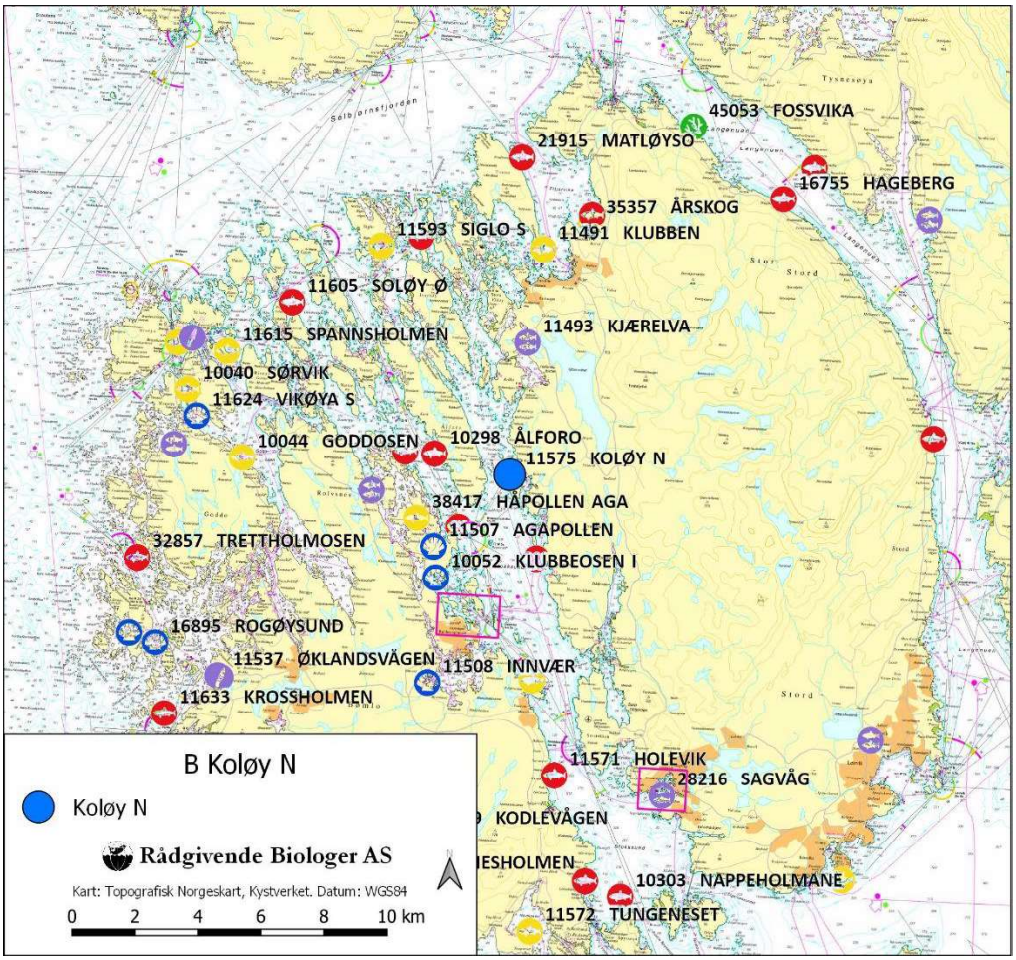
Straummåling ved Koløy N oktober 2022 – mars 2023. Utplassering og tekniske data.

Av: Erling Brekke
Til: Hardingsmolt v/Ole Bergheim
Dato: 15.06.2023

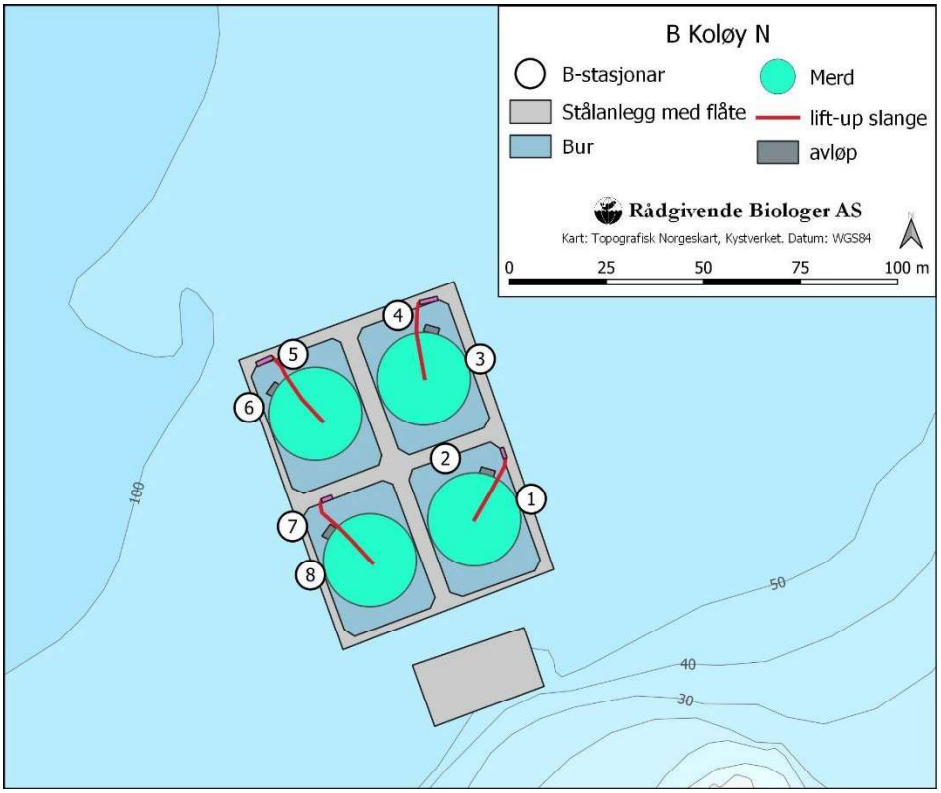
Rådgivende Biologer AS har på oppdrag frå Hardingsmolt AS målt straum ved lokalitet nr. 11575 Koløy N i Fitjar kommune i perioden 19. oktober 2022 – 13. mars 2023. Lokaliteten er godkjent for ein MTB på 780 tonn.

Områdeskildring

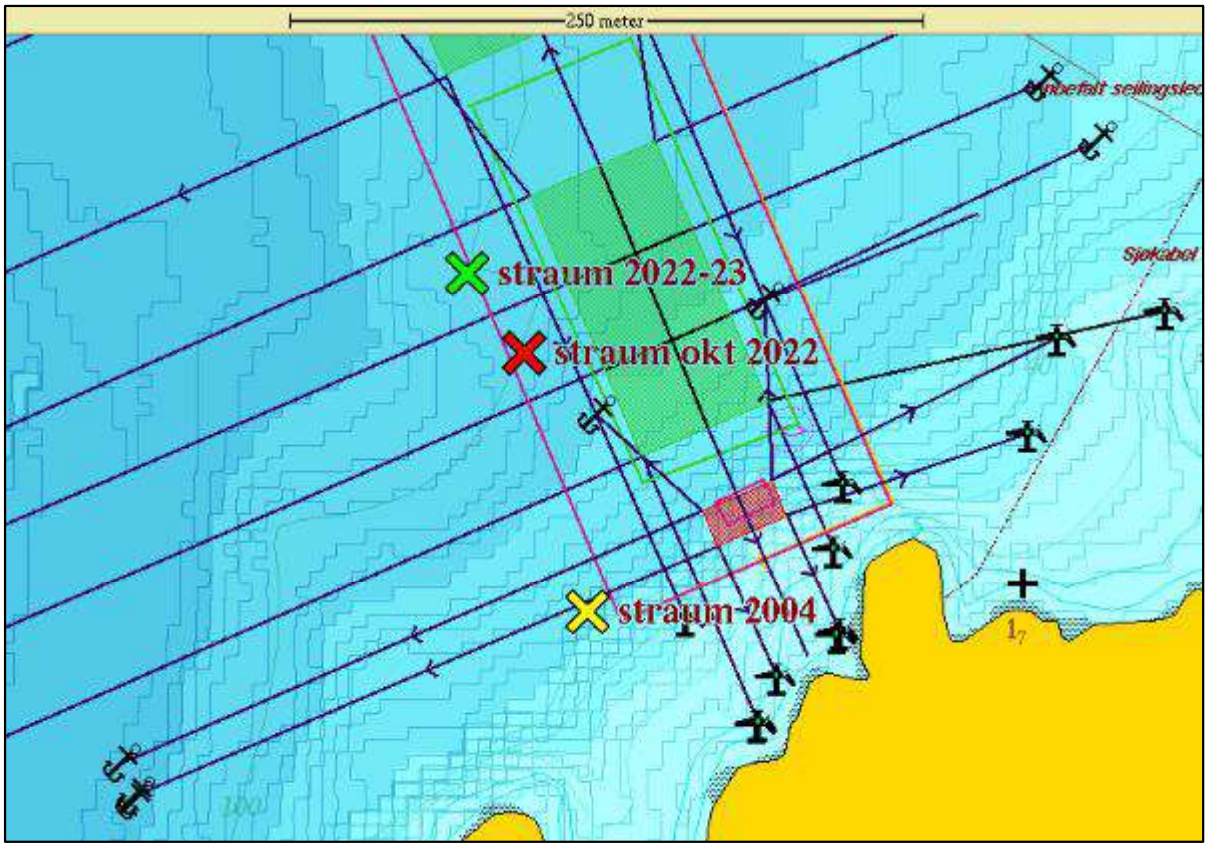
Koløy ligg sør for Ålforo i nordleg del av Stokksundet (**figur 1**). Stokksundet djupnar sørover mot Sagvågsfjorden, som vidare er bunde saman med Bømlafjorden gjennom fleire terskla sund. Mot nord går Stokksundet ut i Selbjørnsfjorden via fleire tronge og grunne passasjar mellom dei talrike Fitjarøyane. Botn i lokalitetsområdet skrånar nokså bratt nedover mot nordaust til ei djupne på om lag 100 m under anleggets nordvestre hjørne. Under sjølve anlegget er det ca 50 – 100 m djupt (**figur 2**).



