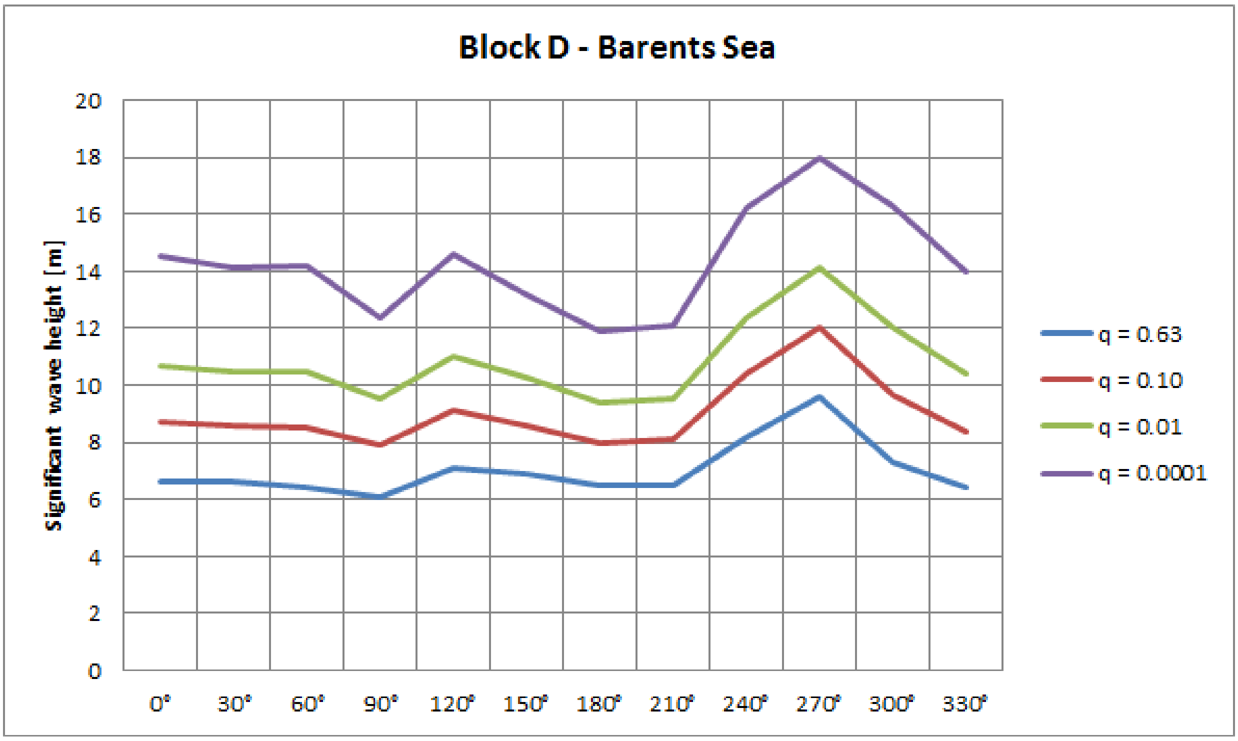


Figure 3-25 **Direction extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block D.**

Table 3-37 **Directional and omni-directional Weibull parameters and corresponding extreme values* for significant wave height at the Block D. Duration of event is 3 hours.**

Direction	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**	**[m]**
0°	7.21	1.174	1.419	0.648	6.6	8.7	10.7	14.5
30°	7.65	1.235	1.535	0.603	6.6	8.6	10.5	14.1
60°	6.44	1.199	1.466	0.611	6.4	8.5	10.5	14.2
90°	6.39	1.342	1.617	0.569	6.1	7.9	9.5	12.4
120°	8.14	1.270	1.685	0.663	7.1	9.1	11.0	14.6
150°	8.29	1.419	1.901	0.565	6.9	8.6	10.3	13.2
180°	7.30	1.554	2.030	0.507	6.5	8.0	9.4	11.9
210°	6.94	1.534	2.018	0.498	6.5	8.1	9.5	12.1
240°	11.10	1.324	2.007	0.646	8.2	10.4	12.4	16.2
270°	15.17	1.245	2.130	0.485	9.6	12.0*	14.1*	18.0*
300°	9.00	1.150	1.513	0.566	7.3	9.7	12.0	16.3
330°	6.36	1.220	1.504	0.563	6.4	8.4	10.4	14.0
0° - 360°	**100.00**	**1.234**	**1.729**	**0.606**	**9.9**	**12.0**	**14.1**	**18.0**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

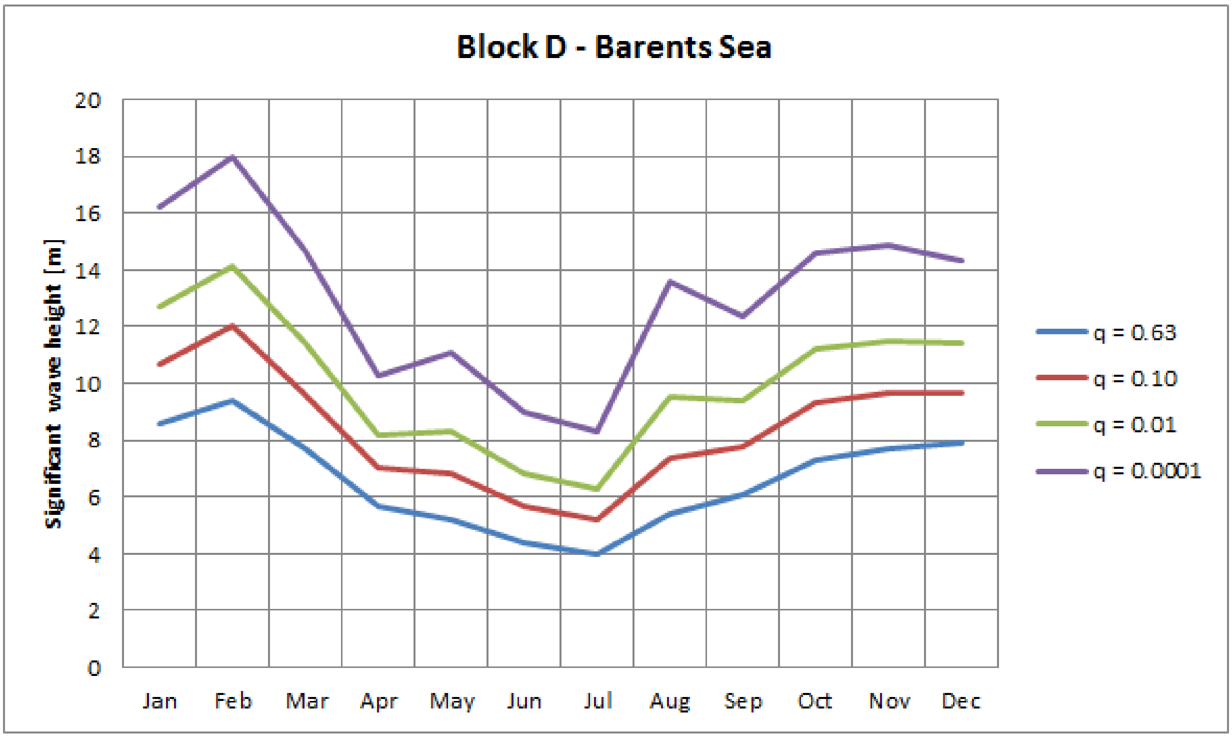


Figure 3-26 Monthly extreme values of significant wave height of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at the Block D.

Table 3-38 Monthly and annual Weibull parameters and corresponding extreme values* for significant wave height at the Block D. Duration of event is 3 hours.

Month	Annual prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[m]	[m]	[m]	[m]	[m]	[m]
Jan	8.33	1.436	2.363	0.850	8.6	10.7	12.7	16.2
Feb	8.33	1.270	2.220	0.922	9.4	12.0*	14.1*	18.0*
Mar	8.33	1.405	2.058	0.745	7.7	9.6	11.4	14.7
Apr	8.33	1.581	1.805	0.425	5.7	7.0	8.2	10.3
May	8.33	1.222	1.175	0.482	5.2	6.8	8.3	11.1
Jun	8.33	1.278	1.035	0.510	4.4	5.7	6.8	9.0
Jul	8.33	1.222	0.858	0.563	4.0	5.2	6.3	8.3
Aug	8.33	0.976	0.820	0.711	5.4	7.4	9.5	13.6
Sept	8.33	1.254	1.359	0.773	6.1	7.8	9.4	12.4
Oct	8.33	1.303	1.734	0.920	7.3	9.3	11.2	14.6
Nov	8.33	1.349	1.910	0.921	7.7	9.7	11.5	14.9
Dec	8.33	1.514	2.284	0.833	7.9	9.7	11.4	14.3
Year	**100.00**	**1.234**	**1.729**	**0.606**	**9.9**	**12.0**	**14.1**	**18.0**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

A short term sea state is for most practical purposes reasonably well characterized by the significant wave height, H_S, and the spectral peak period, T_p.

Table 3-39 shows the scatter table of H_S and T_p for a period of 100 years.

Scatter tables for monthly and directional data may be provided upon request.

Table 3-39 Scatter table of significant wave height (H_S) and spectral peak period (T_p) at the Block D for a period of 100 years. Duration of sea state is 3 hours. The scatter is based on a statistical distribution. The number of sea states in each cell is rounded downward to nearest integer. The sums are calculated based on exact numbers and will not match exactly the sum of numbers provided in the cells.

H_S [m]	Spectral peak period (T_p) - [s]																			Sum
	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	
0-1	834	3294	5807	6534	5701	4271	2912	1870	1157	698	416	245	144	85	50	30	18	10	16	**34092**
1-2	150	2145	8649	17025	21768	21194	17257	12454	8271	5183	3118	1823	1045	591	332	185	103	57	72	**121422**
2-3	1	104	1197	4812	10055	13701	13981	11665	8434	5498	3322	1897	1040	553	287	147	74	37	37	**76842**
3-4		1	45	480	1987	4385	6248	6524	5434	3829	2381	1347	708	352	168	78	35	15	12	**34028**
4-5				18	187	817	1898	2795	2937	2394	1609	931	480	226	99	41	16	6	4	**14460**
5-6					7	79	367	893	1342	1397	1095	687	362	166	68	26	9	3	1	**6502**
6-7						3	33	163	411	621	630	466	268	126	50	18	6	2	1	**2798**
7-8							1	14	72	183	273	266	183	95	39	14	4	1		**1145**
8-9								1	6	31	79	114	105	66	31	11	3	1		**448**
9-10										3	14	33	45	39	22	9	3	1		**169**
10-11											1	6	13	17	13	7	3	1		**61**
11-12												1	2	5	6	4	2	1		**21**
12-13														1	2	2	1	1		**7**
13-14																1	1			**2**
14-15																				**1**
15-16																				
16-17																				
17-18																				
18-19																				
Sum	**985**	**5544**	**15698**	**28868**	**39705**	**44449**	**42697**	**36379**	**28063**	**19838**	**12937**	**7817**	**4397**	**2323**	**1169**	**572**	**278**	**137**	**145**	**292000**

The conditional distribution of spectral peak period (T_p) given significant wave height (H_S) is modelled by a log-normal distribution as described in Appendix A.

Table 3-40 shows the parameters in the log-normal distribution of T_p given H_S.

Table 3-40 Parameters in the log-normal distribution of T_p given H_S.

	Parameters					
Direction	**a_1**	**a_2**	**a_3**	**b_1**	**b_2**	**b_3**
0°	0.218	1.613	0.165	0.005	0.118	0.505
30°	-2.161	4.000	0.071	0.005	0.085	0.438
60°	0.873	0.941	0.258	0.005	0.096	0.518
90°	1.280	0.545	0.394	0.005	0.108	0.537
120°	1.425	0.417	0.461	0.005	0.139	0.727
150°	1.236	0.566	0.391	0.005	0.111	0.506
180°	1.711	0.207	0.628	0.005	0.147	0.393
210°	1.563	0.447	0.354	0.005	0.151	0.253
240°	1.737	0.386	0.443	0.005	0.175	0.395
270°	1.719	0.398	0.414	0.005	0.145	0.425
300°	1.005	0.984	0.222	0.005	0.147	0.444
330°	1.266	0.641	0.311	0.005	0.175	0.523
0° - 360°	**1.470**	**0.456**	**0.438**	**0.005**	**0.149**	**0.362**

Figure 3-27 and Table 3-41 show spectral peak period as a function of significant wave height.

The apparent discontinuity in T_p at $T_p \approx 18.8$ s in the data-values (in Figure 3-27) is due to the discretization of frequencies used in the Nora10 model, and has not been fully resolved by the non-discretization procedure [1, Equation 3.2].

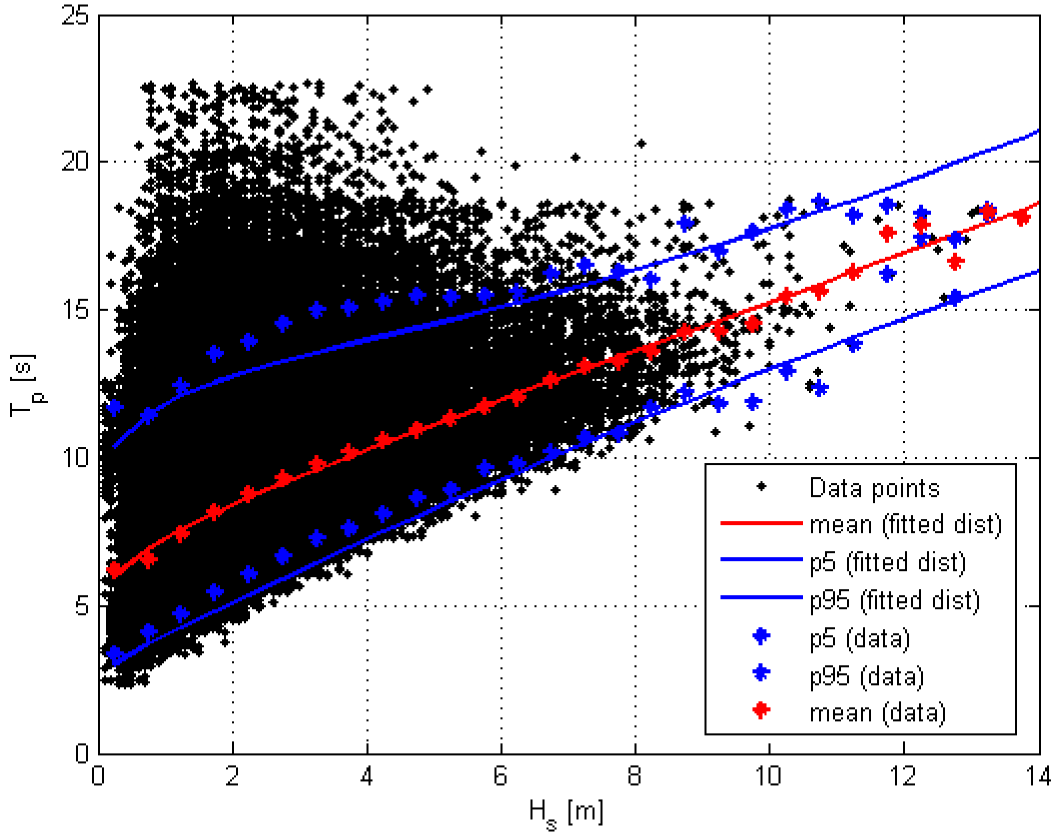


Figure 3-27 Spectral peak period for given significant wave height at the Block D.

Table 3-41 Spectral peak period T_p as a function of significant wave height H_S at the Block D; mean values and 90 % confidence bands.

Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
	P5	**Mean**	**P95**
1.0	4.0	7.2	11.8
2.0	5.1	8.4	12.8
3.0	6.2	9.4	13.4
4.0	7.2	10.3	14.0
5.0	8.3	11.1	14.5
6.0	9.3	12.0	15.1
7.0	10.2	12.8	15.7
8.0	11.2	13.6	16.3
9.0	12.1	14.4	17.0
10.0	13.0	15.3	17.8
11.0	13.9	16.1	18.5
12.0	14.7	16.9	19.3
13.0	15.5	17.7	20.2
14.0	16.3	18.6	21.0
15.0	17.1	19.4	21.9
16.0	17.9	20.3	22.8
17.0	18.7	21.1	23.8
18.0	19.5	22.0	24.7

Table 3-42 shows omni-directional extreme significant wave heights and associated spectral peak periods.

Table 3-42 Omni-directional extreme significant wave heights and corresponding spectral peak periods; mean values and 90 % confidence bands.

Annual probability of exceedance	Significant wave height H_S – [m]	Spectral peak period T_p – [s]		
		P5	Mean	P95
0.63	9.9	12.9	15.2	17.7
10^{-1}	12.0	14.7	16.9	19.3
10^{-2}	14.1	16.4	18.7	21.1
10^{-4}	18.0	19.5	22.0	24.7

Table 3-43 and Table 3-44 show directional and monthly extreme significant wave heights and associated spectral peak periods. (See [1, Chapter 1.3.2] if directional extremes are to be used for design).

Figure 3-28 and Table 3-45 show q – probability contour lines of H_s – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves.

Table 3-43 Directional and omni-directional extreme significant wave height (H_S) and spectral peak period (T_p) at the Block D.

Direction sector	Sector probability	Annual probability (q) of exceedance							
		q = 0.63		q = 10^{-1}		q = 10^{-2}		q = 10^{-4}	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
0°	7.21	6.6	11.3	8.7	12.5	10.7	13.5	14.5	15.3
30°	7.65	6.6	11.3	8.6	12.3	10.5	13.1	14.1	14.5
60°	6.44	6.4	11.0	8.5	12.3	10.5	13.5	14.2	15.5
90°	6.39	6.1	11.0	7.9	12.4	9.5	13.6	12.4	15.7
120°	8.14	7.1	11.7	9.1	13.2	11.0	14.7	14.6	17.5
150°	8.29	6.9	11.5	8.6	12.8	10.3	14.1	13.2	16.3
180°	7.30	6.5	10.9	8.0	11.9	9.4	12.9	11.9	14.8
210°	6.94	6.5	11.6	8.1	12.3	9.5	13.0	12.1	14.1
240°	11.10	8.2	15.2	10.4	16.9	12.4	18.5	16.2	21.4
270°	15.17	9.6	15.2*	12.0	16.9*	14.1	18.4	18.0	20.9
300°	9.00	7.3	12.7	9.7	14.0	12.0	15.1	16.3	17.0
330°	6.36	6.4	11.2	8.4	12.3	10.4	13.4	14.0	15.3
0°-360°	**100.00**	**9.9**	**15.2**	**12.0**	**16.9**	**14.1**	**18.7**	**18.0**	**22.0**

* Indicates when the associated period value presented has been adjusted to the omnidirectional value.

Table 3-44 Monthly and annual extreme significant wave height (H_S) and spectral peak period (T_p) at the Block D.

Month	Annual probability	Annual probability (q) of exceedance							
		q = 0.63		$q = 10^{-1}$		$q = 10^{-2}$		$q = 10^{-4}$	
		H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]	H_S [m]	T_p [s]
Jan	8.33	8.6	14.1	10.7	15.8	12.7	17.5	16.2	20.4
Feb	8.33	9.4	14.8	12.0	16.9	14.1	18.7	18.0	22.0
Mar	8.33	7.7	13.4	9.6	14.9	11.4	16.4	14.7	19.2
Apr	8.33	5.7	11.7	7.0	12.8	8.2	13.8	10.3	15.5
May	8.33	5.2	11.3	6.8	12.6	8.3	13.9	11.1	16.2
Jun	8.33	4.4	10.6	5.7	11.7	6.8	12.6	9.0	14.4
Jul	8.33	4.0	10.3	5.2	11.3	6.3	12.2	8.3	13.9
Aug	8.33	5.4	11.5	7.4	13.1	9.5	14.8	13.6	18.3
Sept	8.33	6.1	12.0	7.8	13.4	9.4	14.8	12.4	17.2
Oct	8.33	7.3	13.0	9.3	14.7	11.2	16.3	14.6	19.1
Nov	8.33	7.7	13.4	9.7	15.0	11.5	16.5	14.9	19.3
Dec	8.33	7.9	13.5	9.7	15.0	11.4	16.4	14.3	18.8
Year	**100.00**	**9.9**	**15.2**	**12.0**	**16.9**	**14.1**	**18.7**	**18.0**	**22.0**

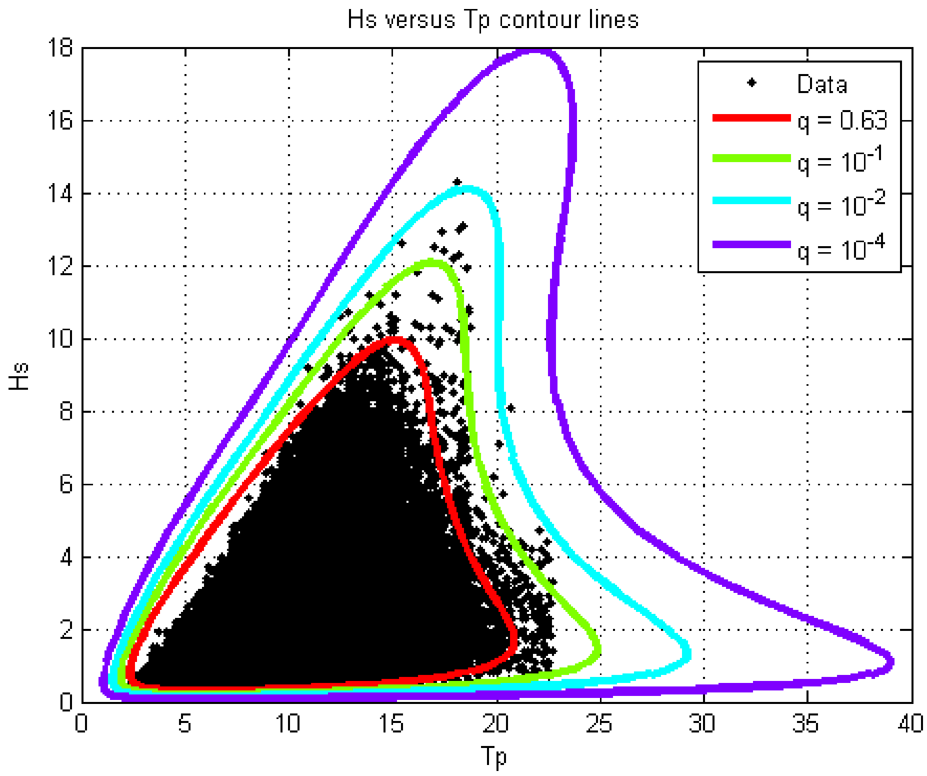


Figure 3-28 **q – probability contour lines of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block D. Duration of sea state is 3 hours.**

Table 3-45 **q – probability contour values of H_S – T_p for q = 0.63, 10^{-1}, 10^{-2} and 10^{-4} for omni-directional waves at the Block D. Duration of sea state is 3 hours. T_{pL} and T_{pH} are lower and higher limits of T_p, respectively.**

Annual probability of exceedance											
0.63			10^{-1}			10^{-2}			10^{-4}		
H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]	H_S [m]	T_{pL} [s]	T_{pH} [s]
9.9	15.1	15.1	12.0	16.9	16.9	14.1	18.6	18.6	18.0	21.9	21.9
9.0	12.5	16.5	12.0	16.3	17.4	14.0	17.8	19.2	17.0	18.9	23.5
8.0	10.9	16.8	11.0	14.1	18.3	13.0	15.6	20.0	16.0	17.3	23.7
7.0	9.4	17.1	10.0	12.5	18.5	12.0	14.1	20.1	15.0	15.9	23.6
6.0	8.0	17.5	9.0	11.1	18.6	11.0	12.8	20.1	14.0	14.7	23.4
5.0	6.7	18.0	8.0	9.8	18.7	10.0	11.5	20.1	13.0	13.5	23.1
4.0	5.4	18.7	7.0	8.5	19.0	9.0	10.3	20.1	12.0	12.4	22.9
3.0	4.2	19.7	6.0	7.2	19.5	8.0	9.0	20.3	11.0	11.3	22.7
2.0	3.2	20.7	5.0	5.9	20.2	7.0	7.8	20.6	10.0	10.2	22.6
1.0	2.3	20.8	4.0	4.8	21.3	6.0	6.6	21.3	9.0	9.1	22.7
			3.0	3.7	22.7	5.0	5.4	22.3	8.0	8.0	23.0
			2.0	2.7	24.3	4.0	4.3	23.7	7.0	6.8	23.6
			1.0	1.9	25.3	3.0	3.2	25.7	6.0	5.7	24.6
						2.0	2.3	28.1	5.0	4.6	26.3
						1.0	1.6	30.1	4.0	3.5	28.6

3.4 Wave-induced orbital velocity at sea bed

Table 3-46 – Table 3-49 shows wave-induced significant orbital velocity U_S and corresponding zero-crossing period T_u, based on the JONSWAP and Torsethaugen spectra. The significant wave height and spectral peak data are as given in Table 3-14.

Table 3-46 Wave induced significant orbital velocity (U_S) and corresponding zero crossing period (T_u) at sea bottom at Block A at 250 m depth. Computations are based on JONSWAP and Torsethaugen spectra.

Significant wave height H_S	Spectral peak period T_p	JONSWAP spectrum		Torsethaugen spectrum	
		U_S	T_u	U_S	T_u
[m]	[s]	[cm/s]	[s]	[cm/s]	[s]
1.0	7.5	0	11.7	0	12.1
2.0	8.6	0	12.8	0	13.2
3.0	9.5	0	13.7	0	14.1
4.0	10.4	0	14.5	0	14.9
5.0	11.2	1	15.3	1	15.7
6.0	12.0	1	16.0	1	16.3
7.0	12.8	2	16.6	2	17.0
8.0	13.6	4	17.3	4	17.5
9.0	14.3	5	17.8	5	18.0
10.0	15.1	8	18.4	7	18.4
11.0	15.9	11	19.0	10	18.8
12.0	16.6	14	19.5	12	19.0
13.0	17.4	18	20.1	15	19.3
14.0	18.2	23	20.5	18	19.6
15.0	18.9	27	20.9	21	19.9
16.0	19.7	32	21.2	25	20.2
17.0	20.5	36	21.5	29	20.7
18.0	21.3	41	21.7	33	21.1

Table 3-47 **Wave induced significant orbital velocity (U_S) and corresponding zero crossing period (T_u) at sea bottom at Block B at 220 m depth. Computations are based on JONSWAP and Torsethaugen spectra.**

Significant wave height H_S	Spectral peak period T_p	JONSWAP spectrum		Torsethaugen spectrum	
		U_S	T_u	U_S	T_u
[m]	[s]	[cm/s]	[s]	[cm/s]	[s]
1.0	7.2	0	11.1	0	11.5
2.0	8.4	0	12.3	0	12.7
3.0	9.3	0	13.2	0	13.7
4.0	10.2	0	14.0	1	14.5
5.0	11.1	1	14.8	1	15.2
6.0	11.9	2	15.5	2	15.9
7.0	12.7	3	16.2	3	16.5
8.0	13.5	5	16.8	5	17.0
9.0	14.3	8	17.4	8	17.5
10.0	15.1	11	18.0	11	17.9
11.0	15.9	15	18.6	14	18.3
12.0	16.7	20	19.2	18	18.6
13.0	17.5	25	19.7	21	19.0
14.0	18.3	30	20.2	25	19.3
15.0	19.1	36	20.6	29	19.7
16.0	19.9	42	20.9	33	20.1
17.0	20.8	47	21.2	38	20.5
18.0	21.6	53	21.4	44	21.0

Table 3-48 **Wave induced significant orbital velocity (U_S) and corresponding zero crossing period (T_u) at sea bottom at Block C at 300 m depth. Computations are based on JONSWAP and Torsethaugen spectra.**

Significant wave height H_S	Spectral peak period T_p	JONSWAP spectrum		Torsethaugen spectrum	
		U_S	T_u	U_S	T_u
[m]	[s]	[cm/s]	[s]	[cm/s]	[s]
1.0	7.3	0	11.8	0	12.2
2.0	8.4	0	13.0	0	13.4
3.0	9.4	0	14.0	0	14.5
4.0	10.2	0	14.8	0	15.4
5.0	11.1	0	15.6	0	16.1
6.0	11.9	1	16.4	1	16.8
7.0	12.6	1	17.0	1	17.4
8.0	13.4	2	17.7	2	18.1
9.0	14.2	3	18.3	3	18.6
10.0	14.9	4	18.9	4	19.1
11.0	15.7	6	19.5	6	19.5
12.0	16.4	8	20.0	7	19.7
13.0	17.2	11	20.5	9	19.9
14.0	17.9	14	20.9	11	20.1
15.0	18.7	17	21.3	13	20.3
16.0	19.4	20	21.6	15	20.5
17.0	20.2	23	21.8	18	20.9
18.0	20.9	26	22.0	21	21.2

Table 3-49 Wave induced significant orbital velocity (U_S) and corresponding zero crossing period (T_u) at sea bottom at Block D at 230 m depth. Computations are based on JONSWAP and Torsethaugen spectra.

Significant wave height H_S	Spectral peak period T_p	JONSWAP spectrum		Torsethaugen spectrum	
		U_S	T_u	U_S	T_u
[m]	[s]	[cm/s]	[s]	[cm/s]	[s]
1.0	7.2	0	11.2	0	11.6
2.0	8.4	0	12.4	0	12.8
3.0	9.4	0	13.4	0	13.8
4.0	10.3	0	14.2	0	14.7
5.0	11.1	1	15.0	1	15.4
6.0	12.0	2	15.7	2	16.1
7.0	12.8	3	16.4	3	16.7
8.0	13.6	5	17.0	5	17.2
9.0	14.4	7	17.6	7	17.7
10.0	15.3	11	18.4	10	18.1
11.0	16.1	14	19.0	13	18.5
12.0	16.9	19	19.5	16	18.8
13.0	17.7	23	20.0	19	19.2
14.0	18.6	29	20.5	23	19.5
15.0	19.4	34	20.9	27	19.9
16.0	20.3	39	21.2	31	20.4
17.0	21.1	45	21.4	36	20.8
18.0	22.0	50	21.6	41	21.4

3.5 Individual waves

3.5.1 Block A

Table 3-50 shows the estimated design wave heights. The wave periods, T_{Hmax}, in Table 3-50 are the peak periods from the q-probability sea states given in Table 3-15 multiplied by 0.90.

Extreme individual wave heights versus direction sectors are given in Table 3-51. These wave heights are determined from the significant wave heights given in Table 3.10 by assuming that H_{max}/H_S for each sector is equal to H_{max}/H_S for omni-directional seas and reflect the same relative severity as shown by that table. The wave periods, T_{Hmax}, are computed from T_{Hmax} = 0.90 T_p, were T_p is as given in Table 3-16 [24].

Table 3-50 **Extreme individual wave heights for selected annual exceedance probabilities. Crest heights based on Stokes 5th order theory (for load calculations) and Forristall's theory (for air gap calculations) are given for the Block A.**

Annual probability of exceedance	Wave height	Crest height		Wave period		
		Stokes V	Forristall	P5	Mean	P95
-	[m]	[m]	[m]	[s]	[s]	[s]
0.63	18.9	10.4	11.3	11.4	13.5	15.7
10^{-1}	22.2	12.2	13.4	12.9	14.8	17.0
10^{-2}	25.7	14.1	15.5	14.2	16.2	18.4
10^{-4}	32.8	17.9	20.0	16.6	18.8	21.1

Table 3-51 **Extreme individual wave height versus direction at Block A. Annual probability of exceedance is 10^{-2} and 10^{-4}.**

Direction	Annual probability of exceedance 10^{-2}				Annual probability of exceedance 10^{-4}			
	Wave height	Wave period			Wave height	Wave period		
		P5	Mean	P95		P5	Mean	P95
[°]	[m]	[s]	[s]	[s]	[m]	[s]	[s]	[s]
345 - 15	19.3	11.8	13.9	16.1	26.4	14.4	16.4	18.6
15 - 45	17.5	11.1	13.2	15.5	23.2	13.3	15.2	17.4
45 - 75	20.6	12.4	14.4	16.5	28.5	15.1	17.2	19.4
75 - 105	18.0	11.3	13.4	15.7	24.0	13.5	15.5	17.7
105 - 135	20.1	12.1	14.1	16.4	26.8	14.5	16.6	18.7
135 - 165	18.8	11.6	13.7	15.9	24.2	13.6	15.6	17.7
165 - 195	19.7	12.0	14.0	16.2	25.5	14.1	16.1	18.2
195 - 225	18.6	11.5	13.6	15.9	23.6	13.4	15.4	17.5
225 - 255	22.1	12.9	14.9	17.1	28.7	15.2	17.2	19.5
255 - 285	25.7	14.2	16.2	18.4	32.8	16.6	18.8	21.1
285 - 315	20.8	12.4	14.4	16.6	28.7	15.2	17.2	19.5
315 - 345	18.8	11.6	13.7	15.9	25.7	14.2	16.1	18.3
0 - 360	**25.7**	**14.2**	**16.2**	**18.4**	**32.8**	**16.6**	**18.8**	**21.1**

3.5.2 Block B

Table 3-52 shows the estimated design wave heights. The wave periods, T_{Hmax}, in Table 3-52 are the peak periods from the q-probability sea states given in Table 3-24 multiplied by 0.90.

Extreme individual wave heights versus direction sectors are given in Table 3-53. These wave heights are determined from the significant wave heights given in Table 3-19 by assuming that H_{max}/H_S for each sector is equal to H_{max}/H_S for omni-directional seas and reflect the same relative severity as shown by that table. The wave periods, T_{Hmax}, are computed from $T_{Hmax} = 0.90\ T_p$, were T_p is as given in Table 3-19 [24].

Table 3-52 Extreme individual wave heights for selected annual exceedance probabilities. Crest heights based on Stokes 5th order theory (for load calculations) and Forristall's theory (for air gap calculations) are given for the Block B.

Annual probability of exceedance	Wave height	Crest height		Wave period		
		Stokes V	Forristall	P5	Mean	P95
-	[m]	[m]	[m]	[s]	[s]	[s]
0.63	19.6	10.8	11.7	11.8	13.6	15.6
10^{-1}	23.1	12.6	13.9	13.4	15.2	17.2
10^{-2}	26.7	14.6	16.1	14.9	16.8	18.9
10^{-4}	34.3	18.8	20.9	17.5	19.7	22.1

Table 3-53 Extreme individual wave height versus direction at Block B. Annual probability of exceedance is 10^{-2} and 10^{-4}.

Direction	Annual probability of exceedance 10^{-2}				Annual probability of exceedance 10^{-4}			
	Wave height	Wave period			Wave height	Wave period		
		P5	Mean	P95		P5	Mean	P95
[°]	[m]	[s]	[s]	[s]	[m]	[s]	[s]	[s]
345 - 15	21.7	13.0	14.8	16.8	30.6	16.2	18.2	20.5
15 - 45	18.4	11.7	13.6	15.5	24.6	14.0	15.9	18.0
45 - 75	16.7	11.0	12.9	14.9	22.4	13.2	15.1	17.0
75 - 105	17.8	11.5	13.3	15.3	23.9	13.8	15.6	17.6
105 - 135	19.7	12.2	14.1	16.0	26.1	14.6	16.5	18.6
135 - 165	18.9	12.0	13.8	15.7	24.8	14.1	16.0	18.0
165 - 195	17.2	11.3	13.1	15.1	22.0	13.1	14.9	16.9
195 - 225	17.2	11.3	13.1	15.1	21.8	13.0	14.8	16.8
225 - 255	19.5	12.2	14.0	16.0	25.0	14.2	16.1	18.1
255 - 285	26.7	14.9	16.8	18.9	34.3	17.5	19.7	22.1
285 - 315	24.1	13.9	15.8	17.8	33.2	17.1	19.3	21.6
315 - 345	20.4	12.5	14.3	16.3	28.1	15.3	17.3	19.4
0 - 360	**26.7**	**14.9**	**16.8**	**18.9**	**34.3**	**17.5**	**19.7**	**22.1**

3.5.3 Block C

Table 3-54 shows the estimated design wave heights. The wave periods, T_{Hmax}, in Table 3-54 are the peak periods from the q-probability sea states given in Table 3-33 multiplied by 0.90.

Extreme individual wave heights versus direction sectors are given in Table 3-55. These wave heights are determined from the significant wave heights given in Table 3-28 by assuming that H_{max}/H_S for each sector is equal to H_{max}/H_S for omni-directional seas and reflect the same relative severity as shown by that table. The wave periods, T_{Hmax}, are computed from $T_{Hmax} = 0.90\ T_p$, were T_p is as given in Table 3-28 [24].

Table 3-54 Extreme individual wave heights for selected annual exceedance probabilities. Crest heights based on Stokes 5th order theory (for load calculations) and Forristall's theory (for air gap calculations) are given for the Block C.

Annual probability of exceedance	Wave height	Crest height		Wave period		
		Stokes V	Forristall	P5	Mean	P95
-	[m]	[m]	[m]	[s]	[s]	[s]
0.63	19.6	10.8	11.7	11.5	13.4	15.6
10^{-1}	23.2	12.7	14.0	13.1	15.0	17.0
10^{-2}	27.0	14.8	16.3	14.5	16.5	18.6
10^{-4}	34.8	19.0	21.2	17.2	19.4	21.7

Table 3-55 Extreme individual wave height versus direction at Block C. Annual probability of exceedance is 10^{-2} and 10^{-4}.

Direction	Annual probability of exceedance 10^{-2}				Annual probability of exceedance 10^{-4}			
	Wave height	Wave period			Wave height	Wave period		
		P5	Mean	P95		P5	Mean	P95
[°]	[m]	[s]	[s]	[s]	[m]	[s]	[s]	[s]
345 - 15	21.8	12.7	14.6	16.6	30.0	15.6	17.6	19.8
15 - 45	17.1	10.9	12.9	15.1	22.4	13.0	14.9	16.9
45 - 75	16.8	10.8	12.8	15.0	22.0	12.8	14.7	16.8
75 - 105	18.4	11.4	13.4	15.5	24.4	13.7	15.6	17.7
105 - 135	18.6	11.5	13.4	15.6	24.6	13.8	15.7	17.7
135 - 165	16.0	10.5	12.5	14.7	20.4	12.2	14.1	16.2
165 - 195	14.5	9.9	11.9	14.3	18.0	11.3	13.2	15.4
195 - 225	15.5	10.2	12.3	14.6	19.1	11.7	13.6	15.7
225 - 255	16.9	10.9	12.8	15.0	21.7	12.7	14.6	16.6
255 - 285	26.4	14.3	16.3	18.4	34.2	17.0	19.2	21.5
285 - 315	27.0	14.5	16.5	18.6	34.8	17.2	19.4	21.7
315 - 345	21.2	12.5	14.4	16.4	28.9	15.2	17.2	19.4
0 - 360	**27.0**	**14.5**	**16.5**	**18.6**	**34.8**	**17.2**	**19.4**	**21.7**

3.5.4 Block D

Table 3-56 shows the estimated design wave heights. The wave periods, T_{Hmax}, in Table 3-56 are the peak periods from the q-probability sea states given in Table 3.42 multiplied by 0.90.

Extreme individual wave heights versus direction sectors are given in Table 3-57. These wave heights are determined from the significant wave heights given in Table 3-37 by assuming that H_{max}/H_S for each sector is equal to H_{max}/H_S for omni-directional seas and reflect the same relative severity as shown by that table. The wave periods, T_{Hmax}, are computed from $T_{Hmax} = 0.90\ T_p$, were T_p is as given in Table 3-37 [24].

Table 3-56 Extreme individual wave heights for selected annual exceedance probabilities. Crest heights based on Stokes 5th order theory (for load calculations) and Forristall's theory (for air gap calculations) are given for the Block D.

Annual probability of exceedance	Wave height	Crest height		Wave period		
		Stokes V	Forristall	P5	Mean	P95
-	[m]	[m]	[m]	[s]	[s]	[s]
0.63	19.3	10.6	11.5	11.6	13.7	15.9
10^{-1}	22.7	12.4	13.6	13.2	15.2	17.4
10^{-2}	26.2	14.3	15.8	14.8	16.8	19.0
10^{-4}	33.4	18.2	20.3	17.5	19.8	22.2

Table 3-57 Extreme individual wave height versus direction at Block D. Annual probability of exceedance is 10^{-2} and 10^{-4}.

Direction	Annual probability of exceedance 10^{-2}				Annual probability of exceedance 10^{-4}			
	Wave height	Wave period			Wave height	Wave period		
		P5	Mean	P95		P5	Mean	P95
[°]	[m]	[s]	[s]	[s]	[m]	[s]	[s]	[s]
345 - 15	19.9	12.2	14.3	16.5	26.9	15.1	17.1	19.3
15 - 45	19.5	12.1	14.1	16.3	26.2	14.8	16.8	19.0
45 - 75	19.5	12.1	14.1	16.3	26.3	14.8	16.9	19.1
75 - 105	17.7	11.3	13.4	15.7	23.0	13.5	15.5	17.7
105 - 135	20.4	12.5	14.5	16.7	27.1	15.1	17.2	19.4
135 - 165	19.1	11.9	14.0	16.2	24.5	14.1	16.1	18.3
165 - 195	17.5	11.2	13.3	15.6	22.1	13.2	15.2	17.3
195 - 225	17.7	11.3	13.4	15.7	22.5	13.3	15.3	17.5
225 - 255	23.0	13.5	15.5	17.7	30.1	16.3	18.4	20.7
255 - 285	26.2	14.8	16.8	19.0	33.4	17.5	19.8	22.2
285 - 315	22.3	13.2	15.2	17.4	30.2	16.3	18.5	20.8
315 - 345	19.3	12.0	14.0	16.3	26.0	14.7	16.7	18.9
0 - 360	**26.2**	**14.8**	**16.8**	**19.0**	**33.4**	**17.5**	**19.8**	**22.2**

3.6 Operational data

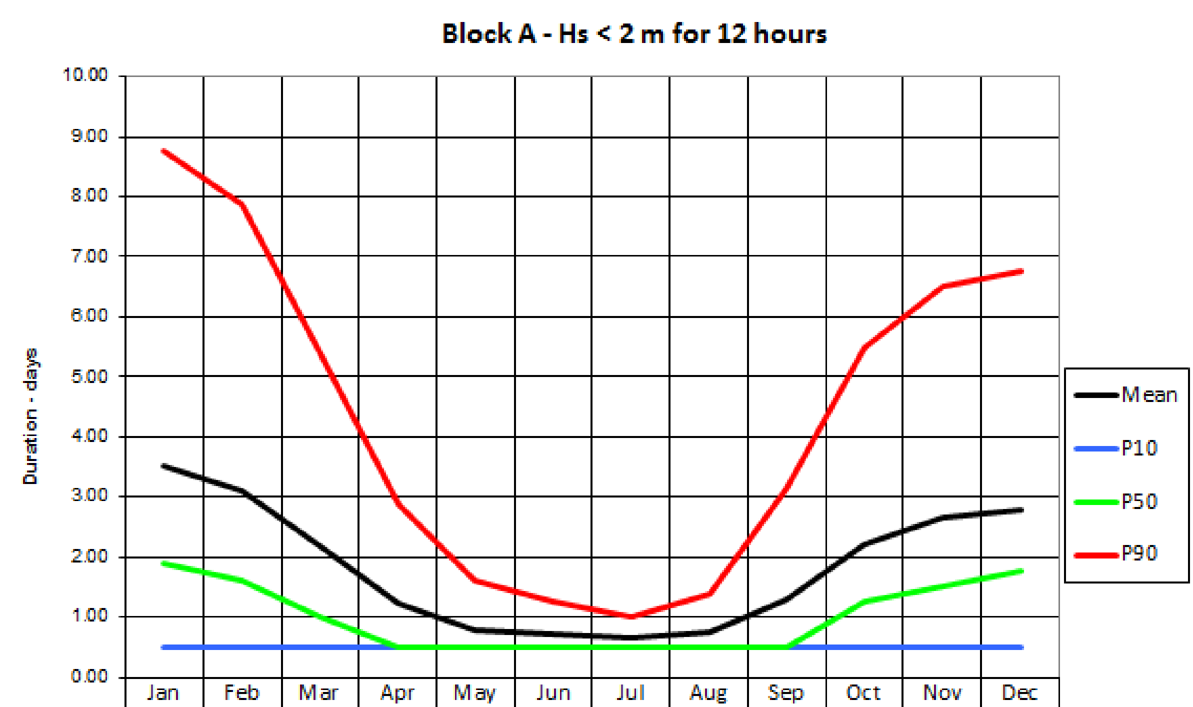
Marine operations which must be completed without break are called critical. Otherwise they are termed non-critical, see Metocean Design Basis Guidelines [1].

The duration statistics presented in this report is restricted to critical operations, only

Figure 3-29 – Figure 3-64 show characteristic durations of operations limited by significant wave heights of 2.0, 3.0 and 4.0 m for 12, 24 and 48 hours. The figures show the expected mean duration and 10, 50 and 90 percentiles.

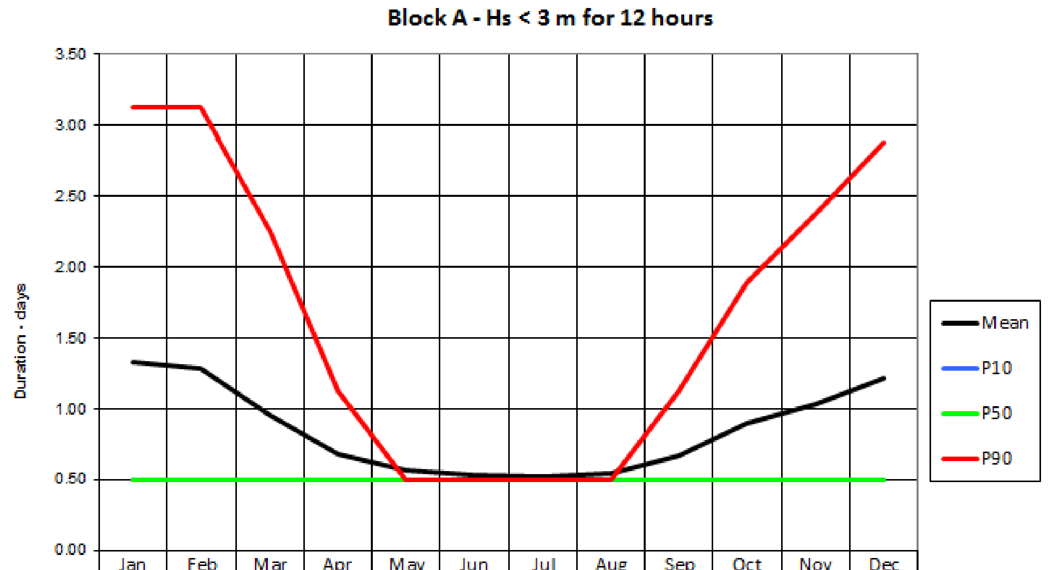
The figures show duration characteristics for completing a critical operation including waiting time. Duration is measured from the day the operation is ready for launching. The day of launching is assumed to be an arbitrary day within the relevant month.

Duration statistics for non-critical operations may be established upon request.



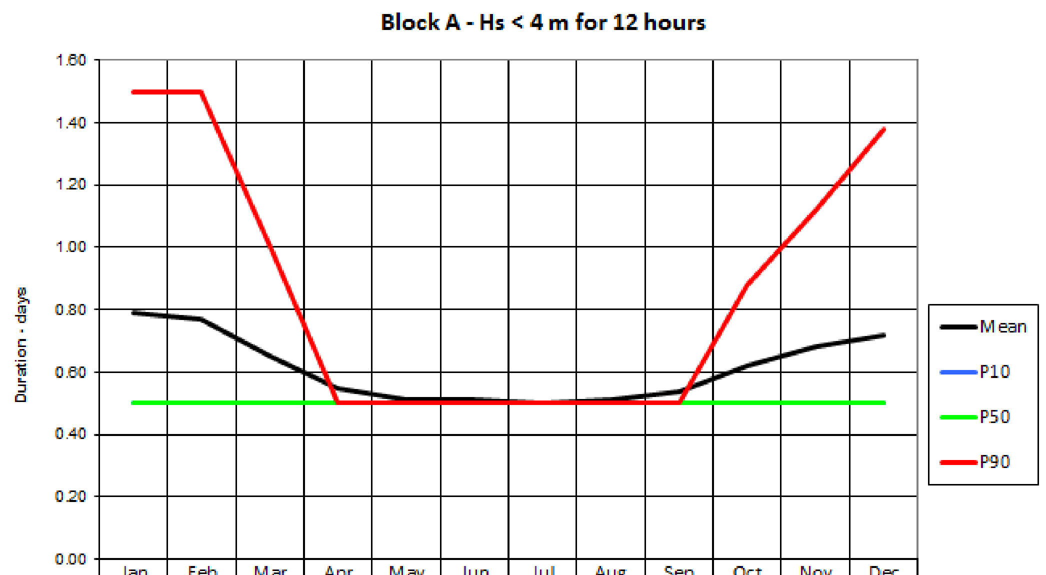
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.52	3.09	2.18	1.22	0.77	0.71	0.64	0.75	1.29	2.20	2.67	2.78
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	1.88	1.62	1.00	0.50	0.50	0.50	0.50	0.50	0.50	1.25	1.50	1.75
P90	8.75	7.88	5.38	2.88	1.62	1.25	1.00	1.38	3.12	5.50	6.50	6.75

Figure 3-29 Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 12 hours at the Block A.



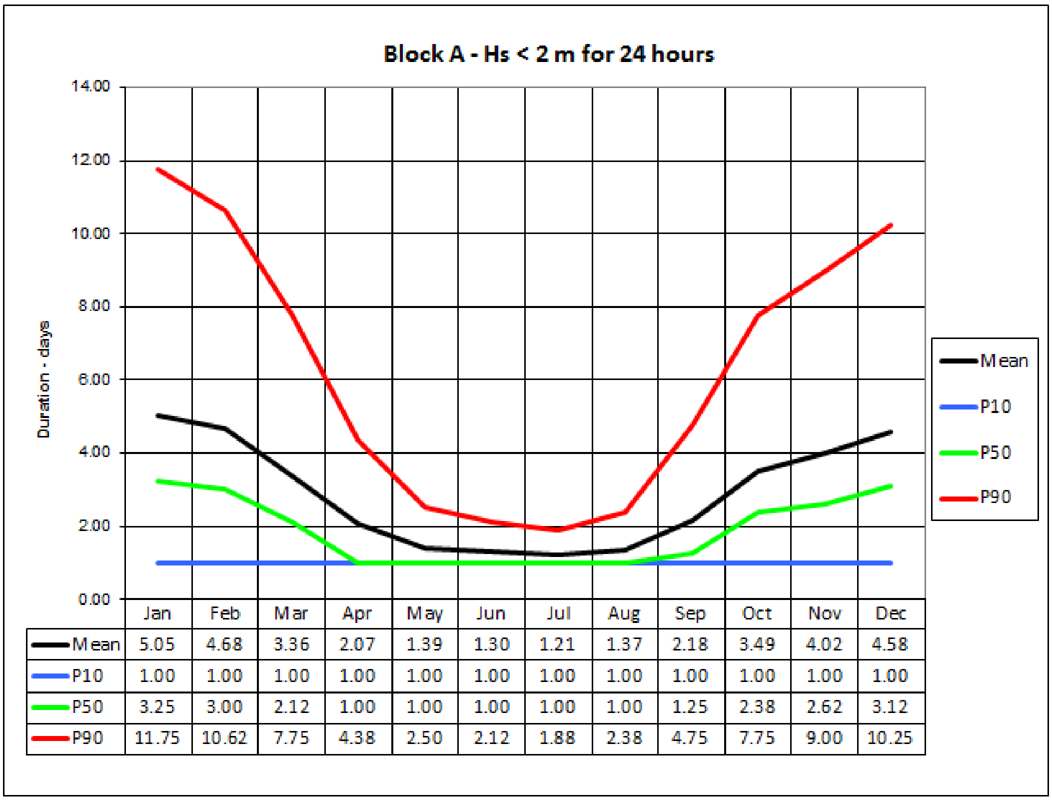
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.33	1.28	0.95	0.68	0.56	0.53	0.52	0.54	0.67	0.89	1.03	1.21
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	3.12	3.12	2.25	1.12	0.50	0.50	0.50	0.50	1.12	1.88	2.38	2.88

Figure 3-30 Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 12 hours at the Block A.



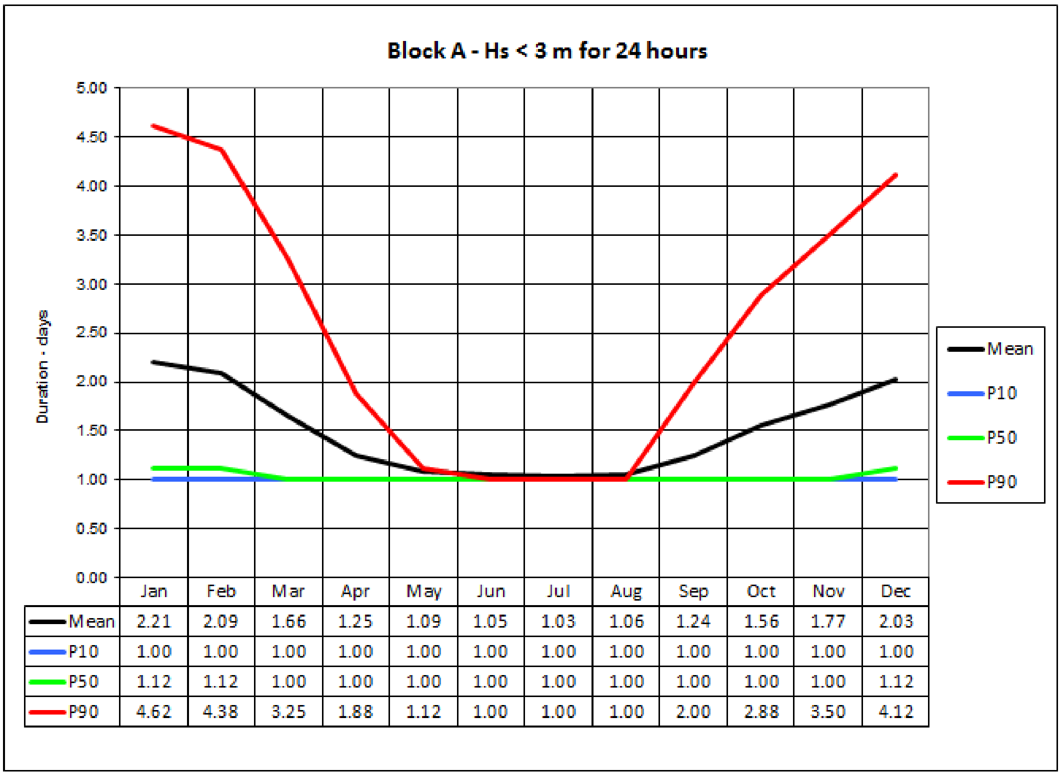
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.79	0.77	0.65	0.55	0.51	0.51	0.50	0.51	0.54	0.62	0.68	0.72
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.50	1.50	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.88	1.12	1.38

Figure 3-31 Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 12 hours at the Block A.



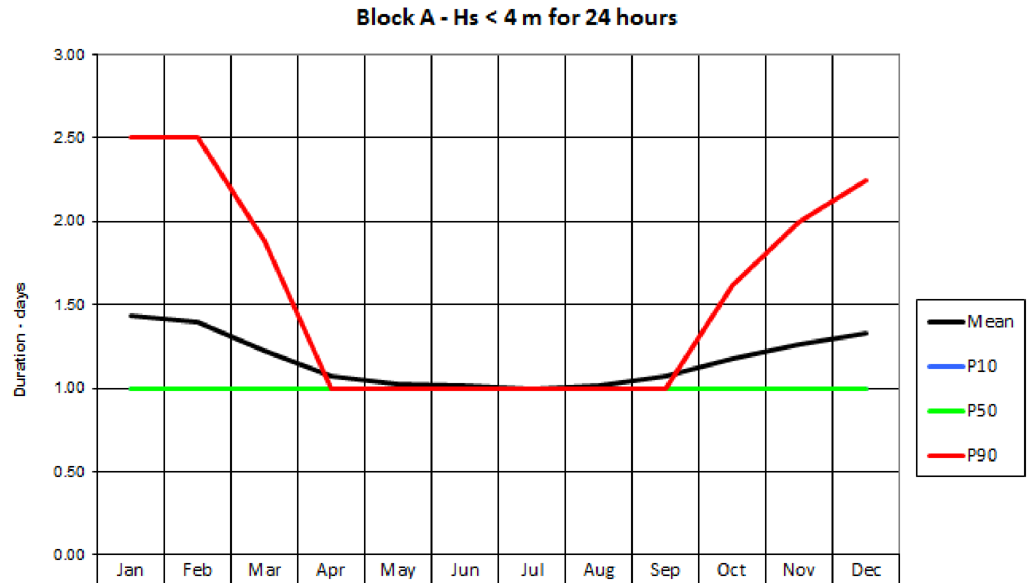
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	5.05	4.68	3.36	2.07	1.39	1.30	1.21	1.37	2.18	3.49	4.02	4.58
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	3.25	3.00	2.12	1.00	1.00	1.00	1.00	1.00	1.25	2.38	2.62	3.12
P90	11.75	10.62	7.75	4.38	2.50	2.12	1.88	2.38	4.75	7.75	9.00	10.25

Figure 3-32 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 24 hours at the Block A.**



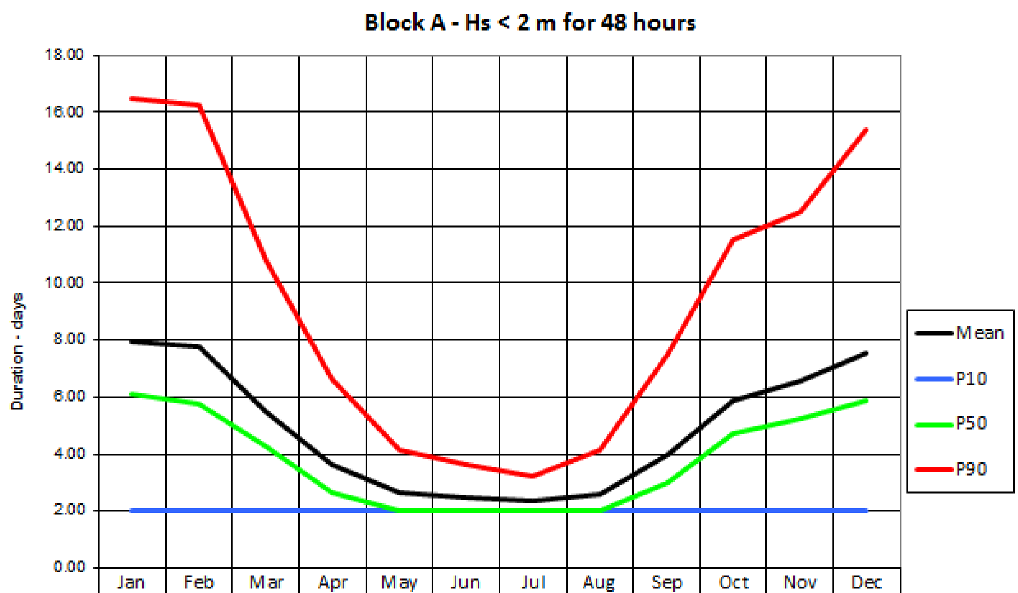
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.21	2.09	1.66	1.25	1.09	1.05	1.03	1.06	1.24	1.56	1.77	2.03
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.12	1.12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12
P90	4.62	4.38	3.25	1.88	1.12	1.00	1.00	1.00	2.00	2.88	3.50	4.12

Figure 3-33 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 24 hours at the Block A.**



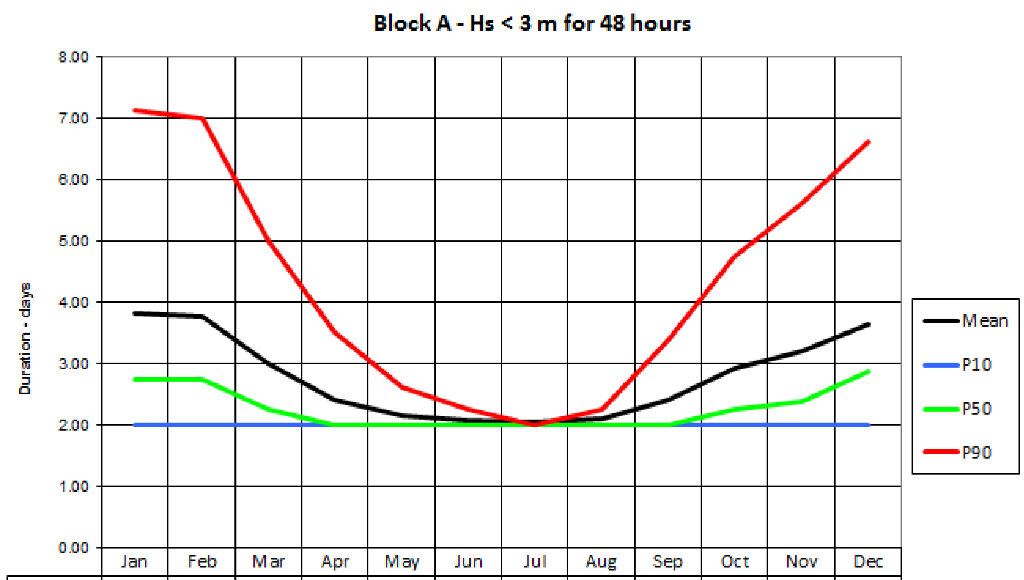
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.43	1.40	1.22	1.07	1.02	1.01	1.00	1.01	1.07	1.18	1.26	1.33
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	2.50	2.50	1.88	1.00	1.00	1.00	1.00	1.00	1.00	1.62	2.00	2.25

Figure 3-34 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 24 hours at the Block A.**



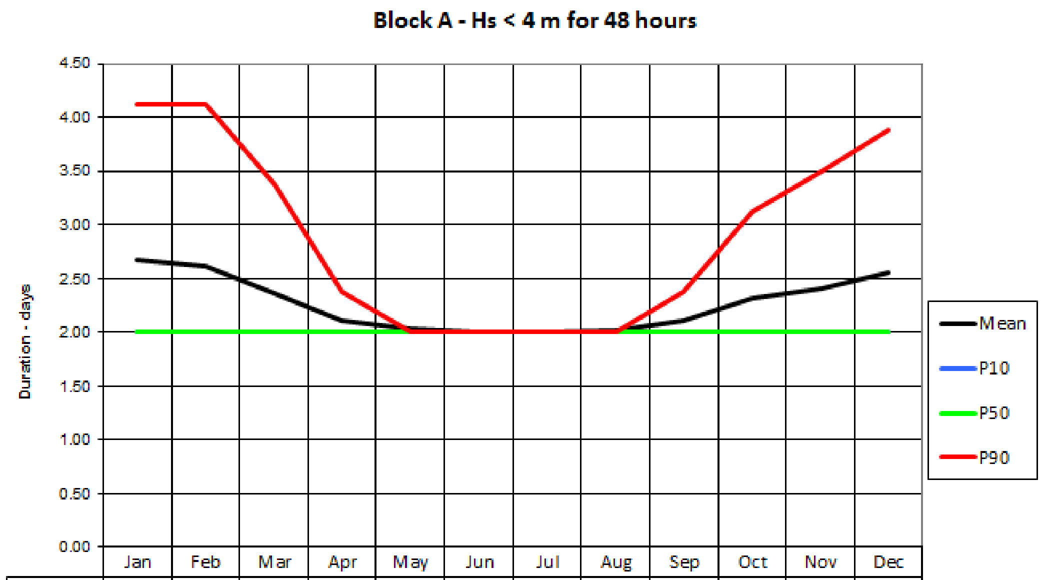
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	7.97	7.77	5.48	3.61	2.62	2.48	2.34	2.61	3.96	5.89	6.54	7.53
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	6.12	5.75	4.25	2.62	2.00	2.00	2.00	2.00	3.00	4.75	5.25	5.88
P90	16.50	16.25	10.75	6.62	4.12	3.62	3.25	4.12	7.50	11.50	12.50	15.38

Figure 3-35 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 48 hours at the Block A.**



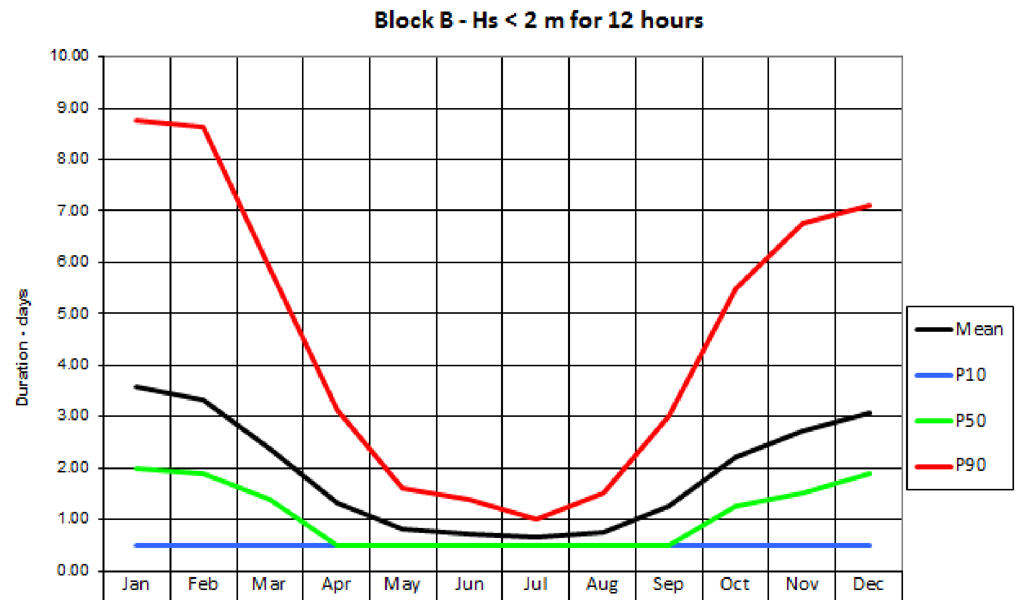
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.82	3.77	3.01	2.40	2.15	2.08	2.06	2.11	2.41	2.91	3.21	3.64
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.75	2.75	2.25	2.00	2.00	2.00	2.00	2.00	2.00	2.25	2.38	2.88
P90	7.12	7.00	5.00	3.50	2.62	2.25	2.00	2.25	3.38	4.75	5.62	6.62

Figure 3-36 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 48 hours at the Block A.**



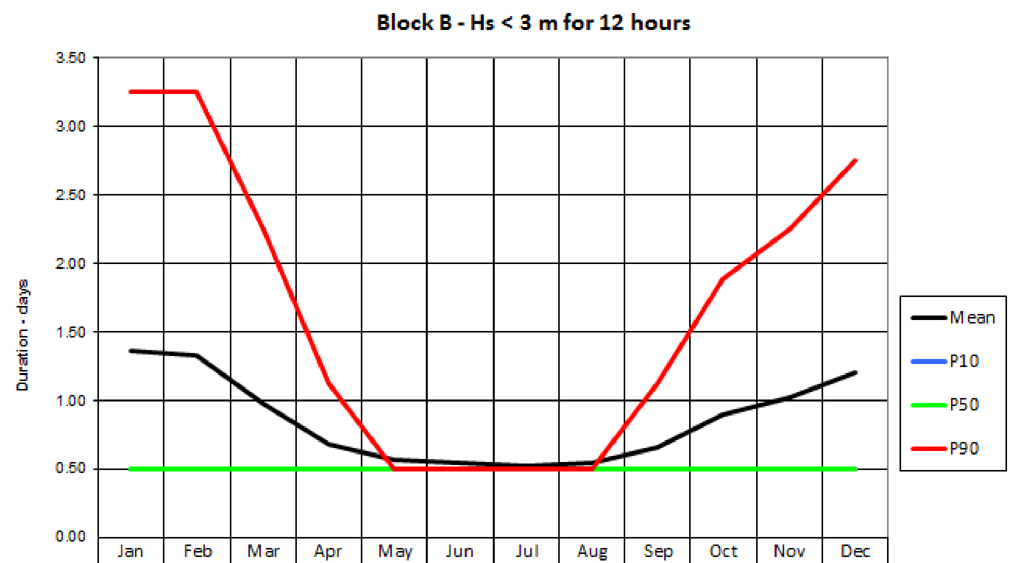
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.67	2.62	2.36	2.11	2.04	2.01	2.01	2.02	2.11	2.31	2.41	2.56
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	4.12	4.12	3.38	2.38	2.00	2.00	2.00	2.00	2.38	3.12	3.50	3.88

Figure 3-37 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 48 hours at the Block A.**



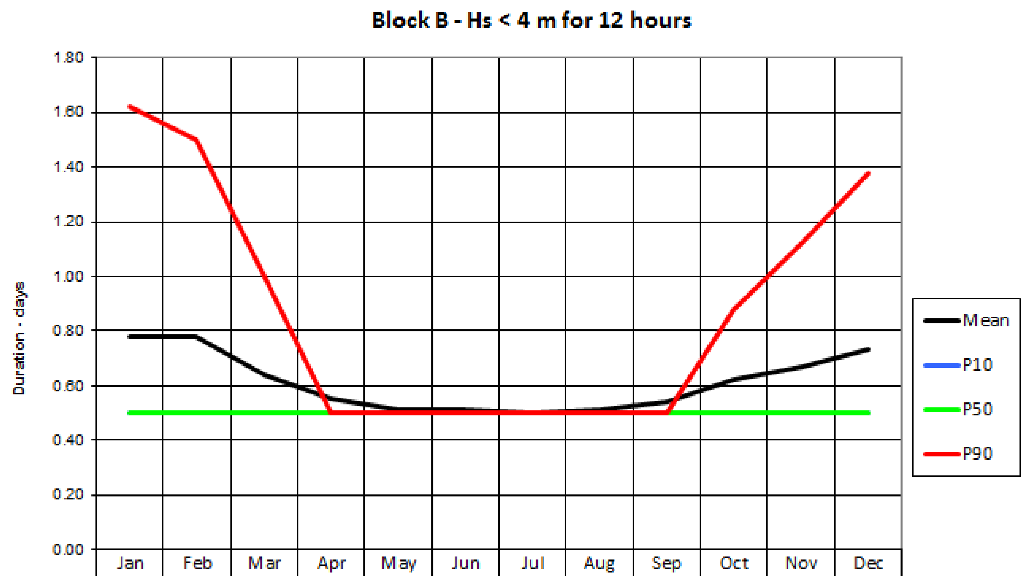
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.57	3.33	2.37	1.31	0.81	0.72	0.65	0.76	1.25	2.20	2.73	3.07
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	2.00	1.88	1.38	0.50	0.50	0.50	0.50	0.50	0.50	1.25	1.50	1.88
P90	8.75	8.62	5.88	3.12	1.62	1.38	1.00	1.50	3.00	5.50	6.75	7.12

Figure 3-38 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 12 hours at the Block B.**



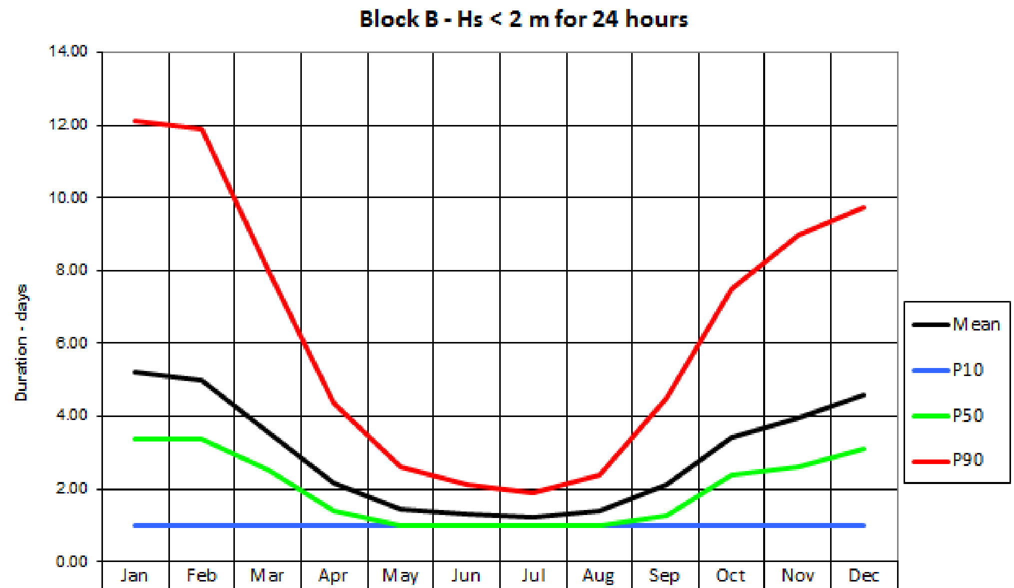
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.36	1.33	0.97	0.68	0.57	0.54	0.52	0.54	0.66	0.89	1.02	1.20
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	3.25	3.25	2.25	1.12	0.50	0.50	0.50	0.50	1.12	1.88	2.25	2.75

Figure 3-39 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 12 hours at the Block B.**



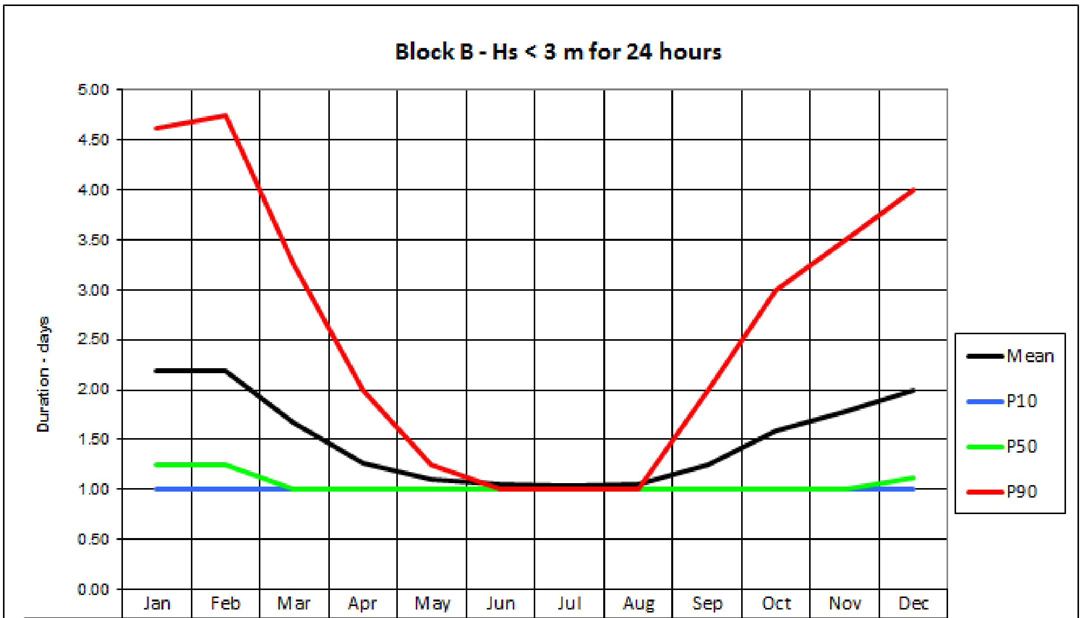
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.78	0.78	0.64	0.55	0.51	0.51	0.50	0.51	0.54	0.62	0.67	0.73
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.62	1.50	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.88	1.12	1.38

Figure 3-40 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 12 hours at the Block B.**



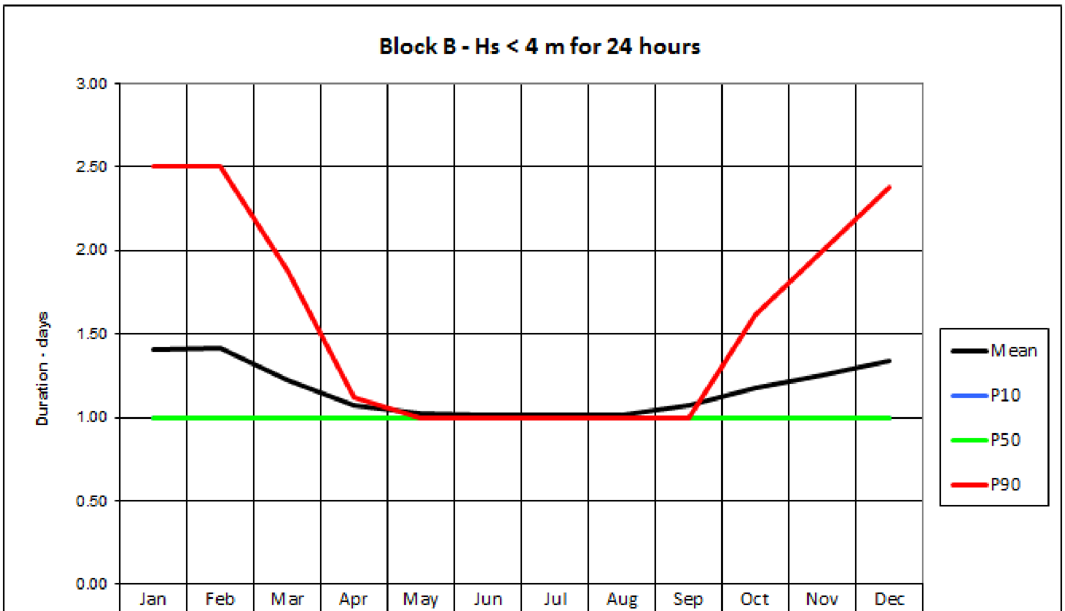
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	5.20	5.00	3.57	2.14	1.45	1.31	1.22	1.39	2.11	3.42	3.97	4.57
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	3.38	3.38	2.50	1.38	1.00	1.00	1.00	1.00	1.25	2.38	2.62	3.12
P90	12.12	11.88	8.00	4.38	2.62	2.12	1.88	2.38	4.50	7.50	9.00	9.75

Figure 3-41 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 24 hours at the Block B.**



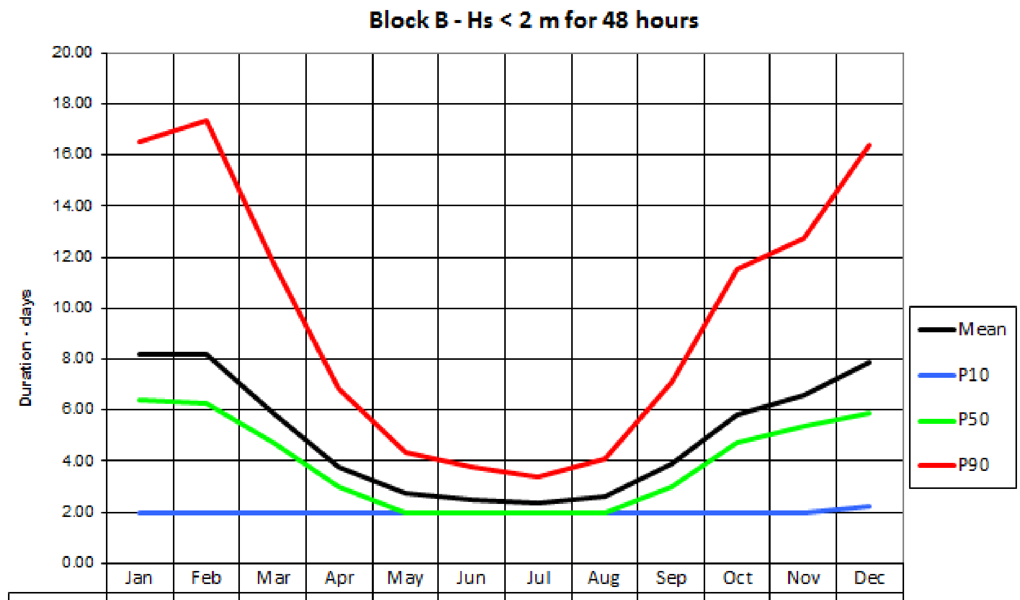
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.18	2.19	1.67	1.26	1.10	1.06	1.03	1.06	1.24	1.59	1.79	2.00
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.25	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12
P90	4.62	4.75	3.25	2.00	1.25	1.00	1.00	1.00	2.00	3.00	3.50	4.00

Figure 3-42 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 24 hours at the Block B.**



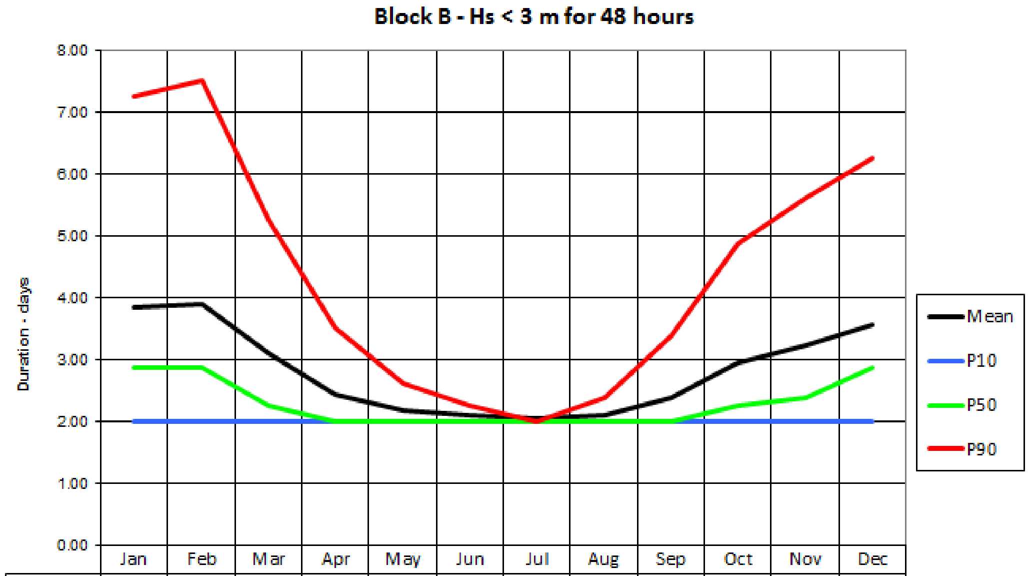
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.41	1.42	1.22	1.07	1.02	1.01	1.01	1.01	1.07	1.18	1.25	1.34
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	2.50	2.50	1.88	1.12	1.00	1.00	1.00	1.00	1.00	1.62	2.00	2.38

Figure 3-43 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 24 hours at the Block B.**



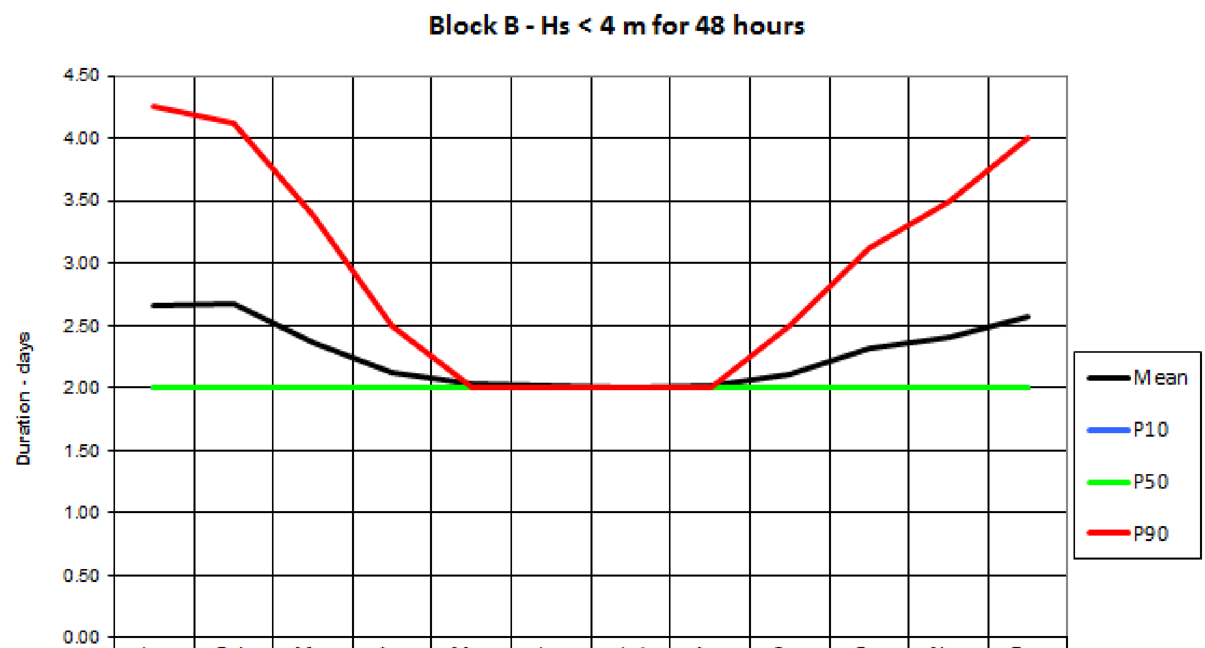
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	8.20	8.21	5.91	3.79	2.73	2.50	2.36	2.62	3.87	5.82	6.62	7.86
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.25
P50	6.38	6.25	4.75	3.00	2.00	2.00	2.00	2.00	3.00	4.75	5.38	5.88
P90	16.50	17.38	11.75	6.88	4.38	3.75	3.38	4.12	7.12	11.50	12.75	16.38

Figure 3-44 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 48 hours at the Block B.**



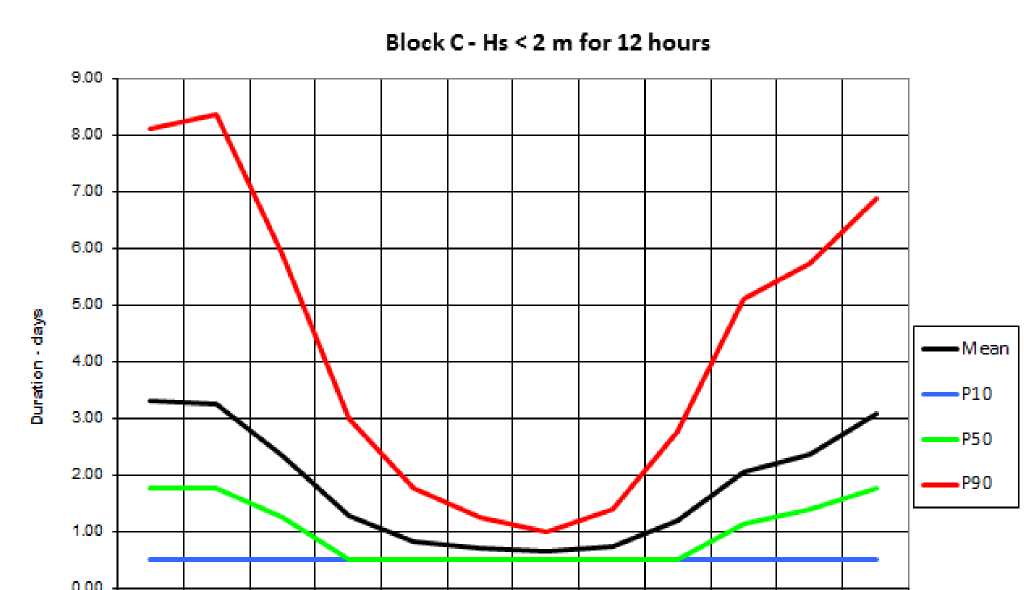
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.85	3.89	3.09	2.44	2.17	2.10	2.06	2.11	2.39	2.94	3.22	3.57
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.88	2.88	2.25	2.00	2.00	2.00	2.00	2.00	2.00	2.25	2.38	2.88
P90	7.25	7.50	5.25	3.50	2.62	2.25	2.00	2.38	3.38	4.88	5.62	6.25

Figure 3-45 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 48 hours at the Block B.**



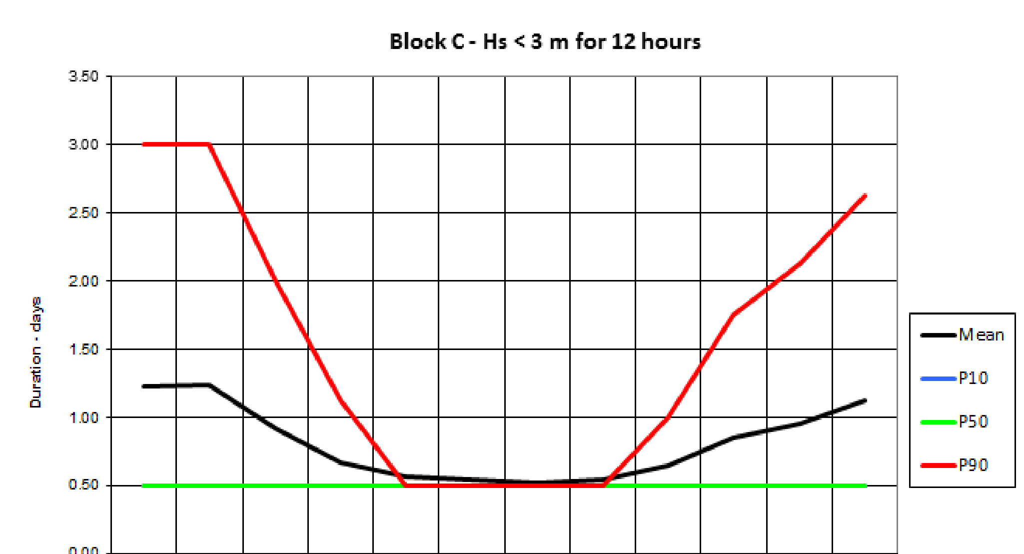
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.66	2.67	2.36	2.13	2.04	2.02	2.01	2.02	2.11	2.31	2.40	2.57
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	4.25	4.12	3.38	2.50	2.00	2.00	2.00	2.00	2.50	3.12	3.50	4.00

Figure 3-46 Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 48 hours at the Block B.



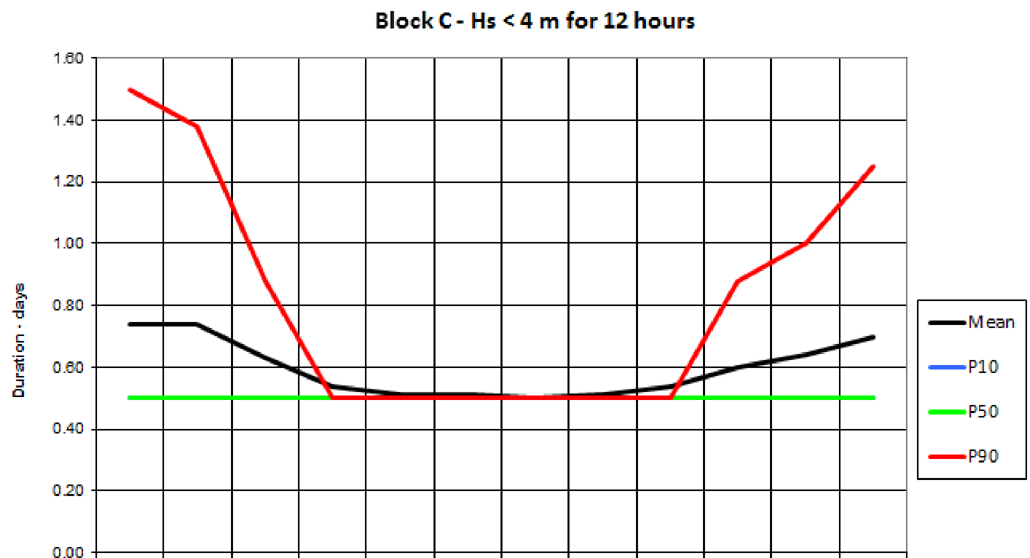
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.32	3.24	2.32	1.26	0.83	0.71	0.65	0.73	1.19	2.06	2.35	3.09
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	1.75	1.75	1.25	0.50	0.50	0.50	0.50	0.50	0.50	1.12	1.38	1.75
P90	8.12	8.38	5.88	3.00	1.75	1.25	1.00	1.38	2.75	5.12	5.75	6.88

Figure 3-47 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 12 hours at the Block C.**



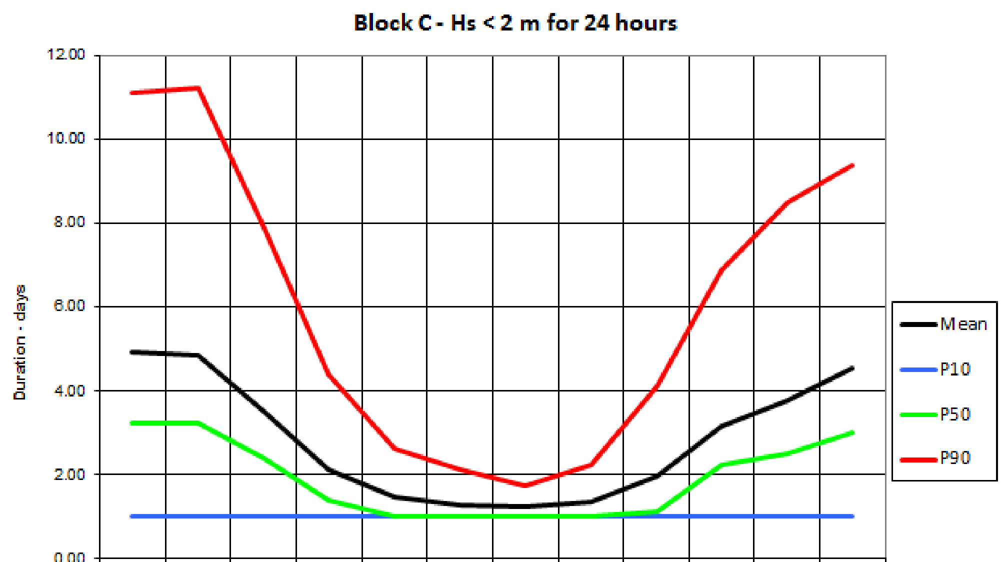
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.22	1.24	0.92	0.67	0.57	0.54	0.52	0.54	0.64	0.85	0.95	1.12
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	3.00	3.00	2.00	1.12	0.50	0.50	0.50	0.50	1.00	1.75	2.12	2.62

Figure 3-48 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 12 hours at the Block C.**



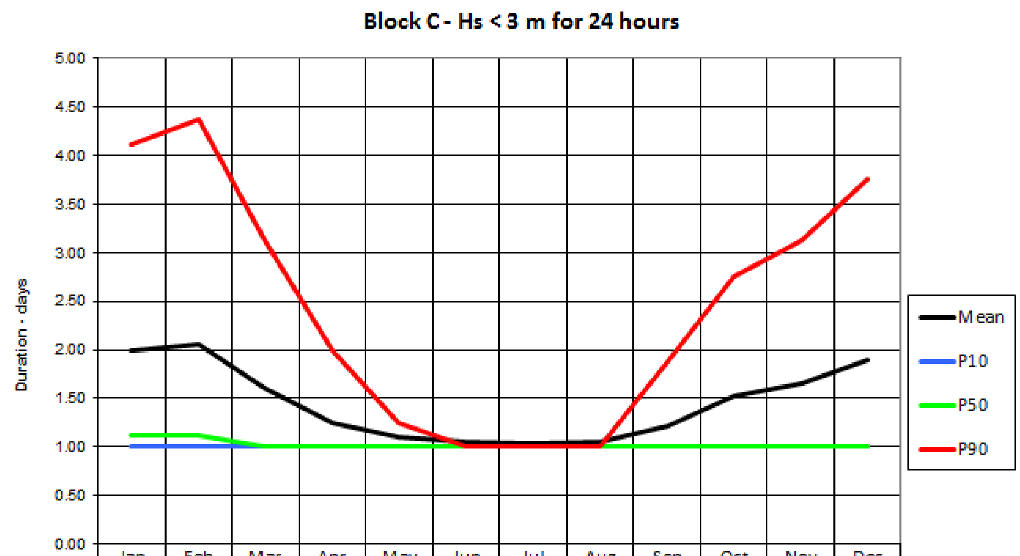
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.74	0.74	0.63	0.54	0.51	0.51	0.50	0.51	0.54	0.60	0.64	0.70
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.50	1.38	0.88	0.50	0.50	0.50	0.50	0.50	0.50	0.88	1.00	1.25

Figure 3-49 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 12 hours at the Block C.**



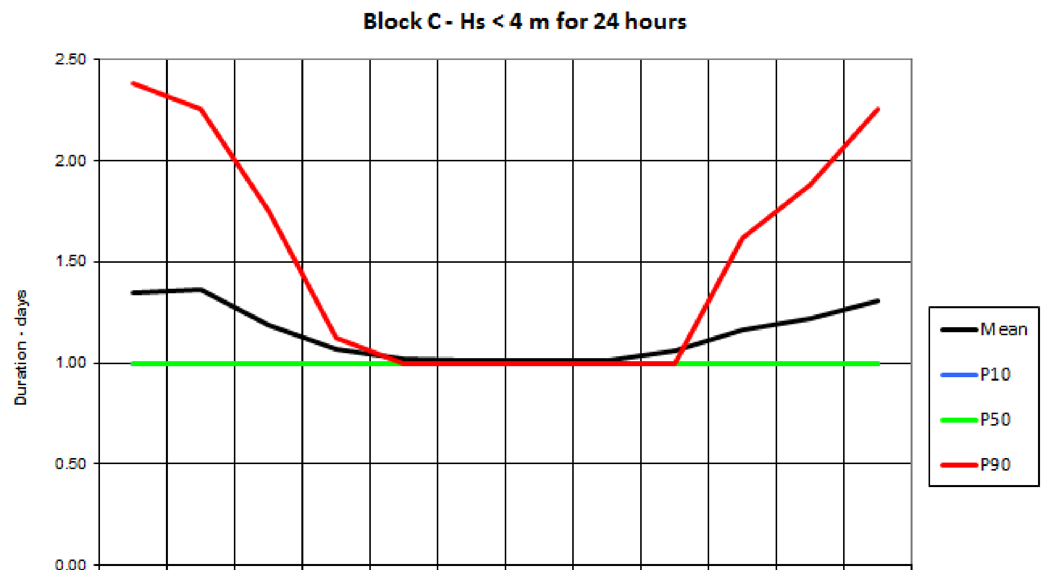
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	4.92	4.84	3.49	2.12	1.46	1.29	1.22	1.35	1.97	3.15	3.77	4.54
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	3.25	3.25	2.38	1.38	1.00	1.00	1.00	1.00	1.12	2.25	2.50	3.00
P90	11.12	11.25	7.88	4.38	2.62	2.12	1.75	2.25	4.12	6.88	8.50	9.38

Figure 3-50 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 24 hours at the Block C.**



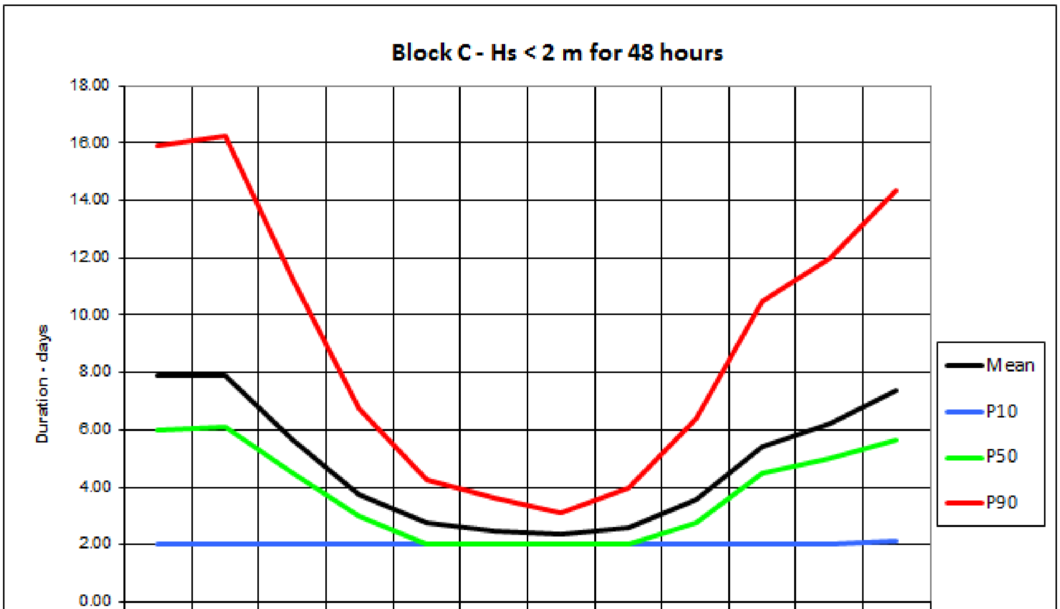
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.99	2.05	1.61	1.25	1.10	1.06	1.04	1.06	1.21	1.53	1.65	1.90
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.12	1.12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	4.12	4.38	3.12	2.00	1.25	1.00	1.00	1.00	1.88	2.75	3.12	3.75

Figure 3-51 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 24 hours at the Block C.**



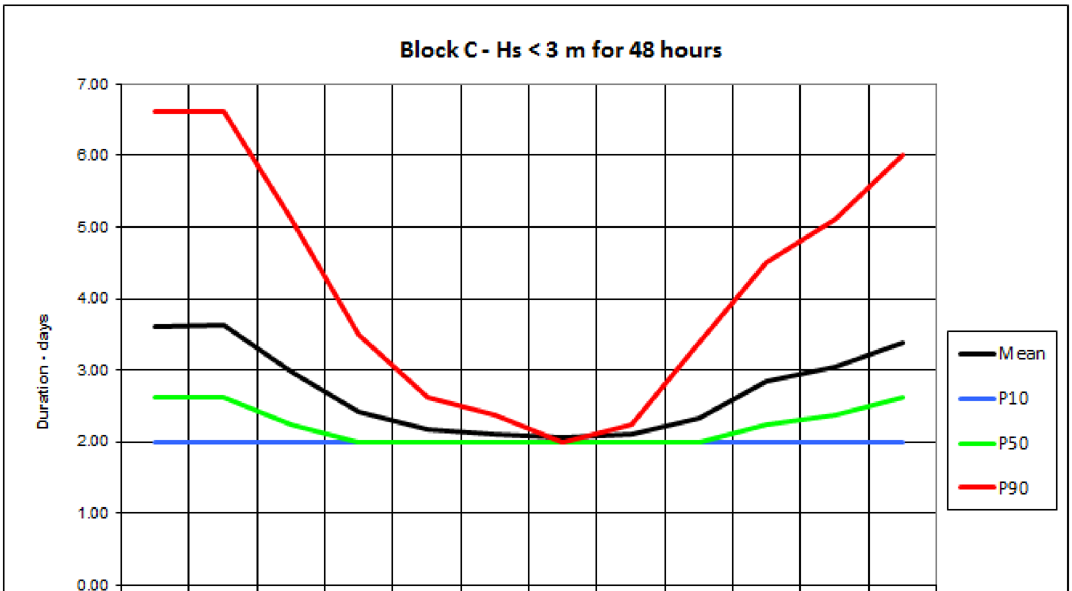
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.35	1.36	1.19	1.07	1.02	1.01	1.01	1.01	1.06	1.16	1.22	1.31
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	2.38	2.25	1.75	1.12	1.00	1.00	1.00	1.00	1.00	1.62	1.88	2.25

Figure 3-52 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 24 hours at the Block C.**



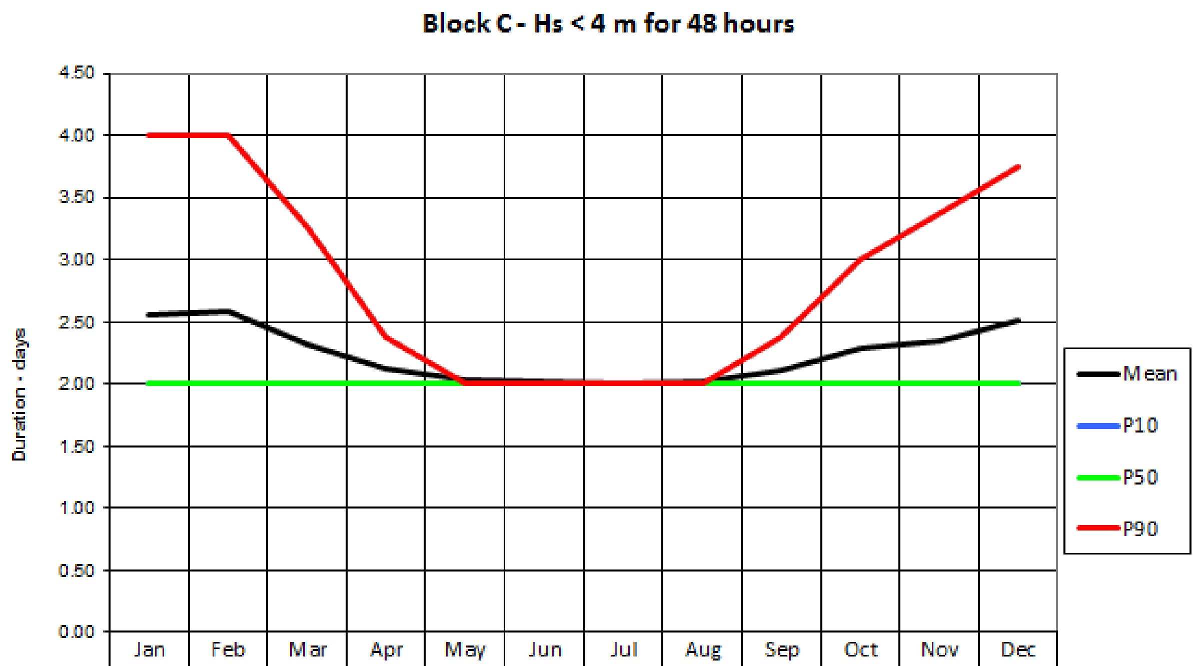
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	7.87	7.90	5.63	3.75	2.74	2.48	2.35	2.57	3.57	5.44	6.24	7.40
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.12
P50	6.00	6.12	4.50	3.00	2.00	2.00	2.00	2.00	2.75	4.50	5.00	5.62
P90	15.88	16.25	11.25	6.75	4.25	3.62	3.12	4.00	6.38	10.50	12.00	14.38

Figure 3-53 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 48 hours at the Block C.**



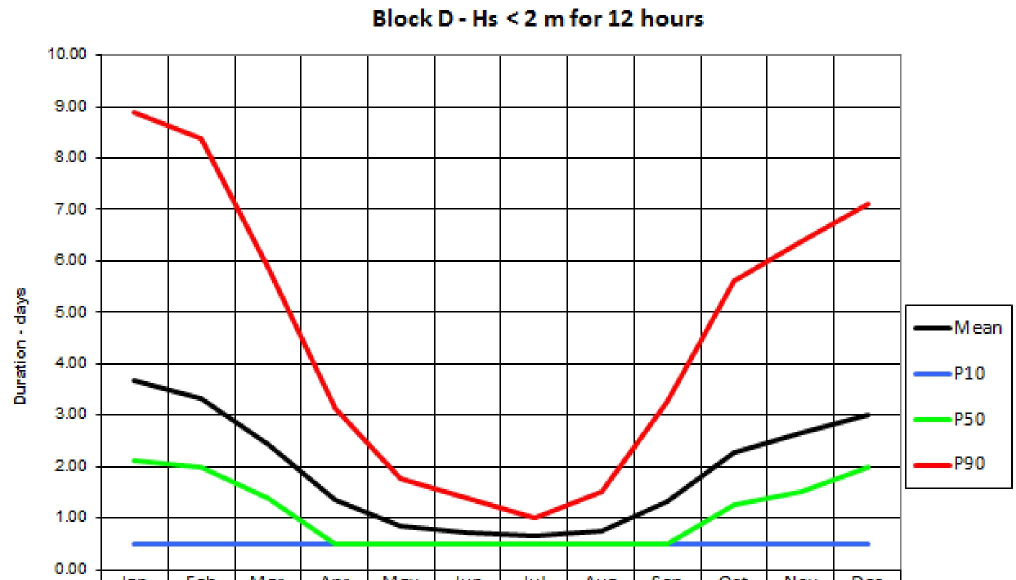
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.62	3.64	2.99	2.42	2.17	2.10	2.06	2.11	2.34	2.85	3.04	3.38
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.62	2.62	2.25	2.00	2.00	2.00	2.00	2.00	2.00	2.25	2.38	2.62
P90	6.62	6.62	5.12	3.50	2.62	2.38	2.00	2.25	3.38	4.50	5.12	6.00

Figure 3-54 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 48 hours at the Block C.**



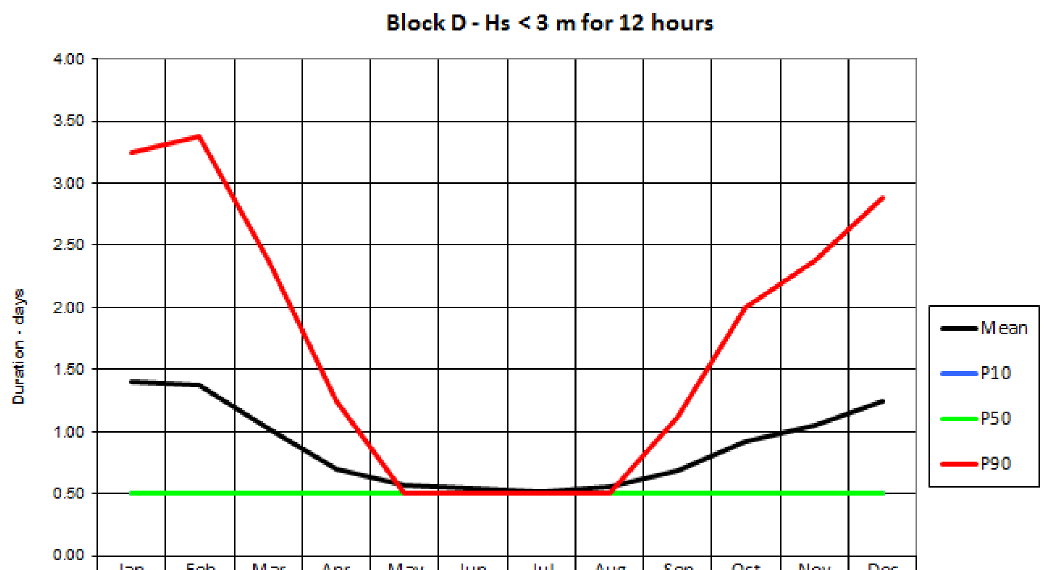
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.56	2.59	2.32	2.12	2.03	2.02	2.01	2.02	2.11	2.28	2.35	2.51
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	4.00	4.00	3.25	2.38	2.00	2.00	2.00	2.00	2.38	3.00	3.38	3.75

Figure 3-55 Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 48 hours at the Block C.