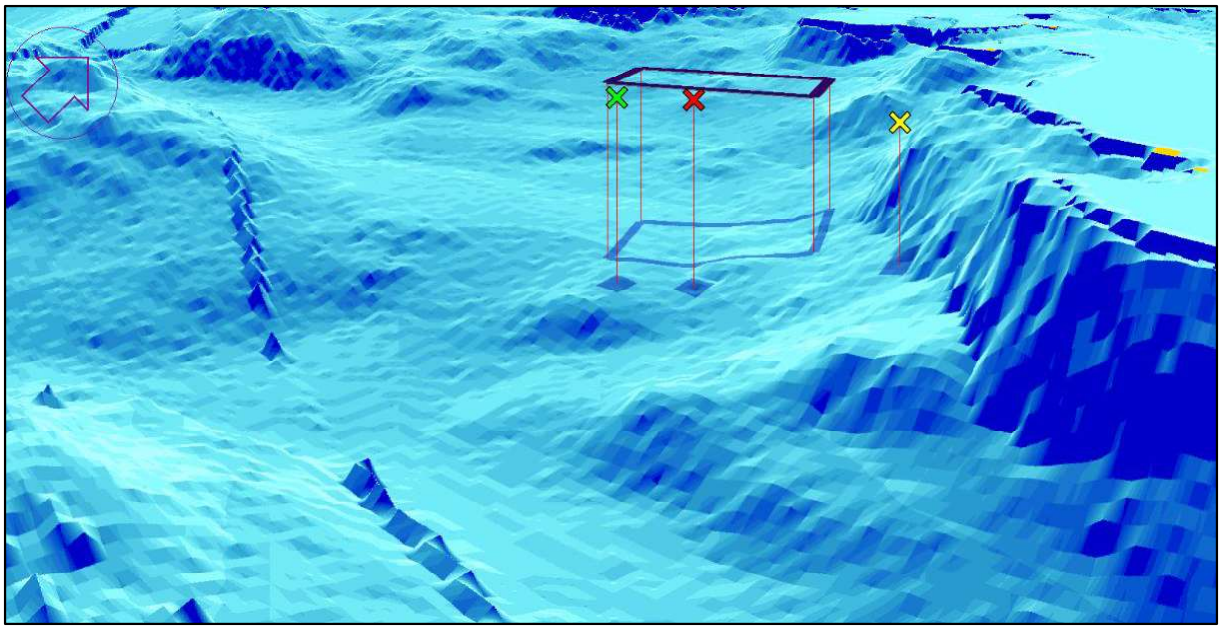
***Figur 1**. Oversiktskart over fjordsystemet rundt lokaliteten. Omkringliggjande anlegg er markert.*



***Figur 2**. Oversiktskart over anlegget slik det låg ved lokaliteten i september 2022, med plassering av grabbhogg ved B-granskinga (frå Rustand 2022).*



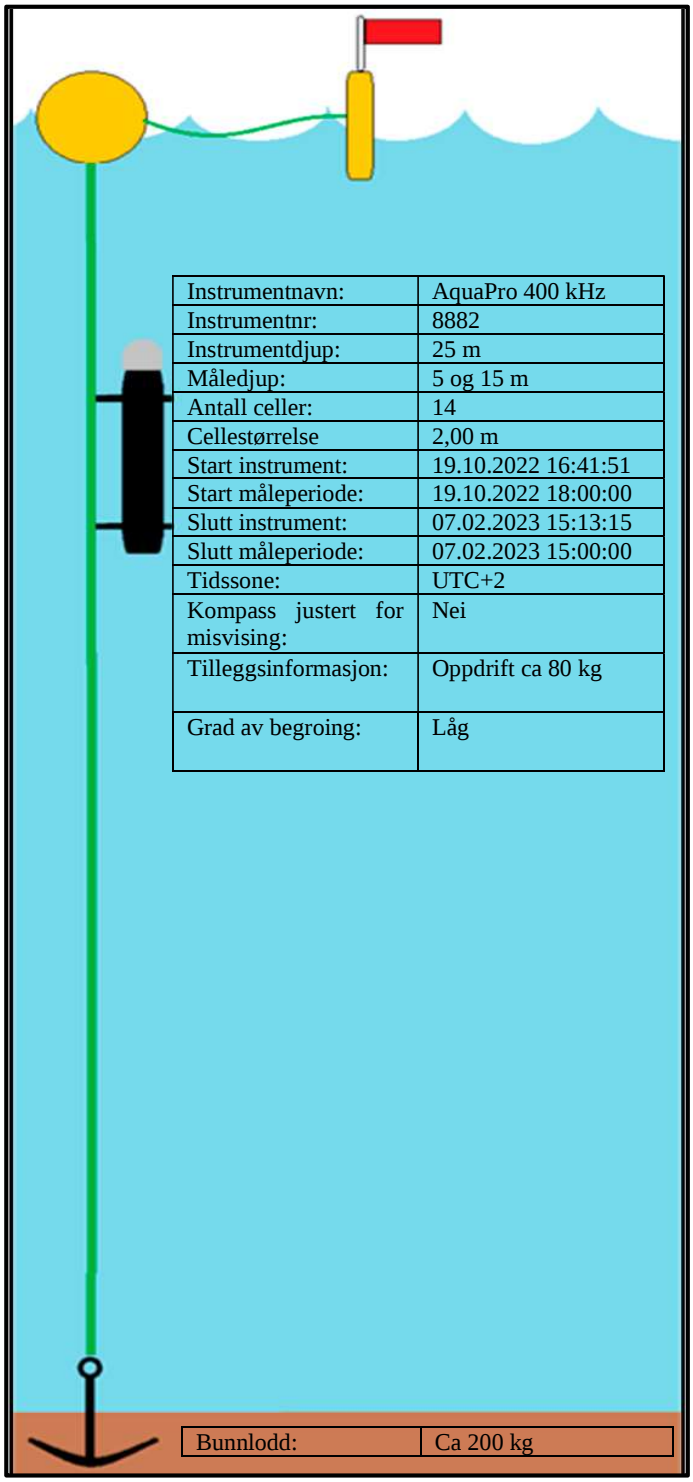
***Figur 3**. Olex kart med planlagt anlegg med fortøyiingar og posisjonar for ulike straummålingar. Ved straummålingane i 2022-23 låg det merder ved dei fire sørlegaste rammene (jf. figur 2).*



***Figur 4**. Olex 3D-kart med posisjonar for dei ulike straummålingane ved Koløy N (jf. figur 3). Ramme for delar av planlagt anlegg er teikna inn.*

Riggskjema og tilleggsinformasjon

Prosjekt: Straummåling Koløy N, periode 1
Kunde: Hardingsmolt AS

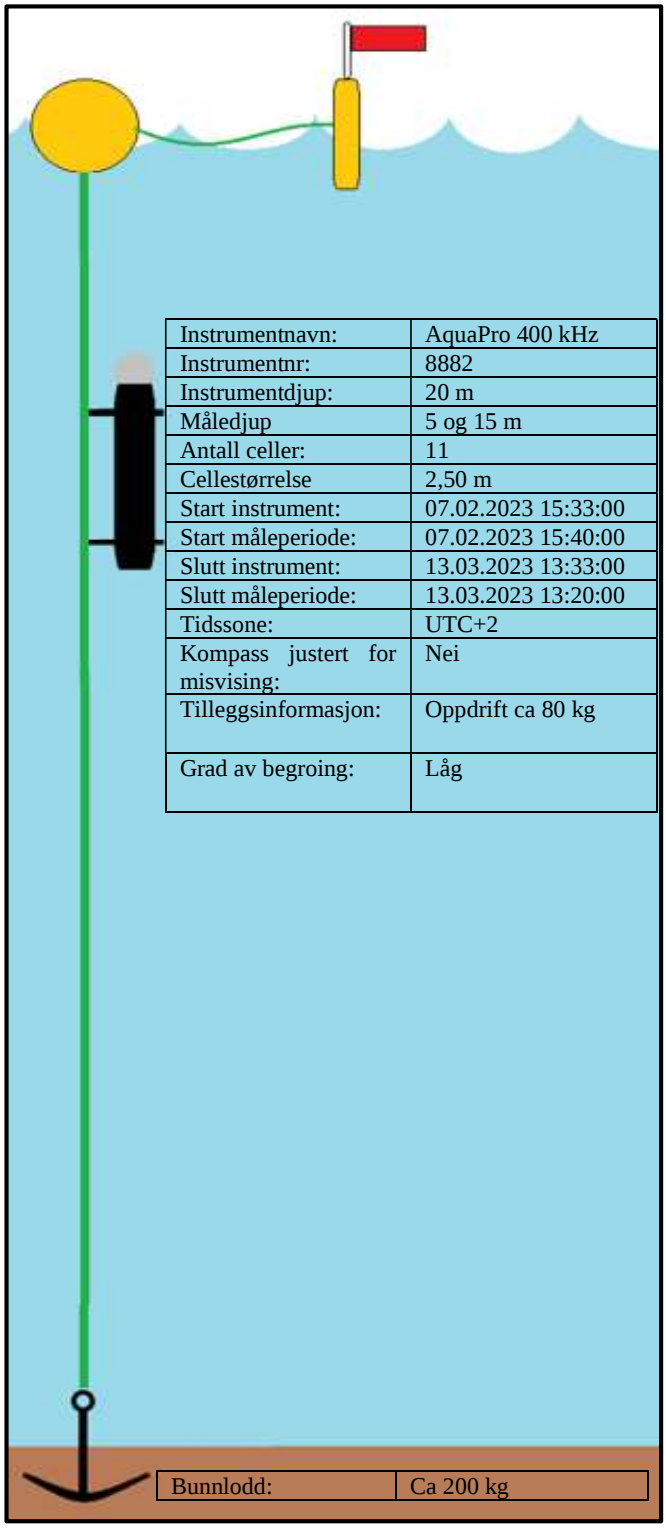


Instrumentnavn:	AquaPro 400 kHz
Instrumentnr:	8882
Instrumentdjup:	25 m
Måledjup:	5 og 15 m
Antall celler:	14
Cellestørrelse	2,00 m
Start instrument:	19.10.2022 16:41:51
Start måleperiode:	19.10.2022 18:00:00
Slutt instrument:	07.02.2023 15:13:15
Slutt måleperiode:	07.02.2023 15:00:00
Tidssone:	UTC+2
Kompass justert for misvising:	Nei
Tilleggsinformasjon:	Oppdrift ca 80 kg
Grad av begroing:	Låg
Bunnlodd:	Ca 200 kg