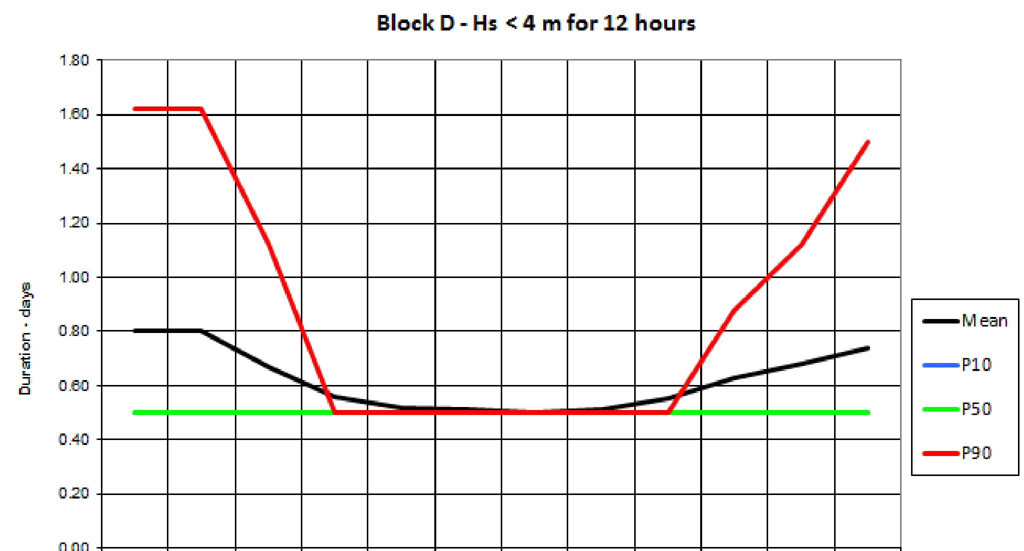
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.68	3.31	2.43	1.35	0.83	0.73	0.65	0.76	1.33	2.27	2.66	3.02
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	2.12	2.00	1.38	0.50	0.50	0.50	0.50	0.50	0.50	1.25	1.50	2.00
P90	8.88	8.38	5.88	3.12	1.75	1.38	1.00	1.50	3.25	5.62	6.38	7.12

Figure 3-56 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 12 hours at the Block A.**



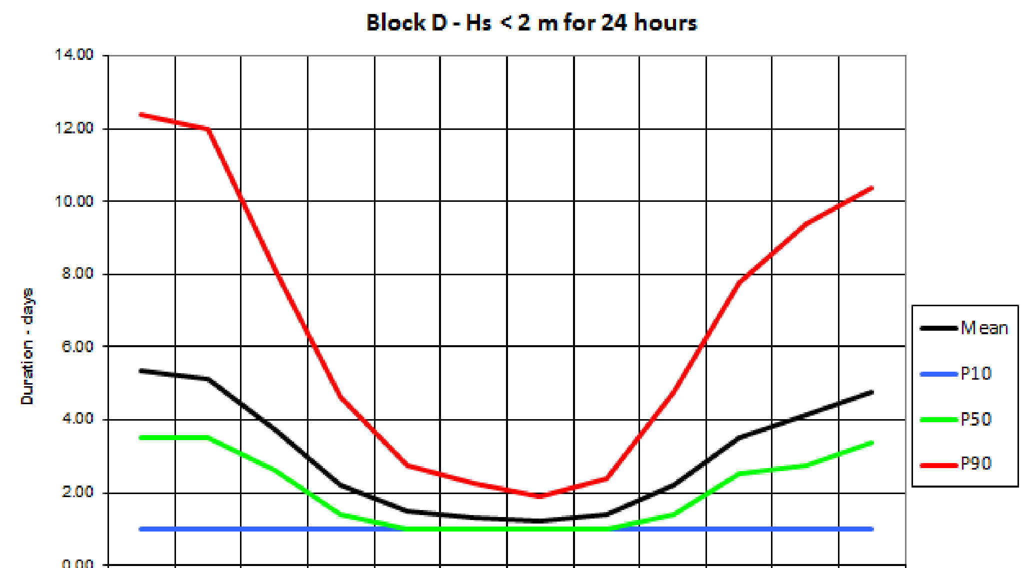
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.40	1.37	1.02	0.70	0.57	0.54	0.52	0.55	0.68	0.92	1.05	1.25
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	3.25	3.38	2.38	1.25	0.50	0.50	0.50	0.50	1.12	2.00	2.38	2.88

Figure 3-57 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 12 hours at the Block D.**



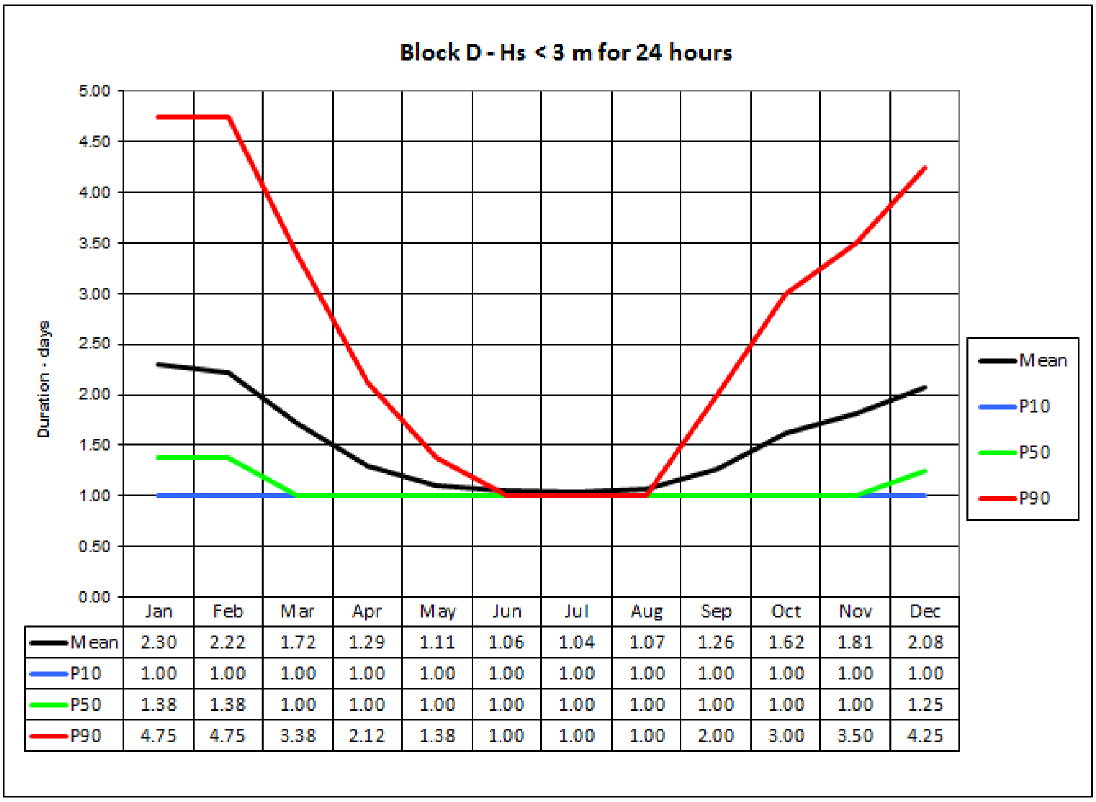
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.80	0.80	0.67	0.56	0.52	0.51	0.50	0.51	0.55	0.63	0.68	0.74
P10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
P90	1.62	1.62	1.12	0.50	0.50	0.50	0.50	0.50	0.50	0.88	1.12	1.50

Figure 3-58 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 12 hours at the Block D.**



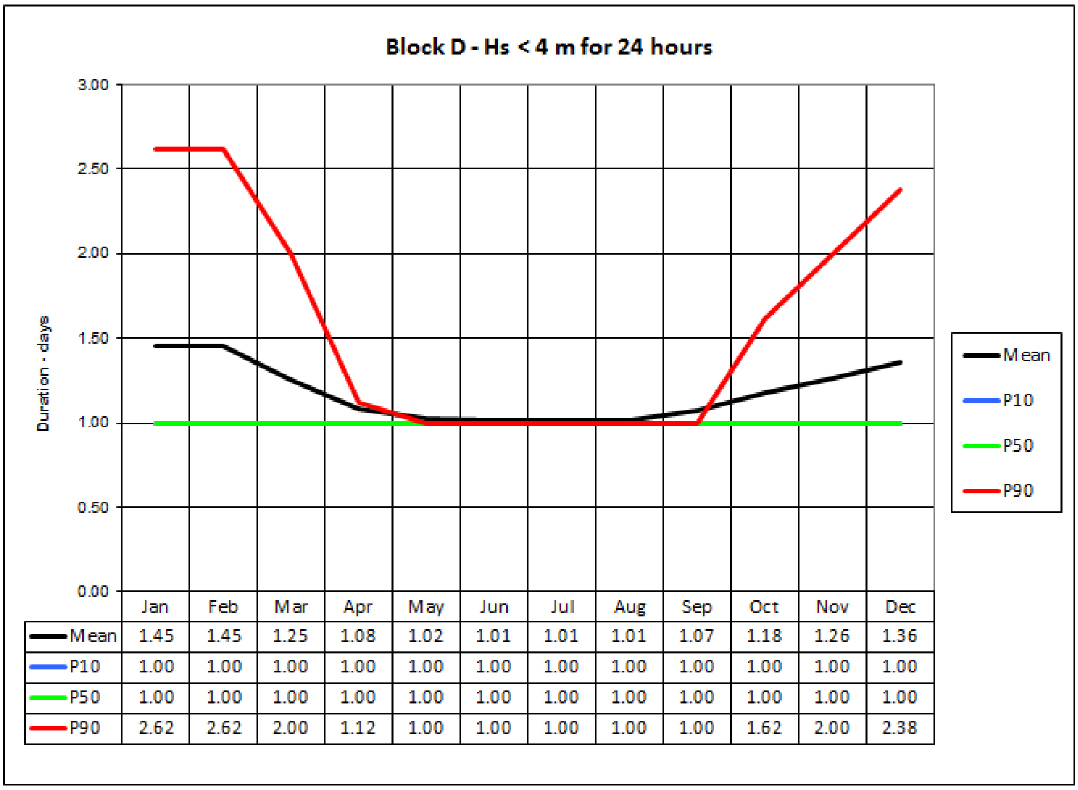
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	5.33	5.12	3.72	2.19	1.47	1.33	1.23	1.39	2.19	3.52	4.14	4.76
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	3.50	3.50	2.62	1.38	1.00	1.00	1.00	1.00	1.38	2.50	2.75	3.38
P90	12.38	12.00	8.12	4.62	2.75	2.25	1.88	2.38	4.75	7.75	9.38	10.38

Figure 3-59 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 24 hours at the Block D.**



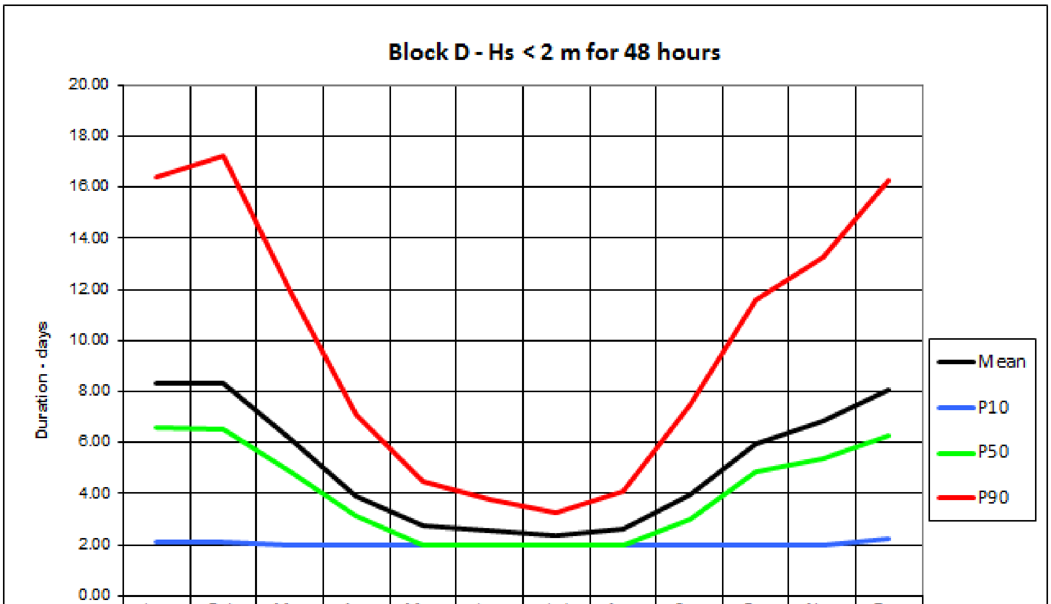
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.30	2.22	1.72	1.29	1.11	1.06	1.04	1.07	1.26	1.62	1.81	2.08
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.38	1.38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25
P90	4.75	4.75	3.38	2.12	1.38	1.00	1.00	1.00	2.00	3.00	3.50	4.25

Figure 3-60 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 24 hours at the Block D.**



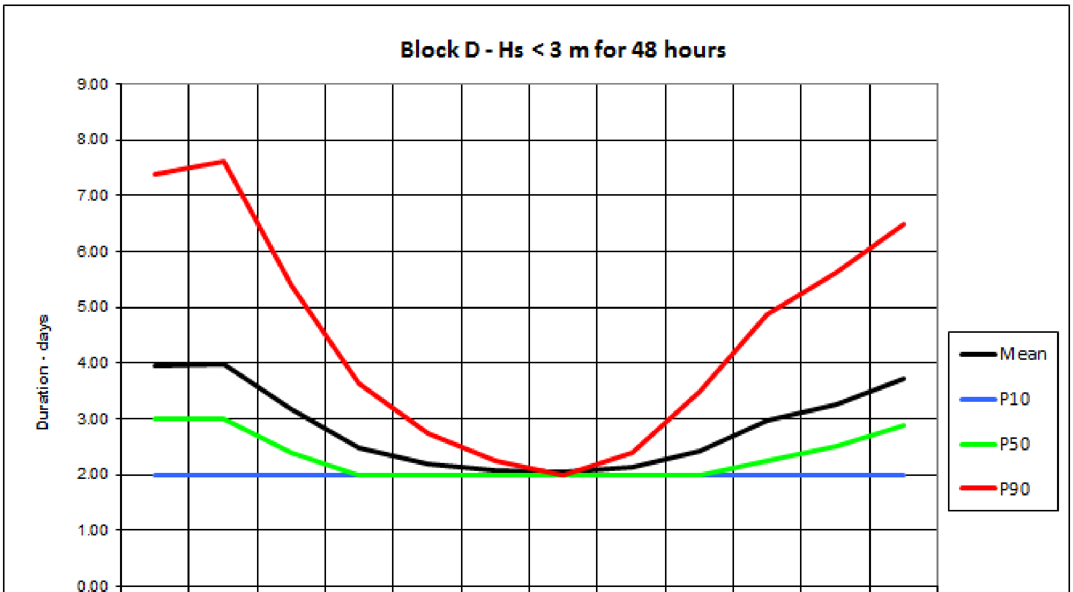
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	1.45	1.45	1.25	1.08	1.02	1.01	1.01	1.01	1.07	1.18	1.26	1.36
P10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P90	2.62	2.62	2.00	1.12	1.00	1.00	1.00	1.00	1.00	1.62	2.00	2.38

Figure 3-61 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 24 hours at the Block D.**



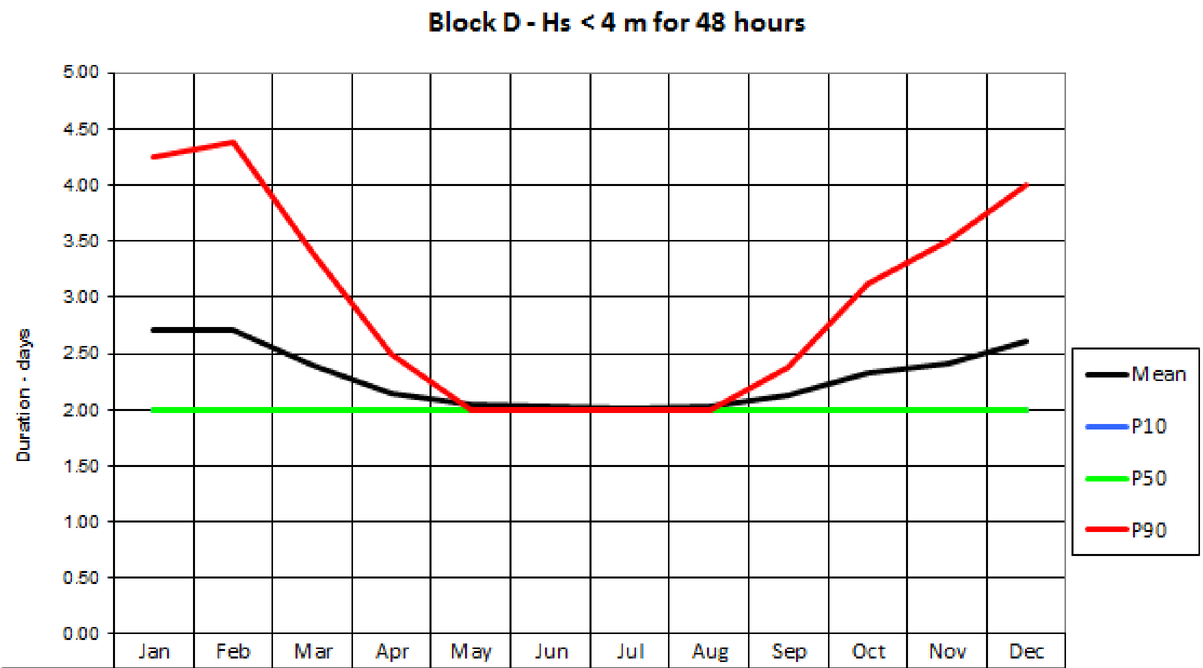
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	8.31	8.29	6.14	3.92	2.77	2.53	2.37	2.64	3.95	5.93	6.88	8.05
P10	2.12	2.12	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.25
P50	6.62	6.50	4.88	3.12	2.00	2.00	2.00	2.00	3.00	4.88	5.38	6.25
P90	16.38	17.25	11.88	7.12	4.50	3.75	3.25	4.12	7.50	11.62	13.25	16.25

Figure 3-62 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 2.0 m for 48 hours at the Block D.**



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	3.96	3.97	3.16	2.47	2.18	2.09	2.06	2.12	2.43	2.97	3.26	3.71
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	3.00	3.00	2.38	2.00	2.00	2.00	2.00	2.00	2.00	2.25	2.50	2.88
P90	7.38	7.62	5.38	3.62	2.75	2.25	2.00	2.38	3.50	4.88	5.62	6.50

Figure 3-63 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 3.0 m for 48 hours at the Block D.**



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	2.71	2.71	2.40	2.14	2.04	2.02	2.01	2.02	2.12	2.32	2.41	2.61
P10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P90	4.25	4.38	3.38	2.50	2.00	2.00	2.00	2.00	2.38	3.12	3.50	4.00

Figure 3-64 **Characteristic durations, including waiting time, in order to perform operations limited by a significant wave height (H_S) of 4.0 m for 48 hours at the Block D.**

4 Currents

4.1 Current data

Current data are based upon the BaSIC4 hindcast model operated by the Norwegian Meteorological Institute [14]. The data chosen for analysis are from 4 grid points as shown in Table 4-1 and cover the period December 1984 – December 2012 (29 years). The sample interval is 1 hour. It should be noted that the quality of hindcast currents is not as good as locally recorded data. Comparisons between recorded and modelled data has been carried out with the conclusion that BaSIC4 currents should be of sufficient quality to indicate the dynamics at the selected locations. If field developments are planned, site specific current recordings should be made as soon as possible.

Table 4-1 shows the BASIC grid points used for the analysis of the 4 areas of interest in the Barents Sea.

Table 4-1 Position of Nora10 grid points for which wave data are chosen for analysis.

Area Name	BaSIC Position
Block A	73.99° N, 035.64° E
Block B	72.77° N, 034.99° E
Block C	71.75° N, 032.70° E
Block D	73.37° N, 032.94° E

Table 4-2 – Table 4-5 present summary statistics for the current data at the Block A, B, C and D.

Table 4-2 Summary statistics of current data at the Block A

Depth	Mean current speed	Maximum current speed	Sector of maximum current
[m]	[cm/s]	[cm/s]	[°]
0	16.7	70.0	330
10	14.7	64.0	330
20	14.2	63.0	330
30	13.9	60.0	330
40	13.7	58.0	330
50	13.5	56.0	330
60	13.4	54.0	330
70	13.3	53.0	330
80	13.2	50.0	330
90	13.1	49.0	330
100	12.9	48.0	330
125	12.8	46.0	120
150	12.6	44.0	120
175	12.6	42.0	120
200	12.6	44.0	120
250	9.2	31.0	120

Table 4-3 Summary statistics of current data at the Block B

Depth	Mean current speed	Maximum current speed	Sector of maximum current
[m]	[cm/s]	[cm/s]	[°]
0	17.7	81.0	120
10	16.0	73.0	120
20	15.4	71.0	60
30	15.0	69.0	60
40	14.7	66.0	90
50	14.6	64.0	90
60	14.4	60.0	90
70	14.2	58.0	270
80	14.2	58.0	270
90	14.1	57.0	270
100	14.0	57.0	270
125	13.9	57.0	270
150	13.8	56.0	270
175	12.9	55.0	270
200	10.3	52.0	270

Table 4-4 Summary statistics of current data at the Block C

Depth	Mean current speed	Maximum current speed	Sector of maximum current
[m]	[cm/s]	[cm/s]	[°]
0	19.3	87.0	120
10	17.8	86.0	150
20	17.3	84.0	150
30	17.1	82.0	150
40	16.8	76.0	150
50	16.6	71.0	150
60	16.4	64.0	150
70	16.2	60.0	120
80	16.1	59.0	330
90	15.8	57.0	120
100	15.7	56.0	120
125	15.5	55.0	120
150	15.3	54.0	120
175	15.2	54.0	300
200	15.1	56.0	300
250	13.6	58.0	300

Table 4-5 Summary statistics of current data at the Block D

Depth	Mean current speed	Maximum current speed	Sector of maximum current
[m]	[cm/s]	[cm/s]	[°]
0	16.1	66.0	300
10	14.3	55.0	90
20	13.8	52.0	90 - 120
30	13.5	50.0	90 - 120
40	13.3	48.0	90 - 120
50	13.2	47.0	90 - 270
60	13.1	47.0	90
70	13.0	46.0	90 – 120 – 270 - 300
80	12.9	46.0	90 – 120 – 270 - 300
90	12.9	46.0	90 - 300
100	12.8	46.0	90
125	12.7	45.0	90 - 300
150	12.6	45.0	90 - 300
175	12.5	45.0	300
200	12.3	45.0	300
250	9.7	37.0	120

4.2 Current data analysis

4.2.1 Block A

Figure 4-1 – Figure 4-16 show current roses for Block A. Table 4-3 – Table 4-18 show the corresponding distributions of non-exceedance of current speed.

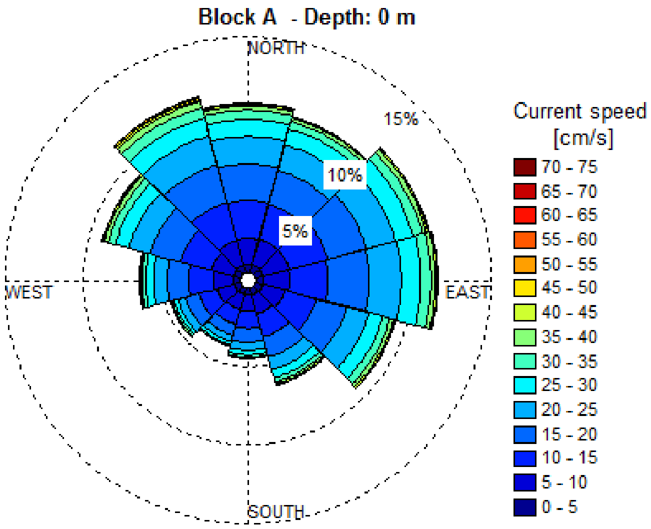


Figure 4-1 Current rose at 0 m depth at the Block A.

Table 4-6 Direction sample distribution of non-exceedance [%] of current speed at 0 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.48	0.52	0.49	0.49	0.48	0.43	0.40	0.41	0.43	0.43	0.47	0.51	5.53
< 10	2.14	2.21	2.20	2.12	1.95	1.69	1.47	1.42	1.53	1.71	1.92	2.16	22.53
< 15	4.52	4.53	4.76	4.60	4.05	3.25	2.57	2.41	2.72	3.28	3.96	4.63	45.28
< 20	6.81	6.77	7.31	7.23	6.09	4.59	3.44	3.14	3.58	4.61	5.92	7.09	66.58
< 25	8.55	8.45	9.21	9.30	7.57	5.47	3.97	3.57	4.08	5.49	7.34	8.99	81.99
< 30	9.63	9.52	10.39	10.55	8.49	5.99	4.27	3.77	4.33	5.98	8.21	10.19	91.32
< 35	10.22	10.00	10.99	11.20	8.97	6.28	4.42	3.86	4.47	6.20	8.67	10.89	96.17
< 40	10.50	10.22	11.27	11.50	9.21	6.41	4.49	3.90	4.53	6.31	8.92	11.26	98.51
< 45	10.61	10.29	11.37	11.61	9.31	6.49	4.50	3.90	4.55	6.36	9.02	11.43	99.44
< 50	10.66	10.31	11.40	11.64	9.35	6.51	4.51	3.90	4.56	6.38	9.05	11.52	99.80
< 55	10.67	10.32	11.41	11.65	9.36	6.52	4.51		4.56	6.39	9.07	11.58	99.96
< 60	10.68	10.32	11.42	11.66	9.37	6.52	4.51		4.57	6.39	9.07	11.59	99.99
< 65	10.68					6.52	4.51					11.60	100.00
< 70												11.60	100.00
< 75												11.60	100.00
Total	**10.68**	**10.32**	**11.42**	**11.66**	**9.37**	**6.52**	**4.51**	**3.90**	**4.57**	**6.39**	**9.07**	**11.60**	**100.00**
Mean	**17.3**	**16.7**	**17.2**	**17.6**	**17.1**	**15.9**	**14.3**	**13.2**	**13.9**	**15.4**	**17.0**	**18.1**	**16.7**
Maximum	**63.0**	**55.0**	**58.0**	**59.0**	**57.0**	**61.0**	**63.0**	**49.0**	**58.0**	**59.0**	**56.0**	**70.0**	**70.0**

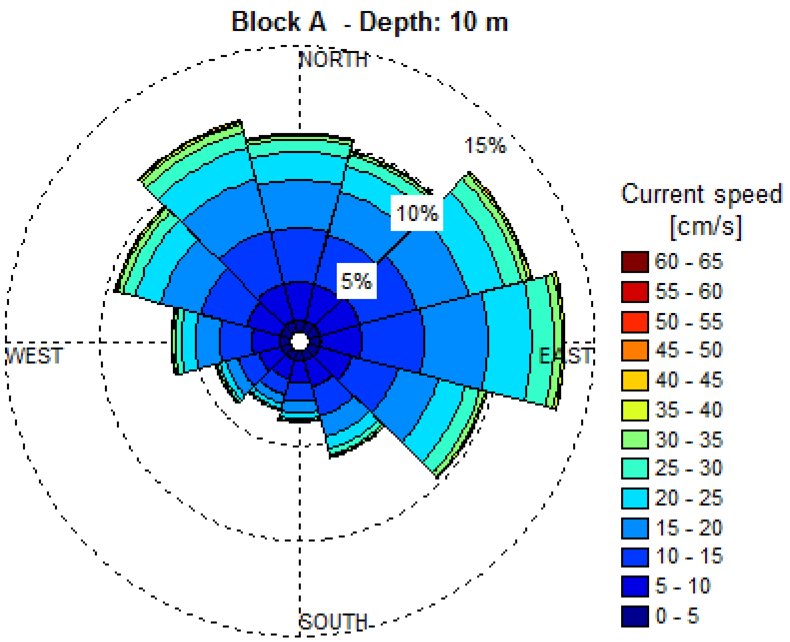


Figure 4-2 **Current rose at 10 m depth at the Block A.**

Table 4-7 **Direction sample distribution of non-exceedance [%] of current speed at 10 m depth at the Block A.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.56	0.61	0.61	0.62	0.58	0.52	0.50	0.47	0.50	0.52	0.57	0.62	6.67
< 10	2.53	2.60	2.79	2.77	2.37	1.97	1.66	1.55	1.71	1.99	2.39	2.62	26.95
< 15	5.34	5.29	5.84	6.05	4.91	3.58	2.66	2.41	2.84	3.66	4.86	5.54	52.97
< 20	7.83	7.63	8.68	9.39	7.18	4.76	3.30	2.90	3.49	4.93	7.01	8.30	75.40
< 25	9.31	9.04	10.58	11.72	8.71	5.44	3.61	3.16	3.84	5.64	8.39	10.04	89.46
< 30	9.97	9.65	11.52	12.90	9.49	5.77	3.74	3.25	3.98	5.97	9.03	10.90	96.18
< 35	10.19	9.83	11.89	13.32	9.81	5.89	3.77	3.29	4.04	6.10	9.33	11.32	98.78
< 40	10.27	9.89	12.01	13.46	9.90	5.92	3.78	3.30	4.07	6.15	9.43	11.47	99.65
< 45	10.30	9.90	12.05	13.49	9.92	5.93	3.79	3.30	4.07	6.17	9.47	11.52	99.91
< 50	10.30	9.90	12.06	13.50	9.93	5.94	3.79	3.30	4.07	6.18	9.48	11.54	99.98
< 55	10.31		12.06		9.93				4.07	6.18	9.49	11.54	99.99
< 60	10.31								4.07	6.18		11.54	100.00
< 65												11.54	100.00
Total	**10.31**	**9.90**	**12.06**	**13.50**	**9.93**	**5.94**	**3.79**	**3.30**	**4.07**	**6.18**	**9.49**	**11.54**	**100.00**
Mean	**14.8**	**14.5**	**15.5**	**16.0**	**15.4**	**13.5**	**11.6**	**11.2**	**12.0**	**13.7**	**15.1**	**15.7**	**14.7**
Maximum	**59.0**	**49.0**	**52.0**	**48.0**	**50.0**	**47.0**	**46.0**	**45.0**	**56.0**	**57.0**	**52.0**	**64.0**	**64.0**

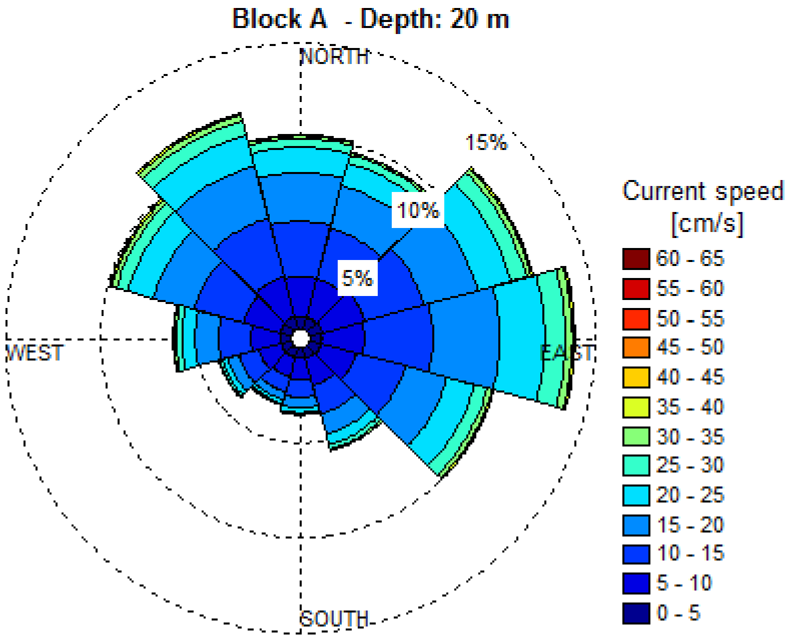


Figure 4-3 Current rose at 20 m depth at the Block A.

Table 4-8 Direction sample distribution of non-exceedance [%] of current speed at 20 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.62	0.64	0.68	0.62	0.62	0.56	0.51	0.52	0.52	0.56	0.60	0.65	7.10
< 10	2.69	2.72	2.98	2.88	2.55	2.07	1.67	1.59	1.75	2.08	2.59	2.83	28.39
< 15	5.56	5.47	6.18	6.47	5.24	3.65	2.61	2.41	2.82	3.74	5.27	5.99	55.41
< 20	8.10	7.77	9.12	9.98	7.59	4.80	3.16	2.85	3.42	4.94	7.45	8.87	78.05
< 25	9.44	9.01	10.93	12.36	9.13	5.40	3.42	3.06	3.70	5.62	8.81	10.55	91.41
< 30	9.91	9.45	11.71	13.47	9.83	5.65	3.50	3.13	3.82	5.91	9.43	11.32	97.13
< 35	10.05	9.56	12.00	13.83	10.10	5.73	3.52	3.15	3.87	6.02	9.68	11.64	99.15
< 40	10.09	9.60	12.09	13.94	10.17	5.75	3.53	3.15	3.89	6.06	9.77	11.75	99.79
< 45	10.11	9.60	12.11	13.97	10.18	5.76	3.53	3.16	3.89	6.07	9.80	11.78	99.94
< 50	10.11	9.60	12.12	13.97	10.19	5.76			3.89	6.07	9.81	11.79	99.99
< 55	10.11		12.12		10.19				3.89	6.07		11.79	100.00
< 60	10.11								3.89	6.08		11.79	100.00
< 65												11.79	100.00
Total	**10.11**	**9.60**	**12.12**	**13.97**	**10.19**	**5.76**	**3.53**	**3.16**	**3.89**	**6.08**	**9.81**	**11.79**	**100.00**
Mean	**14.1**	**13.8**	**14.9**	**15.7**	**14.9**	**12.8**	**11.0**	**10.6**	**11.4**	**13.3**	**14.7**	**15.1**	**14.2**
Maximum	**57.0**	**46.0**	**51.0**	**46.0**	**50.0**	**46.0**	**44.0**	**40.0**	**55.0**	**56.0**	**48.0**	**63.0**	**63.0**

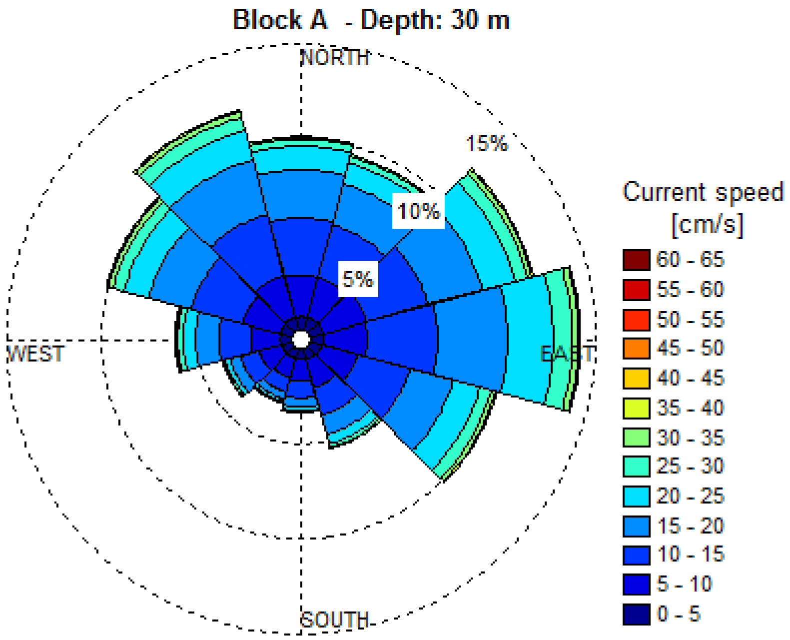


Figure 4-4 Current rose at 30 m depth at the Block A.

Table 4-9 Direction sample distribution of non-exceedance [%] of current speed at 30 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.64	0.67	0.69	0.65	0.61	0.56	0.54	0.54	0.54	0.59	0.64	0.66	7.34
< 10	2.82	2.81	3.05	2.99	2.60	2.12	1.70	1.61	1.77	2.15	2.66	2.96	29.23
< 15	5.81	5.69	6.40	6.69	5.47	3.68	2.59	2.39	2.79	3.80	5.45	6.28	57.04
< 20	8.31	7.94	9.33	10.37	7.92	4.77	3.09	2.77	3.35	4.98	7.72	9.26	79.80
< 25	9.56	9.07	11.06	12.78	9.42	5.31	3.32	2.94	3.60	5.61	9.06	10.88	92.59
< 30	9.95	9.43	11.72	13.80	10.06	5.52	3.38	3.00	3.71	5.88	9.64	11.60	97.67
< 35	10.04	9.52	11.96	14.13	10.28	5.57	3.39	3.02	3.75	5.97	9.87	11.87	99.38
< 40	10.07	9.53	12.03	14.21	10.34	5.59	3.40	3.03	3.76	6.00	9.95	11.95	99.85
< 45	10.07	9.53	12.05	14.23	10.35	5.59	3.40		3.76	6.01	9.97	11.97	99.96
< 50	10.07	9.53	12.05		10.36				3.76	6.01	9.98	11.98	99.99
< 55	10.07		12.05						3.76	6.02		11.98	100.00
< 60	10.07									6.02		11.98	100.00
< 65												11.98	100.00
Total	**10.07**	**9.53**	**12.05**	**14.23**	**10.36**	**5.59**	**3.40**	**3.03**	**3.76**	**6.02**	**9.98**	**11.98**	**100.00**
Mean	**13.6**	**13.3**	**14.5**	**15.5**	**14.7**	**12.4**	**10.6**	**10.1**	**11.1**	**13.0**	**14.5**	**14.7**	**13.9**
Maximum	**55.0**	**45.0**	**50.0**	**44.0**	**49.0**	**43.0**	**43.0**	**38.0**	**54.0**	**55.0**	**48.0**	**60.0**	**60.0**

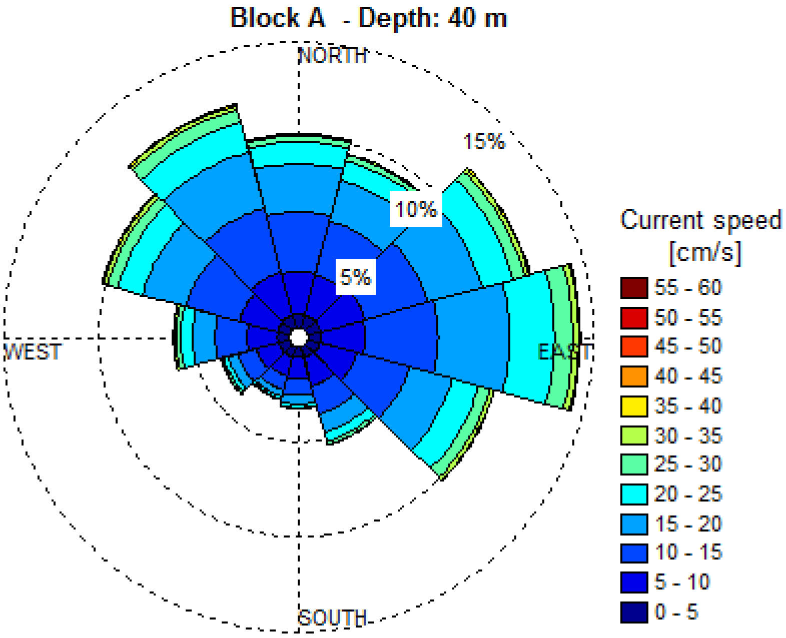


Figure 4-5 **Current rose at 40 m depth at the Block A.**

Table 4-10 **Direction sample distribution of non-exceedance [%] of current speed at 40 m depth at the Block A.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.66	0.68	0.69	0.66	0.64	0.58	0.53	0.55	0.57	0.58	0.64	0.67	7.45
< 10	2.89	2.88	3.09	3.02	2.69	2.16	1.70	1.61	1.77	2.18	2.73	3.00	29.72
< 15	5.98	5.79	6.52	6.87	5.60	3.72	2.58	2.36	2.77	3.81	5.60	6.48	58.07
< 20	8.49	8.02	9.45	10.64	8.05	4.74	3.04	2.71	3.30	4.97	7.93	9.57	80.92
< 25	9.67	9.07	11.10	13.00	9.53	5.25	3.24	2.86	3.54	5.58	9.25	11.19	93.27
< 30	9.99	9.38	11.69	13.97	10.17	5.43	3.29	2.91	3.65	5.83	9.81	11.89	97.99
< 35	10.07	9.44	11.91	14.28	10.37	5.47	3.30	2.92	3.68	5.92	10.02	12.12	99.51
< 40	10.09	9.45	11.96	14.36	10.42	5.48	3.30	2.93	3.69	5.94	10.08	12.19	99.89
< 45	10.09	9.45	11.97	14.37	10.43	5.48	3.31		3.69	5.95	10.11	12.20	99.97
< 50	10.09		11.98		10.44				3.69	5.95	10.11	12.21	100.00
< 55	10.09								3.69	5.95		12.21	100.00
< 60												12.21	100.00
Total	**10.09**	**9.45**	**11.98**	**14.37**	**10.44**	**5.48**	**3.31**	**2.93**	**3.69**	**5.95**	**10.11**	**12.21**	**100.00**
Mean	**13.4**	**13.1**	**14.3**	**15.3**	**14.5**	**12.1**	**10.3**	**9.8**	**10.9**	**12.8**	**14.3**	**14.5**	**13.7**
Maximum	**52.0**	**44.0**	**49.0**	**43.0**	**48.0**	**40.0**	**42.0**	**38.0**	**53.0**	**54.0**	**48.0**	**58.0**	**58.0**

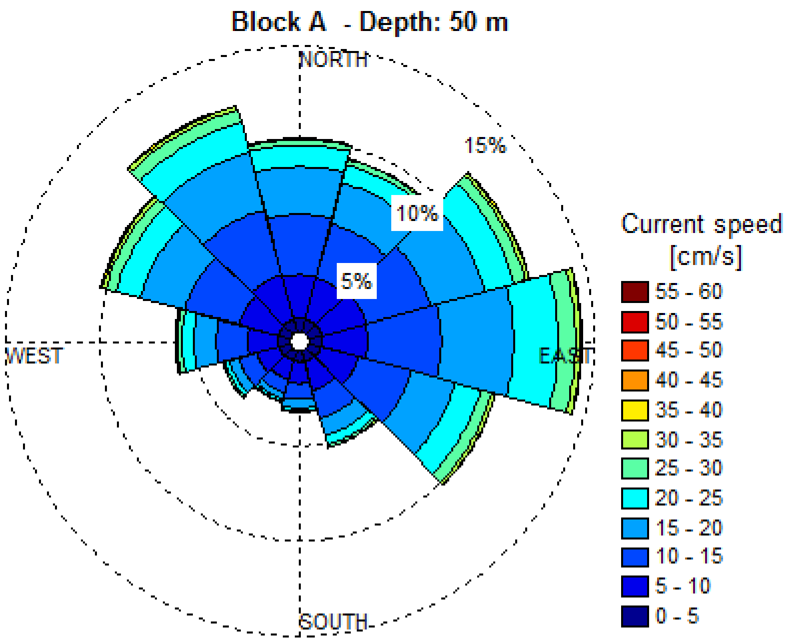


Figure 4-6 Current rose at 50 m depth at the Block A.

Table 4-11 Direction sample distribution of non-exceedance [%] of current speed at 50 m depth at the Block A.

Current speed [cm/s]	Current direction											Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.69	0.69	0.70	0.67	0.65	0.59	0.55	0.53	0.59	0.60	0.65	0.67	7.60
< 10	2.95	2.92	3.11	3.07	2.72	2.17	1.72	1.59	1.81	2.19	2.80	3.07	30.10
< 15	6.12	5.88	6.57	6.95	5.66	3.73	2.57	2.32	2.77	3.82	5.71	6.62	58.72
< 20	8.63	8.08	9.53	10.78	8.12	4.72	3.04	2.65	3.28	4.98	8.10	9.75	81.65
< 25	9.76	9.08	11.10	13.12	9.57	5.21	3.21	2.79	3.51	5.59	9.41	11.39	93.74
< 30	10.06	9.36	11.66	14.03	10.18	5.38	3.25	2.83	3.61	5.83	9.95	12.08	98.22
< 35	10.13	9.41	11.87	14.31	10.38	5.42	3.26	2.84	3.63	5.90	10.15	12.30	99.59
< 40	10.14	9.42	11.91	14.38	10.42	5.42	3.26	2.84	3.64	5.92	10.21	12.35	99.91
< 45	10.14	9.42	11.92	14.39	10.43	5.42	3.27		3.64	5.92	10.23	12.36	99.98
< 50	10.14		11.92		10.43				3.64	5.93	10.23	12.36	100.00
< 55	10.14								3.64	5.93		12.36	100.00
< 60												12.37	100.00
Total	**10.14**	**9.42**	**11.92**	**14.39**	**10.43**	**5.42**	**3.27**	**2.84**	**3.64**	**5.93**	**10.23**	**12.37**	**100.00**
Mean	**13.2**	**12.9**	**14.1**	**15.1**	**14.4**	**11.9**	**10.1**	**9.7**	**10.7**	**12.7**	**14.2**	**14.4**	**13.5**
Maximum	**50.0**	**44.0**	**48.0**	**42.0**	**48.0**	**40.0**	**41.0**	**37.0**	**52.0**	**53.0**	**48.0**	**56.0**	**56.0**

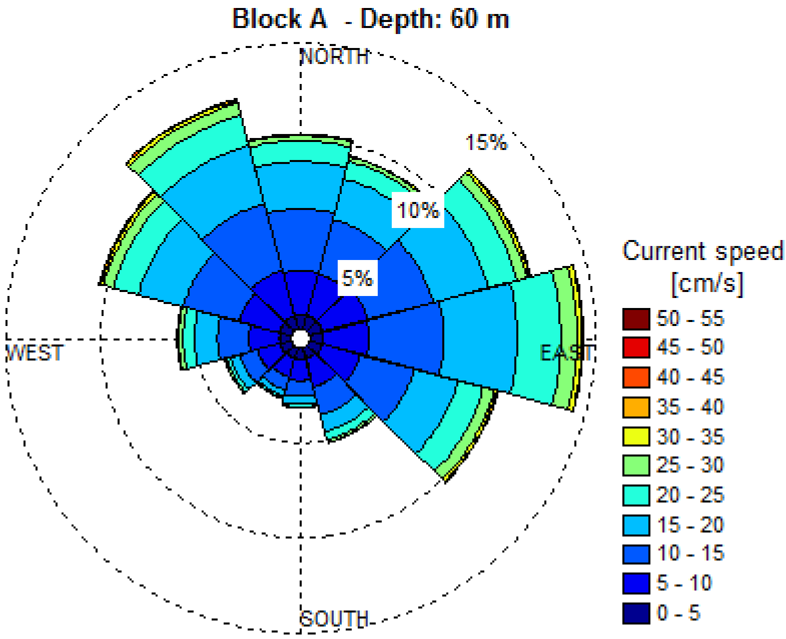


Figure 4-7 Current rose at 60 m depth at the Block A.

Table 4-12 Direction sample distribution of non-exceedance [%] of current speed at 60 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.70	0.72	0.72	0.65	0.68	0.58	0.56	0.55	0.60	0.59	0.64	0.69	7.68
< 10	2.98	2.99	3.17	3.10	2.78	2.17	1.71	1.61	1.81	2.21	2.81	3.18	30.54
< 15	6.19	5.98	6.67	7.06	5.77	3.72	2.55	2.31	2.77	3.83	5.79	6.83	59.47
< 20	8.68	8.19	9.63	10.93	8.23	4.66	2.99	2.64	3.27	5.00	8.21	10.01	82.44
< 25	9.79	9.15	11.16	13.23	9.64	5.14	3.15	2.75	3.47	5.59	9.54	11.65	94.25
< 30	10.06	9.39	11.67	14.09	10.24	5.28	3.18	2.79	3.55	5.82	10.07	12.32	98.45
< 35	10.12	9.43	11.85	14.35	10.41	5.31	3.19	2.80	3.57	5.88	10.25	12.51	99.67
< 40	10.13	9.44	11.88	14.41	10.45	5.32	3.19	2.80	3.58	5.90	10.30	12.56	99.93
< 45	10.13	9.44	11.89	14.41	10.45	5.32	3.19		3.58	5.90	10.32	12.56	99.98
< 50	10.13		11.89		10.46				3.58	5.90	10.32	12.57	100.00
< 55									3.58	5.90		12.57	100.00
Total	**10.13**	**9.44**	**11.89**	**14.41**	**10.46**	**5.32**	**3.19**	**2.80**	**3.58**	**5.90**	**10.32**	**12.57**	**100.00**
Mean	**13.1**	**12.7**	**13.9**	**15.0**	**14.2**	**11.7**	**9.8**	**9.4**	**10.4**	**12.5**	**14.1**	**14.3**	**13.4**
Maximum	**48.0**	**43.0**	**47.0**	**44.0**	**48.0**	**40.0**	**40.0**	**36.0**	**51.0**	**52.0**	**47.0**	**54.0**	**54.0**

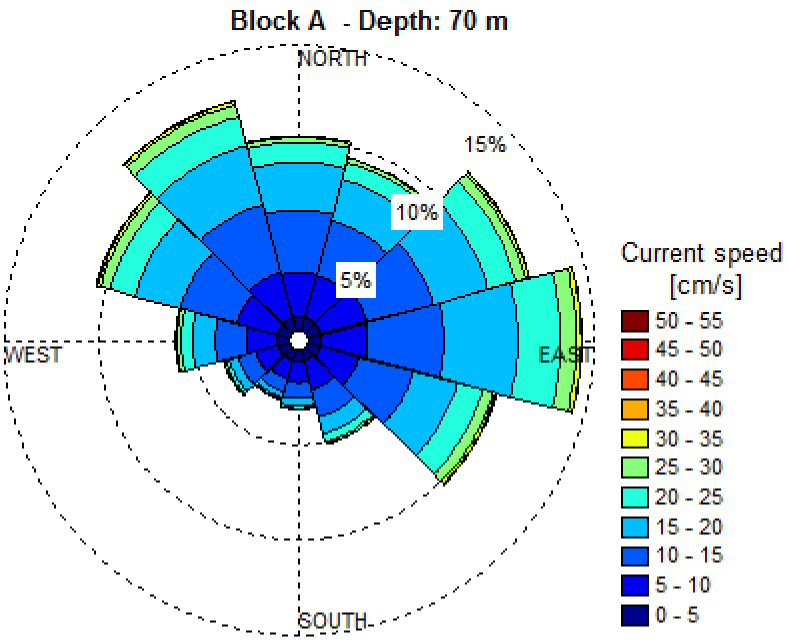


Figure 4-8 Current rose at 70 m depth at the Block A.

Table 4-13 Direction sample distribution of non-exceedance [%] of current speed at 70 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.70	0.74	0.72	0.66	0.69	0.58	0.57	0.55	0.60	0.61	0.65	0.69	7.73
< 10	3.01	3.05	3.20	3.13	2.82	2.19	1.72	1.60	1.81	2.22	2.84	3.17	30.75
< 15	6.25	6.04	6.73	7.12	5.80	3.73	2.55	2.30	2.74	3.85	5.84	6.87	59.83
< 20	8.74	8.26	9.70	10.99	8.27	4.66	2.98	2.61	3.23	5.02	8.29	10.09	82.84
< 25	9.83	9.19	11.21	13.26	9.68	5.13	3.13	2.72	3.43	5.59	9.62	11.74	94.52
< 30	10.08	9.42	11.70	14.10	10.25	5.25	3.15	2.75	3.51	5.81	10.14	12.39	98.56
< 35	10.13	9.45	11.87	14.34	10.41	5.28	3.16	2.76	3.53	5.87	10.32	12.58	99.70
< 40	10.14	9.45	11.89	14.39	10.45	5.29	3.17	2.76	3.53	5.88	10.37	12.62	99.94
< 45	10.14	9.46	11.90	14.40	10.46	5.29			3.53	5.89	10.38	12.63	99.99
< 50	10.14		11.90		10.46				3.53	5.89	10.38	12.63	100.00
< 55										5.89		12.63	100.00
Total	**10.14**	**9.46**	**11.90**	**14.40**	**10.46**	**5.29**	**3.17**	**2.76**	**3.53**	**5.89**	**10.38**	**12.63**	**100.00**
Mean	**13.0**	**12.6**	**13.9**	**14.9**	**14.2**	**11.6**	**9.8**	**9.3**	**10.3**	**12.4**	**14.0**	**14.2**	**13.3**
Maximum	**47.0**	**43.0**	**46.0**	**42.0**	**48.0**	**40.0**	**39.0**	**36.0**	**49.0**	**50.0**	**46.0**	**53.0**	**53.0**

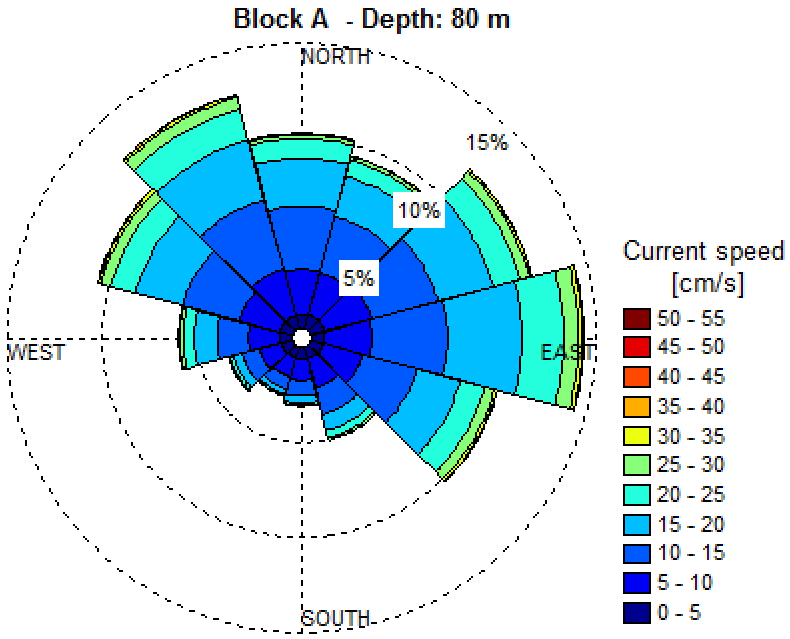


Figure 4-9 Current rose at 80 m depth at the Block A.

Table 4-14 Direction sample distribution of non-exceedance [%] of current speed at 80 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.71	0.76	0.76	0.68	0.67	0.60	0.57	0.57	0.59	0.63	0.68	0.70	7.92
< 10	3.05	3.09	3.30	3.18	2.85	2.24	1.73	1.62	1.78	2.27	2.90	3.23	31.26
< 15	6.35	6.13	6.91	7.21	5.87	3.74	2.56	2.29	2.70	3.90	5.96	7.01	60.64
< 20	8.86	8.32	9.87	11.12	8.33	4.64	2.96	2.59	3.17	5.05	8.47	10.29	83.66
< 25	9.91	9.20	11.30	13.33	9.70	5.06	3.08	2.68	3.35	5.61	9.80	11.98	95.01
< 30	10.14	9.40	11.78	14.12	10.24	5.18	3.10	2.70	3.42	5.80	10.30	12.61	98.78
< 35	10.18	9.43	11.91	14.33	10.40	5.20	3.11	2.70	3.42	5.85	10.46	12.77	99.78
< 40	10.19	9.43	11.93	14.37	10.43	5.20	3.12	2.70	3.42	5.86	10.50	12.80	99.96
< 45	10.19	9.43	11.94	14.37	10.44				3.42	5.86	10.51	12.80	99.99
< 50	10.19		11.94		10.44				3.43	5.86		12.81	100.00
< 55												12.81	100.00
Total	**10.19**	**9.43**	**11.94**	**14.37**	**10.44**	**5.20**	**3.12**	**2.70**	**3.43**	**5.86**	**10.51**	**12.81**	**100.00**
Mean	**12.9**	**12.4**	**13.6**	**14.7**	**14.0**	**11.4**	**9.5**	**9.0**	**10.1**	**12.2**	**13.9**	**14.1**	**13.2**
Maximum	**46.0**	**42.0**	**45.0**	**42.0**	**47.0**	**36.0**	**38.0**	**36.0**	**46.0**	**46.0**	**44.0**	**50.0**	**50.0**

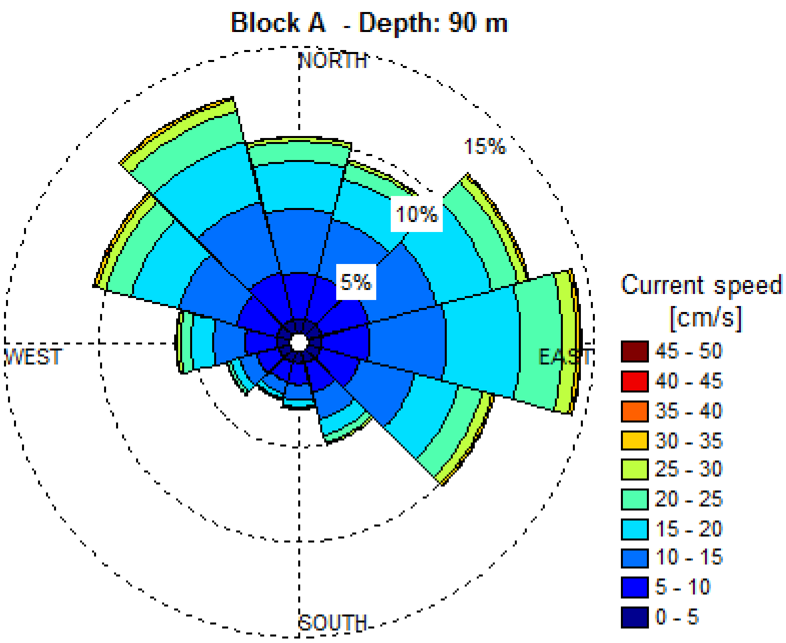


Figure 4-10 Current rose at 90 m depth at the Block A.

Table 4-15 Direction sample distribution of non-exceedance [%] of current speed at 90 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.72	0.75	0.75	0.70	0.67	0.62	0.56	0.59	0.60	0.63	0.68	0.71	7.98
< 10	3.07	3.12	3.32	3.23	2.85	2.25	1.72	1.64	1.79	2.30	2.89	3.28	31.46
< 15	6.40	6.19	6.97	7.29	5.89	3.74	2.54	2.31	2.70	3.94	5.98	7.13	61.06
< 20	8.91	8.37	9.94	11.19	8.33	4.63	2.92	2.58	3.15	5.09	8.53	10.44	84.09
< 25	9.96	9.23	11.34	13.39	9.69	5.03	3.04	2.67	3.33	5.63	9.84	12.15	95.29
< 30	10.18	9.42	11.78	14.14	10.21	5.14	3.06	2.68	3.38	5.81	10.32	12.77	98.89
< 35	10.22	9.43	11.90	14.35	10.36	5.17	3.06	2.68	3.38	5.85	10.48	12.92	99.80
< 40	10.22	9.44	11.92	14.38	10.39	5.17	3.07	2.68	3.39	5.86	10.52	12.95	99.97
< 45	10.22	9.44	11.92	14.38	10.40				3.39	5.86	10.52	12.95	99.99
< 50	10.22				10.40					5.86		12.95	100.00
Total	**10.22**	**9.44**	**11.92**	**14.38**	**10.40**	**5.17**	**3.07**	**2.68**	**3.39**	**5.86**	**10.52**	**12.95**	**100.00**
Mean	**12.8**	**12.4**	**13.5**	**14.7**	**14.0**	**11.3**	**9.4**	**8.8**	**10.0**	**12.1**	**13.9**	**14.1**	**13.1**
Maximum	**45.0**	**41.0**	**44.0**	**42.0**	**47.0**	**36.0**	**37.0**	**36.0**	**44.0**	**46.0**	**43.0**	**49.0**	**49.0**

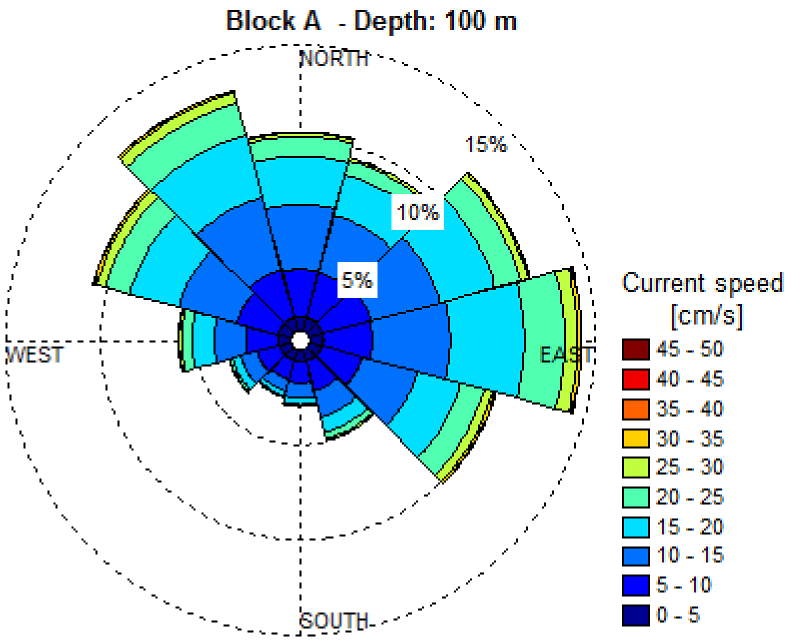


Figure 4-11 Current rose at 100 m depth at the Block A.

Table 4-16 Direction sample distribution of non-exceedance [%] of current speed at 100 m depth at the Block A.

Current speed [cm/s]	**Current direction**												**Omni**
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.73	0.74	0.73	0.72	0.67	0.63	0.58	0.59	0.61	0.64	0.70	0.73	8.07
< 10	3.14	3.18	3.36	3.30	2.90	2.28	1.74	1.63	1.81	2.31	2.95	3.33	31.93
< 15	6.53	6.30	7.07	7.41	5.96	3.74	2.52	2.28	2.70	3.96	6.07	7.26	61.80
< 20	9.05	8.49	10.04	11.32	8.40	4.59	2.89	2.53	3.13	5.09	8.69	10.67	84.87
< 25	10.09	9.28	11.37	13.45	9.72	4.97	2.98	2.59	3.28	5.60	9.99	12.43	95.74
< 30	10.30	9.44	11.77	14.15	10.20	5.07	2.99	2.61	3.31	5.75	10.47	13.02	99.07
< 35	10.33	9.46	11.86	14.33	10.34	5.09	3.00	2.61	3.32	5.78	10.61	13.14	99.85
< 40	10.33	9.46	11.87	14.35	10.37	5.09	3.00		3.32	5.78	10.64	13.16	99.98
< 45	10.33		11.87	14.36	10.37				3.32	5.78	10.64	13.17	100.00
< 50					10.38							13.17	100.00
Total	**10.33**	**9.46**	**11.87**	**14.36**	**10.38**	**5.09**	**3.00**	**2.61**	**3.32**	**5.78**	**10.64**	**13.17**	**100.00**
Mean	**12.7**	**12.2**	**13.3**	**14.5**	**13.8**	**11.1**	**9.2**	**8.6**	**9.7**	**11.8**	**13.8**	**14.0**	**12.9**
Maximum	**44.0**	**39.0**	**42.0**	**41.0**	**47.0**	**35.0**	**37.0**	**34.0**	**41.0**	**44.0**	**42.0**	**48.0**	**48.0**

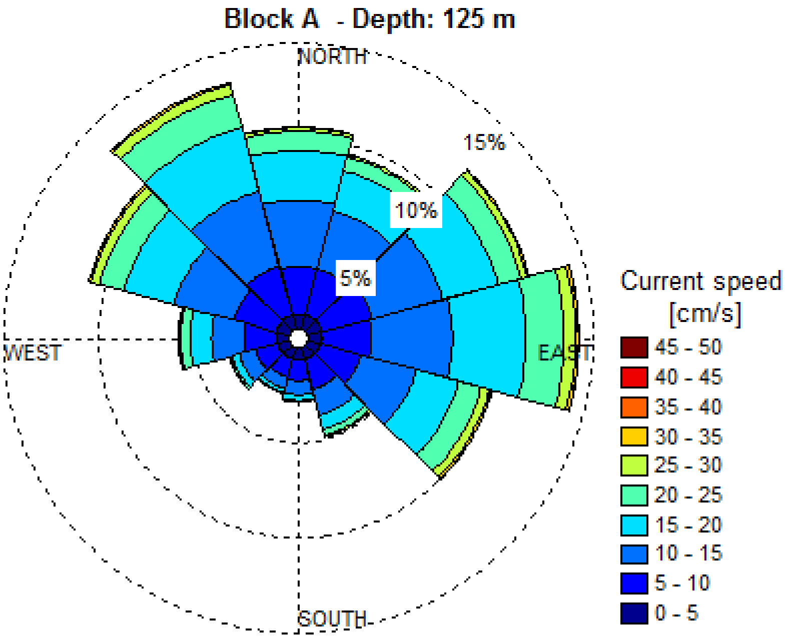


Figure 4-12 Current rose at 125 m depth at the Block A.

Table 4-17 Direction sample distribution of non-exceedance [%] of current speed at 125 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.74	0.76	0.77	0.72	0.67	0.65	0.57	0.60	0.63	0.64	0.71	0.75	8.21
< 10	3.21	3.27	3.49	3.37	2.91	2.29	1.73	1.62	1.83	2.32	3.02	3.40	32.45
< 15	6.67	6.43	7.28	7.64	6.00	3.74	2.48	2.24	2.69	3.99	6.21	7.50	62.88
< 20	9.27	8.64	10.25	11.52	8.40	4.54	2.80	2.45	3.08	5.07	8.88	11.03	85.92
< 25	10.29	9.39	11.49	13.52	9.67	4.88	2.87	2.50	3.19	5.54	10.18	12.83	96.34
< 30	10.48	9.52	11.83	14.13	10.11	4.97	2.88	2.50	3.21	5.64	10.63	13.39	99.28
< 35	10.50	9.53	11.88	14.28	10.24	4.98	2.88	2.51	3.21	5.66	10.74	13.50	99.91
< 40	10.50	9.53	11.89	14.30	10.26	4.98	2.88		3.21	5.66	10.76	13.51	99.99
< 45	10.50			14.30	10.27					5.66	10.76	13.51	100.00
< 50					10.27							13.51	100.00
Total	**10.50**	**9.53**	**11.89**	**14.30**	**10.27**	**4.98**	**2.88**	**2.51**	**3.21**	**5.66**	**10.76**	**13.51**	**100.00**
Mean	**12.7**	**12.1**	**13.1**	**14.2**	**13.6**	**10.9**	**8.9**	**8.3**	**9.2**	**11.6**	**13.6**	**13.9**	**12.8**
Maximum	**41.0**	**37.0**	**39.0**	**40.0**	**46.0**	**36.0**	**37.0**	**34.0**	**37.0**	**41.0**	**41.0**	**45.0**	**46.0**

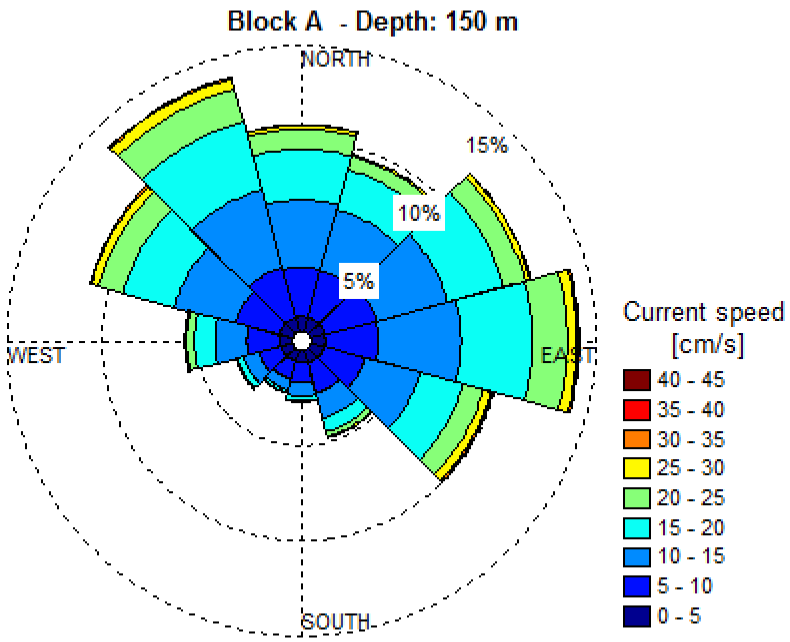


Figure 4-13 **Current rose at 150 m depth at the Block A.**

Table 4-18 **Direction sample distribution of non-exceedance [%] of current speed at 150 m depth at the Block A.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.76	0.76	0.78	0.73	0.70	0.67	0.58	0.58	0.61	0.65	0.73	0.72	8.26
< 10	3.31	3.33	3.56	3.54	2.96	2.34	1.72	1.58	1.80	2.35	3.10	3.47	33.06
< 15	6.82	6.62	7.46	7.90	6.06	3.76	2.43	2.16	2.62	3.99	6.36	7.71	63.90
< 20	9.48	8.79	10.48	11.68	8.47	4.51	2.68	2.32	2.95	5.03	9.13	11.44	86.96
< 25	10.53	9.54	11.60	13.53	9.64	4.80	2.72	2.35	3.02	5.42	10.43	13.25	96.83
< 30	10.75	9.65	11.87	14.03	10.05	4.87	2.73	2.35	3.03	5.50	10.82	13.81	99.46
< 35	10.77	9.65	11.90	14.13	10.16	4.88	2.73	2.36	3.03	5.51	10.91	13.90	99.94
< 40	10.78		11.90	14.15	10.18	4.88	2.73			5.51	10.91	13.91	100.00
< 45	10.78				10.18							13.91	100.00
Total	**10.78**	**9.65**	**11.90**	**14.15**	**10.18**	**4.88**	**2.73**	**2.36**	**3.03**	**5.51**	**10.91**	**13.91**	**100.00**
Mean	**12.7**	**12.0**	**12.8**	**13.9**	**13.4**	**10.6**	**8.5**	**8.0**	**8.9**	**11.2**	**13.4**	**13.9**	**12.6**
Maximum	**40.0**	**33.0**	**35.0**	**39.0**	**44.0**	**35.0**	**36.0**	**33.0**	**33.0**	**37.0**	**39.0**	**42.0**	**44.0**

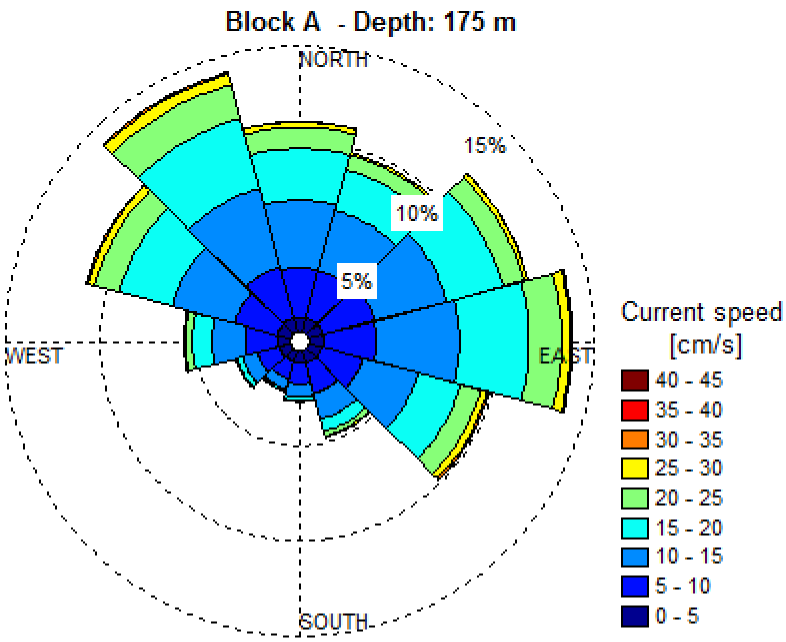


Figure 4-14 Current rose at 175 m depth at the Block A.

Table 4-19 Direction sample distribution of non-exceedance [%] of current speed at 175 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.72	0.75	0.78	0.74	0.69	0.67	0.57	0.56	0.58	0.64	0.71	0.75	8.16
< 10	3.27	3.34	3.57	3.54	2.98	2.35	1.74	1.55	1.78	2.35	3.03	3.54	33.04
< 15	6.77	6.64	7.51	7.94	6.07	3.79	2.42	2.11	2.58	4.05	6.37	7.82	64.07
< 20	9.49	8.85	10.54	11.62	8.46	4.50	2.65	2.24	2.88	5.04	9.19	11.67	87.13
< 25	10.63	9.64	11.65	13.34	9.60	4.77	2.68	2.26	2.93	5.40	10.50	13.54	96.92
< 30	10.89	9.77	11.88	13.79	10.00	4.83	2.69	2.26	2.94	5.47	10.87	14.11	99.49
< 35	10.93	9.78	11.90	13.88	10.09	4.84	2.69	2.27	2.94	5.47	10.94	14.21	99.94
< 40	10.93		11.91	13.89	10.12	4.84			2.94	5.47	10.95	14.22	100.00
< 45					10.12							14.22	100.00
Total	**10.93**	**9.78**	**11.91**	**13.89**	**10.12**	**4.84**	**2.69**	**2.27**	**2.94**	**5.47**	**10.95**	**14.22**	**100.00**
Mean	**12.9**	**12.1**	**12.7**	**13.7**	**13.3**	**10.4**	**8.4**	**7.8**	**8.7**	**11.1**	**13.4**	**13.9**	**12.6**
Maximum	**36.0**	**33.0**	**36.0**	**38.0**	**42.0**	**37.0**	**33.0**	**31.0**	**35.0**	**36.0**	**38.0**	**40.0**	**42.0**

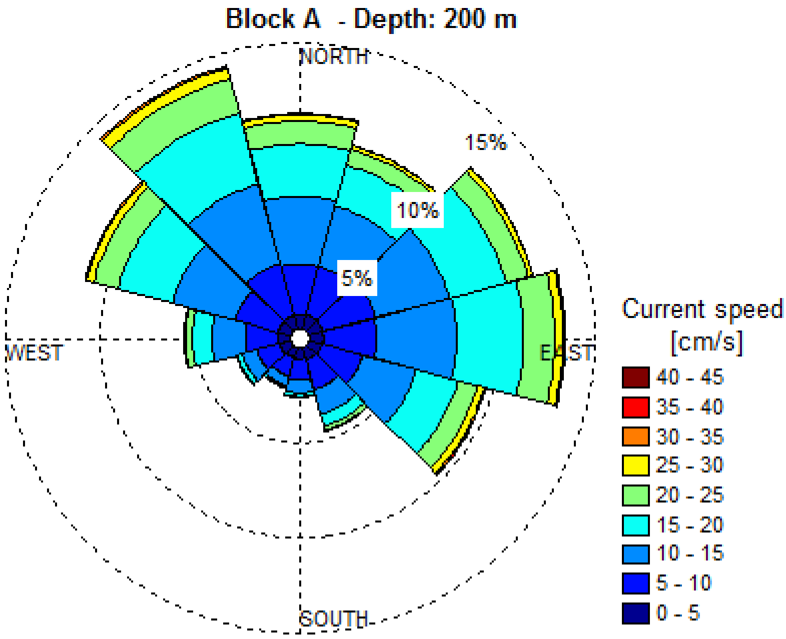


Figure 4-15 Current rose at 200 m depth at the Block A.

Table 4-20 Direction sample distribution of non-exceedance [%] of current speed at 200 m depth at the Block A.

Current speed [cm/s]	Current direction											Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.72	0.76	0.75	0.72	0.69	0.65	0.57	0.54	0.59	0.63	0.69	0.73	8.05
< 10	3.33	3.37	3.63	3.53	2.93	2.32	1.72	1.56	1.82	2.35	2.99	3.52	33.07
< 15	6.86	6.65	7.61	7.76	5.91	3.71	2.38	2.08	2.60	4.06	6.39	7.87	63.88
< 20	9.63	8.90	10.67	11.30	8.25	4.40	2.58	2.20	2.86	5.05	9.28	11.82	86.94
< 25	10.84	9.75	11.83	12.94	9.35	4.63	2.60	2.22	2.91	5.39	10.58	13.66	96.71
< 30	11.19	9.96	12.10	13.35	9.73	4.69	2.61	2.22	2.92	5.45	10.96	14.26	99.44
< 35	11.24	9.98	12.13	13.46	9.82	4.69	2.61		2.92	5.46	11.02	14.36	99.93
< 40	11.24		12.14	13.47	9.84	4.70				5.46	11.03	14.38	100.00
< 45					9.85	4.70						14.38	100.00
Total	**11.24**	**9.98**	**12.14**	**13.47**	**9.85**	**4.70**	**2.61**	**2.22**	**2.92**	**5.46**	**11.03**	**14.38**	**100.00**
Mean	**13.1**	**12.3**	**12.8**	**13.6**	**13.3**	**10.3**	**8.3**	**7.7**	**8.6**	**11.0**	**13.5**	**14.0**	**12.6**
Maximum	**37.0**	**34.0**	**37.0**	**38.0**	**44.0**	**42.0**	**31.0**	**28.0**	**34.0**	**35.0**	**36.0**	**41.0**	**44.0**

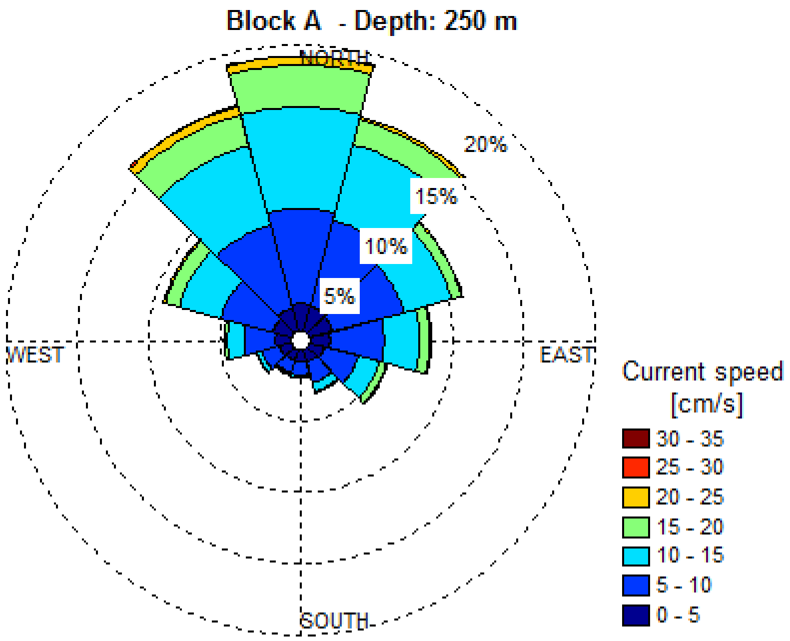


Figure 4-16 Current rose at 250 m depth at the Block A.

Table 4-21 Direction sample distribution of non-exceedance [%] of current speed at 250 m depth at the Block A.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	1.85	1.78	1.66	1.39	1.09	0.88	0.78	0.76	0.84	1.08	1.33	1.62	15.05
< 10	8.41	8.12	6.89	5.27	3.59	2.45	1.77	1.68	2.11	3.24	5.07	7.58	56.18
< 15	15.47	13.72	10.42	7.79	5.19	3.09	1.99	1.85	2.44	4.38	8.04	13.26	87.64
< 20	18.41	15.59	11.17	8.48	5.70	3.18	2.02	1.87	2.46	4.59	9.00	15.53	98.00
< 25	19.00	15.82	11.25	8.59	5.78	3.19			2.46	4.61	9.14	16.11	99.86
< 30	19.04	15.82	11.25	8.60	5.79						9.14	16.19	100.00
< 35					5.79							16.19	100.00
Total	**19.04**	**15.82**	**11.25**	**8.60**	**5.79**	**3.19**	**2.02**	**1.87**	**2.46**	**4.61**	**9.14**	**16.19**	**100.00**
Mean	**10.4**	**9.6**	**8.6**	**8.7**	**8.6**	**7.0**	**5.8**	**5.6**	**6.1**	**7.6**	**9.2**	**10.3**	**9.2**
Maximum	**29.0**	**25.0**	**25.0**	**26.0**	**31.0**	**24.0**	**19.0**	**19.0**	**20.0**	**23.0**	**25.0**	**30.0**	**31.0**

4.2.2 Block B

Figure 4-17 – Figure 4-31 show current roses for Block B. Table 4-19 – Table 4-33 show the corresponding distributions of non-exceedance of current speed.

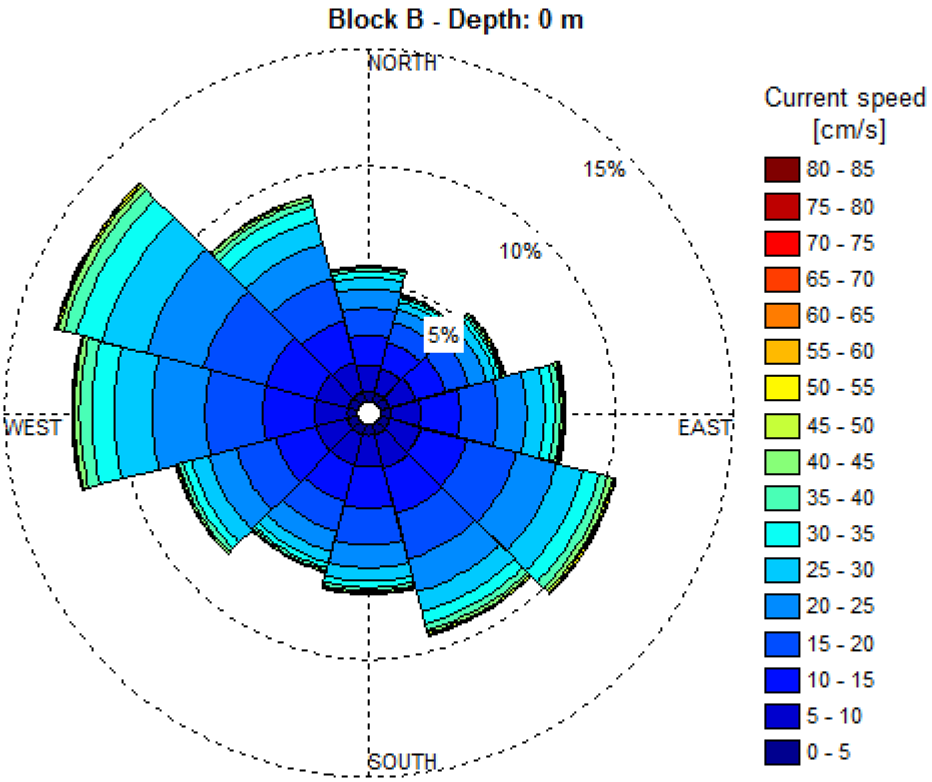


Figure 4-17 Current rose at 0 m depth at the Block B.

Table 4-22 Direction sample distribution of non-exceedance [%] of current speed at 0 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.41	0.39	0.39	0.43	0.42	0.46	0.43	0.44	0.44	0.39	0.41	0.42	5.05
< 10	1.50	1.43	1.55	1.70	1.80	1.92	1.79	1.77	1.80	1.80	1.80	1.72	20.59
< 15	2.78	2.59	2.86	3.37	3.84	3.95	3.55	3.39	3.60	3.98	4.05	3.55	41.51
< 20	3.94	3.50	3.91	4.92	6.00	6.00	5.13	4.74	5.29	6.42	6.84	5.46	62.14
< 25	4.75	4.07	4.64	6.14	7.75	7.46	6.12	5.62	6.48	8.66	9.42	7.02	78.14
< 30	5.24	4.40	5.05	6.89	8.92	8.35	6.70	6.11	7.24	10.26	11.35	8.11	88.61
< 35	5.52	4.57	5.25	7.32	9.59	8.89	6.97	6.34	7.60	11.19	12.49	8.73	94.47
< 40	5.66	4.66	5.35	7.57	9.97	9.18	7.12	6.44	7.79	11.70	13.05	9.02	97.50
< 45	5.71	4.70	5.41	7.67	10.18	9.33	7.20	6.50	7.88	11.91	13.29	9.17	98.95
< 50	5.73	4.72	5.45	7.73	10.28	9.39	7.24	6.52	7.91	11.97	13.40	9.22	99.56
< 55	5.74	4.73	5.46	7.76	10.32	9.43	7.25	6.53	7.92	12.00	13.44	9.24	99.82
< 60	5.75	4.73	5.47	7.77	10.34	9.43	7.26	6.54	7.92	12.01	13.45	9.25	99.92
< 65		4.74	5.48	7.78	10.35	9.44	7.26	6.54	7.92	12.01	13.45	9.25	99.96
< 70		4.74	5.48	7.78	10.35	9.44	7.27	6.54			13.46	9.25	99.99
< 75		4.74	5.48	7.78	10.35		7.27	6.54				9.25	99.99
< 80			5.48		10.35		7.27	6.54				9.25	100.00
< 85					10.35								100.00
Total	**5.75**	**4.74**	**5.48**	**7.78**	**10.35**	**9.44**	**7.27**	**6.54**	**7.92**	**12.01**	**13.46**	**9.25**	**100.00**
Mean	**16.2**	**15.1**	**15.7**	**17.5**	**18.8**	**17.6**	**16.1**	**15.4**	**16.7**	**19.4**	**20.0**	**18.3**	**17.7**
Maximum	**57.0**	**70.0**	**78.0**	**74.0**	**81.0**	**65.0**	**79.0**	**78.0**	**63.0**	**61.0**	**67.0**	**76.0**	**81.0**

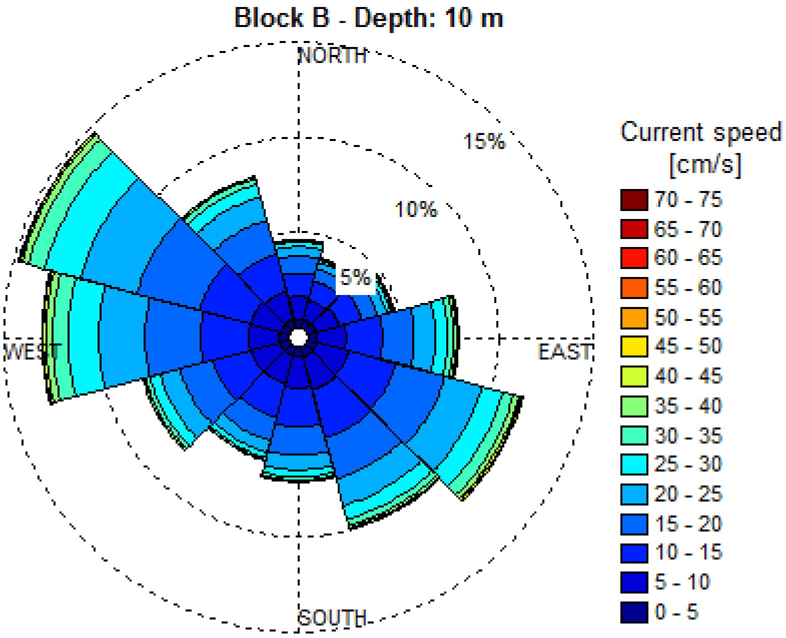


Figure 4-18 Current rose at 10 m depth at the Block B.

Table 4-23 Direction sample distribution of non-exceedance [%] of current speed at 10 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.43	0.44	0.47	0.47	0.50	0.52	0.51	0.50	0.49	0.50	0.48	0.46	5.78
< 10	1.60	1.52	1.70	2.00	2.24	2.34	2.16	2.03	2.07	2.12	2.11	1.97	23.87
< 15	2.82	2.57	2.92	3.87	4.81	4.95	4.22	3.88	4.12	4.65	4.89	4.04	47.73
< 20	3.71	3.24	3.77	5.48	7.44	7.24	5.73	5.15	5.87	7.52	8.33	5.93	69.41
< 25	4.22	3.58	4.26	6.56	9.45	8.72	6.54	5.79	6.93	9.89	11.46	7.26	84.64
< 30	4.47	3.73	4.48	7.20	10.59	9.48	6.91	6.06	7.48	11.47	13.43	7.97	93.28
< 35	4.56	3.78	4.59	7.50	11.19	9.82	7.08	6.17	7.70	12.26	14.37	8.27	97.29
< 40	4.60	3.81	4.65	7.65	11.45	9.98	7.14	6.21	7.80	12.62	14.73	8.36	98.99
< 45	4.60	3.82	4.67	7.73	11.58	10.05	7.16	6.22	7.83	12.75	14.85	8.38	99.63
< 50	4.61	3.82	4.68	7.75	11.63	10.07	7.17	6.22	7.83	12.79	14.89	8.39	99.87
< 55	4.61	3.83	4.69	7.76	11.65	10.08	7.17	6.23	7.84	12.80	14.90	8.39	99.94
< 60		3.83	4.69	7.76	11.66	10.08	7.17	6.23	7.84	12.80	14.91	8.39	99.98
< 65		3.83	4.69	7.77	11.67	10.08							99.99
< 70			4.70	7.77	11.67								100.00
< 75			4.70	7.77	11.67								100.00
Total	**4.61**	**3.83**	**4.70**	**7.77**	**11.67**	**10.08**	**7.17**	**6.23**	**7.84**	**12.80**	**14.91**	**8.39**	**100.00**
Mean	**13.4**	**12.4**	**13.5**	**15.8**	**17.4**	**15.7**	**13.9**	**13.3**	**15.0**	**18.2**	**18.6**	**15.7**	**16.0**
Maximum	**51.0**	**61.0**	**73.0**	**71.0**	**73.0**	**63.0**	**59.0**	**59.0**	**58.0**	**59.0**	**59.0**	**59.0**	**73.0**

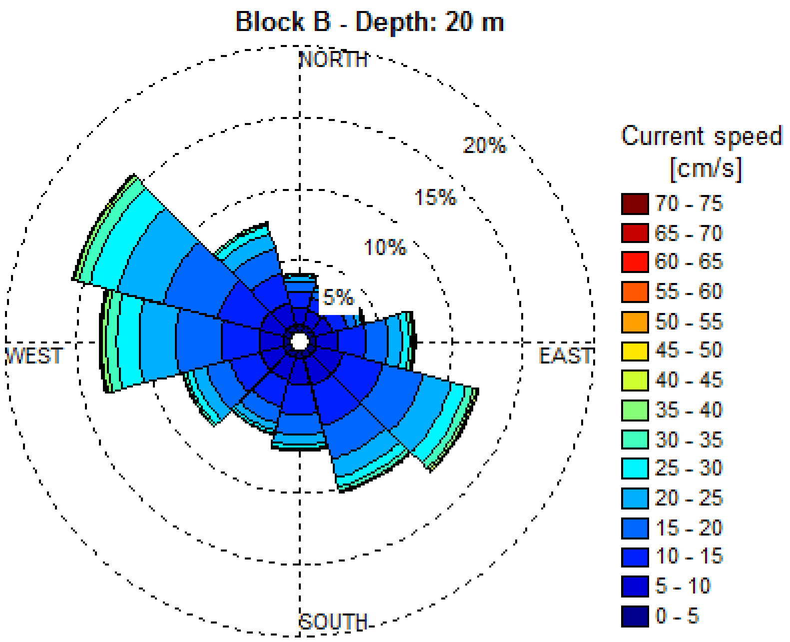


Figure 4-19 Current rose at 20 m depth at the Block B.