Prosjektleiar:	Erling Brekke
Lokalitet:	Koløy N
Lokalitetsnummer:	11575
Kommune:	Fitjar
Fylke:	Vestland
Måleposisjon: (WGS 84)	N 59° 51,675’ Ø 5° 17,248’
Djup ved målepunkt:	102 m (Olex)
Instrument starta av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Instrument avlest av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Rigg satt ut av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Rigg tatt opp av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Måleintervall:	10 minutt
Midlingsperiode:	60 s
Fjerna data:	Automatisk fjerna pga. låg SNR: 15 m: 1306 målingar (8,2%) 5m: 5200 målingar (32,6 %). Manuelt fjerna: 28.10.2022 12:53 (1 måling) pga. flytting av rigg. Manuelt fjerna: 10.12.2022 02:03 (1 måling) pga. enkeltstående ekstremverdi.

Kommentar/merknadar:

Rigg vart opphavleg sett ut i posisjon N 59° 51,658’ Ø 5° 17,272’ (ca 40 m SSØ for hovudposisjonen), men vart flytta på grunn av tilgang for brønnbåt. Riggen vart flytta den 28. oktober 2022, ca kl. 12:50, etter ca 9 dagars måling. Målaren vart ikkje stoppa/starta i samband med flyttinga. Djupna var den same i dei to ulike posisjonane.



Instrumentnavn:	AquaPro 400 kHz
Instrumentnr:	8882
Instrumentdjup:	20 m
Måledjup	5 og 15 m
Antall celler:	11
Cellestørrelse	2,50 m
Start instrument:	07.02.2023 15:33:00
Start måleperiode:	07.02.2023 15:40:00
Slutt instrument:	13.03.2023 13:33:00
Slutt måleperiode:	13.03.2023 13:20:00
Tidssone:	UTC+2
Kompass justert for misvising:	Nei
Tilleggsinformasjon:	Oppdrift ca 80 kg
Grad av begroing:	Låg
Bunnlodd:	Ca 200 kg

Prosjektleiar:	Erling Brekke
Lokalitet:	Koløy N
Lokalitetsnummer:	11575
Kommune:	Fitjar
Fylke:	Vestland
Måleposisjon: (WGS 84)	N 59° 51,675’ Ø 5° 17,248’
Djup ved målepunkt:	102 m (Olex)
Instrument starta av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Instrument avlest av:	Erling Brekke
Rigg satt ut av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Rigg tatt opp av:	Bjarte Espevik, Kvitsøy Sjøtjenester AS
Måleintervall:	10 minutt
Midlingsperiode:	60 s
Fjerna data:	Ingen

Kommentar/merknadar:

Det var ein del mangelfulle/dårlege data ved avlesing etter første måleperiode, difor vart måleperioden forlenga med vel ein månad etter batteribyte.

Riggen vart sett ut på same staden, men målaren vart plassert litt grunnare i vassøyla, og med litt større cellestorleik, for å sikre at ein fekk tilstrekkeleg med gode data.

Tekniske spesifikasjonar

Generell instrumentbeskrivelse

Rådgivende Biologer AS nyttar Nortek AS sine ADCP straummålarar (Acoustic Doppler Current Profiler). ADCP straummålarar måler straum ved hjelp av høgfrekvente akustiske signal. Signalet vert sendt ut i tre aksar, og partiklar i vatnet reflekterer signalet. Når ein antar at partiklane har same fart og retning som vatnet, kan straumfart og -retning bereknast på bakgrunn av doppler-effekten. Ved hjelp av innebygd kompass kan retninga på straumen relaterast til himmelretningane. Straummålarane har trykksensor som registrerer djup, og tiltsensor som registrerer hellinga til målaren, samt temperatursensor som registrerer sjøtemperaturen kvart sekund. Ved utrekning av lydfart i sjøvatn vert temperatur, trykk og salinitet nytta som variablar. Sidan salinitet har ein relativt sett lågare påverknad på lydfart i sjøvatn, vert saliniteten satt til å vera ein konstant på 35 ppt i Nortek AS sine ADCP straummålarar. Sjå http://www.nortek-as.com/ for meir informasjon om straummålarar.

Tabell 1 *Beskrivelse av instrument nytta ved straummålinga.*

	AquaPro 400 kHz
Type målar	Profilerande
Oppløysing	0,45 dB
Nøyaktigheit	± 1 %
Responsområde	± 10 m/s
Antall rådatamålingar for kvar aggregert dataverdi	>4
Temperatursensor: type, nøyaktigheit, responstid og terskelverdi	Thermistor / 0,1 °C til 0,01 °C / 10 min / -4 °C til 40 °C
Tiltsensor: type, nøyaktigheit og terskelverdi	Vater/ 0,2° til 0,1°/ 30°
Trykksensor: type, nøyaktigheit og terskelverdi	Piezoresistive / 0,5 % FS / 0-100 m
Kompass: Type, nøyaktigheit og terskelverdi	Magnetometer / 0,2° til 0,1° ved tilt < 20 °
Kompassorientering	ENU / Magnetisk nord
Modifikasjonar	Nei

Handtering av straumdata

Kontroll av data er gjort med programmet SeaReport, versjon 1.1.11, eit dataprogram utvikla av Nortek AS. Ved import av datafiler vert data automatisk kontrollert i høve til førehandsbestemte grenseverdiar for signalstyrke, trykk og tilt. Ved gjennomgang av data vert det gjort ein manuell kontroll av data der ein ser på parametrane trykk og tilt. Excel er nytta for generering av figurar og enkel handsaming og samanstilling av data.

Tabell 2 *Grenseverdiar ved automatisk kvalitetskontroll i SeaReport versjon 1.1.11.*

Parameter	Grenseverdi
Trykk	0 m
Grense for tilt	>30 °
Amplitudehøgde	70 db
Straumfart	>5 m/s
Signal-to-Noise-Ratio (SNR)	>3 db
Korrelasjon	>50 %

***Tabell 3**. Deployment data*

```
============================================================
Deployment   : 8882
Current time : 19.10.2022 16:42:42
Start at     : 19.10.2022 16:41:51
Comment:
strømmåling Koløy
------------------------------------------------------------
Profile interval      (s) : 600
Number of cells         : 14
Cell size           (m) : 2.00
Blanking distance     (m) : 1.00
Measurement load      (%) : 100
Average interval      (s) : 60
Power level             : LOW+
Wave data collection      : DISABLED
Compass upd. rate     (s) : 2
Coordinate System         : ENU
Speed of sound      (m/s) : MEASURED
Salinity          (ppt) : 35
Analog input 1          : NONE
Analog input 2          : NONE
Analog input power out    : DISABLED
File wrapping           : OFF
TellTale                : OFF
Acoustic modem          : OFF
Serial output           : OFF
Baud rate               : 9600
------------------------------------------------------------
Assumed duration   (days) : 30.0
Battery utilization   (%) : 24.0
Battery level         (V) : 11.7
Recorder size        (MB) : 9
Recorder free space  (MB) : 8.973
Memory required      (MB) : 0.7
Vertical vel. prec (cm/s) : 0.9
Horizon. vel. prec (cm/s) : 2.7
------------------------------------------------------------
Instrument ID           : AQD13100
Head ID                 : AQP 8882
Firmware version        : 3.40
------------------------------------------------------------
AquaPro Version 1.37.08
Copyright (C) Nortek AS
============================================================
```

Referansar:

Rustand, T.E. 2022. Oppdrettslokalitet Koløy N i Fitjar kommune, september 2022. Miljøovervaking av anleggssona – B-gransking. Rådgivende Biologer AS, rapport 3779, 18 sider.

Tveranger, B., E. Brekke & G. H. Johnsen 2005. Straummålingar og lokalitetsklassifisering av oppdrettslokalitet nord for Koløy i Fitjar kommune. Rådgivende Biologer AS, rapport nr. 774, 36 sider.

Vedlegg 1: Koløy N 1. periode 19.10.22 - 07.02.23 (Utskrift av straumdata og figurar generert av straumprogrammet).

Vedlegg 2: Koløy N, 2. periode 07.02.23 - 13.03.23 (Utskrift av straumdata og figurar generert av straumprogrammet).