Table 4-24 Direction sample distribution of non-exceedance [%] of current speed at 20 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.46	0.48	0.48	0.52	0.55	0.55	0.53	0.50	0.50	0.50	0.50	0.50	6.06
< 10	1.68	1.55	1.70	2.07	2.50	2.53	2.34	2.17	2.19	2.14	2.23	2.12	25.19
< 15	2.80	2.46	2.81	3.94	5.39	5.49	4.50	4.11	4.36	4.84	5.32	4.26	50.27
< 20	3.53	2.98	3.48	5.44	8.28	7.98	5.96	5.30	6.05	7.96	9.30	6.15	72.39
< 25	3.86	3.20	3.82	6.34	10.31	9.41	6.65	5.82	7.02	10.47	12.72	7.33	86.96
< 30	4.03	3.28	3.98	6.85	11.37	10.06	6.95	6.04	7.47	11.98	14.78	7.90	94.69
< 35	4.07	3.31	4.05	7.08	11.89	10.36	7.06	6.11	7.64	12.70	15.64	8.10	98.01
< 40	4.08	3.32	4.07	7.18	12.12	10.47	7.09	6.13	7.71	13.01	15.95	8.14	99.27
< 45	4.09	3.32	4.09	7.23	12.22	10.51	7.11	6.14	7.73	13.12	16.04	8.15	99.74
< 50	4.09	3.32	4.09	7.25	12.26	10.53	7.11	6.14	7.73	13.15	16.07	8.16	99.91
< 55	4.09	3.33	4.10	7.26	12.27	10.53	7.11	6.14	7.73	13.16	16.08	8.16	99.97
< 60		3.33	4.10	7.26	12.28	10.54			7.73	13.17	16.08		99.99
< 65			4.10	7.26	12.28	10.54							100.00
< 70			4.10	7.26	12.28	10.54							100.00
< 75			4.10										100.00
Total	**4.09**	**3.33**	**4.10**	**7.26**	**12.28**	**10.54**	**7.11**	**6.14**	**7.73**	**13.17**	**16.08**	**8.16**	**100.00**
Mean	**12.0**	**11.2**	**12.3**	**14.9**	**16.6**	**15.1**	**13.1**	**12.6**	**14.3**	**17.9**	**18.2**	**14.7**	**15.4**
Maximum	**53.0**	**57.0**	**71.0**	**69.0**	**68.0**	**66.0**	**51.0**	**54.0**	**55.0**	**59.0**	**58.0**	**52.0**	**71.0**

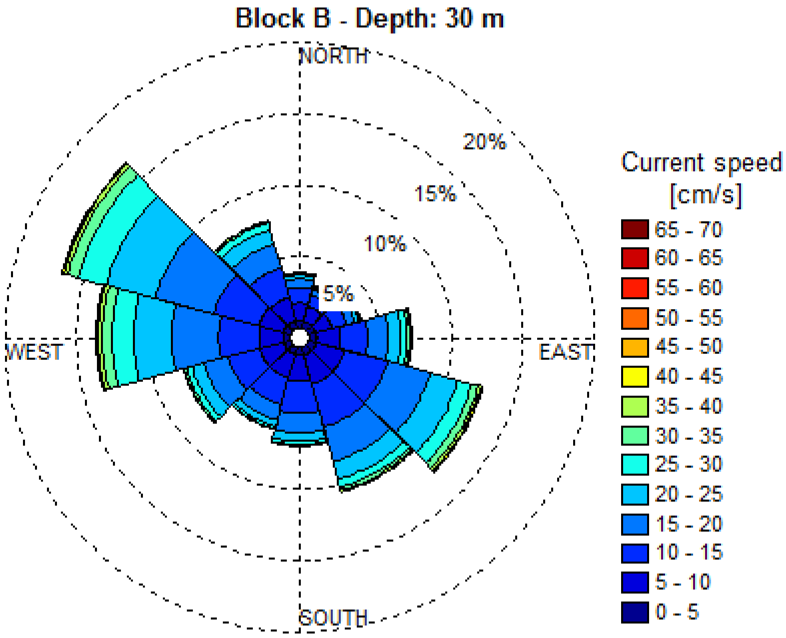


Figure 4-20 **Current rose at 30 m depth at the Block B.**

Table 4-25 **Direction sample distribution of non-exceedance [%] of current speed at 30 m depth at the Block B.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.49	0.49	0.50	0.54	0.58	0.59	0.51	0.52	0.49	0.49	0.51	0.54	6.24
< 10	1.71	1.54	1.70	2.16	2.60	2.70	2.39	2.27	2.23	2.14	2.29	2.22	25.94
< 15	2.80	2.37	2.75	4.04	5.69	5.85	4.68	4.21	4.52	5.01	5.58	4.42	51.91
< 20	3.41	2.79	3.30	5.50	8.72	8.43	6.08	5.32	6.20	8.25	9.87	6.23	74.11
< 25	3.70	2.96	3.57	6.29	10.75	9.77	6.68	5.79	7.06	10.80	13.52	7.32	88.22
< 30	3.83	3.01	3.70	6.70	11.74	10.38	6.92	5.98	7.45	12.27	15.60	7.83	95.40
< 35	3.86	3.03	3.74	6.90	12.21	10.62	7.00	6.03	7.60	12.94	16.43	7.99	98.33
< 40	3.86	3.03	3.76	6.98	12.42	10.71	7.02	6.04	7.64	13.21	16.71	8.02	99.42
< 45	3.86	3.04	3.77	7.01	12.49	10.75	7.04	6.04	7.65	13.32	16.80	8.03	99.81
< 50	3.86	3.04	3.78	7.02	12.53	10.76	7.04	6.05	7.66	13.35	16.82	8.03	99.94
< 55	3.87	3.05	3.78	7.03	12.53	10.76		6.05	7.66	13.36	16.83		99.98
< 60			3.78	7.03	12.54	10.76				13.36	16.83		100.00
< 65			3.78	7.03	12.54	10.77							100.00
< 70			3.78	7.03	12.54								100.00
Total	**3.87**	**3.05**	**3.78**	**7.03**	**12.54**	**10.77**	**7.04**	**6.05**	**7.66**	**13.36**	**16.83**	**8.03**	**100.00**
Mean	**11.4**	**10.5**	**11.7**	**14.3**	**16.2**	**14.6**	**12.7**	**12.2**	**13.8**	**17.7**	**18.1**	**14.2**	**15.0**
Maximum	**54.0**	**54.0**	**69.0**	**67.0**	**65.0**	**63.0**	**49.0**	**52.0**	**54.0**	**59.0**	**57.0**	**48.0**	**69.0**

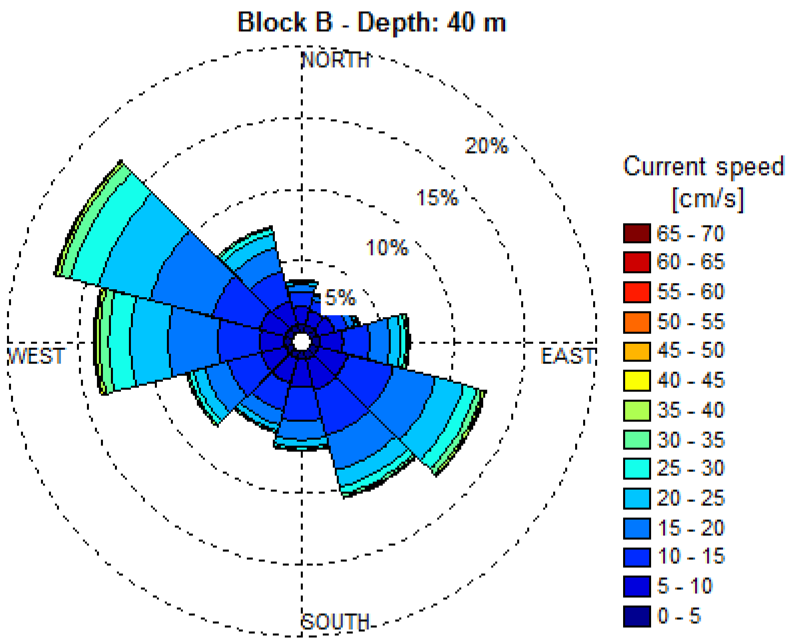


Figure 4-21 Current rose at 40 m depth at the Block B.

Table 4-26 Direction sample distribution of non-exceedance [%] of current speed at 40 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.51	0.49	0.53	0.56	0.58	0.60	0.56	0.53	0.49	0.51	0.53	0.53	6.44
< 10	1.73	1.54	1.75	2.21	2.69	2.83	2.55	2.34	2.27	2.25	2.38	2.28	26.81
< 15	2.77	2.29	2.69	4.03	5.96	6.18	4.93	4.33	4.68	5.18	5.85	4.52	53.39
< 20	3.29	2.63	3.18	5.40	9.01	8.79	6.27	5.37	6.33	8.60	10.39	6.29	75.55
< 25	3.52	2.76	3.39	6.11	11.01	10.08	6.79	5.78	7.13	11.19	14.22	7.34	89.31
< 30	3.61	2.80	3.48	6.46	11.93	10.62	6.99	5.92	7.45	12.64	16.34	7.77	96.01
< 35	3.63	2.81	3.51	6.62	12.35	10.82	7.04	5.96	7.57	13.27	17.16	7.90	98.64
< 40	3.63	2.81	3.53	6.68	12.52	10.90	7.06	5.97	7.60	13.50	17.42	7.92	99.55
< 45	3.64	2.81	3.54	6.70	12.58	10.92	7.07	5.97	7.61	13.60	17.50	7.93	99.86
< 50		2.82	3.54	6.71	12.60	10.93	7.07	5.97	7.61	13.63	17.52	7.93	99.95
< 55		2.82	3.54	6.71	12.61	10.93		5.97	7.61	13.63	17.53		99.98
< 60		2.82	3.54	6.71	12.61	10.93				13.64	17.53		100.00
< 65			3.54	6.71		10.93							100.00
< 70				6.72									100.00
Total	**3.64**	**2.82**	**3.54**	**6.72**	**12.61**	**10.93**	**7.07**	**5.97**	**7.61**	**13.64**	**17.53**	**7.93**	**100.00**
Mean	**10.8**	**9.9**	**10.9**	**13.7**	**15.8**	**14.2**	**12.1**	**11.7**	**13.5**	**17.4**	**18.0**	**13.9**	**14.7**
Maximum	**42.0**	**55.0**	**64.0**	**66.0**	**59.0**	**61.0**	**47.0**	**50.0**	**54.0**	**58.0**	**57.0**	**45.0**	**66.0**

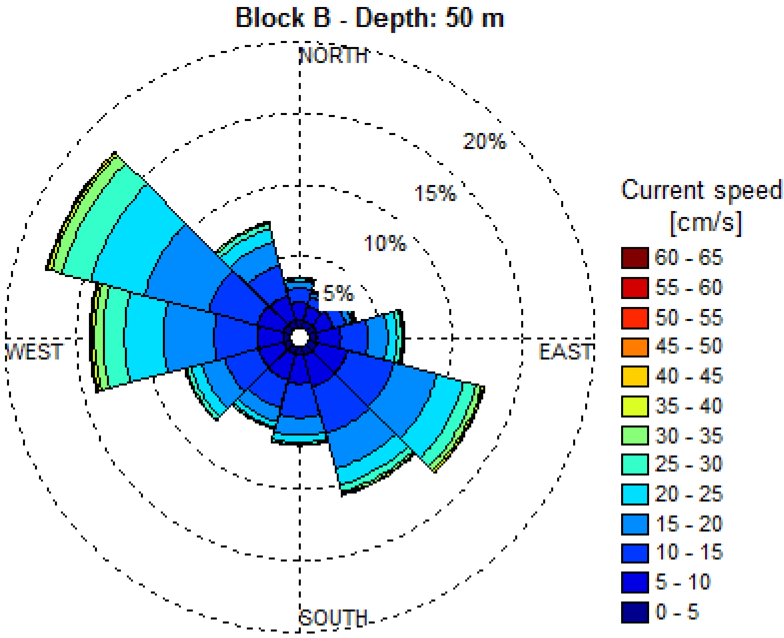


Figure 4-22 Current rose at 50 m depth at the Block B.

Table 4-27 Direction sample distribution of non-exceedance [%] of current speed at 50 m depth at the Block B.

Current speed [cm/s]	Current direction 0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	Omni
< 5	0.51	0.50	0.56	0.54	0.61	0.60	0.54	0.55	0.48	0.49	0.53	0.54	6.46
< 10	1.74	1.55	1.79	2.21	2.81	2.89	2.57	2.43	2.32	2.26	2.40	2.34	27.31
< 15	2.72	2.24	2.67	4.06	6.15	6.36	4.97	4.43	4.75	5.31	5.96	4.61	54.24
< 20	3.21	2.55	3.11	5.35	9.24	8.99	6.26	5.45	6.37	8.81	10.66	6.40	76.40
< 25	3.42	2.65	3.28	6.01	11.19	10.24	6.76	5.84	7.13	11.43	14.62	7.42	89.97
< 30	3.49	2.67	3.35	6.30	12.06	10.76	6.93	5.95	7.43	12.85	16.79	7.81	96.40
< 35	3.50	2.69	3.38	6.43	12.44	10.93	6.97	5.98	7.52	13.44	17.60	7.93	98.83
< 40	3.51	2.69	3.39	6.48	12.59	10.99	6.99	5.98	7.55	13.66	17.84	7.94	99.61
< 45	3.51	2.69	3.40	6.49	12.64	11.01	6.99	5.98	7.55	13.76	17.92	7.94	99.89
< 50		2.70	3.40	6.50	12.65	11.01		5.99	7.56	13.78	17.94		99.96
< 55		2.70	3.41	6.50	12.65	11.02			7.56	13.78	17.95		99.99
< 60		2.70	3.41	6.50	12.65	11.02				13.79	17.95		100.00
< 65			3.41	6.50									100.00
Total	**3.51**	**2.70**	**3.41**	**6.50**	**12.65**	**11.02**	**6.99**	**5.99**	**7.56**	**13.79**	**17.95**	**7.94**	**100.00**
Mean	**10.5**	**9.6**	**10.4**	**13.3**	**15.5**	**14.0**	**12.0**	**11.4**	**13.2**	**17.3**	**17.9**	**13.7**	**14.6**
Maximum	**40.0**	**55.0**	**62.0**	**64.0**	**57.0**	**57.0**	**44.0**	**48.0**	**53.0**	**58.0**	**57.0**	**42.0**	**64.0**

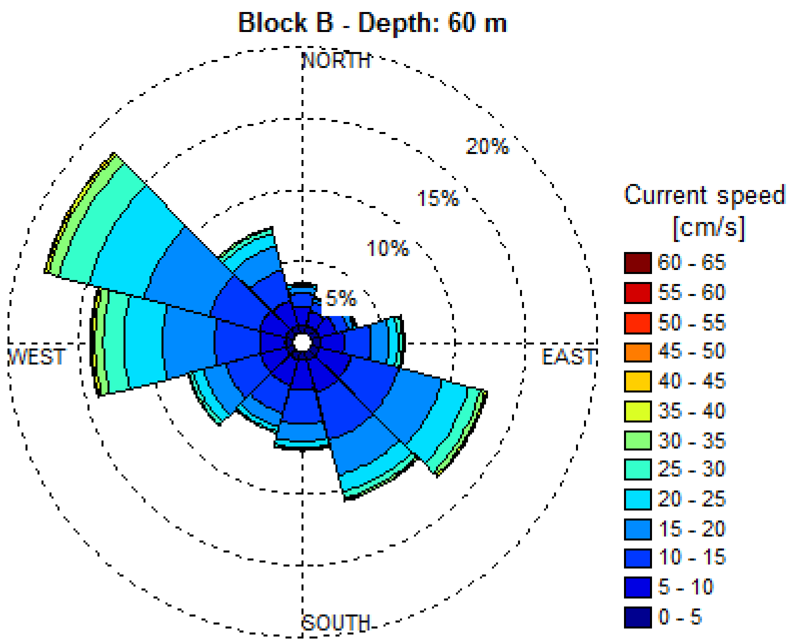


Figure 4-23 Current rose at 60 m depth at the Block B.

Table 4-28 Direction sample distribution of non-exceedance [%] of current speed at 60 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.54	0.51	0.57	0.57	0.60	0.62	0.56	0.55	0.50	0.50	0.55	0.55	6.63
< 10	1.77	1.56	1.81	2.26	2.87	2.97	2.64	2.42	2.36	2.30	2.45	2.35	27.77
< 15	2.73	2.21	2.66	4.08	6.27	6.47	5.12	4.46	4.87	5.44	6.08	4.65	55.02
< 20	3.19	2.48	3.04	5.29	9.42	9.13	6.34	5.45	6.47	9.00	10.91	6.45	77.19
< 25	3.37	2.56	3.19	5.90	11.30	10.36	6.81	5.80	7.18	11.65	15.00	7.44	90.56
< 30	3.43	2.58	3.25	6.15	12.14	10.84	6.96	5.89	7.44	13.02	17.22	7.81	96.74
< 35	3.44	2.59	3.27	6.26	12.48	10.99	6.99	5.91	7.52	13.59	18.03	7.91	98.98
< 40	3.44	2.59	3.28	6.29	12.60	11.03	7.00	5.92	7.54	13.80	18.26	7.93	99.67
< 45		2.60	3.28	6.30	12.63	11.05	7.00	5.92	7.54	13.88	18.34	7.93	99.91
< 50		2.60	3.29	6.30	12.64	11.05		5.92	7.55	13.90	18.36		99.97
< 55		2.60	3.29	6.30	12.64	11.05			7.55	13.90	18.37		99.99
< 60			3.29	6.30						13.91	18.37		100.00
< 65				6.30									100.00
Total	**3.44**	**2.60**	**3.29**	**6.30**	**12.64**	**11.05**	**7.00**	**5.92**	**7.55**	**13.91**	**18.37**	**7.93**	**100.00**
Mean	**10.2**	**9.2**	**10.0**	**12.8**	**15.3**	**13.8**	**11.7**	**11.3**	**13.0**	**17.1**	**17.9**	**13.6**	**14.4**
Maximum	**37.0**	**54.0**	**58.0**	**60.0**	**54.0**	**51.0**	**43.0**	**47.0**	**53.0**	**58.0**	**56.0**	**42.0**	**60.0**

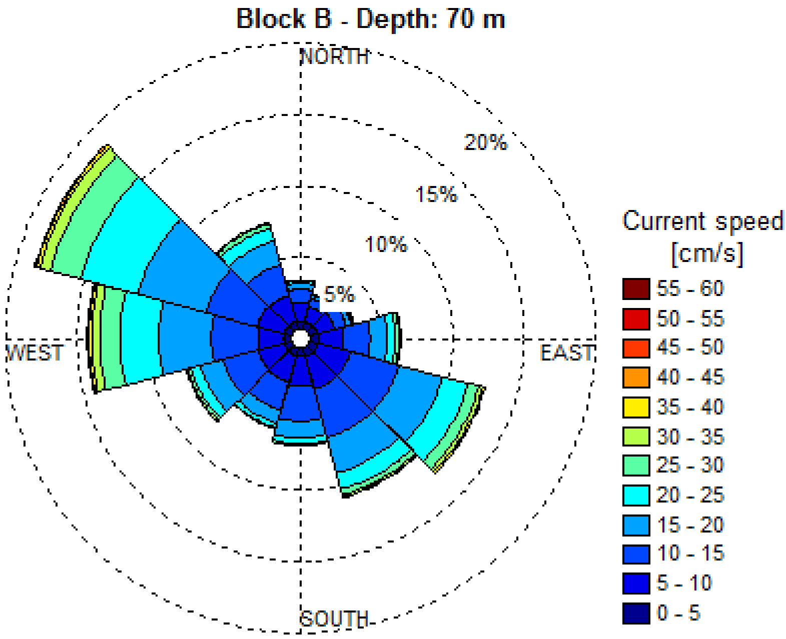


Figure 4-24 Current rose at 70 m depth at the Block B.

Table 4-29 Direction sample distribution of non-exceedance [%] of current speed at 70 m depth at the Block B.

Current speed [cm/s]	Current direction											Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.55	0.53	0.57	0.59	0.61	0.62	0.58	0.56	0.50	0.51	0.55	0.56	6.72
< 10	1.80	1.57	1.80	2.30	2.95	2.99	2.71	2.48	2.41	2.32	2.48	2.41	28.22
< 15	2.74	2.18	2.63	4.11	6.42	6.57	5.17	4.55	4.93	5.55	6.20	4.74	55.77
< 20	3.18	2.42	2.97	5.28	9.53	9.24	6.39	5.50	6.49	9.17	11.21	6.55	77.92
< 25	3.34	2.48	3.09	5.80	11.36	10.45	6.82	5.82	7.17	11.77	15.47	7.51	91.08
< 30	3.38	2.50	3.14	6.04	12.13	10.89	6.94	5.89	7.39	13.12	17.73	7.87	97.02
< 35	3.39	2.50	3.15	6.11	12.43	11.03	6.97	5.91	7.46	13.65	18.53	7.96	99.09
< 40	3.39	2.51	3.16	6.13	12.53	11.06	6.98	5.91	7.48	13.85	18.76	7.97	99.73
< 45		2.51	3.17	6.14	12.55	11.07	6.98	5.91	7.48	13.91	18.84	7.97	99.92
< 50		2.51	3.17	6.14	12.56	11.07		5.91	7.49	13.93	18.86		99.98
< 55		2.51	3.17	6.14	12.56	11.08			7.49	13.94	18.86		99.99
< 60				6.14						13.94	18.86		100.00
Total	**3.39**	**2.51**	**3.17**	**6.14**	**12.56**	**11.08**	**6.98**	**5.91**	**7.49**	**13.94**	**18.86**	**7.97**	**100.00**
Mean	**9.9**	**8.9**	**9.7**	**12.4**	**15.0**	**13.6**	**11.5**	**11.0**	**12.8**	**16.9**	**17.9**	**13.4**	**14.2**
Maximum	**36.0**	**51.0**	**54.0**	**55.0**	**52.0**	**50.0**	**40.0**	**46.0**	**53.0**	**58.0**	**56.0**	**42.0**	**58.0**

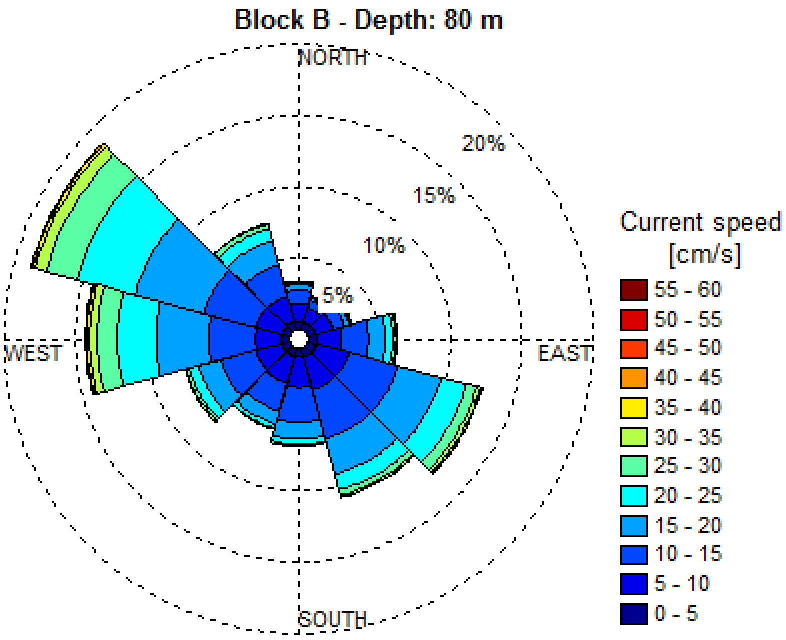


Figure 4-25 Current rose at 80 m depth at the Block B.

Table 4-30 Direction sample distribution of non-exceedance [%] of current speed at 80 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.55	0.52	0.59	0.59	0.63	0.63	0.58	0.55	0.52	0.53	0.53	0.57	6.79
< 10	1.82	1.57	1.81	2.33	2.97	3.01	2.72	2.51	2.44	2.36	2.46	2.45	28.45
< 15	2.75	2.16	2.62	4.14	6.46	6.60	5.21	4.58	4.95	5.62	6.20	4.80	56.08
< 20	3.18	2.37	2.96	5.27	9.58	9.27	6.43	5.51	6.50	9.27	11.29	6.62	78.25
< 25	3.33	2.43	3.06	5.78	11.37	10.45	6.84	5.82	7.17	11.86	15.60	7.57	91.28
< 30	3.37	2.44	3.11	5.99	12.11	10.90	6.95	5.89	7.37	13.20	17.89	7.93	97.14
< 35	3.38	2.45	3.12	6.06	12.38	11.02	6.97	5.90	7.44	13.71	18.68	8.02	99.14
< 40	3.38	2.45	3.13	6.08	12.47	11.05	6.98	5.90	7.45	13.90	18.92	8.03	99.74
< 45		2.46	3.13	6.08	12.49	11.06		5.90	7.46	13.97	18.99	8.03	99.93
< 50		2.46	3.14	6.09	12.50	11.06		5.90	7.46	13.99	19.01		99.99
< 55			3.14	6.09	12.50				7.46	13.99	19.01		100.00
< 60										13.99	19.01		100.00
Total	**3.38**	**2.46**	**3.14**	**6.09**	**12.50**	**11.06**	**6.98**	**5.90**	**7.46**	**13.99**	**19.01**	**8.03**	**100.00**
Mean	**9.8**	**8.7**	**9.5**	**12.2**	**14.8**	**13.6**	**11.4**	**11.0**	**12.6**	**16.9**	**17.9**	**13.4**	**14.2**
Maximum	**36.0**	**46.0**	**51.0**	**53.0**	**52.0**	**49.0**	**38.0**	**46.0**	**52.0**	**58.0**	**56.0**	**42.0**	**58.0**

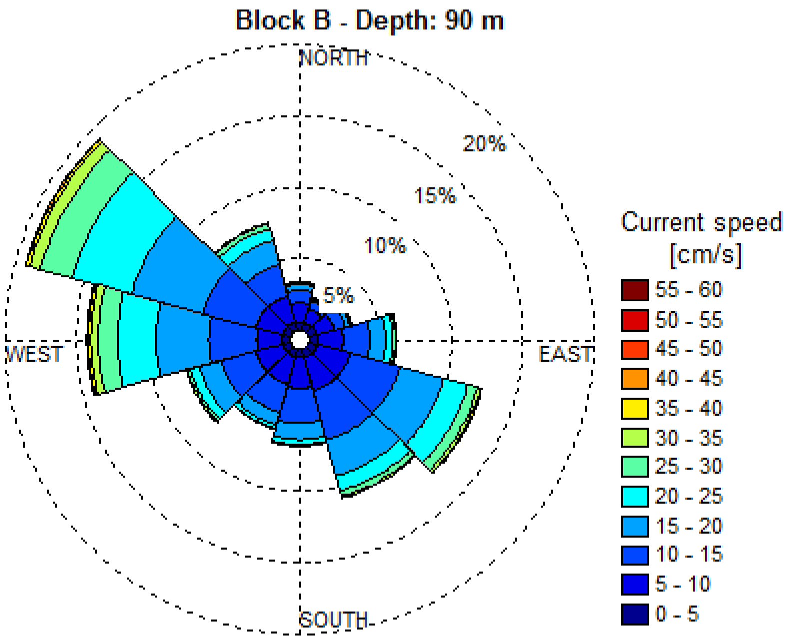


Figure 4-26 Current rose at 90 m depth at the Block B.

Table 4-31 Direction sample distribution of non-exceedance [%] of current speed at 90 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.56	0.54	0.60	0.60	0.64	0.63	0.56	0.55	0.54	0.51	0.55	0.57	6.86
< 10	1.86	1.56	1.85	2.36	3.01	3.03	2.75	2.56	2.50	2.33	2.50	2.47	28.79
< 15	2.77	2.13	2.63	4.15	6.55	6.67	5.26	4.62	5.02	5.68	6.34	4.84	56.66
< 20	3.18	2.31	2.94	5.22	9.69	9.36	6.44	5.50	6.55	9.30	11.58	6.68	78.75
< 25	3.32	2.36	3.03	5.70	11.42	10.50	6.81	5.78	7.17	11.88	16.03	7.62	91.62
< 30	3.35	2.38	3.07	5.87	12.12	10.91	6.91	5.83	7.36	13.17	18.39	7.97	97.33
< 35	3.35	2.38	3.08	5.93	12.36	11.02	6.93	5.84	7.42	13.66	19.19	8.05	99.21
< 40	3.36	2.39	3.09	5.94	12.44	11.04	6.93	5.84	7.44	13.83	19.43	8.06	99.78
< 45		2.39	3.10	5.94	12.45	11.05		5.84	7.44	13.89	19.50	8.06	99.94
< 50			3.10	5.94	12.46	11.05		5.84	7.44	13.91	19.51		99.99
< 55					12.46				7.44	13.91	19.52		100.00
< 60										13.92	19.52		100.00
Total	**3.36**	**2.39**	**3.10**	**5.94**	**12.46**	**11.05**	**6.93**	**5.84**	**7.44**	**13.92**	**19.52**	**8.06**	**100.00**
Mean	**9.6**	**8.5**	**9.2**	**11.9**	**14.6**	**13.4**	**11.3**	**10.8**	**12.4**	**16.7**	**17.9**	**13.3**	**14.1**
Maximum	**37.0**	**43.0**	**47.0**	**49.0**	**51.0**	**48.0**	**37.0**	**45.0**	**52.0**	**57.0**	**56.0**	**42.0**	**57.0**

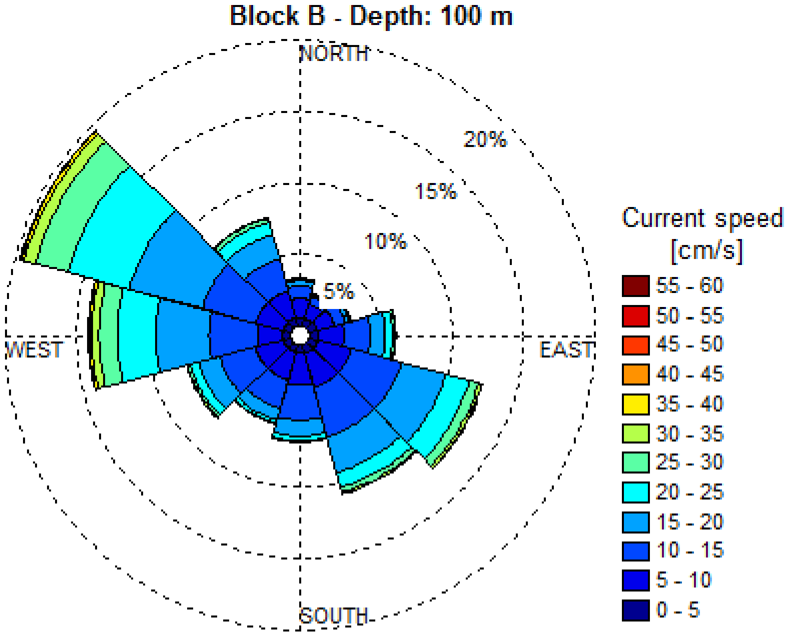


Figure 4-27 Current rose at 100 m depth at the Block B.

Table 4-32 Direction sample distribution of non-exceedance [%] of current speed at 100 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.58	0.55	0.61	0.60	0.65	0.61	0.58	0.53	0.54	0.51	0.55	0.58	6.90
< 10	1.88	1.57	1.84	2.38	3.05	3.08	2.80	2.54	2.56	2.30	2.51	2.52	29.04
< 15	2.77	2.12	2.60	4.17	6.62	6.71	5.32	4.62	5.11	5.68	6.41	4.95	57.07
< 20	3.15	2.29	2.88	5.17	9.79	9.42	6.47	5.48	6.59	9.33	11.77	6.80	79.13
< 25	3.28	2.33	2.96	5.63	11.46	10.54	6.80	5.72	7.17	11.87	16.35	7.76	91.89
< 30	3.31	2.35	2.99	5.78	12.13	10.93	6.89	5.77	7.34	13.11	18.77	8.09	97.46
< 35	3.31	2.35	3.00	5.82	12.33	11.02	6.90	5.78	7.39	13.59	19.59	8.17	99.28
< 40	3.31	2.36	3.01	5.83	12.40	11.04	6.91	5.78	7.41	13.75	19.82	8.18	99.80
< 45		2.36	3.01	5.84	12.41	11.05		5.78	7.41	13.80	19.89	8.18	99.95
< 50			3.01	5.84	12.41	11.05			7.41	13.82	19.91		99.99
< 55					12.41				7.41	13.82	19.91		100.00
< 60										13.83	19.91		100.00
Total	**3.31**	**2.36**	**3.01**	**5.84**	**12.41**	**11.05**	**6.91**	**5.78**	**7.41**	**13.83**	**19.91**	**8.18**	**100.00**
Mean	**9.4**	**8.3**	**9.0**	**11.7**	**14.5**	**13.3**	**11.1**	**10.7**	**12.2**	**16.6**	**18.0**	**13.3**	**14.0**
Maximum	**35.0**	**41.0**	**45.0**	**45.0**	**50.0**	**46.0**	**36.0**	**44.0**	**52.0**	**57.0**	**56.0**	**42.0**	**57.0**

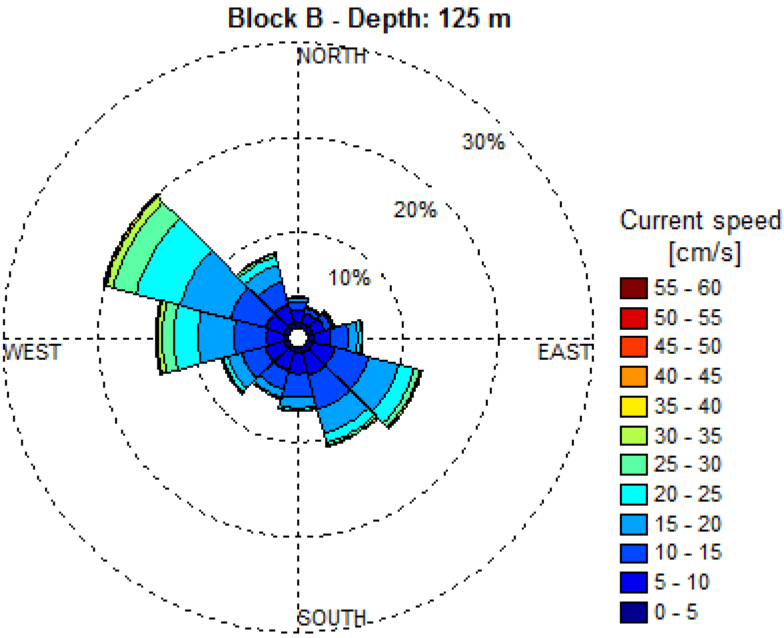


Figure 4-28 Current rose at 125 m depth at the Block B.

Table 4-33 Direction sample distribution of non-exceedance [%] of current speed at 125 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.58	0.57	0.59	0.63	0.62	0.62	0.57	0.53	0.51	0.52	0.53	0.59	6.89
< 10	1.90	1.62	1.85	2.47	3.00	3.11	2.80	2.59	2.57	2.29	2.48	2.59	29.26
< 15	2.79	2.16	2.57	4.20	6.66	6.82	5.33	4.65	5.09	5.73	6.39	5.12	57.52
< 20	3.14	2.31	2.81	5.15	9.84	9.59	6.47	5.47	6.55	9.37	11.89	7.06	79.65
< 25	3.27	2.34	2.88	5.53	11.51	10.66	6.75	5.67	7.04	11.82	16.74	8.07	92.28
< 30	3.29	2.35	2.90	5.66	12.09	10.98	6.82	5.71	7.19	12.95	19.26	8.42	97.61
< 35	3.29	2.36	2.90	5.69	12.26	11.06	6.83	5.72	7.23	13.37	20.11	8.50	99.33
< 40		2.36	2.91	5.70	12.32	11.08	6.83	5.72	7.24	13.52	20.34	8.51	99.83
< 45			2.91	5.70	12.33	11.08		5.72	7.25	13.57	20.41	8.51	99.96
< 50					12.33				7.25	13.58	20.43		99.99
< 55									7.25	13.58	20.43		100.00
< 60										13.59	20.43		100.00
Total	**3.29**	**2.36**	**2.91**	**5.70**	**12.33**	**11.08**	**6.83**	**5.72**	**7.25**	**13.59**	**20.43**	**8.51**	**100.00**
Mean	**9.3**	**8.0**	**8.7**	**11.3**	**14.3**	**13.2**	**11.0**	**10.5**	**12.1**	**16.4**	**18.1**	**13.3**	**13.9**
Maximum	**34.0**	**39.0**	**43.0**	**44.0**	**48.0**	**43.0**	**35.0**	**42.0**	**51.0**	**57.0**	**56.0**	**40.0**	**57.0**

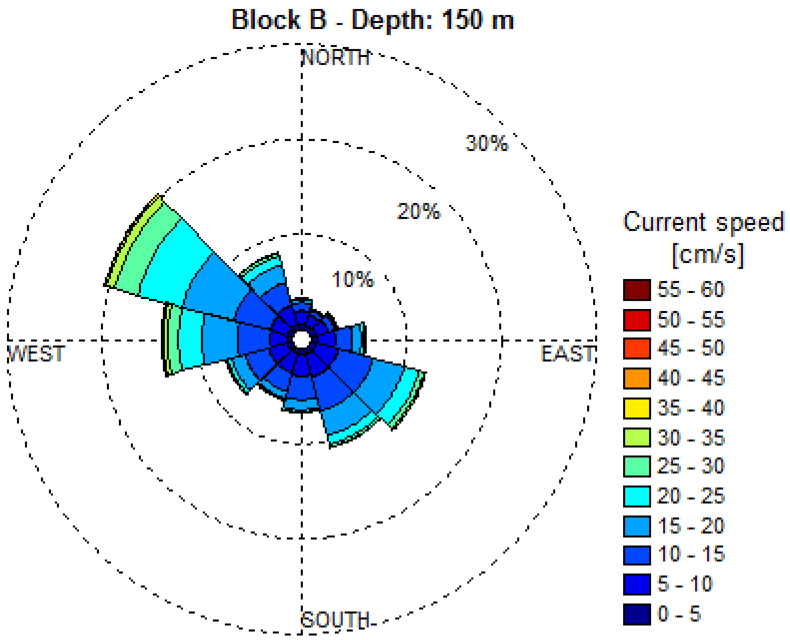


Figure 4-29 Current rose at 150 m depth at the Block B.

Table 4-34 Direction sample distribution of non-exceedance [%] of current speed at 150 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.57	0.55	0.62	0.64	0.63	0.63	0.56	0.53	0.52	0.51	0.51	0.60	6.88
< 10	1.94	1.62	1.91	2.54	3.02	3.09	2.85	2.62	2.57	2.32	2.41	2.67	29.55
< 15	2.81	2.13	2.60	4.24	6.76	6.88	5.38	4.65	5.14	5.77	6.39	5.26	57.99
< 20	3.15	2.26	2.81	5.17	10.00	9.64	6.45	5.41	6.53	9.37	12.04	7.27	80.12
< 25	3.27	2.30	2.87	5.51	11.62	10.66	6.70	5.59	6.98	11.74	16.99	8.29	92.51
< 30	3.29	2.30	2.89	5.62	12.15	10.96	6.76	5.62	7.11	12.80	19.56	8.65	97.70
< 35	3.29	2.31	2.90	5.65	12.30	11.04	6.77	5.63	7.14	13.20	20.43	8.74	99.37
< 40	3.29	2.31	2.90	5.65	12.34	11.05	6.77	5.63	7.15	13.33	20.67	8.75	99.84
< 45		2.31	2.90	5.66	12.35	11.06		5.63	7.16	13.37	20.73	8.75	99.96
< 50					12.35				7.16	13.38	20.74		99.99
< 55									7.16	13.38	20.75		100.00
< 60										13.38	20.75		100.00
Total	**3.29**	**2.31**	**2.90**	**5.66**	**12.35**	**11.06**	**6.77**	**5.63**	**7.16**	**13.38**	**20.75**	**8.75**	**100.00**
Mean	**9.2**	**7.8**	**8.4**	**11.1**	**14.2**	**13.1**	**10.8**	**10.3**	**11.9**	**16.2**	**18.2**	**13.3**	**13.8**
Maximum	**36.0**	**41.0**	**42.0**	**43.0**	**47.0**	**42.0**	**37.0**	**41.0**	**51.0**	**56.0**	**55.0**	**43.0**	**56.0**

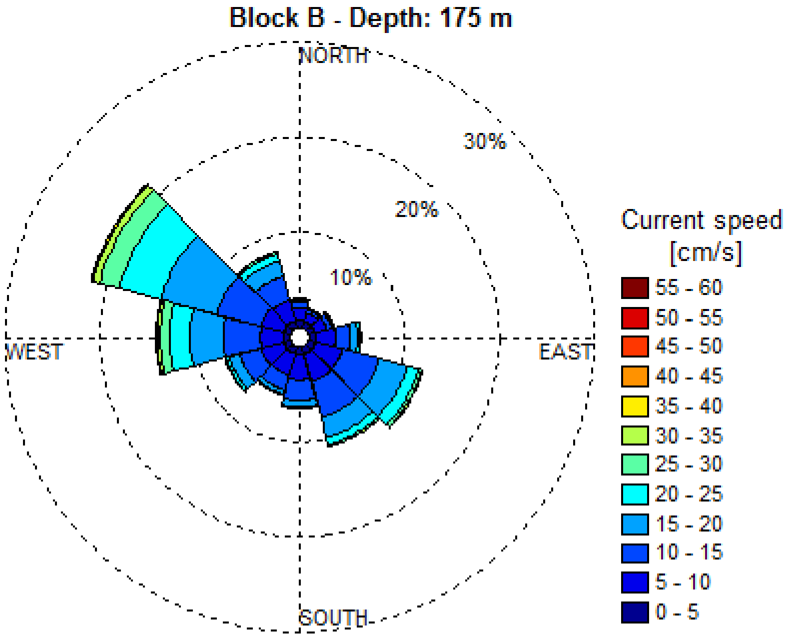


Figure 4-30 **Current rose at 175 m depth at the Block B.**

Table 4-35 **Direction sample distribution of non-exceedance [%] of current speed at 175 m depth at the Block B.**

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.70	0.66	0.73	0.76	0.80	0.80	0.78	0.74	0.72	0.66	0.72	0.75	8.83
< 10	2.07	1.64	1.96	2.72	3.68	3.81	3.45	3.07	3.21	3.12	3.23	3.04	34.99
< 15	2.72	2.01	2.48	4.20	7.61	7.81	5.66	4.70	5.52	7.02	8.07	5.74	63.56
< 20	2.96	2.13	2.67	4.95	10.54	10.13	6.39	5.20	6.60	10.39	14.17	7.54	83.66
< 25	3.03	2.16	2.71	5.21	11.75	10.90	6.55	5.32	6.93	12.43	18.79	8.35	94.13
< 30	3.05	2.16	2.73	5.29	12.12	11.12	6.59	5.34	7.01	13.31	21.00	8.60	98.32
< 35	3.05	2.16	2.74	5.31	12.22	11.17	6.59	5.34	7.03	13.62	21.71	8.65	99.59
< 40		2.16	2.74	5.31	12.23	11.17	6.59	5.34	7.04	13.71	21.88	8.66	99.90
< 45		2.16	2.74	5.32	12.24			5.34	7.04	13.73	21.92	8.66	99.98
< 50				5.32					7.04	13.74	21.93		100.00
< 55										13.75	21.93		100.00
< 60										13.75			100.00
Total	**3.05**	**2.16**	**2.74**	**5.32**	**12.24**	**11.17**	**6.59**	**5.34**	**7.04**	**13.75**	**21.93**	**8.66**	**100.00**
Mean	**8.3**	**7.2**	**7.8**	**10.3**	**13.0**	**12.1**	**9.7**	**9.2**	**10.7**	**15.0**	**17.0**	**12.4**	**12.9**
Maximum	**33.0**	**40.0**	**40.0**	**45.0**	**43.0**	**39.0**	**36.0**	**40.0**	**49.0**	**55.0**	**50.0**	**41.0**	**55.0**

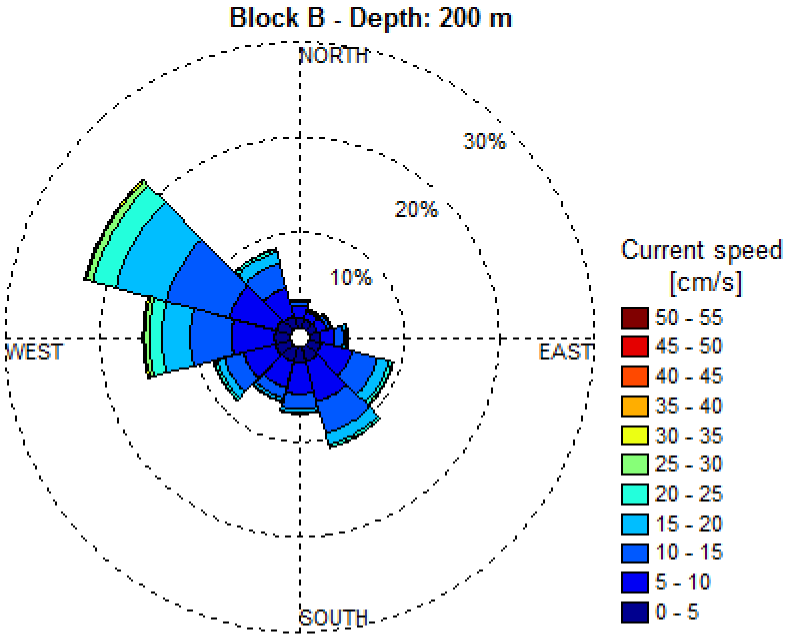


Figure 4-31 Current rose at 200 m depth at the Block B.

Table 4-36 Direction sample distribution of non-exceedance [%] of current speed at 200 m depth at the Block B.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.96	0.85	0.91	1.05	1.33	1.58	1.61	1.56	1.65	1.61	1.56	1.27	15.95
< 10	2.31	1.70	1.90	2.60	4.61	5.98	5.00	4.44	5.08	6.10	6.69	4.44	50.86
< 15	2.79	1.95	2.31	3.53	7.34	9.47	6.61	5.57	7.10	10.38	13.62	7.29	77.95
< 20	2.91	2.01	2.44	3.87	8.57	10.75	7.02	5.93	7.88	13.20	19.20	8.62	92.39
< 25	2.93	2.03	2.47	3.97	8.92	11.09	7.12	6.00	8.16	14.48	21.71	9.00	97.89
< 30	2.94	2.03	2.48	3.99	9.01	11.17	7.13	6.02	8.24	14.95	22.46	9.06	99.48
< 35		2.04	2.49	3.99	9.02	11.18	7.13	6.02	8.26	15.10	22.63	9.07	99.88
< 40		2.04		3.99	9.02		7.13	6.02	8.28	15.14	22.67	9.07	99.98
< 45									8.28	15.15	22.67		99.99
< 50									8.28	15.15	22.67		100.00
< 55										15.15			100.00
Total	**2.94**	**2.04**	**2.49**	**3.99**	**9.02**	**11.18**	**7.13**	**6.02**	**8.28**	**15.15**	**22.67**	**9.07**	**100.00**
Mean	**6.9**	**6.1**	**6.9**	**8.3**	**10.0**	**9.7**	**7.9**	**7.5**	**9.0**	**12.0**	**13.2**	**10.1**	**10.3**
Maximum	**29.0**	**36.0**	**34.0**	**35.0**	**37.0**	**34.0**	**35.0**	**37.0**	**49.0**	**52.0**	**47.0**	**35.0**	**52.0**

4.2.3 Block C

Figure 4-32 – Figure 4-47 show current roses for Block C. Table 4-34 – Table 4-49 show the corresponding distributions of non-exceedance of current speed.

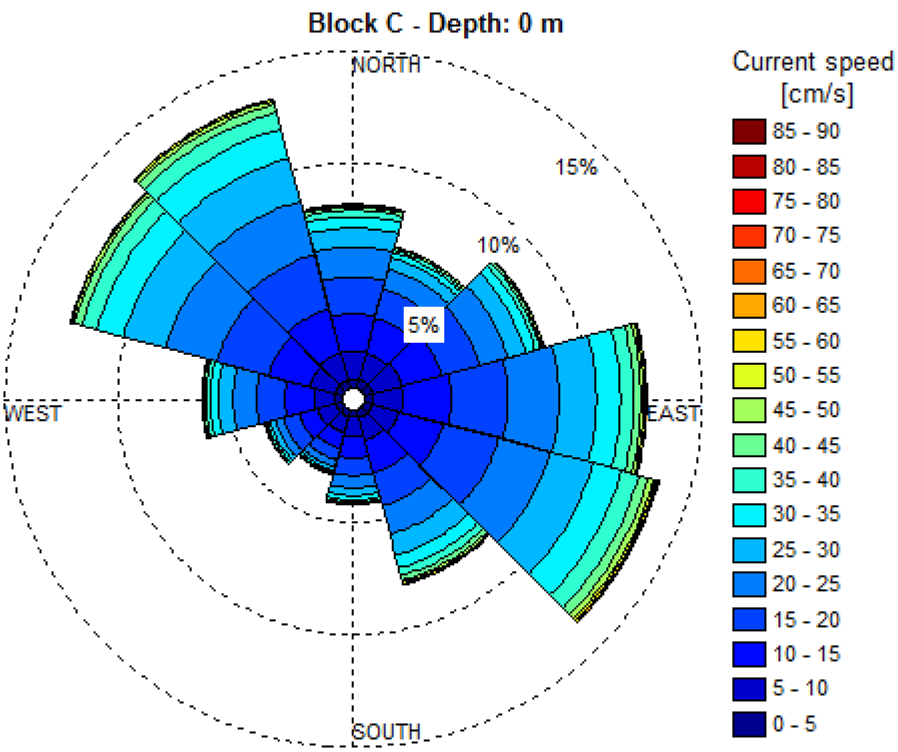


Figure 4-32 Current rose at 0 m depth at the Block C.

Table 4-37 Direction sample distribution of non-exceedance [%] of current speed at 0 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.38	0.38	0.40	0.35	0.36	0.35	0.30	0.29	0.32	0.33	0.35	0.36	4.17
< 10	1.59	1.59	1.72	1.70	1.61	1.40	1.15	1.05	1.14	1.27	1.51	1.60	17.32
< 15	3.26	3.20	3.54	3.84	3.68	2.92	2.13	1.78	1.98	2.52	3.40	3.63	35.89
< 20	4.88	4.51	5.26	6.36	6.21	4.49	2.93	2.32	2.70	3.76	5.74	6.15	55.32
< 25	6.22	5.44	6.55	8.59	8.61	5.85	3.48	2.64	3.08	4.78	8.07	8.66	71.96
< 30	7.10	5.96	7.35	10.22	10.60	6.85	3.84	2.82	3.31	5.42	9.97	10.67	84.10
< 35	7.61	6.21	7.80	11.28	11.94	7.47	4.06	2.92	3.44	5.75	11.16	12.07	91.71
< 40	7.89	6.34	8.00	11.87	12.75	7.82	4.18	2.97	3.51	5.93	11.83	12.85	95.94
< 45	8.03	6.41	8.11	12.17	13.19	8.04	4.23	2.99	3.55	6.03	12.16	13.23	98.13
< 50	8.10	6.46	8.16	12.32	13.44	8.15	4.26	2.99	3.56	6.08	12.29	13.40	99.20
< 55	8.15	6.47	8.18	12.38	13.56	8.21	4.27	3.00	3.57	6.09	12.33	13.47	99.67
< 60	8.16	6.48	8.19	12.41	13.62	8.24	4.27	3.00	3.57	6.09	12.35	13.49	99.87
< 65	8.17		8.19	12.42	13.66	8.25	4.27		3.58	6.09	12.35	13.50	99.95
< 70	8.17			12.43	13.67	8.26	4.27		3.58	6.09	12.35	13.50	99.98
< 75				12.43	13.68	8.26	4.27						99.99
< 80					13.68	8.26							100.00
< 85					13.68	8.26							100.00
< 90					13.69								100.00
Total	**8.17**	**6.48**	**8.19**	**12.43**	**13.69**	**8.26**	**4.27**	**3.00**	**3.58**	**6.09**	**12.35**	**13.50**	**100.00**
Mean	**18.3**	**16.1**	**17.3**	**20.4**	**22.0**	**19.8**	**16.3**	**14.1**	**14.8**	**17.7**	**21.1**	**21.4**	**19.3**
Maximum	**67.0**	**59.0**	**64.0**	**70.0**	**87.0**	**80.0**	**73.0**	**59.0**	**65.0**	**65.0**	**65.0**	**66.0**	**87.0**

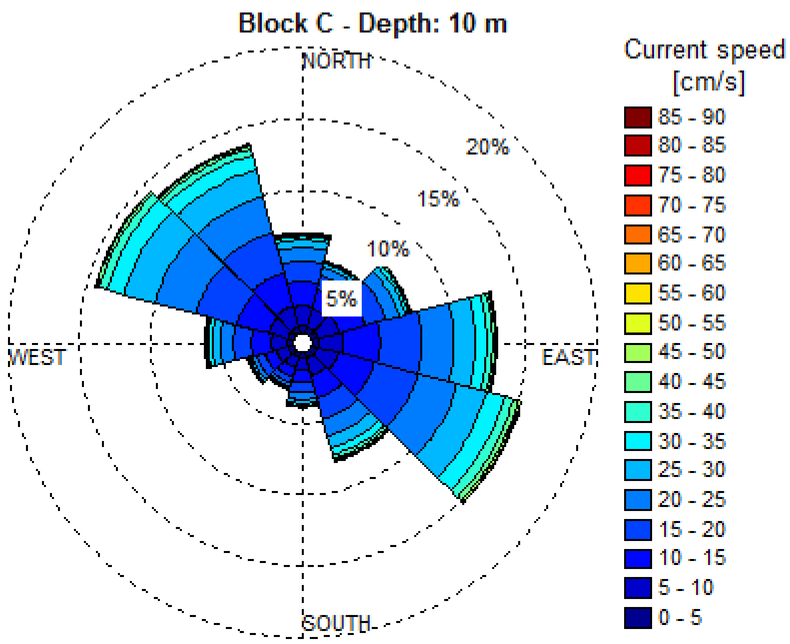


Figure 4-33 Current rose at 10 m depth at the Block C.

Table 4-38 Direction sample distribution of non-exceedance [%] of current speed at 10 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.47	0.44	0.48	0.46	0.42	0.43	0.36	0.34	0.38	0.39	0.41	0.45	5.03
< 10	1.86	1.76	2.00	2.16	1.95	1.70	1.26	1.12	1.24	1.50	1.79	1.97	20.31
< 15	3.55	3.21	3.84	4.75	4.58	3.35	2.16	1.80	2.04	2.86	4.08	4.43	40.66
< 20	5.00	4.22	5.31	7.59	7.78	4.97	2.86	2.25	2.64	4.09	7.00	7.40	61.10
< 25	5.96	4.80	6.23	9.80	10.67	6.25	3.36	2.51	2.95	4.97	9.90	10.09	77.50
< 30	6.51	5.07	6.69	11.24	12.81	7.13	3.64	2.66	3.13	5.49	12.09	12.09	88.55
< 35	6.79	5.19	6.91	12.01	14.14	7.67	3.81	2.72	3.24	5.79	13.29	13.19	94.74
< 40	6.93	5.26	7.01	12.40	14.81	7.95	3.87	2.74	3.28	5.95	13.85	13.68	97.72
< 45	7.00	5.29	7.05	12.58	15.14	8.08	3.90	2.75	3.29	6.01	14.05	13.90	99.05
< 50	7.04	5.30	7.07	12.67	15.30	8.16	3.91	2.76	3.30	6.04	14.13	13.99	99.65
< 55	7.05	5.30	7.07	12.69	15.36	8.19	3.92	2.76	3.31	6.05	14.15	14.01	99.87
< 60	7.06	5.30	7.08	12.71	15.40	8.21	3.92		3.31	6.05	14.15	14.02	99.96
< 65			7.08	12.71	15.41	8.21			3.31			14.02	99.99
< 70			7.08	12.71	15.41	8.22						14.02	99.99
< 75					15.41	8.22							100.00
< 80					15.41	8.22							100.00
< 85						8.22							100.00
< 90						8.22							100.00
Total	**7.06**	**5.30**	**7.08**	**12.71**	**15.41**	**8.22**	**3.92**	**2.76**	**3.31**	**6.05**	**14.15**	**14.02**	**100.00**
Mean	**15.8**	**13.8**	**14.9**	**18.3**	**20.4**	**18.2**	**14.9**	**12.8**	**13.6**	**16.4**	**20.0**	**19.5**	**17.8**
Maximum	**58.0**	**56.0**	**67.0**	**65.0**	**77.0**	**86.0**	**57.0**	**54.0**	**64.0**	**57.0**	**59.0**	**65.0**	**86.0**

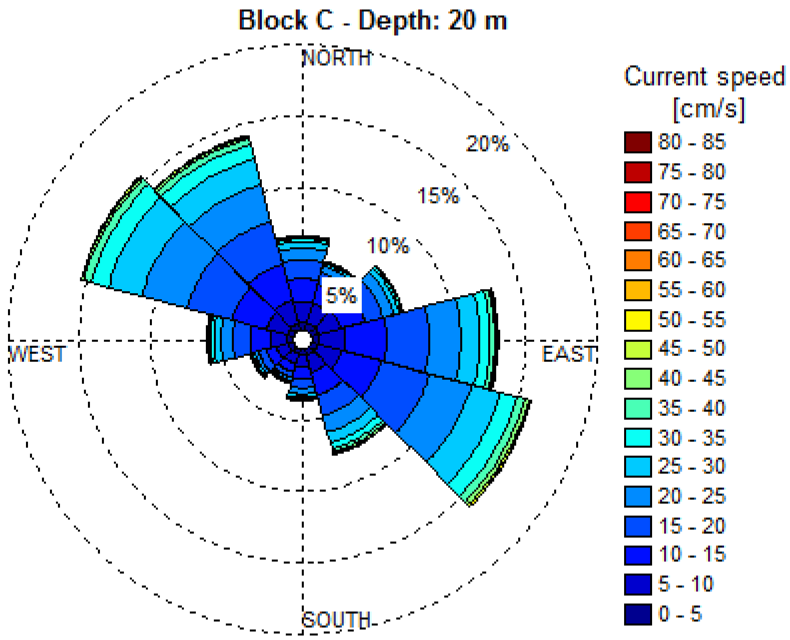


Figure 4-34 **Current rose at 20 m depth at the Block C.**

Table 4-39 **Direction sample distribution of non-exceedance [%] of current speed at 20 m depth at the Block C.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.49	0.49	0.52	0.51	0.47	0.43	0.39	0.35	0.38	0.43	0.45	0.47	5.38
< 10	1.92	1.94	2.13	2.31	2.20	1.72	1.29	1.10	1.20	1.57	1.94	2.15	21.46
< 15	3.56	3.29	3.87	5.18	5.12	3.43	2.11	1.72	1.93	2.95	4.44	4.80	42.39
< 20	4.89	4.17	5.12	8.09	8.67	5.00	2.75	2.10	2.48	4.14	7.62	7.96	62.97
< 25	5.72	4.66	5.90	10.21	11.73	6.24	3.19	2.34	2.77	4.94	10.80	10.75	79.26
< 30	6.19	4.87	6.27	11.52	13.84	7.04	3.44	2.47	2.93	5.42	13.16	12.73	89.87
< 35	6.41	4.96	6.43	12.19	15.06	7.51	3.58	2.53	3.03	5.68	14.38	13.79	95.55
< 40	6.53	5.01	6.51	12.52	15.63	7.75	3.64	2.54	3.07	5.82	14.90	14.24	98.15
< 45	6.59	5.03	6.54	12.66	15.92	7.88	3.67	2.55	3.08	5.88	15.07	14.41	99.27
< 50	6.61	5.04	6.55	12.72	16.05	7.93	3.68	2.55	3.09	5.89	15.14	14.48	99.74
< 55	6.63	5.04	6.56	12.73	16.10	7.96	3.68	2.55	3.10	5.90	15.15	14.50	99.91
< 60	6.63	5.04	6.56	12.74	16.13	7.97			3.10	5.90	15.16	14.51	99.97
< 65			6.56	12.75	16.13	7.97			3.10			14.51	99.99
< 70					16.13	7.98						14.51	99.99
< 75					16.13	7.98							100.00
< 80						7.98							100.00
< 85						7.98							100.00
Total	**6.63**	**5.04**	**6.56**	**12.75**	**16.13**	**7.98**	**3.68**	**2.55**	**3.10**	**5.90**	**15.16**	**14.51**	**100.00**
Mean	**15.1**	**12.9**	**14.0**	**17.5**	**19.6**	**17.6**	**14.4**	**12.4**	**13.3**	**15.8**	**19.7**	**19.0**	**17.3**
Maximum	**57.0**	**55.0**	**64.0**	**62.0**	**70.0**	**84.0**	**54.0**	**50.0**	**64.0**	**57.0**	**56.0**	**65.0**	**84.0**

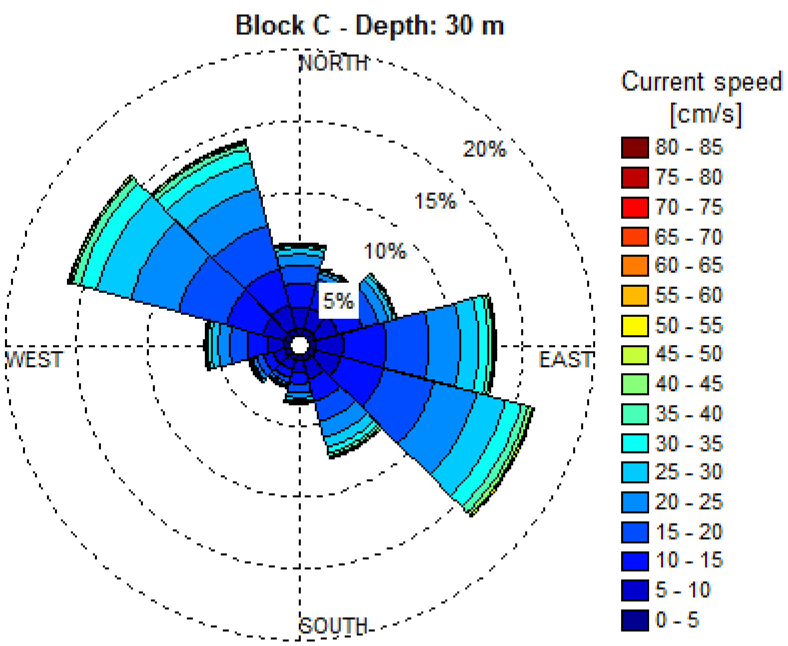


Figure 4-35 Current rose at 30 m depth at the Block C.

Table 4-40 Direction sample distribution of non-exceedance [%] of current speed at 30 m depth at the Block C.

Current speed [cm/s]	Current direction											Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.50	0.51	0.51	0.52	0.50	0.45	0.39	0.38	0.40	0.42	0.46	0.51	5.55
< 10	1.94	1.95	2.13	2.39	2.37	1.80	1.26	1.12	1.21	1.61	2.03	2.19	22.00
< 15	3.59	3.29	3.85	5.35	5.52	3.45	2.06	1.71	1.91	2.94	4.65	4.89	43.22
< 20	4.89	4.10	5.03	8.26	9.24	4.98	2.68	2.05	2.43	4.14	8.03	8.08	63.91
< 25	5.66	4.54	5.72	10.39	12.39	6.19	3.07	2.26	2.70	4.91	11.36	10.93	80.12
< 30	6.09	4.73	6.05	11.66	14.46	6.94	3.32	2.38	2.86	5.39	13.75	12.91	90.54
< 35	6.30	4.81	6.21	12.30	15.62	7.37	3.43	2.44	2.94	5.63	14.98	13.93	95.96
< 40	6.40	4.85	6.27	12.60	16.16	7.60	3.49	2.45	2.97	5.76	15.47	14.35	98.39
< 45	6.45	4.87	6.30	12.72	16.43	7.71	3.52	2.46	2.99	5.81	15.64	14.50	99.40
< 50	6.48	4.87	6.31	12.76	16.54	7.77	3.52	2.46	2.99	5.82	15.70	14.56	99.78
< 55	6.49	4.87	6.31	12.78	16.58	7.79	3.53	2.46	3.00	5.83	15.71	14.58	99.93
< 60	6.49		6.31	12.79	16.60	7.80			3.00	5.83	15.72	14.59	99.98
< 65				12.79	16.60	7.80			3.00			14.59	99.99
< 70					16.60	7.81			3.00				100.00
< 75						7.81							100.00
< 80						7.81							100.00
< 85						7.81							100.00
Total	**6.49**	**4.87**	**6.31**	**12.79**	**16.60**	**7.81**	**3.53**	**2.46**	**3.00**	**5.83**	**15.72**	**14.59**	**100.00**
Mean	**14.8**	**12.5**	**13.7**	**17.2**	**19.1**	**17.3**	**14.1**	**12.0**	**13.1**	**15.6**	**19.5**	**18.8**	**17.1**
Maximum	**56.0**	**53.0**	**56.0**	**61.0**	**68.0**	**82.0**	**52.0**	**51.0**	**65.0**	**55.0**	**57.0**	**64.0**	**82.0**

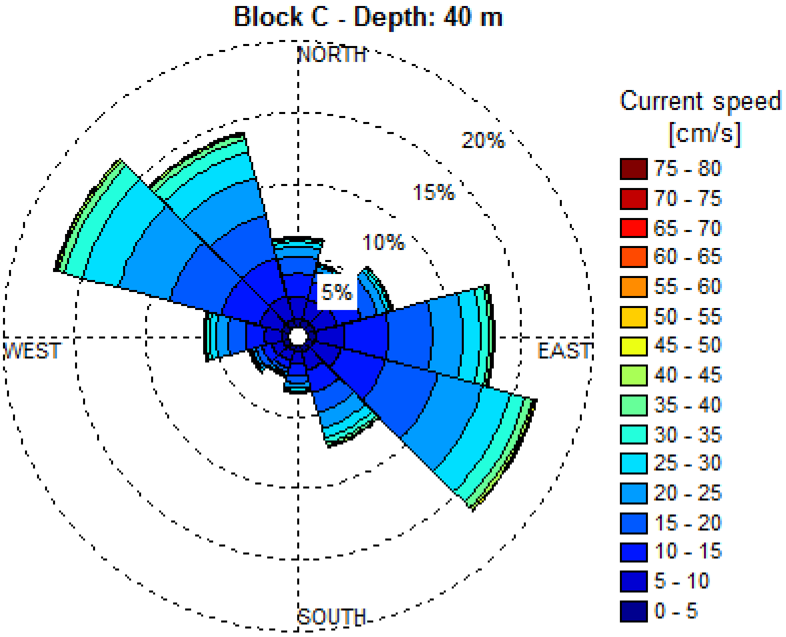


Figure 4-36 Current rose at 40 m depth at the Block C.

Table 4-41 Direction sample distribution of non-exceedance [%] of current speed at 40 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.53	0.54	0.54	0.55	0.49	0.47	0.41	0.36	0.41	0.45	0.49	0.53	5.78
< 10	2.02	1.98	2.16	2.56	2.48	1.82	1.29	1.10	1.24	1.62	2.14	2.25	22.65
< 15	3.67	3.28	3.89	5.60	5.74	3.50	2.08	1.66	1.91	2.95	4.90	5.01	44.20
< 20	4.88	4.05	5.01	8.58	9.62	5.02	2.63	1.97	2.37	4.13	8.52	8.23	65.02
< 25	5.58	4.42	5.61	10.65	12.90	6.19	2.99	2.18	2.62	4.94	12.13	11.05	81.27
< 30	5.97	4.58	5.90	11.85	14.94	6.92	3.20	2.27	2.77	5.38	14.69	13.00	91.48
< 35	6.16	4.65	6.03	12.43	16.02	7.33	3.30	2.31	2.84	5.61	15.94	13.97	96.59
< 40	6.24	4.67	6.07	12.67	16.53	7.53	3.35	2.32	2.87	5.72	16.40	14.37	98.75
< 45	6.28	4.68	6.09	12.76	16.76	7.61	3.36	2.33	2.88	5.77	16.56	14.50	99.57
< 50	6.29	4.68	6.09	12.79	16.83	7.65	3.37	2.33	2.88	5.78	16.61	14.55	99.86
< 55	6.30		6.10	12.80	16.86	7.67	3.37		2.89	5.78	16.62	14.57	99.96
< 60	6.30			12.80	16.87	7.68	3.37		2.89		16.62	14.57	99.99
< 65					16.87	7.68			2.89			14.57	100.00
< 70					16.87	7.68							100.00
< 75						7.68							100.00
< 80						7.68							100.00
Total	**6.30**	**4.68**	**6.10**	**12.80**	**16.87**	**7.68**	**3.37**	**2.33**	**2.89**	**5.78**	**16.62**	**14.57**	**100.00**
Mean	**14.2**	**11.9**	**13.1**	**16.7**	**18.7**	**16.9**	**13.5**	**11.6**	**12.6**	**15.4**	**19.4**	**18.6**	**16.8**
Maximum	**55.0**	**49.0**	**52.0**	**56.0**	**66.0**	**76.0**	**55.0**	**49.0**	**61.0**	**54.0**	**56.0**	**61.0**	**76.0**

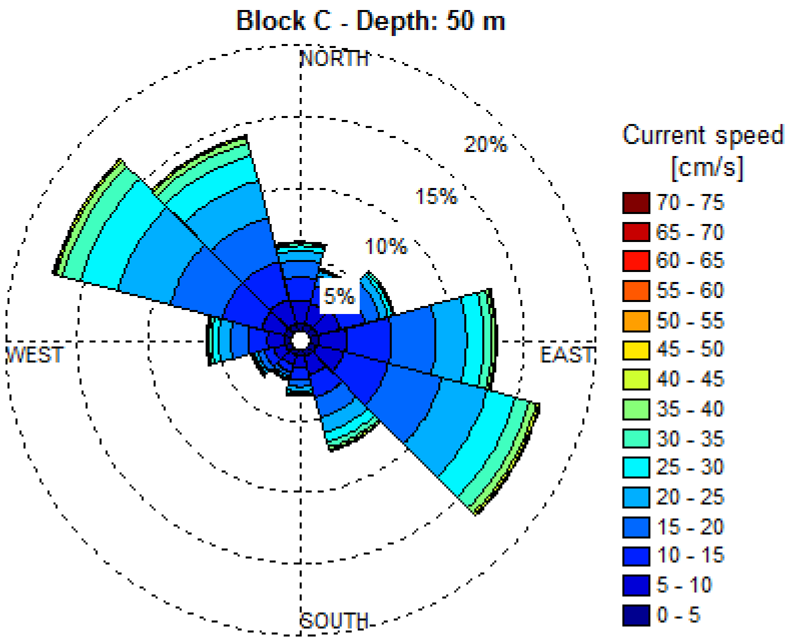


Figure 4-37 Current rose at 50 m depth at the Block C.

Table 4-42 Direction sample distribution of non-exceedance [%] of current speed at 50 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.54	0.53	0.56	0.56	0.50	0.48	0.39	0.38	0.42	0.45	0.50	0.54	5.85
< 10	2.07	1.97	2.21	2.56	2.49	1.85	1.29	1.09	1.26	1.62	2.18	2.26	22.85
< 15	3.71	3.25	3.95	5.65	5.80	3.52	2.09	1.64	1.94	2.94	4.99	5.05	44.54
< 20	4.91	4.00	5.04	8.66	9.71	5.06	2.61	1.94	2.38	4.11	8.67	8.30	65.40
< 25	5.59	4.35	5.61	10.72	13.03	6.21	2.96	2.14	2.63	4.92	12.36	11.13	81.65
< 30	5.96	4.50	5.89	11.90	15.10	6.93	3.17	2.22	2.76	5.36	14.96	13.05	91.80
< 35	6.14	4.56	6.00	12.45	16.15	7.33	3.25	2.26	2.83	5.58	16.23	14.01	96.79
< 40	6.21	4.58	6.04	12.68	16.64	7.51	3.29	2.27	2.85	5.69	16.69	14.41	98.88
< 45	6.24	4.58	6.05	12.75	16.85	7.59	3.31	2.28	2.86	5.74	16.84	14.53	99.63
< 50	6.26	4.58	6.06	12.78	16.91	7.63	3.31	2.28	2.87	5.75	16.88	14.58	99.89
< 55	6.26		6.06	12.79	16.94	7.64	3.32		2.87	5.75	16.89	14.59	99.97
< 60	6.26			12.79	16.94	7.65			2.87		16.90	14.59	99.99
< 65					16.95	7.65			2.87			14.59	100.00
< 70					16.95	7.65							100.00
< 75						7.65							100.00
Total	**6.26**	**4.58**	**6.06**	**12.79**	**16.95**	**7.65**	**3.32**	**2.28**	**2.87**	**5.75**	**16.90**	**14.59**	**100.00**
Mean	**14.0**	**11.8**	**12.9**	**16.5**	**18.6**	**16.7**	**13.3**	**11.5**	**12.4**	**15.3**	**19.4**	**18.5**	**16.6**
Maximum	**55.0**	**48.0**	**50.0**	**55.0**	**65.0**	**71.0**	**54.0**	**48.0**	**61.0**	**53.0**	**56.0**	**61.0**	**71.0**

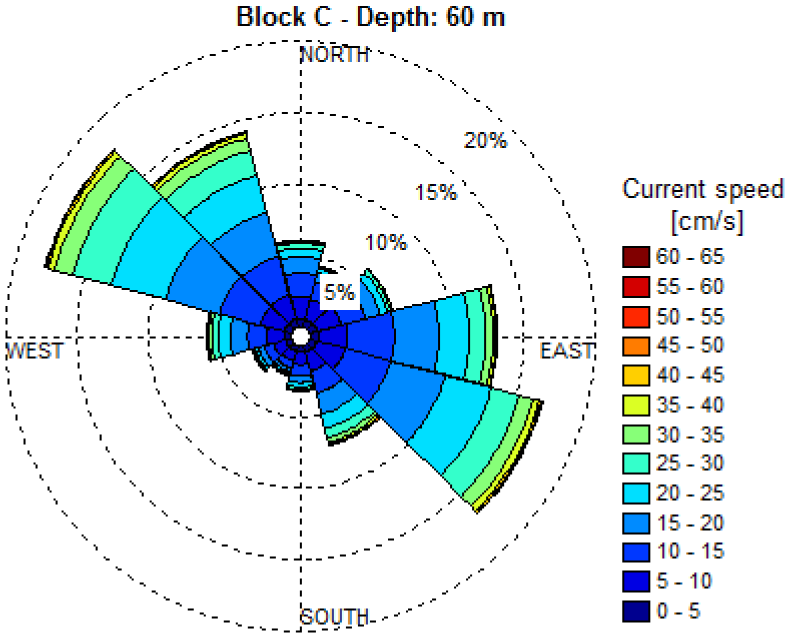


Figure 4-38 Current rose at 60 m depth at the Block C.

Table 4-43 Direction sample distribution of non-exceedance [%] of current speed at 60 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.53	0.55	0.56	0.57	0.54	0.49	0.41	0.40	0.40	0.47	0.53	0.55	6.00
< 10	2.08	1.99	2.26	2.62	2.60	1.89	1.31	1.10	1.26	1.65	2.25	2.32	23.35
< 15	3.72	3.27	3.97	5.82	6.00	3.55	2.09	1.64	1.93	2.99	5.18	5.17	45.33
< 20	4.89	3.95	5.00	8.84	10.03	5.10	2.60	1.92	2.35	4.14	9.00	8.41	66.23
< 25	5.53	4.27	5.53	10.88	13.43	6.22	2.91	2.10	2.58	4.95	12.83	11.24	82.47
< 30	5.87	4.40	5.78	11.99	15.48	6.91	3.08	2.18	2.70	5.38	15.54	13.17	92.47
< 35	6.02	4.44	5.87	12.48	16.47	7.27	3.17	2.21	2.75	5.58	16.82	14.11	97.20
< 40	6.08	4.45	5.90	12.68	16.92	7.43	3.20	2.22	2.78	5.68	17.29	14.47	99.09
< 45	6.10	4.46	5.90	12.74	17.08	7.49	3.21	2.22	2.79	5.72	17.42	14.59	99.73
< 50	6.11	4.46	5.91	12.76	17.13	7.52	3.21	2.22	2.79	5.73	17.46	14.63	99.93
< 55	6.11		5.91	12.76	17.15	7.53	3.21		2.79		17.47	14.64	99.99
< 60					17.16	7.54			2.79		17.47	14.64	100.00
< 65					17.16	7.54						14.64	100.00
Total	**6.11**	**4.46**	**5.91**	**12.76**	**17.16**	**7.54**	**3.21**	**2.22**	**2.79**	**5.73**	**17.47**	**14.64**	**100.00**
Mean	**13.6**	**11.4**	**12.5**	**16.2**	**18.3**	**16.3**	**12.8**	**11.0**	**12.1**	**15.1**	**19.3**	**18.3**	**16.4**
Maximum	**53.0**	**46.0**	**50.0**	**53.0**	**62.0**	**64.0**	**53.0**	**46.0**	**58.0**	**49.0**	**57.0**	**61.0**	**64.0**

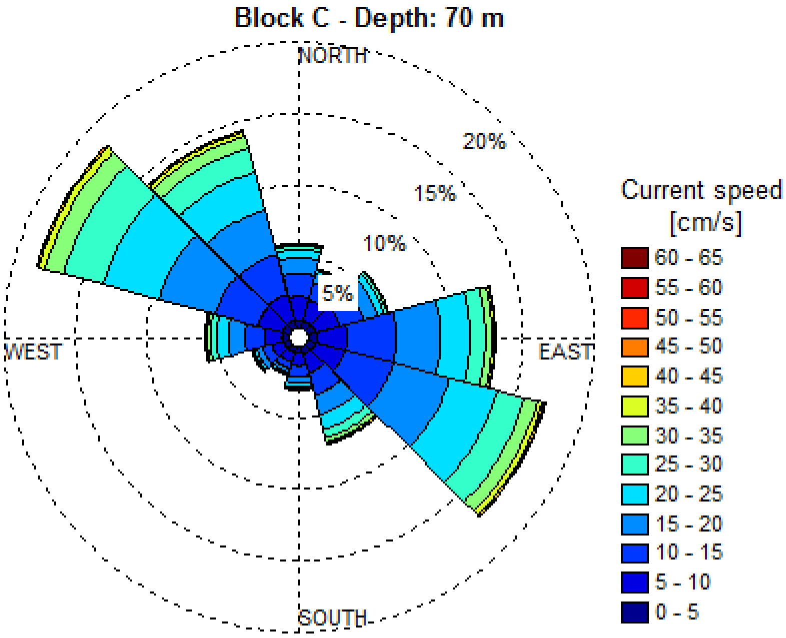


Figure 4-39 **Current rose at 70 m depth at the Block C.**

Table 4-44 **Direction sample distribution of non-exceedance [%] of current speed at 70 m depth at the Block C.**

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.56	0.55	0.55	0.60	0.57	0.52	0.40	0.40	0.42	0.50	0.55	0.57	6.20
< 10	2.14	1.99	2.29	2.70	2.72	1.93	1.31	1.10	1.27	1.67	2.32	2.43	23.87
< 15	3.76	3.24	3.97	6.02	6.25	3.59	2.09	1.61	1.93	3.04	5.34	5.35	46.20
< 20	4.88	3.87	4.97	9.05	10.39	5.09	2.56	1.88	2.32	4.18	9.31	8.66	67.16
< 25	5.48	4.14	5.43	11.03	13.90	6.19	2.85	2.04	2.54	4.97	13.26	11.53	83.36
< 30	5.78	4.23	5.64	12.08	15.91	6.85	3.01	2.10	2.65	5.39	16.05	13.42	93.12
< 35	5.90	4.27	5.72	12.52	16.85	7.16	3.08	2.12	2.69	5.59	17.34	14.33	97.56
< 40	5.94	4.28	5.73	12.69	17.24	7.29	3.10	2.13	2.71	5.68	17.81	14.66	99.25
< 45	5.96	4.28	5.74	12.73	17.37	7.35	3.10	2.13	2.71	5.71	17.94	14.77	99.79
< 50	5.97		5.74	12.75	17.42	7.37	3.11		2.71	5.72	17.96	14.80	99.95
< 55	5.97			12.75	17.43	7.38			2.72		17.97	14.81	99.99
< 60					17.43	7.38			2.72			14.81	100.00
< 65					17.43							14.81	100.00
Total	**5.97**	**4.28**	**5.74**	**12.75**	**17.43**	**7.38**	**3.11**	**2.13**	**2.72**	**5.72**	**17.97**	**14.81**	**100.00**
Mean	**13.2**	**11.0**	**12.1**	**15.9**	**18.0**	**15.9**	**12.4**	**10.6**	**11.6**	**14.9**	**19.2**	**18.1**	**16.2**
Maximum	**52.0**	**44.0**	**47.0**	**53.0**	**60.0**	**56.0**	**47.0**	**44.0**	**55.0**	**47.0**	**53.0**	**60.0**	**60.0**

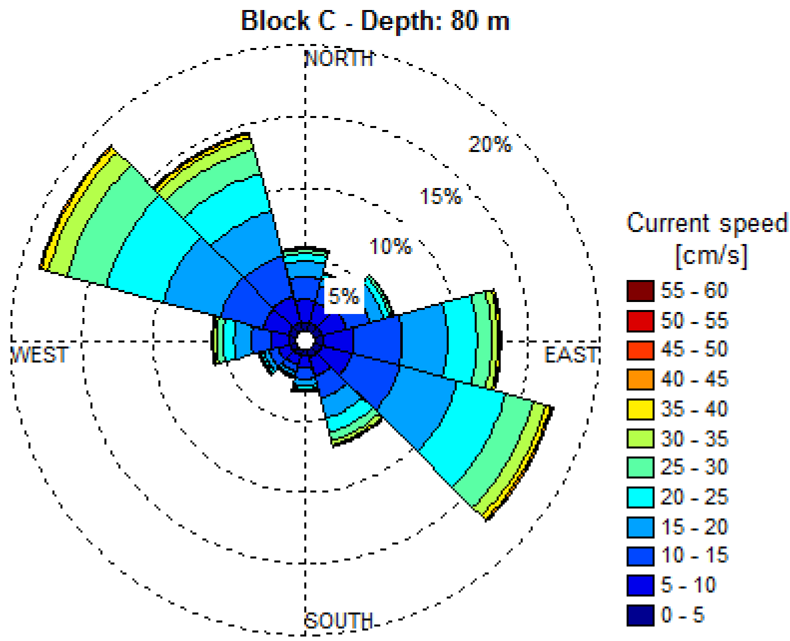


Figure 4-40 Current rose at 80 m depth at the Block C.

Table 4-45 Direction sample distribution of non-exceedance [%] of current speed at 80 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.57	0.56	0.58	0.58	0.57	0.53	0.42	0.40	0.44	0.49	0.56	0.57	6.26
< 10	2.14	2.02	2.33	2.73	2.78	1.94	1.30	1.10	1.27	1.67	2.37	2.49	24.15
< 15	3.73	3.26	4.00	6.06	6.37	3.62	2.07	1.61	1.93	3.04	5.45	5.45	46.58
< 20	4.83	3.85	4.99	9.10	10.59	5.11	2.53	1.87	2.32	4.18	9.45	8.82	67.63
< 25	5.41	4.10	5.42	11.08	14.13	6.20	2.80	2.01	2.53	4.97	13.48	11.70	83.82
< 30	5.70	4.18	5.61	12.08	16.15	6.83	2.95	2.06	2.63	5.37	16.31	13.58	93.44
< 35	5.81	4.21	5.67	12.49	17.06	7.12	3.01	2.07	2.66	5.56	17.60	14.48	97.74
< 40	5.84	4.22	5.69	12.64	17.43	7.24	3.03	2.08	2.68	5.65	18.07	14.78	99.34
< 45	5.86	4.22	5.69	12.68	17.54	7.29	3.03	2.08	2.68	5.68	18.19	14.89	99.82
< 50	5.86		5.69	12.69	17.58	7.31	3.04		2.68	5.68	18.22	14.92	99.96
< 55	5.86			12.69	17.59	7.32			2.68		18.22	14.92	99.99
< 60					17.59							14.92	100.00
Total	**5.86**	**4.22**	**5.69**	**12.69**	**17.59**	**7.32**	**3.04**	**2.08**	**2.68**	**5.68**	**18.22**	**14.92**	**100.00**
Mean	**13.0**	**10.8**	**11.9**	**15.7**	**17.8**	**15.7**	**12.2**	**10.3**	**11.4**	**14.8**	**19.2**	**17.9**	**16.1**
Maximum	**51.0**	**42.0**	**46.0**	**52.0**	**58.0**	**54.0**	**46.0**	**44.0**	**53.0**	**46.0**	**53.0**	**59.0**	**59.0**

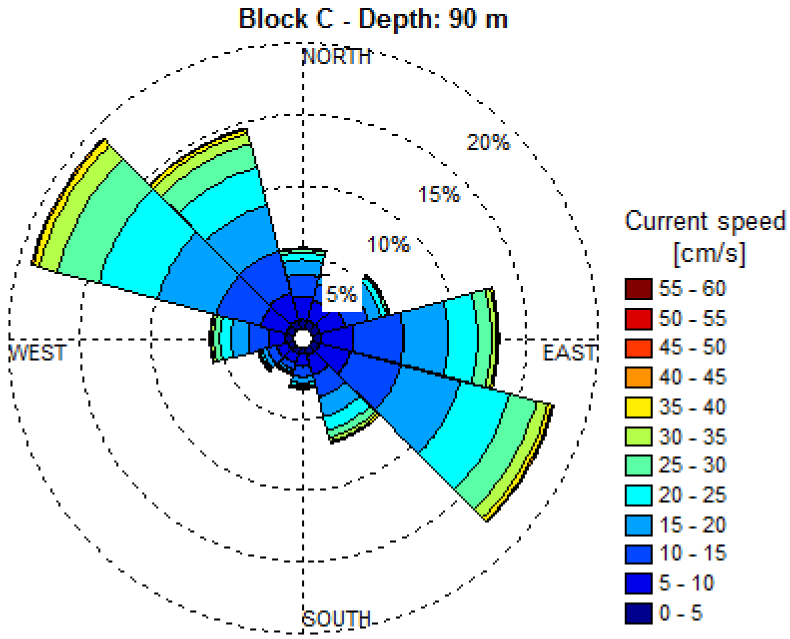


Figure 4-41 Current rose at 90 m depth at the Block C.

Table 4-46 Direction sample distribution of non-exceedance [%] of current speed at 90 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.58	0.58	0.60	0.62	0.59	0.54	0.44	0.41	0.42	0.52	0.55	0.58	6.42
< 10	2.19	2.05	2.39	2.89	2.84	1.99	1.31	1.10	1.23	1.73	2.42	2.57	24.71
< 15	3.75	3.24	4.02	6.30	6.55	3.68	2.05	1.58	1.89	3.09	5.56	5.68	47.39
< 20	4.80	3.77	4.94	9.33	10.91	5.17	2.50	1.81	2.25	4.24	9.71	9.11	68.54
< 25	5.32	3.98	5.32	11.28	14.54	6.21	2.75	1.93	2.44	4.99	13.89	12.02	84.67
< 30	5.57	4.05	5.48	12.22	16.51	6.80	2.87	1.97	2.52	5.40	16.80	13.86	94.05
< 35	5.64	4.07	5.52	12.56	17.35	7.05	2.92	1.97	2.55	5.57	18.10	14.71	98.03
< 40	5.67	4.08	5.53	12.67	17.68	7.16	2.93	1.98	2.56	5.65	18.56	15.00	99.48
< 45	5.69		5.53	12.70	17.78	7.20	2.93		2.57	5.67	18.68	15.09	99.88
< 50	5.69			12.71	17.80	7.21	2.94		2.57	5.67	18.70	15.11	99.98
< 55				12.71	17.81	7.22					18.70	15.11	100.00
< 60					17.81								100.00
Total	**5.69**	**4.08**	**5.53**	**12.71**	**17.81**	**7.22**	**2.94**	**1.98**	**2.57**	**5.67**	**18.70**	**15.11**	**100.00**
Mean	**12.5**	**10.3**	**11.5**	**15.3**	**17.6**	**15.3**	**11.7**	**9.8**	**11.1**	**14.5**	**19.1**	**17.7**	**15.8**
Maximum	**48.0**	**39.0**	**43.0**	**52.0**	**57.0**	**52.0**	**48.0**	**38.0**	**48.0**	**49.0**	**54.0**	**53.0**	**57.0**

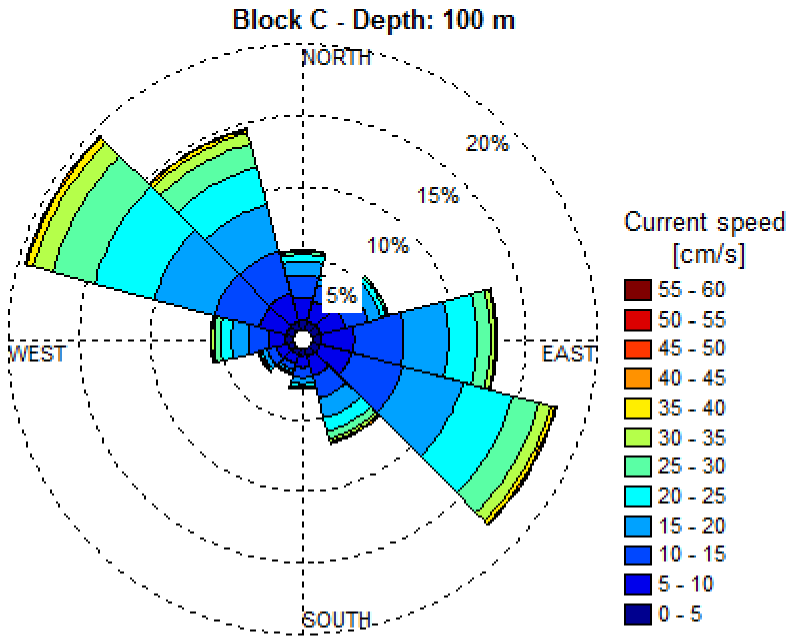


Figure 4-42 Current rose at 100 m depth at the Block C.

Table 4-47 Direction sample distribution of non-exceedance [%] of current speed at 100 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.60	0.60	0.62	0.61	0.60	0.54	0.45	0.42	0.42	0.52	0.55	0.58	6.52
< 10	2.21	2.06	2.42	2.93	2.87	2.00	1.32	1.10	1.24	1.72	2.48	2.62	24.99
< 15	3.78	3.21	4.03	6.35	6.69	3.71	2.04	1.57	1.88	3.06	5.68	5.76	47.76
< 20	4.80	3.71	4.92	9.39	11.14	5.20	2.48	1.79	2.23	4.22	9.93	9.26	69.05
< 25	5.29	3.90	5.27	11.28	14.79	6.23	2.72	1.90	2.39	4.97	14.18	12.15	85.08
< 30	5.51	3.95	5.41	12.19	16.75	6.78	2.84	1.93	2.47	5.36	17.13	13.96	94.29
< 35	5.58	3.97	5.44	12.50	17.56	7.02	2.88	1.94	2.49	5.53	18.45	14.80	98.18
< 40	5.60	3.98	5.46	12.60	17.86	7.12	2.89	1.94	2.50	5.59	18.90	15.07	99.52
< 45	5.61		5.46	12.63	17.95	7.16	2.89		2.51	5.61	19.01	15.15	99.90
< 50	5.62			12.63	17.97	7.17	2.90		2.51	5.61	19.03	15.17	99.98
< 55				12.63	17.98	7.17					19.04	15.17	100.00
< 60					17.98								100.00
Total	**5.62**	**3.98**	**5.46**	**12.63**	**17.98**	**7.17**	**2.90**	**1.94**	**2.51**	**5.61**	**19.04**	**15.17**	**100.00**
Mean	**12.3**	**10.1**	**11.2**	**15.2**	**17.5**	**15.1**	**11.6**	**9.6**	**10.8**	**14.4**	**19.1**	**17.6**	**15.7**
Maximum	**48.0**	**38.0**	**42.0**	**52.0**	**56.0**	**51.0**	**47.0**	**38.0**	**46.0**	**47.0**	**53.0**	**53.0**	**56.0**

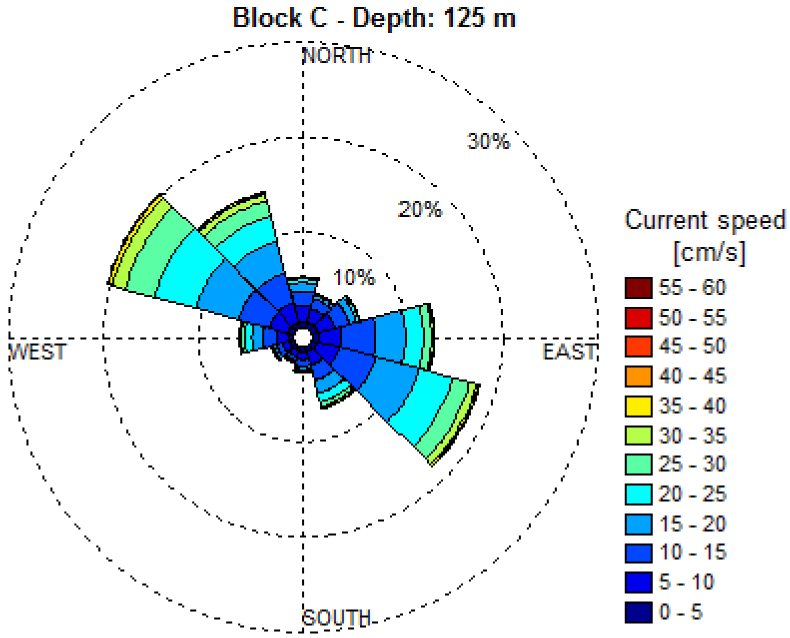


Figure 4-43 Current rose at 125 m depth at the Block C.

Table 4-48 Direction sample distribution of non-exceedance [%] of current speed at 125 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.59	0.64	0.65	0.65	0.63	0.56	0.48	0.44	0.44	0.51	0.62	0.60	6.81
< 10	2.26	2.11	2.48	3.08	3.00	2.05	1.33	1.11	1.24	1.76	2.64	2.72	25.79
< 15	3.82	3.17	4.04	6.59	7.07	3.79	2.01	1.55	1.85	3.08	5.95	6.01	48.92
< 20	4.72	3.59	4.80	9.52	11.78	5.28	2.42	1.75	2.17	4.21	10.44	9.62	70.30
< 25	5.15	3.71	5.08	11.27	15.54	6.30	2.62	1.82	2.32	4.93	14.86	12.53	86.13
< 30	5.30	3.75	5.16	12.06	17.43	6.79	2.71	1.84	2.36	5.29	17.93	14.30	94.93
< 35	5.35	3.76	5.18	12.29	18.19	7.00	2.74	1.84	2.38	5.43	19.27	15.07	98.51
< 40	5.36	3.76	5.18	12.36	18.43	7.07	2.75	1.84	2.38	5.48	19.72	15.31	99.65
< 45	5.37			12.37	18.49	7.10	2.75		2.38	5.49	19.83	15.38	99.94
< 50	5.37			12.37	18.50	7.10				5.49	19.85	15.39	99.99
< 55				12.37	18.50	7.10					19.85	15.39	100.00
< 60					18.50								100.00
Total	**5.37**	**3.76**	**5.18**	**12.37**	**18.50**	**7.10**	**2.75**	**1.84**	**2.38**	**5.49**	**19.85**	**15.39**	**100.00**
Mean	**11.7**	**9.5**	**10.6**	**14.6**	**17.1**	**14.7**	**11.0**	**9.0**	**10.3**	**14.1**	**19.0**	**17.3**	**15.5**
Maximum	**46.0**	**35.0**	**38.0**	**53.0**	**55.0**	**50.0**	**44.0**	**37.0**	**40.0**	**45.0**	**52.0**	**53.0**	**55.0**

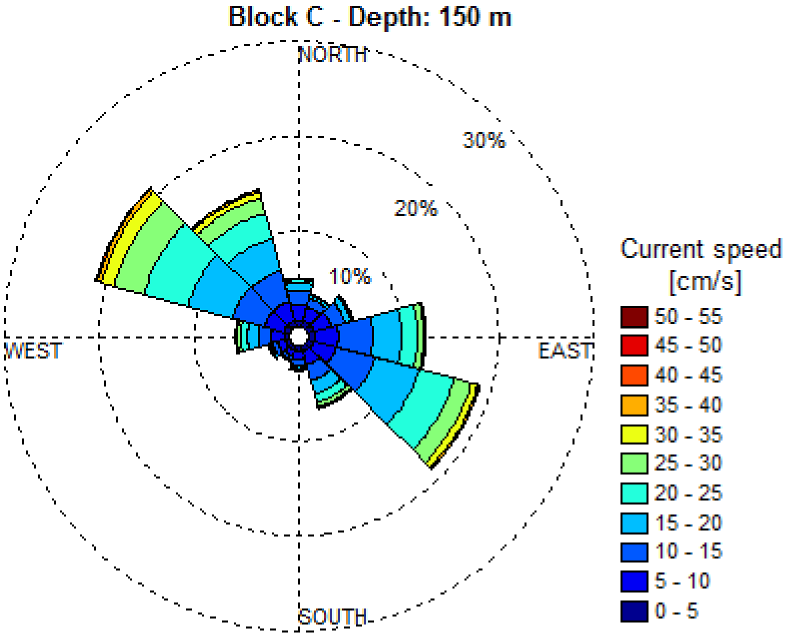


Figure 4-44 Current rose at 150 m depth at the Block C.

Table 4-49 Direction sample distribution of non-exceedance [%] of current speed at 150 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.60	0.64	0.68	0.64	0.65	0.59	0.49	0.46	0.46	0.53	0.61	0.62	6.97
< 10	2.30	2.15	2.53	3.14	3.13	2.15	1.37	1.12	1.28	1.81	2.72	2.74	26.45
< 15	3.83	3.11	3.98	6.68	7.39	3.94	2.04	1.52	1.83	3.18	6.16	6.16	49.82
< 20	4.62	3.45	4.63	9.53	12.30	5.45	2.41	1.70	2.12	4.25	10.87	9.84	71.18
< 25	4.97	3.54	4.83	11.09	16.16	6.46	2.57	1.75	2.23	4.93	15.50	12.77	86.82
< 30	5.08	3.56	4.88	11.72	18.04	6.91	2.64	1.76	2.27	5.26	18.70	14.54	95.37
< 35	5.11	3.57	4.89	11.92	18.74	7.09	2.66	1.77	2.28	5.38	20.10	15.25	98.75
< 40	5.12		4.90	11.95	18.93	7.14	2.66			5.42	20.53	15.48	99.73
< 45	5.12			11.96	18.97	7.15	2.66			5.42	20.63	15.52	99.94
< 50				11.96	18.98	7.16					20.65	15.53	99.99
< 55				11.96	18.98						20.66	15.53	100.00
Total	**5.12**	**3.57**	**4.90**	**11.96**	**18.98**	**7.16**	**2.66**	**1.77**	**2.28**	**5.42**	**20.66**	**15.53**	**100.00**
Mean	**11.2**	**8.9**	**10.0**	**14.1**	**16.9**	**14.3**	**10.4**	**8.5**	**9.6**	**13.7**	**19.0**	**17.1**	**15.3**
Maximum	**43.0**	**33.0**	**36.0**	**51.0**	**54.0**	**49.0**	**40.0**	**31.0**	**34.0**	**44.0**	**53.0**	**52.0**	**54.0**

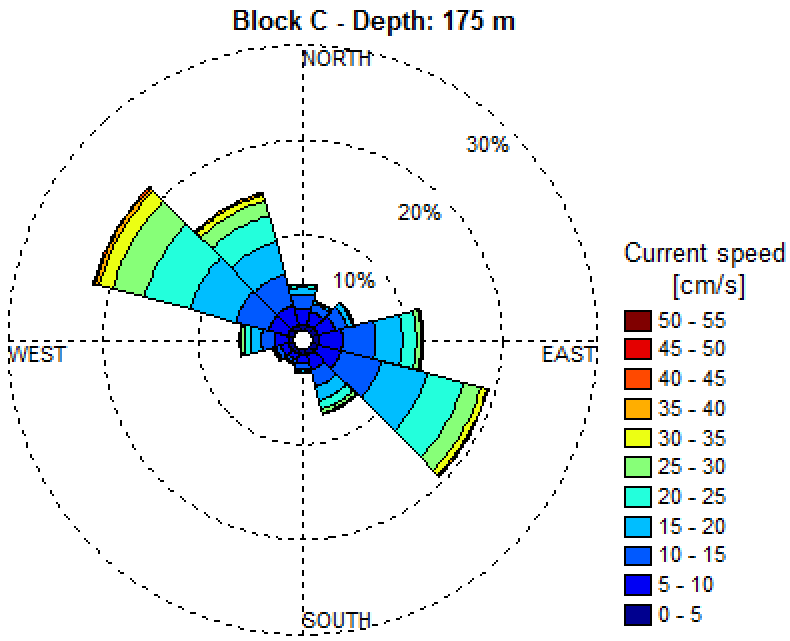


Figure 4-45 Current rose at 175 m depth at the Block C.

Table 4-50 Direction sample distribution of non-exceedance [%] of current speed at 175 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.62	0.63	0.66	0.65	0.68	0.61	0.49	0.46	0.49	0.52	0.63	0.59	7.04
< 10	2.27	2.09	2.50	3.17	3.23	2.26	1.42	1.14	1.34	1.87	2.69	2.79	26.76
< 15	3.77	2.97	3.81	6.61	7.71	4.17	2.08	1.53	1.86	3.25	6.24	6.21	50.23
< 20	4.54	3.25	4.35	9.25	12.78	5.76	2.42	1.68	2.12	4.33	11.04	9.93	71.45
< 25	4.83	3.31	4.50	10.64	16.73	6.76	2.55	1.72	2.20	4.99	15.86	12.97	87.06
< 30	4.92	3.33	4.54	11.16	18.62	7.20	2.60	1.73	2.22	5.28	19.22	14.73	95.55
< 35	4.94	3.33	4.54	11.30	19.29	7.36	2.61	1.73	2.22	5.39	20.68	15.46	98.85
< 40	4.95		4.54	11.32	19.46	7.39	2.61			5.41	21.11	15.67	99.75
< 45	4.95			11.33	19.49	7.40				5.42	21.22	15.71	99.95
< 50				11.33	19.49	7.41					21.25	15.72	99.99
< 55					19.49						21.25	15.72	100.00
Total	**4.95**	**3.33**	**4.54**	**11.33**	**19.49**	**7.41**	**2.61**	**1.73**	**2.22**	**5.42**	**21.25**	**15.72**	**100.00**
Mean	**10.8**	**8.6**	**9.6**	**13.7**	**16.7**	**14.0**	**9.9**	**8.1**	**9.0**	**13.4**	**19.1**	**17.1**	**15.2**
Maximum	**40.0**	**31.0**	**35.0**	**49.0**	**52.0**	**46.0**	**35.0**	**30.0**	**31.0**	**44.0**	**54.0**	**51.0**	**54.0**

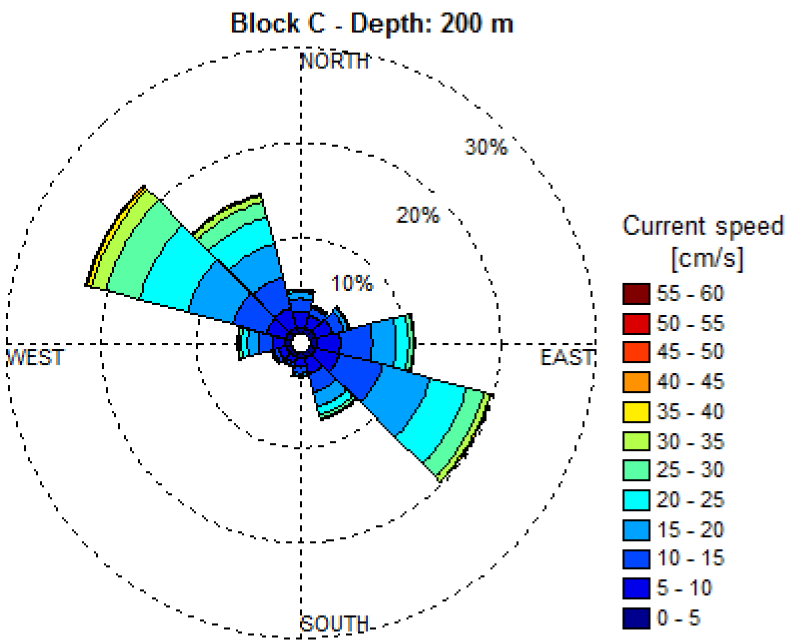


Figure 4-46 Current rose at 200 m depth at the Block C.

Table 4-51 Direction sample distribution of non-exceedance [%] of current speed at 200 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.62	0.66	0.68	0.65	0.63	0.54	0.47	0.49	0.58	0.63	0.63	7.20
< 10	2.24	2.03	2.47	3.15	3.27	2.37	1.53	1.18	1.36	1.94	2.70	2.82	27.07
< 15	3.64	2.84	3.68	6.38	7.94	4.47	2.19	1.53	1.86	3.39	6.33	6.24	50.50
< 20	4.37	3.09	4.14	8.74	13.20	6.14	2.47	1.65	2.06	4.44	11.17	10.03	71.48
< 25	4.63	3.14	4.27	9.96	17.21	7.09	2.58	1.69	2.12	5.05	16.18	13.14	87.05
< 30	4.70	3.15	4.30	10.40	19.11	7.52	2.62	1.69	2.14	5.32	19.70	14.93	95.56
< 35	4.72		4.30	10.50	19.74	7.67	2.63	1.69	2.14	5.41	21.23	15.68	98.86
< 40	4.72			10.52	19.89	7.70	2.63			5.43	21.70	15.88	99.75
< 45				10.52	19.91	7.71				5.43	21.82	15.92	99.95
< 50				10.53	19.92						21.84	15.93	99.99
< 55					19.92						21.85	15.93	100.00
< 60											21.85		100.00
Total	**4.72**	**3.15**	**4.30**	**10.53**	**19.92**	**7.71**	**2.63**	**1.69**	**2.14**	**5.43**	**21.85**	**15.93**	**100.00**
Mean	**10.7**	**8.5**	**9.3**	**13.3**	**16.7**	**13.7**	**9.3**	**7.8**	**8.6**	**13.0**	**19.2**	**17.1**	**15.1**
Maximum	**37.0**	**29.0**	**34.0**	**49.0**	**51.0**	**44.0**	**36.0**	**30.0**	**30.0**	**43.0**	**56.0**	**51.0**	**56.0**

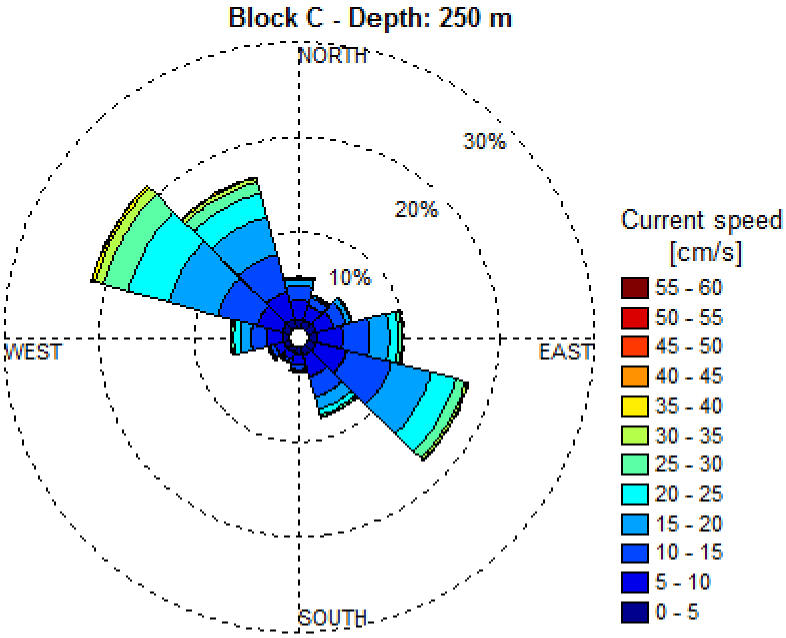


Figure 4-47 Current rose at 250 m depth at the Block C.

Table 4-52 Direction sample distribution of non-exceedance [%] of current speed at 250 m depth at the Block C.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.83	0.82	0.91	0.94	0.93	0.88	0.69	0.60	0.66	0.71	0.86	0.90	9.73
< 10	2.83	2.40	2.77	3.57	4.25	3.31	1.86	1.40	1.60	2.34	3.49	3.91	33.73
< 15	4.40	3.33	4.09	6.34	9.02	5.65	2.44	1.69	2.08	3.89	7.71	8.11	58.75
< 20	5.09	3.59	4.62	8.22	13.37	7.12	2.62	1.78	2.25	4.98	12.86	12.35	78.84
< 25	5.31	3.65	4.77	9.14	16.03	7.78	2.69	1.80	2.31	5.59	17.22	15.15	91.42
< 30	5.36	3.66	4.80	9.48	17.10	8.02	2.70	1.80	2.32	5.83	19.79	16.48	97.35
< 35	5.37		4.80	9.56	17.40	8.11	2.71		2.33	5.93	20.73	16.94	99.33
< 40			4.80	9.57	17.46	8.12			2.33	5.95	21.03	17.06	99.86
< 45				9.58	17.47	8.13				5.95	21.09	17.09	99.97
< 50				9.58	17.48					5.96	21.10	17.10	99.99
< 55					17.48						21.10	17.10	100.00
< 60											21.11		100.00
Total	**5.37**	**3.66**	**4.80**	**9.58**	**17.48**	**8.13**	**2.71**	**1.80**	**2.33**	**5.96**	**21.11**	**17.10**	**100.00**
Mean	**9.8**	**8.2**	**9.1**	**12.4**	**14.7**	**11.9**	**8.0**	**6.9**	**8.0**	**12.4**	**17.5**	**15.4**	**13.6**
Maximum	**34.0**	**28.0**	**35.0**	**45.0**	**51.0**	**44.0**	**31.0**	**28.0**	**37.0**	**45.0**	**58.0**	**50.0**	**58.0**

4.2.4 Block D

Figure 4-48 – Figure 4-63 show current roses for Block D. Table 4-50 – Table 4-65 show the corresponding distributions of non-exceedance of current speed.

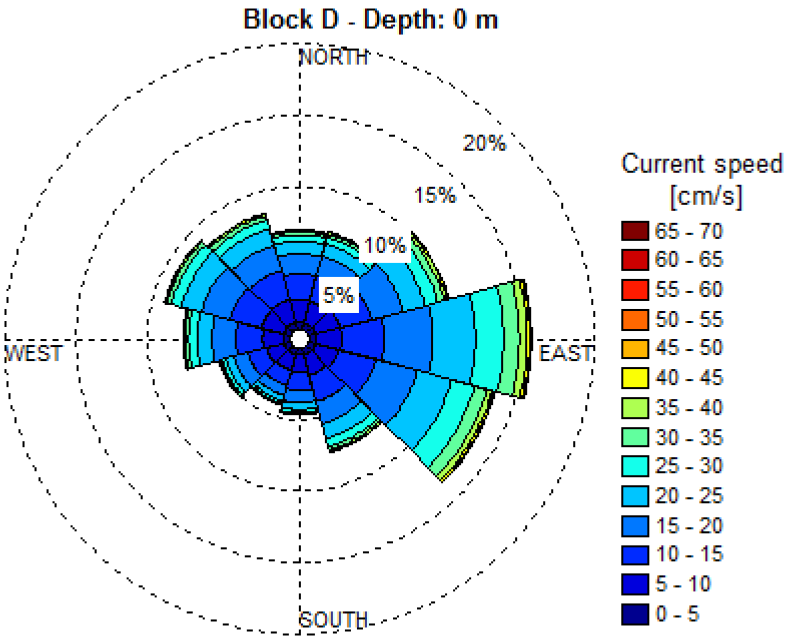


Figure 4-48 Current rose at 0 m depth at the Block D.

Table 4-53 Direction sample distribution of non-exceedance [%] of current speed at 0 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.53	0.48	0.51	0.49	0.49	0.48	0.44	0.44	0.46	0.46	0.48	0.51	5.78
< 10	2.08	2.04	2.26	2.29	2.19	1.97	1.67	1.60	1.73	1.91	2.11	2.20	24.03
< 15	3.83	3.85	4.56	5.25	4.90	3.88	2.95	2.69	3.04	3.76	4.39	4.33	47.43
< 20	5.18	5.31	6.81	8.64	7.99	5.57	3.83	3.41	4.05	5.41	6.45	6.18	68.82
< 25	6.06	6.20	8.38	11.59	10.55	6.68	4.32	3.81	4.63	6.45	7.89	7.40	83.95
< 30	6.52	6.67	9.28	13.55	12.24	7.26	4.55	3.99	4.90	7.03	8.63	8.05	92.67
< 35	6.72	6.89	9.74	14.63	13.13	7.52	4.65	4.08	5.03	7.28	8.93	8.36	96.96
< 40	6.81	7.00	9.95	15.16	13.53	7.62	4.69	4.11	5.08	7.37	9.05	8.49	98.86
< 45	6.85	7.03	10.03	15.37	13.70	7.67	4.71	4.11	5.10	7.40	9.10	8.53	99.60
< 50	6.87	7.05	10.06	15.45	13.77	7.69	4.71	4.12	5.10	7.41	9.12	8.55	99.88
< 55	6.87	7.06	10.06	15.47	13.79	7.69	4.71	4.12	5.11	7.42	9.12	8.55	99.97
< 60		7.06	10.07	15.48	13.79	7.70			5.11	7.42	9.12	8.56	99.99
< 65			10.07	15.48	13.79	7.70					9.12	8.56	100.00
< 70				15.48							9.12		100.00
Total	**6.87**	**7.06**	**10.07**	**15.48**	**13.79**	**7.70**	**4.71**	**4.12**	**5.11**	**7.42**	**9.12**	**8.56**	**100.00**
Mean	**14.6**	**14.8**	**16.5**	**18.9**	**18.5**	**15.4**	**13.3**	**12.7**	**13.7**	**15.3**	**15.7**	**15.4**	**16.1**
Maximum	**54.0**	**58.0**	**64.0**	**65.0**	**63.0**	**60.0**	**52.0**	**53.0**	**55.0**	**58.0**	**66.0**	**64.0**	**66.0**

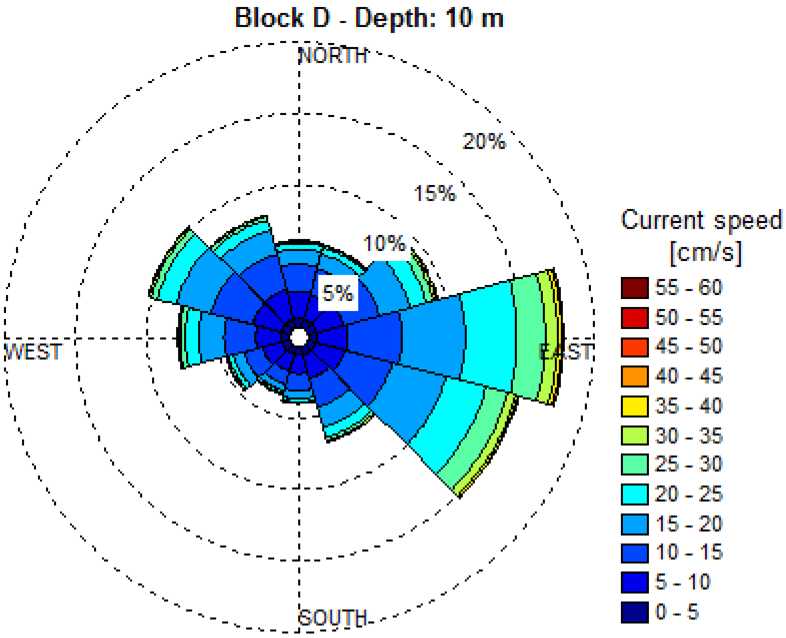


Figure 4-49 Current rose at 10 m depth at the Block D.

Table 4-54 Direction sample distribution of non-exceedance [%] of current speed at 10 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.60	0.60	0.62	0.63	0.58	0.57	0.52	0.51	0.58	0.57	0.61	0.62	7.00
< 10	2.47	2.38	2.57	2.79	2.70	2.31	1.87	1.76	1.96	2.33	2.69	2.78	28.61
< 15	4.35	4.25	5.13	6.50	6.17	4.42	3.07	2.75	3.28	4.52	5.71	5.37	55.53
< 20	5.42	5.33	7.27	10.88	10.15	5.95	3.67	3.21	4.07	6.26	8.23	7.17	77.61
< 25	5.84	5.78	8.43	14.43	13.14	6.72	3.91	3.41	4.41	7.18	9.59	7.94	90.77
< 30	5.98	5.92	8.95	16.36	14.77	6.99	3.99	3.48	4.56	7.53	10.06	8.18	96.76
< 35	6.02	5.97	9.14	17.20	15.40	7.09	4.01	3.49	4.60	7.65	10.21	8.26	99.05
< 40	6.03	5.99	9.21	17.49	15.58	7.12	4.02	3.50	4.61	7.68	10.26	8.28	99.76
< 45	6.03	5.99	9.23	17.59	15.62	7.12	4.02		4.61	7.69	10.27	8.29	99.95
< 50		5.99	9.23	17.61	15.63				4.61	7.69	10.27	8.29	99.99
< 55			9.23	17.61	15.63								100.00
< 60				17.62									100.00
Total	**6.03**	**5.99**	**9.23**	**17.62**	**15.63**	**7.12**	**4.02**	**3.50**	**4.61**	**7.69**	**10.27**	**8.29**	**100.00**
Mean	**11.6**	**11.8**	**14.2**	**17.5**	**16.9**	**13.1**	**10.8**	**10.4**	**11.6**	**13.6**	**14.1**	**12.7**	**14.3**
Maximum	**42.0**	**48.0**	**50.0**	**55.0**	**54.0**	**42.0**	**41.0**	**39.0**	**46.0**	**48.0**	**49.0**	**47.0**	**55.0**

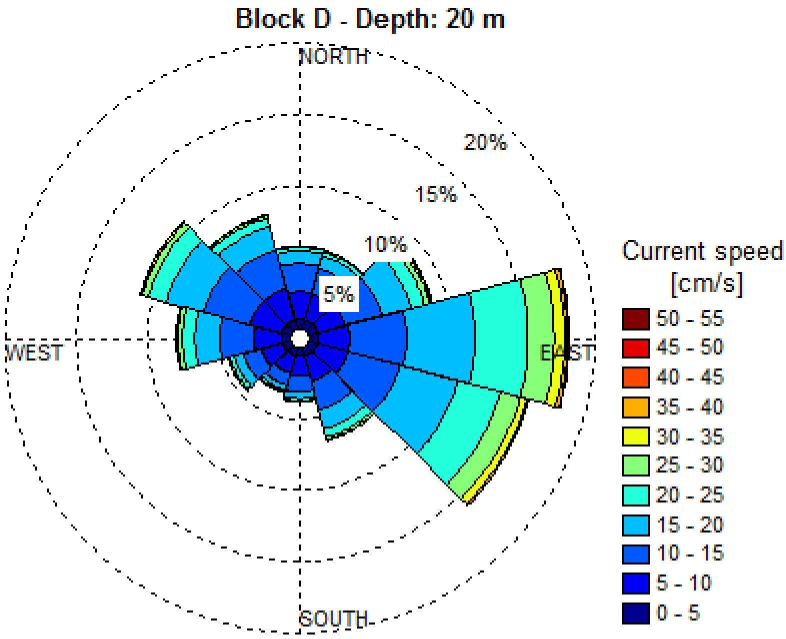


Figure 4-50 Current rose at 20 m depth at the Block D.

Table 4-55 Direction sample distribution of non-exceedance [%] of current speed at 20 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.62	0.61	0.60	0.61	0.60	0.55	0.56	0.58	0.61	0.64	0.64	7.23
< 10	2.56	2.50	2.61	2.80	2.83	2.46	1.98	1.84	2.09	2.53	2.93	2.93	30.07
< 15	4.50	4.35	5.27	6.73	6.63	4.62	3.09	2.73	3.36	4.91	6.28	5.78	58.25
< 20	5.39	5.24	7.26	11.48	10.94	6.06	3.58	3.10	4.03	6.61	9.01	7.54	80.22
< 25	5.65	5.53	8.18	15.10	14.07	6.70	3.76	3.24	4.30	7.46	10.31	8.16	92.46
< 30	5.72	5.61	8.54	16.88	15.57	6.91	3.81	3.30	4.42	7.76	10.73	8.34	97.60
< 35	5.74	5.63	8.67	17.61	16.10	6.97	3.81	3.31	4.45	7.85	10.85	8.39	99.38
< 40	5.75	5.64	8.72	17.82	16.23	6.98	3.82		4.45	7.87	10.88	8.40	99.86
< 45	5.75	5.64	8.72	17.89	16.25	6.98			4.46	7.87	10.89	8.40	99.97
< 50			8.73	17.91	16.26					7.87	10.89	8.40	100.00
< 55				17.91	16.26								100.00
Total	**5.75**	**5.64**	**8.73**	**17.91**	**16.26**	**6.98**	**3.82**	**3.31**	**4.46**	**7.87**	**10.89**	**8.40**	**100.00**
Mean	**10.8**	**10.9**	**13.4**	**17.2**	**16.5**	**12.4**	**10.0**	**9.7**	**10.9**	**13.1**	**13.7**	**12.1**	**13.8**
Maximum	**41.0**	**44.0**	**48.0**	**52.0**	**52.0**	**40.0**	**39.0**	**34.0**	**42.0**	**48.0**	**48.0**	**47.0**	**52.0**

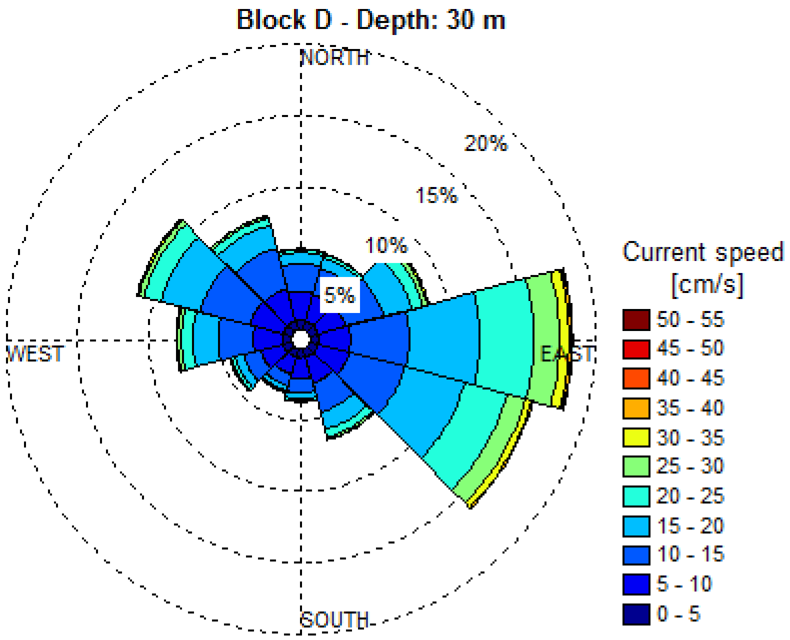


Figure 4-51 Current rose at 30 m depth at the Block D.

Table 4-56 Direction sample distribution of non-exceedance [%] of current speed at 30 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.59	0.59	0.55	0.61	0.60	0.60	0.58	0.63	0.60	0.61	0.64	7.22
< 10	2.61	2.53	2.60	2.79	2.87	2.52	2.07	1.85	2.21	2.66	3.01	2.99	30.69
< 15	4.56	4.40	5.31	6.85	6.91	4.70	3.10	2.70	3.43	5.09	6.58	5.97	59.61
< 20	5.34	5.18	7.26	11.73	11.38	6.05	3.55	3.03	4.03	6.80	9.40	7.71	81.46
< 25	5.55	5.40	8.05	15.42	14.56	6.63	3.71	3.15	4.28	7.59	10.68	8.26	93.28
< 30	5.60	5.45	8.35	17.17	15.97	6.81	3.75	3.19	4.38	7.86	11.05	8.41	98.00
< 35	5.61	5.47	8.45	17.82	16.44	6.86	3.75	3.20	4.40	7.93	11.15	8.45	99.51
< 40	5.61	5.47	8.47	18.00	16.54	6.86	3.75		4.40	7.95	11.18	8.45	99.89
< 45	5.62	5.47	8.48	18.05	16.55				4.40	7.95	11.18	8.46	99.98
< 50			8.48	18.06	16.56					7.95	11.18	8.46	100.00
< 55				18.06	16.56								100.00
Total	**5.62**	**5.47**	**8.48**	**18.06**	**16.56**	**6.86**	**3.75**	**3.20**	**4.40**	**7.95**	**11.18**	**8.46**	**100.00**
Mean	**10.4**	**10.5**	**13.1**	**17.0**	**16.3**	**12.1**	**9.7**	**9.4**	**10.5**	**12.8**	**13.6**	**11.9**	**13.5**
Maximum	**40.0**	**43.0**	**47.0**	**50.0**	**50.0**	**39.0**	**38.0**	**32.0**	**42.0**	**47.0**	**47.0**	**48.0**	**50.0**

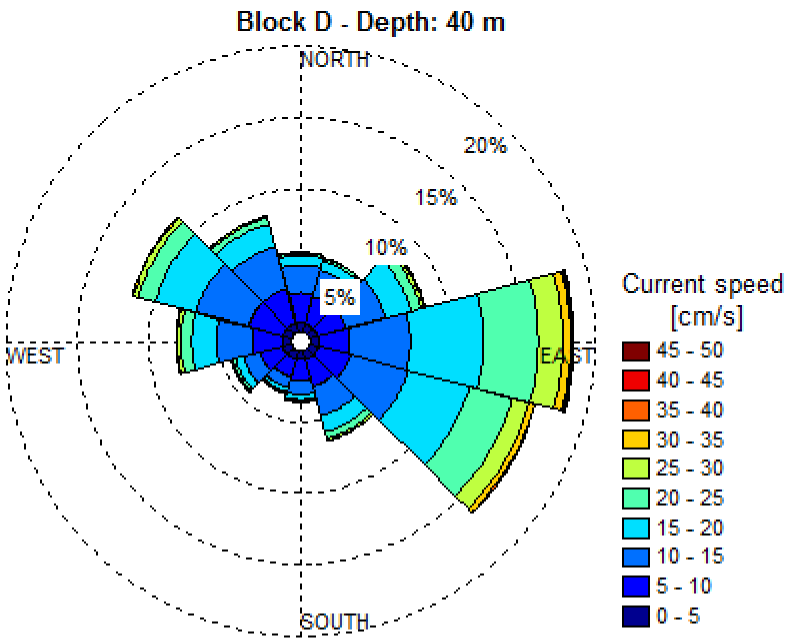


Figure 4-52 Current rose at 40 m depth at the Block D.

Table 4-57 Direction sample distribution of non-exceedance [%] of current speed at 40 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.60	0.59	0.57	0.57	0.61	0.62	0.59	0.60	0.64	0.62	0.63	0.65	7.29
< 10	2.68	2.57	2.62	2.77	2.95	2.61	2.07	1.89	2.24	2.70	3.14	3.11	31.33
< 15	4.64	4.45	5.44	6.97	7.18	4.79	3.06	2.68	3.44	5.17	6.93	6.23	60.99
< 20	5.33	5.11	7.25	12.06	11.79	6.05	3.45	2.98	4.01	6.85	9.87	7.93	82.67
< 25	5.48	5.29	7.92	15.76	14.99	6.56	3.58	3.09	4.24	7.59	11.13	8.41	94.05
< 30	5.51	5.32	8.14	17.43	16.33	6.71	3.61	3.12	4.32	7.83	11.48	8.54	98.35
< 35	5.51	5.33	8.21	17.98	16.73	6.75	3.62	3.13	4.34	7.90	11.57	8.57	99.62
< 40	5.51	5.33	8.23	18.13	16.81	6.76	3.62		4.34	7.91	11.59	8.57	99.92
< 45		5.33	8.23	18.18	16.82	6.76				7.91	11.59	8.57	99.99
< 50				18.18	16.82					7.92	11.59	8.57	100.00
Total	**5.51**	**5.33**	**8.23**	**18.18**	**16.82**	**6.76**	**3.62**	**3.13**	**4.34**	**7.92**	**11.59**	**8.57**	**100.00**
Mean	**10.1**	**10.1**	**12.6**	**16.8**	**16.0**	**11.8**	**9.4**	**9.1**	**10.3**	**12.6**	**13.4**	**11.7**	**13.3**
Maximum	**38.0**	**41.0**	**44.0**	**48.0**	**48.0**	**42.0**	**37.0**	**31.0**	**39.0**	**47.0**	**47.0**	**45.0**	**48.0**

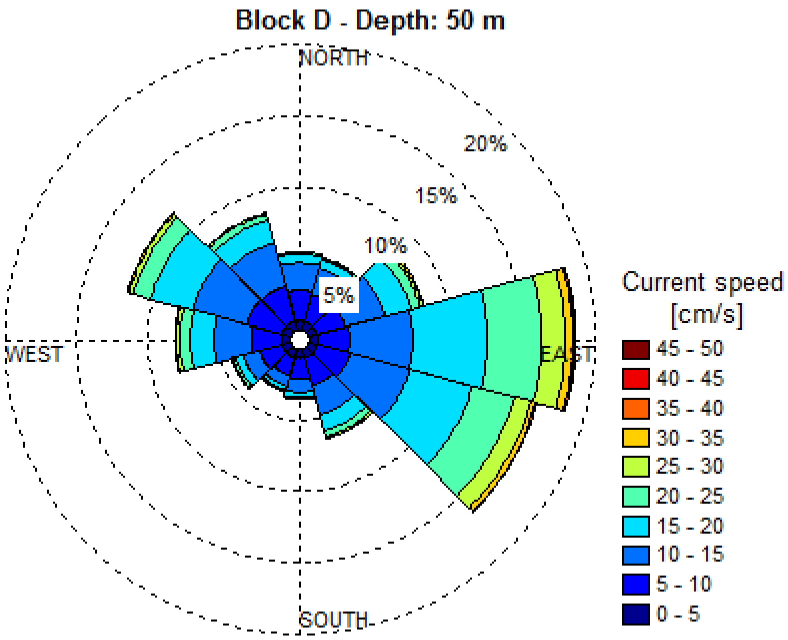


Figure 4-53 Current rose at 50 m depth at the Block D.

Table 4-58 Direction sample distribution of non-exceedance [%] of current speed at 50 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.59	0.59	0.57	0.61	0.60	0.63	0.59	0.61	0.62	0.63	0.63	0.67	7.35
< 10	2.71	2.58	2.64	2.83	2.98	2.67	2.09	1.92	2.23	2.73	3.19	3.19	31.76
< 15	4.64	4.45	5.47	7.16	7.32	4.85	3.05	2.69	3.39	5.26	7.10	6.37	61.76
< 20	5.28	5.07	7.23	12.29	12.01	6.08	3.42	2.97	3.92	6.89	10.12	8.06	83.36
< 25	5.41	5.22	7.84	15.96	15.18	6.57	3.54	3.08	4.14	7.60	11.38	8.52	94.44
< 30	5.44	5.25	8.03	17.56	16.46	6.71	3.57	3.11	4.21	7.84	11.72	8.62	98.51
< 35	5.44	5.25	8.09	18.08	16.84	6.74	3.57	3.11	4.23	7.90	11.80	8.64	99.68
< 40	5.44	5.25	8.10	18.21	16.90	6.74	3.57		4.23	7.91	11.82	8.65	99.93
< 45			8.10	18.25	16.90	6.74				7.91	11.83	8.65	99.99
< 50				18.25	16.91					7.92	11.83	8.65	100.00
Total	**5.44**	**5.25**	**8.10**	**18.25**	**16.91**	**6.74**	**3.57**	**3.11**	**4.23**	**7.92**	**11.83**	**8.65**	**100.00**
Mean	**9.9**	**10.0**	**12.4**	**16.6**	**15.9**	**11.6**	**9.3**	**8.9**	**10.1**	**12.4**	**13.4**	**11.5**	**13.2**
Maximum	**37.0**	**35.0**	**43.0**	**47.0**	**46.0**	**42.0**	**36.0**	**32.0**	**38.0**	**47.0**	**46.0**	**45.0**	**47.0**

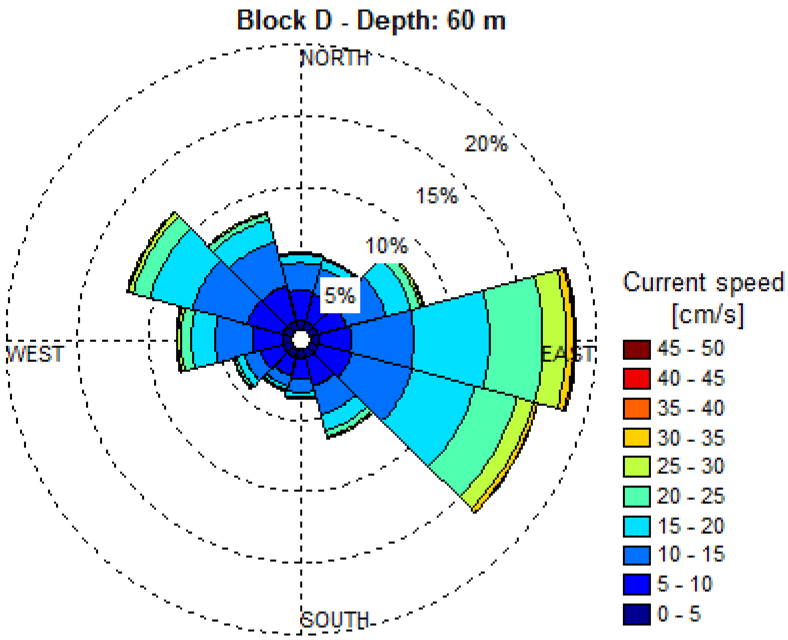


Figure 4-54 Current rose at 60 m depth at the Block D.

Table 4-59 Direction sample distribution of non-exceedance [%] of current speed at 60 m depth at the Block D.

Current speed [cm/s]	Current direction 0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	Omni
< 5	0.59	0.59	0.57	0.60	0.61	0.63	0.61	0.61	0.62	0.63	0.65	0.67	7.40
< 10	2.73	2.60	2.64	2.84	3.03	2.69	2.13	1.92	2.24	2.73	3.25	3.20	31.99
< 15	4.64	4.45	5.47	7.17	7.45	4.87	3.08	2.68	3.39	5.27	7.20	6.44	62.11
< 20	5.26	5.05	7.19	12.35	12.15	6.09	3.44	2.95	3.92	6.89	10.26	8.11	83.69
< 25	5.38	5.19	7.79	15.98	15.32	6.56	3.55	3.05	4.13	7.58	11.52	8.56	94.60
< 30	5.40	5.21	7.96	17.55	16.58	6.69	3.58	3.08	4.20	7.81	11.85	8.66	98.58
< 35	5.41	5.22	8.01	18.05	16.94	6.72	3.58	3.08	4.21	7.87	11.93	8.68	99.69
< 40	5.41	5.22	8.02	18.18	17.00	6.73	3.58		4.21	7.88	11.95	8.68	99.94
< 45			8.03	18.21	17.01	6.73				7.88	11.96	8.68	99.99
< 50				18.22	17.01					7.88	11.96		100.00
Total	**5.41**	**5.22**	**8.03**	**18.22**	**17.01**	**6.73**	**3.58**	**3.08**	**4.21**	**7.88**	**11.96**	**8.68**	**100.00**
Mean	**9.8**	**9.9**	**12.3**	**16.6**	**15.8**	**11.6**	**9.1**	**8.8**	**10.0**	**12.4**	**13.3**	**11.5**	**13.1**
Maximum	**37.0**	**35.0**	**42.0**	**47.0**	**46.0**	**43.0**	**36.0**	**32.0**	**38.0**	**46.0**	**46.0**	**43.0**	**47.0**

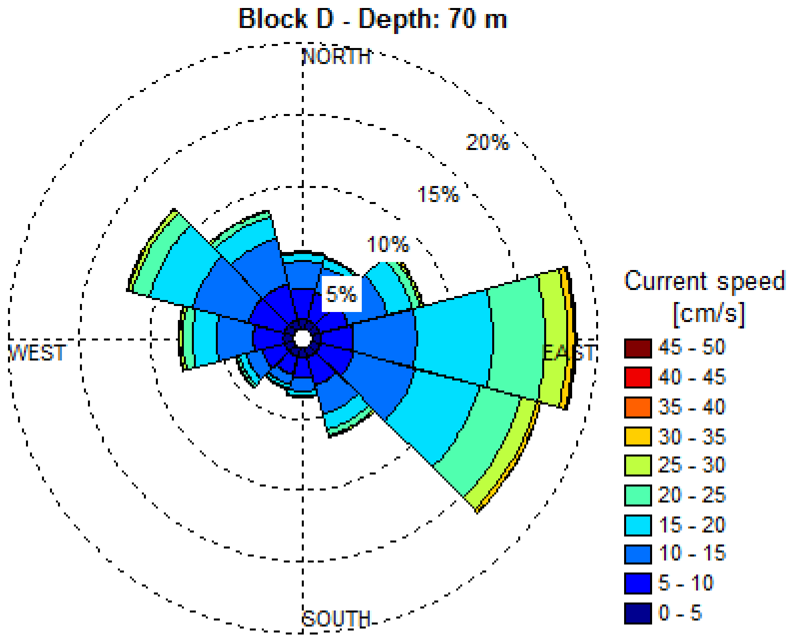


Figure 4-55 Current rose at 70 m depth at the Block D.

Table 4-60 Direction sample distribution of non-exceedance [%] of current speed at 70 m depth at the Block D.

Current speed [cm/s]	**Current direction**												**Omni**
	0°	**30°**	**60°**	**90°**	**120°**	**150°**	**180°**	**210°**	**240°**	**270°**	**300°**	**330°**	
< 5	0.61	0.59	0.58	0.59	0.62	0.65	0.61	0.63	0.63	0.66	0.66	0.66	7.49
< 10	2.77	2.63	2.66	2.86	3.06	2.73	2.13	1.96	2.25	2.79	3.28	3.25	32.36
< 15	4.67	4.46	5.48	7.26	7.56	4.93	3.07	2.68	3.37	5.31	7.31	6.58	62.69
< 20	5.25	5.02	7.15	12.51	12.34	6.13	3.42	2.95	3.88	6.91	10.46	8.24	84.25
< 25	5.36	5.14	7.71	16.07	15.50	6.58	3.53	3.04	4.07	7.57	11.72	8.67	94.96
< 30	5.38	5.16	7.86	17.57	16.72	6.70	3.55	3.06	4.14	7.78	12.05	8.77	98.74
< 35	5.38	5.16	7.90	18.02	17.04	6.72	3.55	3.06	4.15	7.83	12.12	8.78	99.73
< 40	5.38		7.91	18.14	17.09	6.73	3.55		4.15	7.85	12.14	8.79	99.95
< 45			7.91	18.17	17.10	6.73				7.85	12.14	8.79	99.99
< 50				18.17	17.10					7.85	12.15		100.00
Total	**5.38**	**5.16**	**7.91**	**18.17**	**17.10**	**6.73**	**3.55**	**3.06**	**4.15**	**7.85**	**12.15**	**8.79**	**100.00**
Mean	**9.7**	**9.7**	**12.1**	**16.4**	**15.7**	**11.4**	**9.1**	**8.6**	**9.9**	**12.3**	**13.3**	**11.4**	**13.0**
Maximum	**36.0**	**33.0**	**41.0**	**46.0**	**46.0**	**42.0**	**36.0**	**32.0**	**37.0**	**46.0**	**46.0**	**41.0**	**46.0**

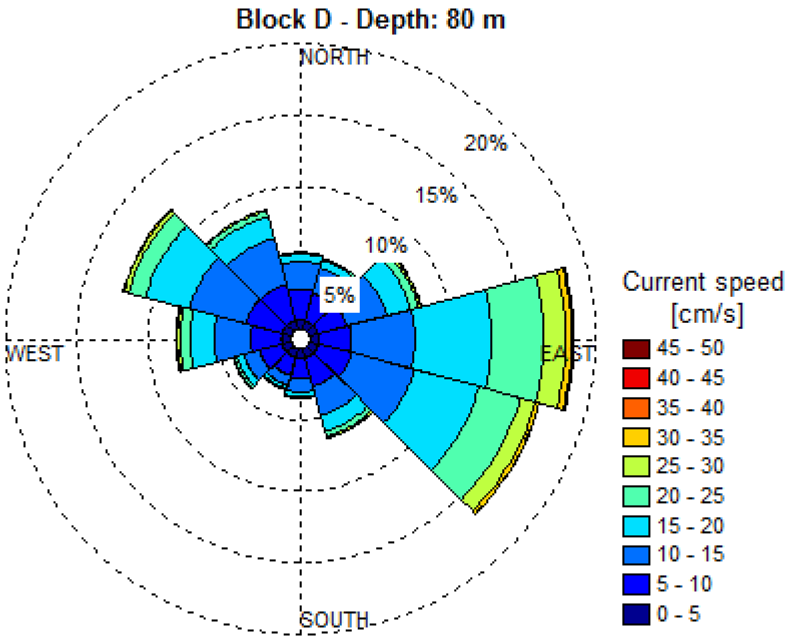


Figure 4-56 Current rose at 80 m depth at the Block D.

Table 4-61 Direction sample distribution of non-exceedance [%] of current speed at 80 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.58	0.60	0.58	0.62	0.66	0.61	0.64	0.64	0.66	0.65	0.66	7.52
< 10	2.77	2.61	2.70	2.86	3.06	2.79	2.13	1.95	2.27	2.80	3.29	3.28	32.51
< 15	4.67	4.44	5.55	7.29	7.60	4.98	3.06	2.66	3.39	5.34	7.35	6.66	62.99
< 20	5.24	4.99	7.19	12.56	12.45	6.17	3.41	2.91	3.88	6.93	10.54	8.31	84.57
< 25	5.35	5.10	7.72	16.09	15.57	6.60	3.51	3.01	4.07	7.59	11.79	8.74	95.14
< 30	5.36	5.11	7.87	17.57	16.75	6.72	3.53	3.02	4.14	7.80	12.10	8.83	98.81
< 35	5.36	5.12	7.91	18.00	17.05	6.74	3.53	3.03	4.14	7.85	12.18	8.85	99.75
< 40	5.36		7.91	18.10	17.10	6.75	3.53		4.14	7.87	12.20	8.85	99.95
< 45			7.91	18.13	17.10	6.75				7.87	12.20	8.85	100.00
< 50				18.13	17.11					7.87	12.20		100.00
Total	**5.36**	**5.12**	**7.91**	**18.13**	**17.11**	**6.75**	**3.53**	**3.03**	**4.14**	**7.87**	**12.20**	**8.85**	**100.00**
Mean	**9.6**	**9.7**	**12.0**	**16.3**	**15.6**	**11.3**	**9.0**	**8.6**	**9.8**	**12.3**	**13.3**	**11.4**	**12.9**
Maximum	**35.0**	**32.0**	**40.0**	**46.0**	**46.0**	**42.0**	**36.0**	**32.0**	**37.0**	**46.0**	**46.0**	**41.0**	**46.0**

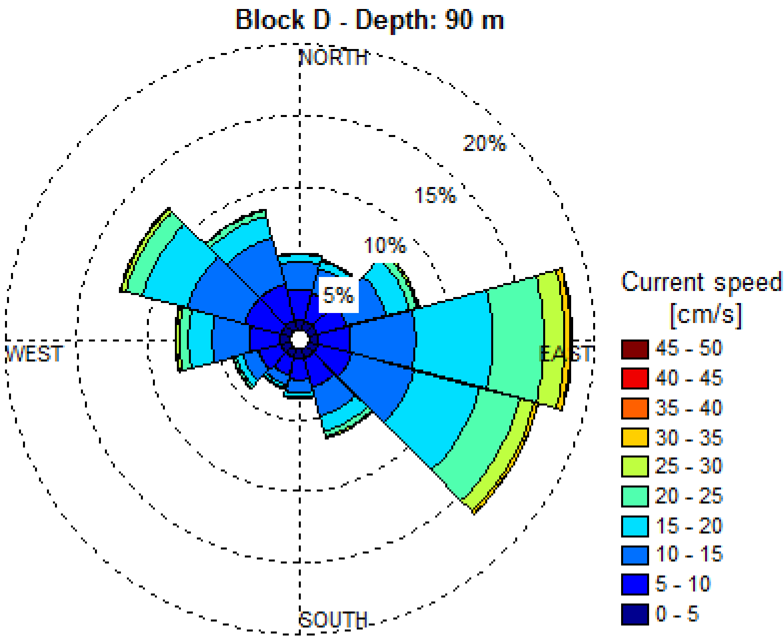


Figure 4-57 Current rose at 90 m depth at the Block D.

Table 4-62 Direction sample distribution of non-exceedance [%] of current speed at 90 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.60	0.61	0.58	0.65	0.66	0.63	0.61	0.65	0.67	0.66	0.67	7.61
< 10	2.79	2.64	2.76	2.90	3.09	2.80	2.16	1.93	2.31	2.82	3.31	3.30	32.81
< 15	4.71	4.43	5.59	7.38	7.72	5.00	3.08	2.64	3.42	5.38	7.45	6.72	63.53
< 20	5.24	4.96	7.18	12.69	12.62	6.17	3.41	2.87	3.90	6.98	10.69	8.40	85.13
< 25	5.33	5.05	7.67	16.16	15.70	6.60	3.51	2.96	4.08	7.62	11.95	8.82	95.46
< 30	5.34	5.06	7.81	17.58	16.83	6.70	3.53	2.97	4.13	7.82	12.27	8.91	98.96
< 35	5.34	5.07	7.84	17.96	17.10	6.72	3.53	2.97	4.14	7.87	12.34	8.92	99.79
< 40			7.85	18.04	17.14	6.73	3.53		4.14	7.88	12.36	8.92	99.96
< 45				18.07	17.15	6.73				7.89	12.36	8.92	100.00
< 50				18.07	17.15					7.89	12.36		100.00
Total	**5.34**	**5.07**	**7.85**	**18.07**	**17.15**	**6.73**	**3.53**	**2.97**	**4.14**	**7.89**	**12.36**	**8.92**	**100.00**
Mean	**9.6**	**9.6**	**11.9**	**16.2**	**15.5**	**11.3**	**8.9**	**8.5**	**9.7**	**12.2**	**13.3**	**11.4**	**12.9**
Maximum	**34.0**	**31.0**	**39.0**	**46.0**	**45.0**	**41.0**	**35.0**	**31.0**	**36.0**	**45.0**	**46.0**	**40.0**	**46.0**

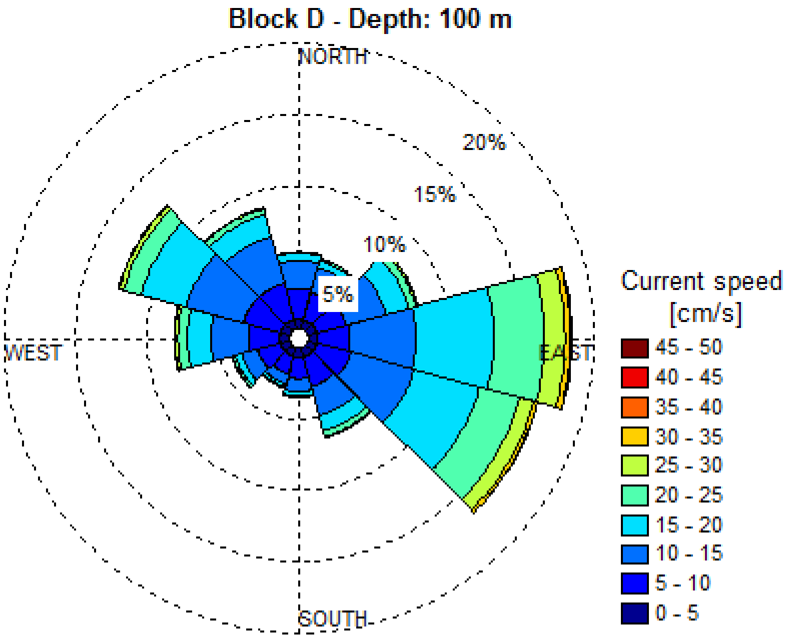


Figure 4-58 Current rose at 100 m depth at the Block D.

Table 4-63 Direction sample distribution of non-exceedance [%] of current speed at 100 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.60	0.59	0.62	0.60	0.65	0.67	0.63	0.61	0.65	0.66	0.66	0.68	7.62
< 10	2.80	2.64	2.76	2.92	3.09	2.83	2.17	1.92	2.32	2.81	3.34	3.33	32.93
< 15	4.72	4.42	5.60	7.45	7.74	5.04	3.07	2.62	3.43	5.41	7.51	6.78	63.78
< 20	5.25	4.94	7.16	12.80	12.66	6.20	3.40	2.85	3.90	6.99	10.79	8.46	85.39
< 25	5.33	5.03	7.64	16.21	15.73	6.63	3.49	2.94	4.06	7.63	12.04	8.88	95.60
< 30	5.34	5.04	7.77	17.58	16.82	6.72	3.50	2.95	4.12	7.83	12.36	8.96	99.00
< 35	5.34	5.04	7.80	17.96	17.08	6.74	3.51	2.95	4.12	7.87	12.43	8.97	99.81
< 40			7.80	18.04	17.12	6.74	3.51		4.12	7.88	12.44	8.97	99.97
< 45				18.06	17.12	6.75				7.89	12.45		100.00
< 50				18.06	17.12					7.89	12.45		100.00
Total	**5.34**	**5.04**	**7.80**	**18.06**	**17.12**	**6.75**	**3.51**	**2.95**	**4.12**	**7.89**	**12.45**	**8.97**	**100.00**
Mean	**9.5**	**9.5**	**11.8**	**16.1**	**15.5**	**11.2**	**8.8**	**8.5**	**9.6**	**12.2**	**13.3**	**11.3**	**12.8**
Maximum	**33.0**	**31.0**	**38.0**	**46.0**	**45.0**	**41.0**	**35.0**	**31.0**	**36.0**	**45.0**	**45.0**	**39.0**	**46.0**

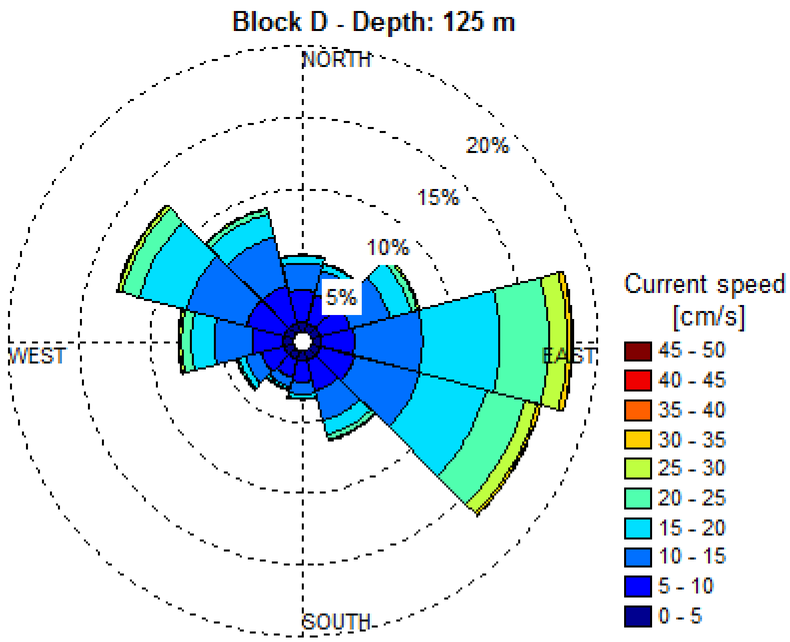


Figure 4-59 Current rose at 125 m depth at the Block D.

Table 4-64 Direction sample distribution of non-exceedance [%] of current speed at 125 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.61	0.60	0.62	0.61	0.63	0.67	0.66	0.62	0.67	0.65	0.67	0.66	7.66
< 10	2.85	2.68	2.77	2.98	3.13	2.94	2.19	1.94	2.34	2.85	3.39	3.37	33.41
< 15	4.76	4.43	5.59	7.66	7.90	5.16	3.06	2.60	3.44	5.44	7.73	6.95	64.73
< 20	5.27	4.90	7.08	12.98	12.90	6.29	3.36	2.82	3.87	7.02	11.12	8.70	86.30
< 25	5.34	4.97	7.52	16.28	15.85	6.69	3.43	2.88	4.02	7.64	12.43	9.12	96.16
< 30	5.34	4.98	7.62	17.51	16.83	6.77	3.44	2.90	4.06	7.82	12.74	9.19	99.19
< 35	5.35		7.63	17.82	17.05	6.78	3.44	2.90	4.06	7.86	12.80	9.19	99.85
< 40			7.63	17.89	17.08	6.78	3.44		4.06	7.87	12.81		99.98
< 45				17.90	17.08	6.79				7.87	12.81		100.00
< 50				17.90							12.81		100.00
Total	**5.35**	**4.98**	**7.63**	**17.90**	**17.08**	**6.79**	**3.44**	**2.90**	**4.06**	**7.87**	**12.81**	**9.19**	**100.00**
Mean	**9.4**	**9.4**	**11.6**	**15.8**	**15.3**	**11.0**	**8.6**	**8.3**	**9.3**	**12.1**	**13.3**	**11.3**	**12.7**
Maximum	**30.0**	**29.0**	**36.0**	**45.0**	**44.0**	**40.0**	**36.0**	**30.0**	**35.0**	**43.0**	**45.0**	**34.0**	**45.0**

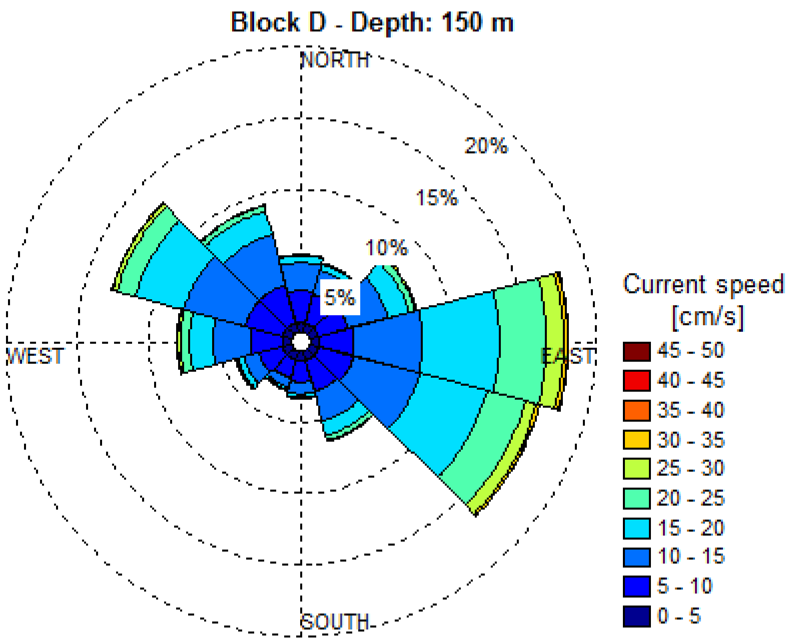


Figure 4-60 Current rose at 150 m depth at the Block D.

Table 4-65 Direction sample distribution of non-exceedance [%] of current speed at 150 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.59	0.61	0.61	0.60	0.62	0.67	0.64	0.64	0.67	0.64	0.66	0.67	7.62
< 10	2.84	2.69	2.77	3.00	3.18	2.97	2.19	1.97	2.33	2.86	3.36	3.40	33.57
< 15	4.80	4.46	5.62	7.72	8.01	5.20	3.04	2.62	3.42	5.44	7.78	7.13	65.23
< 20	5.31	4.90	7.03	13.02	13.06	6.32	3.32	2.81	3.83	7.02	11.31	8.92	86.84
< 25	5.37	4.98	7.45	16.19	15.93	6.70	3.37	2.86	3.96	7.62	12.66	9.35	96.46
< 30	5.38	4.98	7.54	17.33	16.85	6.78	3.38	2.88	4.00	7.78	12.98	9.41	99.28
< 35			7.55	17.59	17.05	6.79	3.39		4.00	7.82	13.03	9.41	99.87
< 40			7.56	17.65	17.08	6.79	3.39		4.00	7.83	13.05		99.99
< 45				17.65	17.08	6.79				7.83	13.05		100.00
< 50				17.65							13.05		100.00
Total	**5.38**	**4.98**	**7.56**	**17.65**	**17.08**	**6.79**	**3.39**	**2.88**	**4.00**	**7.83**	**13.05**	**9.41**	**100.00**
Mean	**9.4**	**9.3**	**11.5**	**15.6**	**15.1**	**10.9**	**8.5**	**8.1**	**9.2**	**12.0**	**13.3**	**11.4**	**12.6**
Maximum	**29.0**	**28.0**	**35.0**	**45.0**	**44.0**	**41.0**	**37.0**	**29.0**	**35.0**	**42.0**	**45.0**	**33.0**	**45.0**

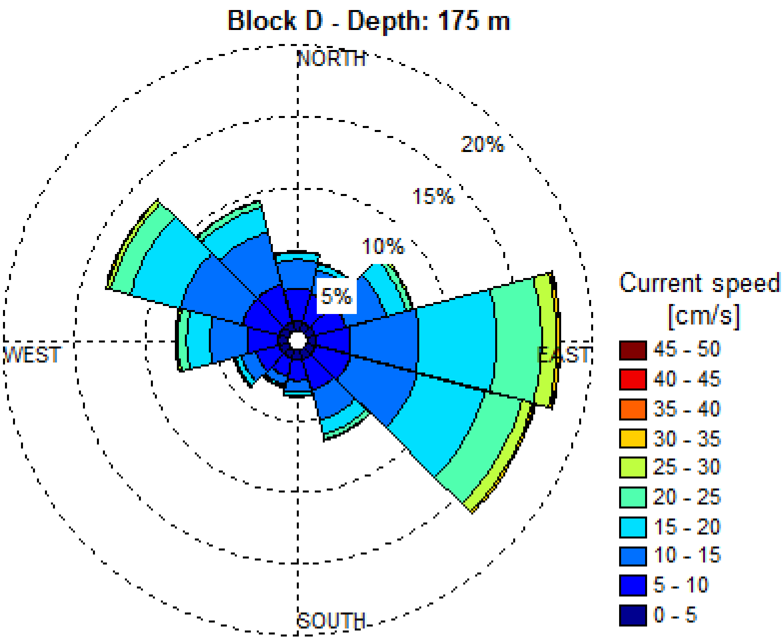


Figure 4-61 Current rose at 175 m depth at the Block D.

Table 4-66 Direction sample distribution of non-exceedance [%] of current speed at 175 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.59	0.59	0.60	0.60	0.63	0.68	0.64	0.62	0.67	0.66	0.64	0.67	7.58
< 10	2.88	2.68	2.81	3.02	3.21	2.98	2.16	1.94	2.33	2.86	3.35	3.39	33.62
< 15	4.91	4.44	5.68	7.78	8.13	5.23	3.00	2.57	3.38	5.41	7.82	7.26	65.60
< 20	5.42	4.88	7.06	13.08	13.19	6.34	3.27	2.75	3.77	6.98	11.44	9.14	87.31
< 25	5.49	4.94	7.46	16.11	15.99	6.70	3.32	2.80	3.90	7.57	12.87	9.58	96.73
< 30	5.50	4.95	7.55	17.14	16.84	6.78	3.33	2.81	3.92	7.72	13.18	9.64	99.35
< 35			7.56	17.37	17.03	6.79	3.33		3.92	7.75	13.24	9.65	99.89
< 40			7.56	17.43	17.05	6.79			3.92	7.76	13.26		99.99
< 45				17.43	17.05					7.76	13.26		100.00
< 50											13.26		100.00
Total	**5.50**	**4.95**	**7.56**	**17.43**	**17.05**	**6.79**	**3.33**	**2.81**	**3.92**	**7.76**	**13.26**	**9.65**	**100.00**
Mean	**9.5**	**9.3**	**11.4**	**15.5**	**15.0**	**10.9**	**8.4**	**8.0**	**9.1**	**11.9**	**13.4**	**11.4**	**12.5**
Maximum	**28.0**	**27.0**	**35.0**	**43.0**	**42.0**	**39.0**	**33.0**	**28.0**	**37.0**	**43.0**	**45.0**	**33.0**	**45.0**

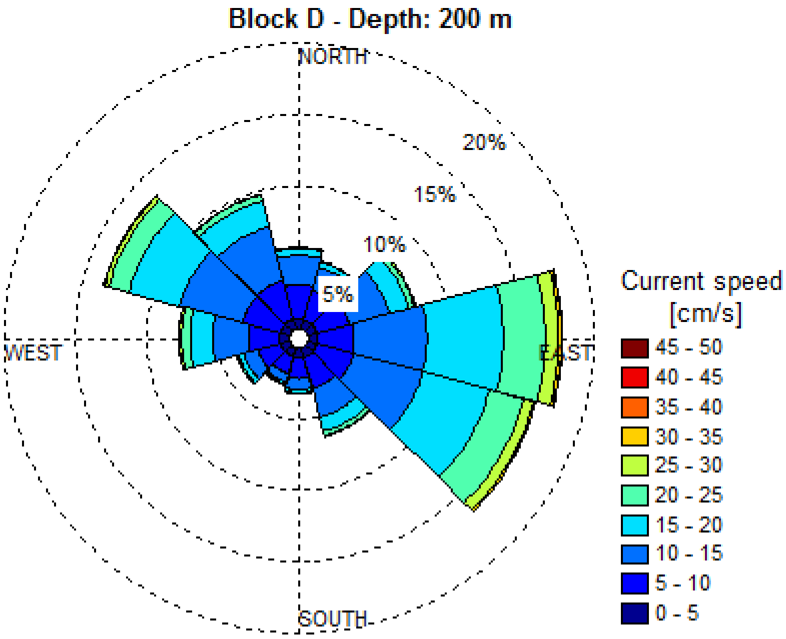


Figure 4-62 Current rose at 200 m depth at the Block D.

Table 4-67 Direction sample distribution of non-exceedance [%] of current speed at 200 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	0.65	0.61	0.62	0.62	0.65	0.69	0.65	0.62	0.68	0.67	0.67	0.68	7.81
< 10	3.04	2.76	2.99	3.19	3.34	3.00	2.15	1.90	2.28	2.83	3.44	3.51	34.42
< 15	5.10	4.47	5.84	8.23	8.40	5.15	2.94	2.51	3.29	5.30	7.95	7.47	66.66
< 20	5.60	4.86	7.16	13.44	13.41	6.23	3.19	2.68	3.66	6.79	11.61	9.43	88.06
< 25	5.67	4.92	7.53	16.28	16.03	6.58	3.24	2.72	3.76	7.35	13.09	9.88	97.05
< 30	5.68	4.93	7.61	17.19	16.80	6.64	3.25	2.73	3.78	7.49	13.40	9.94	99.42
< 35	5.68	4.93	7.62	17.39	16.96	6.65	3.25		3.78	7.52	13.46	9.95	99.91
< 40			7.62	17.43	16.98	6.65			3.78	7.53	13.48		99.99
< 45				17.43	16.98					7.53	13.48		100.00
< 50											13.48		100.00
Total	**5.68**	**4.93**	**7.62**	**17.43**	**16.98**	**6.65**	**3.25**	**2.73**	**3.78**	**7.53**	**13.48**	**9.95**	**100.00**
Mean	**9.4**	**9.1**	**11.2**	**15.1**	**14.8**	**10.8**	**8.3**	**7.9**	**9.0**	**11.8**	**13.4**	**11.5**	**12.3**
Maximum	**31.0**	**30.0**	**36.0**	**41.0**	**40.0**	**38.0**	**32.0**	**28.0**	**38.0**	**43.0**	**45.0**	**33.0**	**45.0**

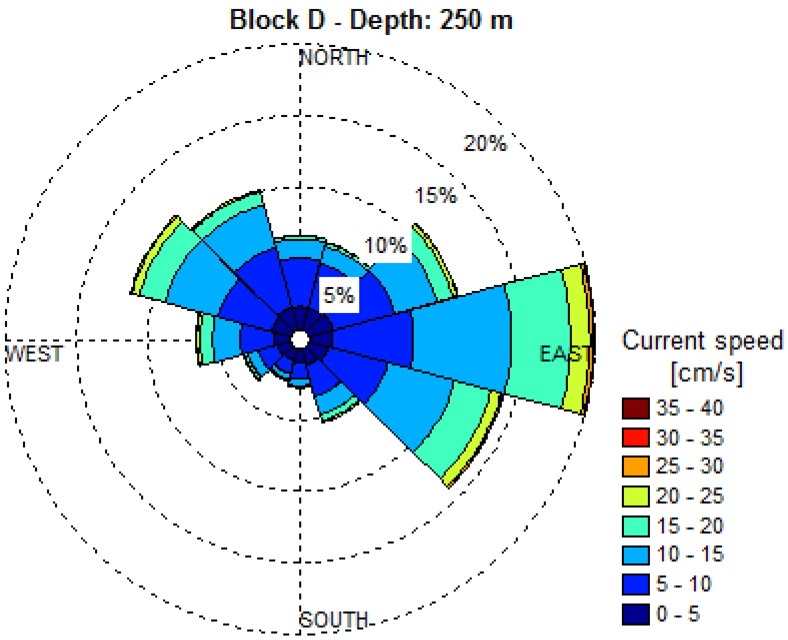


Figure 4-63 Current rose at 250 m depth at the Block D.

Table 4-68 Direction sample distribution of non-exceedance [%] of current speed at 250 m depth at the Block D.

Current speed [cm/s]	Current direction												Omni
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	
< 5	1.55	1.55	1.74	1.66	1.38	1.16	0.92	0.83	0.92	1.10	1.35	1.58	15.74
< 10	4.92	4.79	6.14	7.28	5.79	3.50	2.14	1.81	2.31	3.45	5.23	5.96	53.33
< 15	6.29	6.00	9.11	14.09	10.81	4.90	2.62	2.21	3.03	5.34	9.04	9.18	82.63
< 20	6.50	6.25	10.23	18.14	13.58	5.40	2.73	2.30	3.28	6.20	10.90	10.17	95.68
< 25	6.54	6.29	10.52	19.49	14.36	5.50	2.74	2.32	3.33	6.41	11.43	10.32	99.25
< 30	6.54	6.29	10.57	19.77	14.50	5.52	2.74	2.32	3.33	6.44	11.52	10.34	99.89
< 35			10.57	19.81	14.53	5.52				6.45	11.54	10.34	100.00
< 40			10.58	19.81	14.53	5.52				6.45	11.54		100.00
Total	**6.54**	**6.29**	**10.58**	**19.81**	**14.53**	**5.52**	**2.74**	**2.32**	**3.33**	**6.45**	**11.54**	**10.34**	**100.00**
Mean	**7.3**	**7.3**	**9.2**	**11.7**	**11.2**	**8.5**	**6.7**	**6.7**	**7.7**	**9.6**	**10.6**	**9.0**	**9.7**
Maximum	**27.0**	**29.0**	**35.0**	**35.0**	**37.0**	**35.0**	**28.0**	**27.0**	**27.0**	**35.0**	**36.0**	**31.0**	**37.0**

4.3 Long-term current statistics

The long-term distribution of current speed is modelled in terms of a Weibull distribution as described in the Metocean Design Basis Guidelines (Appendix A).

4.3.1 Block A

Figure 4.64 to Figure 4.79 and Table 4.69 – Table 4.84 show the directional and omnidirectional Weibull parameters and extreme values of current speed throughout the water column for Block A.

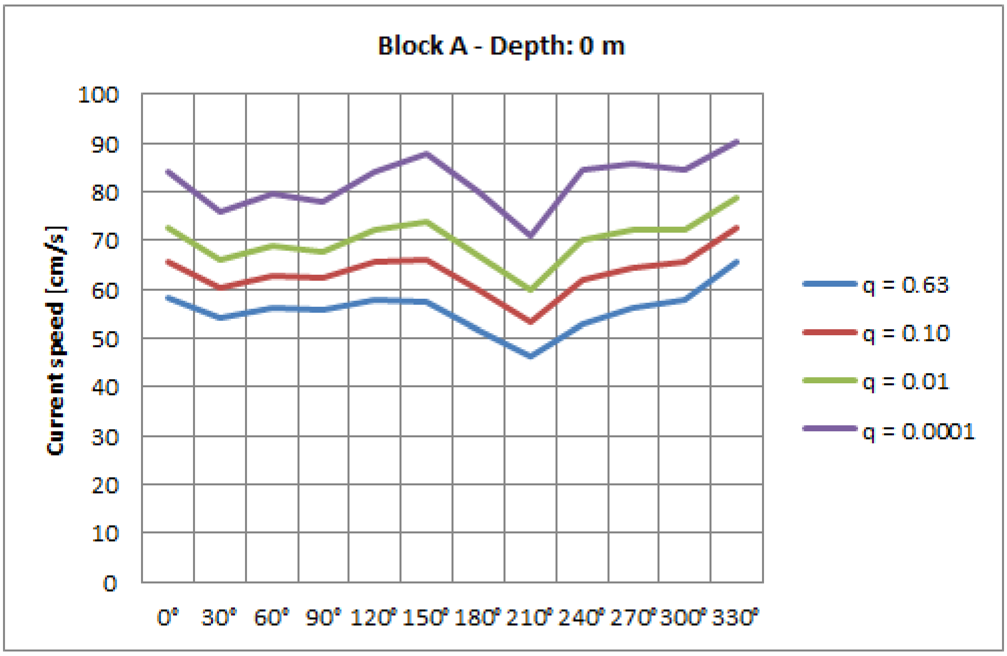


Figure 4-64 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 0 m water depth at Block A location.

Table 4.69 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 0 m water depth at the Block A location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.68	1.952	19.033	0.926	58	66	72	84
30°	10.32	2.124	19.610	-0.144	54	60	66	76
60°	11.42	2.049	19.244	0.685	56	63	69	79
90°	11.66	2.129	19.981	0.389	56	62	68	78
120°	9.37	1.936	18.898	0.787	58	65	72	84
150°	6.52	1.769	17.270	0.998	58	66	74	88
180°	4.51	1.773	16.103	0.462	52	60	67	80
210°	3.90	1.854	15.515	-0.081	46	53	60	71
240°	4.57	1.635	14.735	1.224	53	62	70	85
270°	6.39	1.735	16.327	1.380	56	64	72	86
300°	9.07	1.935	18.945	0.707	58	65	72	84
330°	11.60	1.765	18.638	2.010	66	73*	79*	90*
0°-360°	**100.00**	**1.897**	**18.409**	**0.809**	**66**	**73**	**79**	**90**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

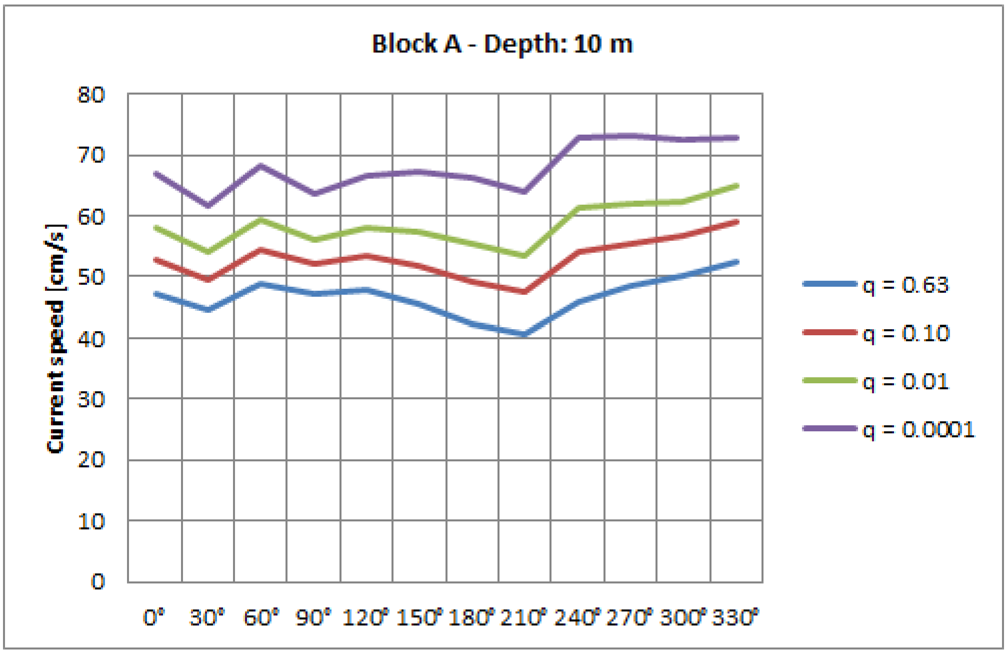


Figure 4-65 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 10 m water depth at Block A location.

Table 4.70 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 10 m water depth at the Block A location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.31	2.059	16.269	0.926	47	53	58	67
30°	9.90	2.239	17.139	-0.217	45	50	54	62
60°	12.06	2.148	17.703	0.322	49	55	60	68
90°	13.50	2.404	19.272	-0.601	47	52	56	64
120°	9.93	2.215	18.302	-0.360	48	53	58	67
150°	5.94	1.961	15.739	0.027	46	52	57	67
180°	3.79	1.747	13.126	0.430	42	49	55	66
210°	3.30	1.767	13.028	0.090	41	47	53	64
240°	4.07	1.614	12.720	1.113	46	54	61	73*
270°	6.18	1.805	14.925	0.946	49	56	62	73
300°	9.49	1.972	16.704	0.817	50	57	62	73
330°	11.54	1.944	16.787	1.295	52	59	65	73*
0°-360°	**100.00**	**2.054**	**16.932**	**0.203**	**54**	**60**	**65**	**73**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

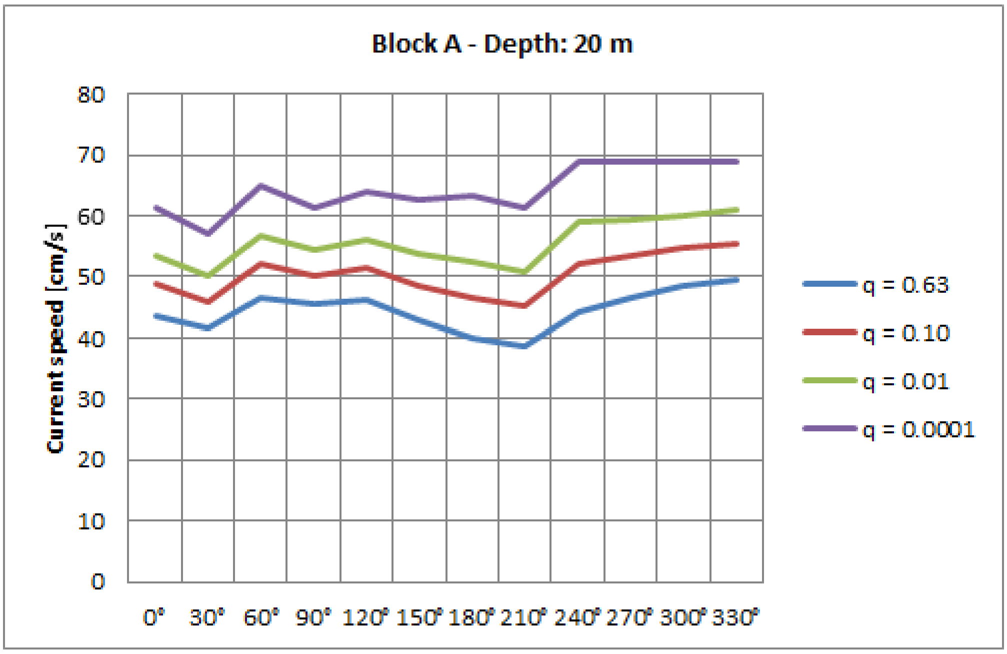


Figure 4-66 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 20 m water depth at Block A location.**

Table 4.71 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 20 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.11	2.138	15.749	0.638	44	49	53	61
30°	9.60	2.316	16.631	-0.468	42	46	50	57
60°	12.12	2.175	17.133	0.233	47	52	57	65
90°	13.97	2.426	18.712	-0.423	46	50	54	61
120°	10.19	2.240	17.829	-0.394	46	51	56	64
150°	5.76	2.007	15.244	-0.201	43	49	54	63
180°	3.53	1.738	12.414	0.431	40	47	53	63
210°	3.16	1.757	12.356	0.031	39	45	51	61
240°	3.89	1.595	12.068	1.122	44	52	59	69*
270°	6.08	1.836	14.740	0.668	47	53	59	69*
300°	9.81	1.992	16.272	0.754	49	55	60	69*
330°	11.79	1.979	16.097	1.278	49	55	61	69*
0°-360°	**100.00**	**2.089**	**16.467**	**0.096**	**52**	**57**	**61**	**69**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

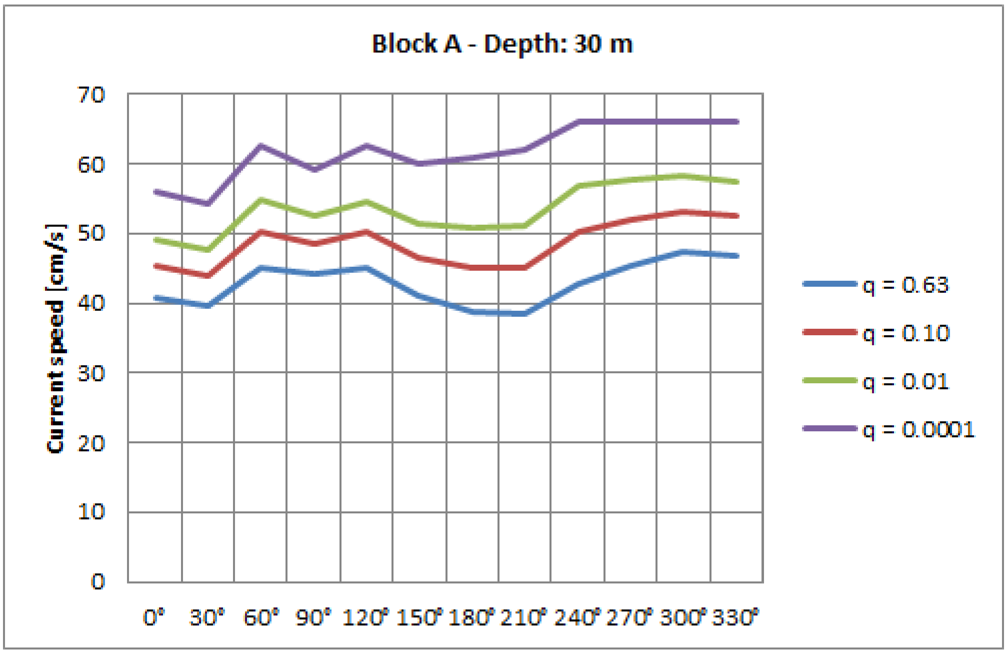


Figure 4-67 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 30 m water depth at Block A location.**

Table 4.72 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 30 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.07	2.280	15.871	0.059	41	45	49	56
30°	9.53	2.373	16.320	-0.628	40	44	48	54
60°	12.05	2.183	16.576	0.336	45	50	55	63
90°	14.23	2.502	18.747	-0.701	44	49	52	59
120°	10.36	2.224	17.120	-0.035	45	50	55	63
150°	5.59	2.021	14.724	-0.178	41	47	51	60
180°	3.40	1.742	12.066	0.302	39	45	51	61
210°	3.03	1.668	11.466	0.374	38	45	51	62
240°	3.76	1.619	11.947	0.895	43	50	57	66*
270°	6.02	1.852	14.555	0.510	45	52	58	66*
300°	9.98	2.026	16.149	0.645	47	53	58	66*
330°	11.98	2.060	16.024	0.988	47	52	57	66
0°-360°	**100.00**	**2.129**	**16.248**	**-0.033**	**50**	**55**	**59**	**66**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

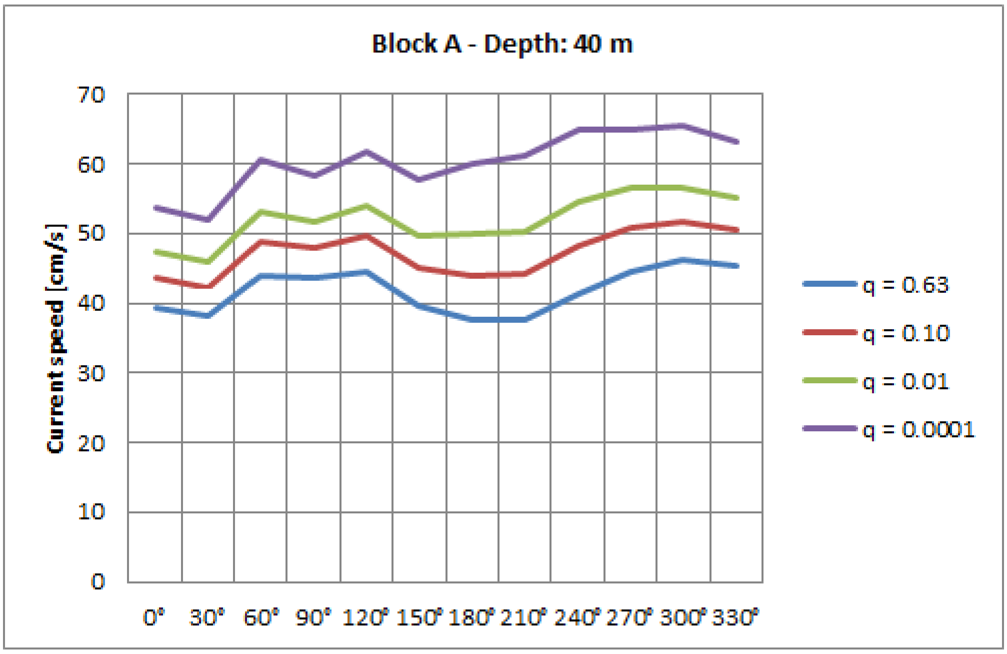


Figure 4-68 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 40 m water depth at Block A location.**

Table 4.73 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 40 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.09	2.350	15.819	-0.170	39	44	47	54
30°	9.45	2.443	16.274	-0.870	38	42	46	52
60°	11.98	2.207	16.319	0.324	44	49	53	61
90°	14.37	2.499	18.411	-0.554	44	48	52	58
120°	10.44	2.242	17.105	-0.182	45	50	54	62
150°	5.48	2.054	14.548	-0.344	40	45	50	58
180°	3.31	1.706	11.431	0.577	38	44	50	60
210°	2.93	1.641	10.988	0.469	38	44	50	61
240°	3.69	1.675	12.163	0.525	41	48	55	65*
270°	5.95	1.873	14.471	0.420	45	51	57	65*
300°	10.11	2.054	15.953	0.638	46	52	57	65
330°	12.21	2.128	16.035	0.819	45	50	55	63
0°-360°	**100.00**	**2.160**	**16.121**	**-0.116**	**49**	**53**	**57**	**65**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

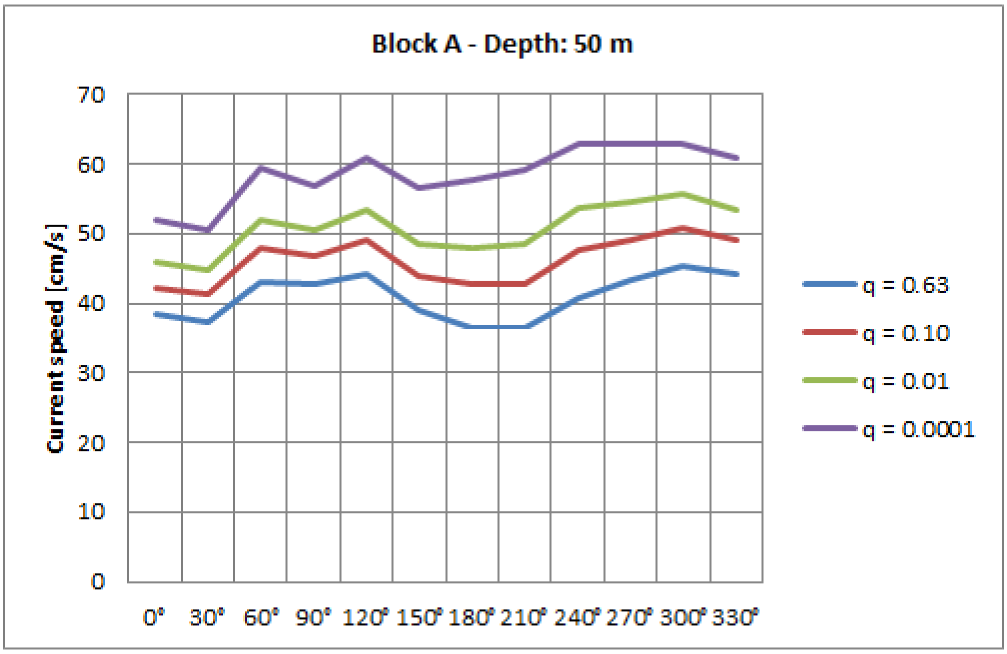


Figure 4-69 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 50 m water depth at Block A location.**

Table 4.74 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 50 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.14	2.431	16.021	-0.527	38	42	46	52
30°	9.42	2.482	16.197	-0.983	37	41	45	51
60°	11.92	2.239	16.275	0.212	43	48	52	59
90°	14.39	2.548	18.453	-0.745	43	47	51	57
120°	10.43	2.245	16.951	-0.162	44	49	53	61
150°	5.42	2.080	14.539	-0.477	39	44	49	57
180°	3.27	1.744	11.426	0.387	37	43	48	58
210°	2.84	1.664	10.851	0.467	36	43	49	59
240°	3.64	1.679	12.043	0.401	41	48	54	63*
270°	5.93	1.936	14.679	0.111	43	49	55	63*
300°	10.23	2.082	15.947	0.526	45	51	56	63*
330°	12.37	2.202	16.259	0.515	44	49	53	61
0°-360°	**100.00**	**2.198**	**16.148**	**-0.276**	**48**	**52**	**56**	**63**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

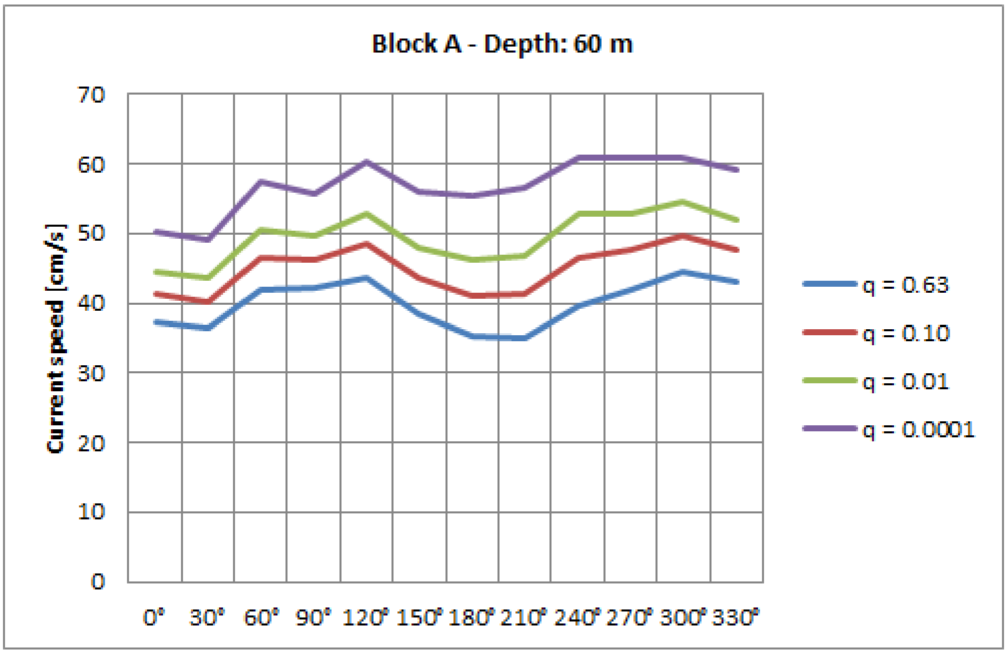


Figure 4-70 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 60 m water depth at Block A location.**

Table 4.75 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 60 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.13	2.508	16.208	-0.830	37	41	45	50
30°	9.44	2.547	16.295	-1.260	37	40	44	49
60°	11.89	2.299	16.334	-0.046	42	46	50	57
90°	14.41	2.562	18.211	-0.669	42	46	50	56
120°	10.46	2.253	16.841	-0.237	44	48	53	60
150°	5.32	2.061	14.171	-0.316	38	44	48	56
180°	3.19	1.784	11.405	0.201	35	41	46	55
210°	2.80	1.690	10.718	0.343	35	41	47	57
240°	3.58	1.660	11.600	0.555	40	47	53	61*
270°	5.90	1.991	14.759	-0.069	42	48	53	61*
300°	10.32	2.118	15.940	0.469	45	50	54	61*
330°	12.57	2.261	16.353	0.272	43	48	52	59
0°-360°	**100.00**	**2.232**	**16.117**	**-0.394**	**47**	**51**	**55**	**61**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

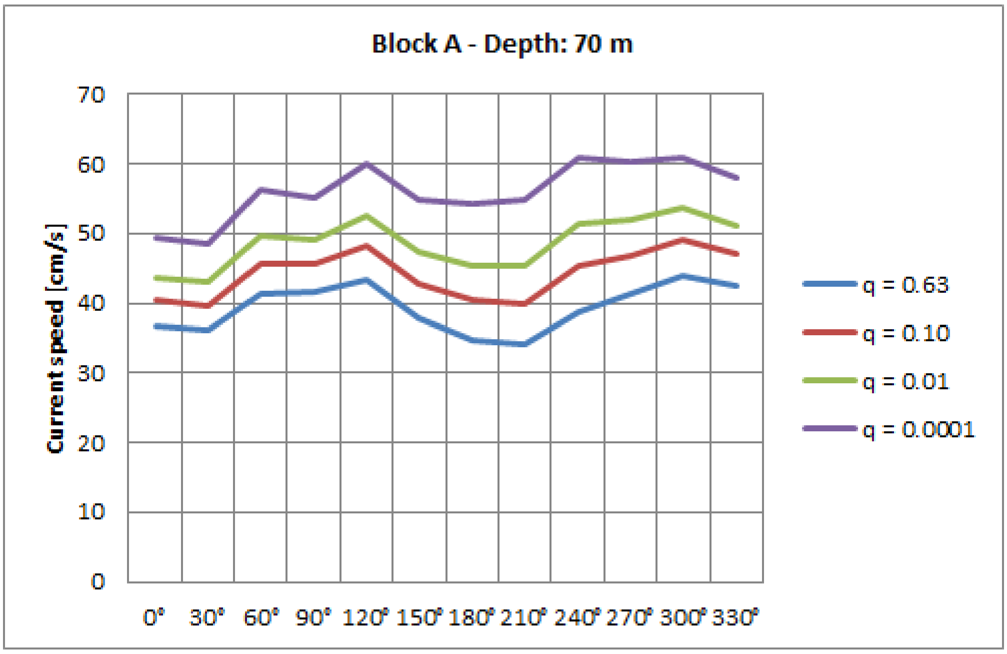


Figure 4-71 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 70 m water depth at Block A location.**

Table 4.76 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 70 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.14	2.551	16.267	-0.965	37	41	44	49
30°	9.46	2.574	16.303	-1.380	36	40	43	48
60°	11.90	2.327	16.317	-0.116	41	46	50	56
90°	14.40	2.583	18.210	-0.758	42	46	49	55
120°	10.46	2.254	16.772	-0.244	43	48	53	60
150°	5.29	2.083	14.127	-0.373	38	43	47	55
180°	3.17	1.810	11.461	0.055	35	40	45	54
210°	2.76	1.727	10.747	0.206	34	40	45	55
240°	3.53	1.696	11.675	0.410	39	45	51	61*
270°	5.89	2.019	14.797	-0.210	41	47	52	60
300°	10.38	2.145	16.002	0.363	44	49	54	61*
330°	12.63	2.294	16.409	0.189	43	47	51	58
0°-360°	**100.00**	**2.255**	**16.128**	**-0.479**	**46**	**50**	**54**	**61**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

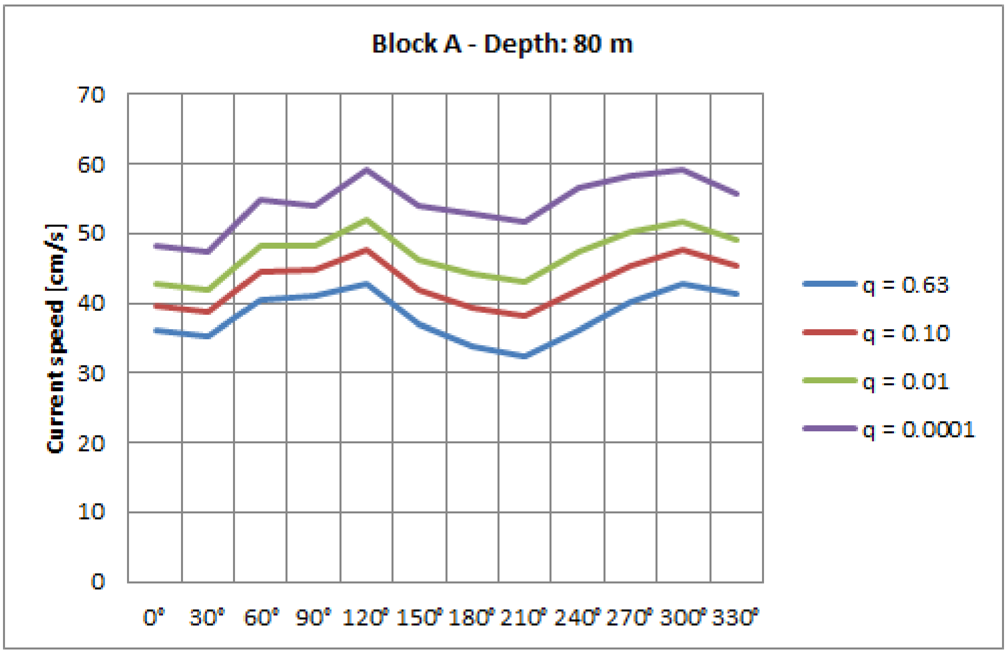


Figure 4-72 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 80 m water depth at Block A location.**

Table 4.77 **Directional and omnidirectional Weibull parameters and corresponding extreme values of current speed at 80 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.19	2.610	16.335	-1.156	36	40	43	48
30°	9.43	2.625	16.321	-1.572	35	39	42	47
60°	11.94	2.371	16.327	-0.354	40	45	48	55
90°	14.37	2.631	18.219	-0.941	41	45	48	54
120°	10.44	2.256	16.553	-0.168	43	48	52	59
150°	5.20	2.087	13.946	-0.472	37	42	46	54
180°	3.12	1.805	11.103	0.152	34	39	44	53
210°	2.70	1.768	10.572	0.074	33	38	43	52
240°	3.43	1.810	11.909	0.003	36	42	47	56
270°	5.86	2.067	14.818	-0.451	40	45	50	58
300°	10.51	2.235	16.307	-0.046	43	48	52	59
330°	12.81	2.408	16.816	-0.280	41	45	49	56
0°-360°	**100.00**	**2.307**	**16.192**	**-0.695**	**45**	**49**	**52**	**59**

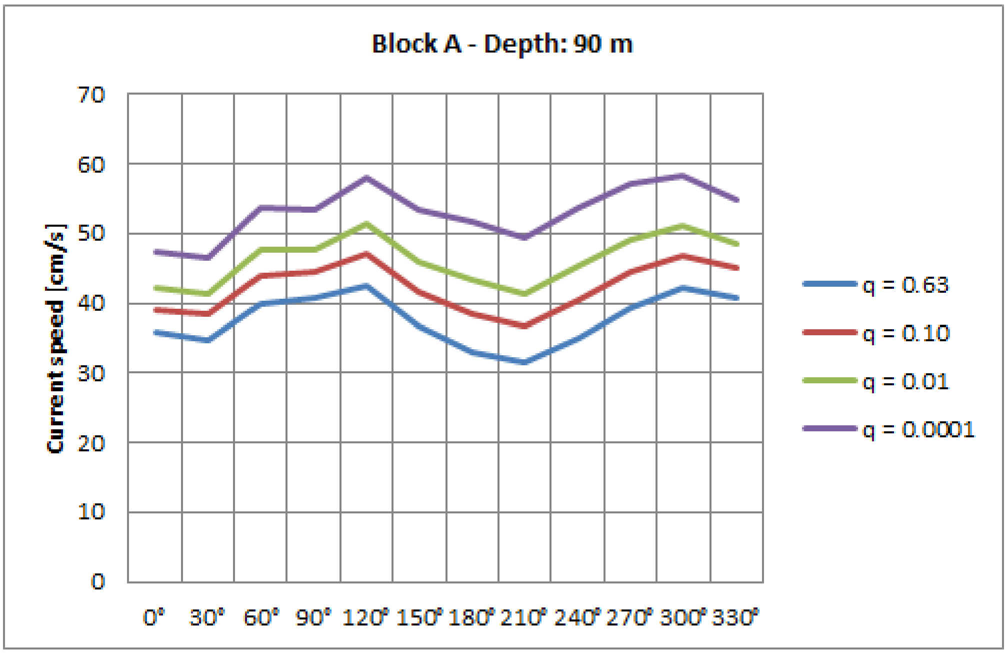


Figure 4-73 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 90 m water depth at Block A location.