Koløy N 1. periode

19.10.22 - 07.02.23

06/15/2023
RB
EB

Content

Summary

Details

Instrument

Head Id	AQP 8882
Board Id	AQD13100
Frequency	400000

Configuration

File	888201.prf
Start	19.10.2022 17:23
End	07.02.2023 15:13
Data Records	15972
Orientation	UP
Cells	14
Cell Size [m]	2
Blanking Distance [m]	0.970000028610229
Average Interval [sec]	00:01:00
Measurement Interval [sec]	00:10:00

Quality

Low Pressure Treshold	0
HighTilt Threshold	30
Expected Orientation	UP
Amplitude Spike Treshold	70
Velocity Spike Treshold	5
SNR Treshold	3
Correlation Treshold	50

Post processing

Selected Start	19.10.2022 18:00
Selected End	07.02.2023 15:00
Compass Offset	0
Pressure Offset	0
Selected Records	15966
Reference	Water Surface
Top Depth [m]	5
Top Invalid Data	5205
Middle Depth [m]	10
Middle Invalid Data	2778
Bottom Depth [m]	15
Bottom Invalid Data	1310

Manually removed data

Start Time	End Time	Comment
28.10.2022 12:32:53	28.10.2022 13:04:50	Flytting av rigg
10.12.2022 01:56:18	10.12.2022 02:11:07	Enkeltstående ekstremverdi

Statistics

Top [5.0m]

Mean current [m/s]	0.06
Max current [m/s]	0.33
Min current [m/s]	0.00
Measurements used/total [#]	10761 / 15966
Std.dev [m/s]	0.04
Significant max velocity [m/s]	0.11
Significant min velocity [m/s]	0.03
10 year return current [m/s]	0.542
50 year return current [m/s]	0.608
Most significant directions [°]	210°, 225°, 195°, 30°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	633.71m³ / day at 195-210°
Least flow	68.06m³ / day at 285-300°
Neumann parameter	0.17
Residue current	0.01 m/s at 209°
Zero current [%] - [HH:mm]	2.83% - 00:30

Middle [10.0m]

Mean current [m/s]	0.06
Max current [m/s]	0.32
Min current [m/s]	0.00
Measurements used/total [#]	13188 / 15966
Std.dev [m/s]	0.04
Significant max velocity [m/s]	0.10
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.525
50 year return current [m/s]	0.589
Most significant directions [°]	225°, 210°, 195°, 240°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	433.89m³ / day at 210-225°
Least flow	78.62m³ / day at 105-120°
Neumann parameter	0.09
Residue current	0.01 m/s at 216°
Zero current [%] - [HH:mm]	2.88% - 00:20

Bottom [15.0m]

Mean current [m/s]	0.05
Max current [m/s]	0.27
Min current [m/s]	0.00
Measurements used/total [#]	14656 / 15966
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.09
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.452

50 year return current [m/s]	0.507
Most significant directions [°]	225°, 210°, 195°, 240°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	365.07m³ / day at 195-210°
Least flow	63.73m³ / day at 90-105°
Neumann parameter	0.11
Residue current	0.01 m/s at 220°
Zero current [%] - [HH:mm]	3.69% - 00:30

Sensors

	Mean	**Min**	**Max**
Pressure [dbar]	25.32	7.06	26.13
Temperature [°C]	9.77	6.40	12.39
Heading [°]	214.01	0.00	359.80
Pitch [°]	-0.77	-8.20	2.10
Roll [°]	0.46	-2.80	8.00

Direction with return period

Top [5.0m]

Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.071	0.271	0.117	0.447	0.132	0.501
45	0.066	0.328	0.108	0.542	0.121	0.608
90	0.042	0.195	0.070	0.322	0.078	0.361
135	0.042	0.221	0.070	0.365	0.078	0.409
180	0.067	0.226	0.110	0.373	0.123	0.418
225	0.074	0.255	0.122	0.420	0.136	0.471
270	0.045	0.192	0.075	0.317	0.084	0.355
315	0.044	0.153	0.073	0.253	0.081	0.283

Middle [10.0m]

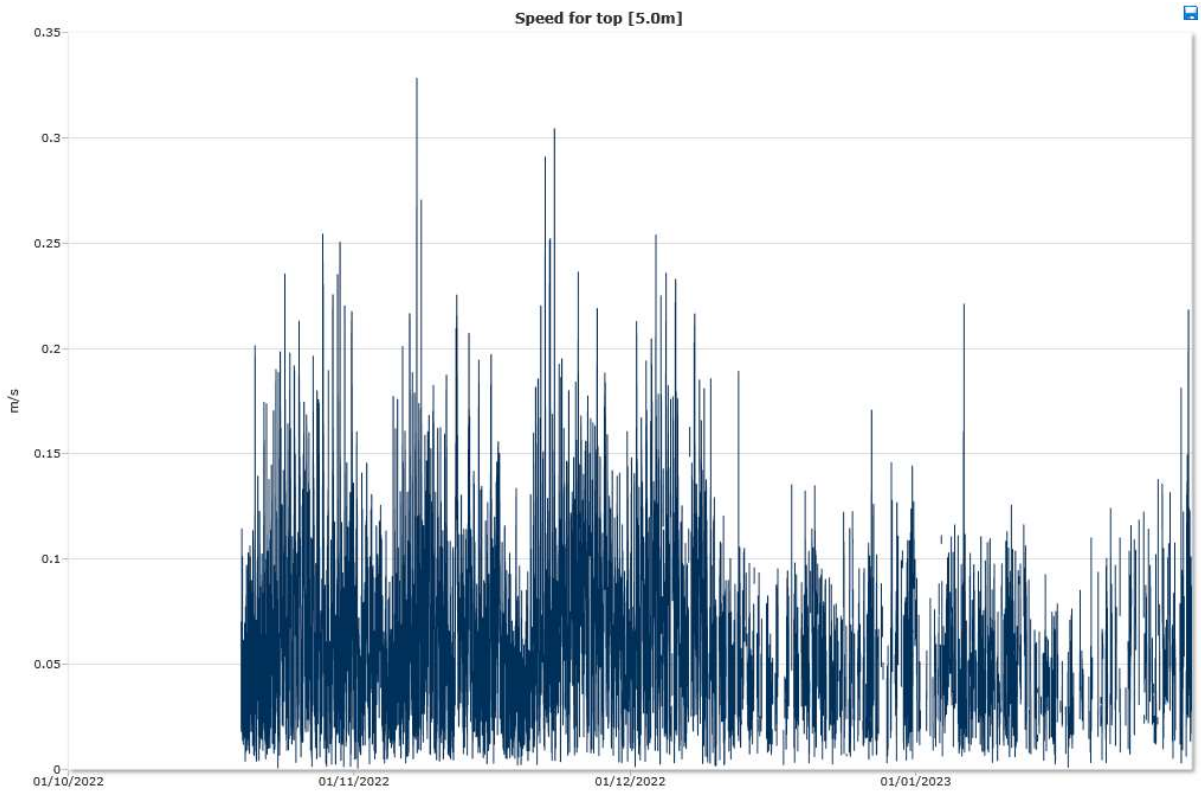
Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.064	0.258	0.106	0.426	0.119	0.478
45	0.068	0.237	0.112	0.391	0.126	0.439
90	0.042	0.318	0.070	0.525	0.078	0.589
135	0.046	0.220	0.077	0.363	0.086	0.407
180	0.061	0.271	0.101	0.447	0.113	0.501
225	0.064	0.318	0.105	0.525	0.118	0.588
270	0.048	0.190	0.080	0.314	0.089	0.352
315	0.044	0.150	0.072	0.247	0.081	0.277

Bottom [15.0m]

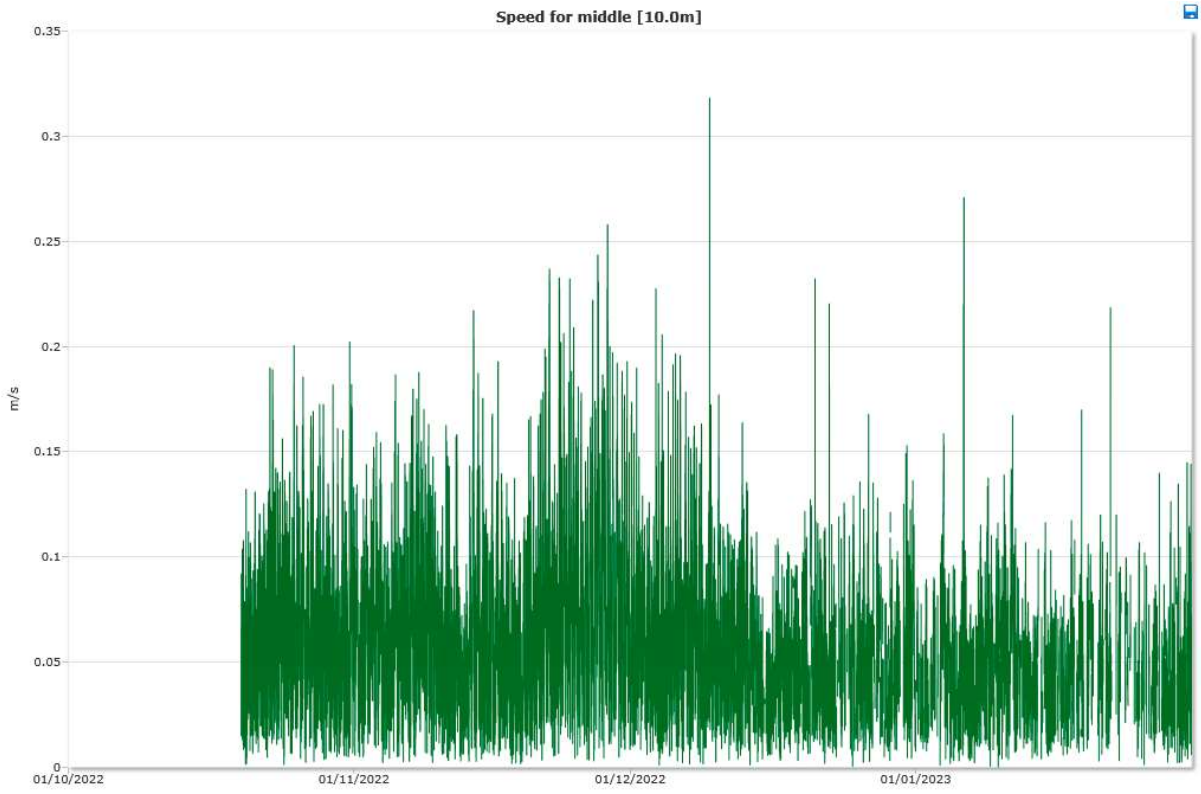
Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.054	0.237	0.090	0.390	0.101	0.438
45	0.060	0.258	0.099	0.426	0.111	0.478
90	0.038	0.274	0.063	0.452	0.071	0.507
135	0.041	0.240	0.067	0.395	0.075	0.443
180	0.054	0.233	0.090	0.385	0.100	0.432
225	0.057	0.191	0.094	0.315	0.105	0.353
270	0.043	0.178	0.071	0.293	0.079	0.328
315	0.038	0.117	0.063	0.194	0.070	0.217