Table 4.78 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 90 m water depth at the Block A location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.22	2.660	16.497	-1.356	36	39	42	47
30°	9.44	2.657	16.281	-1.609	35	38	41	46
60°	11.92	2.399	16.265	-0.400	40	44	48	54
90°	14.38	2.651	18.246	-1.063	41	44	48	53
120°	10.40	2.271	16.526	-0.213	42	47	51	58*
150°	5.17	2.101	13.937	-0.569	37	42	46	53
180°	3.07	1.823	11.010	0.159	33	38	43	52
210°	2.68	1.818	10.617	-0.145	31	37	41	49
240°	3.39	1.877	12.057	-0.275	35	40	45	54
270°	5.86	2.088	14.724	-0.491	39	45	49	57
300°	10.52	2.260	16.297	-0.088	42	47	51	58
330°	12.95	2.448	16.937	-0.449	41	45	49	55
0°-360°	**100.00**	**2.332**	**16.200**	**-0.782**	**44**	**48**	**52**	**58**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

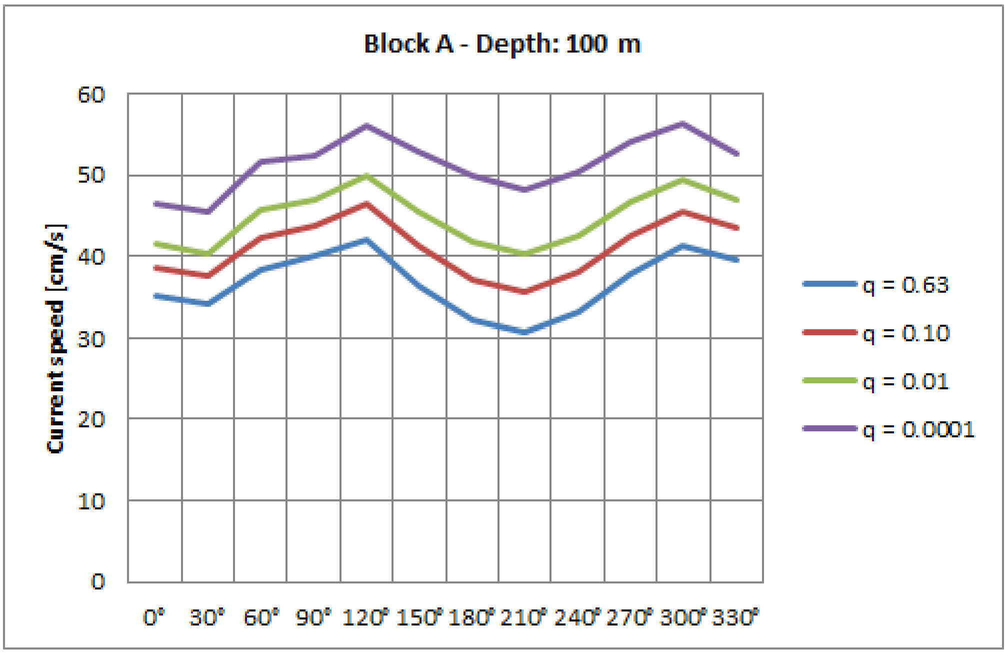


Figure 4-74 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 100 m water depth at Block A location.**

Table 4.79 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 100 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.33	2.704	16.573	-1.514	35	39	42	47
30°	9.46	2.673	16.027	-1.534	34	38	40	45
60°	11.87	2.471	16.198	-0.545	38	42	46	52
90°	14.36	2.677	18.177	-1.180	40	44	47	53
120°	10.38	2.263	16.276	-0.134	42	47	50*	56*
150°	5.09	2.086	13.708	-0.535	36	41	46	53
180°	3.00	1.834	10.784	0.091	32	37	42	50
210°	2.61	1.808	10.290	-0.080	31	36	40	48
240°	3.32	1.947	11.991	-0.511	33	38	43	50
270°	5.78	2.172	14.798	-0.782	38	43	47	54
300°	10.64	2.345	16.605	-0.460	41	46	50	56
330°	13.17	2.563	17.318	-0.876	40	44	47	53
0°-360°	**100.00**	**2.376**	**16.212**	**-0.935**	**43**	**47**	**50**	**56**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

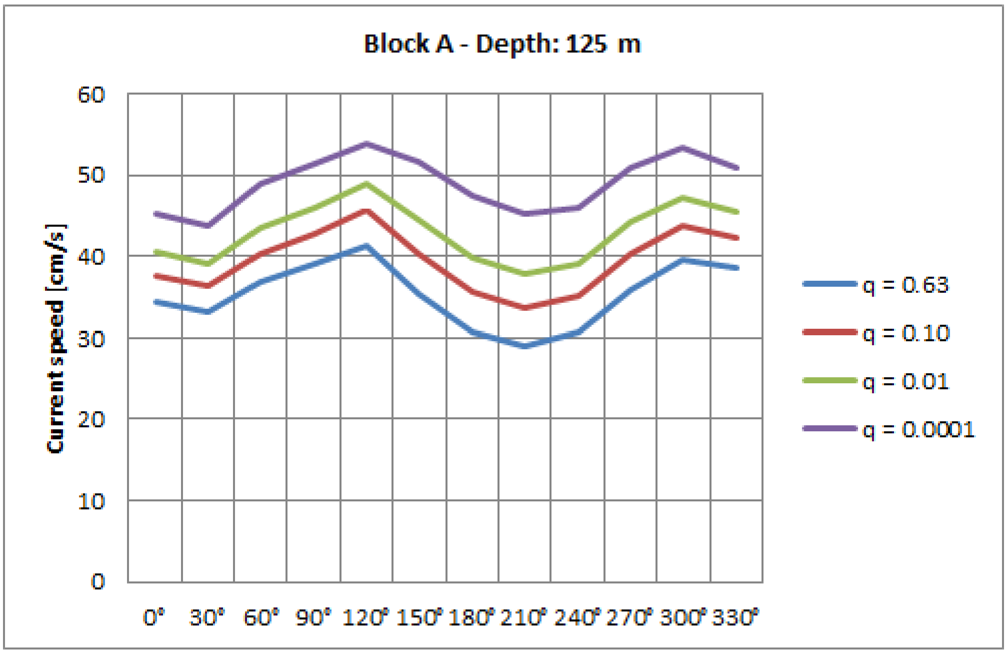


Figure 4-75 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 125 m water depth at Block A location.**

Table 4.80 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 125 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.50	2.798	16.803	-1.814	35	38	41	45
30°	9.53	2.778	16.244	-1.904	33	36	39	44
60°	11.89	2.594	16.410	-1.043	37	40	44	49
90°	14.30	2.666	17.663	-0.988	39	43	46	51
120°	10.27	2.290	16.176	-0.202	41	46	49*	54*
150°	4.98	2.090	13.454	-0.564	36	40	44	52
180°	2.88	1.853	10.455	0.102	31	36	40	48
210°	2.51	1.856	10.089	-0.223	29	34	38	45
240°	3.21	2.052	11.881	-0.816	31	35	39	46
270°	5.66	2.252	14.714	-1.004	36	40	44	51
300°	10.76	2.473	16.954	-0.955	40	44	47	53
330°	13.51	2.657	17.539	-1.171	39	42	46	51
0°-360°	**100.00**	**2.440**	**16.233**	**-1.144**	**42**	**46**	**49**	**54**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

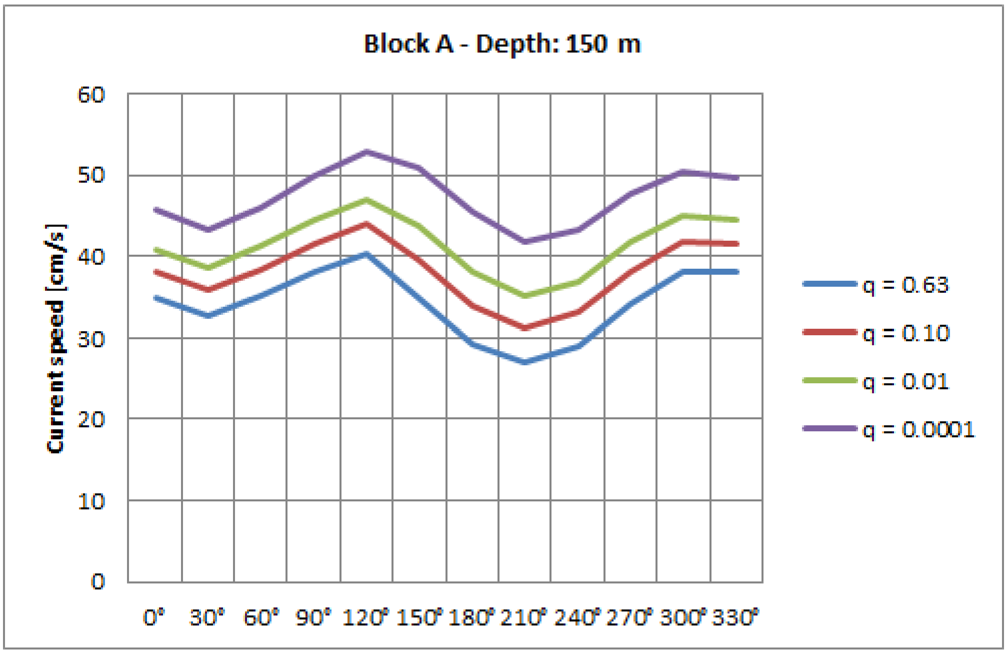


Figure 4-76 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 150 m water depth at Block A location.**

Table 4.81 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 150 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.78	2.779	16.853	-1.825	35	38	41	46
30°	9.65	2.776	15.994	-1.772	33	36	39	43
60°	11.90	2.741	16.574	-1.464	35	38	41	46
90°	14.15	2.674	17.230	-0.979	38	42	45	50
120°	10.18	2.325	16.141	-0.391	40	44*	47*	53*
150°	4.88	2.047	12.845	-0.348	35	40	44	51
180°	2.73	1.838	9.890	0.213	29	34	38	46
210°	2.36	1.905	9.685	-0.165	27	31	35	42
240°	3.03	2.080	11.392	-0.740	29	33	37	43
270°	5.51	2.360	14.715	-1.357	34	38	42	48
300°	10.91	2.624	17.348	-1.497	38	42	45	51
330°	13.91	2.720	17.580	-1.247	38	42	45	50
0°-360°	**100.00**	**2.493**	**16.191**	**-1.284**	**41**	**44**	**47**	**53**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

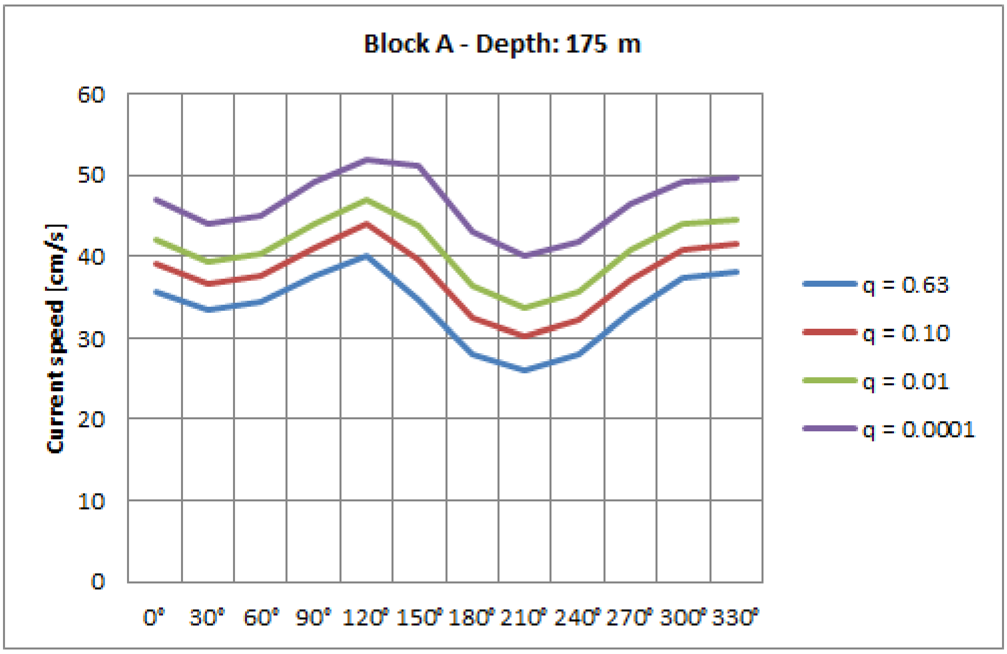


Figure 4-77 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 175 m water depth at Block A location.**

Table 4.82 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 175 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	10.93	2.711	16.750	-1.501	36	39	42	47
30°	9.78	2.730	15.937	-1.607	33	37	39	44
60°	11.91	2.819	16.756	-1.711	34	38	40	45
90°	13.89	2.664	16.940	-0.898	38	41	44	49
120°	10.12	2.301	15.885	-0.237	40	44*	47*	52*
150°	4.84	1.995	12.372	-0.061	35	40	44	51
180°	2.69	1.899	9.857	0.062	28	32	36	43
210°	2.27	1.934	9.505	-0.171	26	30	34	40
240°	2.94	2.091	11.060	-0.586	28	32	36	42
270°	5.47	2.368	14.389	-1.225	33	37	41	47
300°	10.95	2.696	17.488	-1.617	37	41	44	49
330°	14.22	2.738	17.736	-1.361	38	42	45	50
0°-360°	**100.00**	**2.497**	**16.128**	**-1.246**	**41**	**44**	**47**	**52**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

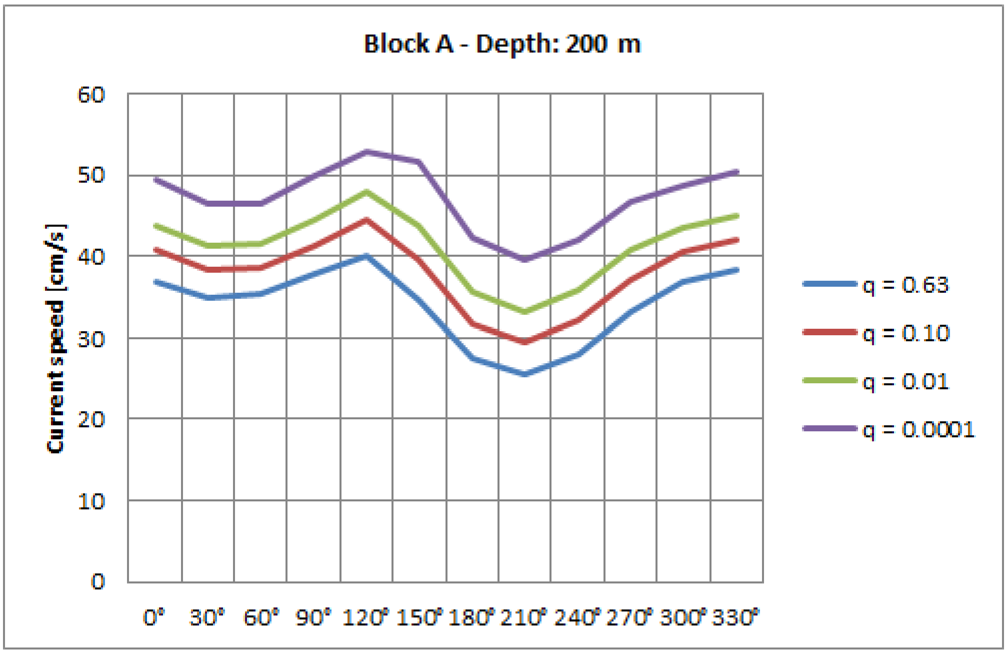


Figure 4-78 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 200 m water depth at Block A location.**

Table 4.83 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 200 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	11.24	2.579	16.473	-1.054	37	41	44	49
30°	9.98	2.589	15.742	-1.224	35	38	41	47
60°	12.14	2.692	16.272	-1.166	35	39	42	46
90°	13.47	2.604	16.675	-0.718	38	41	45	50
120°	9.85	2.298	15.898	-0.287	40	45	48*	53*
150°	4.70	1.943	11.956	0.196	35	40	44	52
180°	2.61	1.894	9.615	0.133	27	32	36	42
210°	2.22	1.903	9.130	0.056	26	30	33	40
240°	2.92	2.017	10.545	-0.292	28	32	36	42
270°	5.46	2.338	14.136	-1.026	33	37	41	47
300°	11.03	2.739	17.570	-1.668	37	41	44	49
330°	14.38	2.677	17.410	-1.001	38	42	45	50
0°-360°	**100.00**	**2.453**	**15.980**	**-1.072**	**41**	**45**	**48**	**53**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

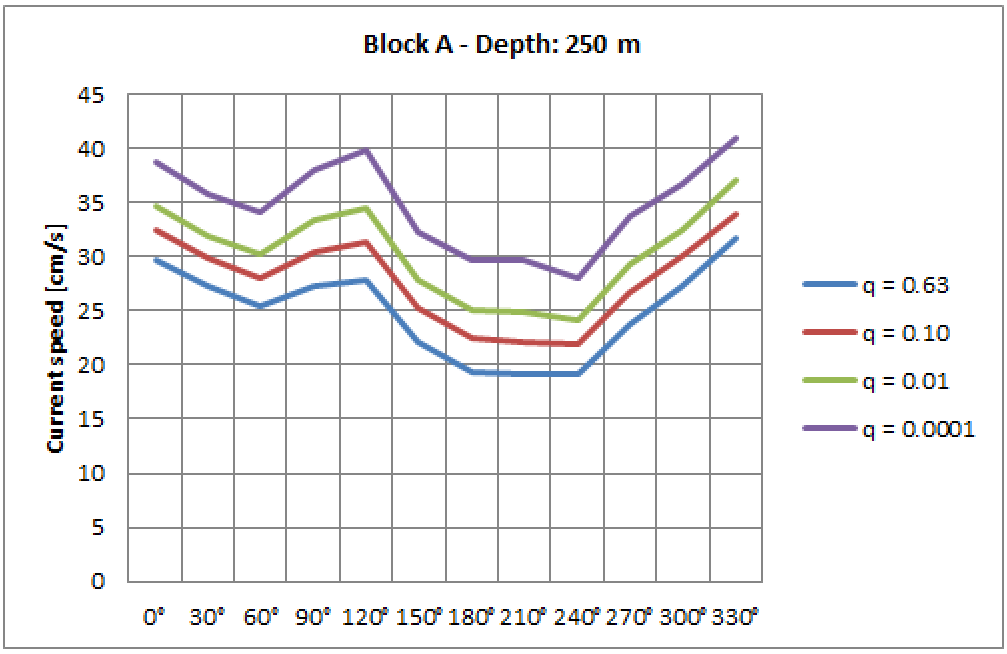


Figure 4-79 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 250 m water depth at Block A location.**

Table 4.84 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 250 m water depth at the Block A location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	19.04	2.699	13.560	-1.142	30	32	35	39
30°	15.82	2.711	12.646	-1.137	27	30	32	36
60°	11.25	2.505	10.988	-0.637	25	28	30	34
90°	8.60	2.244	10.692	-0.299	27	31	33	38
120°	5.79	2.155	10.769	-0.475	28	31	35	40
150°	3.19	2.211	9.271	-0.760	22	25	28	32
180°	2.02	2.019	7.603	-0.480	19	22	25	30
210°	1.87	1.942	7.162	-0.284	19	22	25	30
240°	2.46	2.251	8.362	-0.833	19	22	24	28
270°	4.61	2.321	10.249	-0.990	24	27	29	34
300°	9.14	2.539	12.230	-1.176	27	30	33	37
330°	16.19	2.298	12.124	0.057	32	34*	37*	41*
0°-360°	**100.00**	**2.342**	**11.683**	**-0.689**	**32**	**34**	**37**	**41**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

4.3.2 Block B

Figure 4.80 to Figure 4.94 and Table 4.85 – Table 4.99 show the directional and omnidirectional Weibull parameters and extreme values of current speed throughout the water column for Block B.

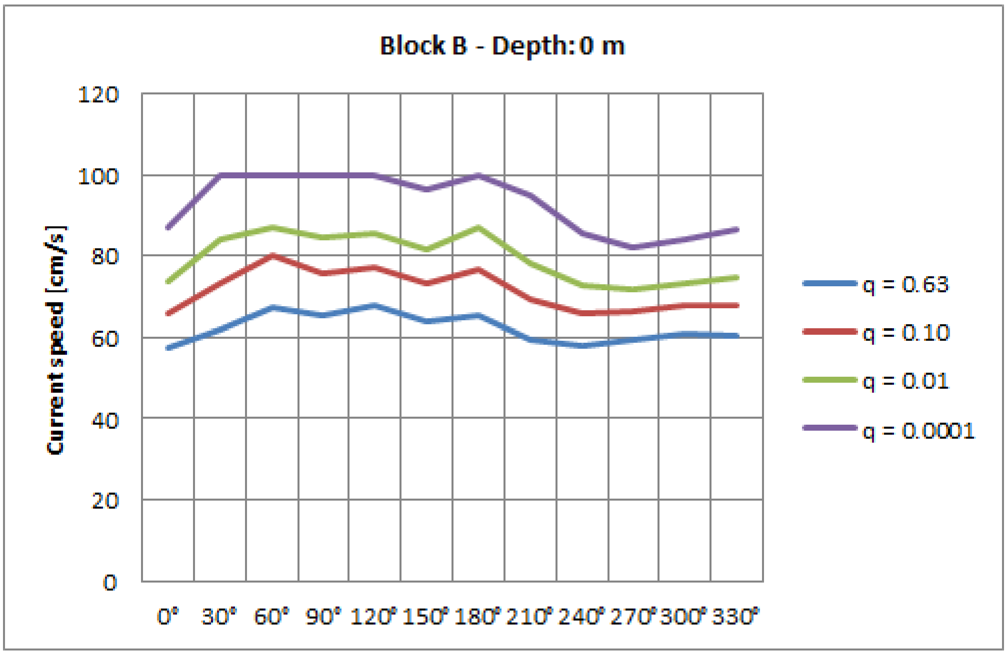


Figure 4-80 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 0 m water depth at Block B location.

Table 4.85 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 0 m water depth at the Block B location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.75	1.827	18.299	0.371	58	66	74	87
30°	4.74	1.468	14.689	2.282	62	73	84	100*
60°	5.48	1.380	14.283	3.138	67	80	87*	100*
90°	7.78	1.686	18.144	1.786	66	76	85	100*
120°	10.35	1.758	19.265	2.182	68	77	86	100*
150°	9.44	1.752	18.366	1.767	64	73	82	97
180°	7.27	1.468	14.705	3.295	65	77	87	100*
210°	6.54	1.574	15.104	2.352	60	69	78	95
240°	7.92	1.865	18.249	0.940	58	66	73	86
270°	12.01	2.242	22.732	-0.210	60	66	72	82
300°	13.46	2.227	22.773	0.345	61	68	74	84
330°	9.25	2.020	20.794	0.340	60	68	75	87
0°-360°	**100.00**	**1.819**	**19.020**	**1.285**	**72**	**80**	**87**	**100**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

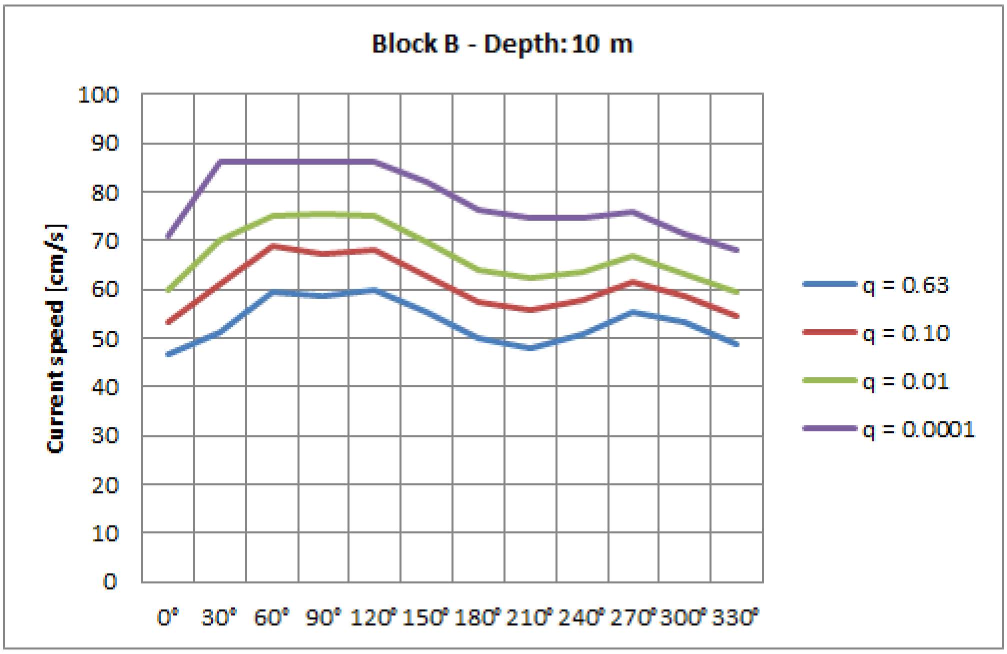


Figure 4-81 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 10 m water depth at Block B location.**

Table 4.86 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 10 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	4.61	1.845	15.150	0.395	47	53	60	71
30°	3.83	1.425	11.734	2.288	51	61	70	86*
60°	4.70	1.338	12.166	2.817	59	69*	75*	86*
90°	7.77	1.706	16.428	1.672	59	67	75	86*
120°	11.67	1.835	17.822	2.010	60	68	75	86*
150°	10.08	1.781	15.926	2.056	55	63	70	82
180°	7.17	1.724	14.156	1.799	50	57	64	76
210°	6.23	1.671	13.192	1.997	48	56	62	75
240°	7.84	1.887	16.136	1.111	51	58	64	75
270°	12.80	2.278	21.419	-0.276	55	61	67	76
300°	14.91	2.448	21.878	-0.284	53	59	63	71
330°	8.39	2.198	18.563	-0.303	49	54	59	68
0°-360°	**100.00**	**1.895**	**17.464**	**0.980**	**63**	**69**	**75**	**86**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

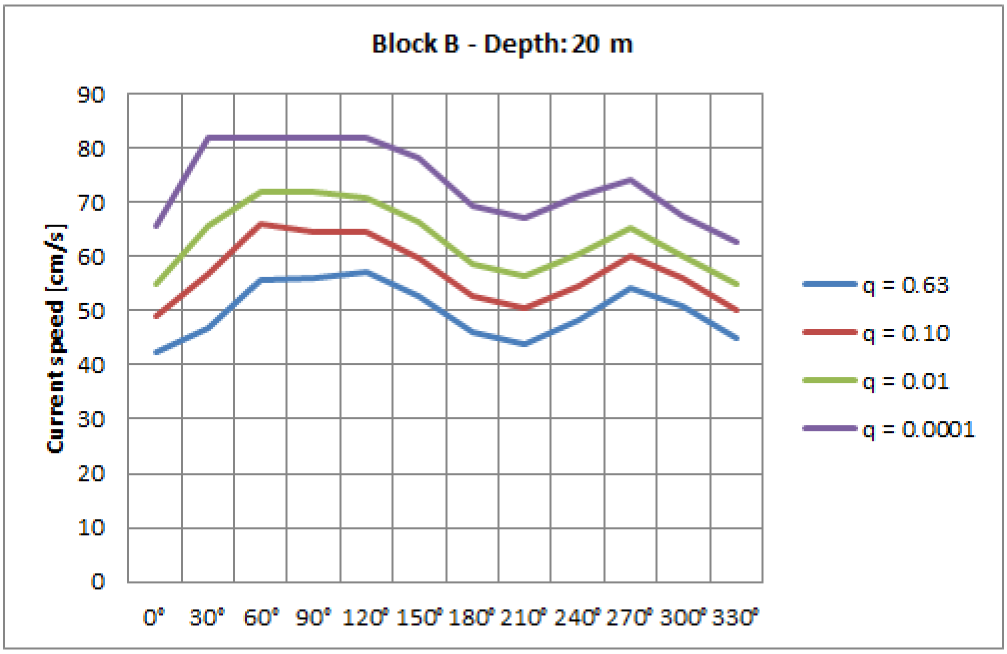


Figure 4-82 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 20 m water depth at Block B location.

Table 4.87 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 20 m water depth at the Block B location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	4.09	1.791	13.436	0.572	43	49	55	66
30°	3.33	1.364	10.228	2.285	47	57	66	82*
60°	4.10	1.277	10.675	2.927	56	66*	72*	82*
90°	7.26	1.667	15.295	1.730	56	65	72*	82*
120°	12.28	1.856	17.078	1.966	57	64	71	82*
150°	10.54	1.755	14.683	2.479	53	60	66	78
180°	7.11	1.760	13.349	1.741	46	53	59	70
210°	6.14	1.732	12.581	1.839	44	50	56	67
240°	7.73	1.876	15.183	1.270	48	55	61	71
270°	13.17	2.243	20.352	0.349	54	60	65	74
300°	16.08	2.522	21.423	-0.257	51	56	60	68
330°	8.16	2.259	17.784	-0.528	45	50	55	63
0°-360°	**100.00**	**1.904**	**16.761**	**1.005**	**60**	**66**	**72**	**82**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

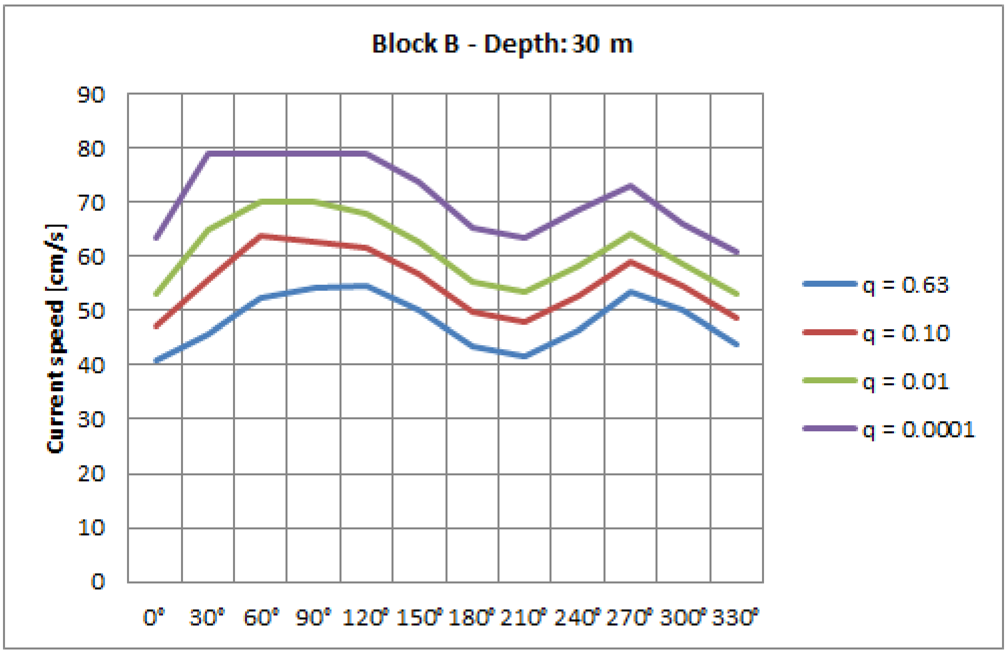


Figure 4-83 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 30 m water depth at Block B location.**

Table 4.88 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 30 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**
0°	3.87	1.763	12.694	0.606	41	47	53	64
30°	3.05	1.298	9.247	2.445	46	56	65	79*
60°	3.78	1.272	10.111	2.742	53	64	70*	79*
90°	7.03	1.628	14.322	1.901	54	63	70*	79*
120°	12.54	1.891	16.728	1.881	55	62	68	79
150°	10.77	1.799	14.404	2.277	50	57	63	74
180°	7.04	1.766	12.585	1.966	43	50	55	65
210°	6.05	1.766	12.305	1.655	42	48	54	63
240°	7.66	1.858	14.353	1.568	46	53	58	69
270°	13.36	2.218	19.664	0.737	53	59	64	73
300°	16.83	2.547	21.099	-0.131	50	55	59	66
330°	8.03	2.259	17.331	-0.608	44	49	53	61
0°-360°	**100.00**	**1.917**	**16.409**	**0.979**	**58**	**64**	**70**	**79**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

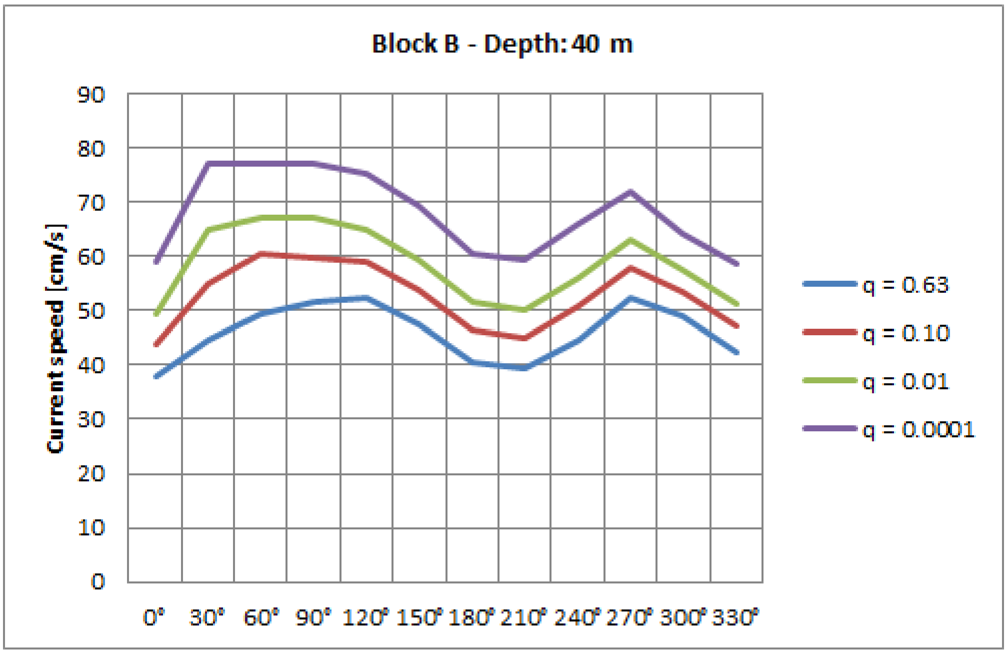


Figure 4-84 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 40 m water depth at Block B location.**

Table 4.89 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 40 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.64	1.808	12.318	0.313	38	44	49	59
30°	2.82	1.222	8.212	2.717	45	55	65	77*
60°	3.54	1.269	9.581	2.514	50	61	67*	77*
90°	6.72	1.643	13.892	1.739	52	60	67	77*
120°	12.61	1.927	16.396	1.786	53	59	65	75
150°	10.93	1.850	14.128	2.139	48	54	59	69
180°	7.07	1.832	12.378	1.644	41	46	52	61
210°	5.97	1.811	11.981	1.548	39	45	50	59
240°	7.61	1.853	13.683	1.778	45	51	56	66
270°	13.64	2.230	19.397	0.726	52	58	63	72
300°	17.53	2.609	21.155	-0.324	49	54	57	64
330°	7.93	2.292	16.996	-0.659	42	47	51	59
0°-360°	**100.00**	**1.943**	**16.204**	**0.856**	**56**	**62**	**67**	**77**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

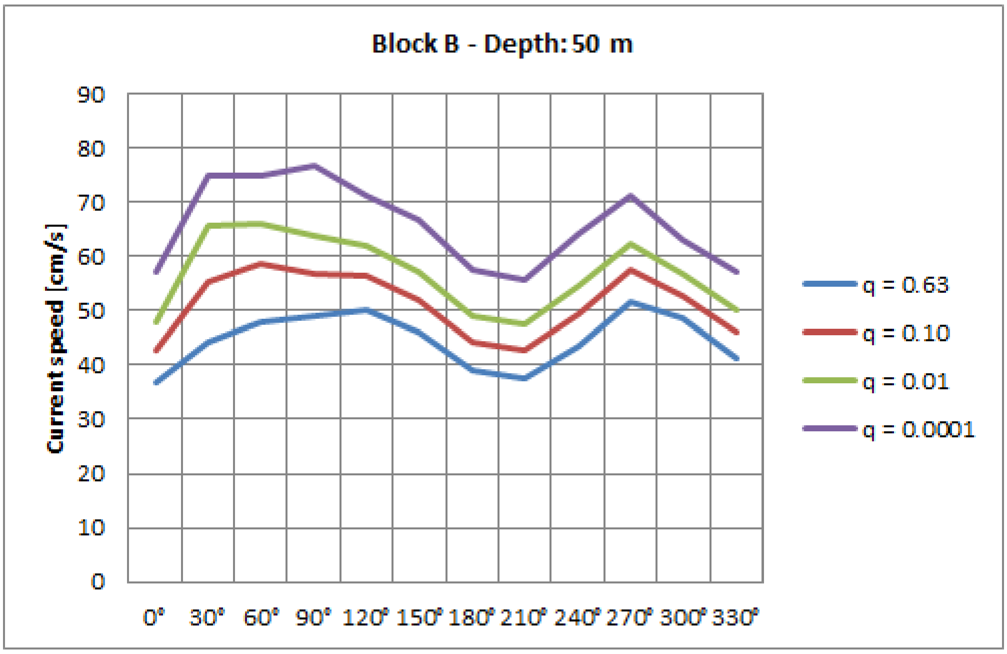


Figure 4-85 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 50 m water depth at Block B location.**

Table 4.90 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 50 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.51	1.810	11.994	0.316	37	43	48	57
30°	2.70	1.171	7.616	2.824	44	55	66	75*
60°	3.41	1.256	9.128	2.420	48	59	66*	75*
90°	6.50	1.657	13.367	1.818	49	57	64	77
120°	12.65	2.000	16.501	1.374	50	56	62	71
150°	11.02	1.877	13.903	2.129	46	52	57	67
180°	6.99	1.883	12.290	1.547	39	44	49	58
210°	5.99	1.884	11.983	1.280	38	43	47	56
240°	7.56	1.860	13.385	1.803	44	49	55	64
270°	13.79	2.211	18.922	1.007	52	57	62	71
300°	17.95	2.647	21.198	-0.397	49	53	57	63
330°	7.94	2.320	16.823	-0.719	41	46	50	57
0°-360°	**100.00**	**1.963**	**16.083**	**0.788**	**55**	**61**	**66**	**75**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

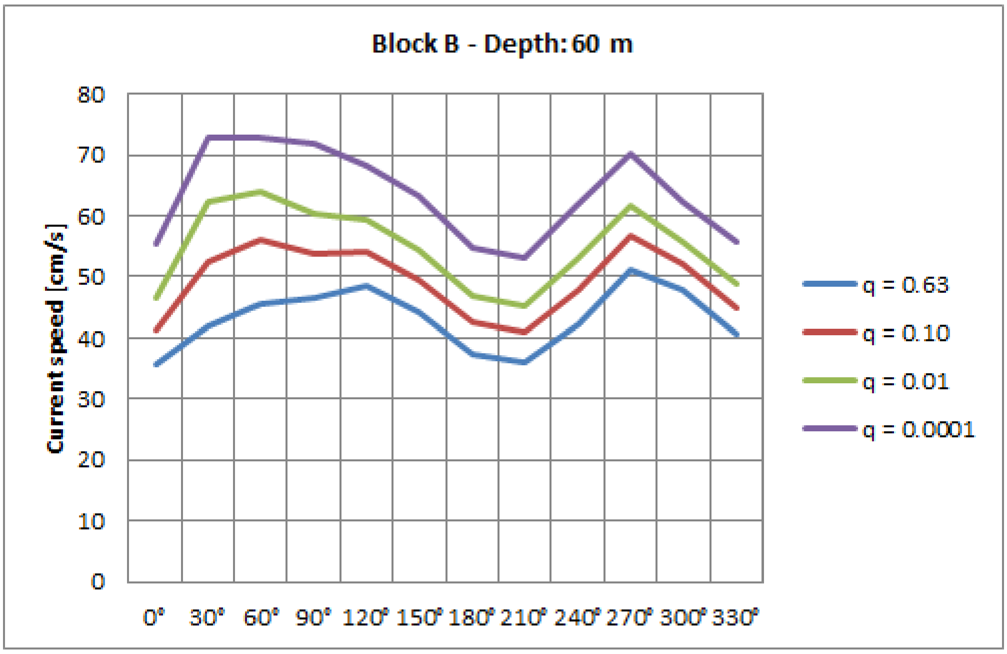


Figure 4-86 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 60 m water depth at Block B location.**

Table 4.91 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 60 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.44	1.825	11.773	0.211	36	41	46	55
30°	2.60	1.185	7.409	2.670	42	52	62	73*
60°	3.29	1.249	8.672	2.419	46	56	64*	73*
90°	6.30	1.711	13.285	1.455	47	54	60	72
120°	12.64	2.050	16.380	1.230	49	54	59	68
150°	11.05	1.967	14.188	1.696	44	50	55	63
180°	7.00	1.940	12.224	1.359	38	43	47	55
210°	5.92	1.942	11.961	1.138	36	41	45	53
240°	7.55	1.878	13.118	1.790	42	48	53	62
270°	13.91	2.208	18.642	1.096	51	57	62	70
300°	18.37	2.709	21.470	-0.682	48	52	56	62
330°	7.93	2.351	16.769	-0.801	41	45	49	56
0°-360°	**100.00**	**1.992**	**16.062**	**0.643**	**54**	**59**	**64**	**73**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

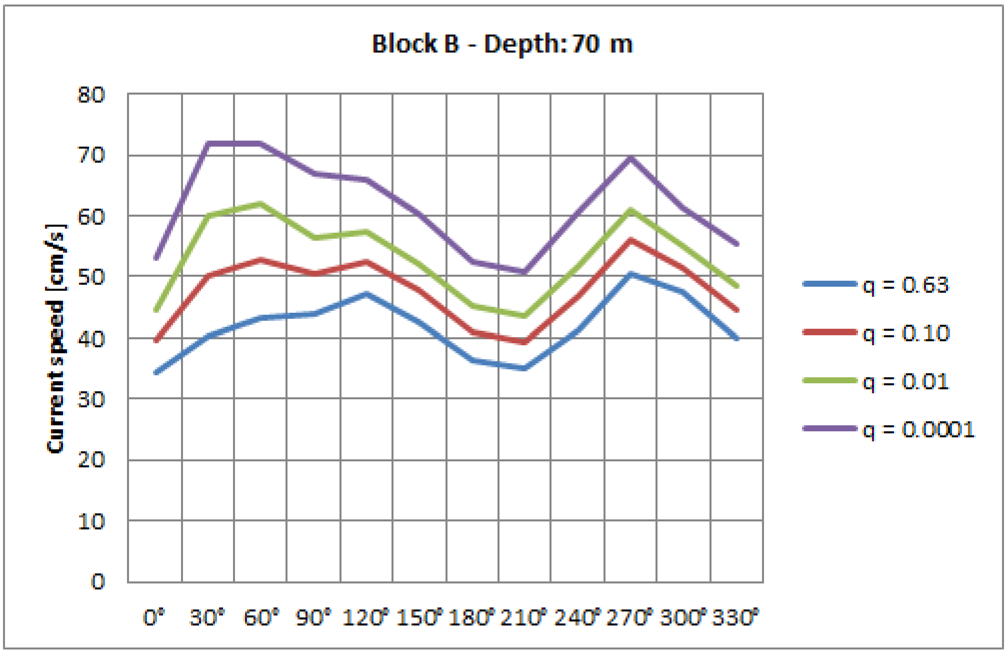


Figure 4-87 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 70 m water depth at Block B location.**

Table 4.92 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 70 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.39	1.850	11.558	0.145	35	40	45	53
30°	2.51	1.183	7.125	2.592	40	50	60	72*
60°	3.17	1.270	8.440	2.313	43	53	62	72*
90°	6.14	1.774	13.181	1.162	44	51	56	67
120°	12.56	2.086	16.223	1.082	47	53	57	66
150°	11.08	2.043	14.321	1.441	43	48	52	60
180°	6.98	1.999	12.264	1.128	36	41	45	52
210°	5.91	1.988	11.856	1.030	35	39	44	51
240°	7.49	1.886	12.913	1.769	41	47	52	61
270°	13.94	2.210	18.404	1.131	51	56	61	69
300°	18.86	2.744	21.498	-0.724	48	52	55	61
330°	7.97	2.349	16.576	-0.766	40	45	49	55
0°-360°	**100.00**	**2.013**	**15.998**	**0.551**	**53**	**58**	**63**	**72**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

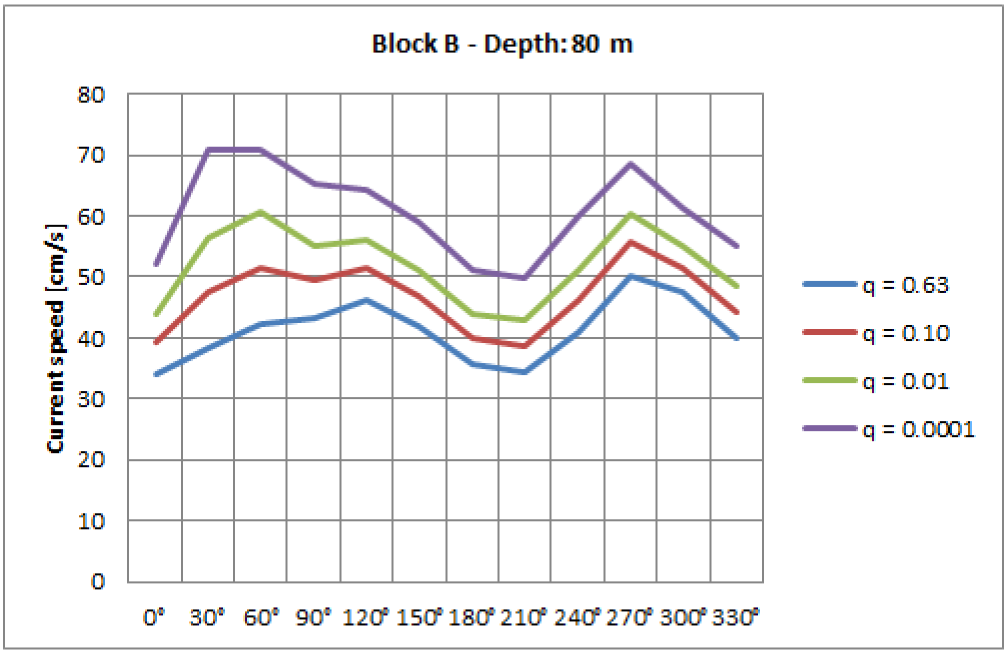


Figure 4-88 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 80 m water depth at Block B location.

Table 4.93 Directional and omnidirectional Weibull parameters and corresponding extreme values of current speed at 80 m water depth at the Block B location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.38	1.852	11.383	0.185	34	39	44	52
30°	2.46	1.226	7.221	2.385	38	48	56	71*
60°	3.14	1.283	8.404	2.219	42	52	61	71*
90°	6.09	1.793	13.106	1.071	43	49	55	65
120°	12.50	2.124	16.273	0.901	46	51	56	64
150°	11.06	2.083	14.446	1.263	42	47	51	59
180°	6.98	2.036	12.275	1.050	36	40	44	51
210°	5.90	2.002	11.757	1.033	34	39	43	50
240°	7.46	1.897	12.875	1.697	41	46	51	60
270°	13.99	2.232	18.496	0.960	50	56	60	69
300°	19.01	2.740	21.365	-0.580	48	52	55	61
330°	8.03	2.355	16.583	-0.835	40	44	48	55
0°-360°	**100.00**	**2.024**	**15.992**	**0.491**	**53**	**58**	**62**	**71**

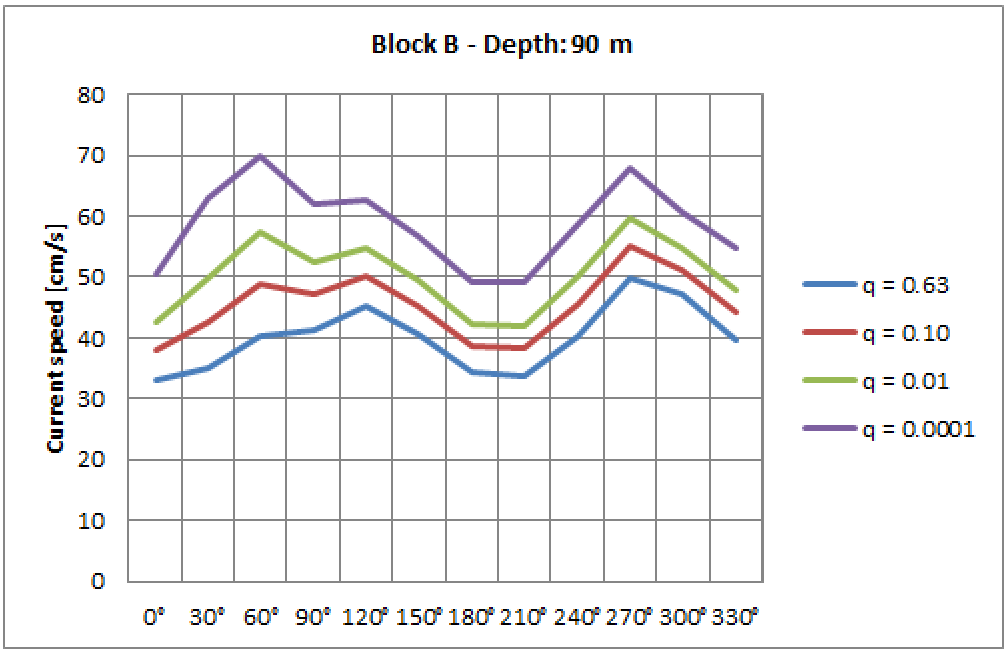


Figure 4-89 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 90 m water depth at Block B location.**

Table 4.94 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 90 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	**Sector prob.**	**Weibull parameters**			**Annual probability of exceedance**			
		Shape	**Scale**	**Location**	**0.63**	**10^{-1}**	**10^{-2}**	**10^{-4}**
-	**[%]**	**-**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**	**[cm/s]**
0°	3.36	1.874	11.244	0.108	33	38	43	51
30°	2.39	1.358	7.829	1.737	35	43	50	63
60°	3.10	1.315	8.348	2.023	40	49	57	70*
90°	5.94	1.839	13.010	0.861	41	47	53	62
120°	12.46	2.159	16.201	0.762	45	50	55	63
150°	11.05	2.152	14.546	1.037	41	45	49	57
180°	6.93	2.075	12.122	1.025	34	39	42	49
210°	5.84	1.979	11.369	1.191	34	38	42	49
240°	7.44	1.916	12.811	1.570	40	45	50	59
270°	13.92	2.226	18.195	1.116	50	55	60	68
300°	19.52	2.789	21.578	-0.786	47	51	55	61
330°	8.06	2.355	16.454	-0.781	40	44	48	55
0°-360°	**100.00**	**2.040**	**15.954**	**0.419**	**52**	**57**	**62**	**70**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

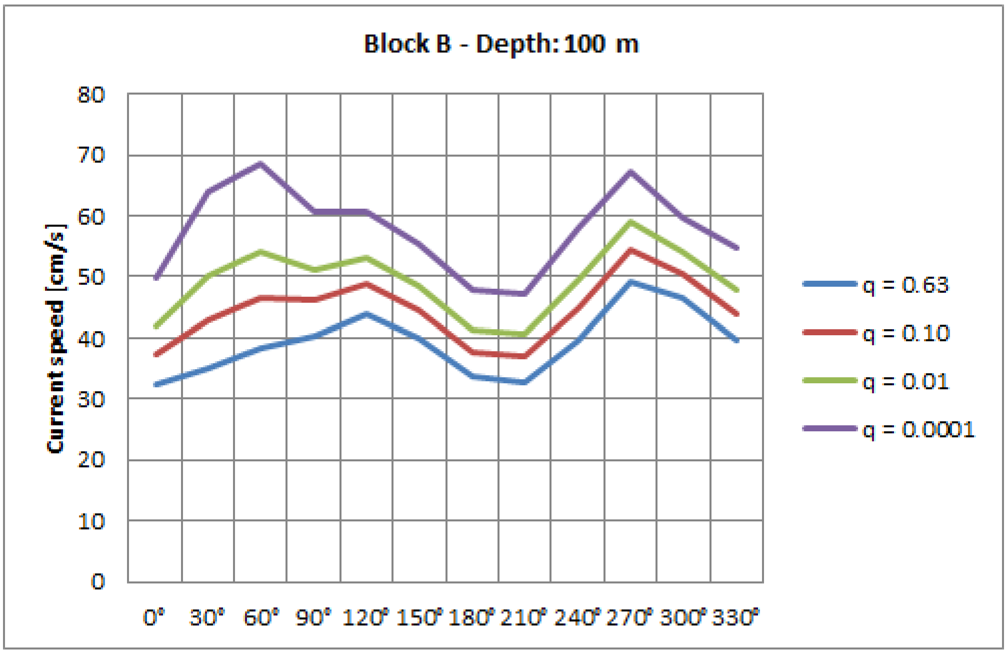


Figure 4-90 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 100 m water depth at Block B location.**

Table 4.95 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 100 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.31	1.876	11.109	0.044	33	38	42	50
30°	2.36	1.321	7.497	1.846	35	43	50	64
60°	3.01	1.341	8.219	1.915	38	47	54	69
90°	5.84	1.846	12.772	0.841	40	46	51	61
120°	12.41	2.205	16.196	0.593	44	49	53	61
150°	11.05	2.181	14.520	0.976	40	45	49	55
180°	6.91	2.112	12.101	0.897	34	38	41	48
210°	5.78	2.036	11.379	1.087	33	37	41	47
240°	7.41	1.895	12.426	1.712	40	45	50	58
270°	13.83	2.229	18.014	1.187	49	54	59	67
300°	19.91	2.842	21.795	-0.966	47	51	54	60
330°	8.18	2.348	16.306	-0.697	40	44	48	55
0°-360°	**100.00**	**2.051**	**15.914**	**0.377**	**51**	**56**	**61**	**69**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

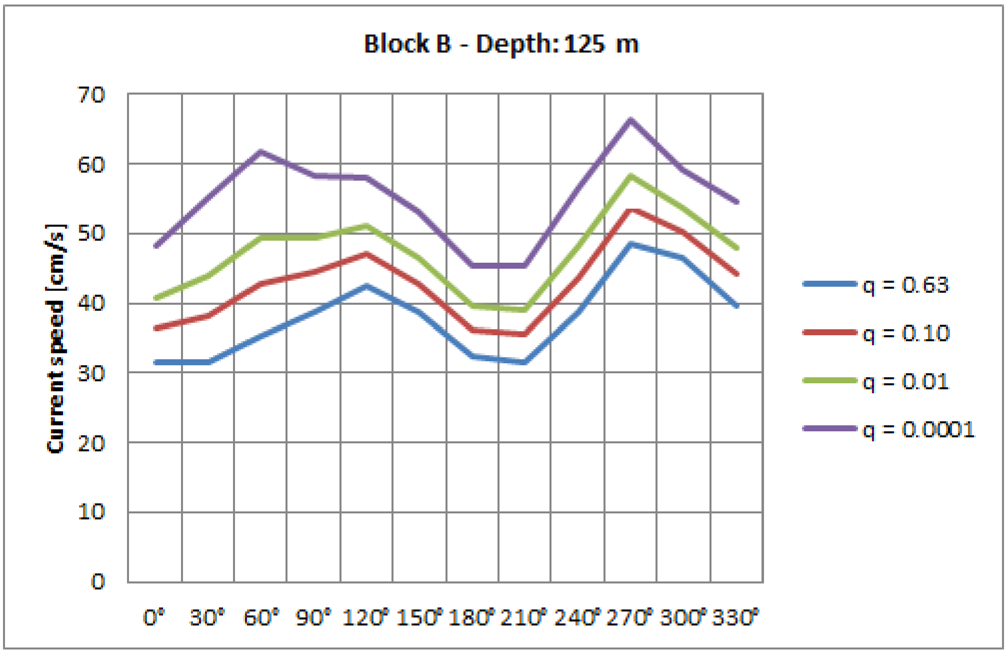


Figure 4-91 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 125 m water depth at Block B location.**

Table 4.96 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 125 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.29	1.907	10.993	0.012	32	36	41	48
30°	2.36	1.447	7.783	1.387	32	38	44	55
60°	2.91	1.399	8.075	1.799	35	43	49	62
90°	5.70	1.851	12.367	0.792	39	44	49	58
120°	12.33	2.269	16.093	0.539	43	47	51	58
150°	11.08	2.258	14.569	0.757	39	43	47	53
180°	6.83	2.187	12.081	0.760	32	36	40	45
210°	5.72	2.077	11.240	1.015	32	36	39	45
240°	7.25	1.891	12.032	1.857	39	44	48	56
270°	13.59	2.220	17.661	1.261	49	54	58	66
300°	20.43	2.895	22.002	-1.033	47	50	54	59
330°	8.51	2.352	16.331	-0.667	40	44	48	55
0°-360°	**100.00**	**2.060**	**15.806**	**0.382**	**51**	**56**	**60**	**68**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

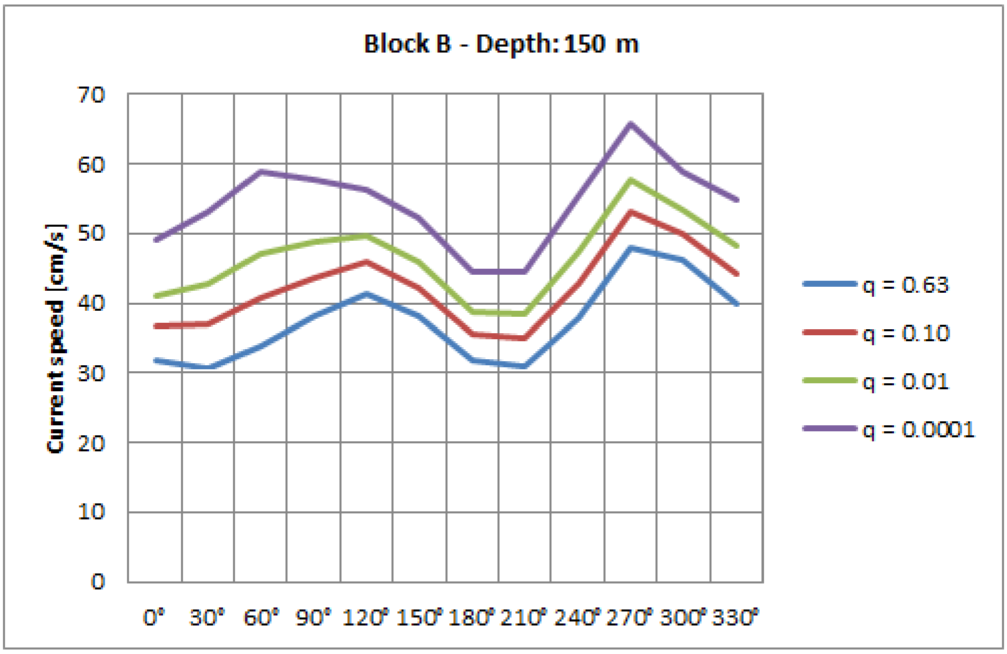


Figure 4-92 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 150 m water depth at Block B location.**

Table 4.97 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 150 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.29	1.831	10.469	0.358	32	37	41	49
30°	2.31	1.458	7.619	1.440	31	37	43	53
60°	2.90	1.419	7.910	1.697	34	41	47	59
90°	5.66	1.832	11.997	0.875	38	44	49	58
120°	12.35	2.310	15.993	0.476	41	46	50	56
150°	11.06	2.275	14.466	0.768	38	42	46	52
180°	6.77	2.186	11.816	0.844	32	36	39	45
210°	5.63	2.075	10.991	1.076	31	35	38	44
240°	7.16	1.889	11.760	1.923	38	43	47	55
270°	13.38	2.206	17.351	1.354	48	53	58	66
300°	20.75	2.904	21.871	-0.852	46	50	53	59
330°	8.75	2.330	16.186	-0.547	40	44	48	55
0°-360°	**100.00**	**2.055**	**15.663**	**0.429**	**50**	**55**	**60**	**68**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

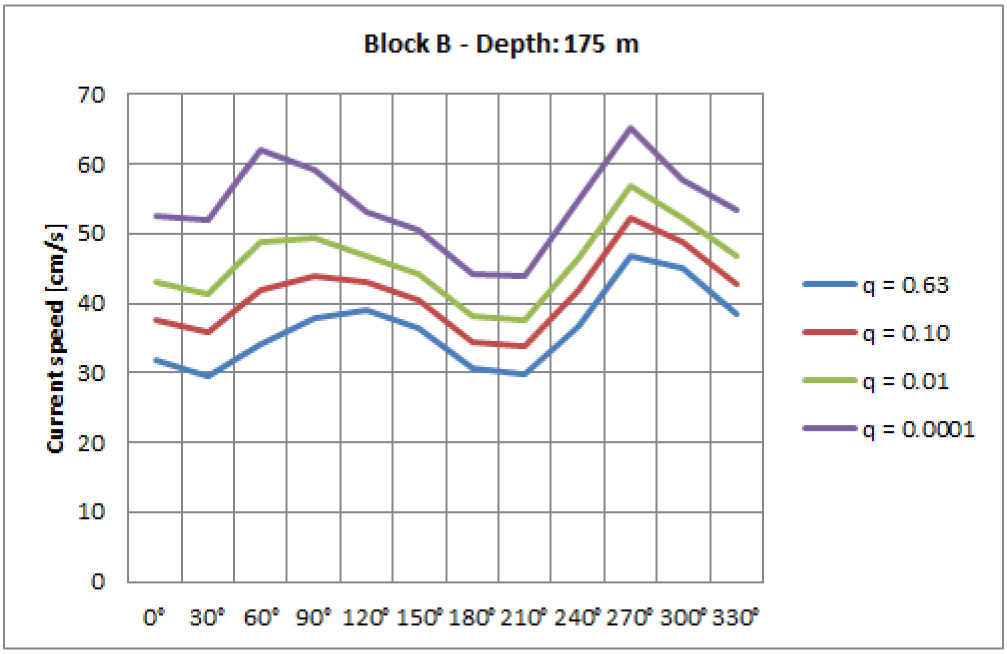


Figure 4-93 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 175 m water depth at Block B location.**

Table 4.98 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 175 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	3.05	1.587	8.818	0.809	32	38	43	53
30°	2.16	1.436	7.321	0.981	30	36	41	52
60°	2.74	1.329	7.358	1.509	34	42	49	62
90°	5.32	1.705	10.967	0.972	38	44	49	59
120°	12.24	2.303	15.150	0.079	39	43	47	53
150°	11.17	2.202	13.420	0.672	37	41	44	50
180°	6.59	2.030	10.605	0.796	31	35	38	44
210°	5.34	1.943	9.960	0.860	30	34	38	44
240°	7.04	1.792	10.800	1.612	37	42	47	55
270°	13.75	2.115	16.313	1.047	47	52	57	65
300°	21.93	2.851	21.195	-1.365	45	49	52	58
330°	8.66	2.242	14.991	-0.404	38	43	47	54
0°-360°	**100.00**	**1.994**	**14.840**	**0.200**	**49**	**54**	**59**	**67**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

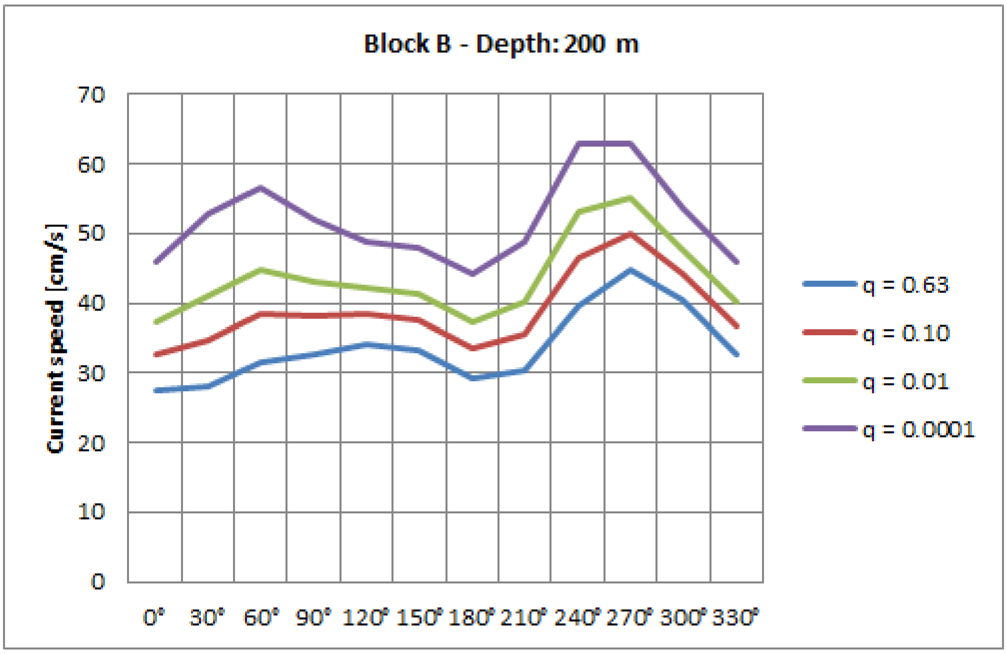


Figure 4-94 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 200 m water depth at Block B location.**

Table 4.99 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 200 m water depth at the Block B location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	2.94	1.557	7.470	0.566	27	33	37	46
30°	2.04	1.298	6.075	0.905	28	35	41	53
60°	2.49	1.375	7.327	0.647	31	38	45	57
90°	3.99	1.688	9.762	0.007	33	38	43	52
120°	9.02	2.034	11.959	-0.145	34	38	42	49
150°	11.18	1.953	10.844	0.513	33	38	41	48
180°	7.13	1.778	8.738	0.555	29	33	37	44
210°	6.02	1.593	8.002	0.817	31	36	40	49
240°	8.28	1.460	8.931	1.413	40	47	53	63*
270°	15.15	1.838	13.348	0.632	45	50*	55*	63*
300°	22.67	2.404	16.100	-0.558	40	44	48	54
330°	9.07	2.214	12.759	-0.677	33	37	40	46
0°-360°	**100.00**	**1.805**	**11.905**	**0.196**	**45**	**50**	**55**	**63**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

4.3.3 Block C

Figure 4.96 to Figure 4.111 and Table 4.101 – Table 4.116 show the directional and omnidirectional Weibull parameters and extreme values of current speed throughout the water column for Block C.

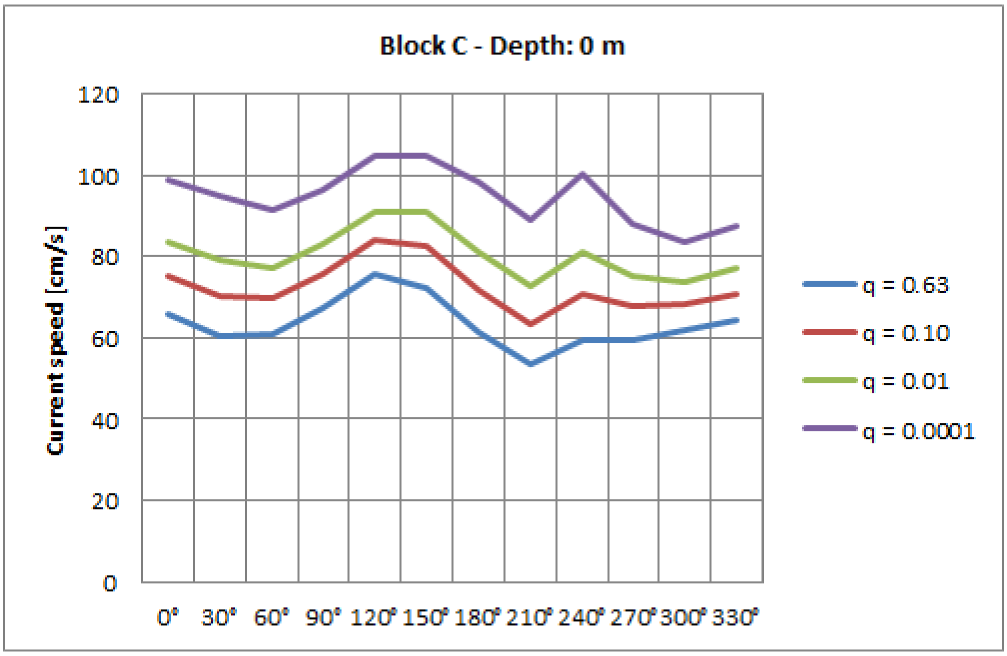


Figure 4-95 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 0 m water depth at Block C location.

Table 4.100 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 0 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	8.17	1.778	19.452	1.507	66	75	84	99
30°	6.48	1.634	16.194	2.110	61	70	79	95
60°	8.19	1.803	18.328	1.489	61	70	77	91
90°	12.43	1.957	21.649	1.668	67	76	83	97
120°	13.69	1.853	22.436	2.561	76	84*	91*	105*
150°	8.26	1.733	20.613	1.917	72	83	91*	105*
180°	4.27	1.646	17.405	1.201	61	72	81	98
210°	3.00	1.588	14.982	1.082	54	64	73	89
240°	3.58	1.494	14.952	1.803	60	71	81	100
270°	6.09	1.924	19.920	0.474	59	68	75	88
300°	12.35	2.394	25.316	-0.887	62	68	74	84
330°	13.50	2.313	25.165	-0.382	64	71	77	88
0°-360°	**100.00**	**1.893**	**21.259**	**0.974**	**76**	**84**	**91**	**105**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

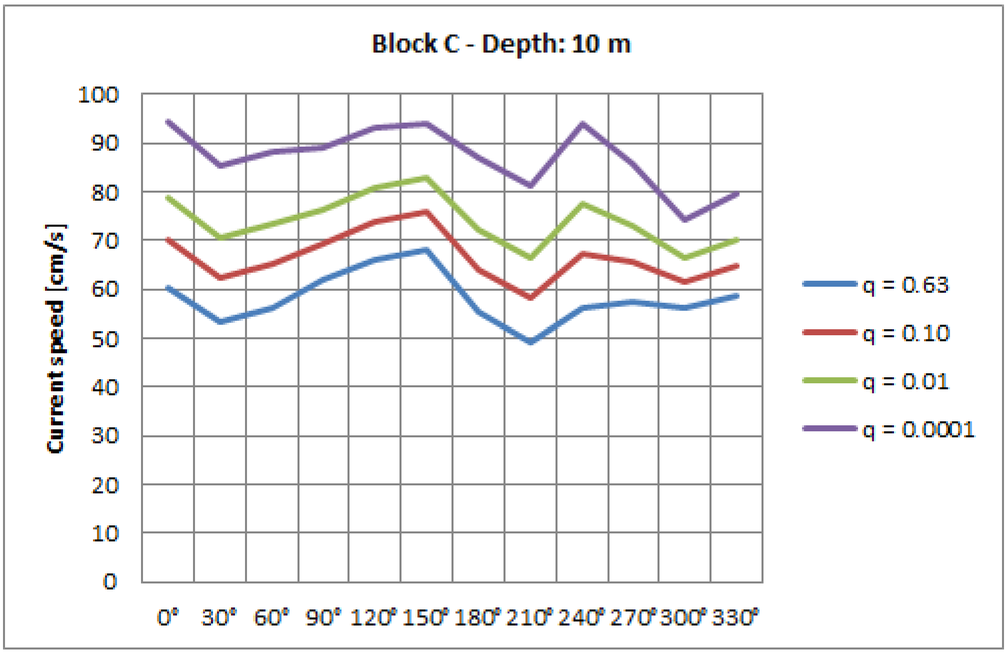


Figure 4-96 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 10 m water depth at Block C location.**

Table 4.101 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 10 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	7.06	1.644	16.282	1.742	60	70	79	94
30°	5.30	1.575	13.736	1.928	53	62	70	85
60°	7.08	1.620	14.738	2.169	56	65	73	88
90°	12.71	1.917	19.271	1.717	62	69	76	89
120°	15.41	2.007	21.437	1.864	66	74	81	93
150°	8.22	1.690	18.860	1.839	68	76*	83*	94*
180°	3.92	1.730	16.945	0.246	55	64	72	87
210°	2.76	1.610	14.106	0.626	49	58	66	81
240°	3.31	1.457	13.767	1.580	56	67	78	94*
270°	6.05	1.869	18.619	0.333	57	65	73	86
300°	14.15	2.583	24.655	-1.399	56	62	66	74
330°	14.02	2.309	22.750	-0.164	59	65	70	80
0°-360°	**100.00**	**1.941**	**20.009**	**0.550**	**69**	**76**	**83**	**94**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

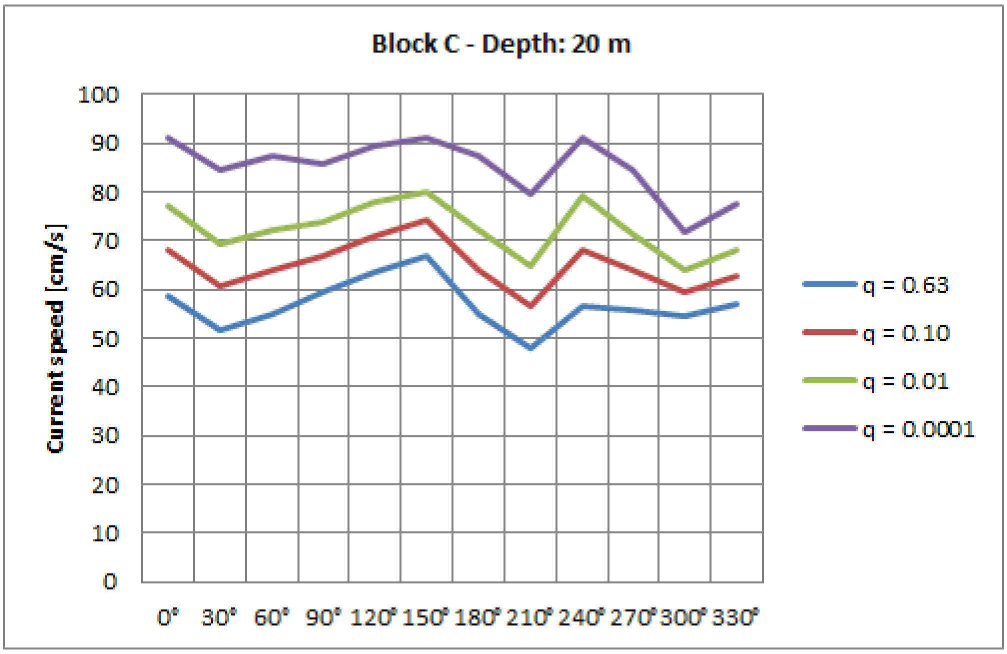


Figure 4-97 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 20 m water depth at Block C location.**

Table 4.102 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 20 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.63	1.612	15.508	1.720	59	68	77	91*
30°	5.04	1.518	12.737	1.876	52	61	69	85
60°	6.56	1.569	13.865	2.065	55	64	72	88
90°	12.75	1.898	18.300	1.784	59	67	74	86
120°	16.13	1.998	20.490	1.919	64	71	78	90
150°	7.98	1.654	17.962	2.070	67*	74*	80*	91*
180°	3.68	1.704	16.684	-0.025	55	64	72	87
210°	2.55	1.617	14.009	0.328	48	57	65	79
240°	3.10	1.423	13.507	1.575	57	68	79	91*
270°	5.90	1.852	18.069	0.249	56	64	71	84
300°	15.16	2.655	24.601	-1.657	55	60	64	72
330°	14.51	2.314	22.153	-0.128	57	63	68	77
0°-360°	**100.00**	**1.958**	**19.649**	**0.383**	**67**	**74**	**80**	**91**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

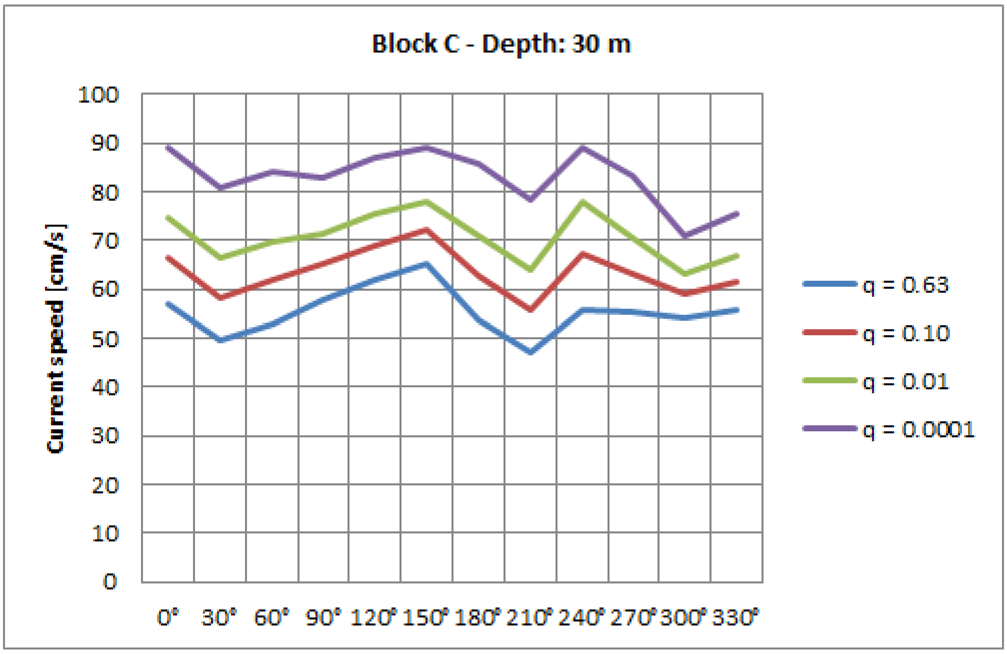


Figure 4-98 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 30 m water depth at Block C location.**

Table 4.103 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 30 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.49	1.624	15.224	1.636	57	66	75	89*
30°	4.87	1.539	12.532	1.693	50	58	66	81
60°	6.31	1.592	13.729	1.875	53	62	70	84
90°	12.79	1.928	18.169	1.601	58	65	72	83
120°	16.60	2.020	20.177	1.733	62	69	75	87
150°	7.81	1.657	17.839	1.842	65*	72*	78*	89*
180°	3.53	1.703	16.366	-0.009	54	63	71	86
210°	2.46	1.611	13.822	0.086	47	56	64	79
240°	3.00	1.414	13.244	1.474	56	67	78	89*
270°	5.83	1.850	17.836	0.277	55	63	71	83
300°	15.72	2.661	24.309	-1.581	54	59	63	71
330°	14.59	2.366	22.313	-0.469	56	62	67	76
0°-360°	**100.00**	**1.987**	**19.602**	**0.187**	**65**	**72**	**78**	**89**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

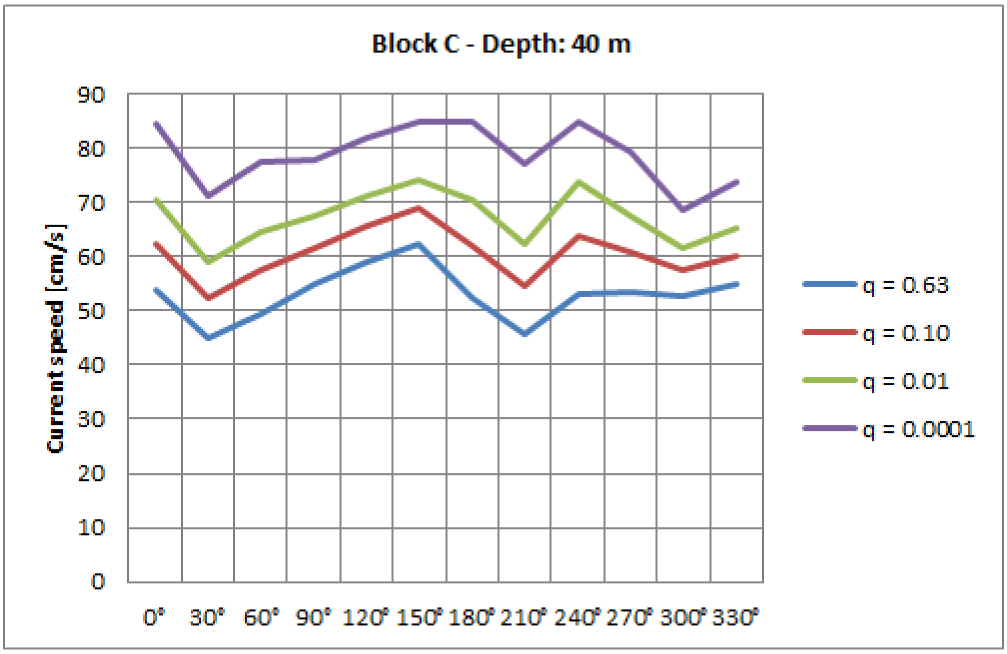


Figure 4-99 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 40 m water depth at Block C location.

Table 4.104 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 40 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.30	1.664	14.992	1.276	54	63	70	85
30°	4.68	1.651	12.623	1.108	45	52	59	71
60°	6.10	1.651	13.538	1.530	50	57	65	78
90°	12.80	1.995	18.029	1.200	55	62	68	78
120°	16.87	2.094	20.055	1.463	59	66	71	82
150°	7.68	1.724	17.863	1.438	62	69*	74*	85*
180°	3.37	1.642	15.353	0.234	53	62	70	85*
210°	2.33	1.575	13.020	0.386	46	54	63	77
240°	2.89	1.452	13.189	1.106	53	64	74	85*
270°	5.78	1.924	18.145	-0.222	53	61	68	79
300°	16.62	2.750	24.521	-1.919	53	57	62	69
330°	14.57	2.409	22.367	-0.775	55	60	65	74
0°-360°	**100.00**	**2.059**	**19.742**	**-0.244**	**63**	**69**	**74**	**85**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

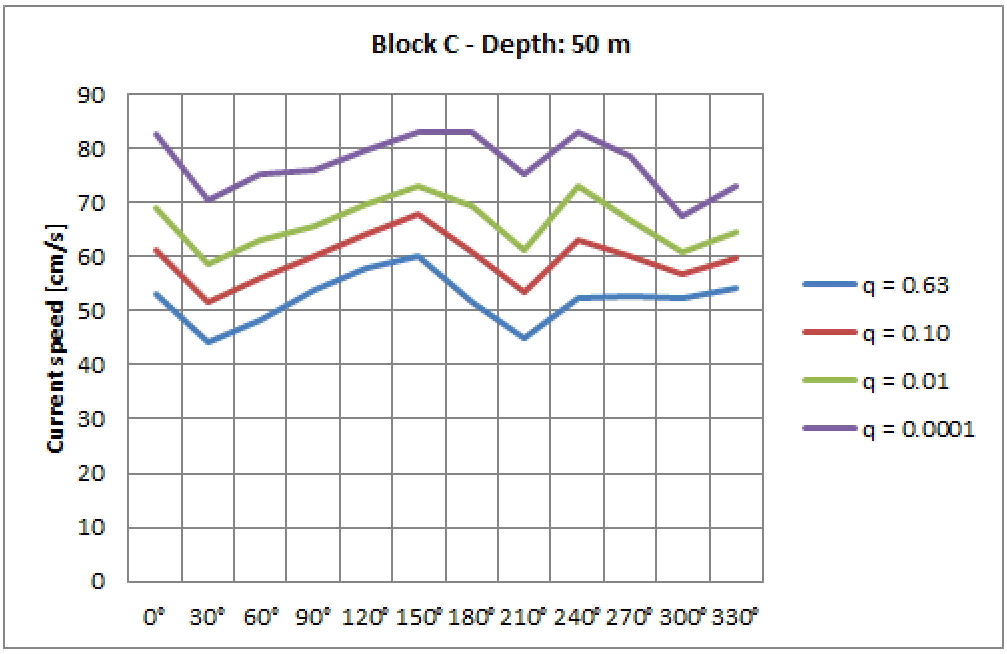


Figure 4-100 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 50 m water depth at Block C location.**

Table 4.105 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 50 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.26	1.672	14.825	1.207	53	61	69	83
30°	4.58	1.638	12.309	1.235	44	52	59	71
60°	6.06	1.665	13.369	1.433	48	56	63	75
90°	12.79	2.034	18.063	1.029	54	60	66	76
120°	16.95	2.136	20.137	1.276	58	64	70	80
150°	7.65	1.791	18.219	0.952	60	68*	73*	83*
180°	3.32	1.628	14.931	0.433	52	61	69	83*
210°	2.28	1.601	13.168	0.137	45	54	61	75
240°	2.87	1.445	12.922	1.090	52	63	73	83
270°	5.75	1.935	18.127	-0.252	53	60	67	79
300°	16.90	2.804	24.791	-2.221	52	57	61	68
330°	14.59	2.426	22.363	-0.853	54	60	65	73
0°-360°	**100.00**	**2.094**	**19.852**	**-0.444**	**62**	**68**	**73**	**83**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

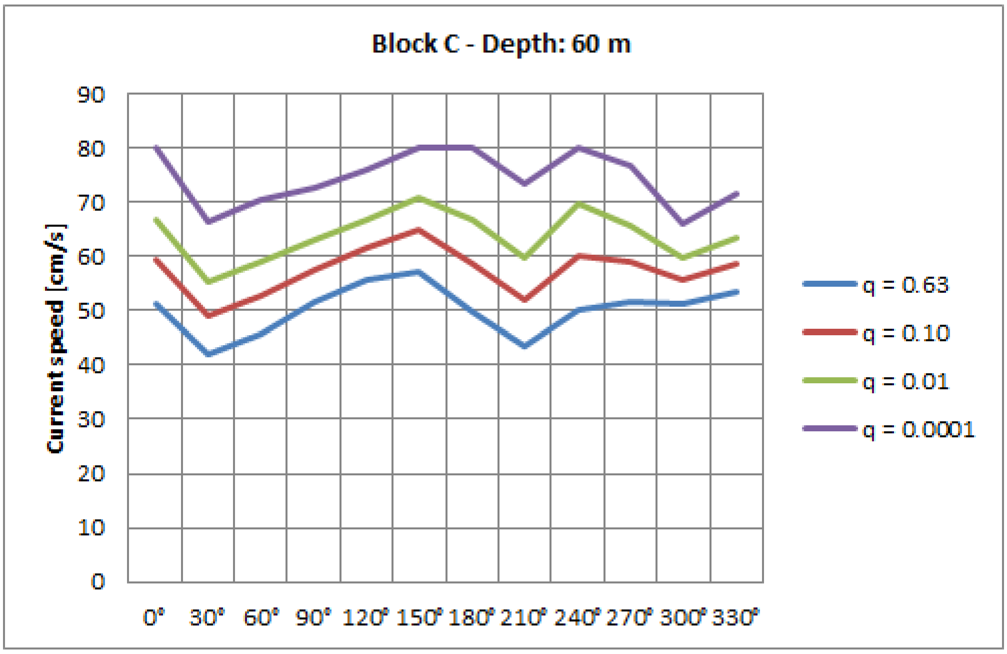


Figure 4-101 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 60 m water depth at Block C location.**

Table 4.106 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 60 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.11	1.670	14.323	1.328	51	60	67	80
30°	4.46	1.678	12.112	1.031	42	49	55	67
60°	5.91	1.715	13.187	1.229	46	53	59	71
90°	12.76	2.084	17.926	0.822	52	58	63	73
120°	17.16	2.216	20.287	0.821	56	62	67	76
150°	7.54	1.889	18.536	0.327	57	65	71*	80*
180°	3.21	1.637	14.515	0.315	50	59	67	80*
210°	2.22	1.594	12.757	0.084	44	52	60	74
240°	2.79	1.465	12.633	1.089	50	60	70	80*
270°	5.73	1.958	18.055	-0.430	52	59	66	77
300°	17.47	2.897	25.221	-2.715	51	56	60	66
330°	14.64	2.465	22.443	-1.099	54	59	64	72
0°-360°	**100.00**	**2.151**	**19.970**	**-0.774**	**60**	**65**	**71**	**80**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

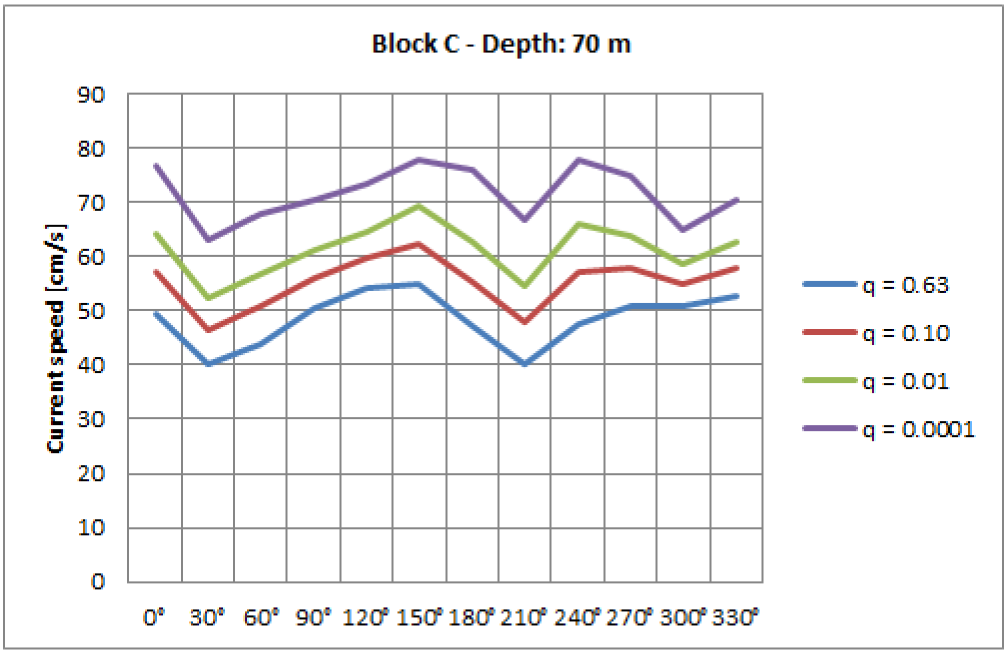


Figure 4-102 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 70 m water depth at Block C location.

Table 4.107 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 70 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.97	1.689	14.012	1.152	49	57	64	77
30°	4.28	1.689	11.634	1.074	40	47	53	63
60°	5.74	1.721	12.746	1.268	44	51	57	68
90°	12.75	2.098	17.576	0.781	50	56	61	71
120°	17.43	2.272	20.229	0.564	54	60	65	73
150°	7.38	1.930	18.424	0.031	55	63	69	78*
180°	3.11	1.678	14.204	0.205	47	55	63	76
210°	2.13	1.654	12.414	-0.055	40	48	55	67
240°	2.72	1.486	12.310	0.965	48	57	66	78*
270°	5.72	1.988	18.077	-0.656	51	58	64	75
300°	17.97	2.971	25.545	-3.103	51	55	59	65
330°	14.81	2.479	22.305	-1.218	53	58	63	71
0°-360°	**100.00**	**2.185**	**19.918**	**-0.962**	**58**	**64**	**69**	**78**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

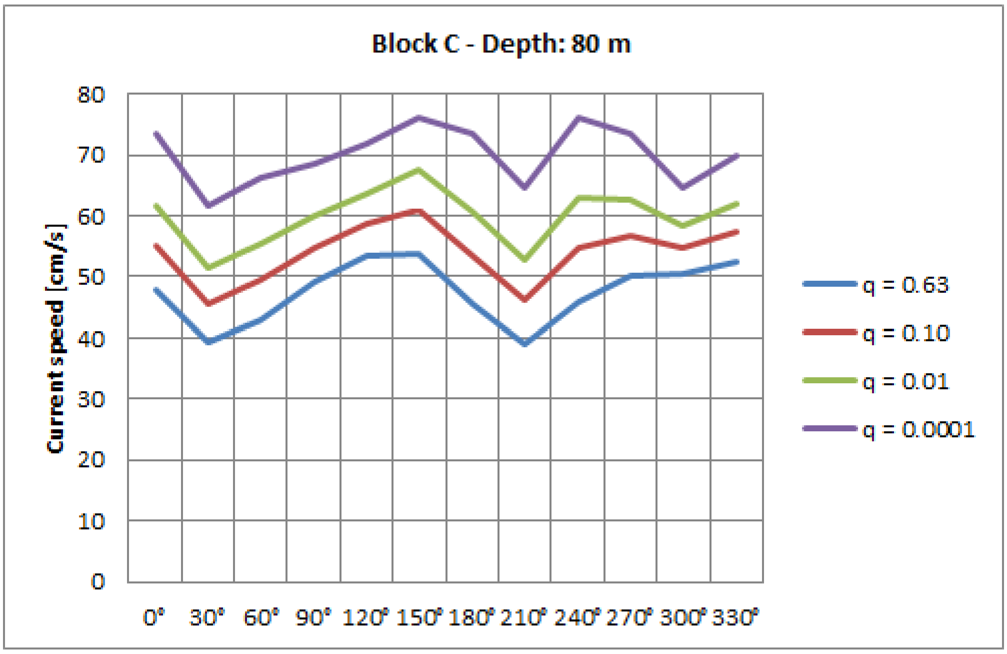


Figure 4-103 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 80 m water depth at Block C location.

Table 4.108 Directional and omnidirectional Weibull parameters and corresponding extreme values of current speed at 80 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.86	1.738	14.115	0.910	48	55	62	74
30°	4.22	1.687	11.365	1.082	39	46	51	62
60°	5.69	1.734	12.572	1.190	43	50	55	66
90°	12.69	2.127	17.461	0.732	49	55	60	69
120°	17.59	2.300	20.179	0.468	53	59	64	72
150°	7.32	1.953	18.318	-0.084	54	61	68	76*
180°	3.04	1.708	14.191	0.006	46	54	61	74
210°	2.08	1.659	12.060	-0.038	39	46	53	65
240°	2.68	1.529	12.378	0.713	46	55	63	76*
270°	5.68	2.010	18.006	-0.678	50	57	63	74
300°	18.22	2.997	25.672	-3.267	51	55	58	65
330°	14.92	2.492	22.218	-1.271	52	57	62	70
0°-360°	**100.00**	**2.208**	**19.917**	**-1.076**	**58**	**63**	**68**	**76**

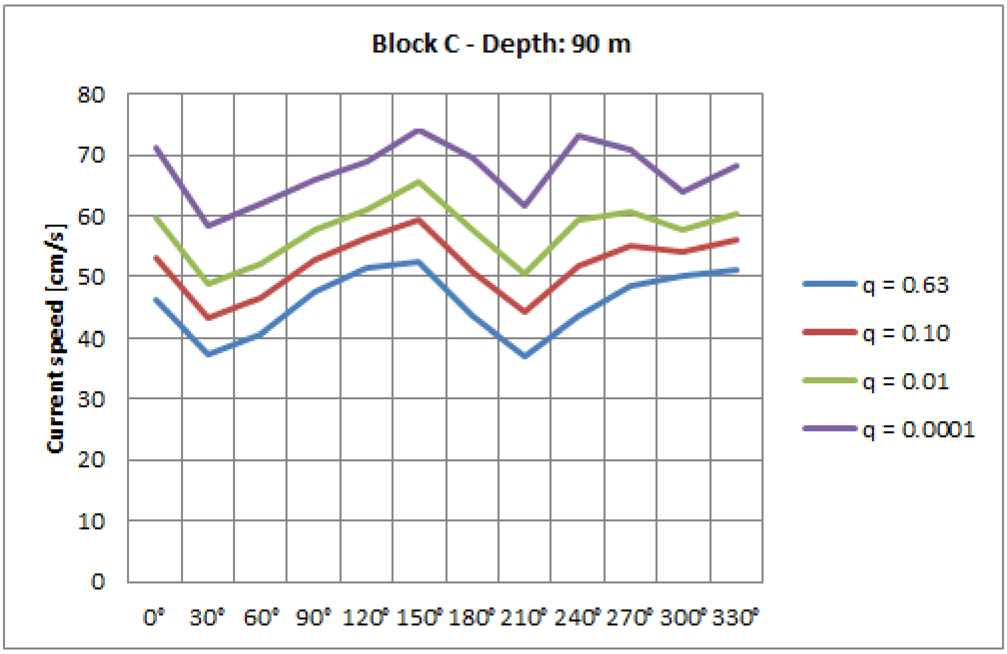


Figure 4-104 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 90 m water depth at Block C location.**

Table 4.109 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 90 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.69	1.733	13.595	0.935	46	53	60	71
30°	4.08	1.722	11.138	0.884	37	43	49	58
60°	5.53	1.780	12.358	0.963	41	47	52	62
90°	12.71	2.178	17.348	0.440	48	53	58	66
120°	17.81	2.383	20.274	0.129	51	57	61	69
150°	7.22	1.965	17.925	-0.119	52	59	66	74*
180°	2.94	1.749	14.015	-0.263	44	51	58	70
210°	1.98	1.660	11.562	-0.034	37	44	51	62
240°	2.57	1.565	12.155	0.655	44	52	60	73
270°	5.67	2.066	18.148	-1.095	49	55	61	71
300°	18.70	3.020	25.581	-3.220	50	54	58	64
330°	15.11	2.528	22.062	-1.404	51	56	61	68
0°-360°	**100.00**	**2.246**	**19.897**	**-1.281**	**56**	**61**	**66**	**74**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

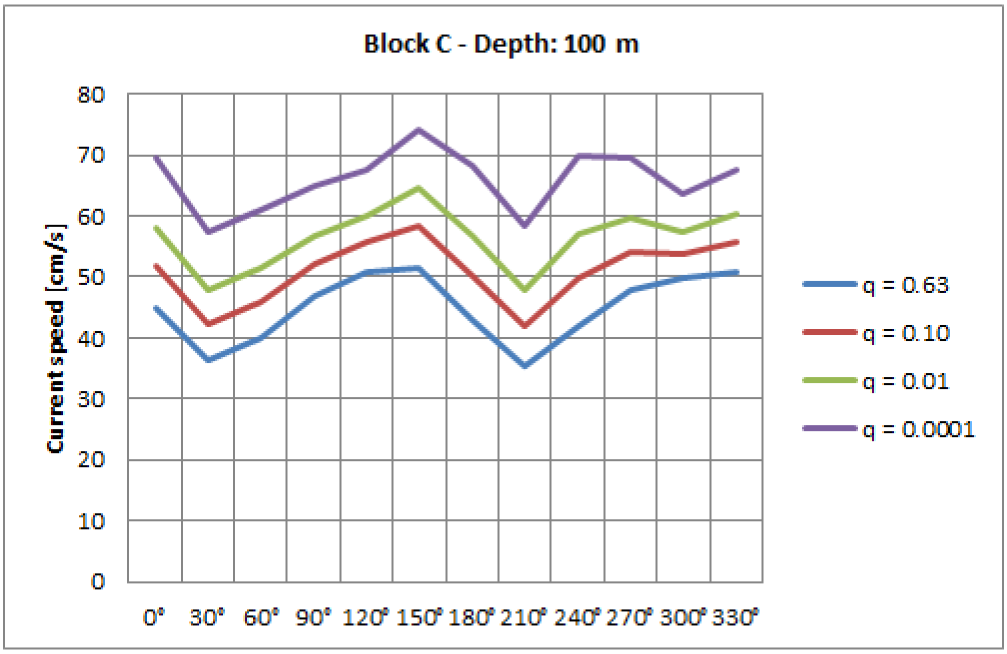


Figure 4-105 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 100 m water depth at Block C location.

Table 4.110 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 100 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.62	1.736	13.319	0.924	45	52	58	70
30°	3.98	1.721	10.947	0.839	37	42	48	57
60°	5.46	1.773	12.095	0.969	40	46	51	61
90°	12.63	2.183	17.137	0.463	47	52	57	65
120°	17.98	2.415	20.250	0.010	51	56	60	68
150°	7.17	1.968	17.714	-0.102	52	59	65	74*
180°	2.90	1.761	13.938	-0.362	43	50	57	68
210°	1.94	1.708	11.523	-0.249	36	42	48	59
240°	2.51	1.597	12.051	0.515	42	50	57	70
270°	5.61	2.093	18.170	-1.180	48	54	60	70
300°	19.04	3.039	25.623	-3.313	50	54	58	64
330°	15.17	2.524	21.881	-1.362	51	56	60	68
0°-360°	**100.00**	**2.258**	**19.845**	**-1.341**	**56**	**61**	**65**	**74**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

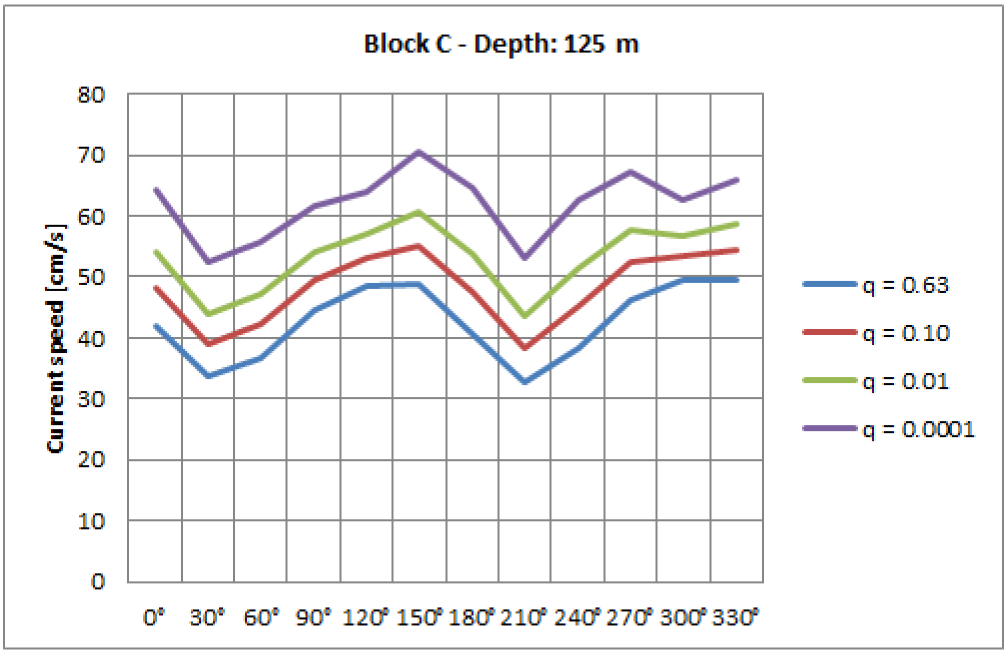


Figure 4-106 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 125 m water depth at Block C location.**

Table 4.111 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 125 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.37	1.760	12.619	0.949	42	48	54	64
30°	3.76	1.766	10.492	0.613	34	39	44	53
60°	5.18	1.820	11.557	0.818	37	42	47	56
90°	12.37	2.229	16.806	0.206	45	50	54	62
120°	18.50	2.519	20.287	-0.379	49	53	57	64
150°	7.10	2.053	17.648	-0.467	49	55	61	71
180°	2.75	1.771	13.402	-0.484	41	48	54	65
210°	1.84	1.764	11.062	-0.426	33	38	44	53
240°	2.38	1.680	11.861	0.162	38	45	52	63
270°	5.49	2.117	17.834	-1.243	46	52	58	67
300°	19.85	3.104	25.989	-3.770	49	53	57	63
330°	15.39	2.560	21.658	-1.469	50	54	59	66
0°-360°	**100.00**	**2.294**	**19.756**	**-1.551**	**54**	**59**	**64**	**72**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

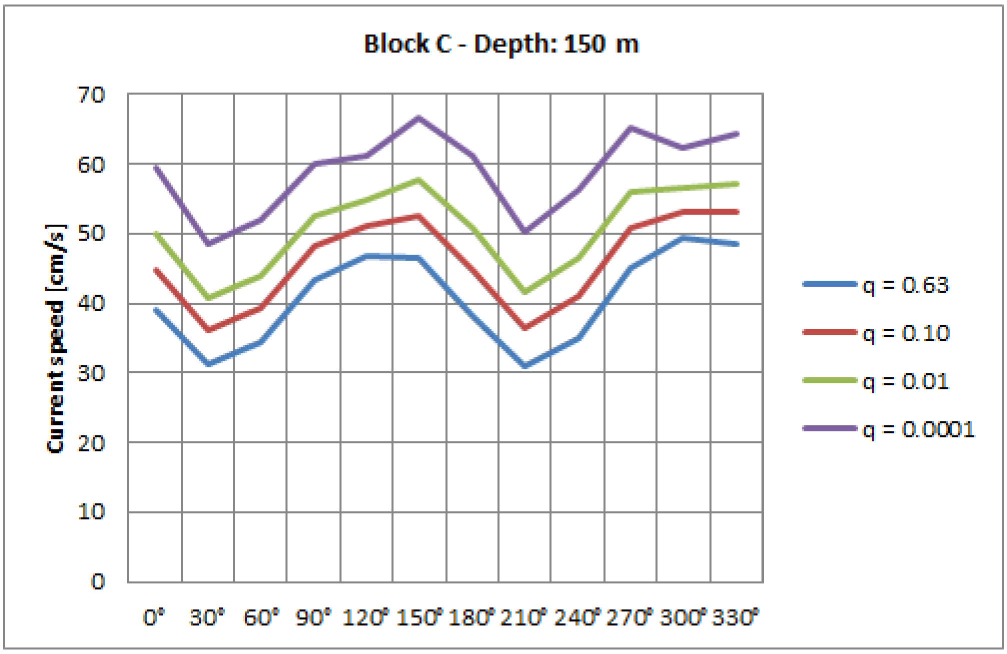


Figure 4-107 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 150 m water depth at Block C location.