Time series

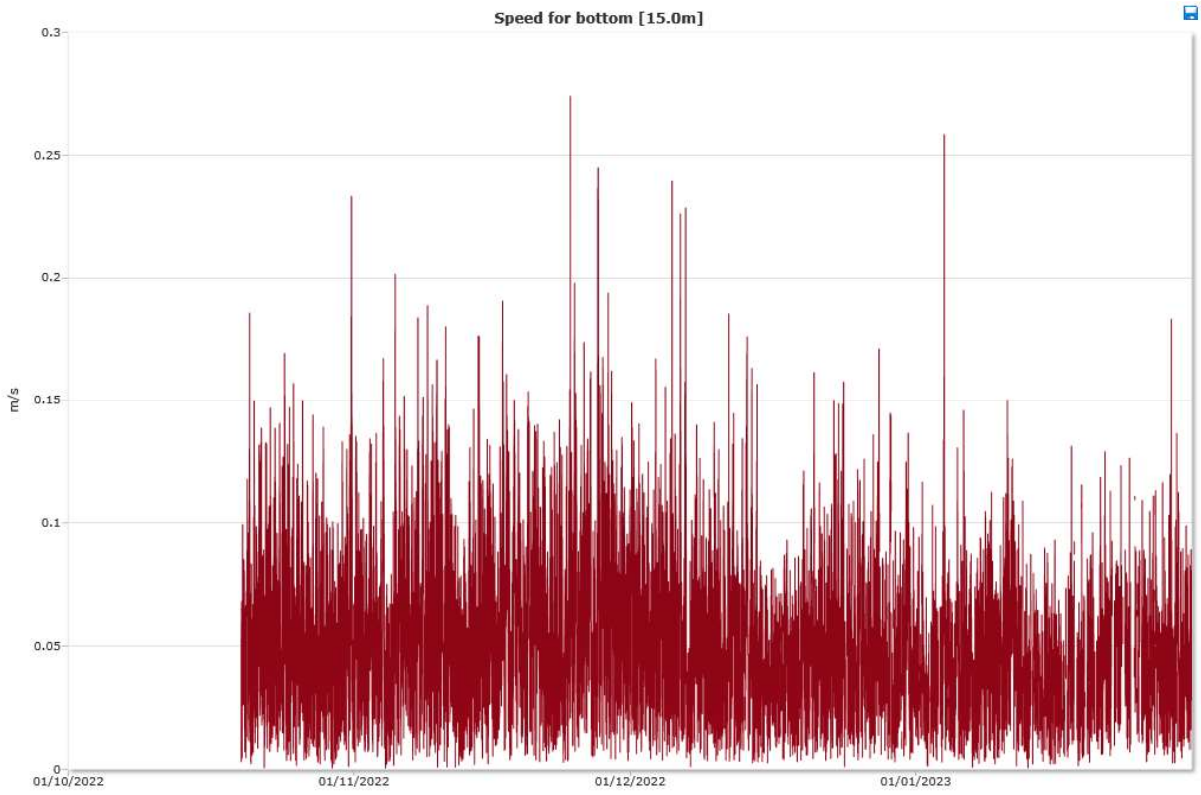
Top [5.0m]



Middle [10.0m]

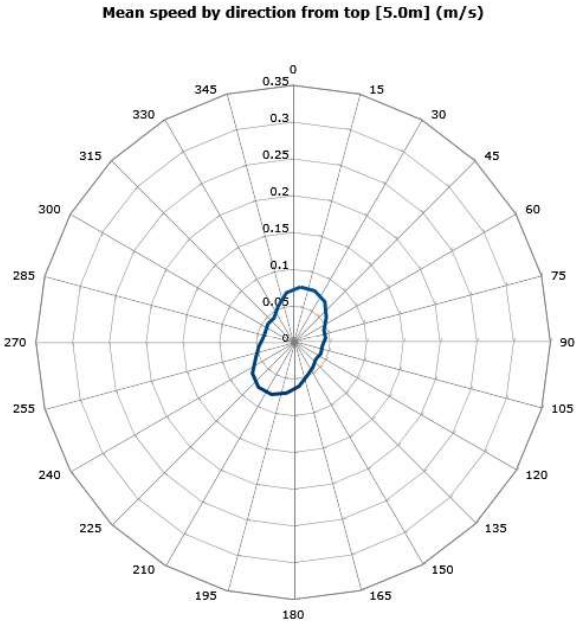


Bottom [15.0m]

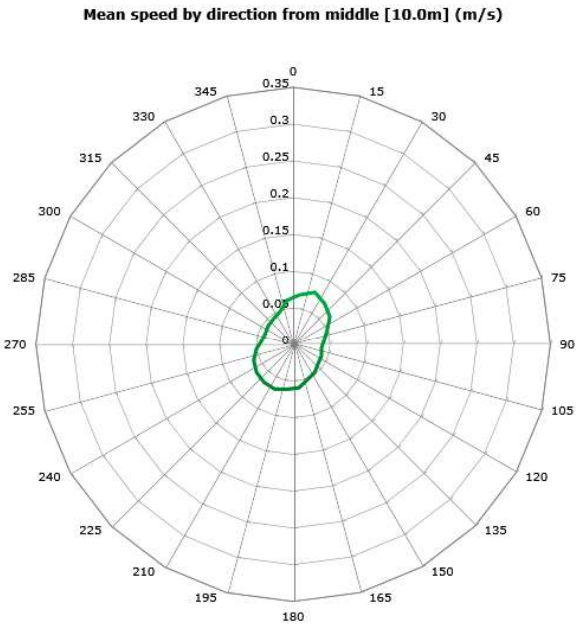

Speed for bottom [15.0m]
m/s
0.3
0.25
0.2
0.15
0.1
0.05
0
01/10/2022
01/11/2022
01/12/2022
01/01/2023

Mean speed - roseplot

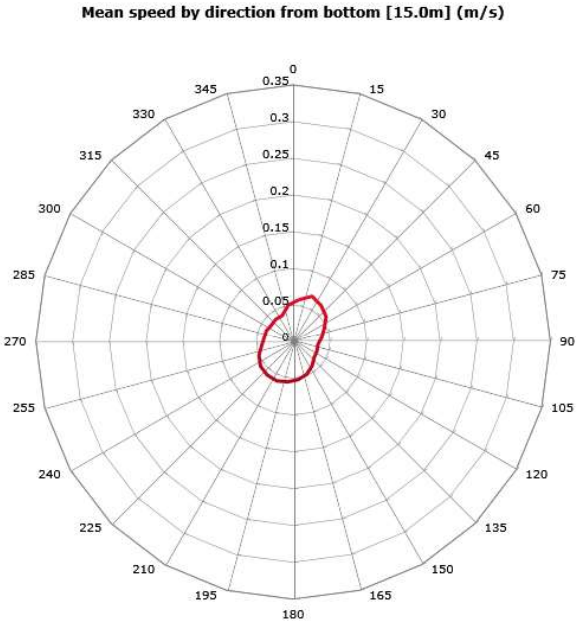
Top [5.0m]



Middle [10.0m]

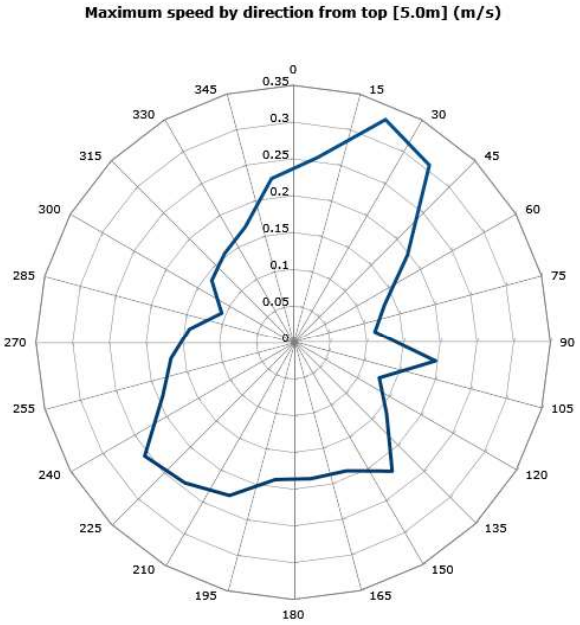


Bottom [15.0m]

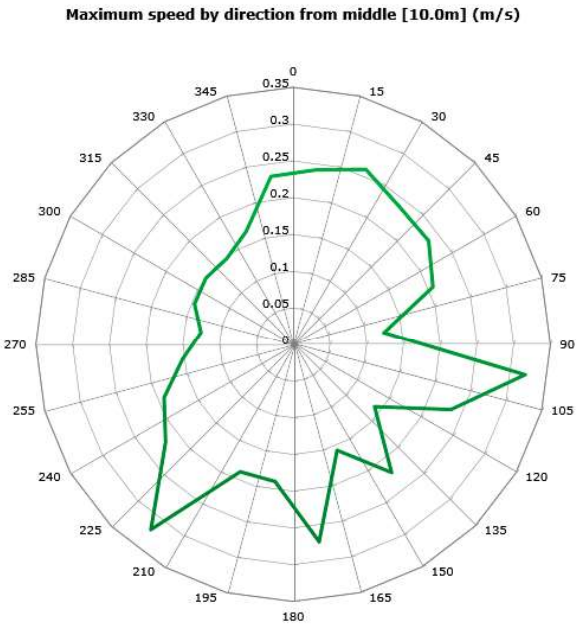

Mean speed by direction from bottom [15.0m] (m/s)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0

Max speed - roseplot

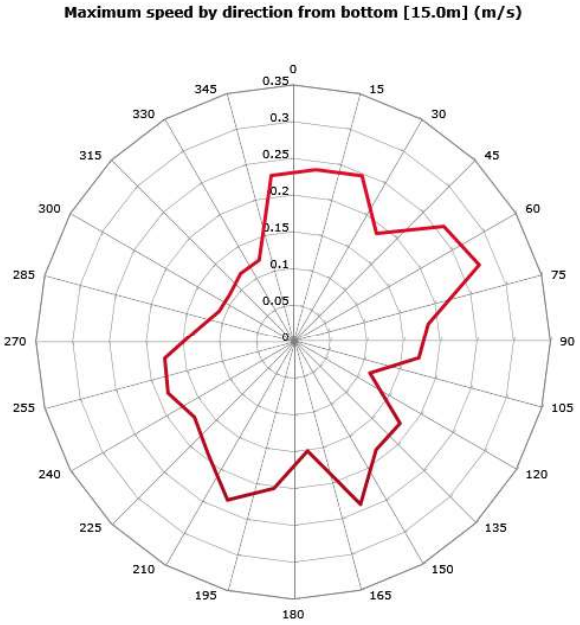
Top [5.0m]



Middle [10.0m]

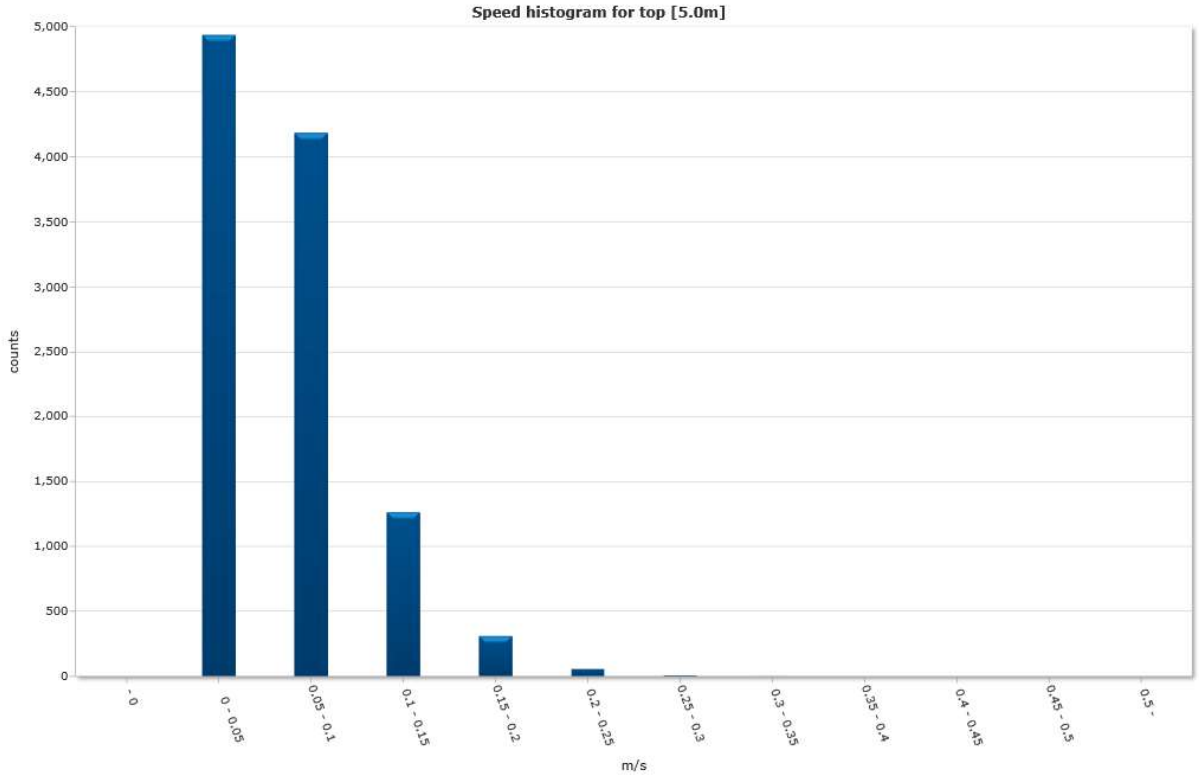


Bottom [15.0m]

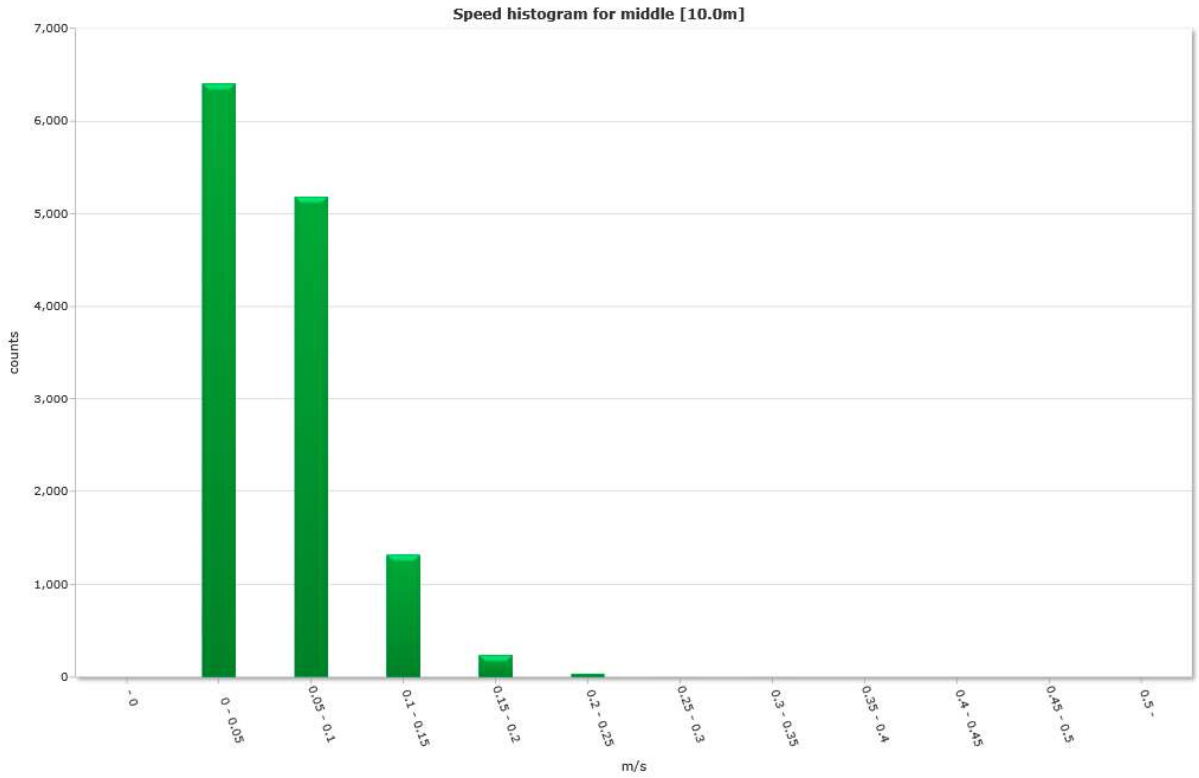

Maximum speed by direction from bottom [15.0m] (m/s)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0