Table 4.112 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 150 m water depth at the Block C location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.12	1.810	12.188	0.785	39	45	50	59
30°	3.57	1.791	9.925	0.610	31	36	41	49
60°	4.90	1.853	11.085	0.670	34	39	44	52
90°	11.96	2.199	15.985	0.476	43	48	52	60
120°	18.98	2.633	20.537	-0.858	47	51	55	61
150°	7.16	2.124	17.552	-0.791	47	52	58	67
180°	2.66	1.757	12.466	-0.248	38	45	51	61
210°	1.77	1.775	10.633	-0.504	31	37	42	50
240°	2.28	1.767	11.626	-0.250	35	41	47	56
270°	5.42	2.121	17.364	-1.241	45	51	56	65
300°	20.66	3.110	25.826	-3.634	49	53	57	62
330°	15.53	2.608	21.641	-1.641	49	53	57	64
0°-360°	**100.00**	**2.312**	**19.645**	**-1.656**	**54**	**58**	**63**	**70**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

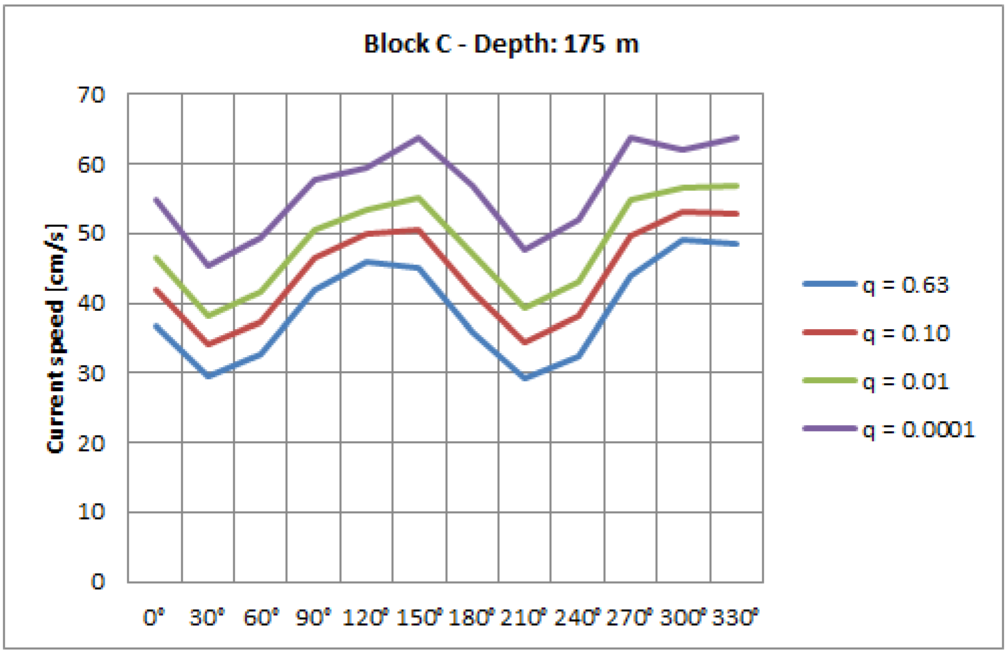


Figure 4-108 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 175 m water depth at Block C location.**

Table 4.113 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 175 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	4.95	1.914	12.360	0.358	37	42	47	55
30°	3.33	1.835	9.692	0.500	30	34	38	45
60°	4.54	1.862	10.612	0.675	33	37	42	49
90°	11.33	2.219	15.660	0.339	42	47	51	58
120°	19.49	2.722	20.778	-1.247	46	50	53	59
150°	7.41	2.176	17.340	-0.883	45	50	55	64
180°	2.61	1.777	11.767	-0.132	36	42	47	57
210°	1.73	1.783	10.092	-0.354	29	35	39	48
240°	2.22	1.795	11.029	-0.302	33	38	43	52
270°	5.42	2.105	16.722	-0.972	44	50	55	64
300°	21.25	3.145	26.031	-3.719	49	53	56	62
330°	15.72	2.622	21.620	-1.620	48	53	57	64
0°-360°	**100.00**	**2.320**	**19.617**	**-1.712**	**53**	**58**	**62**	**70**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

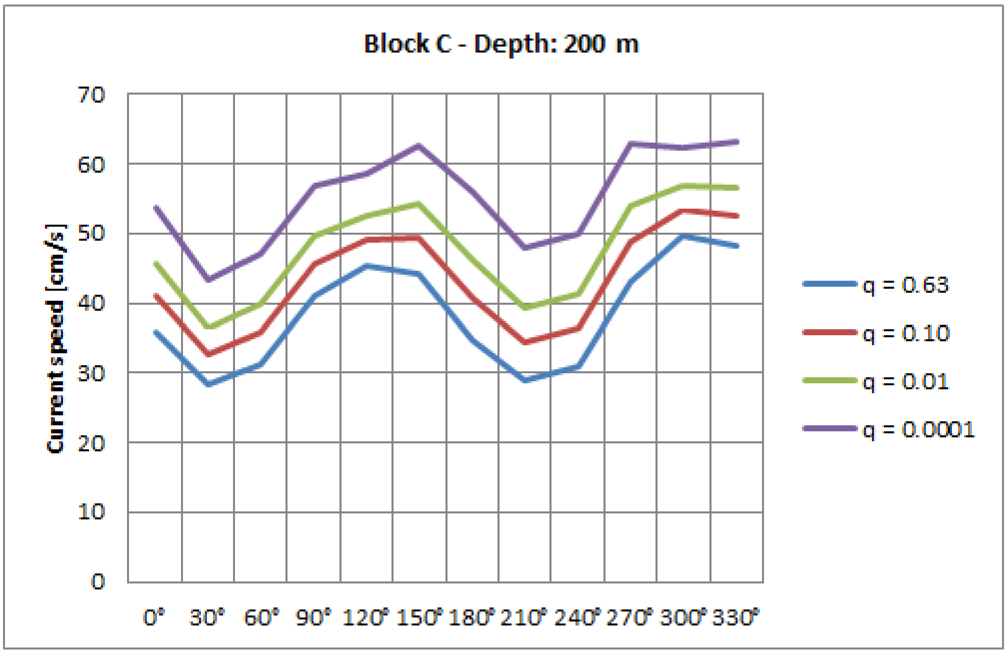


Figure 4-109 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 200 m water depth at Block C location.**

Table 4.114 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 200 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	4.72	1.923	12.204	0.298	36	41	46	54
30°	3.15	1.892	9.735	0.273	28	33	37	43
60°	4.30	1.897	10.473	0.510	31	36	40	47
90°	10.53	2.225	15.527	0.091	41	46	50	57
120°	19.92	2.734	20.508	-1.103	45	49	53	59
150°	7.71	2.163	16.805	-0.651	44	49	54	63
180°	2.63	1.704	10.805	0.129	35	41	46	56
210°	1.69	1.684	9.230	0.027	29	34	39	48
240°	2.14	1.743	10.102	0.059	31	36	41	50
270°	5.43	2.083	16.276	-0.943	43	49	54	63
300°	21.85	3.150	26.149	-3.693	50	53	57	62
330°	15.93	2.678	22.018	-1.973	48	53	56	63
0°-360°	**100.00**	**2.320**	**19.664**	**-1.793**	**53**	**58**	**62**	**70**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

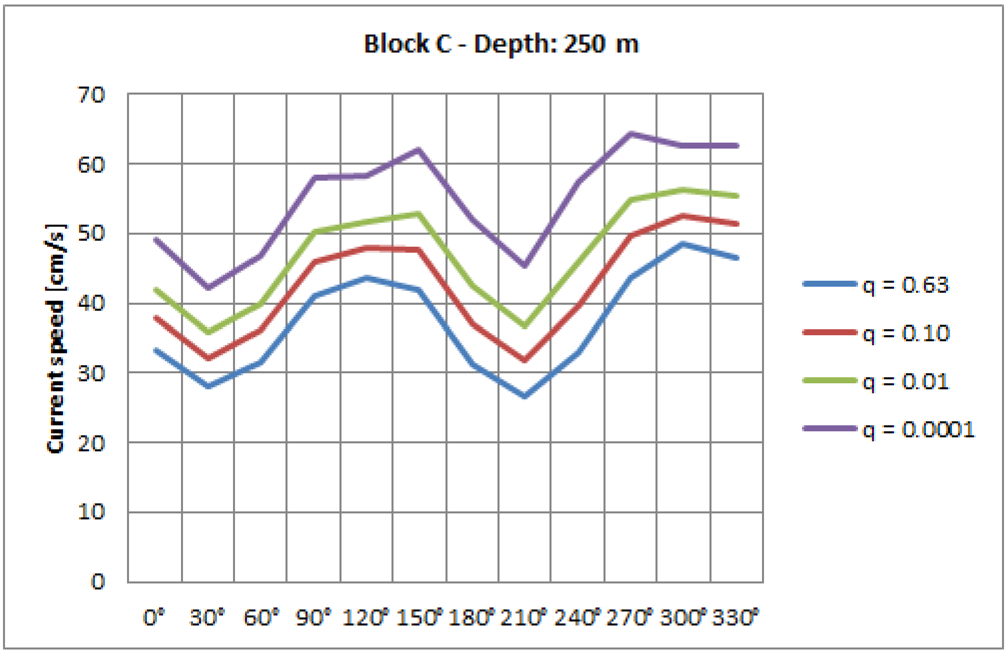


Figure 4-110 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 250 m water depth at Block C location.**

Table 4.115 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 250 m water depth at the Block C location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.37	1.977	11.703	-0.051	33	38	42	49
30°	3.66	1.950	10.001	-0.204	28	32	36	42
60°	4.80	1.982	11.308	-0.397	32	36	40	47
90°	9.58	2.105	14.919	-0.380	41	46	50	58
120°	17.48	2.440	17.882	-0.700	44	48	52	58
150°	8.13	1.886	13.490	0.391	42	48	53	62
180°	2.71	1.592	8.864	0.538	31	37	43	52
210°	1.80	1.589	7.850	0.276	27	32	37	45
240°	2.33	1.484	8.633	0.600	33	40	46	57
270°	5.96	1.970	15.302	-0.651	44	50	55	64
300°	21.11	2.800	22.896	-2.446	48	53	56	63
330°	17.10	2.398	18.899	-0.830	47	51	56	63
0°-360°	**100.00**	**2.110**	**17.091**	**-1.086**	**52**	**57**	**62**	**70**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

4.3.4 Block D

Figure 4.112 to Figure 4.127 and Table 4.117 – Table 4.132 show the directional and omnidirectional Weibull parameters and extreme values of current speed throughout the water column for Block D.

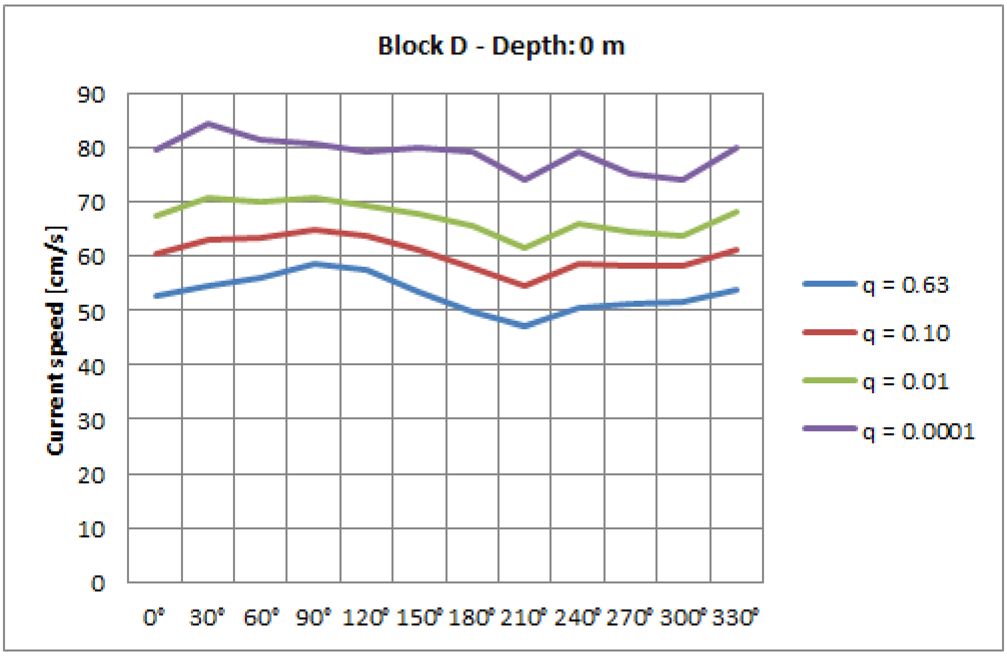


Figure 4-111 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 0 m water depth at Block D location.**

Table 4.116 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 0 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.87	1.790	16.023	0.796	53	60	67	80
30°	7.06	1.694	15.320	1.622	55	63	71	84
60°	10.07	1.914	17.937	1.052	56	64	70	82
90°	15.48	2.190	21.291	0.567	59	65	71	81
120°	13.79	2.177	20.902	0.461	58	64	70	80
150°	7.70	1.830	16.465	1.274	54	61	68	80
180°	4.71	1.640	13.812	1.416	50	58	66	79
210°	4.12	1.705	13.997	0.726	47	55	62	74
240°	5.11	1.695	14.622	1.155	51	59	66	79
270°	7.42	1.929	16.934	0.761	51	58	64	75
300°	9.12	1.982	17.209	0.987	52	58	64	74
330°	8.56	1.838	16.547	1.235	54	61	68	80
0°-360°	**100.00**	**1.908**	**17.881**	**0.739**	**63**	**70**	**76**	**87**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

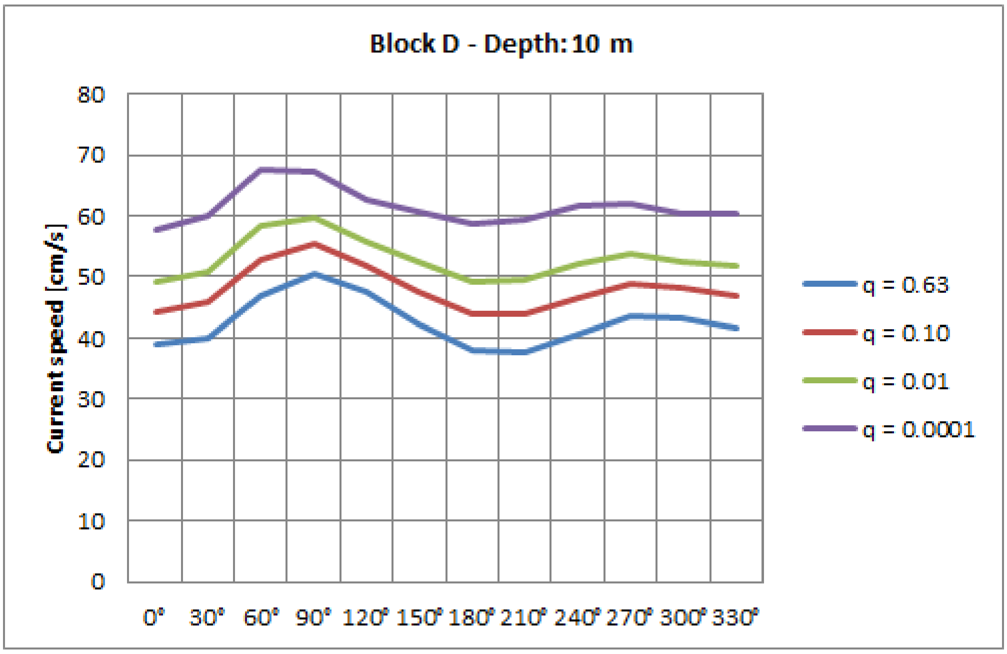


Figure 4-112 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 10 m water depth at Block D location.**

Table 4.117 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 10 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.03	1.898	12.701	0.797	39	44	49	58
30°	5.99	1.853	12.698	0.979	40	46	51	60
60°	9.23	1.982	15.695	0.804	47	53	58	68
90°	17.62	2.457	20.678	-0.322	51	55	60	67
120°	15.63	2.597	20.795	-1.082	47	52	56	63
150°	7.12	2.062	15.092	0.235	42	48	52	61
180°	4.02	1.778	11.825	0.797	38	44	49	59
210°	3.50	1.721	11.428	0.701	38	44	49	59
240°	4.61	1.846	13.266	0.273	41	47	52	62
270°	7.69	2.078	15.592	0.274	44	49	54	62
300°	10.27	2.175	15.868	0.538	43	48	53	60
330°	8.29	1.941	13.514	1.212	42	47	52	60
0°-360°	**100.00**	**2.048**	**16.428**	**0.195**	**53**	**58**	**63**	**71**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

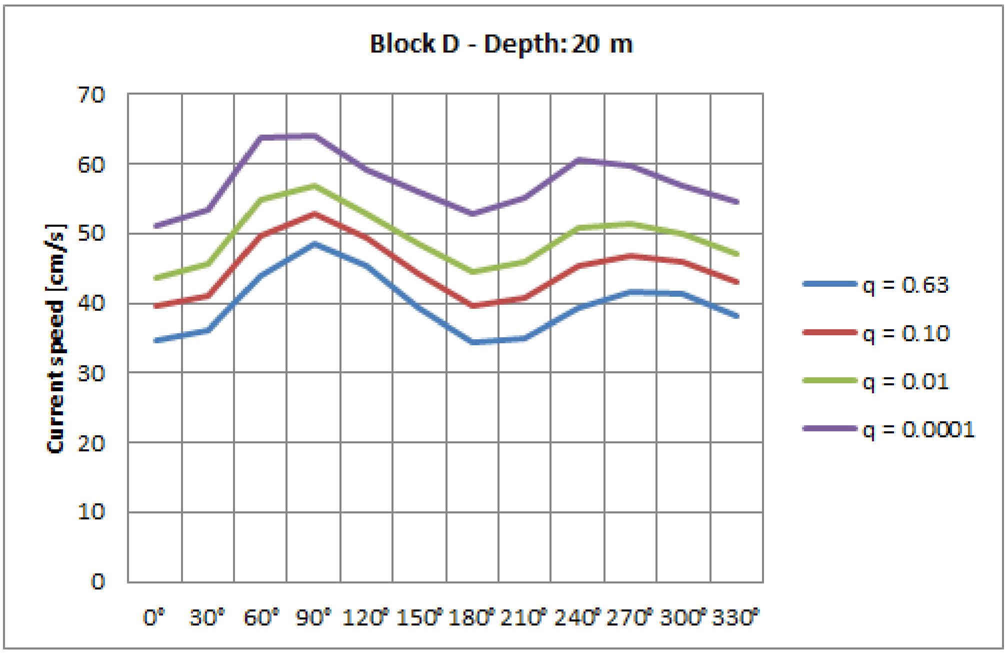


Figure 4-113 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 20 m water depth at Block D location.**

Table 4.118 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 20 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.75	1.948	11.624	0.940	35	40	44	51
30°	5.64	1.899	11.744	0.943	36	41	46	54
60°	8.73	1.966	14.522	1.063	44	50	55	64
90°	17.91	2.499	19.969	-0.069	48	53	57	64
120°	16.26	2.690	20.487	-1.244	45	49	53	59
150°	6.98	2.120	14.536	0.049	39	44	49	56
180°	3.82	1.840	11.284	0.504	35	40	45	53
210°	3.31	1.740	10.852	0.494	35	41	46	55
240°	4.46	1.777	12.174	0.591	39	45	51	61
270°	7.87	2.074	14.881	0.379	42	47	52	60
300°	10.89	2.223	15.407	0.561	41	46	50	57
330°	8.40	2.033	13.041	1.087	38	43	47	55
0°-360°	**100.00**	**2.064**	**15.817**	**0.237**	**51**	**55**	**60**	**68**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

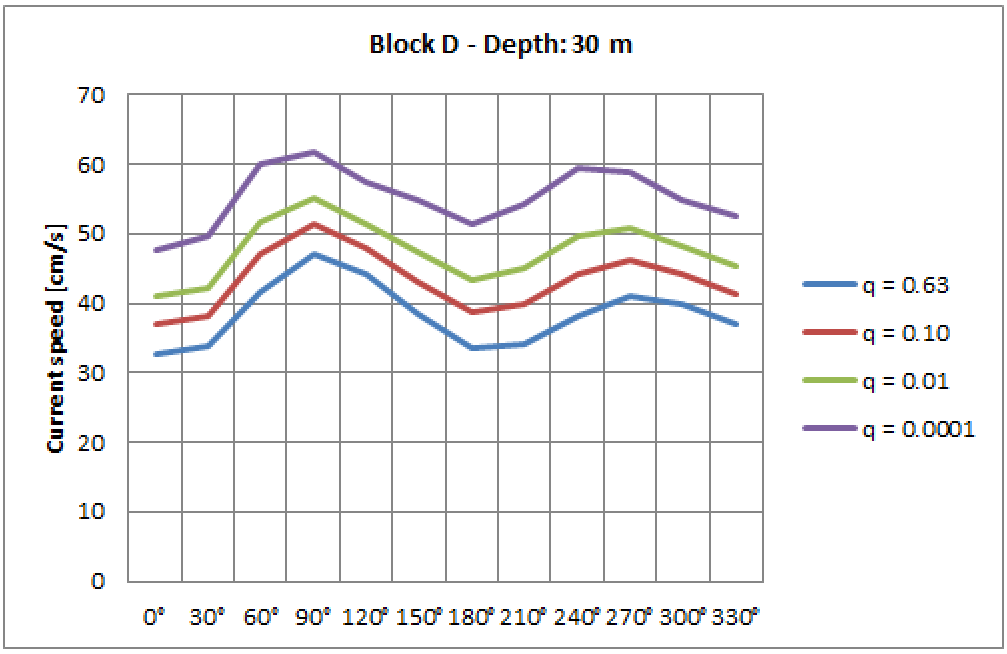


Figure 4-114 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 30 m water depth at Block D location.**

Table 4.119 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 30 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.62	2.002	11.313	0.861	33	37	41	48
30°	5.47	1.945	11.245	1.007	34	38	42	50
60°	8.48	1.999	13.999	1.153	42	47	52	60
90°	18.06	2.555	19.761	-0.044	47	51	55	62
120°	16.56	2.726	20.141	-1.168	44	48	51	57
150°	6.86	2.103	14.010	0.212	38	43	47	55
180°	3.75	1.844	11.027	0.358	33	39	43	51
210°	3.20	1.712	10.377	0.578	34	40	45	54
240°	4.40	1.752	11.670	0.575	38	44	50	59
270°	7.95	2.039	14.242	0.674	41	46	51	59
300°	11.18	2.252	15.064	0.697	40	44	48	55
330°	8.46	2.053	12.678	1.182	37	41	45	52
0°-360°	**100.00**	**2.079**	**15.517**	**0.273**	**49**	**54**	**58**	**66**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

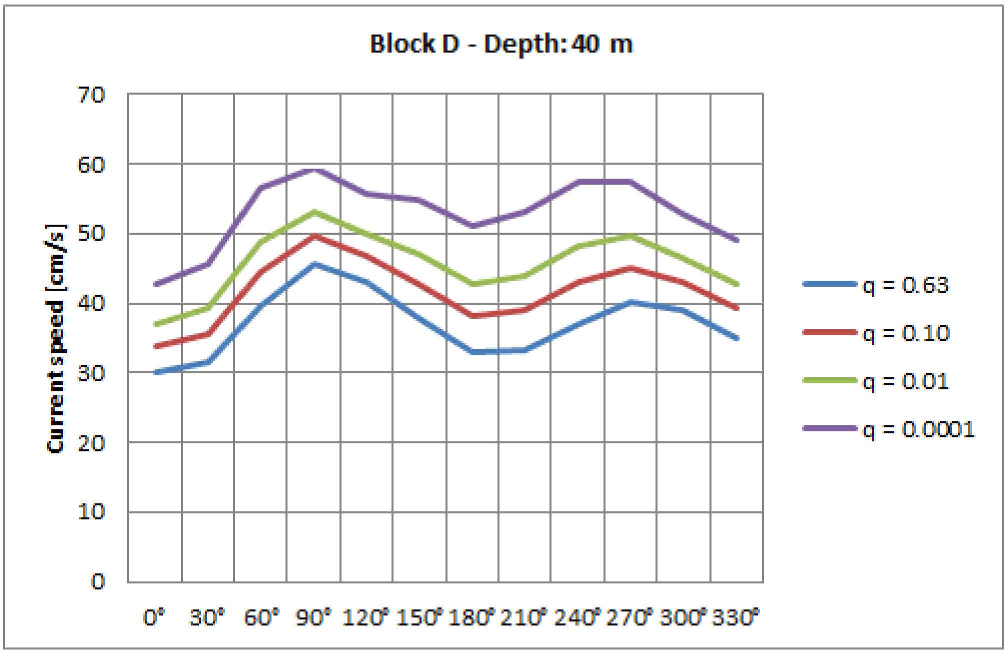


Figure 4-115 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 40 m water depth at Block D location.**

Table 4.120 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 40 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.51	2.153	11.280	0.533	30	34	37	43
30°	5.33	2.019	10.956	0.912	32	36	39	46
60°	8.23	2.015	13.314	1.316	40	44	49	57
90°	18.18	2.631	19.689	-0.199	46	50	53	59
120°	16.82	2.773	19.918	-1.206	43	47	50	56
150°	6.76	2.026	13.251	0.539	38	43	47	55
180°	3.62	1.788	10.422	0.616	33	38	43	51
210°	3.13	1.698	10.048	0.562	33	39	44	53
240°	4.34	1.762	11.427	0.561	37	43	48	58
270°	7.92	2.060	14.130	0.569	40	45	50	57
300°	11.59	2.316	15.067	0.542	39	43	47	53
330°	8.57	2.147	12.672	0.943	35	39	43	49
0°-360°	**100.00**	**2.101**	**15.284**	**0.253**	**48**	**52**	**57**	**64**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

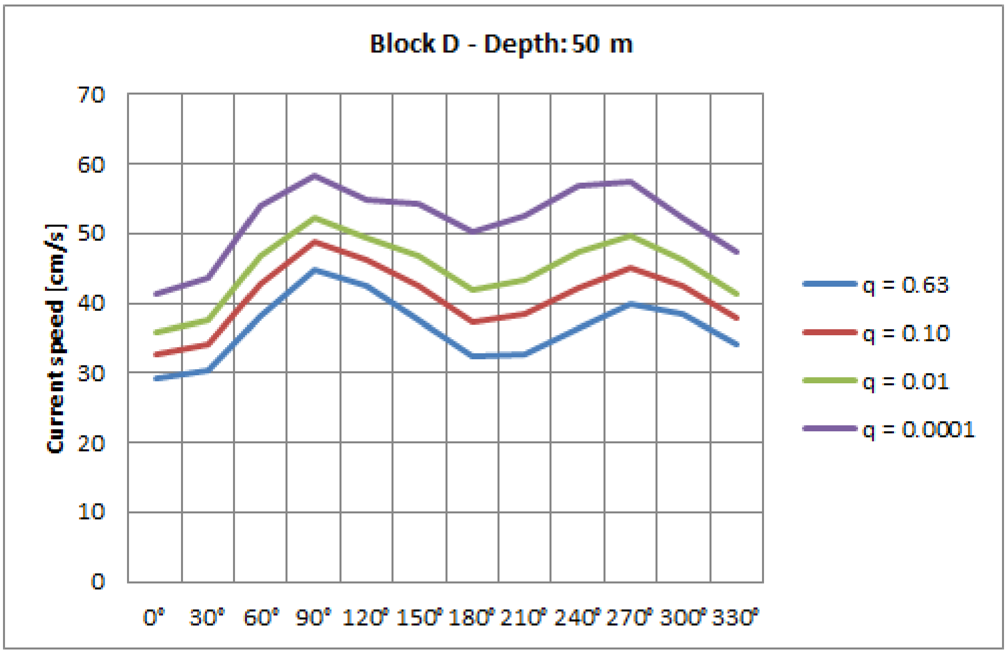


Figure 4-116 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 50 m water depth at Block D location.

Table 4.121 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 50 m water depth at the Block D location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.44	2.192	11.154	0.493	29	33	36	41
30°	5.25	2.087	10.969	0.737	30	34	38	44
60°	8.10	2.080	13.313	1.105	38	43	47	54
90°	18.25	2.671	19.744	-0.440	45	49	52	58
120°	16.91	2.785	19.702	-1.146	42	46	49	55
150°	6.74	2.010	12.980	0.616	38	42	47	54
180°	3.57	1.777	10.126	0.723	32	37	42	50
210°	3.11	1.691	9.856	0.578	33	38	43	53
240°	4.23	1.754	11.176	0.654	37	42	47	57
270°	7.92	2.027	13.806	0.729	40	45	50	58
300°	11.83	2.334	15.012	0.547	39	43	46	52
330°	8.65	2.232	12.864	0.623	34	38	41	47
0°-360°	**100.00**	**2.110**	**15.150**	**0.243**	**47**	**52**	**56**	**63**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

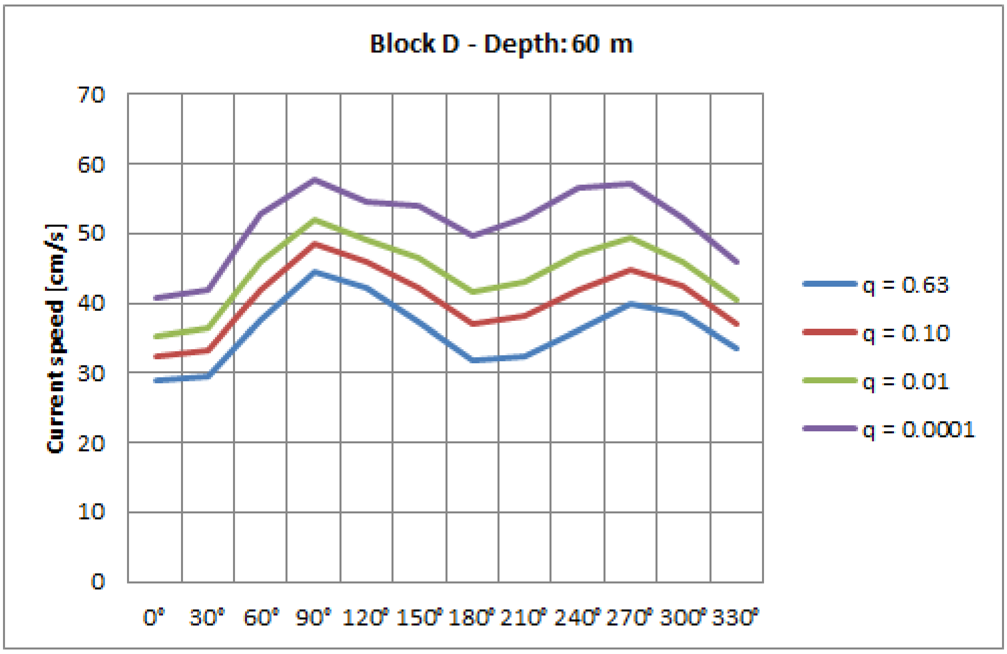


Figure 4-117 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 60 m water depth at Block D location.**

Table 4.122 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 60 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.41	2.207	11.102	0.468	29	32	35	41
30°	5.22	2.160	11.141	0.489	30	33	36	42
60°	8.03	2.109	13.328	1.006	38	42	46	53
90°	18.22	2.681	19.674	-0.440	45	48	52	58
120°	17.01	2.778	19.567	-1.101	42	46	49	55
150°	6.73	2.008	12.873	0.638	37	42	46	54
180°	3.58	1.782	10.066	0.659	32	37	42	50
210°	3.08	1.681	9.694	0.643	33	38	43	52
240°	4.21	1.748	11.049	0.697	36	42	47	56
270°	7.88	2.026	13.732	0.746	40	45	49	57
300°	11.96	2.332	14.980	0.536	39	43	46	52
330°	8.68	2.288	12.973	0.483	33	37	40	46
0°-360°	**100.00**	**2.113**	**15.086**	**0.240**	**47**	**51**	**55**	**63**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

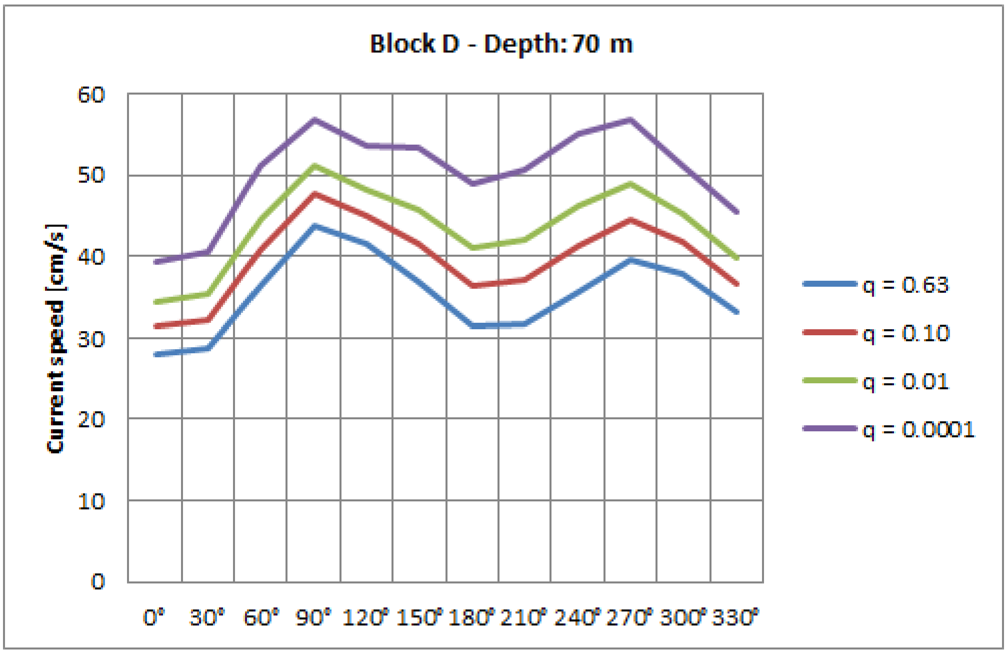


Figure 4-118 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 70 m water depth at Block D location.

Table 4.123 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 70 m water depth at the Block D location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.38	2.272	11.210	0.227	28	31	34	39
30°	5.16	2.205	11.096	0.398	29	32	35	41
60°	7.91	2.158	13.360	0.803	37	41	45	51
90°	18.17	2.700	19.494	-0.434	44	48	51	57
120°	17.10	2.826	19.601	-1.260	42	45	48	54
150°	6.73	2.010	12.710	0.656	37	42	46	53
180°	3.55	1.784	9.950	0.682	32	37	41	49
210°	3.06	1.703	9.651	0.512	32	37	42	51
240°	4.15	1.765	11.010	0.609	36	41	46	55
270°	7.85	2.022	13.619	0.699	40	45	49	57
300°	12.15	2.391	15.153	0.354	38	42	45	51
330°	8.79	2.288	12.807	0.580	33	37	40	46
0°-360°	**100.00**	**2.136**	**15.050**	**0.163**	**46**	**51**	**54**	**62**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

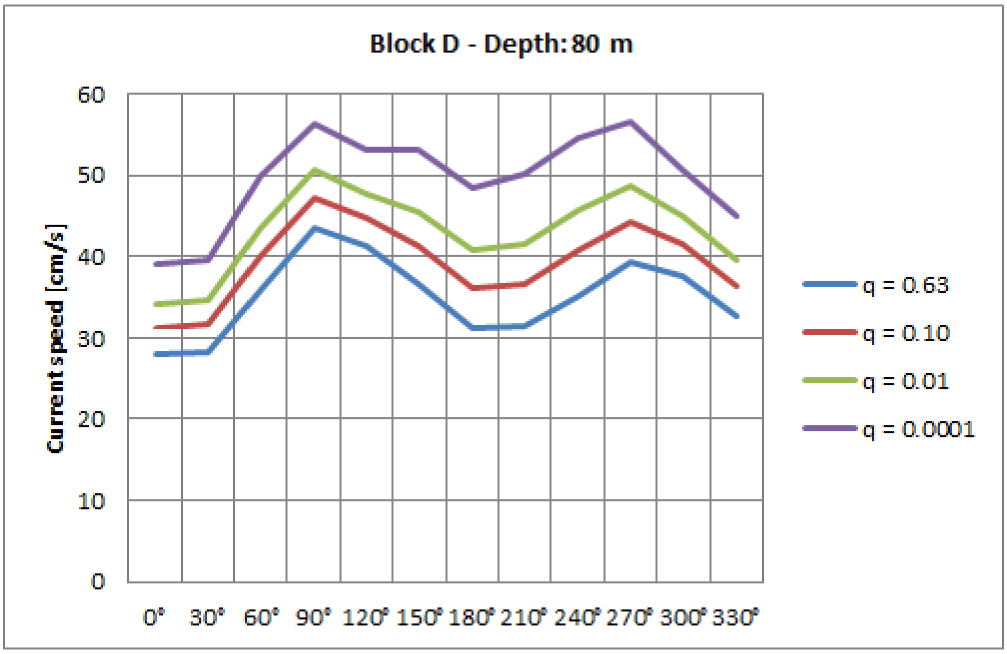


Figure 4-119 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 80 m water depth at Block D location.**

Table 4.124 **Directional and omnidirectional Weibull parameters and corresponding extreme values of current speed at 80 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.36	2.281	11.174	0.215	28	31	34	39
30°	5.12	2.256	11.199	0.264	28	32	35	40
60°	7.91	2.206	13.491	0.571	36	40	44	50
90°	18.13	2.712	19.407	-0.422	44	47	51	56
120°	17.11	2.837	19.485	-1.226	41	45	48	53
150°	6.75	2.004	12.606	0.657	37	41	46	53
180°	3.53	1.791	9.926	0.668	31	36	41	49
210°	3.03	1.713	9.652	0.443	31	37	42	50
240°	4.14	1.769	10.936	0.585	35	41	46	55
270°	7.87	2.028	13.605	0.691	39	44	49	57
300°	12.20	2.400	15.124	0.364	38	42	45	51
330°	8.85	2.319	12.875	0.483	33	36	40	45
0°-360°	**100.00**	**2.148**	**15.029**	**0.128**	**46**	**50**	**54**	**61**

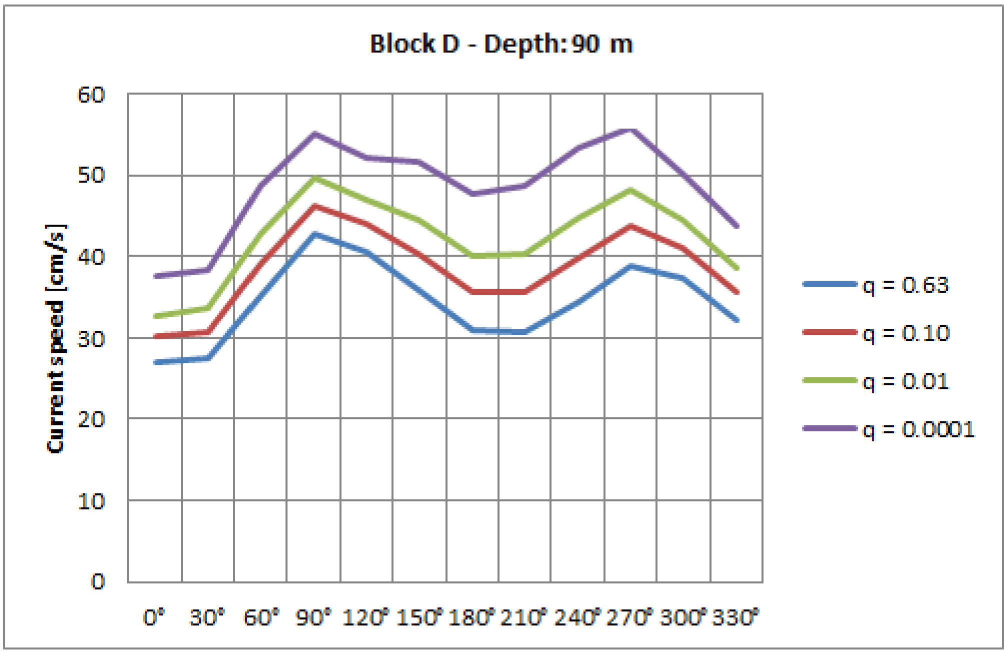


Figure 4-120 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 90 m water depth at Block D location.**

Table 4.125 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 90 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.34	2.373	11.313	-0.008	27	30	33	38
30°	5.07	2.326	11.329	0.022	28	31	34	38
60°	7.85	2.240	13.473	0.414	35	39	43	49
90°	18.07	2.762	19.412	-0.598	43	46	50	55
120°	17.15	2.889	19.592	-1.459	41	44	47	52
150°	6.73	2.046	12.667	0.521	36	40	45	52
180°	3.53	1.799	9.856	0.614	31	36	40	48
210°	2.97	1.731	9.505	0.514	31	36	40	49
240°	4.14	1.781	10.803	0.552	35	40	45	53
270°	7.89	2.045	13.584	0.635	39	44	48	56
300°	12.36	2.434	15.216	0.269	37	41	44	50
330°	8.92	2.398	13.121	0.224	32	36	39	44
0°-360°	**100.00**	**2.178**	**15.032**	**0.025**	**45**	**49**	**53**	**60**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

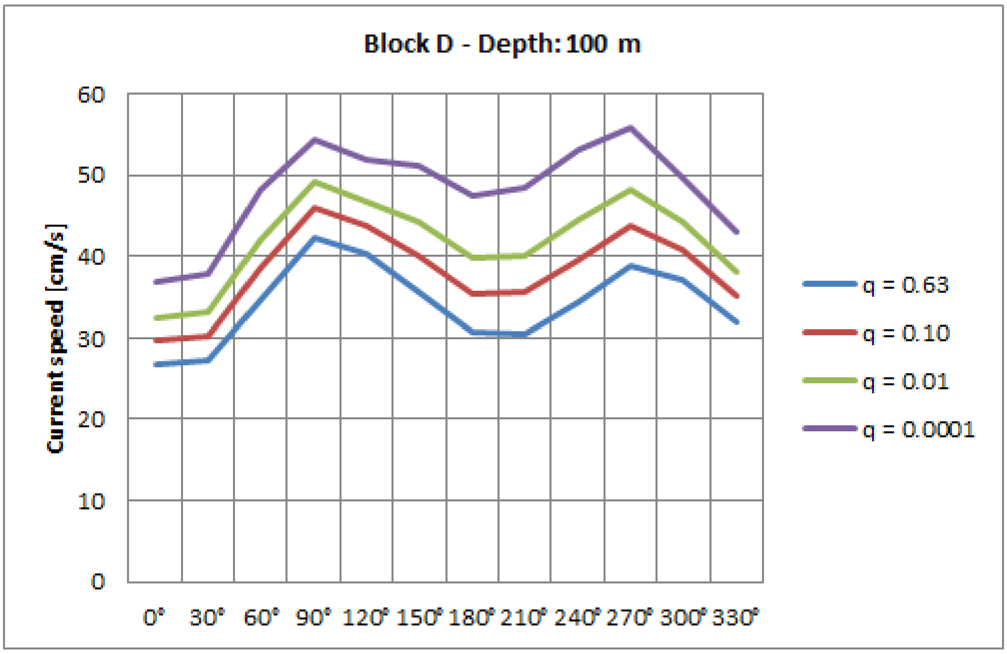


Figure 4-121 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 100 m water depth at Block D location.**

Table 4.126 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 100 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.34	2.404	11.323	-0.038	27	30	32	37
30°	5.04	2.370	11.439	-0.110	27	30	33	38
60°	7.80	2.266	13.498	0.318	35	39	42	48
90°	18.06	2.788	19.452	-0.719	42	46	49	55
120°	17.12	2.893	19.493	-1.416	40	44	47	52
150°	6.75	2.057	12.668	0.454	36	40	44	51
180°	3.51	1.797	9.765	0.631	31	35	40	48
210°	2.95	1.736	9.507	0.504	31	36	40	48
240°	4.12	1.767	10.608	0.640	34	40	45	53
270°	7.89	2.033	13.476	0.719	39	44	48	56
300°	12.45	2.455	15.279	0.197	37	41	44	50
330°	8.97	2.437	13.236	0.097	32	35	38	43
0°-360°	**100.00**	**2.187**	**15.006**	**0.005**	**45**	**49**	**53**	**59**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

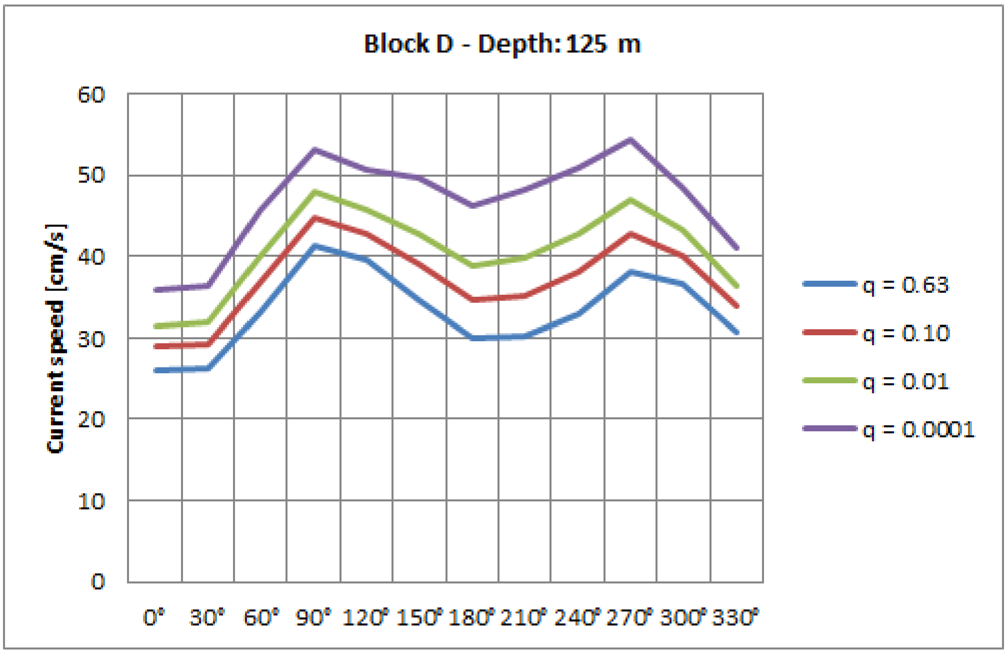


Figure 4-122 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 125 m water depth at Block D location.**

Table 4.127 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 125 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.35	2.473	11.399	-0.216	26	29	32	36
30°	4.98	2.435	11.399	-0.256	26	29	32	36
60°	7.63	2.367	13.634	-0.008	33	37	40	46
90°	17.90	2.822	19.238	-0.816	41	45	48	53
120°	17.08	2.905	19.117	-1.292	40	43	46	51
150°	6.79	2.083	12.485	0.428	35	39	43	50
180°	3.44	1.799	9.563	0.563	30	35	39	46
210°	2.90	1.683	8.981	0.728	30	35	40	48
240°	4.06	1.802	10.491	0.534	33	38	43	51
270°	7.87	2.062	13.399	0.685	38	43	47	54
300°	12.81	2.533	15.501	-0.013	37	40	43	49
330°	9.19	2.603	13.723	-0.354	31	34	37	41
0°-360°	**100.00**	**2.225**	**14.921**	**-0.078**	**44**	**48**	**51**	**57**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

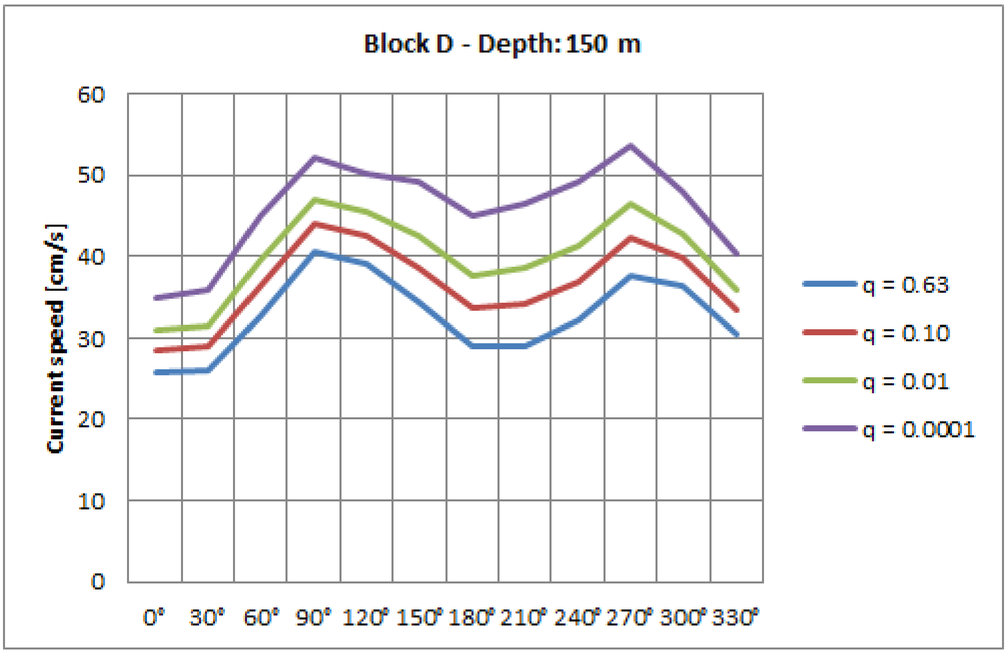


Figure 4-123 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 150 m water depth at Block D location.

Table 4.128 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 150 m water depth at the Block D location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.38	2.540	11.552	-0.331	26	29	31	35
30°	4.98	2.462	11.426	-0.333	26	29	32	36
60°	7.56	2.381	13.483	0.014	33	36	40	45
90°	17.65	2.851	19.082	-0.868	41	44	47	52
120°	17.08	2.894	18.839	-1.164	39	43	45	50
150°	6.79	2.083	12.386	0.455	34	39	43	49
180°	3.39	1.811	9.363	0.629	29	34	38	45
210°	2.88	1.705	8.858	0.642	29	34	39	47
240°	4.00	1.832	10.416	0.480	32	37	41	49
270°	7.83	2.082	13.374	0.641	38	42	46	54
300°	13.05	2.588	15.715	-0.128	36	40	43	48
330°	9.41	2.657	13.845	-0.457	31	34	36	40
0°-360°	**100.00**	**2.248**	**14.863**	**-0.108**	**43**	**47**	**50**	**56**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

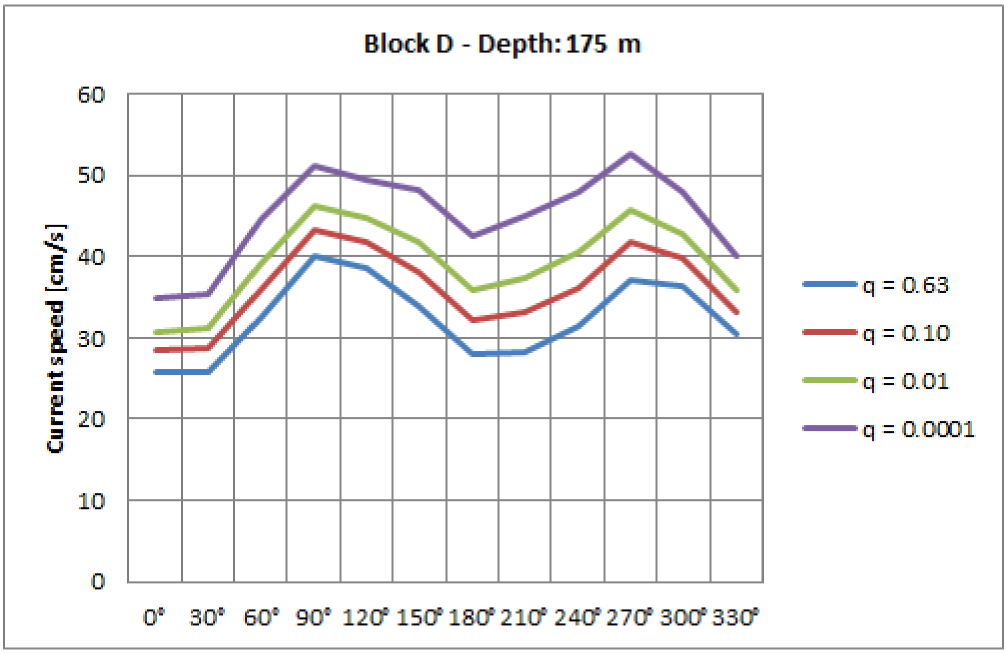


Figure 4-124 Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 175 m water depth at Block D location.

Table 4.129 Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 175 m water depth at the Block D location. Duration of extreme event is 1 hour.

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.50	2.548	11.517	-0.274	26	29	31	35
30°	4.95	2.466	11.300	-0.243	26	29	31	36
60°	7.56	2.367	13.242	0.149	33	36	39	45
90°	17.43	2.858	18.855	-0.845	40	43	46	51
120°	17.05	2.928	18.782	-1.255	39	42	45	49
150°	6.79	2.119	12.447	0.331	34	38	42	48
180°	3.33	1.908	9.660	0.330	28	32	36	43
210°	2.81	1.749	8.920	0.546	28	33	37	45
240°	3.92	1.847	10.324	0.427	31	36	41	48
270°	7.76	2.124	13.566	0.410	37	42	46	53
300°	13.26	2.600	15.767	-0.087	36	40	43	48
330°	9.65	2.715	14.079	-0.587	30	33	36	40
0°-360°	**100.00**	**2.277**	**14.850**	**-0.158**	**42**	**46**	**49**	**55**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

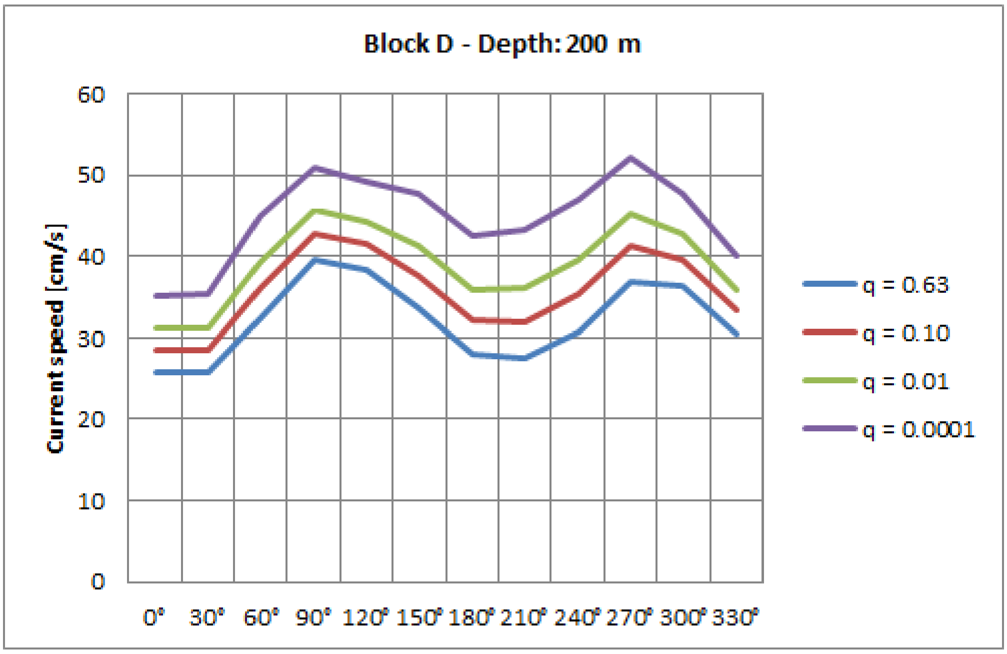


Figure 4-125 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 200 m water depth at Block D location.**

Table 4.130 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 200 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	5.68	2.502	11.377	-0.259	26	29	31	35
30°	4.93	2.426	11.040	-0.168	26	29	31	35
60°	7.62	2.279	12.702	0.408	33	36	39	45
90°	17.43	2.793	18.167	-0.572	40	43	46	51
120°	16.98	2.879	18.271	-1.044	38	42	44	49
150°	6.65	2.132	12.467	0.198	34	38	41	48
180°	3.25	1.890	9.538	0.295	28	32	36	43
210°	2.73	1.787	8.914	0.460	28	32	36	43
240°	3.78	1.856	10.199	0.388	31	36	40	47
270°	7.53	2.139	13.609	0.250	37	41	45	52
300°	13.48	2.627	15.965	-0.288	36	40	43	48
330°	9.95	2.699	14.007	-0.518	31	33	36	40
0°-360°	**100.00**	**2.281**	**14.695**	**-0.184**	**42**	**45**	**49**	**55**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

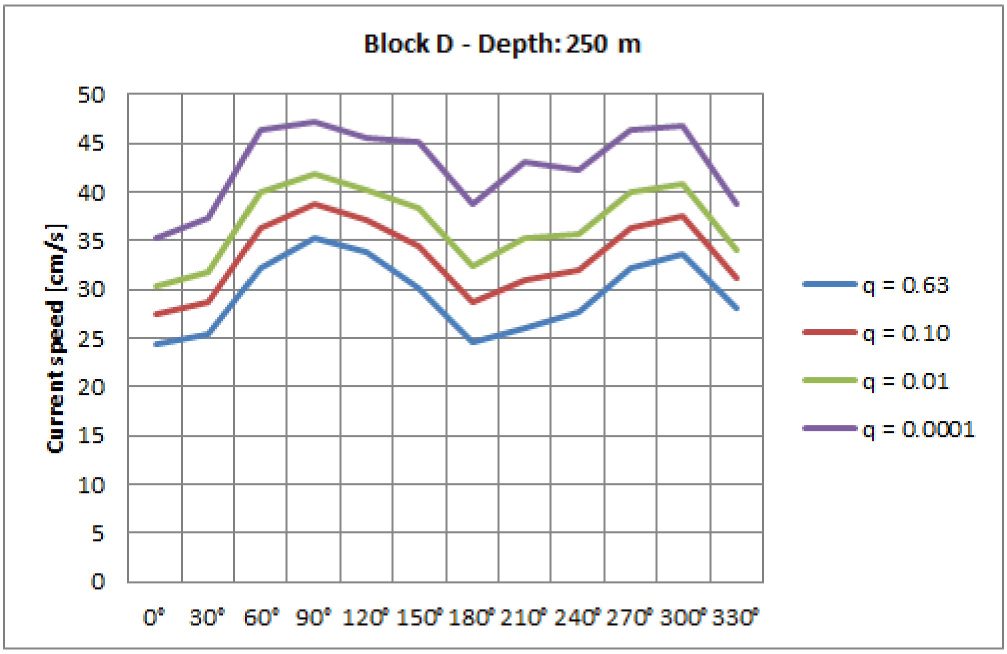


Figure 4-126 **Directional extreme values of current speed of annual probability of exceedance of 0.63, 10^{-1}, 10^{-2} and 10^{-4} at 250 m water depth at Block D location.**

Table 4.131 **Directional and omnidirectional Weibull parameters and corresponding extreme values* of current speed at 250 m water depth at the Block D location. Duration of extreme event is 1 hour.**

Direction sector	Sector prob.	Weibull parameters			Annual probability of exceedance			
		Shape	Scale	Location	0.63	10^{-1}	10^{-2}	10^{-4}
-	[%]	-	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]	[cm/s]
0°	6.54	2.048	8.733	0.030	24	28	30	35
30°	6.29	1.923	8.424	0.250	25	29	32	37
60°	10.58	1.974	10.749	0.128	32	36	40	46
90°	19.81	2.441	14.444	-0.606	35	39	42	47
120°	14.53	2.418	13.902	-0.622	34	37	40	46
150°	5.52	1.905	10.155	-0.034	30	35	38	45
180°	2.74	1.821	8.379	-0.260	25	29	32	39
210°	2.32	1.653	7.963	0.006	26	31	35	43
240°	3.33	1.930	9.988	-0.669	28	32	36	42
270°	6.45	2.099	12.093	-0.636	32	36	40	46
300°	11.54	2.226	12.859	-0.313	34	38	41	47
330°	10.34	2.314	11.315	-0.526	28	31	34	39
0°-360°	**100.00**	**2.064**	**11.850**	**-0.322**	**37**	**41**	**44**	**50**

* Indicates when extreme value presented doesn't correspond to Weibull parameters due to adjustment to the omnidirectional value.

5 Water Levels

5.1 Tidal elevations

Tidal variations at the Block A, Block B, Block C and Block D have been computed using the NAO.99b tidal prediction system [12]. Figure 5-1 – Figure 5-4 show characteristic tidal variations during a lunar month (27.55 days) at each Block. Table 5-1 shows the highest (HAT) and lowest (LAT) astronomical tides (above and below mean sea level, respectively) estimated at each Block.

Table 5-1 Estimates of tidal levels above mean sea level.

Field	Highest Astronomical Tide (HAT) [cm]	Lowest Astronomical Tide (LAT) [cm]
Block A	38.6	-42.1
Block B	53.4	-60.3
Block C	79.6	-89.2
Block D	40.7	-45.1

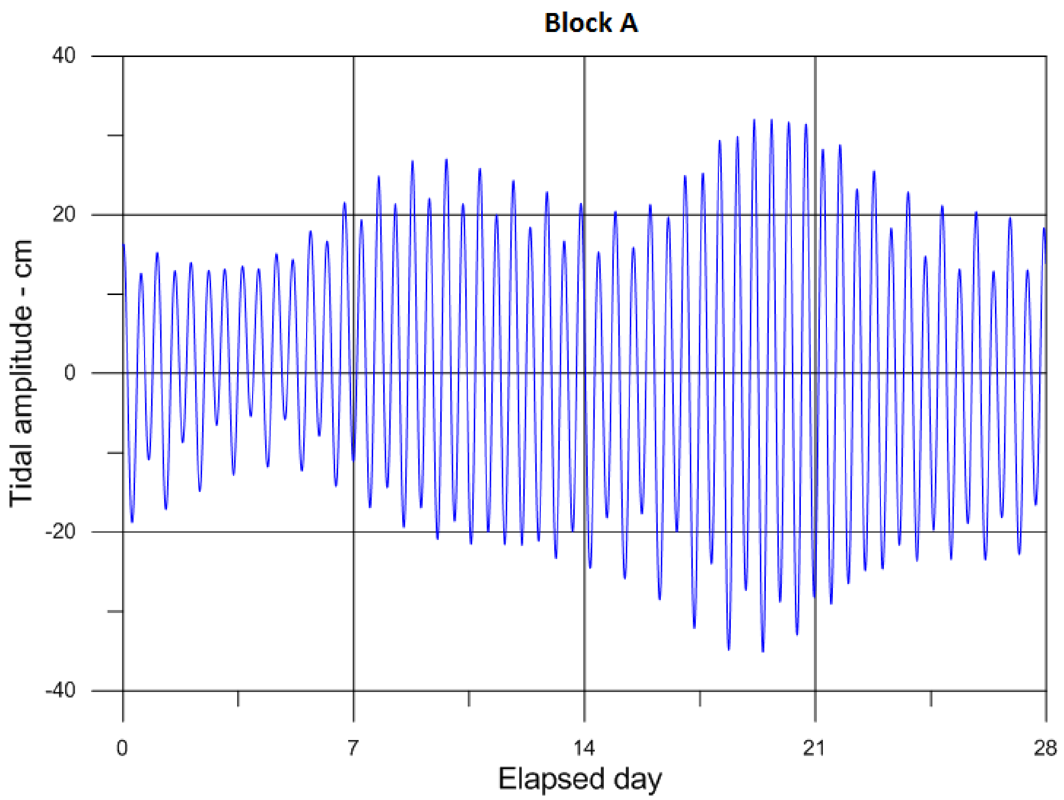


Figure 5-1 Characteristic tidal variations during a lunar month (27.55 days) at the Block A.

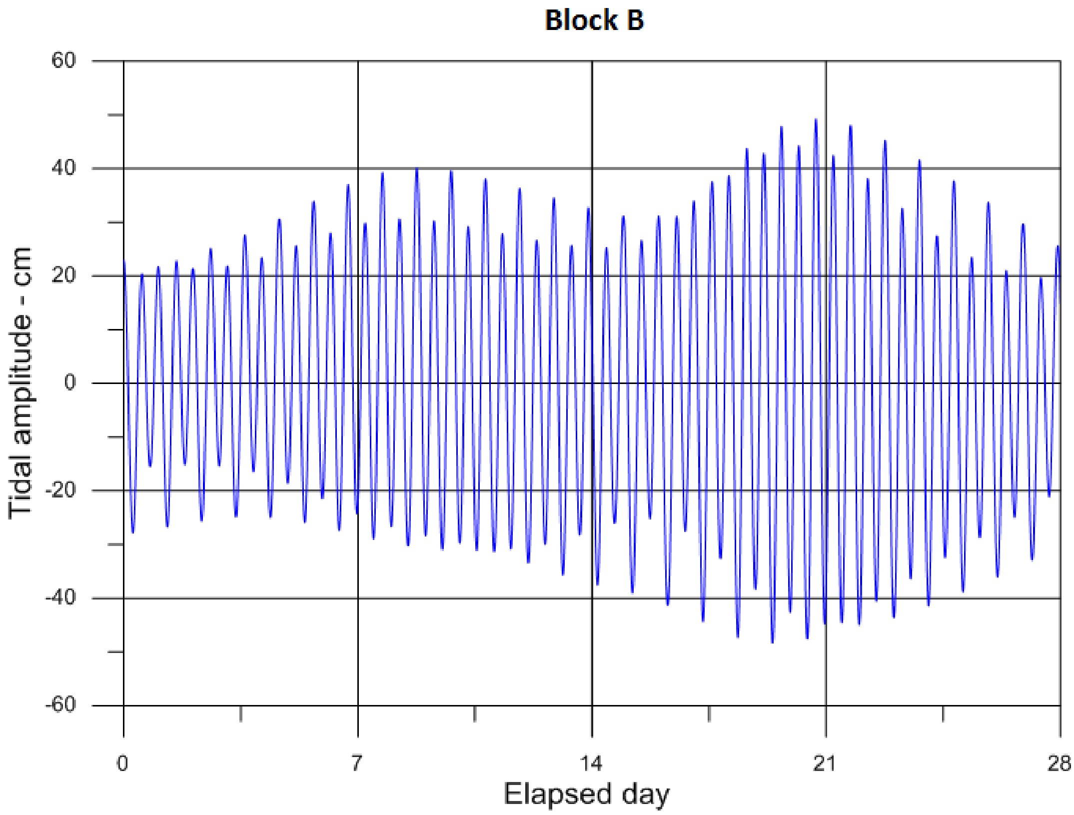


Figure 5-2 **Characteristic tidal variations during a lunar month (27.55 days) at the Block B.**

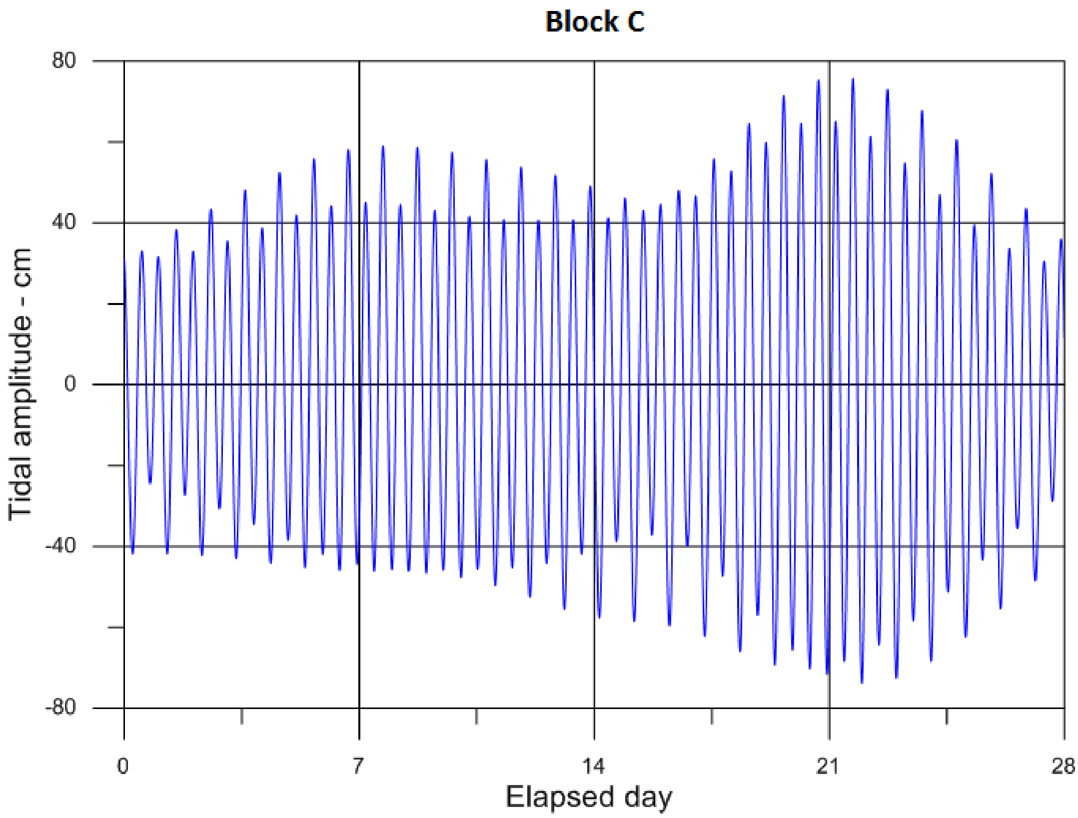


Figure 5-3 **Characteristic tidal variations during a lunar month (27.55 days) at the Block C.**

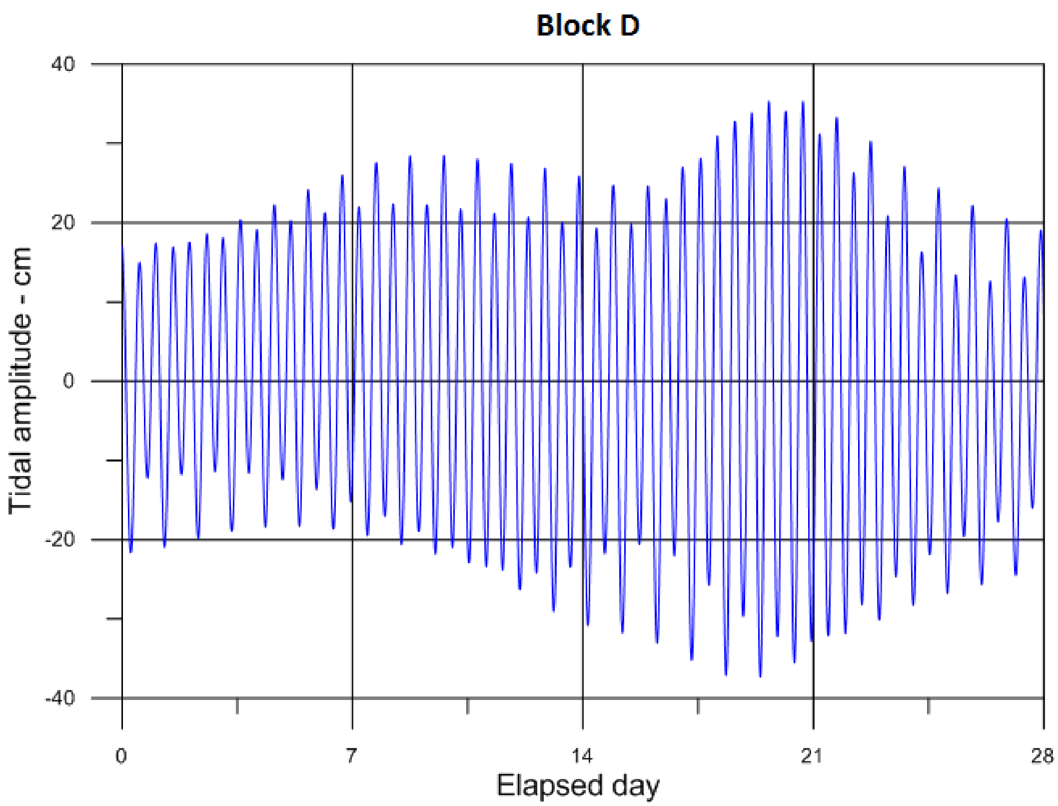


Figure 5-4 Characteristic tidal variations during a lunar month (27.55 days) at the Block D.

5.2 Storm surge

Storm surge data are obtained from the NEXTRA hindcast data base [15]. Table 5-2 shows the storm surge with annual probability of exceedance of 10^{-2} and 10^{-4} estimated for the Block A, Block B, Block C and Block D.

Table 5-2 Estimates of storm surge extremes above mean sea level.

Field	Annual probability of exceedance	
	10^{-2}	10^{-4}
-	[m]	[m]
Block A	1.0	1.2
Block B	0.8	1.0
Block C	0.9	1.2
Block D	0.8	1.0

5.3 Total water level

Table 5-3 – Table 5-6 show estimates of total extreme water levels to be expected at the Block A, Block B, Block C and Block D. The tidal amplitude of 10^{-2} annual probability of exceedance is set equal to the highest astronomical tide (HAT).

Table 5-3 Estimates of extreme water levels above mean sea level for the Block A.

Parameter	Unit	Annual probability of exceedance	
		10^{-2}	10^{-4}
Tidal amplitude (HAT)	**[m]**	0.4	-
Storm surge	**[m]**	1.0	1.2
Wave crest height	**[m]**	15.5	20.0
Total water level	**[m]**	**16.9**	**21.2**

Table 5-4 Estimates of extreme water levels above mean sea level for the Block B.

Parameter	Unit	Annual probability of exceedance	
		10^{-2}	10^{-4}
Tidal amplitude (HAT)	**[m]**	0.5	-
Storm surge	**[m]**	0.8	1.0
Wave crest height	**[m]**	16.1	20.9
Total water level	**[m]**	**17.4**	**21.9**

Table 5-5 Estimates of extreme water levels above mean sea level for the Block C.

Parameter	Unit	Annual probability of exceedance	
		10^{-2}	10^{-4}
Tidal amplitude (HAT)	**[m]**	0.8	-
Storm surge	**[m]**	0.9	1.2
Wave crest height	**[m]**	16.3	21.2
Total water level	**[m]**	**18.0**	**22.2**

Table 5-6 Estimates of extreme water levels above mean sea level for the Block D.

Parameter	Unit	Annual probability of exceedance	
		10^{-2}	10^{-4}
Tidal amplitude (HAT)	**[m]**	0.4	-
Storm surge	**[m]**	0.8	1.0
Wave crest height	**[m]**	15.8	20.3
Total water level	**[m]**	**17.0**	**21.3**

5.4 Sea level rise

An additional increase in water level may be due to climatic effects; e.g. thermal expansion of the oceans and melting of glaciers. According to IPCC projections of global mean sea level rise over the 21st century the assessed likely change in mean sea level is about 0.7 m. The present rate of sea level rise is about 3 mm/year.

For changes in mean sea level in Norwegian waters, see [20, Section 5.5.1].

6 Earthquake actions

Information on earthquake actions is provided in the NORSOK Standard N-003 Section 6.5 [4].

7 Marine growth

Recommendations regarding marine growth are provided in the Metocean Design Basis Guidelines [1]

Table 7-1 provides information on the thickness of marine growth that may be used in the calculation of structural actions.

Table 7-1 Thickness of marine growth at the Barents Sea. Data from NORSOK Standard N-003 Section 6.6.1 [4]

Water depth	Thickness
[m]	**[mm]**
Above + 2	0
+2 to -40	60
Below -40	30

8 Snow and icing

8.1 General

Accretion from snow and icing should always be assessed for operations and structural design in the Barents Sea. For time limited operations, it is sufficient to consider the relevant months with an ample margin, see e.g. DNV-OS-H101 [9].

It is recommended that operators develop a design strategy and operation plan for safe management of situations with snow or ice accretion (e.g. snow removal strategy, heating, production shut-down).

The accretion of snow and icing may have different natures and effects, such as causing additional weight, uneven weight distribution and potential loss of vessel stability, changed structural shapes, obstruction and changed friction and operators should consider all adverse effects.

The joint effect of snow and icing should be considered. It should be recognized that melted snow will freeze to ice when temperature falls below 0 degrees. Operational mitigations (fixed heating arrangement, portable equipment) can be taken into account in order to reduce design loads from snow.

8.2 Snow

Snow actions should be determined based on local conditions (temperature; wind; structural shape, precipitation). One way to estimate extreme snow loads may be to identify max accumulated snow mass each winter, fit a relevant probability distribution to the annual extremes and extrapolate to extreme and abnormal load levels.

Since no recordings of snow or precipitation are available from the Barents East blocks snow accumulations have been estimated in accordance with the following approach [29]:

- Precipitation from the Nora 10 hindcast [14] has been used together with information on air temperature.
- If the air temperature has been less than +1^{o}C, it has been assumed that the precipitation comes as snow.
- The effect of melting and wind drift has initially not been taken into account. It has however been assumed that snow cannot accumulate continuously for more than 1 week without any loss caused by warm temperatures or wind drift.
- Weekly snow accumulations is therefore calculated continuously for the period 1957-2014 and max value within each winter has been identified.
- Snow accumulations corresponding to 1, 10, 100 and 10 000 year exceedance levels are estimated by fitting Gumbel distributions to the annual max values.

Contours for extreme snow accumulations are presented in Figure 8-1 to Figure 8-3. For the Barents Sea blocks values presented in Table 8-1 are recommended.

If reduction of snow loads due to melting or wind drift can be quantified and documented, accumulated amount of snow to be used for design will decrease. High snow rates at high latitudes (North of 70° N) are correlated with severe (but not extreme) winds.

Standardised shape factors for offshore structures do currently not exist. In lack of detailed information shape factors given in NS-EN 1991-1-3 [10] can be used both onshore and offshore. For sites where snow is expected to be of concern, detailed snow drift studies are recommended. For snow density, tabulated values in NS-EN 1991-1-3 can be applied, see Table 8-2.

Table 8-1 Extreme weekly snow accumulations [kPa][3] conditional no melting or wind drift

Annual probability of exceedence			
0.67 (1-year)	**10^{-1}** (10-year)	**10^{-2}** (100-year)	**10^{-4}** (10 000-year)
0.35	0.50	0.80	1.25

Table 8-2 Density for different types of snow.

Type of snow	Density [kg/m^3]
Fresh	100
Settled (hours or days old)	200
Old (weeks or months old)	250 – 350
Wet	400

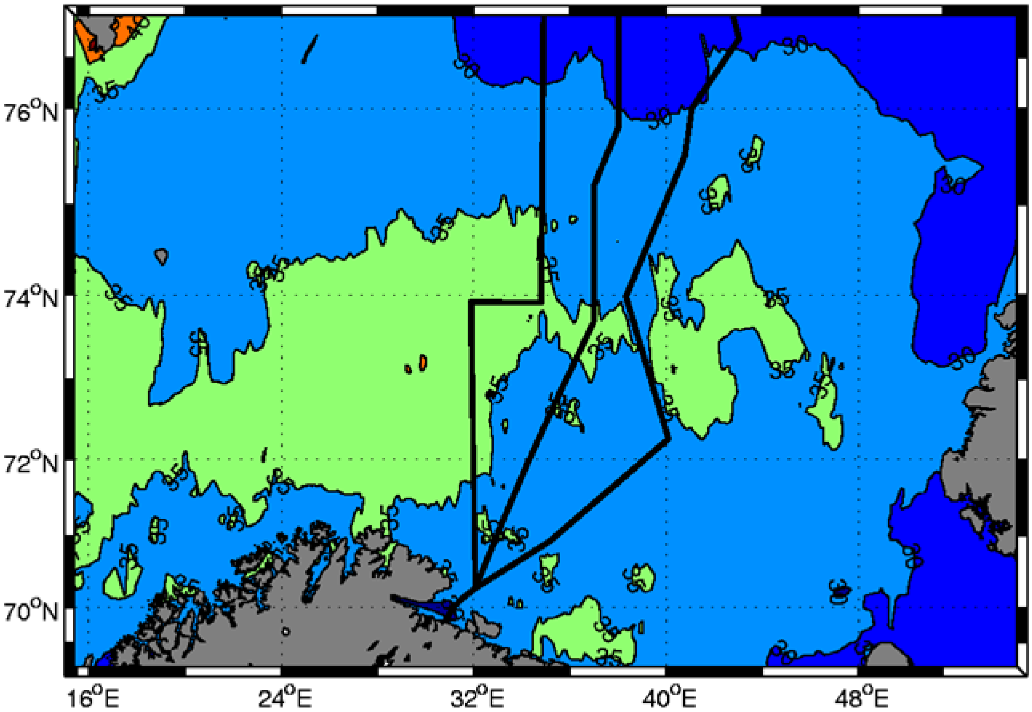


Figure 8-1 Max weekly snowfall [kg/m^2] exceeded with 1-year return period

[3] 1 kPa = 100 kg/m^2

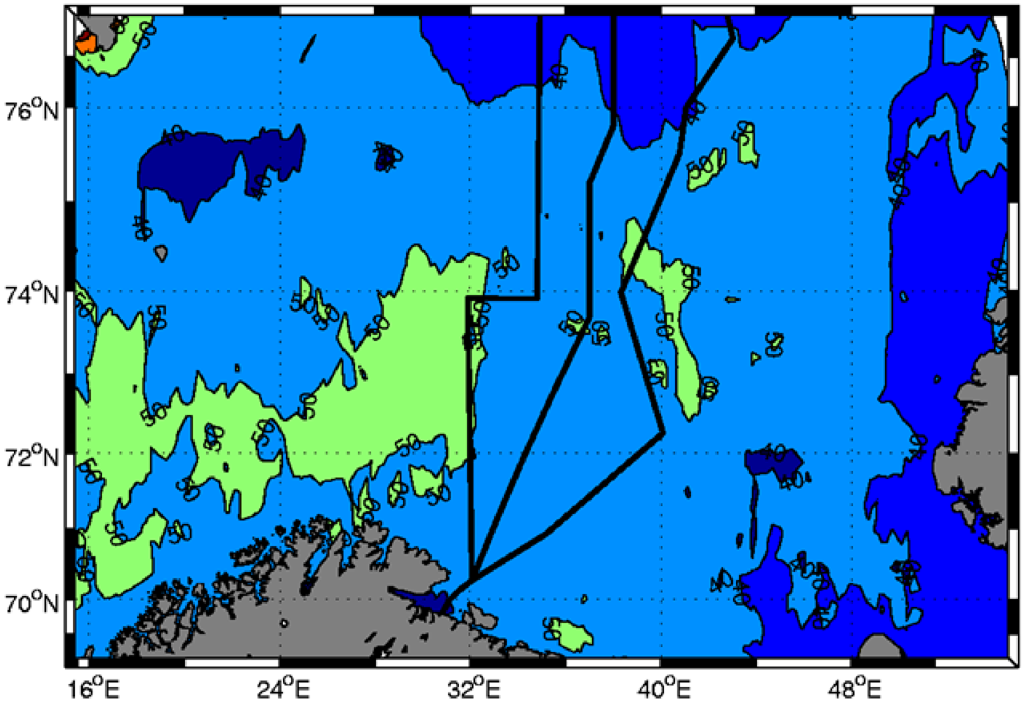


Figure 8-2 Max weekly snowfall [kg/m²] exceeded with 10-year return period

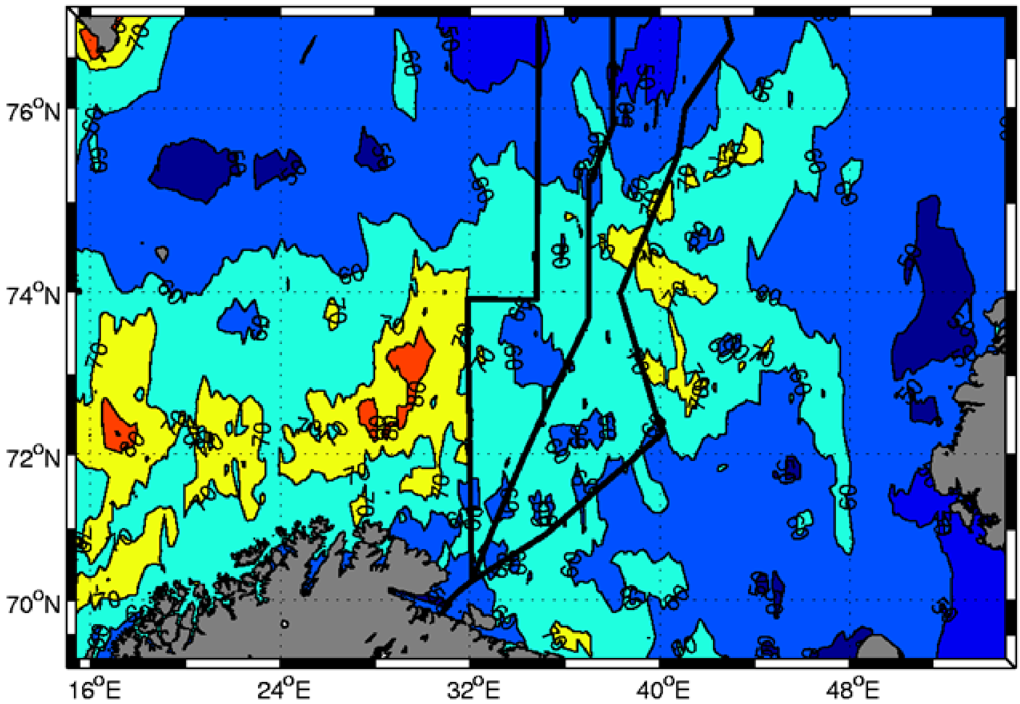


Figure 8-3 Max weekly snowfall [kg/m²] exceeded with 100-year return period

8.3 Icing

8.3.1 Types of icing

Two types of icing may occur: atmospheric icing and ice accretion by sea spray. Since the environmental conditions producing the two icing types are fundamentally different, atmospheric icing and sea spray icing must be considered as independent action cases. Under special conditions, simultaneous occurrence of atmospheric icing and marine icing may still occur, but extreme accumulation of both types simultaneously is unlikely and beyond relevant design conditions.

Besides stability of floating structures the following risks should also be addressed related to both sea spray and atmospheric icing:

- Slippery decks, helicopter landing pad, ladders and handrails
- Malfunctioning cranes, winches, derricks and valves
- Communication equipment not working due to ice on antennas
- Evacuation means blocked
- Life-saving and fire-fighting equipment rendered unusable
- Increased size of structural members may cause higher lateral wind and wave forces
- Blocking of ventilation systems
- Falling ice
- Reduced visibility (iced windows)
- Integrity of structural members

8.3.2 Atmospheric icing

When a structure is iced, this ice will sooner or later fall from the structure. The shedding of ice can be total or (most often) partial. Experience shows that ice shedding typically occurs during increasing temperatures. Normally, accreted ice does not melt from the structure, but breaks because of small deflections, vibrations, etc. and falls of in fragments. It is extremely difficult to avoid such falling ice, so this should be considered during design and as a part of working environment risks. Damage can occur to structural or non-structural elements (antennas etc.) when ice from higher parts fall and hit lower elements in the structure. The height of falling ice is an important factor when evaluating risks of damage because a greater height means greater dynamic forces from the ice. A method of avoiding or reducing damage from falling ice is the use of shielding structures.

Atmospheric icing may potentially decrease the stability by raising the centre of gravity as it accumulates at high elevations. Atmospheric icing must also be expected to cause complications for aircraft operations. Ice from freezing rain covers all surfaces upwards or against the wind. For tubular structures it may be assumed that ice covers half the circumference.

Atmospheric icing is traditionally classified according to different formation processes:

Wet snow icing
- A form of precipitation icing.
- Typical for snow falling at temperatures between 0 and 3 °C.

- Sticks to all surfaces, but may build up to cylindrical ice of 5 kg/m and more at power lines and other thin cables.
- Increases somewhat with the wind speed, but may also stick to cables at calm weather.
- Typical density 500 kg/m^3, but may vary.
- May remain at the structure when the temperature drops below 0 °C after the icing episode.
- Should be considered offshore.

Freezing rain

- A form of precipitation icing. May also be referred to as glaze.
- Typical for water and drizzle falling at surfaces with temperature below 0 °C.
- For cold weather, this ice sticks to all surfaces hit by the precipitation.
- Close to 0°C the ice amounts will depend on surface properties.
- Density 900 kg/m^3.
- Typical at cold, lowland areas onshore, but should also be considered offshore.

In-cloud icing

- Also called rime or hard rime.
- This ice is due to super-cooled cloud droplets hitting constructions (masts and towers, wind turbines, air planes).
- Stick to surfaces exposed to wind, especially slender objects, corners and irregular surfaces.
- Typical density 500 kg/m^3, but may vary.
- Typical at coastal mountains where humid air masses are lifted and form clouds around the mountain tops. May then grow to several hundred kilo per meter structure at the most exposed sites.
- Not to be considered offshore for structures below 200 m. One exception may be sea smoke near the ice edge.

Hoarfrost

- This ice forms when water vapour transforms directly to ice.
- Forms at low temperatures.
- Hoarfrost is of low density and strength.
- May occur near open sea, near cold land and sea ice surfaces.
- No significant loads.

Extreme thicknesses of ice caused by freezing rain and snow (10^{-2} annual exceedance probability) can be assumed to be **20 mm and 100 mm respectively**. Associated ice densities are 900 $\frac{kg}{m^3}$ and 500 $\frac{kg}{m^3}$ respectively. There is no scientific evidence for the extreme thicknesses which are based on a subjective engineering judgement. 10^{-4} values are not estimated but will be of importance if there is a risk for loss of stability caused by atmospheric icing. Figure 8-4 shows examples on snow accretion.

(a) (b)

Figure 8-4 Examples - a) snow accumulated on vertical surfaces, b) snow accreted on wire

8.3.3 Sea spray icing

8.3.3.1 Icing predictions

Ice accretion by sea spray depends on the following parameters:

- Wind speed
- Air temperature
- Sea water temperature
- Wave height and period
- Geometry of structure and response to waves

Icing on vessels and structures can occur when the following environmental factors are present:

- High Wind Speed - Usually above 9 m/s but sometimes lower
- Low Air Temperature - Below freezing temperature of sea water (-1.7 ^{o}C)
- Low Water Temperature - Usually below 7 ^{o}C

In order to assess the icing severity during operations or in transit the Overland algorithm can be applied. Overland [30] developed an algorithm for prediction of sea spray icing on vessels from 25-75 m. Several forecasting agencies offer icing prediction forecasts based on this algorithm, however users should be aware of these formulations do not provide reliable quantitative information on icing accumulation. Thus it should not be used for design purposes.

The icing predictor (PPR) is defined by:

$$PPR = \frac{V_a (T_f - T_a)}{1 + 0.3\,(T_w - T_f)} \quad \text{m}\,^{\circ}\text{C s}^{-1} \tag{5}$$

where

V_a	Wind speed	[m/s]
T_f	Freezing point of seawater:	-1.7 °C
T_a	Air temperature	[°C]
T_w	Sea temperature	[°C]

Figure 8-5 and Table 8-3 show expected icing class and icing rates for sea spray icing on 20 – 75 m vessels. The icing rates are not applicable for estimation of accumulated ice masses but are considered useful to compare the icing severity at different sites and in order to assess icing frequency.

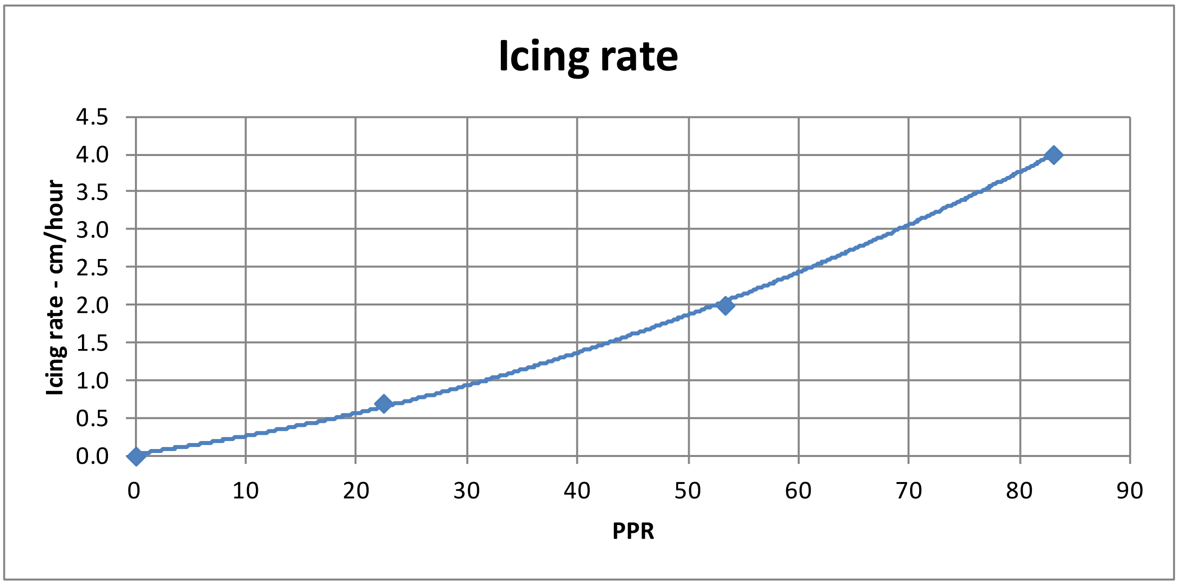


Figure 8-5 Icing rates according to the Overland algorithm.

Table 8-3 Icing class and rate according to the Overland algorithm.

PPR	**< 0**	**0 – 22.4**	**22.4 – 53.3**	**53.3 – 83.0**	**> 83.0**
Icing class	None	Light	Moderate	Heavy	Extreme
Icing rates – cm/hour		0.7	0.7 – 2.0	2.0 – 4.0	> 4.0

8.3.3.2 Extreme icing

The amount of icing on a vessel is highly dependent on size, hull shape and heading of the vessel. The results from the Overland approach is only considered appropriate to assess the general icing severity but not for design purposes.

According to NORSOK N-003 [4] the maximum thickness from sea spray icing on a structure corresponding to a ULS action case is 150 mm between 5 m and 10 m above MSL for all structures north of 68°N (decreasing linearly from 10 to 25 m above MSL). Rather than adopting this fixed thickness for all surfaces, it is recommended to perform specific numerical calculations of marine icing on the geometry of specified vessels and rigs under consideration. Even though tools for such calculations are at an early development stage, numerical simulations will provide detailed statistics for extreme icing and also reveal where the ice should be expected to accumulate.

Ice from sea spray covers, in accordance to NORSOK N003, the whole circumference on all structure elements both, vertical, sloping and horizontal.

Extreme icing shall be addressed also in relation to planning of marine operations and design of lifeboats. It is not possible to provide adequate estimate on e.g. supply vessels and lifeboats without taking into consideration vessel specific design. A generalised icing profile is included in Table 8-4 and intended for simplified assessments to the North of 68^{o}N on Norwegian shelf. Figure 8-6 shows examples of vessels that have been exposed to marine icing.

Table 8-4 Simplified extreme and abnormal icing profiles

Height above mean sea level	**Annual probability of exceedance**		**Density**
[m]	**10^{-2}**	**10^{-4}**	**[kg/m^3]**
0 - 5	linear increase from 0 mm to 650 mm	Linear increase from 0 mm to 1000 mm	900
5 - 10	Linear decrease from 650 mm to 150 mm	Linear decrease from 1000 mm to 260 mm	900
10 – 25	Linear decrease fro 150 mm to 5 mm	Linear decrease from 260 mm to 10 mm	900
Above 25	5 mm	10 mm	900
Accidental icing will not occur at levels above and below 5 m above sea level simultaneously. Icing below 5 m will not occur in combination with extreme waves (ULS and ALS conditions).			

Figure 8-6 Examples – effects of marine icing

9 Sea ice

Sea ice is created when temperatures are low and the water surface starts freezing. At the Barents East blocks local freezing is not expected due to warm influx of warm Atlantic water in the Southern Barents Sea (Figure 10-1). In years with persistent winds from NNE it is however expected that ice can be transported southwards and may enter into all of the Barents East blocks.

With respect to frequency of occurrence of sea ice within the individual Barents East blocks, there will be variations depending on the geographical location. For early assessments, four locations in the northern parts of each of the regions A, B, C and D have been selected (Figure 9-1 and Table 9-1). Ice charts produced by the Norwegian ice services at Met.no spanning from 1967 – 2012 have been studied and the periods with sea ice at the selected locations have been identified. As can be seen from Figure 9-2 to Figure 9-4, sea ice has been present at three of the four sites within the most recent four decades. Since none of the ice charts show sea ice at location C, it is difficult to estimate the frequency of ice occurrence at this site. By considering analyses done for the Johan Castberg (which is located further to the West), it may be concluded that the frequency of sea ice at location C will be within the range once per 50 – 2000 years [22].

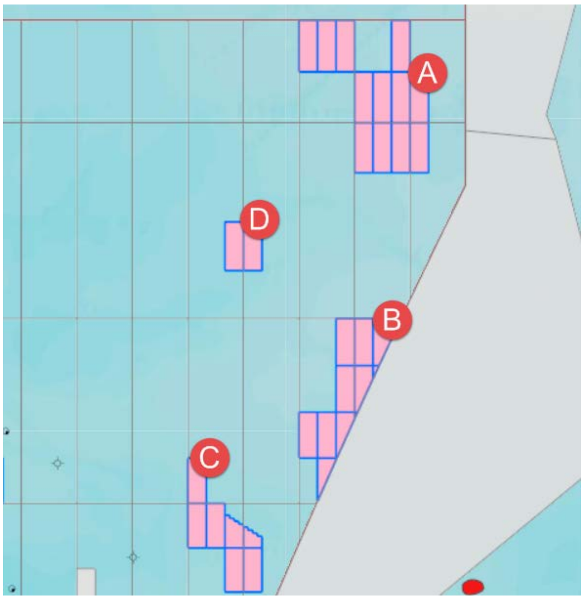


Figure 9-1 Locations used for extracting statistics on sea ice occurrence

Table 9-1 Locations used for extracting statistics on sea ice occurrence

Region	Latitude	Longitude
A	74° 15’ N	36° 20’ E
B	73° 00’ N	35° 45’ E
C	72° 15’ N	32° 15’ E
D	73° 30’ N	33° 15’ E

9.1 Location A

- Sea ice has only been present at the site within the months November to June while the remaining four months have been ice free continuously since 1967.
- The duration of ice at the site varies significantly from a few days (2011) to five-six months (1978,79 and 2003).
- Several of the "ice events" can be characterised by dense first year ice (concentrations in the range 40-100%).
- It is not possible to give accurate descriptions of the ice conditions when the ice is at the site. Based on general information on ice in the Barents Sea, Statoil recordings 2013-14 and work done on the Shtokman project, it is expected that the ice thickness will be less than 1 m but ridges must be expected and can be as deep as 20 m. The ice will mainly be broken but periods with continuous ice may occur in severe years. The ice will consist only of first year ice but fragments of multi year ice cannot be excluded in the most severe years (such as 2003).

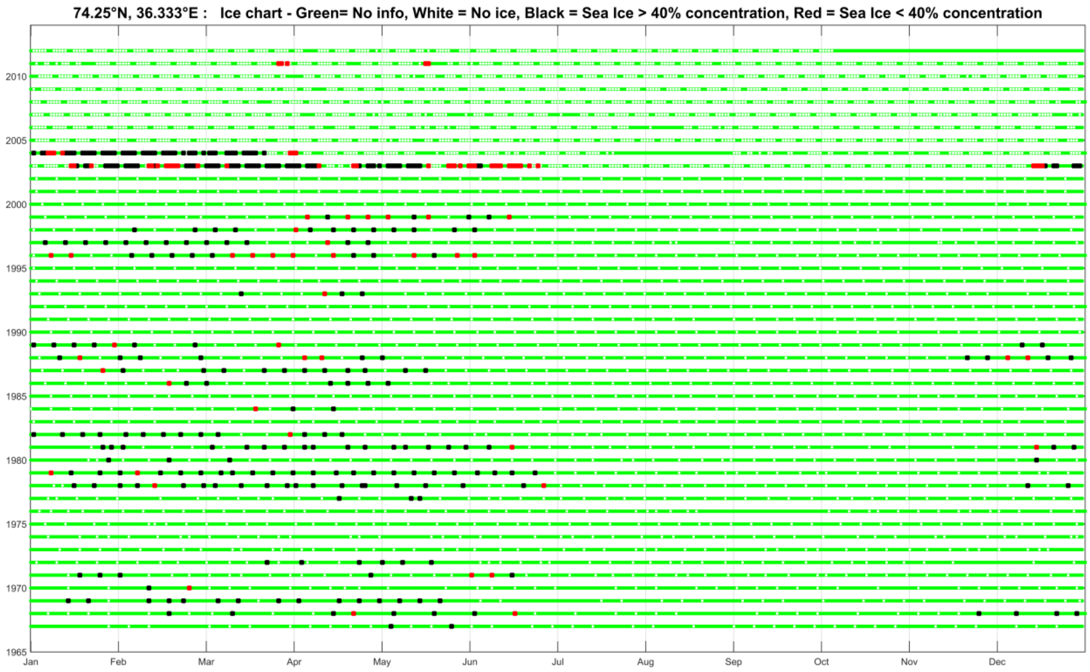


Figure 9-2 **Presence of sea ice at location A**

9.2 Location B

- Sea ice has only been present at the site within the months December to May while the remaining six months have been ice free continuously since 1967.
- The duration of ice at the site is usually limited to a few days (2004) but durations slightly longer than a month may occur (1979, 82 and 2003).
- About half of the “ice events” can be characterised by dense first year ice (concentrations in the range 40-100%).
- It is not possible to give accurate descriptions of the ice conditions when the ice is at the site. Based on general information on ice in the Barents Sea, Statoil recordings 2013-14 and work done on the Shtokman project, it is expected that the ice thickness will be less than 0.8 m but ridges must be expected and can be as deep as 15 m. The ice will mainly be broken but larger ice floes may occur in the first winter months Only first year ice is expected in this region. For loads with return periods of 10 000 years, multi year ice may be considered.