Speed histogram

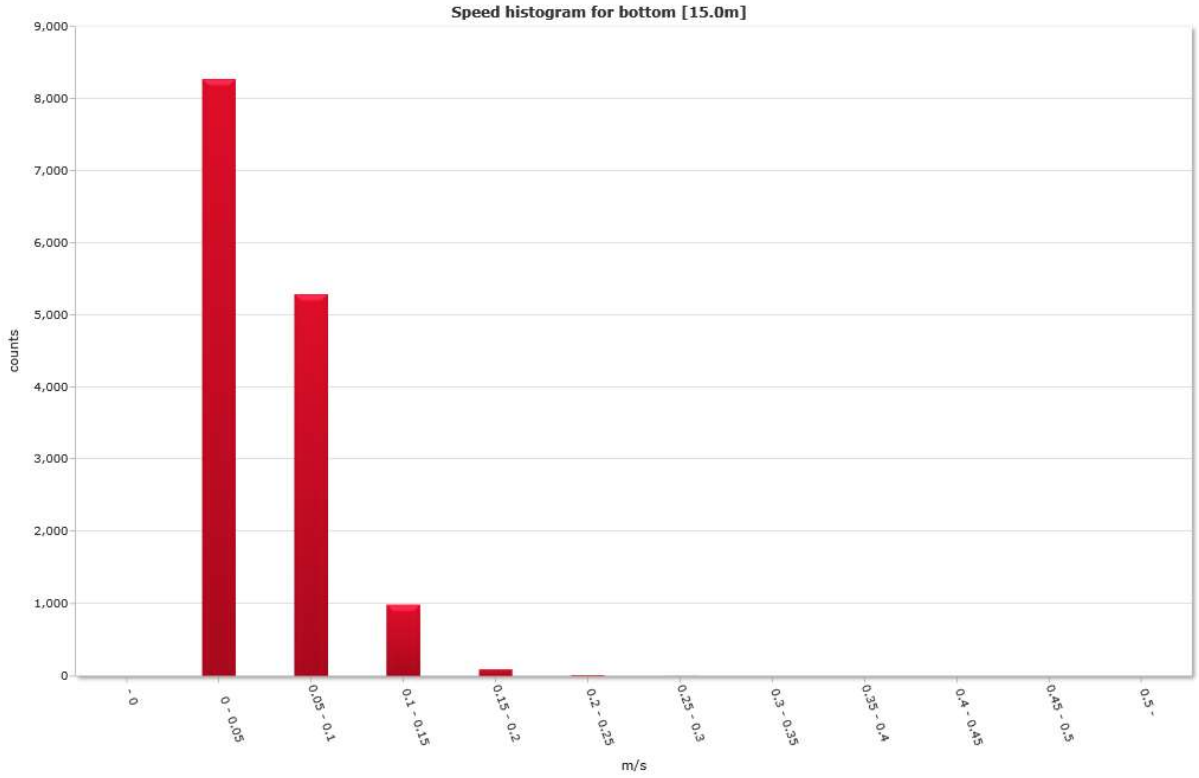
Top [5.0m]



Middle [10.0m]

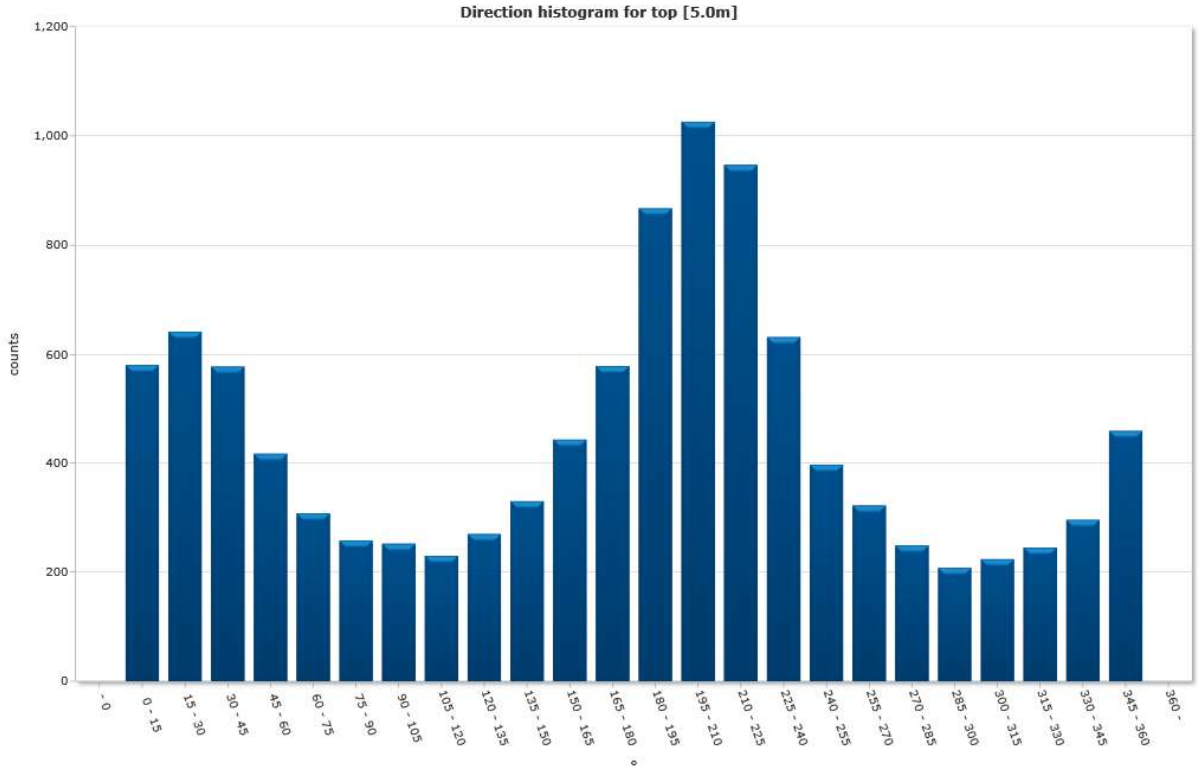


Bottom [15.0m]

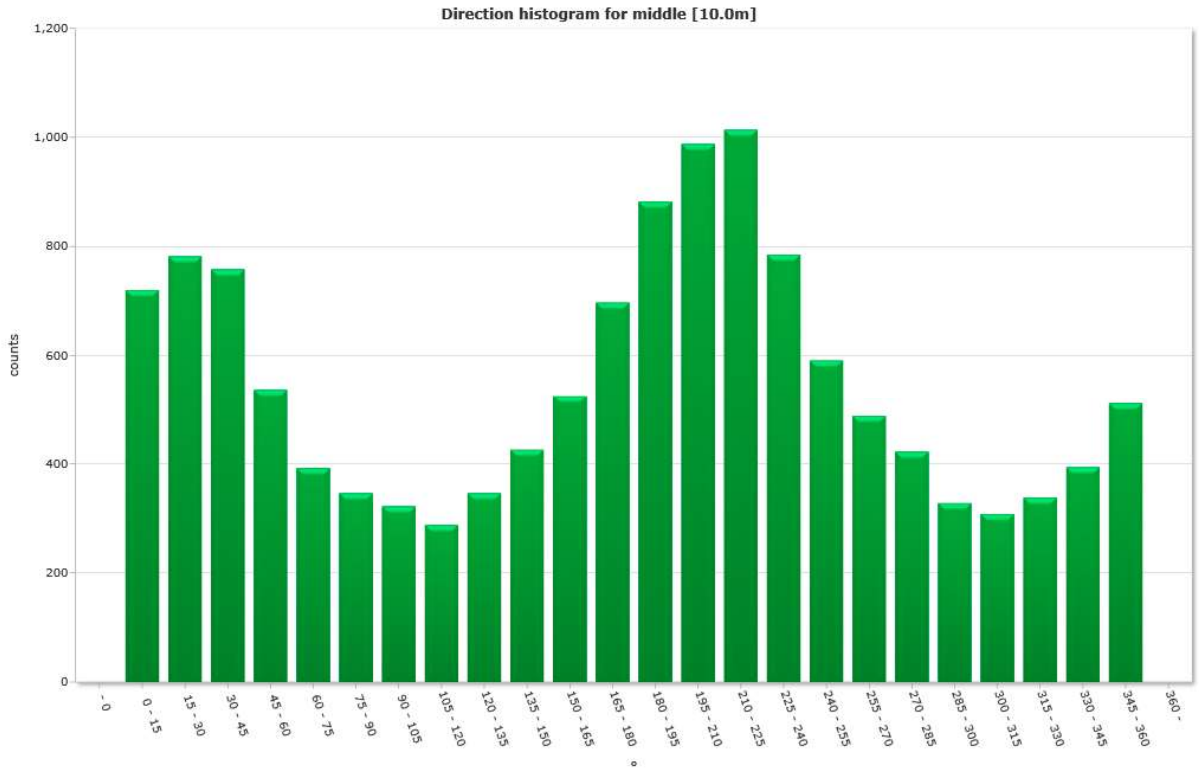

Speed histogram for bottom [15.0m]
counts
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
- 0
0 - 0.05
0.05 - 0.1
0.1 - 0.15
0.15 - 0.2
0.2 - 0.25
0.25 - 0.3
0.3 - 0.35
0.35 - 0.4
0.4 - 0.45
0.45 - 0.5
0.5 -
m/s