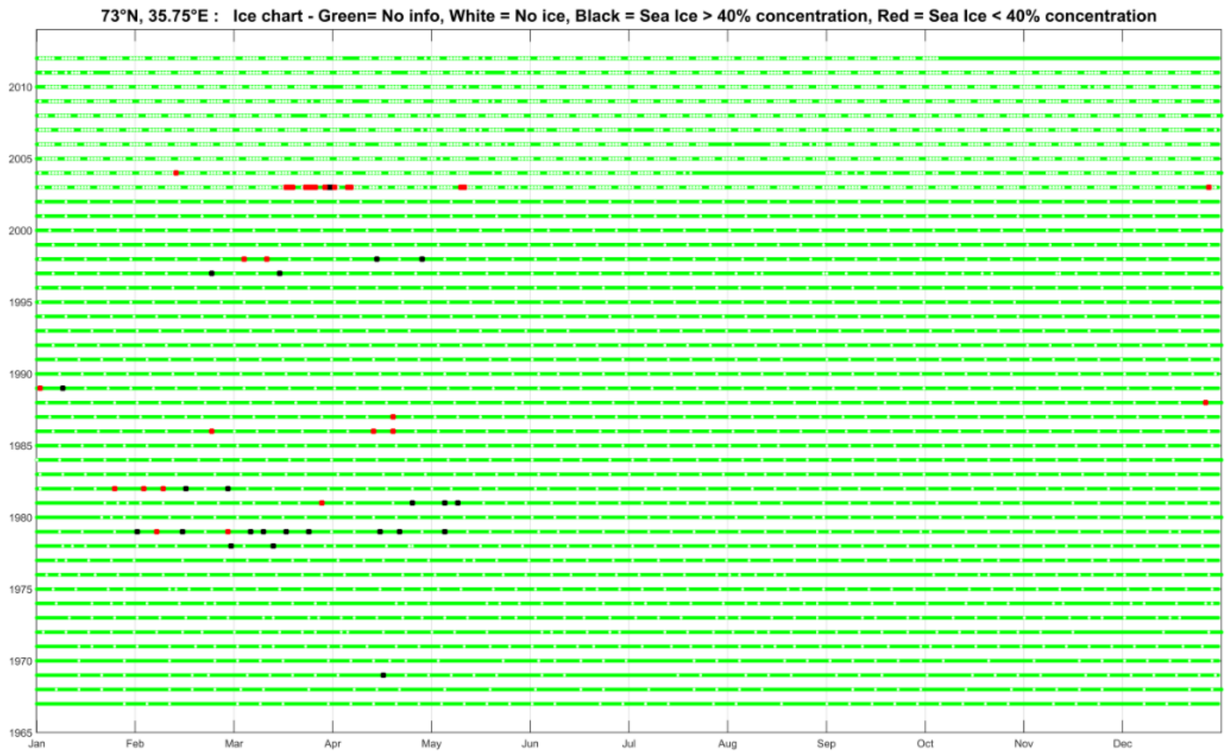


Figure 9-3 Presence of sea ice at location B

9.3 Location D

- Sea ice has only been present at the site within the months November to May while the remaining five months have been ice free continuously since 1967.
- The duration of ice at the site is usually limited to a few days (2003) but durations up to two-three weeks may occur (1979, 81 and 2003).
- About half of the “ice events” can be characterised by dense first year ice (concentrations in the range 40-100%).
- It is not possible to give accurate descriptions of the ice conditions when the ice is at the site. Based on general information on ice in the Barents Sea, Statoil recordings 2013-14 and work done on the Shtokman project, it is expected that the ice thickness will be less than 0.8 m but ridges must be expected and can be as deep as 15 m. The ice will mainly be broken but larger ice floes may occur in the first winter months Only first year ice is expected in this region. For loads with return periods of 10 000 years, multi year ice may be considered.

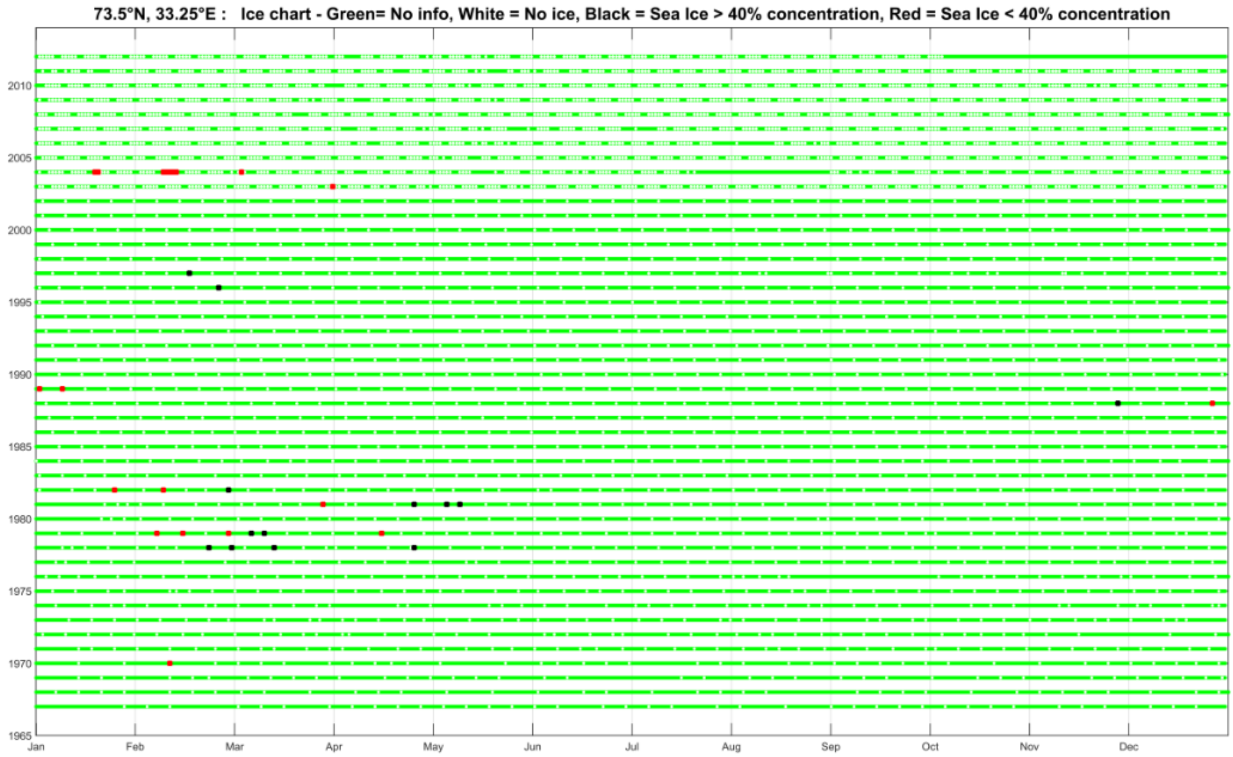


Figure 9-4 Presence of sea ice at location D

10 Icebergs

10.1 General information

Icebergs in the Barents Sea may present a threat for navigation and offshore installations. The main source of icebergs in the Barents Sea is the glaciers in the Franz Josef Land archipelago (Figure 10-1).The Svalbard archipelago is the secondary source, while a smaller contribution of icebergs comes from glaciers of the northern tip of Novaya Zemlya.

Although a great proportion of the icebergs stays and melts close to the calving area, icebergs have been observed as far south as 67.2°N in the Barents Sea (summer 1929). Iceberg presence is thus possible in large parts of the Barents Sea (Figure 10-2). In general, the number of icebergs close to the calving sources is higher in winter than in summer while the extreme southernmost positions occur during the summer period. The maximum iceberg extension occurs typically in June–July and the minimum iceberg around October–November. The interannual variability of the quantity and geographical distribution of the icebergs depend on their calving rate, the predominant winds and the oceanographic circulation. Northerly and northeasterly winds favour a southern extension of the icebergs.

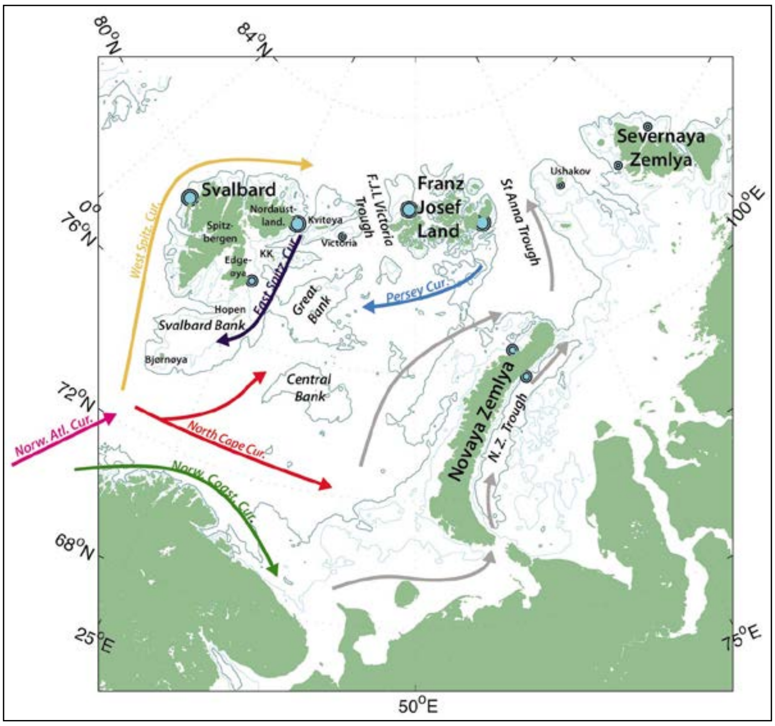


Figure 10-1 Locations of the different sources of icebergs (solid blue circles) and the main ocean currents. Light and dark blue contour lines are the isobaths at 100 and 200 m, respectively.

(a) (b)

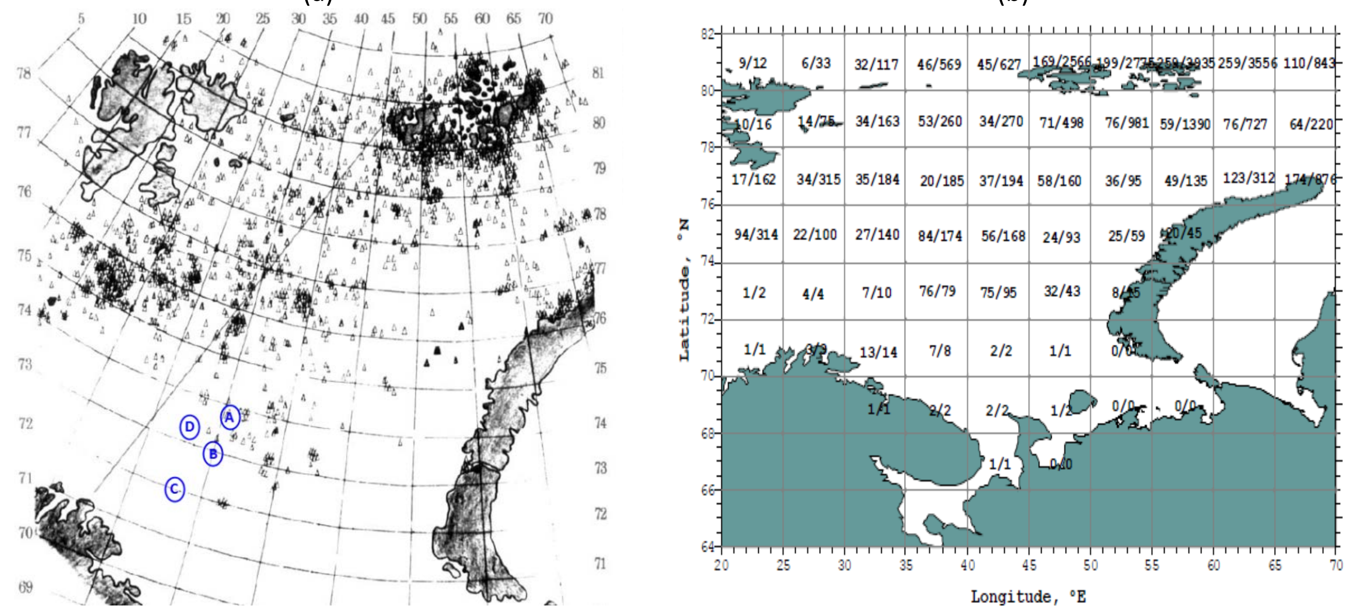


Figure 10-2 a) Observations of icebergs in the Barents Sea (for the period 1933 – 1990). b) Number of iceberg observations within squares of 2°N x 5°E extension. The numerator characterizing each of the squares is the maximal number of icebergs registered within one year period, while the denominator represents the total number of registrations made within the entire period of observations [16 and 17].

10.2 Iceberg characteristics

10.2.1 Distribution of the iceberg shapes

During the Ice Data Acquisition Program (IDAP), 1988-1992, regular airborne reconnaissance and special programs were devoted to iceberg studies providing information on the distributions on iceberg shapes and sizes in the Barents Sea [31]. In comparison with data from Russian sources, it is however evident that minor iceberg features were neglected within IDAP and that the IDAP statistics only is relevant for icebergs longer than 30 m. Due to this, information on iceberg shape distributions is mainly based on Russian data sources.

Table 10-1 and Figure 10-3 presents the different iceberg definitions while Figure 10-4 shows the distribution of iceberg types.

Table 10-1 Description of iceberg types in the Barents Sea

Type	Specification	Figure 10-3
Growler	a piece of glacial ice floating less than 1 m above the sea surface, in order of 5 m to 10 m in length and and occupying an area of approximately 20 m^2. Difficult to detect when embedded in sea ice or in high sea states.	(a)
Bergy Bit	a piece of glacial ice less than 30 m in length, approximately 1 m to 5 m in height with a waterplane area in the range 100-300 m^2 and a mass less than 11,000 tonnes.	(b)
Glacier/Pinnacled iceberg	an iceberg with a pyramid like shape	(c)
Domed iceberg	an iceberg which is smooth and rounded on top	(d)
Tabular iceberg	A flat-topped iceberg. Most show horizontal banding.	(e)

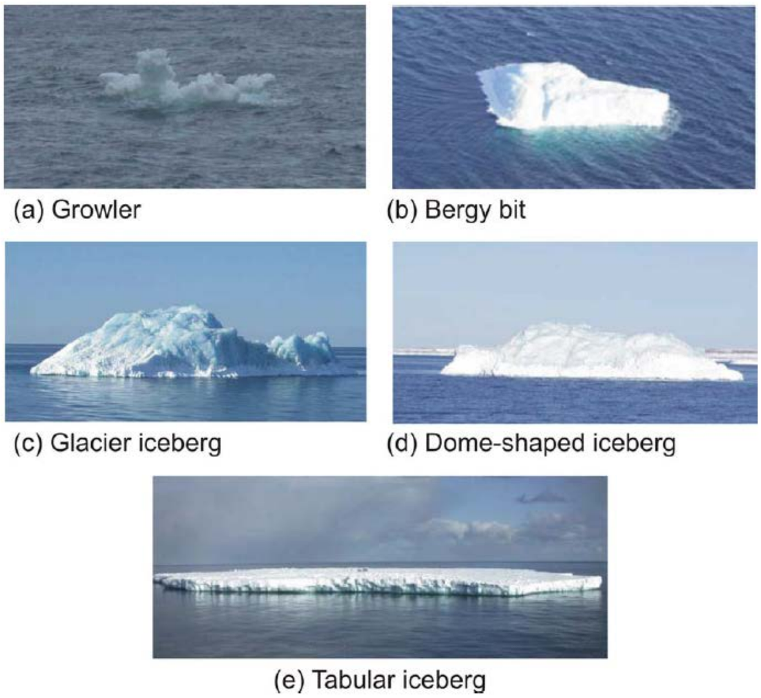
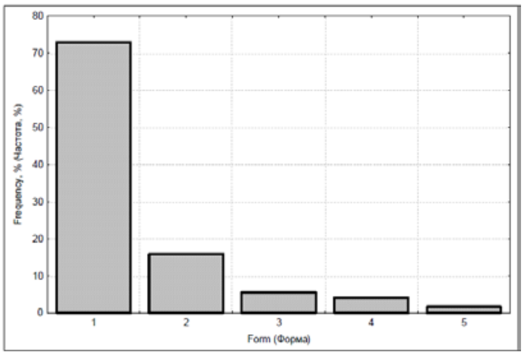


Figure 10-3 Iceberg shape/size categories in the Barents Sea.



1 – bergy bits; 2 – tabular berg; 3 – growler;
4 – glacier berg; 5 – other iceberg shapes

Figure 10-4 Distribution of iceberg shapes in the Barents Sea based on data from 1928 – 1991 [32]. Glacier berg and other iceberg shapes include domed, pinnacled, wedged and drydock icebergs.

10.2.2 Iceberg waterline length and width

Iceberg waterline length (L) is defined as the maximum horizontal dimension of an iceberg at the water surface. Attention should be given to the fact that some iceberg studies (e.g. IDAP) have neglected the presence of growlers and bergy bits and reported size distributions representative only for the 20-30% largest icebergs. For icebergs entering the Barents East blocks, the waterline length distributions presented in Figure 10-5 and Eq. (6) may be applied. The mean waterline length in accordance to expression Eq. (6) is 48 m.

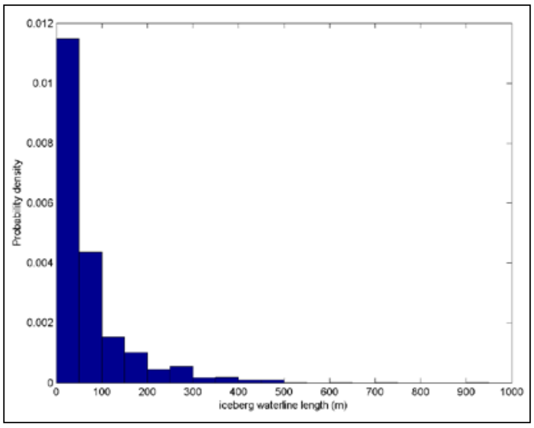


Figure 10-5 Iceberg waterline length distribution [20].

$$f_L(l) = 0.67\left(\frac{1}{5.55}exp\left(-\frac{l-15}{5.55}\right)\right) + 0.335\left(\frac{1}{100}exp\left(-\frac{l-15}{100}\right)\right) \quad (6)$$

where $l \geq 15$ m is the iceberg waterline length. In accordance to this distribution, 66% of the icebergs are Bergy Bits (15 m≤ l ≤30 m) while the remaining 34% are longer than 30 m.

The iceberg width (B) can be estimated based on the empirical relationship [33]:

$$B = 0.7 \cdot L \cdot exp(-0.00062 \cdot L) \quad (7)$$

10.2.3 Iceberg mass

During the Shtokman project in the Russian part of the Barents Sea, a waterline length-to-mass relationship was developed based on data both in Russian and Norwegian sectors [33]:

$$M = 0.196 \cdot \rho \cdot L^3 \cdot exp(-0.00124 \cdot L) \quad (8)$$

where M is the iceberg mass in tons, L is the waterline length, and ρ is ice density (900 kg/m^3).

10.2.4 Iceberg draft and height

The total height of an iceberg (sail height + draft), H, can be expressed by the empirical formulation [33]:

$$H = 0.3 \cdot L \cdot exp(-0.00062 \cdot L) \tag{9}$$

The average draft to sail ratio depends on the iceberg shape but can in general be 1 to 5, e.g a tabular iceberg with total height 120 m will have 20 m sail height and 100 m draft. "Sail to draft" ratios for other iceberg shapes can be found in [34].

10.3 Iceberg mechanical properties

In 2001 and 2003-2005, studies of physical-mechanical properties of several icebergs were carried out during the ice research expedition activities of the Arctic and Antarctic Research Institute in the north-eastern Barents Sea [16]. These studies have formed the basis for recommendations on iceberg temperature, density and strength values.

10.3.1 Temperature of icebergs

The temperature distribution in large icebergs (predominantly tabular icebergs with horizontal sizes of about 100 m) is primarily determined by the place of their generation [26].

Figure 10-6 presents the vertical temperature profiles in the upper layer of icebergs from data of thermal strings deployed in the expeditions of 2003 and 2005 [16]. The readout of the vertical coordinate is from the iceberg surface corresponding to the daytime surface of the parent glacier. In icebergs formed at Franz Josefs Land (FJL) and on Novaya Zemlya (NZ), a positive temperature gradient is preserved under the active layer. The icebergs of FJL are much colder compared to NZ icebergs: in the 5 m horizon from the surface the temperature of the former comprises about –10°C and the temperature of the latter is -6 to -4°C; in 14 m the temperature in icebergs of FJL increases to –8°C and in NZ icebergs up to -2°C. Temperatures based on FJL icebergs can be applied for icebergs in the Barents East blocks.

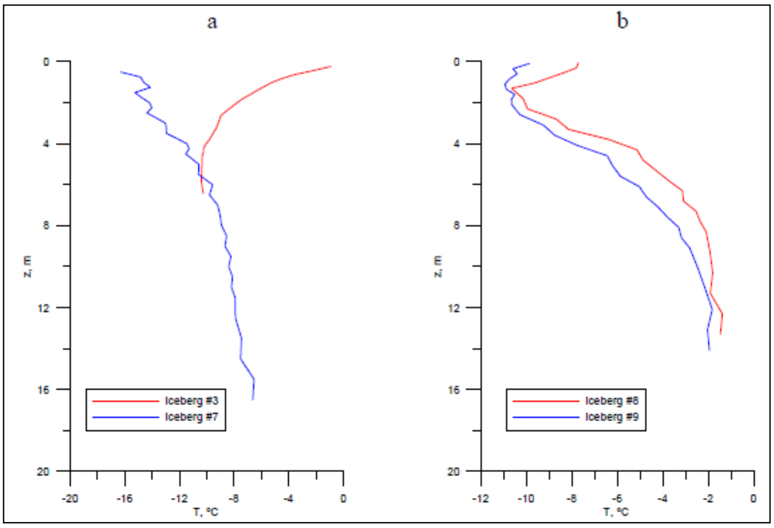


Figure 10-6 Vertical temperature profiles in large icebergs calved from the glaciers of FJL (a) and Severny Island of Novaya Zemlya (b) [16].

In small glacier bergs and bergy bits the temperature distribution depends in many respects on the conditions in which the iceberg was after calving. To determine the relation of the temperature regime in such icebergs to the temperature regime of glaciers is practically impossible. Vertical temperature profiles in bergy bits and small icebergs (up to 60 m long) were obtained during expeditions conducted by the Arctic and Antarctic research Institute (AARI) in 2001 and 2004 in the north-eastern part of the Russian Barents Sea. The profiles are presented in are presented in Figure 10-7.

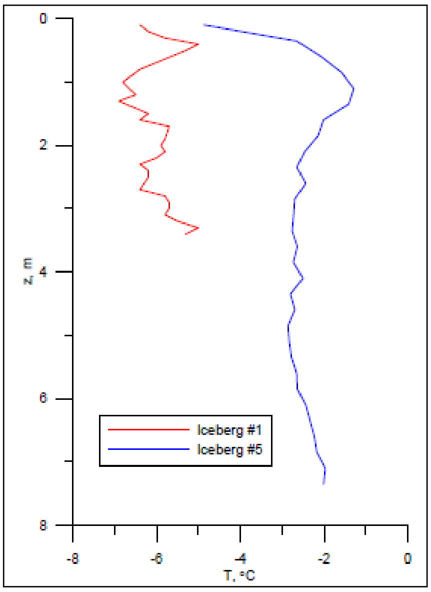


Figure 10-7 Vertical temperature profiles in a bergy bit (2001) and small iceberg (2004) [16]

10.3.2 Ice density and salinity in icebergs

The density of iceberg ice depends on its porosity and temperature. The density values based on the data of measurements on icebergs in the expeditions of 2001, 2003-2005 [16] are mainly within 900±30 kg/m^3. The exception is a thin surface layer 5–30 cm thick formed of snow frozen together at being sprayed by saline sea water. This layer of milky-white colour is characterized by the decreased density (840–860 kg/m^3).

10.3.3 Strength properties of ice from icebergs

The strength of ice from icebergs was investigated by AARI for depths up to 4 m from the iceberg surface [16]. In order to determine the compressive strength, tests of small ice samples collected perpendicular to the iceberg surface were carried out. For determining the flexural strength, tests of disks were made. Since the characteristics of iceberg ice is different when samples are extracted compared to the characteristics of the ice in interactions with structures, AARI also performed strength measurements by using a borehole jack. Even if the data specific for the Barents Sea are available from these tests, recorded values are not easily applicable in iceberg-structure interactions and is therefore not included in this design basis document.

For iceberg structure interactions, it is recommended to use guidelines in to ISO 19906, Clause A8.2.4.7 [8] and relevant coefficients to estimate global pressure and ice intendention.

10.4 Iceberg drift

Several sources have quoted basic statistics corresponding to single iceberg tracks as well as multiple iceberg observations. The largest source available is a database of iceberg tracks collected during the IDAP project [31] and is considered partly to be representative also for iceberg drift data within the Barents East blocks. Drift of larger icebergs is however more affected by wave drift than smaller icebergs due to their ability to reflect waves. Even if this MDB presents the iceberg drift statistics from IDAP, it must be taken into account that all icebergs except bergy bits and growlers may drift somewhat faster within the Barents East blocks since the wave climate in this region is somewhat more severe than in the regions were iceberg drift were recorded.

The mean iceberg drift speed during IDAP was found to be 0.19 m/s with a standard deviation of 0.14. A maximum iceberg drift of 1.3 m/s has also been recorded. Hourly iceberg drift may be represented by a gamma distribution with shape coefficients α = 1.72 and scale coefficient, λ = 9.58. The hourly drift distribution function is from IDAP is shown in Figure 10-8.

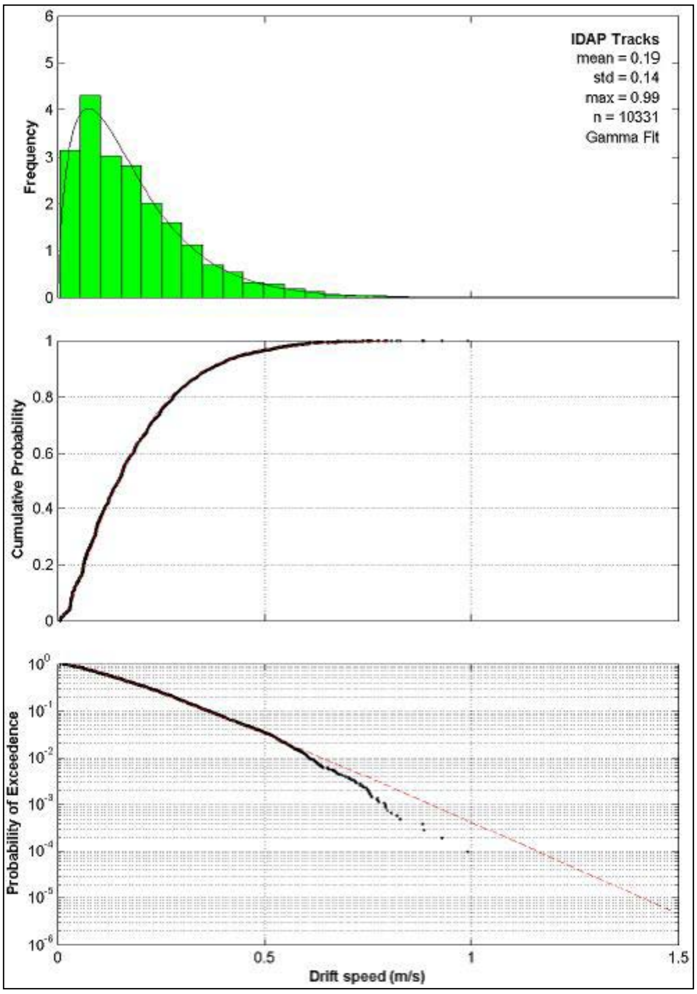


Figure 10-8 Hourly iceberg drift speed data with a gamma fit – based on IDAP data.

10.5 Iceberg Residence Time

The iceberg residence time is the time an iceberg would spend within an area before it drifts out of it or deteriorates completely. The residence times for icebergs within the Barents East blocks have not been investigated and estimates transferred from the Johan Castberg field at approximate location 72°N, 20°E have been applied.

At Johan Castberg, it was found that the average residence time within a 100 x 100 km^2 cell would be 37 hours [21]. The corresponding mean iceberg drift speed was however at the same time estimated to 0.44 m/s. The model used to estimate the residence time has previously been validated against IDAP data and shown good agreement with respect to drift speed statistics. The fact that the model estimates higher iceberg drift velocities in the Southern Barents Sea is an indication of the concern raised in previous section that the recommended iceberg drift speed distribution (in Section 10.4) not fully take into account the effect of forcing from waves.

10.6 Probability of iceberg intrusions

The Abramov Atlas of Arctic Icebergs [17] is a summary of existing data on iceberg distribution in the Arctic Seas and is a very good first source for evaluations of iceberg presence. The main sources for the Atlas are ice charts of aerial surveys. 96% of the iceberg data was obtained from ice reconnaissance flights while about 4% are from shipboard observations. A minor portion of observations (0.1%) were obtained either by satellite observations or observations at coastal polar stations. Within the period 1950-1993 there were in average about 25 flights per year in the Barents Sea. The number of flights over the Barents Sea varied with seasonality with a peak usually in September. The maximum zone of survey along the aircraft route was reported to be no more than 15-20 nautical miles even with good visibility.

Since the ice surveys only covered a certain area along the flight route, the information on number of icebergs observed would only be related to the surveyed zone. This made it possible to estimate the frequency of icebergs along the flight route. In order to estimate the frequency of icebergs within a certain region, Abramov assumed a uniform distribution of icebergs within the region and expanded the estimate along the flight route into 100x100 km cells.

Abramov plotted all iceberg observations for particular months into appropriate cells of regular 100x100 km mesh. The total numbers of icebergs were added for each cell and for each period of time. Based on the multi-year series of observation data, the maximum and mean values for icebergs within each cell were plotted on charts. The occurrence probability of icebergs was estimated by the relationship:

$$P = 100 \cdot \frac{m}{n} \tag{10.7}$$

where P is the probability of occurrence (in %), m is the number of years when icebergs occurred in the given cell and n the total numbers of observations for the given cell. Based on these probability estimates, Abramov developed contour lines with constant annual probability of iceberg occurrence. The locations of the Barents East Blocks have been compared with the contour lines from Abramov (Figure 10-9). The estimated frequency of icebergs entering 100 x 100 km cells around the Barents East blocks is approximately 10, 4, 2 and 3 events within a 100-year period for the A, B, C and D blocks respectively.

There are uncertainties related to the reliability of the Abramov estimated probabilities, in particular with respect to frequencies of smaller icebergs such as growlers and bergy bits which are difficult to spot from airplanes. Due to this, it is suggested to increase the probabilities of icebergs in with a factor of 3. There is no scientific argumentation for this factor and there are large uncertainties regarding to which extent icebergs may have been missed during the observation flights. An assumption in the analysis that Abramov interpolated between the flight paths in order to cover the entire Barents Sea when establishing probability estimates, but this is not well documented in the original source.

Table 10-2 Annual probability of icebergs in 100 x 100 km cells

Block	A	B	C	D
Annual probability of icebergs in 100 x 100 km cell	0.10	0.04	0.02	0.03

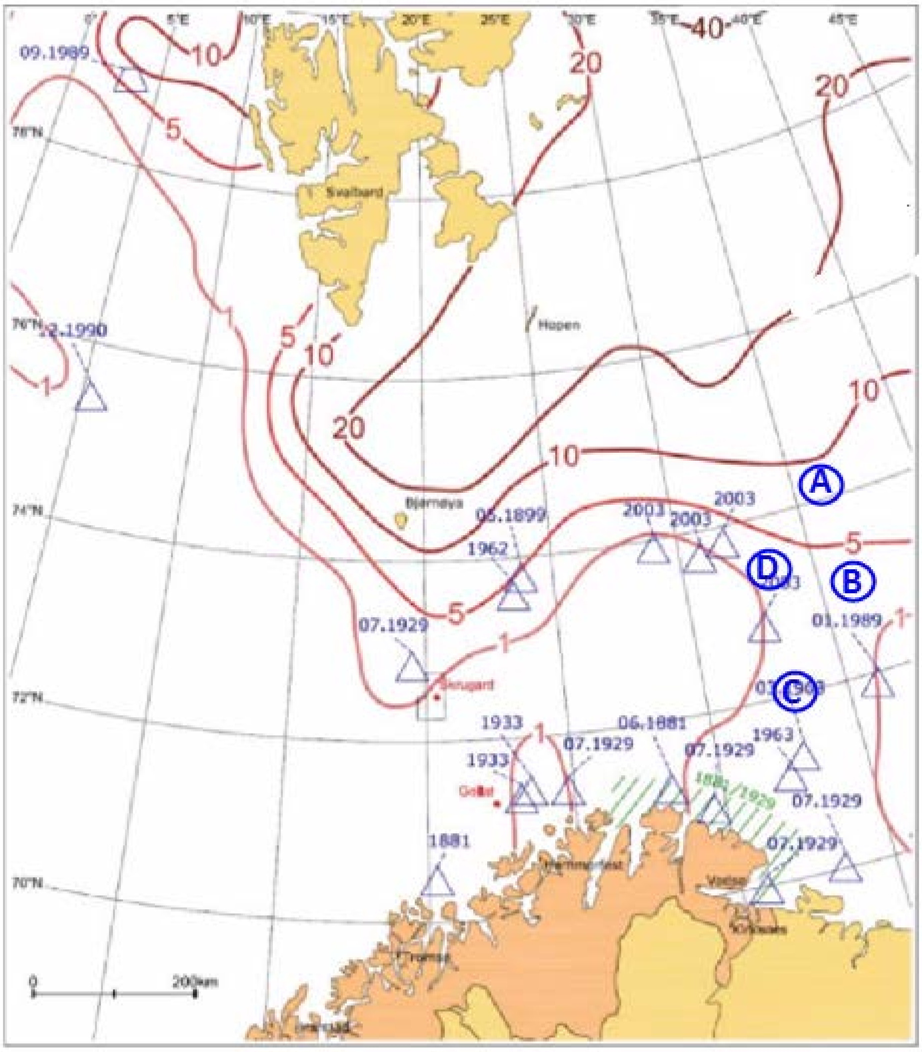


Figure 10-9 Iceberg occurrence in the Barents Sea. The contour lines are the annual probability (%) of occurrence of icebergs in a 100 x 100 km cell. Triangles and shaded areas are abnormal observations of icebergs. The map is prepared by Multiconsult based on figures in Abramov [17]. Approximate locations of the Barents East blocks are included.

10.7 Estimation of iceberg encounters within the Barents East blocks

The "swept area approach" presented by Fuglem et al. (1996) [23] has been applied in order to estimate the iceberg encounter rate in circles with various diameters centred at the 4 locations in block A, B, C and D.

In brief, this approach is based on an iceberg areal density estimate. The encounter probability for all iceberg lengths in all environmental conditions is then summed up. The encounter probability for one single iceberg is calculated from the ratio between the area swept by the iceberg and the total area considered, e.g. a cell with size 100 km x 100 km. This is illustrated in Figure 10-10.

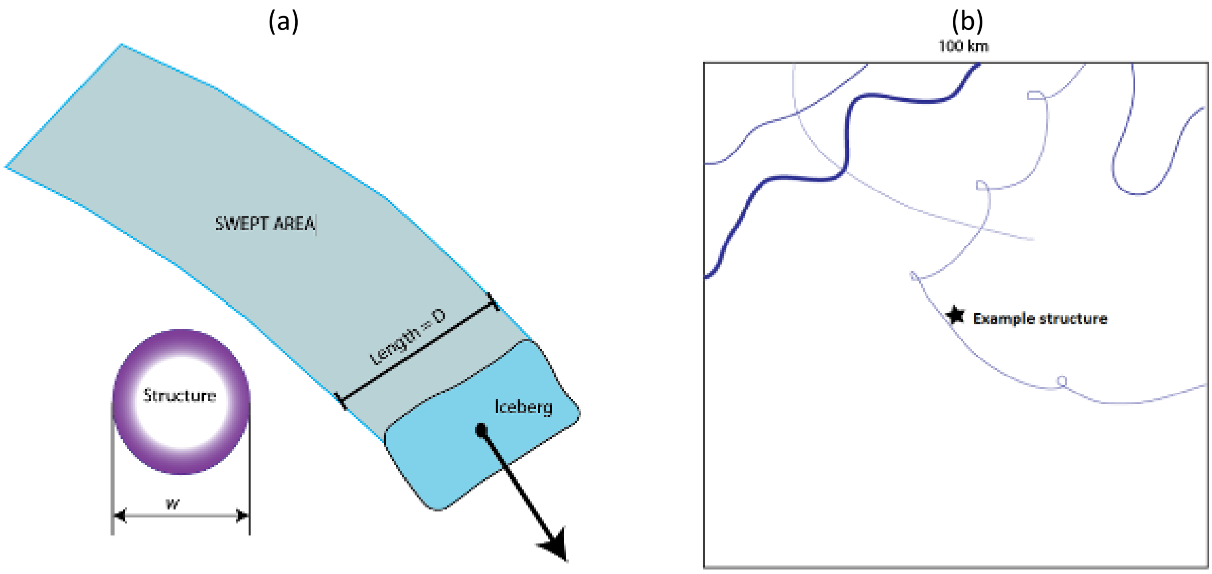


Figure 10-10 **Illustration of areal density estimation. a) shows the area being swept by one iceberg while b) shows area swept by five icebergs with different size and drift patterns (all enters from the North and exits either to the East or to the West with one exception which is a small iceberg which totally deteriorates within the square). It should be noted that these illustrations are for informative purposes only and do not show actual observations.**

The probability of an encounter by one single iceberg may be calculated as follows:

$$p_e = \frac{(w_i + w_s) \cdot v_i . \Delta t}{A} \tag{10}$$

where p_e is the probability of collision during time Δt. w_i is the iceberg width, w_s is the structure width , v_i is the mean iceberg drift speed and A is the regional area through which the iceberg is transiting. The total annual expected number of iceberg encounters (η_e) is expressed by Fuglem et al. [23]:

$$\eta_e = \rho_a \cdot (w_s + \overline{w}_i) \cdot \overline{v}_i \cdot T \tag{11}$$

where ρ_a is the average areal density of icebergs per year (number of icebergs per unit area), $\overline{w}_i$ is the mean iceberg length, $\overline{v}_i$ i is the mean iceberg drift speed and T is the number of seconds per year. It should be noted that the iceberg length is conservatively chosen to represent the swept iceberg width.

With respect to the average areal density of icebergs per year, ρ_a, this is calculated as follows:

$$\rho_a = \rho \cdot R \cdot p \tag{12}$$

where ρ is the crude areal density (not averaged over time), R is the iceberg residence time within the cell and p is the annual probability of occurrence. In accordance to Table 10-3, the annual probability of icebergs expected to enter a 100 x 100 km^2 cell is 0.1, 0.04, 0.02 and 0.03 for the blocks A, B, C and D respectively. Given that one iceberg is within a cell, the crude areal iceberg density is at least $\frac{1}{10\,000\,km^2}$. Considering the possibility of several icebergs to be within the cell simultaneously, it is found rational to assume that about 2 icebergs would be present in the cell [21]. This is the same as assuming that when an iceberg has been detected, there is in average one undetected iceberg within the cell. This gives $\rho = \frac{2}{100 \cdot 100\,km^2}$.

Using location A for illustration we know that icebergs are expected to be present 10 times within the 100 x 100 km area within a 100 year period. By taking into account that icebergs may have been present in years with no detections, the annual probability of icebergs is suggested to be increased with a factor[4] of 3 meaning that p in Eq. (12) becomes 0.3 for block A.

Each iceberg will, in average, stay within the area for 37 hours in accordance to the estimated residence time (Section 10.5). Since the average areal density represents the number of icebergs per m^2 at any time the residence time must be divided by the number of hours per year. The average areal density may then be estimated as follows:

$$\rho_a = \frac{2\ icebergs}{100 \cdot 100 \cdot 10^6\ m^2} \cdot \frac{37\ h}{365 \cdot 24 \frac{h}{year}} \cdot \frac{30}{100\ years} = 2.5342 \cdot 10^{-13} \text{ icebergs per m}^2 \text{ at any time} \tag{13}$$

Consequently, the annual number of icebergs encountered at block A is:

$$\eta_e = 2.5342 \cdot 10^{-13} \cdot (w_s + 48) \cdot 0.44 \cdot 365 \cdot 24 \cdot 3600 \text{ encounters per year} \tag{14}$$

[4] *There is no scientific evidence for this factor – it is simply selected to include some robustness in the case that iceberg surveillance was insufficient to ensure proper estimates for iceberg probability of occurrence.*

Table 10-3 shows the estimated annual encounter frequency within different zones located at the blocks A, B,C and D. It must however be emphasized that there are significant uncertainties related to these estimates. The numbers represent a “best estimate” while in reality the encounter frequency may very well be of an order higher or lower, i.e. in the range between 10^{-2} to 10^{-4} per year. Projects are encouraged to seek robustness when considering specific platform concepts in the Arctic. Operational mitigations such as disconnection capabilities or active iceberg management may be considered. Ideally, the encounter frequencies can be reduced about 80-90% if a proper iceberg management system is in place.

Table 10-3 Annual iceberg encounter frequency at 4 locations.

External diameter of zone (m)	Mean iceberg drift speed, m/s	Mean iceberg waterline length, m	Mean areal density, ρ_D	Annual number of iceberg encounters, η_E
Block A				
100	0.44	48	$2.5342 \cdot 10^{-13}$ m^{-2}	$5.20 \cdot 10^{-4}$
500				$1.93 \cdot 10^{-3}$
1000				$3.69 \cdot 10^{-3}$
4000				$1.42 \cdot 10^{-2}$
8000				$2.83 \cdot 10^{-2}$
Block B				
100	0.44	48	$1.0137 \cdot 10^{-13}$ m^{-2}	$2.08 \cdot 10^{-4}$
500				$7.71 \cdot 10^{-4}$
1000				$1.47 \cdot 10^{-3}$
4000				$5.69 \cdot 10^{-3}$
8000				$1.13 \cdot 10^{-2}$
Block C				
100	0.44	48	$5.0685 \cdot 10^{-14}$ m^{-2}	$1.04 \cdot 10^{-4}$
500				$3.85 \cdot 10^{-4}$
1000				$7.37 \cdot 10^{-4}$
4000				$2.85 \cdot 10^{-3}$
8000				$5.66 \cdot 10^{-3}$
Block D				
100	0.44	48	$7.6027 \cdot 10^{-14}$ m^{-2}	$1.56 \cdot 10^{-4}$
500				$5.78 \cdot 10^{-4}$
1000				$1.11 \cdot 10^{-3}$
4000				$4.27 \cdot 10^{-3}$
8000				$8.49 \cdot 10^{-3}$

11 Temperatures

11.1 Air temperature

Air temperature data are available from the Nora10 hindcast model operated by the Norwegian Meteorological Institute [14]. The data chosen for analysis are from for grid points (as shown in Section 2.1) and cover the period 1958 – 2014 (57 years). The sample interval is 3 hours.

Data on air temperature are available from 2 and 30 m above mean sea level. The time step is 3 hours. These hindcast data has been validated by Statoil against measured data in the Barents Sea. The following correction is applied on air temperature ([1] and Figure 11-1):

$$T_{new} = 1.07*T_{NORA10} \qquad \text{for } T_{NORA10} < 0°C \tag{15}$$

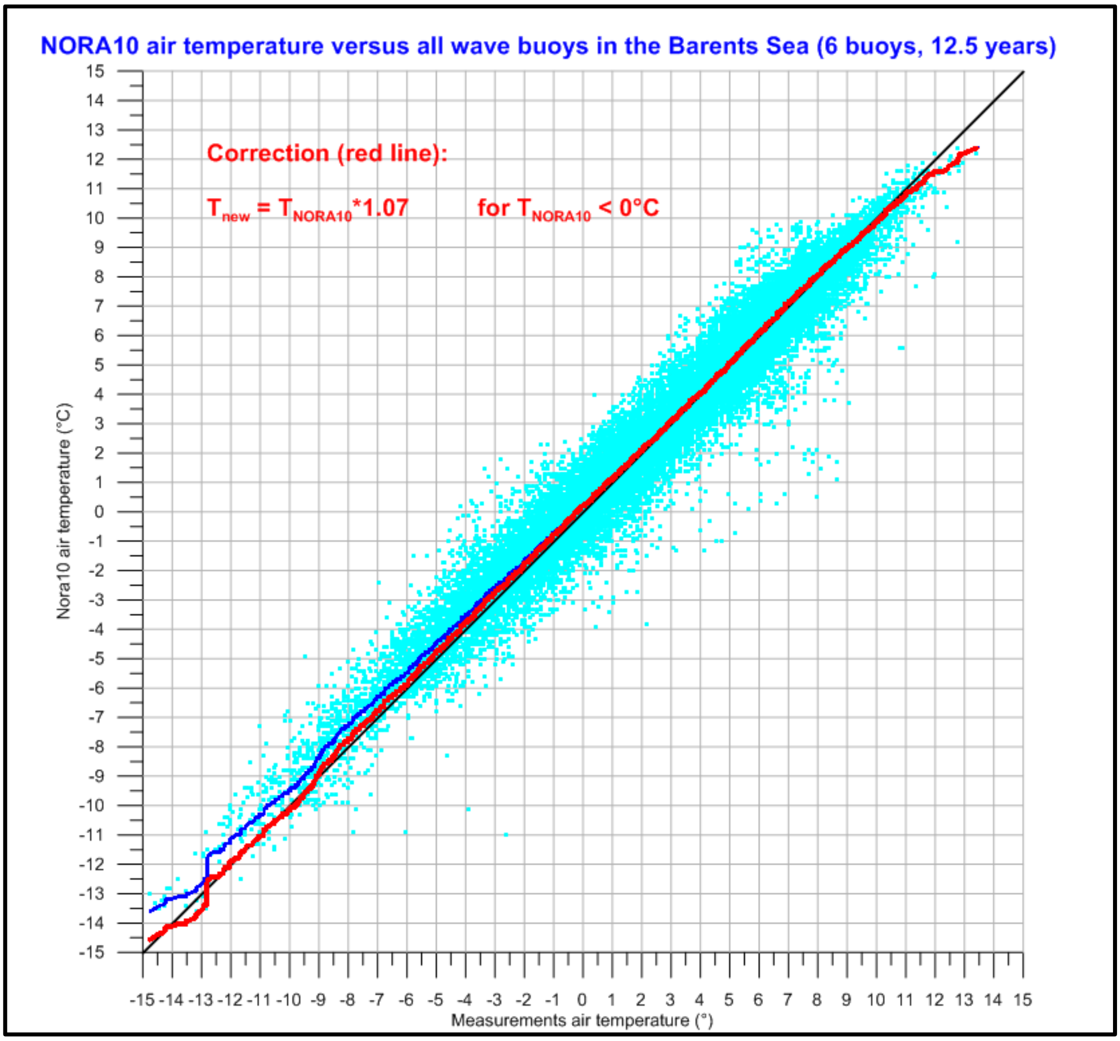


Figure 11-1 Scatter and QQ-plot of air temperature from 6 buoys in the Barents Sea versus corrected NORA10 air temperature (approximately 12.5 years with data).

Figure 11-2 shows the monthly minimum, mean and maximum air temperatures measured at the Block A during the period 1958 – 2014.

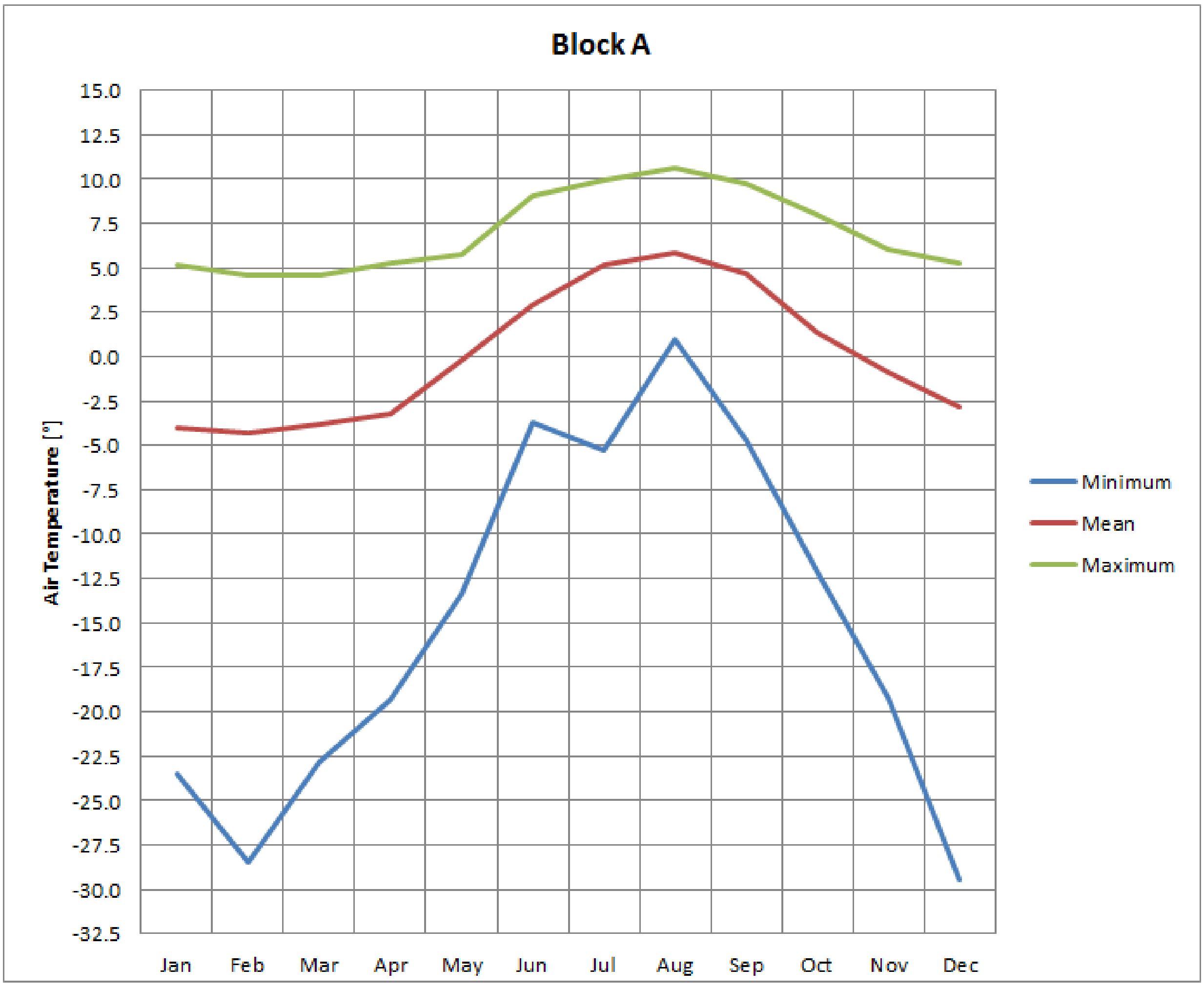


Figure 11-2 Monthly minimum, mean and maximum air temperature measured at the Block A during the period 1958 – 2014.

Table 11-1 shows monthly and annual frequency of non-exceedance of air temperature at the Block A.

Table 11-1 Monthly and annual sample frequency of non-exceedance [%] of air temperature at the Block A.

Air Temp. [°C]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< -29												6	**6**
< -28		6										2	**8**
< -27		10										9	**19**
< -26		5										4	**9**
< -25		1										12	**13**
< -24	1	3										6	**10**
< -23	8	9	1									5	**23**
< -22	14	20	15									2	**51**
< -21	44	74	24									9	**151**
< -20	71	56	32									12	**171**
< -19	80	102	72	1							8	22	**285**
< -18	109	106	132	8							7	27	**389**
< -17	114	130	118	25							20	37	**444**
< -16	178	124	149	34							14	62	**561**
< -15	205	152	154	88							14	86	**699**
< -14	203	198	183	126							23	135	**868**
< -13	225	270	188	158	6						37	140	**1024**
< -12	341	338	285	266	11					7	44	223	**1515**
< -11	355	368	328	383	13					20	73	319	**1859**
< -10	435	375	405	498	40					15	130	359	**2257**
< -9	495	483	534	672	83					37	250	533	**3087**
< -8	522	480	526	557	78					70	277	450	**2960**
< -7	503	516	523	566	121					98	334	522	**3183**
< -6	692	673	732	710	194					151	545	601	**4298**
< -5	764	655	858	697	350		3		2	205	544	671	**4749**
< -4	869	770	968	770	602	1	2		5	421	742	790	**5940**
< -3	1116	969	1061	1048	995	5	4		15	555	952	1003	**7723**
< -2	1089	968	1015	1113	1257	33	14		32	759	1062	1007	**8349**
< -1	1340	1121	1333	1228	1802	171	16		53	1134	1193	1247	**10638**
< 0	1278	1185	1261	1243	2102	629	14		195	1235	1095	1340	**11577**
< 1	1462	1361	1444	1436	2595	1668	59	14	512	1858	1691	1644	**15744**
< 2	944	779	1147	1215	1908	2879	362	100	1004	1703	1661	1373	**15075**
< 3	515	489	551	628	1389	3457	1310	633	1686	1643	1602	888	**14791**
< 4	149	80	96	188	505	2866	2545	1786	2226	1741	922	323	**13427**
< 5	15	4	1	22	80	1433	3412	3012	2679	1442	188	19	**12307**
< 6					5	400	3370	3698	2669	642	12		**10796**
< 7						91	1903	3017	1810	124			**6945**
< 8						36	714	1246	493	28			**2517**
< 9						10	152	324	57				**543**
< 10							8	56	2				**66**
< 11								2					**2**
Total	**14136**	**12880**	**14136**	**13680**	**14136**	**13679**	**13888**	**13888**	**13440**	**13888**	**13440**	**13888**	**165079**

Minimum	**-23.5**	**-28.4**	**-22.9**	**-19.3**	**-13.3**	**-3.7**	**-5.3**	**0.9**	**-4.7**	**-12.1**	**-19.2**	**-29.5**	**-29.5**
Mean	**-4.1**	**-4.3**	**-3.8**	**-3.2**	**-0.2**	**2.9**	**5.2**	**5.8**	**4.7**	**1.4**	**-0.9**	**-2.8**	**0.1**
Maximum	**5.1**	**4.5**	**4.5**	**5.2**	**5.7**	**9.0**	**9.9**	**10.6**	**9.7**	**8.0**	**6.0**	**5.2**	**10.6**

Figure 11-3 shows the monthly minimum, mean and maximum air temperatures measured at the Block B during the period 1958 – 2014.

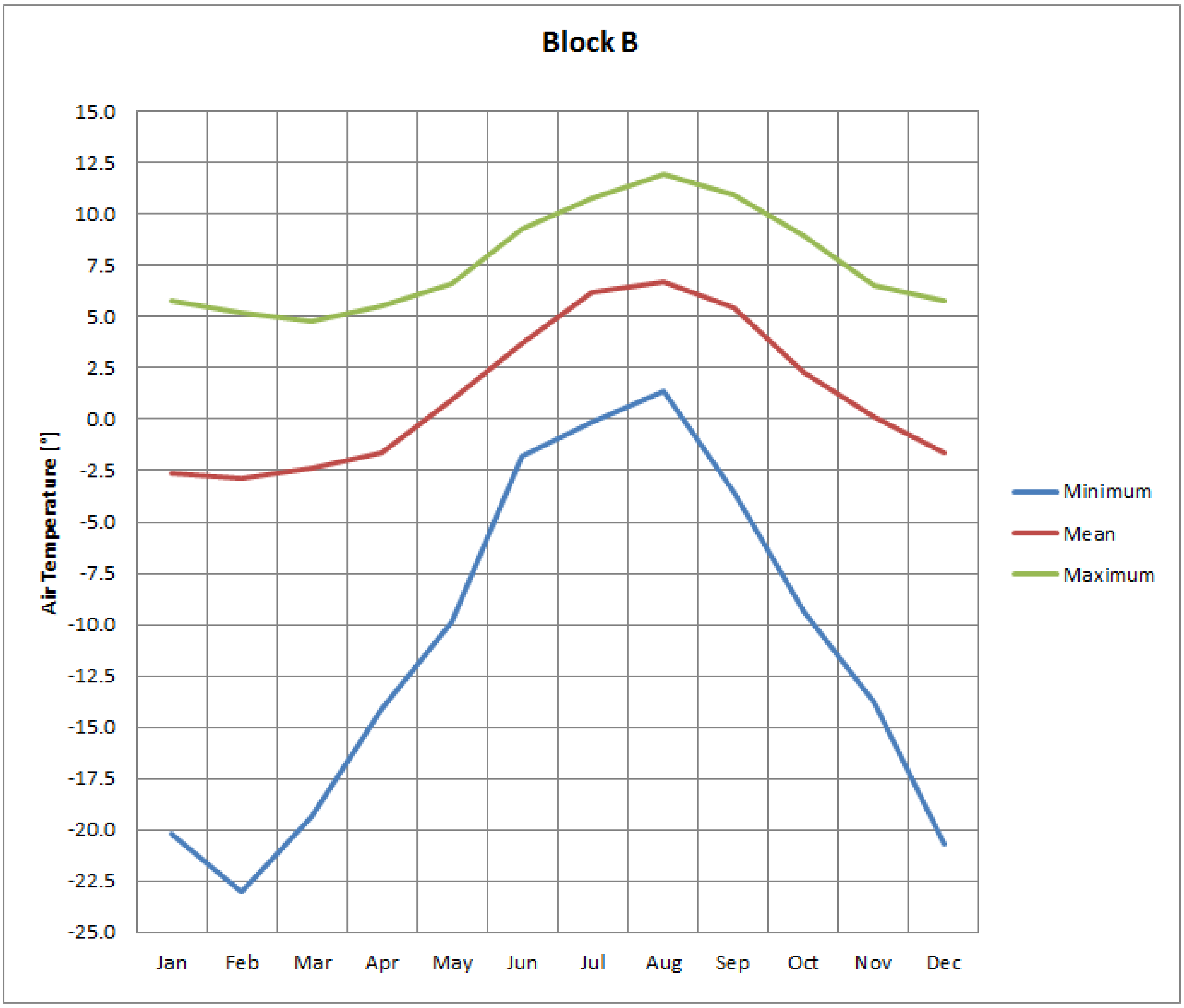


Figure 11-3 Monthly minimum, mean and maximum air temperature measured at the Block B during the period 1958 – 2014.

Table 11-2 shows monthly and annual frequency of non-exceedance of air temperature at the Block B.

Table 11-2 Monthly and annual sample frequency of non-exceedance [%] of air temperature at the Block B.

Air Temp. [°C]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< -21		7											7
< -20		9											9
< -19	1	5										4	10
< -18	5	1	2									6	14
< -17	11	5	8									6	30
< -16	20	23	21									2	66
< -15	36	51	24									5	116
< -14	70	89	50									21	230
< -13	137	137	81	2								27	384
< -12	168	124	136	17							5	44	494
< -11	197	174	169	24							22	113	699
< -10	278	231	216	118							42	153	1038
< -9	300	301	210	167							36	172	1186
< -8	329	384	308	230	10					14	74	272	1621
< -7	453	455	450	446	15					19	135	447	2420
< -6	524	442	471	620	47					26	211	491	2832
< -5	548	575	591	662	85					76	283	490	3310
< -4	655	741	675	804	125					134	494	671	4299
< -3	828	685	819	725	202					167	529	661	4616
< -2	906	877	949	760	386				3	308	588	795	5572
< -1	1162	1026	1304	1076	796				6	455	873	1034	7732
< 0	1235	1094	1138	1062	1103	10			24	687	1032	1083	8468
< 1	1431	1178	1207	1194	1398	56	1		38	878	1231	1277	9889
< 2	1640	1478	1683	1429	2357	469	4		140	1397	1373	1642	13612
< 3	1403	1271	1563	1495	2473	1294	20	5	417	1800	1750	1640	15131
< 4	927	827	1282	1436	2202	2520	212	48	773	1757	1643	1417	15044
< 5	653	553	646	1081	1924	3263	803	404	1565	1683	1626	966	15167
< 6	203	134	133	321	838	3204	1940	1244	2026	1715	1151	393	13302
< 7	16	3		11	163	1938	2955	2474	2607	1558	321	56	12102
< 8					12	714	3658	3444	2749	929	21		11527
< 9						157	2851	3531	2172	241			8952
< 10						49	1054	2028	764	44			3939
< 11						5	362	532	144				1043
< 12							28	154	12				194
< 13								24					24
Total	14136	12880	14136	13680	14136	13679	13888	13888	13440	13888	13440	13888	165079
Minimum	-20.2	-23.0	-19.4	-14.1	-9.8	-1.8	-0.1	1.4	-3.5	-9.4	-13.8	-20.7	-23.0
Mean	-2.7	-2.9	-2.3	-1.6	0.9	3.7	6.2	6.7	5.4	2.3	0.1	-1.6	1.2
Maximum	5.8	5.2	4.8	5.5	6.6	9.3	10.8	11.9	10.9	8.9	6.5	5.8	11.9

Figure 11-4 shows the monthly minimum, mean and maximum air temperatures measured at the Block C during the period 1958 – 2014.

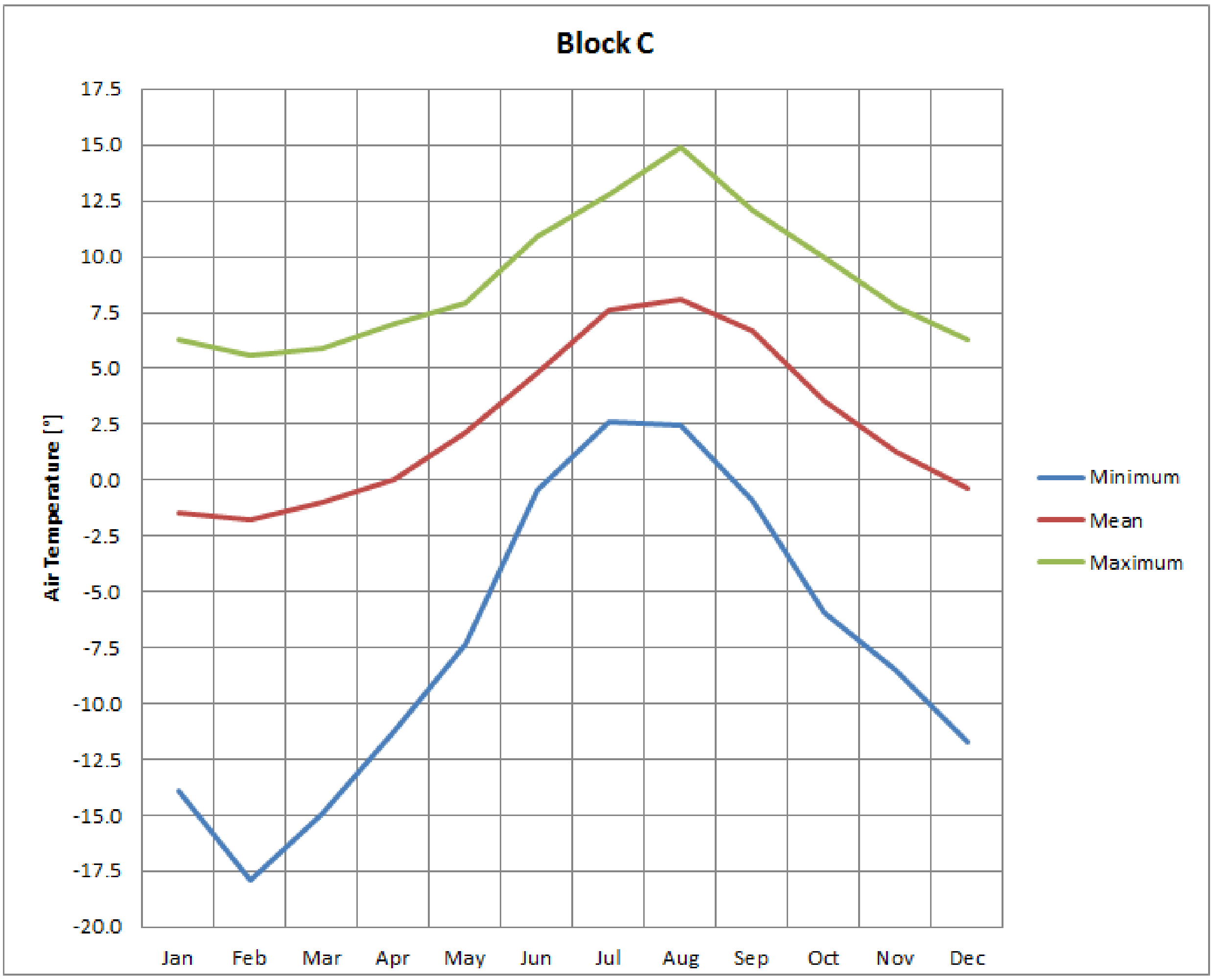


Figure 11-4 **Monthly minimum, mean and maximum air temperature measured at the Block C during the period 1958 – 2014.**

Table 11-3 shows monthly and annual frequency of non-exceedance of air temperature at the Block C.

Table 11-3 Monthly and annual sample frequency of non-exceedance [%] of air temperature at the Block C.

Air Temp. [°C]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< -17		3											3
< -16		3											3
< -15		4	1										5
< -14	2	5	4										11
< -13	19	11	4										34
< -12	18	27	21										66
< -11	48	86	38	3								12	187
< -10	100	107	76	1								41	325
< -9	199	167	115	23								46	550
< -8	286	221	197	70							11	120	905
< -7	315	387	253	110	4						22	163	1254
< -6	496	599	418	287	16					5	88	305	2214
< -5	696	682	514	481	25					18	145	529	3090
< -4	923	956	737	641	44					47	270	684	4302
< -3	1279	1251	1199	946	88					140	520	1022	6445
< -2	1444	1328	1450	1118	228					199	740	1192	7699
< -1	1520	1366	1472	1250	489					312	1039	1393	8841
< 0	1729	1571	1639	1489	1268	8			11	566	1449	1687	11417
< 1	1790	1407	2004	1705	2040	109			41	1126	1627	1714	13563
< 2	1363	1126	1713	1602	2415	617			130	1645	1929	1762	14302
< 3	955	812	1377	1760	2569	1434	4	5	368	1896	1810	1439	14429
< 4	640	562	691	1565	2508	2593	139	31	712	1901	1755	1032	14129
< 5	283	189	207	559	1718	3073	559	308	1419	1755	1311	580	11961
< 6	28	10	6	61	588	3194	1705	1003	2029	1766	588	166	11144
< 7	3			9	123	1728	2931	2192	2756	1580	129	1	11452
< 8					13	625	3501	3388	3029	717	7		11280
< 9						199	2785	3517	2012	185			8698
< 10						78	1489	2361	687	30			4645
< 11						21	625	812	221				1679
< 12							142	207	25				374
< 13							8	55					63
< 14								6					6
< 15								3					3
Total	**14136**	**12880**	**14136**	**13680**	**14136**	**13679**	**13888**	**13888**	**13440**	**13888**	**13440**	**13888**	**165079**
Minimum	**-13.9**	**-17.9**	**-14.9**	**-11.3**	**-7.3**	**-0.5**	**2.6**	**2.5**	**-0.9**	**-5.9**	**-8.5**	**-11.7**	**-17.9**
Mean	**-1.5**	**-1.8**	**-1.0**	**0.0**	**2.2**	**4.8**	**7.6**	**8.1**	**6.7**	**3.5**	**1.3**	**-0.4**	**2.5**
Maximum	**6.3**	**5.6**	**5.9**	**7.0**	**8.0**	**10.9**	**12.8**	**14.9**	**12.1**	**10.0**	**7.8**	**6.3**	**14.9**

Figure 11-5 show the monthly minimum, mean and maximum air temperatures measured at the Block D during the period 1958 – 2014.

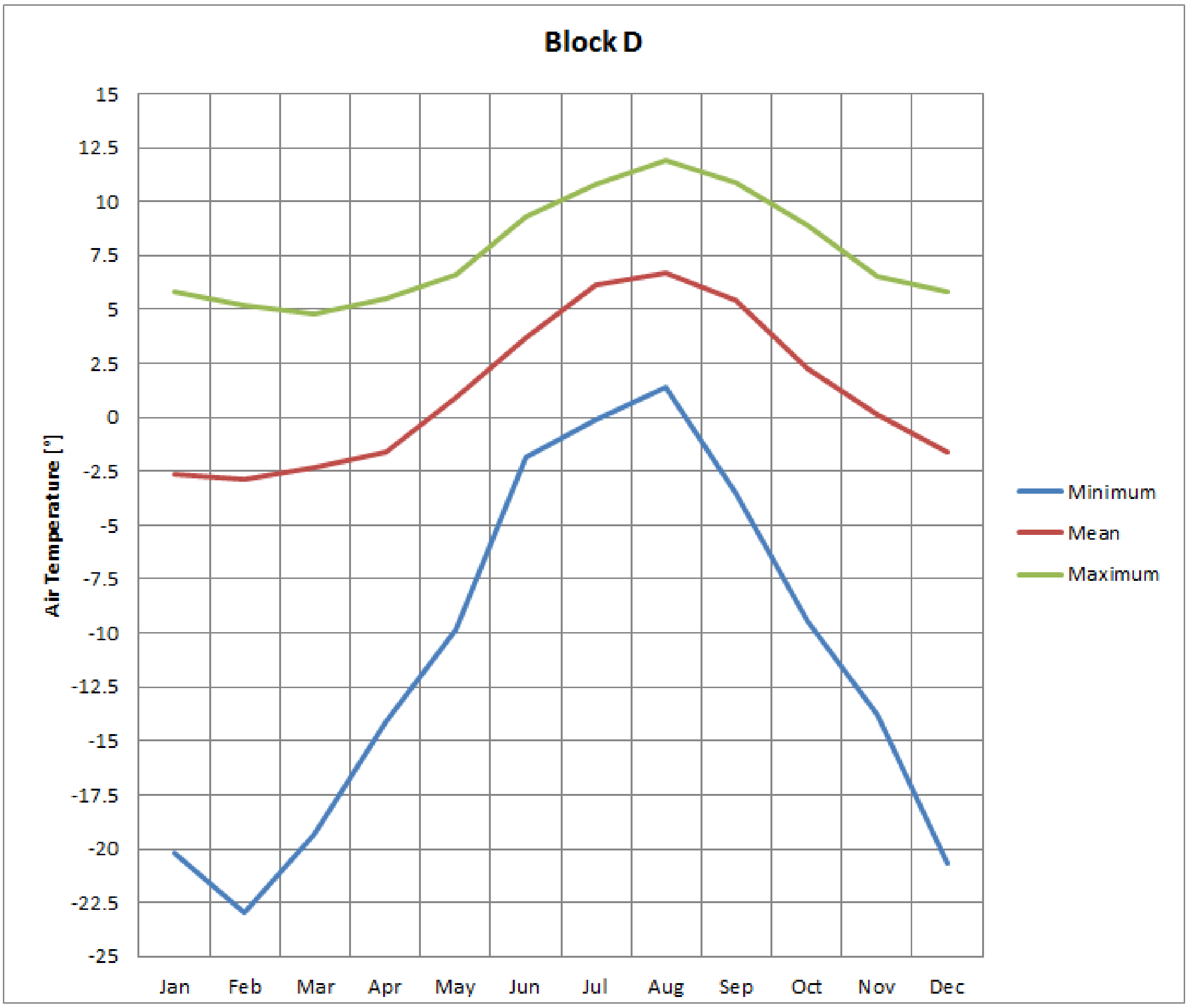


Figure 11-5 Monthly minimum, mean and maximum air temperature measured at the Block D during the period 1958 – 2014.

Table 11-4 shows monthly and annual frequency of non-exceedance of air temperature at the Block D.

Table 11-4 Monthly and annual sample frequency of non-exceedance [%] of air temperature at the Block D.

Air Temp. [°C]	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
< -22		7											7
< -21		9											9
< -20	1	5										4	10
< -19	5	1	2									6	14
< -18	11	5	8									6	30
< -17	20	23	21									2	66
< -16	36	51	24									5	116
< -15	70	89	50									21	230
< -14	137	137	81	2								27	384
< -13	168	124	136	17							5	44	494
< -12	197	174	169	24							22	113	699
< -11	278	231	216	118							42	153	1038
< -10	300	301	210	167							36	172	1186
< -9	329	384	308	230	10					14	74	272	1621
< -8	453	455	450	446	15					19	135	447	2420
< -7	524	442	471	620	47					26	211	491	2832
< -6	548	575	591	662	85					76	283	490	3310
< -5	655	741	675	804	125					134	494	671	4299
< -4	828	685	819	725	202					167	529	661	4616
< -3	906	877	949	760	386				3	308	588	795	5572
< -2	1162	1026	1304	1076	796				6	455	873	1034	7732
< -1	1235	1094	1138	1062	1103	10			24	687	1032	1083	8468
< 0	1431	1178	1207	1194	1398	56	1		38	878	1231	1277	9889
< 1	1640	1478	1683	1429	2357	469	4		140	1397	1373	1642	13612
< 2	1403	1271	1563	1495	2473	1294	20	5	417	1800	1750	1640	15131
< 3	927	827	1282	1436	2202	2520	212	48	773	1757	1643	1417	15044
< 4	653	553	646	1081	1924	3263	803	404	1565	1683	1626	966	15167
< 5	203	134	133	321	838	3204	1940	1244	2026	1715	1151	393	13302
< 6	16	3		11	163	1938	2955	2474	2607	1558	321	56	12102
< 7					12	714	3658	3444	2749	929	21		11527
< 8						157	2851	3531	2172	241			8952
< 9						49	1054	2028	764	44			3939
< 10						5	362	532	144				1043
< 11							28	154	12				194
< 12								24					24
Total	**14136**	**12880**	**14136**	**13680**	**14136**	**13679**	**13888**	**13888**	**13440**	**13888**	**13440**	**13888**	**165079**
Minimum	**-20.2**	**-23.0**	**-19.4**	**-14.1**	**-9.8**	**-1.8**	**-0.1**	**1.4**	**-3.5**	**-9.4**	**-13.8**	**-20.7**	**-23.0**
Mean	**-2.7**	**-2.9**	**-2.3**	**-1.6**	**0.9**	**3.7**	**6.2**	**6.7**	**5.4**	**2.3**	**0.1**	**-1.6**	**1.2**
Maximum	**5.8**	**5.2**	**4.8**	**5.5**	**6.6**	**9.3**	**10.8**	**11.9**	**10.9**	**8.9**	**6.5**	**5.8**	**11.9**

Figures 11-6 – Figure 11-7 show 100-year extreme minimum air temperature in the Barents Sea, with 24 hours duration, 30 m above mean sea level, respectively with or without sea ice present.

Figures 11-8 – Figure 11-9 show annual minimum mean air temperature with 24 hours duration, 30 m above mean sea level, respectively with or without sea ice present.

Figures 11-10 – Figure 11-11 show lowest mean daily air temperature, 30 m above mean sea level, respectively with or without sea ice present.

Figures 11-12 – Figure 11-13 show 100-year extreme minimum air temperature in the Barents Sea, with 1 hour duration, 30 m above mean sea level, respectively with or without sea ice present.

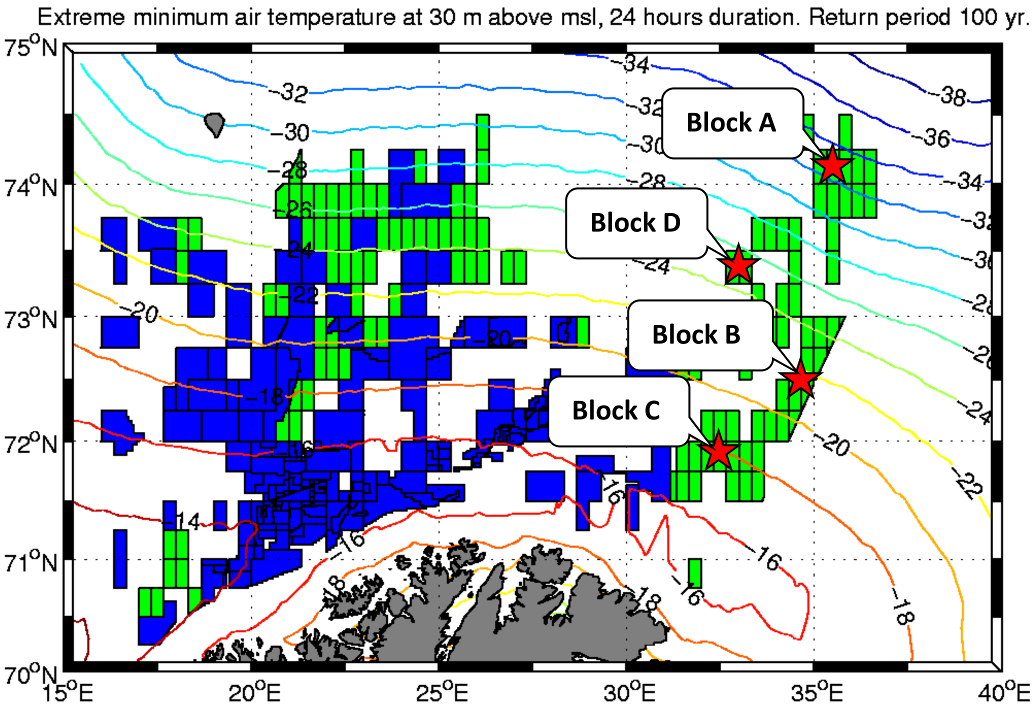


Figure 11-6 **100-year extreme minimum air temperature with 24-hour duration in the Barents Sea 30 m above mean sea level.**

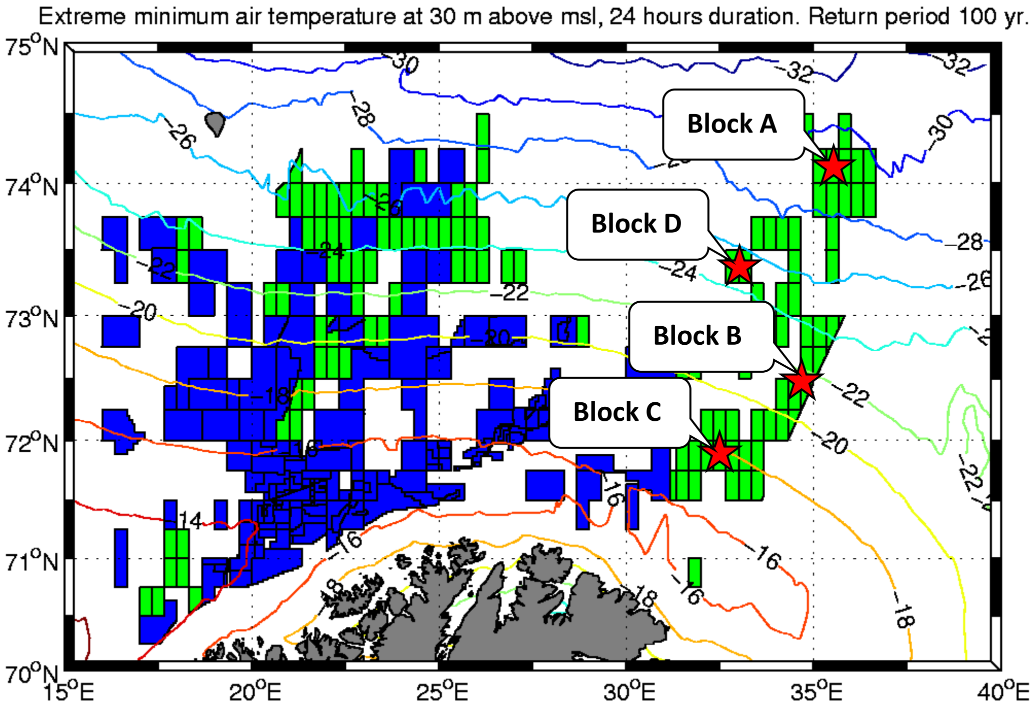


Figure 11-7 **100-year extreme minimum air temperature with 24-hour duration in the Barents Sea 30 m above mean sea level, without sea ice present.**

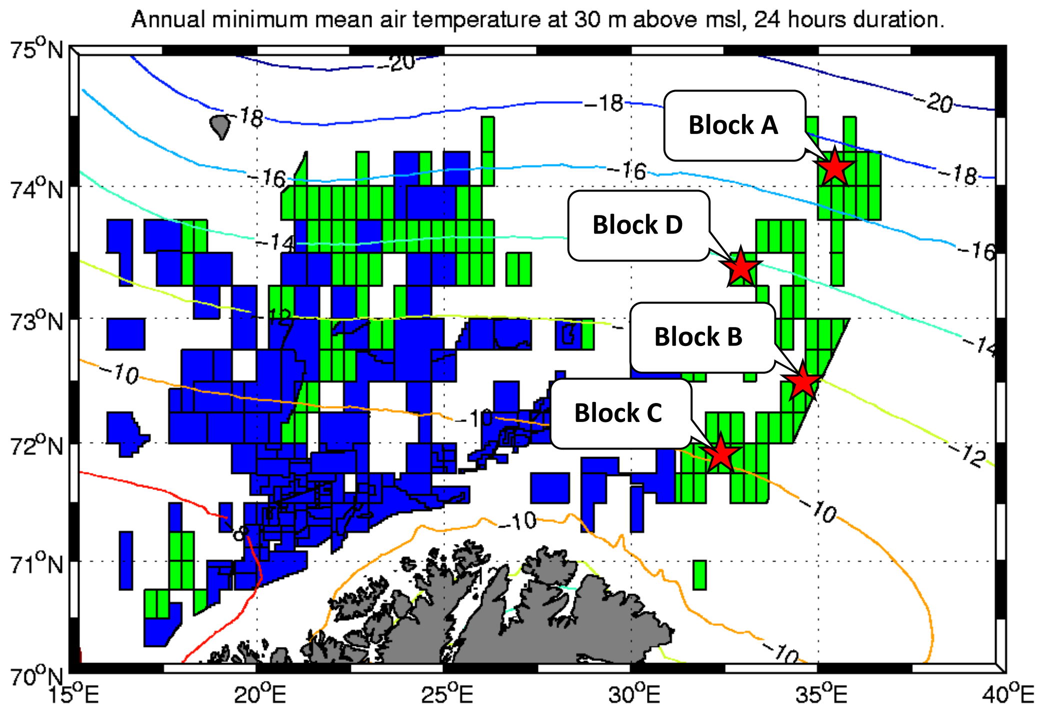


Figure 11-8 **Annual minimum mean air temperature with 24-hour duration in the Barents Sea 30 m above mean sea level.**

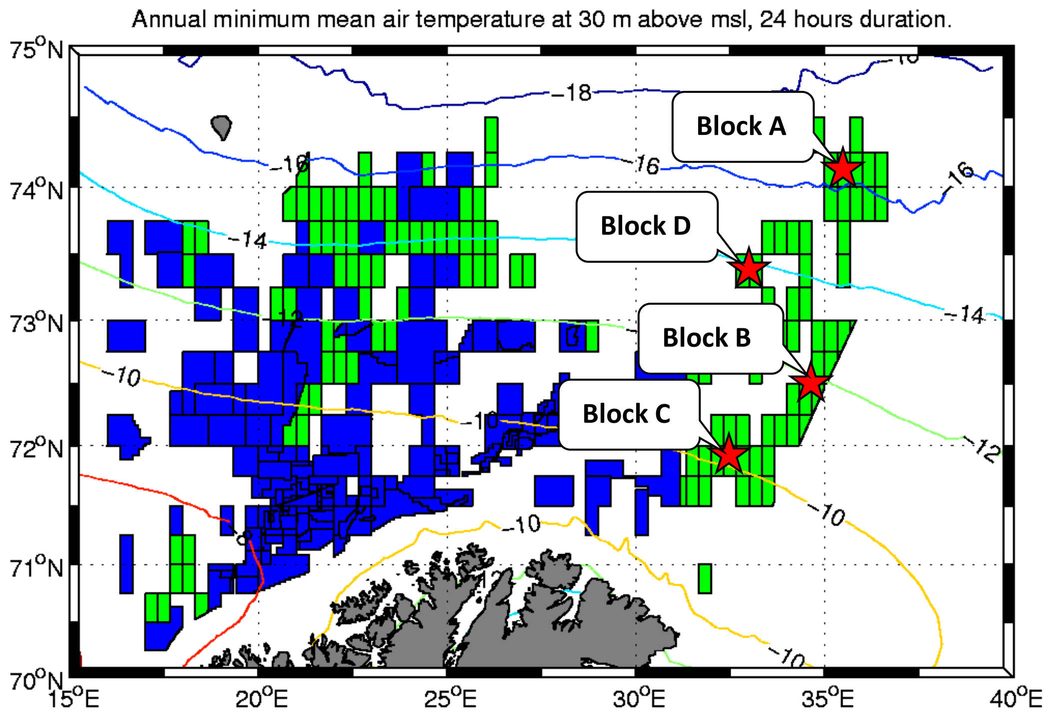


Figure 11-9 **Annual minimum mean air temperature with 24-hour duration in the Barents Sea 30 m above mean sea level, without sea ice present.**

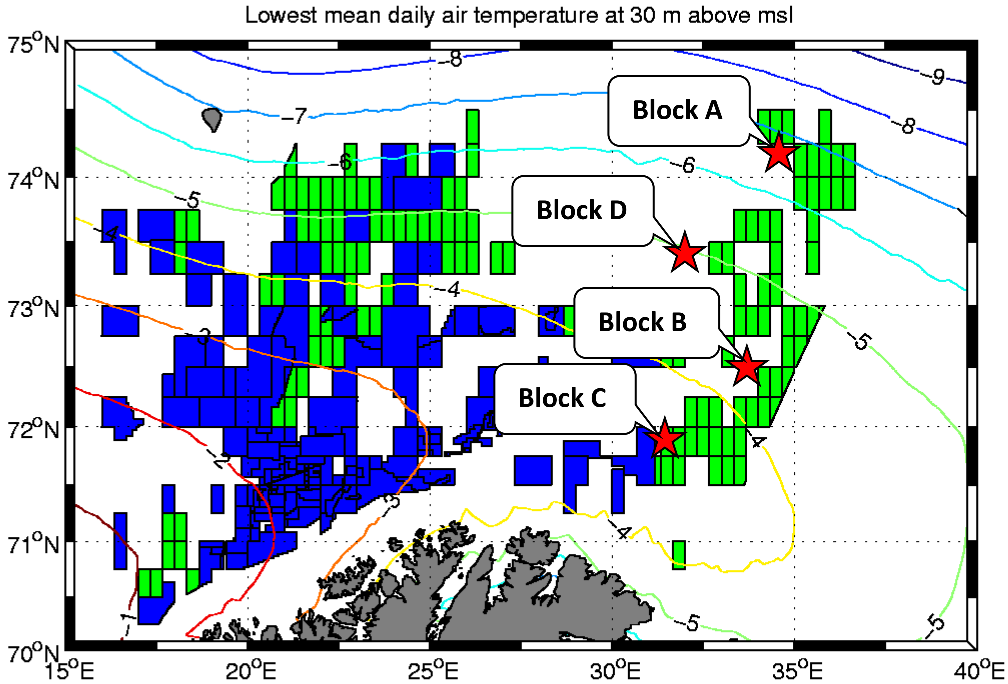


Figure 11-10 **Lowest mean daily air temperature in the Barents Sea 30 m above mean sea level.**

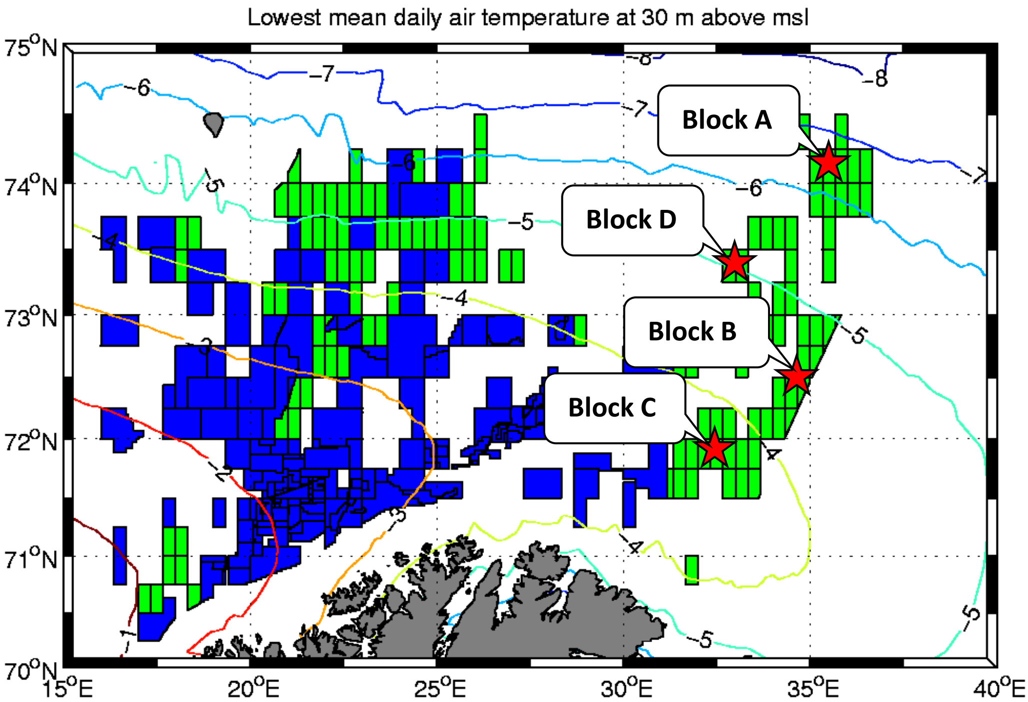


Figure 11-11 **Lowest mean daily air temperature in the Barents Sea 30 m above mean sea level, without sea ice present.**

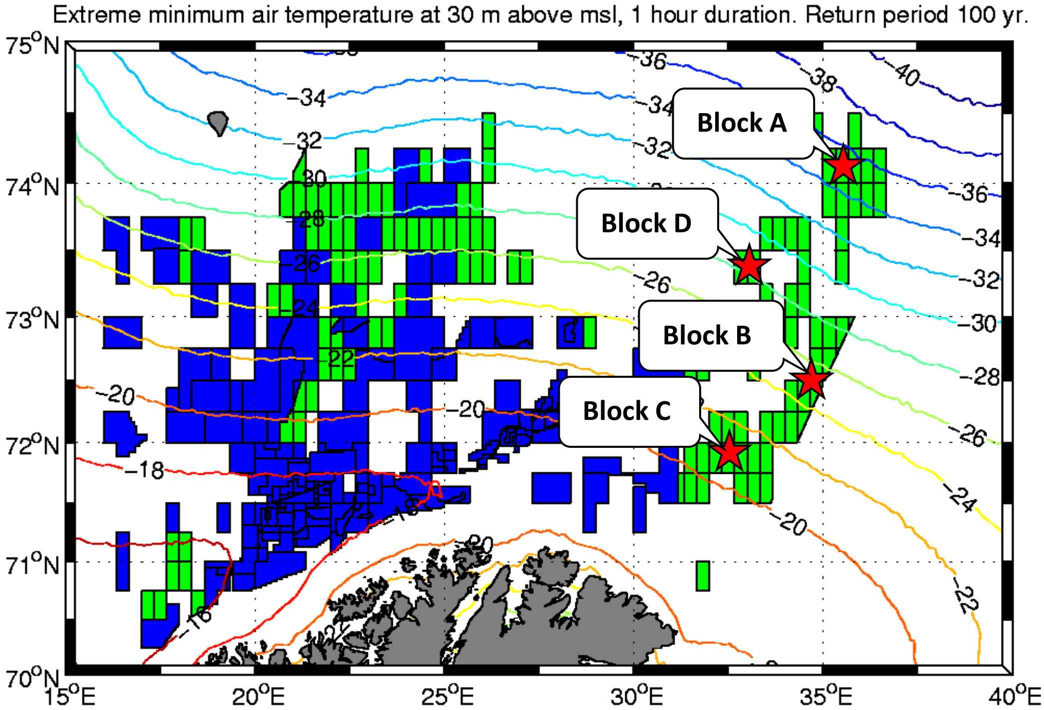


Figure 11-12 **100-year extreme minimum air temperatures with 1-hour duration in the Barents Sea 30 m above mean sea level.**

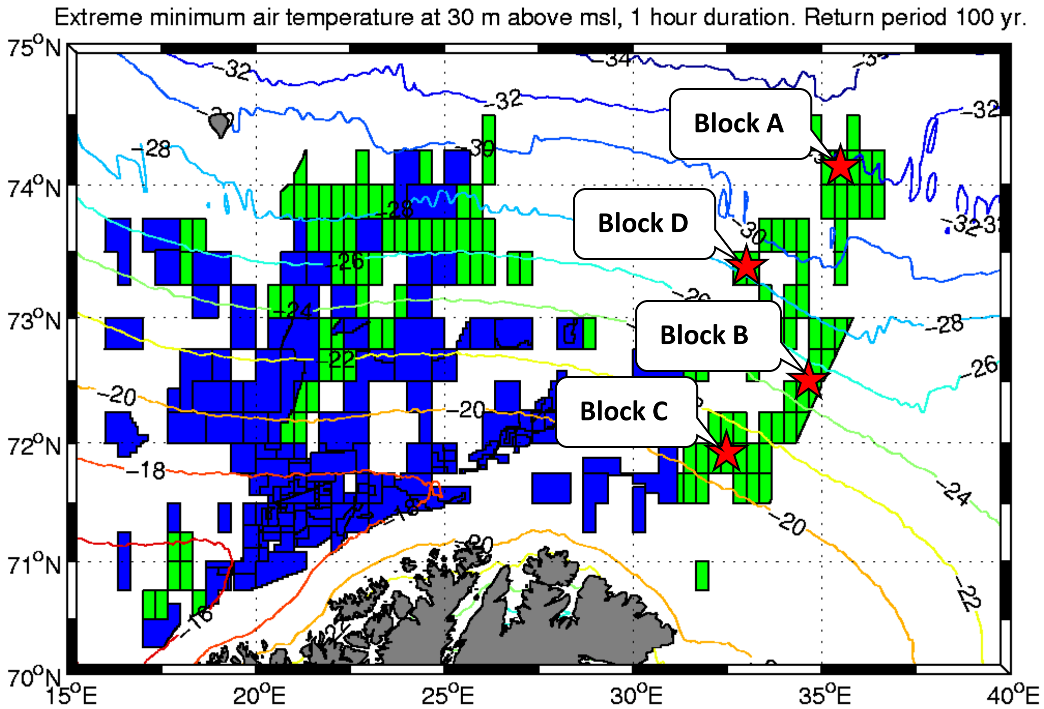


Figure 11-13 **100-year extreme minimum air temperatures with 1-hour duration in the Barents Sea 30 m above mean sea level, without sea ice present.**

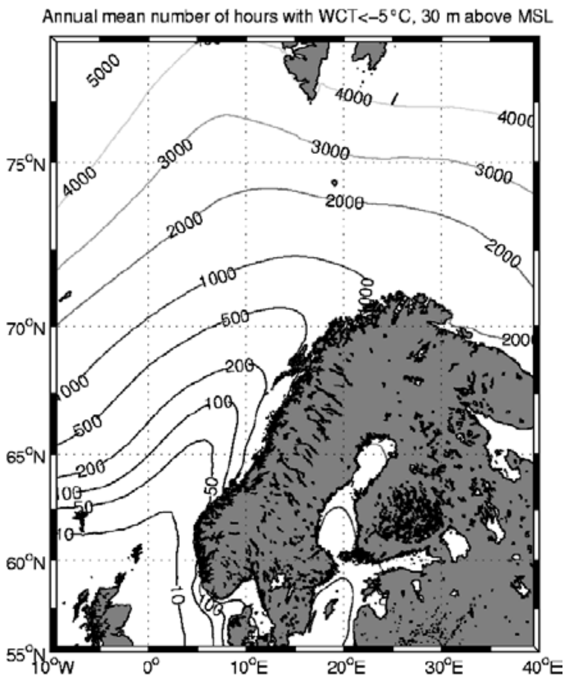
11.2 Wind Chill Temperture

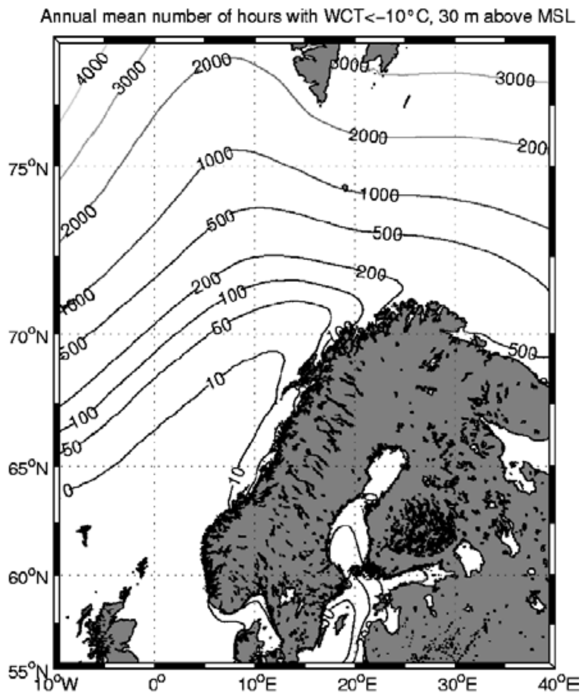
The wind chill index is a measure of the degree of cooling of the human body during exposure to a wind-temperature environment. Scientists and medical experts in U.S. and Canada developed a Wind Chill index by iterating a model of skin temperature under various wind speeds and temperatures. The model use standard engineering correlations of wind speed and heat transfer rate. Heat transfer was calculated for a bare face in wind, facing the wind, while walking into it at 1.4 m/s. The model corrects the wind at 10 m elevation to wind speed at the face height, assuming the person is in an open field. The wind chill index, T_{wc} is defined by [35]:

$$T_{wc} = 13.12 + 0.6215 \cdot T_a - 11.37 \cdot V^{0.16} + 0.3965 \cdot T_a \cdot V^{0.16} \; [^{\circ}\mathrm{C}] \tag{16}$$

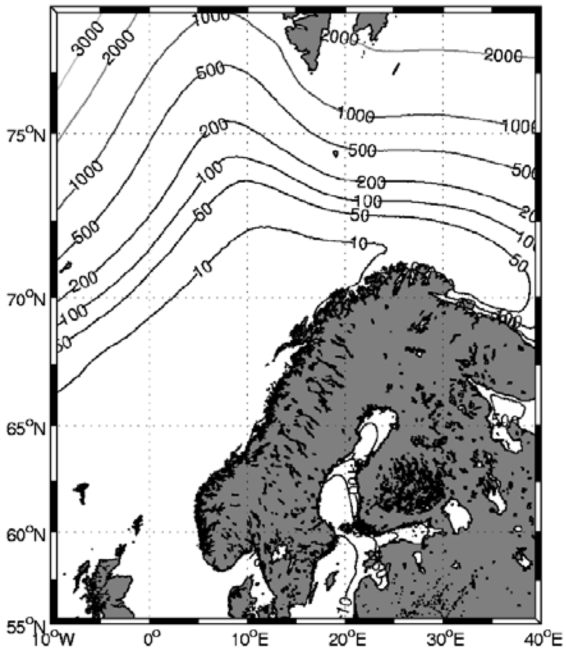
where T_a (ºC) is air temperature and V (km/h) is wind speed at 10 m.

Computations of wind chill temperatures are performed using the Nora10 hindcast air temperature at 30 m height and wind speed data at 10 m height. Shows the annual mean number of hours per year with wind chill temperatures below thresholds varying from -5ºC to -35ºC.

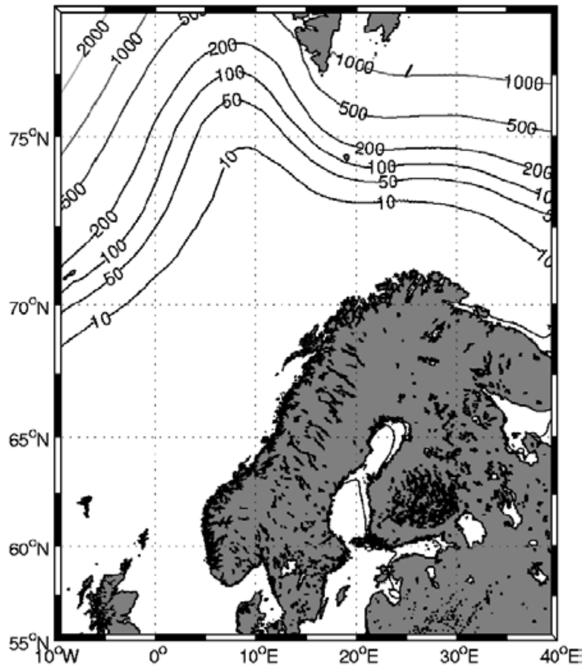




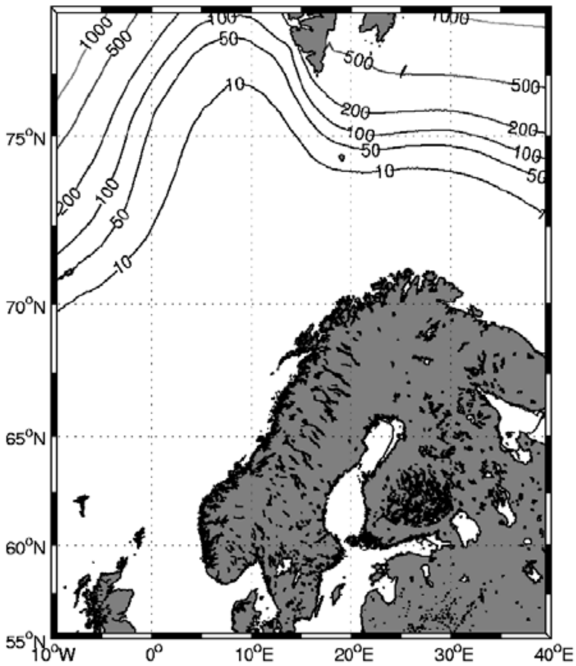
Annual mean number of hours with WCT<−15°C, 30 m above MSL



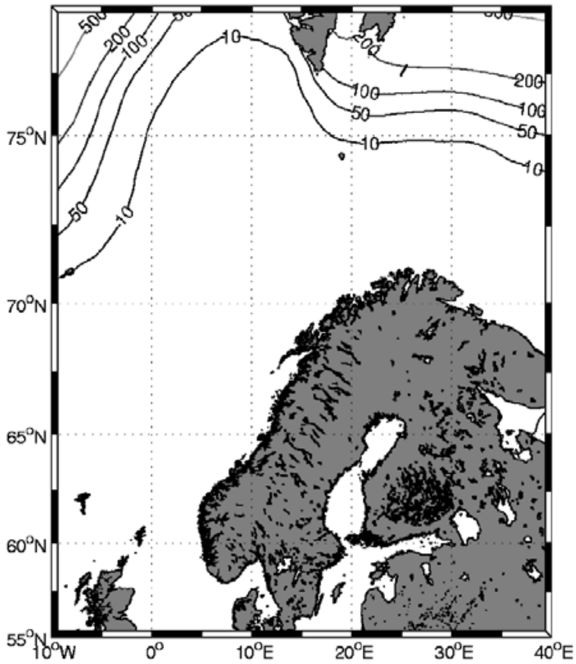
Annual mean number of hours with WCT<−20°C, 30 m above MSL



Annual mean number of hours with WCT<−25°C, 30 m above MSL



Annual mean number of hours with WCT<−30°C, 30 m above MSL



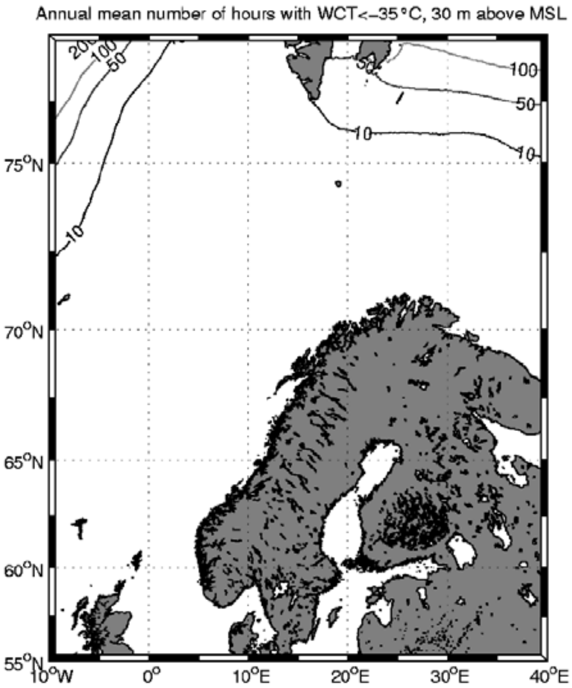


Figure 11-10. Contour lines showing annual mean number of hours with WCT below -5°C, -10°C, -15°C, -20°C, -25°C, -30°C and -35°C.

11.3 Sea temperature

Sea temperature profiles for the Block A, Block B, Block C and Block D are available from the World Ocean Atlas 2013 [13].

Figure 11-14 shows monthly mean sea temperature profiles for Block A.

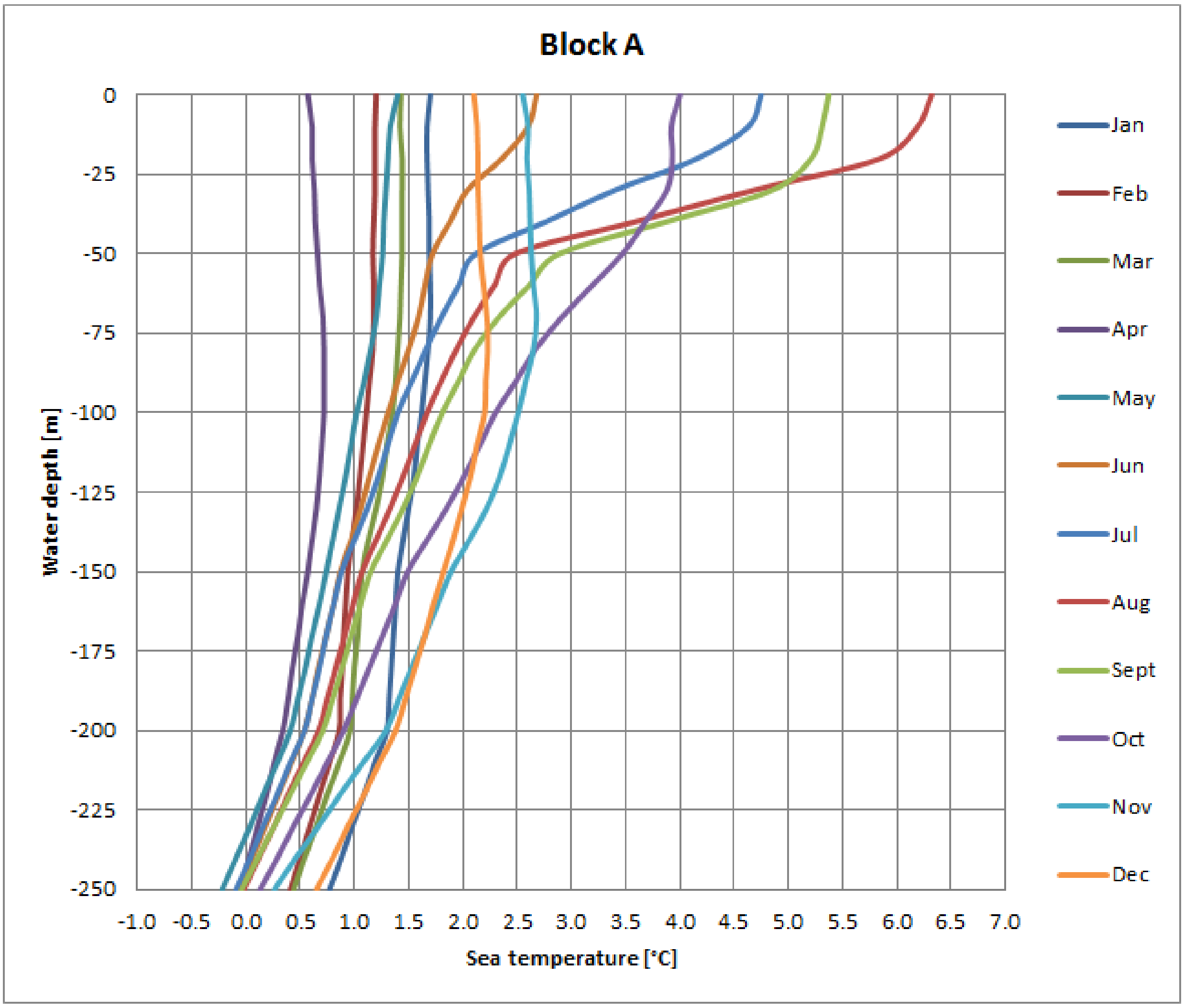


Figure 11-14 Monthly mean sea temperature profiles at the Block A.

Table 11-5 shows monthly mean sea temperature at selected depths.

Table 11-6 shows the corresponding standard deviations.

Table 11-5 Monthly mean sea temperature [°C] at selected water depths at the Block A.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	1.70	1.20	1.43	0.57	1.40	2.68	4.75	6.32	5.37	4.00	2.55	2.10
-10	1.67	1.19	1.42	0.61	1.33	2.60	4.63	6.19	5.31	3.92	2.60	2.13
-20	1.67	1.19	1.44	0.61	1.31	2.36	4.16	5.85	5.21	3.93	2.59	2.14
-30	1.68	1.19	1.44	0.63	1.29	2.04	3.40	4.68	4.85	3.88	2.61	2.14
-40	1.69	1.18	1.44	0.64	1.27	1.88	2.76	3.58	3.87	3.68	2.62	2.15
-50	1.69	1.17	1.44	0.66	1.26	1.72	2.12	2.48	2.89	3.47	2.63	2.16
-60	1.70	1.18	1.43	0.68	1.23	1.65	1.96	2.29	2.61	3.19	2.65	2.19
-70	1.70	1.18	1.42	0.71	1.20	1.59	1.80	2.10	2.33	2.91	2.68	2.22
-80	1.68	1.17	1.40	0.72	1.15	1.50	1.66	1.94	2.11	2.67	2.65	2.23
-90	1.65	1.14	1.38	0.72	1.09	1.40	1.53	1.80	1.96	2.49	2.58	2.21
-100	1.62	1.11	1.35	0.72	1.02	1.31	1.40	1.67	1.81	2.30	2.51	2.20
-110	1.58	1.08	1.30	0.70	0.97	1.22	1.31	1.56	1.69	2.16	2.43	2.13
-120	1.55	1.05	1.26	0.68	0.92	1.14	1.22	1.45	1.58	2.01	2.34	2.07
-130	1.50	1.02	1.20	0.65	0.86	1.06	1.12	1.33	1.45	1.85	2.22	1.99
-140	1.45	0.98	1.13	0.61	0.80	0.97	1.00	1.20	1.30	1.67	2.06	1.91
-150	1.40	0.94	1.07	0.57	0.74	0.87	0.88	1.07	1.15	1.49	1.89	1.82
-160	1.38	0.92	1.05	0.52	0.68	0.81	0.81	0.99	1.06	1.38	1.77	1.73
-170	1.36	0.90	1.03	0.48	0.61	0.74	0.74	0.91	0.97	1.26	1.65	1.65
-180	1.34	0.89	1.00	0.43	0.55	0.67	0.68	0.83	0.89	1.14	1.53	1.56
-190	1.32	0.87	0.98	0.39	0.48	0.61	0.61	0.75	0.80	1.02	1.41	1.47
-200	1.30	0.86	0.96	0.34	0.41	0.54	0.54	0.67	0.71	0.90	1.29	1.38
-210	1.19	0.77	0.86	0.26	0.29	0.42	0.41	0.53	0.56	0.75	1.08	1.23
-220	1.09	0.68	0.75	0.19	0.16	0.30	0.29	0.39	0.41	0.60	0.87	1.09
-230	0.98	0.59	0.65	0.11	0.04	0.18	0.16	0.26	0.26	0.44	0.67	0.94
-240	0.88	0.50	0.54	0.03	-0.09	0.06	0.04	0.12	0.11	0.29	0.46	0.80
-250	0.77	0.41	0.44	-0.04	-0.22	-0.06	-0.09	-0.02	-0.04	0.13	0.26	0.65

Table 11-6 Standard deviation of the monthly mean sea temperature [°C] at selected water depths at the Block A.

Depth [m]	Month											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
0	1.22	1.12	1.10	1.31	1.26	1.52	1.24	1.03	1.02	1.24	0.95	1.05
-10	1.29	1.13	1.07	1.31	1.25	1.49	1.27	1.04	1.03	1.22	0.95	1.05
-20	1.27	1.14	1.04	1.32	1.18	1.43	1.23	1.15	1.06	1.22	0.95	1.02
-30	1.25	1.14	1.04	1.28	1.15	1.35	1.26	1.49	1.18	1.21	0.94	0.96
-40	1.23	1.07	1.02	1.19	1.09	1.21	1.21	1.43	1.30	1.21	0.93	0.95
-50	1.20	1.01	1.01	1.10	1.04	1.07	1.16	1.36	1.42	1.21	0.91	0.94
-60	1.14	0.99	0.97	1.05	1.02	0.98	1.09	1.27	1.30	1.22	0.89	0.92
-70	1.08	0.96	0.94	1.00	0.99	0.90	1.02	1.18	1.18	1.23	0.88	0.90
-80	1.03	0.94	0.91	0.97	0.97	0.86	0.99	1.13	1.10	1.23	0.86	0.89
-90	0.98	0.94	0.89	0.95	0.94	0.87	1.01	1.12	1.07	1.22	0.83	0.88
-100	0.93	0.93	0.87	0.93	0.92	0.87	1.03	1.12	1.04	1.21	0.81	0.87
-110	0.90	0.93	0.88	0.93	0.89	0.86	1.01	1.10	1.07	1.22	0.86	0.87
-120	0.88	0.93	0.88	0.92	0.86	0.85	1.00	1.08	1.09	1.24	0.91	0.87
-130	0.86	0.92	0.89	0.92	0.85	0.84	1.00	1.07	1.11	1.25	0.97	0.88
-140	0.86	0.91	0.90	0.93	0.84	0.84	1.03	1.07	1.13	1.25	1.02	0.89
-150	0.85	0.90	0.90	0.93	0.83	0.85	1.05	1.07	1.14	1.26	1.08	0.90
-160	0.86	0.90	0.93	0.92	0.83	0.85	1.03	1.05	1.13	1.21	1.11	0.94
-170	0.88	0.90	0.96	0.91	0.83	0.86	1.01	1.02	1.12	1.16	1.14	0.98
-180	0.89	0.89	0.98	0.89	0.83	0.87	0.98	1.00	1.11	1.11	1.16	1.02
-190	0.91	0.89	1.01	0.88	0.84	0.87	0.96	0.98	1.10	1.06	1.19	1.06
-200	0.93	0.89	1.04	0.87	0.84	0.88	0.94	0.95	1.09	1.01	1.22	1.10
-210	0.89	0.86	1.06	0.84	0.79	0.84	0.87	0.89	1.01	0.92	1.14	1.06
-220	0.86	0.82	1.08	0.81	0.75	0.81	0.81	0.83	0.93	0.84	1.06	1.02
-230	0.83	0.79	1.09	0.78	0.70	0.77	0.74	0.76	0.84	0.76	0.98	0.97
-240	0.79	0.75	1.11	0.75	0.66	0.73	0.68	0.70	0.76	0.68	0.90	0.93
-250	0.76	0.71	1.13	0.71	0.61	0.70	0.61	0.63	0.67	0.60	0.82	0.88

Figure 11-15 shows monthly mean sea temperature profiles for Block B.

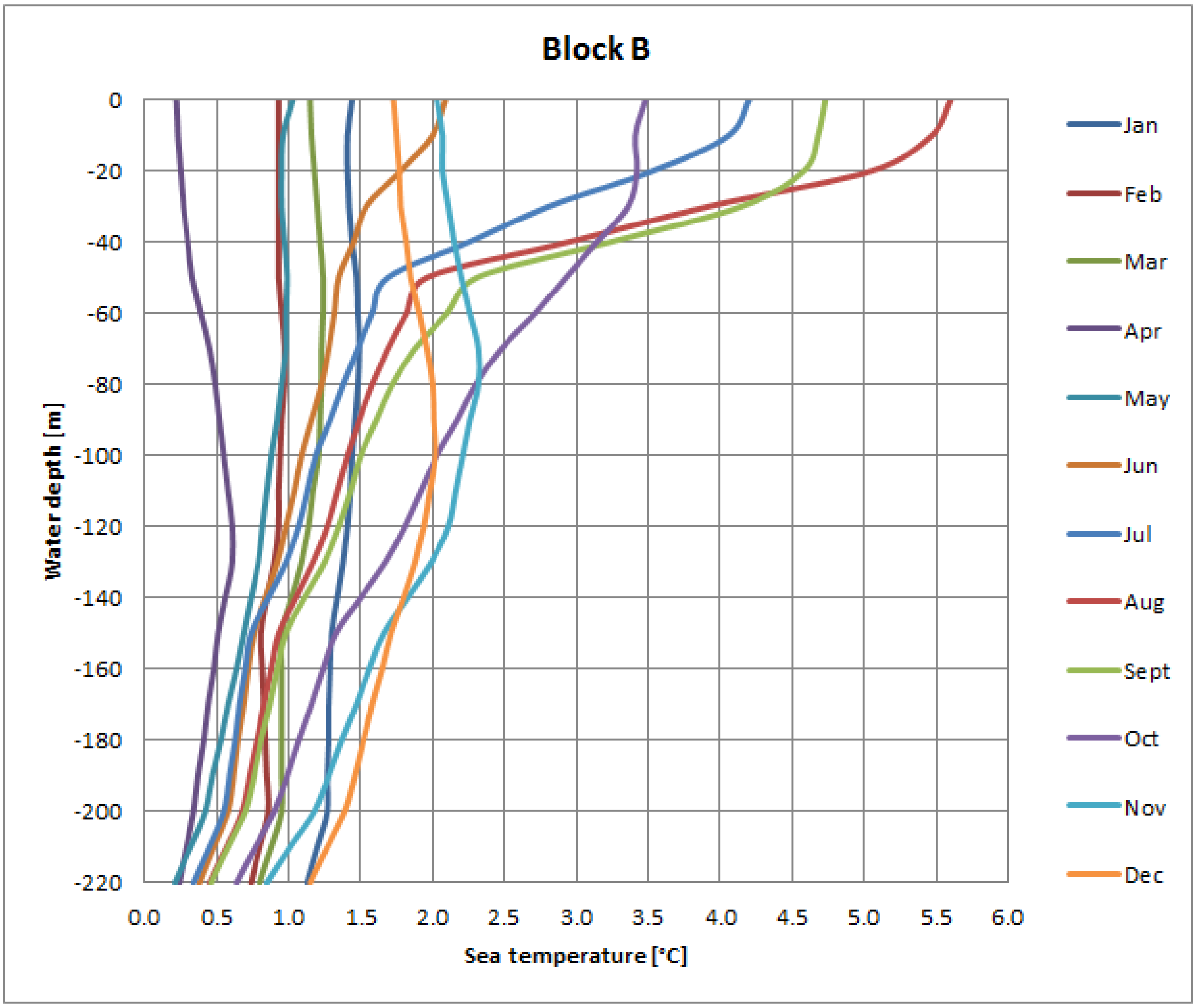


Figure 11-15 Monthly mean sea temperature profiles at the Block B.

Table 11-7 shows monthly mean sea temperature at selected depths.

Table 11-8 shows the corresponding standard deviations.

Table 11-7 Monthly mean sea temperature [°C] at selected water depths at the Block B.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	1.44	0.93	1.15	0.22	1.03	2.09	4.20	5.60	4.73	3.48	2.03	1.73
-10	1.41	0.93	1.16	0.23	0.96	2.00	4.06	5.47	4.68	3.41	2.07	1.75
-20	1.41	0.93	1.18	0.25	0.95	1.78	3.53	5.05	4.58	3.42	2.07	1.77
-30	1.42	0.93	1.20	0.27	0.95	1.54	2.81	3.92	4.15	3.36	2.11	1.78
-40	1.44	0.93	1.22	0.30	0.97	1.45	2.25	2.94	3.23	3.14	2.15	1.82
-50	1.47	0.93	1.24	0.33	0.99	1.35	1.69	1.96	2.31	2.93	2.20	1.85
-60	1.48	0.95	1.24	0.39	0.98	1.32	1.58	1.82	2.10	2.71	2.26	1.91
-70	1.49	0.97	1.23	0.45	0.98	1.28	1.48	1.69	1.88	2.48	2.32	1.96
-80	1.48	0.97	1.23	0.49	0.95	1.23	1.38	1.58	1.72	2.30	2.32	2.00
-90	1.46	0.95	1.22	0.52	0.92	1.16	1.29	1.49	1.61	2.17	2.26	2.01
-100	1.44	0.94	1.21	0.55	0.88	1.09	1.19	1.41	1.50	2.03	2.21	2.02
-110	1.43	0.93	1.17	0.58	0.85	1.04	1.13	1.34	1.43	1.92	2.16	1.98
-120	1.41	0.93	1.14	0.61	0.82	0.98	1.07	1.27	1.35	1.81	2.11	1.94
-130	1.38	0.90	1.09	0.61	0.79	0.92	0.98	1.17	1.25	1.67	1.99	1.88
-140	1.34	0.85	1.02	0.56	0.74	0.84	0.86	1.05	1.11	1.50	1.83	1.80
-150	1.30	0.81	0.95	0.51	0.69	0.76	0.74	0.93	0.98	1.33	1.66	1.71
-160	1.29	0.82	0.95	0.48	0.64	0.72	0.70	0.88	0.92	1.24	1.56	1.65
-170	1.28	0.83	0.95	0.44	0.58	0.69	0.66	0.83	0.87	1.16	1.47	1.58
-180	1.28	0.84	0.95	0.41	0.53	0.65	0.63	0.78	0.81	1.07	1.37	1.52
-190	1.27	0.85	0.95	0.37	0.47	0.62	0.59	0.73	0.76	0.99	1.28	1.46
-200	1.27	0.86	0.95	0.34	0.42	0.58	0.55	0.68	0.70	0.90	1.18	1.39
-210	1.20	0.80	0.88	0.29	0.32	0.48	0.45	0.57	0.58	0.77	1.01	1.27
-220	1.13	0.74	0.80	0.24	0.21	0.38	0.34	0.45	0.46	0.64	0.85	1.15

Table 11-8 Standard deviation of the monthly mean sea temperature [°C] at selected water depths at the Block B.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.88	1.13	0.68	1.33	0.91	1.27	1.47	1.02	1.20	1.12	0.98	1.05
-10	0.90	1.14	0.65	1.34	0.91	1.23	1.47	1.02	1.21	1.09	0.99	1.02
-20	0.95	1.13	0.65	1.43	0.86	1.15	1.42	1.23	1.30	1.09	0.97	1.01
-30	0.95	1.13	0.66	1.33	0.80	1.08	1.31	1.66	1.47	1.13	0.98	0.97
-40	0.93	1.10	0.65	1.23	0.75	0.90	1.24	1.59	1.58	1.20	0.97	0.97
-50	0.91	1.06	0.64	1.12	0.69	0.72	1.16	1.52	1.69	1.27	0.95	0.96
-60	0.88	1.04	0.59	0.95	0.70	0.65	1.13	1.43	1.54	1.21	0.93	0.89
-70	0.85	1.02	0.54	0.78	0.71	0.59	1.10	1.33	1.39	1.15	0.91	0.83
-80	0.82	1.00	0.53	0.71	0.72	0.58	1.10	1.28	1.34	1.15	0.89	0.82
-90	0.79	1.00	0.57	0.77	0.73	0.63	1.13	1.27	1.40	1.21	0.86	0.86
-100	0.77	1.00	0.60	0.82	0.74	0.68	1.15	1.27	1.45	1.27	0.83	0.90
-110	0.77	0.99	0.62	0.83	0.74	0.69	1.14	1.28	1.44	1.30	0.90	0.90
-120	0.77	0.99	0.63	0.84	0.74	0.71	1.13	1.29	1.43	1.32	0.96	0.90
-130	0.76	0.98	0.67	0.85	0.78	0.72	1.13	1.28	1.41	1.33	1.02	0.89
-140	0.72	0.96	0.73	0.85	0.84	0.73	1.14	1.26	1.40	1.32	1.09	0.87
-150	0.69	0.94	0.80	0.86	0.90	0.74	1.16	1.24	1.38	1.31	1.16	0.86
-160	0.70	0.92	0.90	0.84	0.88	0.74	1.11	1.19	1.33	1.25	1.16	0.84
-170	0.71	0.89	1.01	0.82	0.85	0.73	1.06	1.15	1.27	1.18	1.17	0.83
-180	0.72	0.87	1.12	0.80	0.82	0.73	1.02	1.10	1.22	1.11	1.17	0.81
-190	0.72	0.84	1.22	0.78	0.79	0.72	0.97	1.05	1.16	1.05	1.17	0.79
-200	0.73	0.82	1.33	0.76	0.77	0.72	0.92	1.01	1.11	0.98	1.17	0.78
-210	0.74	0.81	1.28	0.77	0.78	0.69	0.94	0.94	1.05	0.93	1.12	0.78
-220	0.75	0.79	1.22	0.78	0.79	0.67	0.96	0.88	0.98	0.87	1.08	0.78

Figure 11-16 shows monthly mean sea temperature profiles for Block C.

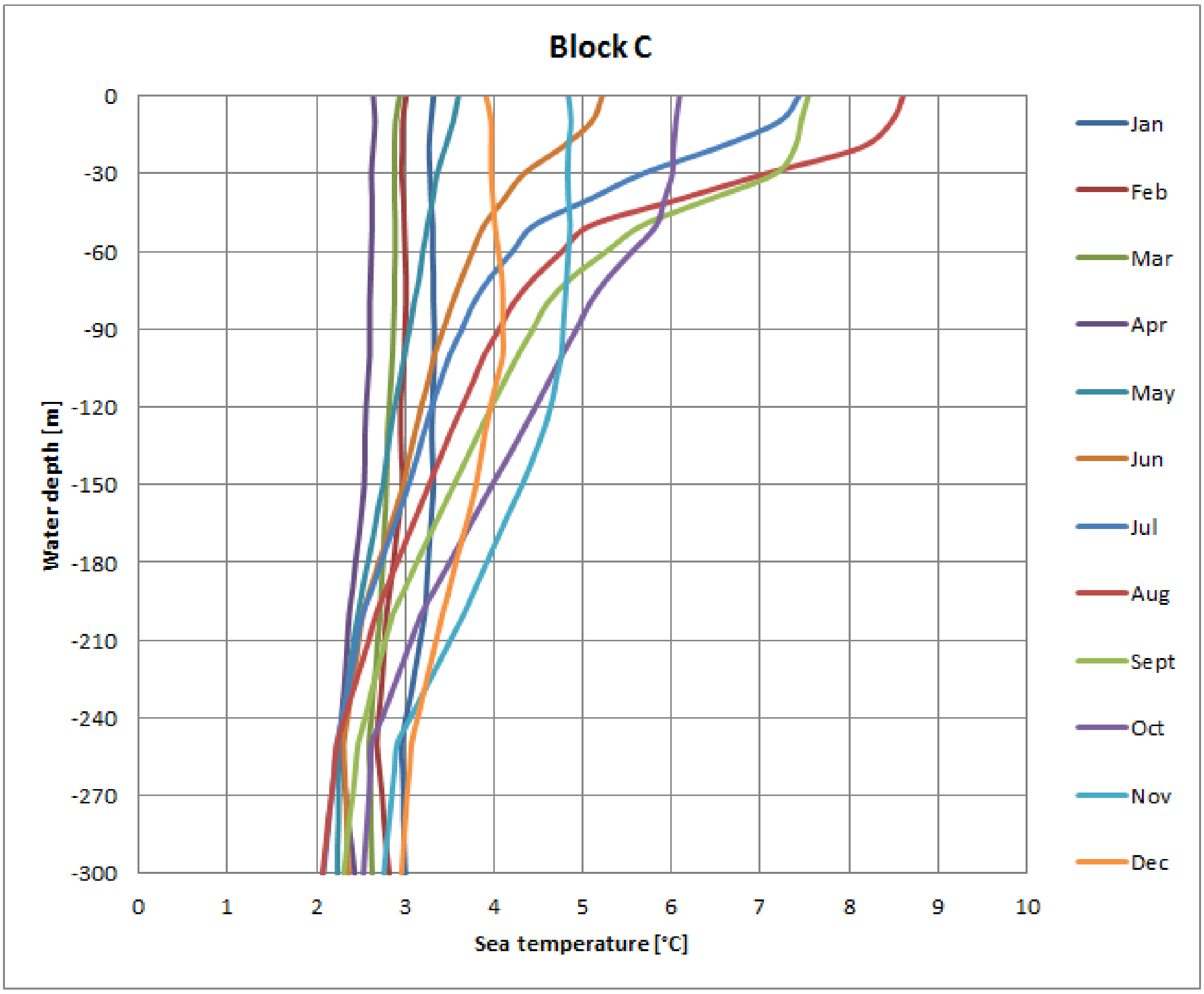


Figure 11-16 Monthly mean sea temperature profiles at the Block C.

Table 11-9 shows monthly mean sea temperature at selected depths.

Table 11-10 shows the corresponding standard deviations.

Table 11-9 Monthly mean sea temperature [°C] at selected water depths at the Block C.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	3.32	3.01	2.94	2.64	3.60	5.22	7.44	8.61	7.54	6.09	4.84	3.91
-10	3.29	2.97	2.89	2.66	3.54	5.10	7.21	8.48	7.46	6.05	4.87	3.97
-20	3.27	2.97	2.88	2.64	3.45	4.76	6.52	8.13	7.39	6.02	4.84	3.97
-30	3.28	2.96	2.88	2.62	3.36	4.34	5.68	7.07	7.17	6.01	4.83	3.97
-40	3.29	2.98	2.88	2.63	3.31	4.11	5.07	6.08	6.42	5.92	4.84	3.99
-50	3.31	2.99	2.89	2.63	3.25	3.89	4.45	5.09	5.67	5.83	4.86	4.01
-60	3.31	3.00	2.89	2.62	3.20	3.76	4.21	4.77	5.27	5.56	4.84	4.05
-70	3.32	3.01	2.88	2.61	3.16	3.64	3.96	4.46	4.88	5.29	4.82	4.09
-80	3.32	3.01	2.88	2.60	3.10	3.53	3.77	4.22	4.60	5.08	4.80	4.10
-90	3.33	3.00	2.87	2.60	3.05	3.43	3.64	4.06	4.44	4.93	4.78	4.10
-100	3.33	2.99	2.86	2.60	2.99	3.33	3.50	3.89	4.27	4.77	4.76	4.10
-110	3.32	2.97	2.84	2.58	2.94	3.26	3.40	3.77	4.12	4.62	4.70	4.03
-120	3.31	2.95	2.82	2.56	2.88	3.18	3.30	3.64	3.97	4.47	4.64	3.96
-130	3.30	2.95	2.80	2.55	2.83	3.11	3.21	3.51	3.83	4.31	4.55	3.90
-140	3.31	2.96	2.80	2.55	2.79	3.04	3.13	3.39	3.69	4.15	4.44	3.85
-150	3.32	2.97	2.79	2.54	2.75	2.98	3.04	3.27	3.55	3.98	4.32	3.80
-160	3.30	2.94	2.78	2.51	2.69	2.89	2.94	3.15	3.41	3.82	4.18	3.73
-170	3.28	2.90	2.76	2.48	2.64	2.80	2.83	3.03	3.27	3.66	4.05	3.65
-180	3.26	2.87	2.75	2.44	2.58	2.70	2.73	2.91	3.13	3.50	3.92	3.57
-190	3.24	2.83	2.73	2.41	2.52	2.61	2.63	2.79	3.00	3.34	3.79	3.50
-200	3.22	2.79	2.72	2.37	2.47	2.52	2.52	2.67	2.86	3.18	3.66	3.42
-210	3.17	2.77	2.69	2.35	2.42	2.48	2.46	2.59	2.78	3.07	3.51	3.35
-220	3.12	2.75	2.67	2.33	2.38	2.44	2.41	2.50	2.70	2.96	3.36	3.28
-230	3.07	2.73	2.64	2.31	2.34	2.39	2.35	2.41	2.62	2.85	3.21	3.21
-240	3.01	2.70	2.62	2.28	2.29	2.35	2.29	2.32	2.55	2.74	3.06	3.14
-250	2.96	2.68	2.59	2.26	2.25	2.31	2.23	2.23	2.47	2.62	2.91	3.07
-260	2.97	2.71	2.60	2.30	2.25	2.32	2.20	2.20	2.44	2.61	2.88	3.05
-270	2.98	2.74	2.61	2.33	2.25	2.33	2.17	2.17	2.41	2.59	2.85	3.02
-280	2.98	2.76	2.61	2.36	2.25	2.34	2.14	2.13	2.37	2.57	2.82	3.00
-290	2.99	2.79	2.62	2.40	2.24	2.35	2.11	2.10	2.34	2.55	2.79	2.98
-300	3.00	2.82	2.63	2.43	2.24	2.36	2.08	2.07	2.31	2.53	2.76	2.96

Table 11-10 Standard deviation of the monthly mean sea temperature [°C] at selected water depths at the Block C.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.58	0.58	0.68	0.71	0.73	1.26	1.51	0.83	0.91	0.83	0.85	0.45
-10	0.56	0.59	0.66	0.73	0.71	1.28	1.31	0.88	0.83	0.84	0.89	0.45
-20	0.56	0.59	0.66	0.76	0.65	1.24	1.16	1.07	0.82	0.85	0.90	0.46
-30	0.57	0.60	0.66	0.77	0.62	1.08	1.06	1.22	0.99	0.86	0.91	0.46
-40	0.57	0.62	0.64	0.76	0.62	0.96	0.95	1.07	1.08	0.83	0.91	0.47
-50	0.57	0.64	0.63	0.75	0.62	0.83	0.84	0.92	1.17	0.80	0.91	0.48
-60	0.60	0.64	0.63	0.75	0.63	0.82	0.79	0.83	1.05	0.79	0.93	0.49
-70	0.62	0.65	0.63	0.75	0.63	0.80	0.74	0.74	0.93	0.78	0.95	0.50
-80	0.65	0.67	0.64	0.75	0.63	0.79	0.70	0.69	0.87	0.77	0.95	0.52
-90	0.68	0.70	0.65	0.75	0.64	0.80	0.67	0.68	0.87	0.76	0.93	0.54
-100	0.70	0.74	0.66	0.75	0.65	0.80	0.65	0.67	0.86	0.75	0.91	0.56
-110	0.72	0.76	0.67	0.78	0.65	0.78	0.63	0.68	0.85	0.74	0.85	0.55
-120	0.74	0.77	0.68	0.81	0.65	0.76	0.62	0.69	0.84	0.74	0.78	0.55
-130	0.75	0.78	0.70	0.83	0.66	0.74	0.62	0.69	0.81	0.74	0.71	0.55
-140	0.76	0.78	0.73	0.83	0.68	0.74	0.62	0.68	0.79	0.74	0.65	0.56
-150	0.78	0.78	0.76	0.84	0.70	0.74	0.63	0.66	0.76	0.75	0.58	0.57
-160	0.77	0.79	0.78	0.86	0.71	0.76	0.65	0.68	0.76	0.76	0.58	0.59
-170	0.77	0.80	0.81	0.87	0.73	0.78	0.68	0.70	0.77	0.78	0.57	0.61
-180	0.77	0.80	0.83	0.88	0.75	0.80	0.70	0.72	0.78	0.80	0.57	0.64
-190	0.77	0.81	0.85	0.90	0.77	0.82	0.73	0.73	0.78	0.82	0.57	0.66
-200	0.77	0.82	0.87	0.91	0.78	0.83	0.75	0.75	0.79	0.84	0.56	0.68
-210	0.77	0.82	0.88	0.94	0.77	0.85	0.71	0.75	0.80	0.81	0.51	0.68
-220	0.77	0.82	0.89	0.97	0.76	0.87	0.67	0.75	0.81	0.79	0.47	0.67
-230	0.77	0.82	0.90	1.00	0.74	0.89	0.62	0.75	0.82	0.76	0.42	0.66
-240	0.77	0.82	0.91	1.03	0.73	0.91	0.58	0.76	0.83	0.73	0.37	0.65
-250	0.77	0.82	0.92	1.06	0.71	0.93	0.54	0.76	0.85	0.70	0.32	0.65
-260	0.72	0.76	0.90	0.97	0.69	0.79	0.46	0.65	0.84	0.64	0.58	0.71
-270	0.68	0.69	0.88	0.89	0.66	0.65	0.37	0.55	0.83	0.58	0.85	0.78
-280	0.63	0.62	0.86	0.80	0.63	0.51	0.29	0.45	0.82	0.52	1.11	0.85
-290	0.58	0.56	0.85	0.72	0.61	0.38	0.21	0.35	0.81	0.46	1.38	0.91
-300	0.53	0.49	0.83	0.63	0.58	0.24	0.12	0.25	0.80	0.40	1.65	0.98

Figure 11-17 shows monthly mean sea temperature profiles for Block D.

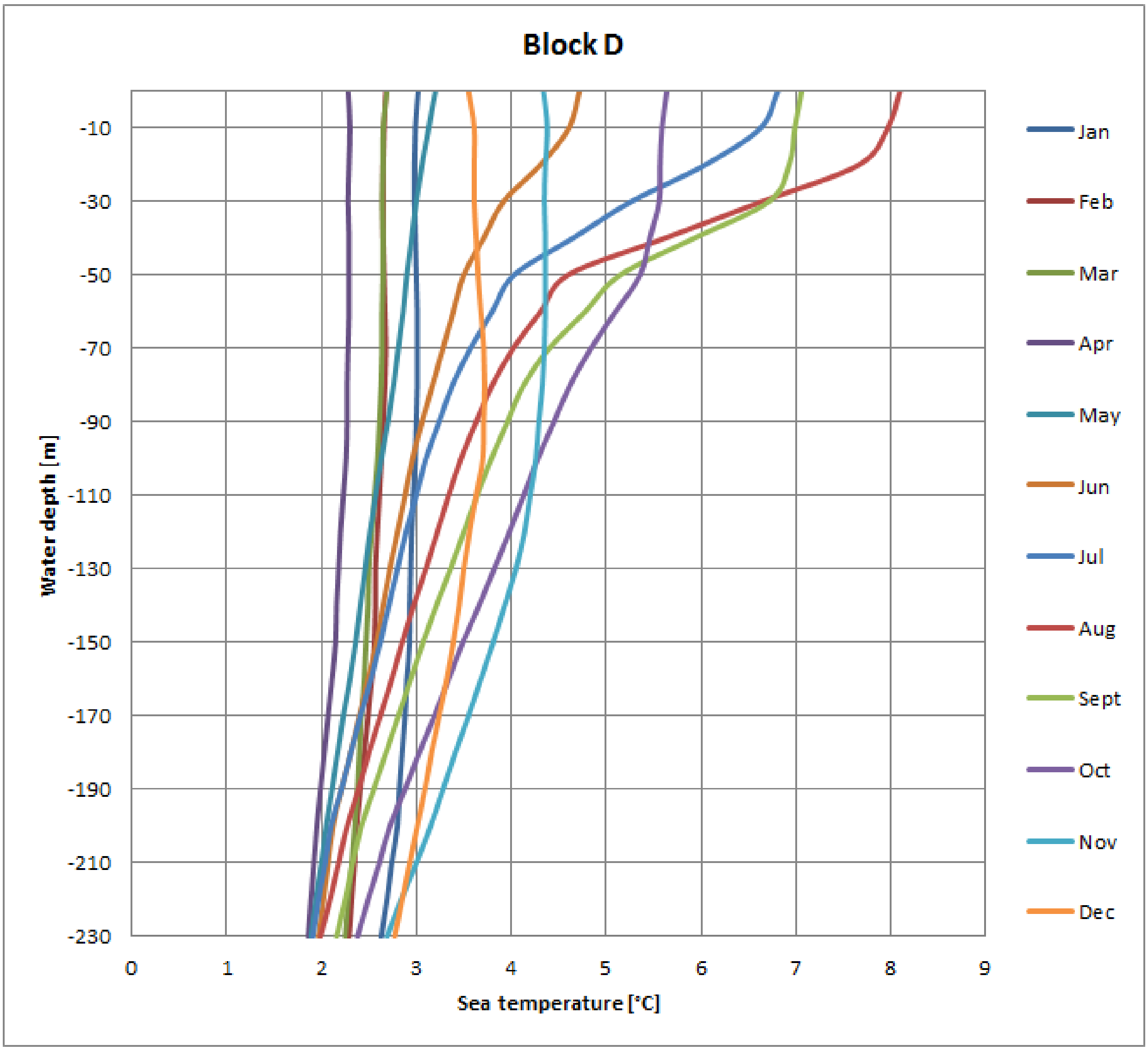


Figure 11-17 Monthly mean sea temperature profiles at the Block D.

Table 11-11 shows monthly mean sea temperature at selected depths.

Table 11-12 shows the corresponding standard deviations.

Table 11-11 Monthly mean sea temperature [°C] at selected water depths at the Block D.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	3.02	2.68	2.69	2.28	3.20	4.72	6.81	8.10	7.06	5.64	4.34	3.55
-10	2.99	2.66	2.65	2.30	3.13	4.61	6.63	7.97	6.99	5.59	4.38	3.61
-20	2.98	2.65	2.65	2.29	3.06	4.31	6.05	7.67	6.93	5.57	4.36	3.61
-30	2.98	2.65	2.64	2.28	3.00	3.92	5.27	6.65	6.72	5.56	4.35	3.61
-40	2.99	2.65	2.65	2.29	2.95	3.71	4.65	5.62	5.93	5.46	4.36	3.63
-50	3.00	2.66	2.65	2.29	2.90	3.50	4.03	4.60	5.15	5.36	4.36	3.65
-60	3.01	2.67	2.64	2.29	2.86	3.39	3.80	4.31	4.78	5.10	4.36	3.68
-70	3.01	2.68	2.64	2.28	2.81	3.28	3.57	4.02	4.40	4.84	4.35	3.71
-80	3.01	2.67	2.63	2.27	2.76	3.17	3.38	3.80	4.13	4.62	4.33	3.72
-90	3.00	2.65	2.61	2.27	2.70	3.06	3.24	3.63	3.96	4.45	4.29	3.71
-100	2.99	2.63	2.59	2.26	2.63	2.96	3.10	3.47	3.79	4.28	4.26	3.70
-110	2.97	2.61	2.56	2.23	2.57	2.88	3.00	3.34	3.64	4.13	4.20	3.63
-120	2.95	2.59	2.53	2.20	2.51	2.80	2.89	3.22	3.50	3.98	4.14	3.56
-130	2.94	2.57	2.50	2.18	2.46	2.72	2.80	3.10	3.36	3.82	4.05	3.50
-140	2.93	2.57	2.49	2.16	2.41	2.65	2.71	2.97	3.21	3.66	3.93	3.45
-150	2.93	2.56	2.47	2.15	2.36	2.58	2.62	2.85	3.07	3.49	3.81	3.39
-160	2.90	2.53	2.45	2.11	2.30	2.49	2.52	2.74	2.94	3.34	3.68	3.32
-170	2.88	2.49	2.42	2.07	2.23	2.40	2.41	2.62	2.81	3.19	3.55	3.24
-180	2.85	2.45	2.40	2.03	2.17	2.31	2.31	2.50	2.68	3.03	3.41	3.16
-190	2.82	2.41	2.38	1.99	2.11	2.21	2.21	2.39	2.55	2.88	3.28	3.09
-200	2.80	2.37	2.35	1.95	2.05	2.12	2.10	2.27	2.42	2.72	3.15	3.01
-210	2.74	2.35	2.32	1.92	2.00	2.07	2.04	2.18	2.33	2.61	3.00	2.93
-220	2.69	2.32	2.28	1.89	1.94	2.02	1.97	2.09	2.25	2.49	2.84	2.85
-230	2.63	2.29	2.25	1.86	1.89	1.97	1.91	1.99	2.16	2.38	2.69	2.77

Table 11-12 Standard deviation of the monthly mean sea temperature [°C] at selected water depths at the Block D.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.53	0.70	0.59	0.76	0.86	1.13	1.35	1.02	0.99	0.88	0.78	0.54
-10	0.53	0.72	0.59	0.76	0.85	1.14	1.25	1.08	0.99	0.90	0.81	0.55
-20	0.53	0.73	0.60	0.82	0.81	1.02	1.15	1.20	0.98	0.89	0.80	0.56
-30	0.56	0.73	0.61	0.82	0.80	0.91	0.99	1.30	1.07	0.88	0.79	0.57
-40	0.55	0.75	0.62	0.82	0.81	0.84	0.87	1.14	1.05	0.81	0.77	0.58
-50	0.53	0.76	0.62	0.83	0.82	0.77	0.74	0.97	1.03	0.74	0.76	0.60
-60	0.55	0.75	0.63	0.82	0.81	0.78	0.70	0.88	0.90	0.73	0.76	0.61
-70	0.57	0.74	0.64	0.81	0.81	0.78	0.65	0.80	0.78	0.71	0.75	0.63
-80	0.59	0.75	0.66	0.80	0.83	0.79	0.63	0.76	0.71	0.70	0.75	0.63
-90	0.61	0.78	0.68	0.80	0.86	0.81	0.63	0.76	0.72	0.68	0.75	0.62
-100	0.62	0.81	0.70	0.80	0.89	0.82	0.64	0.77	0.73	0.66	0.75	0.61
-110	0.64	0.82	0.71	0.81	0.90	0.80	0.65	0.80	0.75	0.67	0.68	0.62
-120	0.66	0.82	0.72	0.83	0.91	0.78	0.67	0.82	0.76	0.69	0.62	0.62
-130	0.68	0.83	0.74	0.84	0.93	0.79	0.69	0.85	0.78	0.72	0.57	0.63
-140	0.70	0.85	0.77	0.86	0.95	0.80	0.72	0.89	0.80	0.76	0.54	0.64
-150	0.72	0.87	0.80	0.88	0.98	0.82	0.75	0.92	0.82	0.79	0.50	0.66
-160	0.74	0.89	0.81	0.89	1.01	0.86	0.77	0.95	0.85	0.83	0.54	0.70
-170	0.76	0.90	0.83	0.91	1.03	0.90	0.79	0.99	0.88	0.87	0.58	0.73
-180	0.78	0.91	0.84	0.93	1.06	0.93	0.82	1.02	0.92	0.91	0.61	0.77
-190	0.80	0.92	0.86	0.94	1.09	0.97	0.84	1.06	0.95	0.95	0.65	0.80
-200	0.83	0.94	0.87	0.96	1.11	1.01	0.87	1.10	0.98	0.99	0.69	0.84
-210	0.84	0.94	0.87	0.97	1.08	0.98	0.84	1.03	0.98	0.97	0.66	0.86
-220	0.85	0.94	0.86	0.98	1.06	0.95	0.81	0.97	0.98	0.95	0.63	0.88
-230	0.86	0.95	0.85	0.99	1.03	0.92	0.79	0.91	0.98	0.94	0.60	0.90

12 Salinity

Salinity profiles for the Block A, Block B, Block C and Block D are available from the World Ocean Atlas 2013 [13].

Figure 12-1 shows monthly mean salinity profiles for Block A.

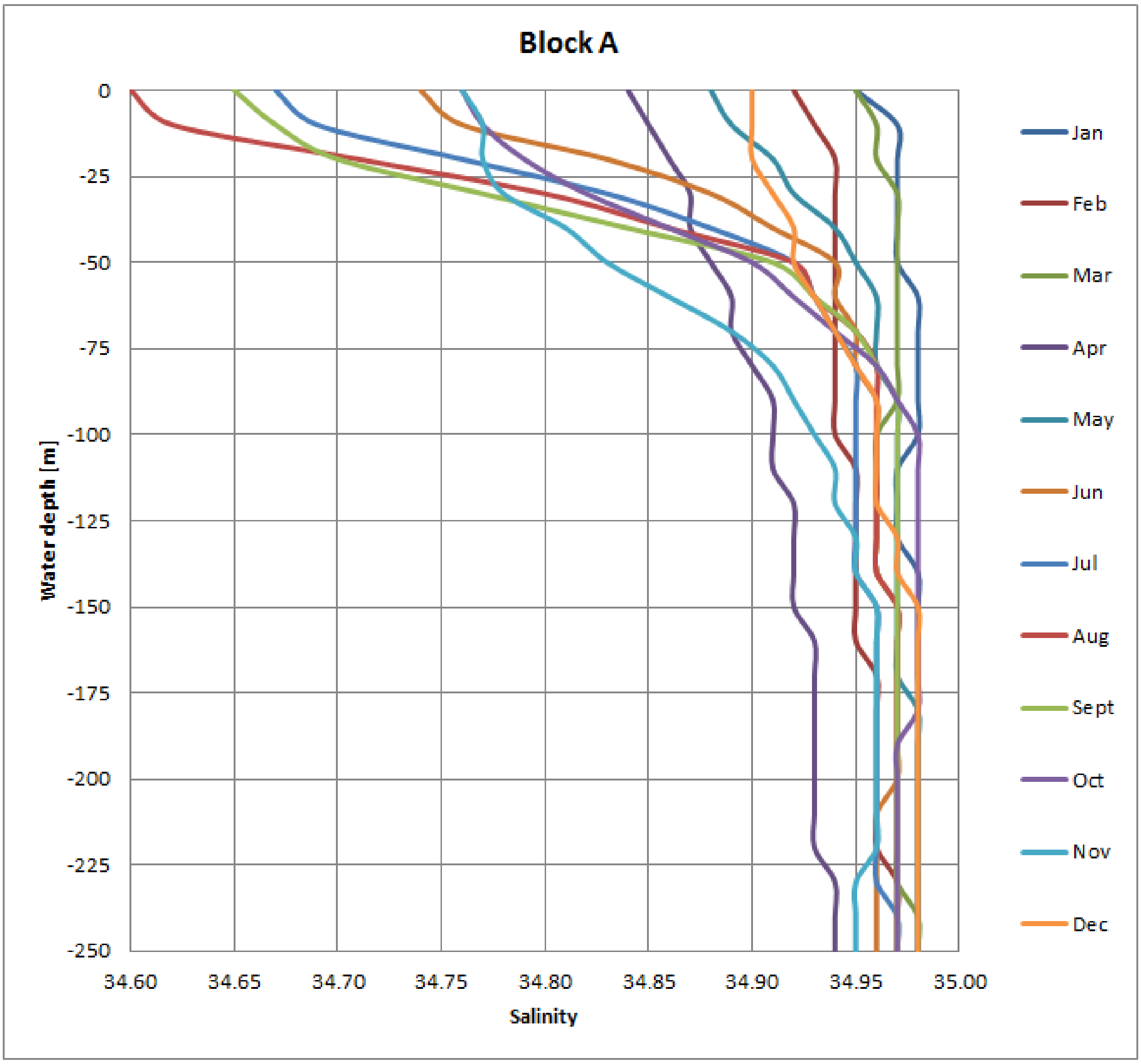


Figure 12-1 Monthly mean salinity profiles at the Block A.

Table 12-1 shows monthly mean salinity at selected depths.

Table 12-2 shows the corresponding standard deviations.

Table 12-1 Monthly mean salinity at selected water depths at the Block A.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	34.95	34.92	34.95	34.84	34.88	34.74	34.67	34.60	34.65	34.76	34.76	34.90
-10	34.97	34.93	34.96	34.85	34.89	34.76	34.69	34.62	34.67	34.77	34.77	34.90
-20	34.97	34.94	34.96	34.86	34.91	34.83	34.76	34.71	34.70	34.79	34.77	34.90
-30	34.97	34.94	34.97	34.87	34.92	34.88	34.83	34.80	34.77	34.82	34.78	34.91
-40	34.97	34.94	34.97	34.87	34.94	34.91	34.88	34.86	34.84	34.86	34.81	34.92
-50	34.97	34.94	34.97	34.88	34.95	34.94	34.92	34.92	34.91	34.90	34.83	34.92
-60	34.98	34.94	34.97	34.89	34.96	34.94	34.93	34.93	34.93	34.92	34.86	34.93
-70	34.98	34.94	34.97	34.89	34.96	34.95	34.94	34.95	34.95	34.94	34.89	34.94
-80	34.98	34.94	34.97	34.90	34.96	34.95	34.95	34.96	34.96	34.96	34.91	34.95
-90	34.98	34.94	34.97	34.91	34.97	34.96	34.95	34.96	34.97	34.97	34.92	34.96
-100	34.98	34.94	34.96	34.91	34.97	34.96	34.95	34.96	34.97	34.98	34.93	34.96
-110	34.97	34.95	34.96	34.91	34.97	34.96	34.95	34.96	34.97	34.98	34.94	34.96
-120	34.97	34.95	34.96	34.92	34.97	34.96	34.95	34.96	34.97	34.98	34.94	34.96
-130	34.97	34.95	34.96	34.92	34.97	34.96	34.95	34.96	34.97	34.98	34.95	34.97
-140	34.98	34.95	34.96	34.92	34.97	34.96	34.95	34.96	34.97	34.98	34.95	34.97
-150	34.98	34.95	34.97	34.92	34.97	34.97	34.96	34.97	34.97	34.98	34.96	34.98
-160	34.98	34.95	34.97	34.93	34.97	34.97	34.96	34.97	34.97	34.98	34.96	34.98
-170	34.98	34.96	34.97	34.93	34.97	34.97	34.96	34.97	34.97	34.98	34.96	34.98
-180	34.98	34.96	34.97	34.93	34.98	34.97	34.96	34.97	34.97	34.98	34.96	34.98
-190	34.98	34.96	34.97	34.93	34.98	34.97	34.96	34.97	34.97	34.97	34.96	34.98
-200	34.98	34.96	34.97	34.93	34.98	34.97	34.96	34.97	34.97	34.97	34.96	34.98
-210	34.98	34.96	34.97	34.93	34.98	34.96	34.96	34.97	34.97	34.97	34.96	34.98
-220	34.98	34.96	34.97	34.93	34.98	34.96	34.96	34.97	34.97	34.97	34.96	34.98
-230	34.98	34.97	34.97	34.94	34.98	34.96	34.96	34.97	34.97	34.97	34.95	34.98
-240	34.98	34.97	34.98	34.94	34.98	34.96	34.97	34.97	34.97	34.97	34.95	34.98
-250	34.98	34.97	34.98	34.94	34.98	34.96	34.97	34.97	34.97	34.97	34.95	34.98

Table 12-2 Standard deviation of the monthly mean salinity at selected water depths at the Block A.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.13	0.12	0.11	0.18	0.15	0.35	0.17	0.23	0.25	0.21	0.12	0.06
-10	0.14	0.10	0.11	0.16	0.15	0.33	0.16	0.22	0.24	0.21	0.11	0.07
-20	0.14	0.09	0.10	0.13	0.14	0.30	0.13	0.19	0.22	0.21	0.11	0.07
-30	0.13	0.09	0.10	0.10	0.11	0.23	0.09	0.14	0.17	0.20	0.10	0.07
-40	0.13	0.08	0.10	0.10	0.10	0.17	0.08	0.11	0.14	0.17	0.10	0.06
-50	0.12	0.07	0.10	0.09	0.09	0.11	0.06	0.08	0.11	0.14	0.09	0.06
-60	0.12	0.06	0.10	0.08	0.09	0.10	0.06	0.07	0.09	0.12	0.09	0.06
-70	0.11	0.05	0.09	0.08	0.09	0.08	0.05	0.06	0.07	0.11	0.08	0.06
-80	0.10	0.05	0.09	0.08	0.09	0.07	0.05	0.06	0.06	0.10	0.08	0.06
-90	0.09	0.05	0.09	0.08	0.09	0.07	0.05	0.06	0.06	0.10	0.07	0.06
-100	0.08	0.05	0.08	0.08	0.09	0.07	0.06	0.06	0.06	0.10	0.07	0.06
-110	0.07	0.05	0.08	0.08	0.09	0.08	0.06	0.06	0.06	0.10	0.07	0.05
-120	0.07	0.05	0.08	0.07	0.10	0.09	0.06	0.05	0.06	0.10	0.06	0.04
-130	0.07	0.05	0.08	0.07	0.10	0.10	0.06	0.06	0.06	0.10	0.06	0.04
-140	0.06	0.05	0.08	0.07	0.10	0.10	0.06	0.06	0.06	0.09	0.06	0.05
-150	0.06	0.05	0.08	0.07	0.10	0.10	0.07	0.06	0.06	0.09	0.06	0.06
-160	0.06	0.05	0.08	0.07	0.10	0.10	0.07	0.06	0.06	0.09	0.06	0.06
-170	0.06	0.05	0.08	0.07	0.10	0.10	0.07	0.06	0.06	0.08	0.06	0.06
-180	0.06	0.05	0.08	0.07	0.10	0.10	0.07	0.06	0.06	0.08	0.06	0.07
-190	0.06	0.05	0.07	0.07	0.10	0.10	0.07	0.05	0.06	0.08	0.06	0.07
-200	0.06	0.05	0.07	0.08	0.11	0.10	0.07	0.05	0.06	0.08	0.06	0.07
-210	0.05	0.05	0.07	0.07	0.11	0.09	0.06	0.05	0.06	0.08	0.07	0.06
-220	0.05	0.05	0.06	0.07	0.11	0.08	0.06	0.05	0.06	0.08	0.07	0.05
-230	0.04	0.04	0.05	0.06	0.11	0.06	0.05	0.04	0.05	0.08	0.07	0.05
-240	0.04	0.04	0.05	0.06	0.11	0.05	0.05	0.04	0.05	0.08	0.08	0.04
-250	0.03	0.04	0.04	0.06	0.11	0.04	0.04	0.03	0.05	0.08	0.08	0.03

Figure 12-2 shows monthly mean salinity profiles for Block B.

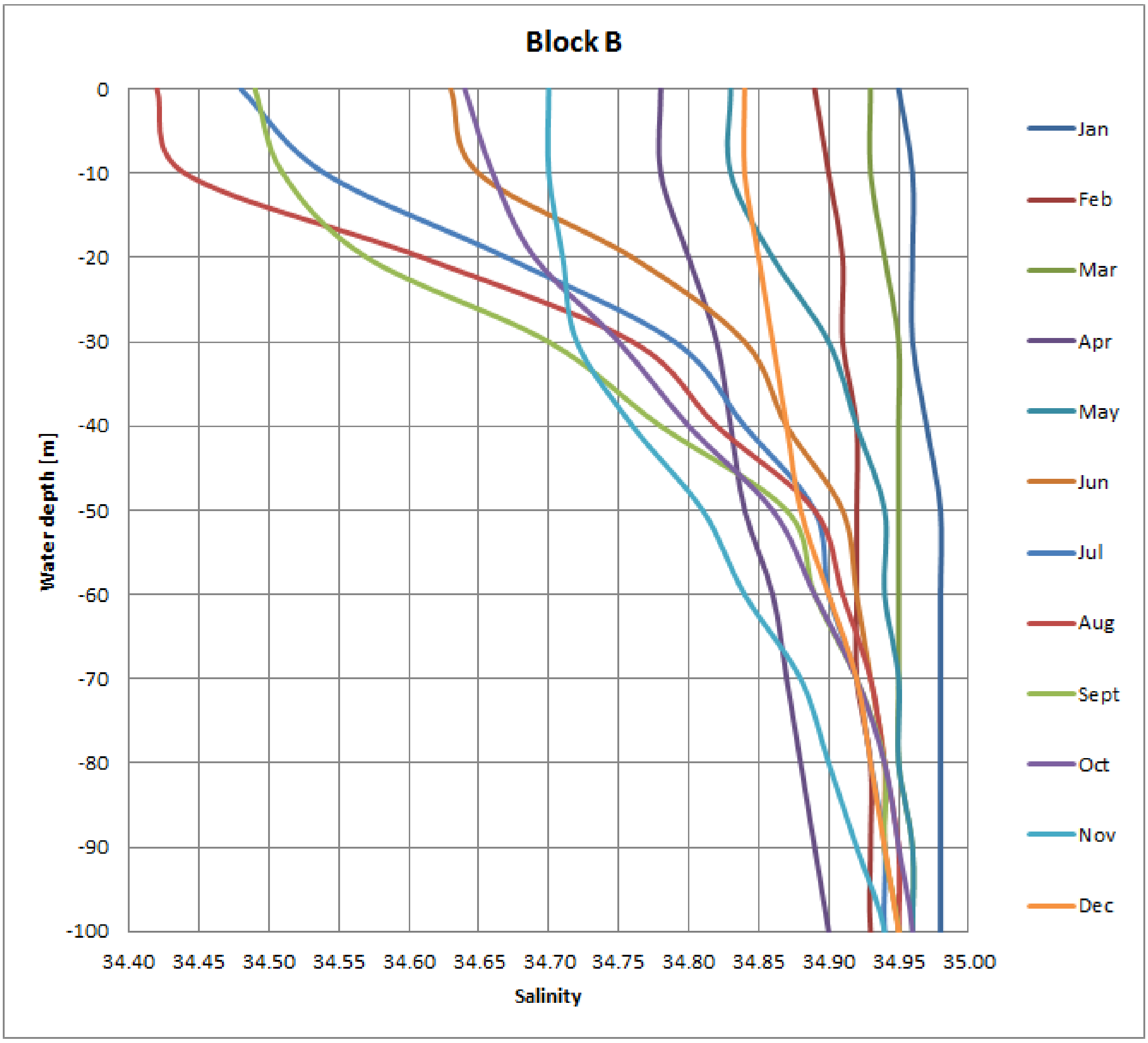


Figure 12-2 Monthly mean salinity profiles at the Block B.

Table 12-3 shows monthly mean salinity at selected depths.

Table 12-4 shows the corresponding standard deviations.

Table 12-3 Monthly mean salinity at selected water depths at the Block B.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	34.95	34.89	34.93	34.78	34.83	34.63	34.48	34.42	34.49	34.64	34.70	34.84
-10	34.96	34.90	34.93	34.78	34.83	34.65	34.54	34.44	34.51	34.66	34.70	34.84
-20	34.96	34.91	34.94	34.80	34.86	34.76	34.67	34.61	34.57	34.69	34.71	34.85
-30	34.96	34.91	34.95	34.82	34.90	34.84	34.79	34.76	34.70	34.75	34.72	34.86
-40	34.97	34.92	34.95	34.83	34.92	34.87	34.84	34.82	34.78	34.80	34.76	34.87
-50	34.98	34.92	34.95	34.84	34.94	34.91	34.89	34.89	34.87	34.86	34.81	34.88
-60	34.98	34.92	34.95	34.86	34.94	34.92	34.90	34.91	34.89	34.89	34.84	34.90
-70	34.98	34.92	34.95	34.87	34.95	34.93	34.92	34.93	34.92	34.92	34.88	34.92
-80	34.98	34.93	34.95	34.88	34.95	34.94	34.93	34.94	34.94	34.94	34.90	34.93
-90	34.98	34.93	34.96	34.89	34.96	34.94	34.94	34.95	34.94	34.95	34.92	34.94
-100	34.98	34.93	34.96	34.90	34.96	34.95	34.94	34.95	34.95	34.96	34.94	34.95
-110	34.98	34.94	34.96	34.91	34.96	34.95	34.95	34.95	34.95	34.96	34.94	34.96
-120	34.98	34.94	34.96	34.91	34.96	34.95	34.95	34.96	34.96	34.97	34.95	34.96
-130	34.98	34.95	34.96	34.92	34.97	34.95	34.95	34.96	34.96	34.97	34.95	34.97
-140	34.99	34.95	34.97	34.93	34.98	34.96	34.95	34.96	34.97	34.97	34.96	34.97
-150	35.00	34.96	34.97	34.93	34.98	34.97	34.96	34.97	34.97	34.98	34.97	34.98
-160	35.00	34.96	34.98	34.94	34.98	34.97	34.96	34.97	34.97	34.98	34.97	34.98
-170	35.00	34.96	34.98	34.94	34.98	34.97	34.96	34.97	34.98	34.98	34.97	34.98
-180	35.00	34.96	34.98	34.94	34.99	34.98	34.97	34.98	34.98	34.98	34.97	34.99
-190	35.00	34.97	34.98	34.94	34.99	34.98	34.97	34.98	34.98	34.98	34.97	34.99
-200	35.00	34.97	34.98	34.94	34.99	34.98	34.97	34.98	34.98	34.98	34.97	34.99
-210	34.99	34.97	34.98	34.94	34.98	34.97	34.97	34.98	34.98	34.98	34.97	34.99
-220	34.99	34.97	34.98	34.94	34.98	34.97	34.97	34.97	34.98	34.97	34.96	34.98

Table 12-4 Standard deviation of the monthly mean salinity at selected water depths at the Block B.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.12	0.14	0.11	0.17	0.21	0.31	0.39	0.36	0.29	0.26	0.18	0.06
-10	0.12	0.14	0.11	0.17	0.20	0.29	0.38	0.35	0.27	0.24	0.18	0.05
-20	0.11	0.14	0.10	0.16	0.18	0.19	0.33	0.28	0.25	0.24	0.17	0.05
-30	0.11	0.13	0.10	0.14	0.14	0.14	0.17	0.18	0.21	0.20	0.17	0.05
-40	0.11	0.11	0.10	0.13	0.11	0.11	0.14	0.13	0.16	0.16	0.15	0.05
-50	0.11	0.08	0.09	0.12	0.09	0.08	0.11	0.09	0.12	0.13	0.14	0.05
-60	0.11	0.07	0.09	0.11	0.08	0.07	0.10	0.08	0.10	0.12	0.12	0.05
-70	0.10	0.07	0.08	0.10	0.08	0.07	0.09	0.07	0.08	0.11	0.10	0.05
-80	0.09	0.07	0.08	0.10	0.08	0.07	0.09	0.06	0.07	0.10	0.09	0.05
-90	0.08	0.06	0.08	0.10	0.08	0.07	0.08	0.06	0.07	0.09	0.08	0.05
-100	0.06	0.06	0.08	0.10	0.08	0.07	0.08	0.06	0.06	0.08	0.07	0.05
-110	0.06	0.06	0.08	0.10	0.08	0.07	0.08	0.06	0.06	0.08	0.07	0.05
-120	0.06	0.06	0.07	0.09	0.08	0.07	0.08	0.06	0.06	0.08	0.07	0.05
-130	0.06	0.06	0.07	0.09	0.08	0.07	0.08	0.06	0.06	0.07	0.06	0.05
-140	0.06	0.06	0.07	0.08	0.08	0.07	0.08	0.06	0.06	0.07	0.06	0.05
-150	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.06	0.06	0.08	0.06	0.05
-160	0.06	0.06	0.08	0.07	0.07	0.07	0.08	0.06	0.06	0.07	0.06	0.05
-170	0.05	0.05	0.08	0.07	0.07	0.08	0.07	0.06	0.06	0.07	0.06	0.05
-180	0.05	0.05	0.09	0.07	0.07	0.08	0.07	0.05	0.06	0.07	0.06	0.05
-190	0.05	0.04	0.09	0.08	0.07	0.08	0.07	0.05	0.06	0.07	0.06	0.06
-200	0.05	0.04	0.09	0.08	0.07	0.09	0.06	0.05	0.06	0.07	0.06	0.06
-210	0.05	0.04	0.09	0.08	0.08	0.09	0.07	0.05	0.06	0.07	0.07	0.06
-220	0.05	0.04	0.09	0.08	0.08	0.09	0.08	0.05	0.06	0.08	0.07	0.06

Figure 12-3 shows monthly mean salinity profiles for Block C.

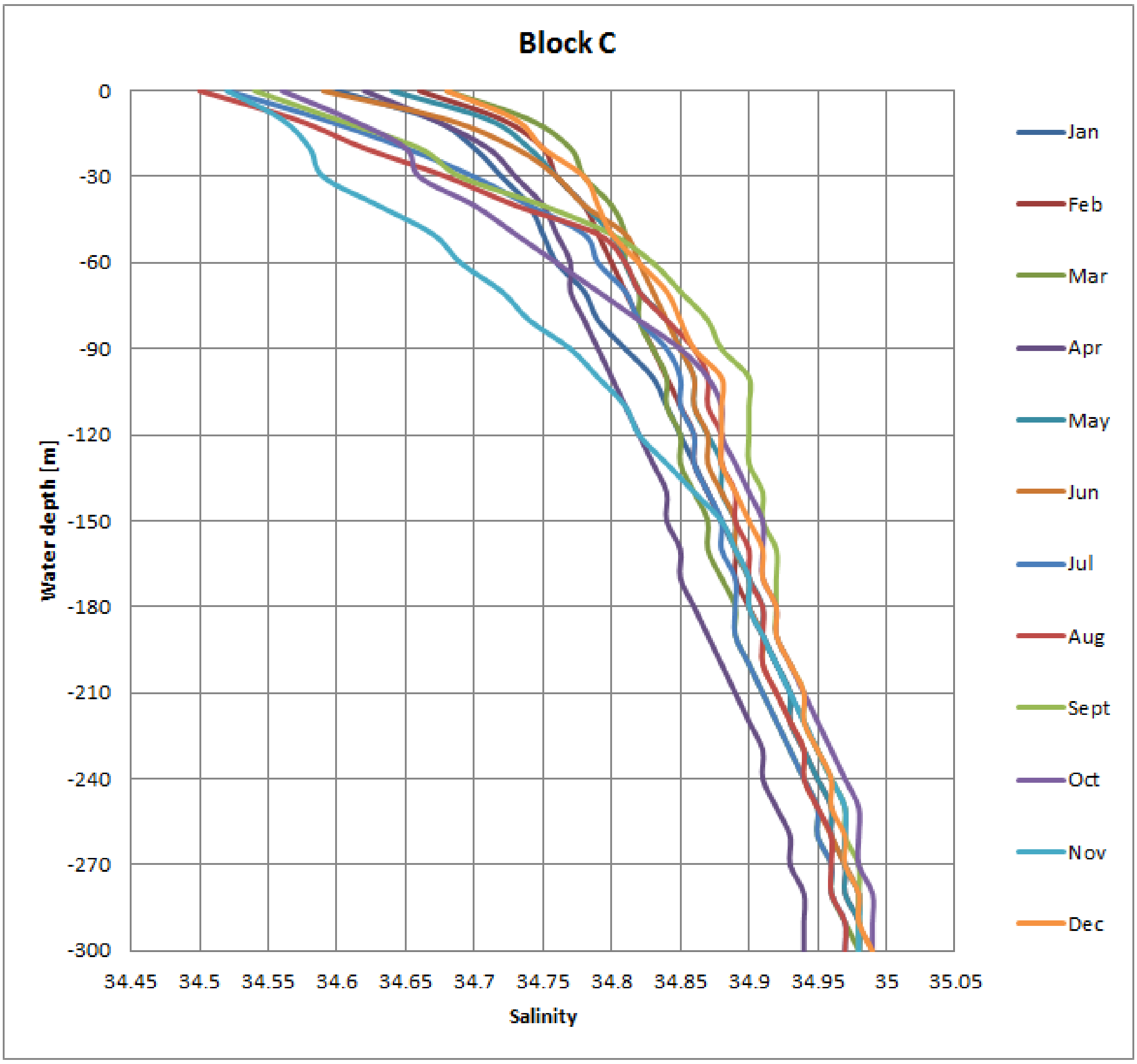


Figure 12-3 Monthly mean salinity profiles at the Block C.

Table 12-5 shows monthly mean salinity at selected depths.

Table 12-6 shows the corresponding standard deviations.

Table 12-5 Monthly mean salinity at selected water depths at the Block C.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	34.60	34.66	34.68	34.62	34.64	34.59	34.52	34.50	34.54	34.56	34.52	34.68
-10	34.67	34.72	34.74	34.67	34.71	34.68	34.59	34.57	34.60	34.61	34.56	34.73
-20	34.70	34.75	34.77	34.71	34.74	34.73	34.65	34.62	34.66	34.65	34.58	34.75
-30	34.72	34.76	34.78	34.73	34.76	34.76	34.70	34.68	34.69	34.66	34.59	34.78
-40	34.74	34.78	34.80	34.75	34.78	34.78	34.74	34.73	34.75	34.70	34.63	34.79
-50	34.75	34.79	34.81	34.76	34.80	34.81	34.78	34.79	34.80	34.73	34.67	34.80
-60	34.76	34.80	34.81	34.77	34.81	34.82	34.79	34.81	34.83	34.76	34.69	34.82
-70	34.78	34.81	34.82	34.77	34.82	34.83	34.81	34.82	34.85	34.79	34.72	34.84
-80	34.79	34.82	34.82	34.78	34.84	34.84	34.82	34.84	34.87	34.82	34.74	34.85
-90	34.81	34.83	34.83	34.79	34.85	34.85	34.84	34.86	34.88	34.85	34.77	34.86
-100	34.83	34.84	34.84	34.80	34.86	34.86	34.85	34.87	34.90	34.87	34.79	34.88
-110	34.84	34.85	34.84	34.81	34.86	34.86	34.85	34.87	34.90	34.88	34.81	34.88
-120	34.85	34.86	34.85	34.82	34.87	34.87	34.86	34.88	34.90	34.88	34.82	34.88
-130	34.86	34.86	34.85	34.83	34.88	34.87	34.86	34.88	34.90	34.89	34.84	34.88
-140	34.87	34.87	34.86	34.84	34.88	34.88	34.87	34.89	34.91	34.90	34.86	34.89
-150	34.88	34.88	34.87	34.84	34.89	34.89	34.88	34.89	34.91	34.91	34.88	34.90
-160	34.89	34.89	34.87	34.85	34.89	34.89	34.88	34.90	34.92	34.91	34.89	34.91
-170	34.90	34.89	34.88	34.85	34.90	34.90	34.89	34.90	34.92	34.91	34.90	34.91
-180	34.90	34.90	34.89	34.86	34.91	34.90	34.89	34.91	34.92	34.92	34.90	34.92
-190	34.91	34.91	34.89	34.87	34.91	34.91	34.89	34.91	34.92	34.92	34.91	34.92
-200	34.92	34.92	34.90	34.88	34.92	34.91	34.90	34.91	34.93	34.93	34.92	34.93
-210	34.93	34.93	34.91	34.89	34.93	34.92	34.91	34.92	34.94	34.94	34.93	34.94
-220	34.94	34.93	34.92	34.90	34.93	34.93	34.92	34.93	34.94	34.95	34.94	34.94
-230	34.95	34.94	34.93	34.91	34.94	34.94	34.93	34.94	34.95	34.96	34.95	34.95
-240	34.96	34.95	34.94	34.91	34.95	34.94	34.94	34.94	34.96	34.97	34.96	34.96
-250	34.97	34.96	34.95	34.92	34.96	34.95	34.95	34.95	34.97	34.98	34.97	34.96
-260	34.97	34.96	34.95	34.93	34.96	34.96	34.95	34.96	34.97	34.98	34.97	34.97
-270	34.97	34.97	34.96	34.93	34.97	34.97	34.96	34.96	34.98	34.98	34.97	34.97
-280	34.98	34.97	34.96	34.94	34.97	34.98	34.96	34.96	34.98	34.99	34.98	34.98
-290	34.98	34.98	34.97	34.94	34.98	34.98	34.97	34.97	34.98	34.99	34.98	34.98
-300	34.98	34.98	34.98	34.94	34.98	34.99	34.97	34.97	34.98	34.99	34.98	34.99

Table 12-6 Standard deviation of the monthly mean salinity at selected water depths at the Block C.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.13	0.17	0.12	0.17	0.13	0.18	0.23	0.16	0.16	0.18	0.12	0.10
-10	0.13	0.17	0.09	0.17	0.13	0.17	0.22	0.16	0.16	0.15	0.12	0.10
-20	0.13	0.16	0.09	0.17	0.12	0.14	0.19	0.17	0.17	0.16	0.11	0.10
-30	0.13	0.16	0.09	0.17	0.12	0.13	0.15	0.14	0.15	0.16	0.11	0.11
-40	0.12	0.15	0.09	0.17	0.12	0.13	0.14	0.13	0.15	0.16	0.09	0.11
-50	0.11	0.14	0.09	0.17	0.12	0.12	0.13	0.13	0.15	0.17	0.07	0.11
-60	0.11	0.13	0.09	0.17	0.11	0.12	0.13	0.11	0.14	0.16	0.07	0.09
-70	0.11	0.12	0.09	0.18	0.11	0.11	0.13	0.10	0.13	0.16	0.07	0.07
-80	0.11	0.12	0.09	0.17	0.10	0.11	0.13	0.09	0.12	0.16	0.07	0.06
-90	0.11	0.12	0.09	0.17	0.10	0.11	0.11	0.09	0.11	0.15	0.06	0.07
-100	0.11	0.12	0.09	0.16	0.10	0.11	0.10	0.09	0.11	0.14	0.05	0.07
-110	0.10	0.11	0.09	0.15	0.09	0.11	0.10	0.09	0.11	0.13	0.06	0.06
-120	0.10	0.11	0.09	0.14	0.09	0.10	0.09	0.09	0.11	0.13	0.06	0.05
-130	0.10	0.11	0.09	0.12	0.08	0.09	0.08	0.09	0.11	0.13	0.07	0.05
-140	0.09	0.11	0.09	0.12	0.08	0.09	0.08	0.09	0.10	0.13	0.09	0.05
-150	0.08	0.11	0.09	0.11	0.08	0.09	0.07	0.09	0.10	0.14	0.10	0.06
-160	0.08	0.10	0.09	0.11	0.08	0.09	0.07	0.09	0.09	0.14	0.10	0.06
-170	0.08	0.10	0.09	0.11	0.08	0.09	0.07	0.08	0.09	0.14	0.10	0.06
-180	0.07	0.10	0.09	0.11	0.08	0.08	0.07	0.08	0.08	0.14	0.09	0.06
-190	0.07	0.10	0.09	0.11	0.07	0.08	0.07	0.08	0.07	0.13	0.09	0.06
-200	0.06	0.09	0.09	0.11	0.07	0.08	0.07	0.08	0.06	0.13	0.09	0.06
-210	0.06	0.09	0.09	0.11	0.07	0.08	0.06	0.07	0.06	0.14	0.08	0.06
-220	0.06	0.09	0.09	0.10	0.07	0.07	0.06	0.07	0.06	0.14	0.07	0.05
-230	0.06	0.08	0.09	0.09	0.07	0.07	0.05	0.06	0.06	0.14	0.06	0.04
-240	0.05	0.08	0.08	0.09	0.06	0.06	0.05	0.06	0.06	0.15	0.05	0.04
-250	0.05	0.08	0.08	0.08	0.06	0.06	0.04	0.05	0.06	0.15	0.04	0.03
-260	0.05	0.07	0.08	0.07	0.06	0.05	0.04	0.05	0.06	0.13	0.05	0.04
-270	0.04	0.05	0.08	0.07	0.05	0.04	0.05	0.04	0.06	0.12	0.05	0.05
-280	0.03	0.04	0.08	0.06	0.05	0.04	0.05	0.04	0.06	0.10	0.05	0.06
-290	0.02	0.03	0.07	0.05	0.05	0.03	0.05	0.03	0.06	0.08	0.05	0.07
-300	0.02	0.01	0.07	0.04	0.04	0.03	0.05	0.03	0.05	0.07	0.06	0.08

Figure 12-4 shows monthly mean salinity profiles for Block D.

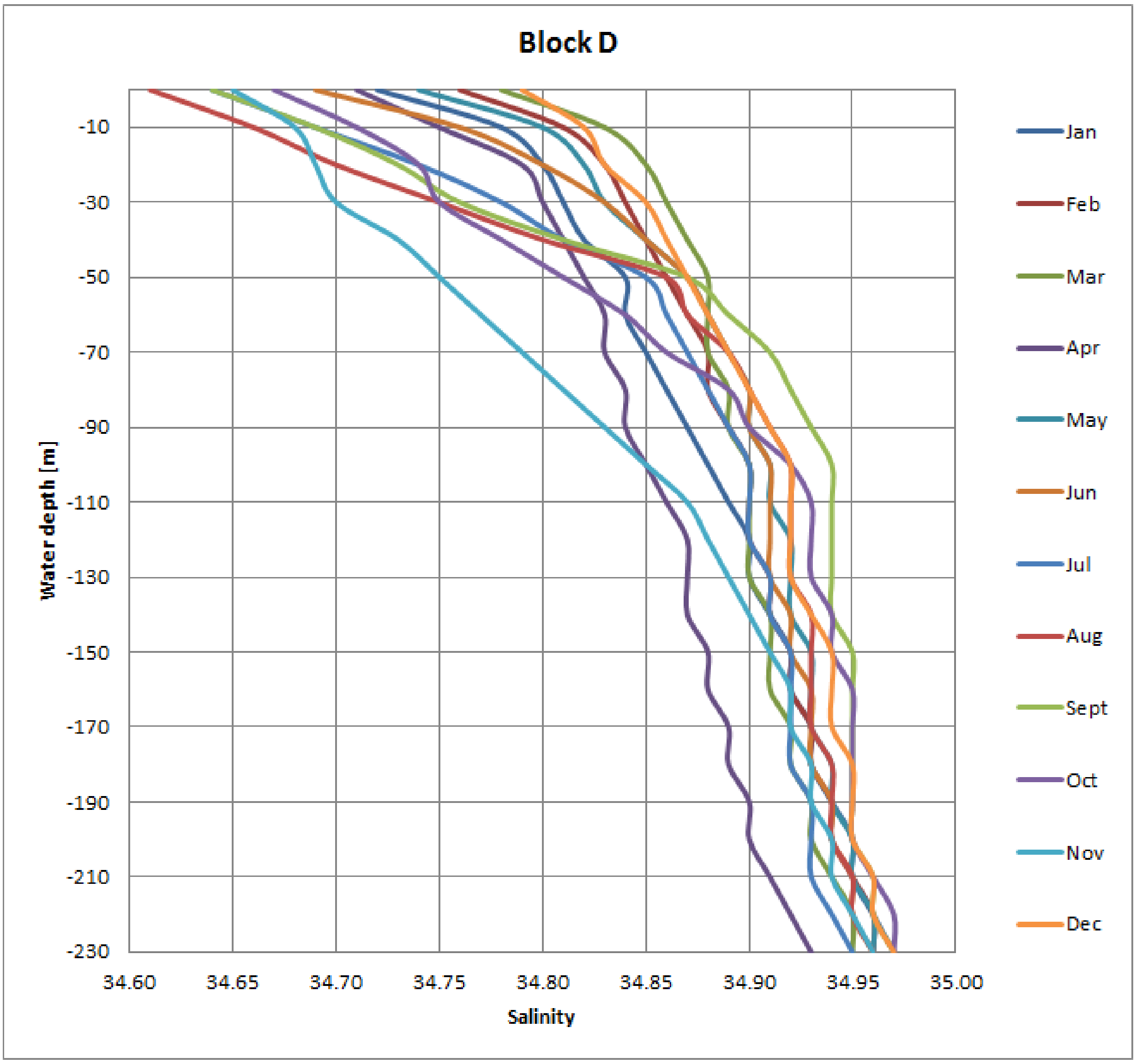


Figure 12-4 Monthly mean salinity profiles at the Block D.

Table 12-7 shows monthly mean salinity at selected depths.

Table 12-8 shows the corresponding standard deviations.

Table 12-7 Monthly mean salinity at selected water depths at the Block D.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	34.72	34.76	34.78	34.71	34.74	34.69	34.64	34.61	34.64	34.67	34.65	34.79
-10	34.78	34.81	34.83	34.75	34.80	34.76	34.69	34.66	34.69	34.71	34.68	34.82
-20	34.80	34.83	34.85	34.79	34.82	34.80	34.74	34.70	34.73	34.74	34.69	34.83
-30	34.81	34.84	34.86	34.80	34.83	34.83	34.78	34.75	34.76	34.75	34.70	34.85
-40	34.82	34.85	34.87	34.81	34.85	34.85	34.81	34.80	34.81	34.78	34.73	34.86
-50	34.84	34.86	34.88	34.82	34.87	34.87	34.85	34.86	34.87	34.81	34.75	34.87
-60	34.84	34.87	34.88	34.83	34.88	34.88	34.86	34.87	34.89	34.84	34.77	34.88
-70	34.85	34.88	34.88	34.83	34.89	34.89	34.87	34.89	34.91	34.86	34.79	34.89
-80	34.86	34.88	34.89	34.84	34.90	34.90	34.88	34.90	34.92	34.89	34.81	34.90
-90	34.87	34.89	34.89	34.84	34.90	34.90	34.89	34.91	34.93	34.90	34.83	34.91
-100	34.88	34.90	34.90	34.85	34.91	34.91	34.90	34.92	34.94	34.92	34.85	34.92
-110	34.89	34.90	34.90	34.86	34.91	34.91	34.90	34.92	34.94	34.93	34.87	34.92
-120	34.90	34.90	34.90	34.87	34.92	34.91	34.90	34.92	34.94	34.93	34.88	34.92
-130	34.90	34.91	34.90	34.87	34.92	34.91	34.91	34.92	34.94	34.93	34.89	34.92
-140	34.91	34.91	34.91	34.87	34.92	34.92	34.91	34.93	34.94	34.94	34.90	34.93
-150	34.92	34.92	34.91	34.88	34.93	34.92	34.92	34.93	34.95	34.94	34.91	34.94
-160	34.92	34.92	34.91	34.88	34.93	34.93	34.92	34.93	34.95	34.95	34.92	34.94
-170	34.93	34.93	34.92	34.89	34.93	34.93	34.92	34.93	34.95	34.95	34.92	34.94
-180	34.93	34.93	34.92	34.89	34.94	34.93	34.92	34.94	34.95	34.95	34.93	34.95
-190	34.94	34.94	34.93	34.90	34.94	34.94	34.93	34.94	34.95	34.95	34.93	34.95
-200	34.95	34.94	34.93	34.90	34.95	34.94	34.93	34.94	34.95	34.95	34.94	34.95
-210	34.95	34.95	34.94	34.91	34.95	34.95	34.93	34.95	34.96	34.96	34.94	34.96
-220	34.96	34.96	34.95	34.92	34.96	34.95	34.94	34.95	34.96	34.97	34.95	34.96
-230	34.97	34.96	34.95	34.93	34.96	34.96	34.95	34.96	34.97	34.97	34.96	34.97

Table 12-8 Standard deviation of the monthly mean salinity at selected water depths at the Block D.

Depth [m]	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0.14	0.14	0.10	0.14	0.11	0.15	0.14	0.16	0.14	0.14	0.07	0.09
-10	0.14	0.12	0.09	0.13	0.10	0.14	0.13	0.14	0.14	0.13	0.07	0.09
-20	0.14	0.12	0.09	0.14	0.10	0.13	0.11	0.13	0.14	0.13	0.07	0.09
-30	0.13	0.11	0.09	0.14	0.10	0.12	0.09	0.10	0.13	0.13	0.07	0.09
-40	0.13	0.11	0.09	0.14	0.10	0.11	0.09	0.10	0.12	0.12	0.07	0.08
-50	0.12	0.11	0.09	0.14	0.10	0.10	0.08	0.10	0.10	0.11	0.06	0.08
-60	0.12	0.10	0.09	0.14	0.10	0.09	0.08	0.09	0.10	0.11	0.06	0.08
-70	0.11	0.10	0.08	0.14	0.09	0.09	0.07	0.08	0.09	0.10	0.05	0.07
-80	0.10	0.10	0.08	0.13	0.09	0.09	0.07	0.08	0.08	0.10	0.05	0.07
-90	0.10	0.09	0.08	0.12	0.09	0.09	0.06	0.07	0.08	0.09	0.04	0.07
-100	0.09	0.09	0.08	0.11	0.09	0.09	0.06	0.07	0.08	0.09	0.04	0.07
-110	0.09	0.09	0.08	0.10	0.08	0.08	0.06	0.07	0.07	0.08	0.04	0.06
-120	0.08	0.09	0.08	0.10	0.08	0.08	0.06	0.06	0.07	0.07	0.04	0.05
-130	0.08	0.09	0.08	0.09	0.08	0.08	0.06	0.06	0.07	0.07	0.04	0.05
-140	0.08	0.09	0.08	0.09	0.08	0.08	0.05	0.06	0.07	0.07	0.04	0.05
-150	0.07	0.09	0.08	0.09	0.08	0.07	0.05	0.06	0.07	0.08	0.04	0.06
-160	0.07	0.09	0.08	0.09	0.07	0.07	0.05	0.06	0.07	0.08	0.04	0.06
-170	0.07	0.08	0.08	0.09	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.06
-180	0.07	0.08	0.08	0.09	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.05
-190	0.07	0.08	0.08	0.10	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.05
-200	0.06	0.08	0.08	0.10	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.05
-210	0.07	0.08	0.08	0.09	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.05
-220	0.07	0.08	0.08	0.09	0.07	0.07	0.06	0.06	0.07	0.07	0.04	0.04
-230	0.07	0.08	0.08	0.09	0.06	0.07	0.06	0.06	0.07	0.07	0.04	0.04

13 References

Standards and guidelines

1. NORA10 – air temperature calibration, Statoil ASA, Metocean ME2015-053, 2015.
2. Barents Sea – Air Extreme temperatures, Statoil ASA,
3. NORSOK Standard N-001 Integrity of offshore structures Edition 6, November 2009.
URL: http://www.standard.no/
4. NORSOK Standard N-003 Action and action effects, Edition 2, September 2007.
URL: http://www.standard.no/
5. NORSOK Standard N-005 Condition monitoring of loadbearing structures, Revision 1, December 1997.
URL: http://www.standard.no/
6. NORSOK Standard N-006 Assessment of structural integrity for existing load-bearing structures, Edition 1, March 2009.
URL: http://www.standard.no/
7. Mathiesen, M (2012), Extreme Environmental Conditions, Recommended Practice, Revision 3, Statoil Document No. RE2010-014.
8. ISO/CD 19906, 2010. Petroleum and natural gas industries – Arctic offshore structures – Chapter 17 and A17, ISO TC 67/SC 7/WG 8. Final Draft International Standard, International Standardisation Organization, Geneva, Switzerland, 434 p.
9. DNV-OS-H101 Marine Operations, General, October 2011.
URL.: http://www.standard.no/en/PDF/FileDownload/?redir=true&filetype=Pdf&item=644177&category=4
10. NS-EN 1991, Eurokode 1: Laster på konstruksjoner, Del 1-3: Allmenne laster, Snølaster. URL.: http://www.standard.no/en/PDF/FileDownload/?redir=true&filetype=Pdf&category=1

Metocean Design Basis

11. None.

Data sources

12. Matsumoto, K, Takanezawa, T and Ooe, M (2004), NAO.99b tidal prediction system.
URL: http://www.miz.nao.ac.jp/staffs/nao99/index_En.html
13. National Oceanographic Data Center (2014), Access to World Ocean Atlas 2013 on-line Objective Analyses and Statistics.
URL: http://www.nodc.noaa.gov/OC5/WOA13/woa13data.html
14. Reistad, M, Breivik, Ø, Haakenstad, H, Aarnes, O J, Furuvik, B R and Bidlot, J-R (2011), A high-resolution hindcast of wind and waves for the North Sea, Norwegian Sea, and the Barents Sea, Journal of Geophysical Research, 116, C05019, doi: 10.1029/2010JC006402.
URL: http://onlinelibrary.wiley.com/doi/10.1029/2010JC006402/suppinfo
15. Oceanweather inc (2008), NEXTRA hindcast data base.

Reports and journal papers

16. AARI,2005a. Glaciers at Novaya Zemlya/Sources for Icebergs in the Barents Sea. Research report ordered by Statoil.
17. Abramov, V. A. and Tunik, A. (1996). Atlas of Arctic Icebergs: The Greenland, Barents, Kara, Laptev, East-Siberian and Chukchi Seas and the Arctic Basin, Backbone, Peramus, N. J.
18. Abramov, 1992. Russian Iceberg observations in the Barents Sea 1933-1990, Polar research 11 (2), pp 93-97.
19. Bruserud, K, Nygaard, E and Johannessen, K (2010); Wave and wind calibration atlas for the Western Europe, Revision 2, Statoil Document No. MMG-MGE-RA 00017.
20. Jordaan, I., Stuckey, P., Liferov, P. and Ralph, F., 2014. Global and Local Iceberg Loads for an Arctic Floater, Arctic Technology Conference, Houston, Texas, USA, OTC 24628.

21. DNV, 2013. Ice and Snow Conditions at Johan Castberg, DNV report 2013-1270, rev. 0.
22. Eik, K. J., Kvingedal, B., Nygaard, E., 2013. Frequency of Sea Ice and Icebergs at Skrugard – Barents Sea, Port and Ocean Engineering under Arctic Conditions (POAC) 2013 Helsinki.
23. Fuglem, M., Jordaan, I., Crocker, G., Camaert, G. And Berry, B., (1996). Environmental factors in iceberg collision risks for floating systems, Cold Regions Science and Technology 24, pp. 251-261.
24. Goda, Y (1988), Statistical variability of sea state parameters as a function of wave spectrum. Coastal Engineering in Japan, Vol. 31, No. 1, pp. 39-52.
25. Hanssen-Bauer, I., H. Drange, E.J. Førland, L.A. Roald, K.Y. Børsheim, H. Hisdal, D. Lawrence, A. Nesje, S. Sandven, A. Sorteberg, S. Sundby, K. Vasskog og B. Ådlandsvik (2009): *Klima I Norge 2100. Bakgrunnsmateriale til NOU Klimatilplassing*, Norsk klimasenter, September 2009, Oslo. URL: http://www.regjeringen.no/upload/MD/Kampanje/klimatilpasning/Bilder/NOU/Klima-Norge-2100_lavoppl_2opplag_okt2009.pdf
26. Løset S. Numerical Modelling of the Temperature Distribution in Tabular Icebergs. Cold Regions Science and Technology, 1993, Vol.21 (2), pp 105-115.
27. Mathiesen, M (2010), Wam10 data archive – Use of Wind and Wave data, Revision 2, Statoil memo dated 1 March 2010.
28. Norwegian Petroleum Directorate (2014), Facts 2014 – The Norwegian petroleum sector. URL: http://www.regjeringen.no/upload/OED/pdf%20filer/Faktaheftet/Fakta2014OG/Facts_2014_nett.pdf
29. Nygaard, E.. 2014. Extreme offshore snow in the Barents Sea – rev. 2, MGE ME 2014-125, memo to K. J. Eik 13.11.2014.
30. Overland, J E, (1990), Prediction of vessel icing for near-freezing sea temperatures, Weather and Forecasting, Vol. 5, pp. 62-77.
31. Spring, W. (1994), Ice data acquisition program, summary report, Tech. Rep. 472-37, Mobil Res. and Dev. Corp., Dallas E&P Eng., Dallas, Texas.
32. Zubakin G.K., Naumov A.K. and Skutina E.A. Spreading and Morphometric Peculiarities of Icebergs in the Barents Sea. // Proceedings of the 18th IAHR International Symposium on Ice (2006). 28 August – 1 September, 2006. Sapporo, Japan. – Vol. 2. – pp. 79-87.
33. Mathiesen, M., 2008. Iceberg characteristics, rev. 2, memo from M. Mathiesen to Einar Nygaard, Feb 2008.
34. Environment Canda, 2015. Icebergs shape, size and colour. https://ec.gc.ca/glaces-ice/default.asp?lang=En&n=D857E6B8-1 .
35. Osczevski, R. and Bluestein, M., 2005. The New Wind Chill Equivalent Temperature Chart. Bulletin of the American Meteorological Society, Oct. 2005, p. 1453–1458.

Appendix A - Model distributions

Weibull distribution

The long-term distribution of wind speed, significant wave height and current speed are modelled in terms of a three-parameter Weibull distribution:

$$F(x) = 1 - \exp\left\{-\left[\frac{x-\varepsilon}{\theta}\right]^{\gamma}\right\} \qquad x \geq \max(0, \varepsilon) \tag{A1}$$

where:

x	Statistical variable
ε	Location parameter
θ	Scale parameter
γ	Shape parameter

In the case ε < 0; then F(0) > 0 means that a (significant) fraction of the data has the value x = 0.

Extreme values, x_R, corresponding to a return period, R, are obtained by inverting Equation **(A1)** for a cumulative probability F = 1 – τ/pR, i.e.:

$$x_R = \varepsilon + \theta\left[-\ln\left(\frac{\tau}{pR}\right)\right]^{1/\gamma} \tag{A2}$$

where

τ	Duration of event [1 hour (wind), 3 hours (waves) or 10 minutes (current)]
p	Sector or monthly probability (=1/12 for monthly omni-directional distributions)
R	Return period

Maximum likelihood estimators can be derived for the three-parameter Weibull distribution, but only when the shape parameter γ > 2.0. These estimators are, however, not suitable for use in extreme analysis since it is most often found that 1 < γ < 2 both for wind speed, significant wave height and current speed.

The mean value μ, the variance σ^2 and the skewness γ_1 of the three-parameter Weibull distribution are given by:

$$\begin{aligned} \mu &= \theta \cdot \Gamma\left(1+\frac{1}{\gamma}\right) + \varepsilon \\ \sigma^2 &= \theta^2 \cdot \left[\Gamma\left(1+\frac{2}{\gamma}\right) - \Gamma^2\left(1+\frac{1}{\gamma}\right)\right] \end{aligned} \tag{A3}$$

$$\gamma_1 = \frac{\theta^3}{\sigma^3} \cdot \left[\Gamma\left(1+\frac{3}{\gamma}\right) - 3\Gamma\left(1+\frac{1}{\gamma}\right)\Gamma\left(1+\frac{2}{\gamma}\right) + 2\Gamma^3\left(1+\frac{1}{\gamma}\right) \right]$$

where Γ() is the Gamma function.

Moment estimators for the three-parameter Weibull distribution are obtained by inserting for σ in the expression for γ_1 above. This gives a non-linear equation for γ which is solved using an iterative procedure. Having determined the shape parameter the scale and location parameters are computed from:

$$\theta = \frac{\sigma}{\sqrt{\Gamma\left(1+\frac{2}{\gamma}\right) - \Gamma^2\left(1+\frac{1}{\gamma}\right)}}$$
$$\varepsilon = \mu - \theta \cdot \Gamma\left(1+\frac{1}{\gamma}\right) \qquad \text{(A4)}$$

For large data samples the efficiency of the shape parameter moment estimator is high, e.g. e(γ) > 0.90 for 1.6 < γ < 4.4. For lower values of γ, however, the efficiency drops rapidly and e(γ) < 0.60 for γ < 1.0.

For small data samples, however, the moment estimators are not expected to be that good. This is due to the considerable uncertainty (variance) in the estimates of the skewness γ_1.

Moment estimators for the two-parameter Weibull distribution are obtained by solving:

$$\frac{\Gamma\left(1+\frac{2}{\gamma}\right)}{\Gamma^2\left(1+\frac{1}{\gamma}\right)} = \frac{\sigma^2}{\mu^2} + 1 \qquad \text{(A5)}$$

with respect to the shape parameter γ using an iterative procedure. The scale parameter is computed from:

$$\theta = \frac{\mu}{\Gamma\left(1+\frac{1}{\gamma}\right)} \qquad \text{(A6}$$

Least squares estimators for the parameters of the two-parameter Weibull distribution are obtained as follows. Let the linear regression function be given by:

$$X = aY + b \qquad \text{(A7)}$$

where

$$X = \ln(x) \qquad \text{(A8)}$$

$$Y = \ln\left[-\ln\left(1 - F(x)\right)\right]$$

Estimates of the shape and scale parameters are then obtained from:

$$\gamma = \frac{1}{a}$$
$$\theta = \exp(b) \qquad \text{(A9)}$$

LoNoWe distribution

The long term variation of the wave climate can be described by the joint probability density function for H_s and T_p, and is given by:

$$f(H_s, T_p) = f(H_s) \cdot f(T_p \mid H_s) \qquad \text{(A10)}$$

where

$$f(H_s) = \frac{1}{H_s \cdot \varsigma\sqrt{2\pi} \cdot} \cdot \exp\left(-\frac{\left(\ln(H_s) - \nu\right)^2}{2 \cdot \varsigma^2}\right) \quad \text{for } H_s \le \eta$$
$$f(H_s) = \frac{\gamma}{\theta}\left(\frac{H_s}{\theta}\right)^{\gamma-1} \exp\left[-\left(\frac{H_s}{\theta}\right)^{\gamma}\right] \quad \text{for } H_s > \eta \qquad \text{(A11)}$$

In this formulation the LoNoWe (LogNormal-Weibull) distribution, Equation (A11), replaces the 3-parameter Weibull distribution, Equation **(A1)**. This choice is made in order to provide a better fit to the data in the lower tail of the distribution.

The LoNoWe distribution is fitted to the data such that the extreme value corresponding to an annual probability of exceedance of 10^{-2} is equal to the corresponding value obtained when fitting a three-parameter Weibull distribution to the data.

Conditional Log-normal distribution for T_p

The conditional distribution of T_p given H_S is modelled by a log-normal distribution:

$$f(T_p \mid H_s) = \frac{1}{T_p \cdot \sigma\sqrt{2\pi}} \cdot \exp\left(-\frac{\left(\ln(T_p) - \mu\right)^2}{2 \cdot \sigma^2}\right) \qquad \text{(A12)}$$

where

$$\mu = a_1 + a_2 \cdot H_s^{a_3}$$
$$\sigma^2 = b_1 + b_2 \cdot \exp(-b_3 \cdot H_s) \qquad \text{(A13)}$$