Direction histogram

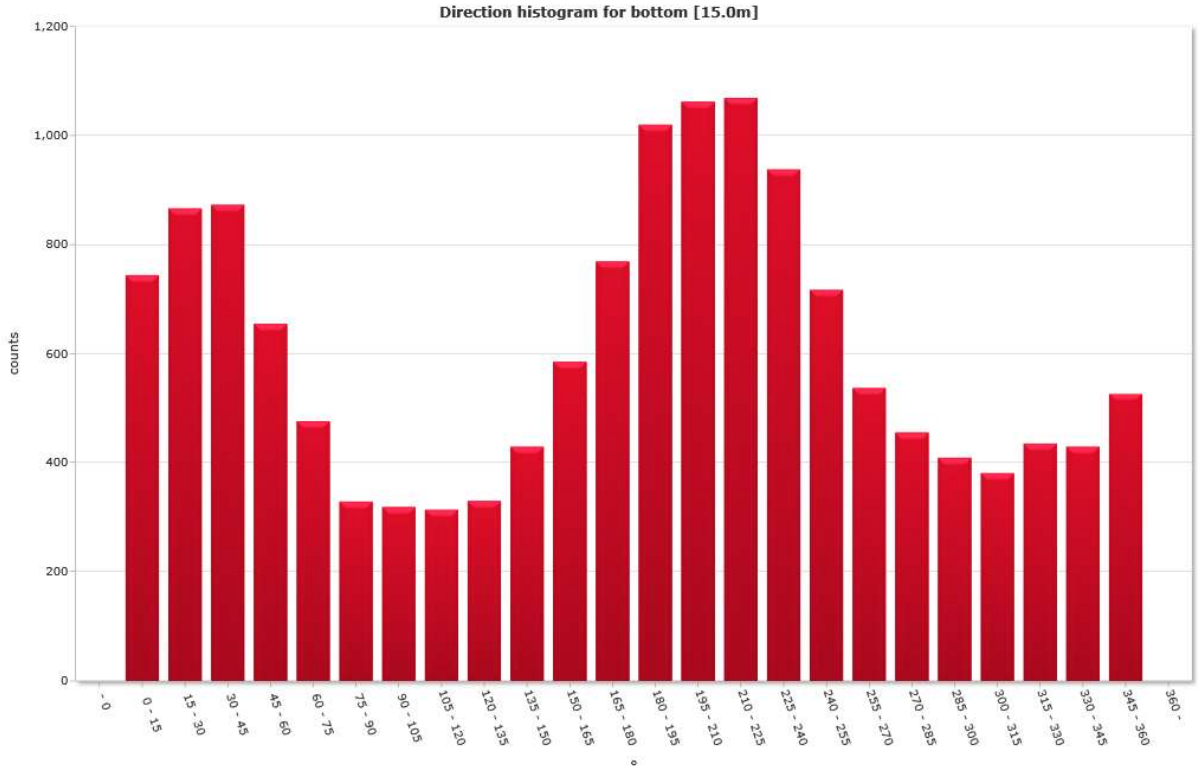
Top [5.0m]



Middle [10.0m]



Bottom [15.0m]


Direction histogram for bottom [15.0m]
counts
1,200
1,000
800
600
400
200
0
- 0
0 - 15
15 - 30
30 - 45
45 - 60
60 - 75
75 - 90
90 - 105
105 - 120
120 - 135
135 - 150
150 - 165
165 - 180
180 - 195
195 - 210
210 - 225
225 - 240
240 - 255
255 - 270
270 - 285
285 - 300
300 - 315
315 - 330
330 - 345
345 - 360
360 -
°

Direction/Speed histogram

Top [5.0m]

° m/s	Direction/speed matrix for top [5.0m]																								
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	198	219	219	205	197	163	182	161	197	230	247	232	292	290	274	244	209	196	177	139	151	168	167	179	45.9	4936
0.10	228	254	233	164	98	90	64	63	68	90	181	286	401	474	420	268	146	107	67	68	68	65	96	184	38.9	4183
0.15	113	113	92	43	13	5	5	6	4	9	14	58	151	201	184	79	37	18	5	1	5	11	28	67	11.7	1262
0.20	30	40	28	5	0	0	1	0	1	0	1	3	24	53	59	33	5	1	0	0	0	1	5	21	2.9	311
0.25	10	11	4	0	0	0	0	0	0	1	0	0	0	8	10	7	0	0	0	0	0	0	0	8	0.5	59
0.30	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	8
0.35	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	2
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	5.4	6.0	5.4	3.9	2.9	2.4	2.3	2.1	2.5	3.1	4.1	5.4	8.1	9.5	8.8	5.9	3.7	3.0	2.3	1.9	2.1	2.3	2.8	4.3	100.0	100.0
Sum	581	642	578	417	308	258	252	230	270	330	443	579	868	1026	947	632	397	322	249	208	224	245	296	459	100.0	10761

Middle [10.0m]

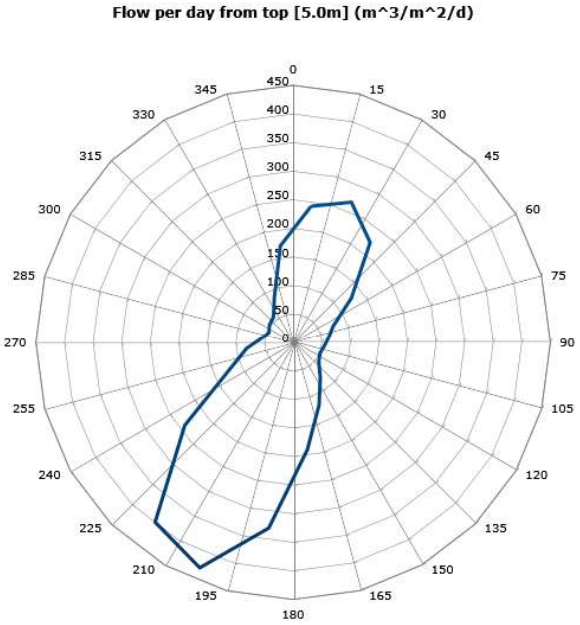
° m/s	Direction/speed matrix for middle [10.0m]																								
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	287	240	291	210	216	238	235	207	234	250	286	316	360	362	385	331	279	269	286	227	212	217	226	241	48.6	6405
0.10	279	334	304	244	157	98	82	72	105	154	204	290	393	457	487	335	241	197	122	95	89	109	146	191	39.3	5185
0.15	117	154	118	72	16	10	4	7	7	21	33	81	112	152	117	100	60	21	14	6	7	12	21	56	10.0	1318
0.20	33	40	38	8	2	0	0	1	0	0	2	9	17	17	20	18	11	1	0	0	0	0	1	20	1.8	238
0.25	4	13	7	3	1	0	0	1	0	1	0	0	0	0	4	1	0	0	0	0	0	0	0	3	0.3	38
0.30	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.0	2
0.35	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.0	2
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	5.5	5.9	5.7	4.1	3.0	2.6	2.4	2.2	2.6	3.2	4.0	5.3	6.7	7.5	7.7	6.0	4.5	3.7	3.2	2.5	2.3	2.6	3.0	3.9	100.0	100.0
Sum	720	782	758	537	392	346	322	288	346	426	525	697	882	988	1014	785	591	488	422	328	308	338	394	511	100.0	13188

Bottom [15.0m]

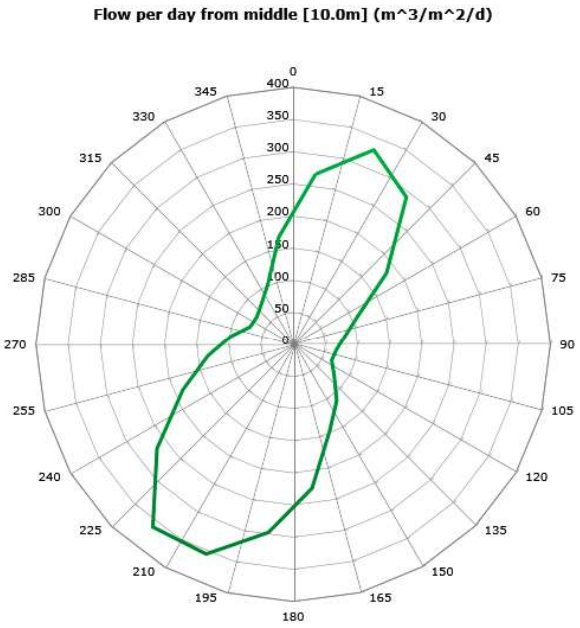
° m/s	Direction/speed matrix for bottom [15.0m]																									
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	373	341	368	336	298	243	260	246	263	294	357	396	486	454	497	458	418	352	322	291	289	325	318	287	56.4	8272
0.10	275	357	371	246	160	80	56	64	63	120	189	318	456	515	469	389	246	167	124	116	88	105	105	211	36.1	5290
0.15	75	142	122	66	15	4	1	3	2	12	36	54	74	90	96	84	46	16	8	1	3	4	5	26	6.7	985
0.20	17	21	12	6	1	1	1	0	1	2	2	1	3	2	7	7	7	2	0	0	0	0	0	1	0.6	94
0.25	4	5	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0.1	13
0.30	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	2
0.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	5.1	5.9	6.0	4.5	3.2	2.2	2.2	2.1	2.2	2.9	4.0	5.2	7.0	7.2	7.3	6.4	4.9	3.7	3.1	2.8	2.6	3.0	2.9	3.6	100.0	100.0
Sum	744	866	873	655	475	328	318	313	329	428	585	769	1020	1062	1069	938	717	537	454	408	380	434	428	526	100.0	14656

Flow

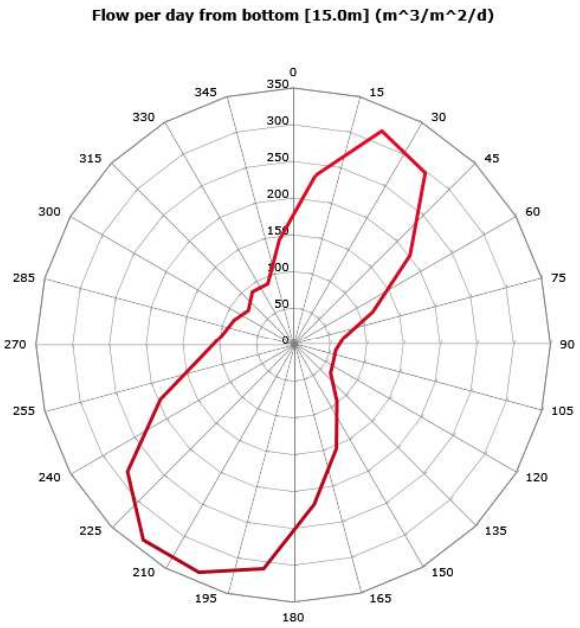
Top [5.0m]



Middle [10.0m]

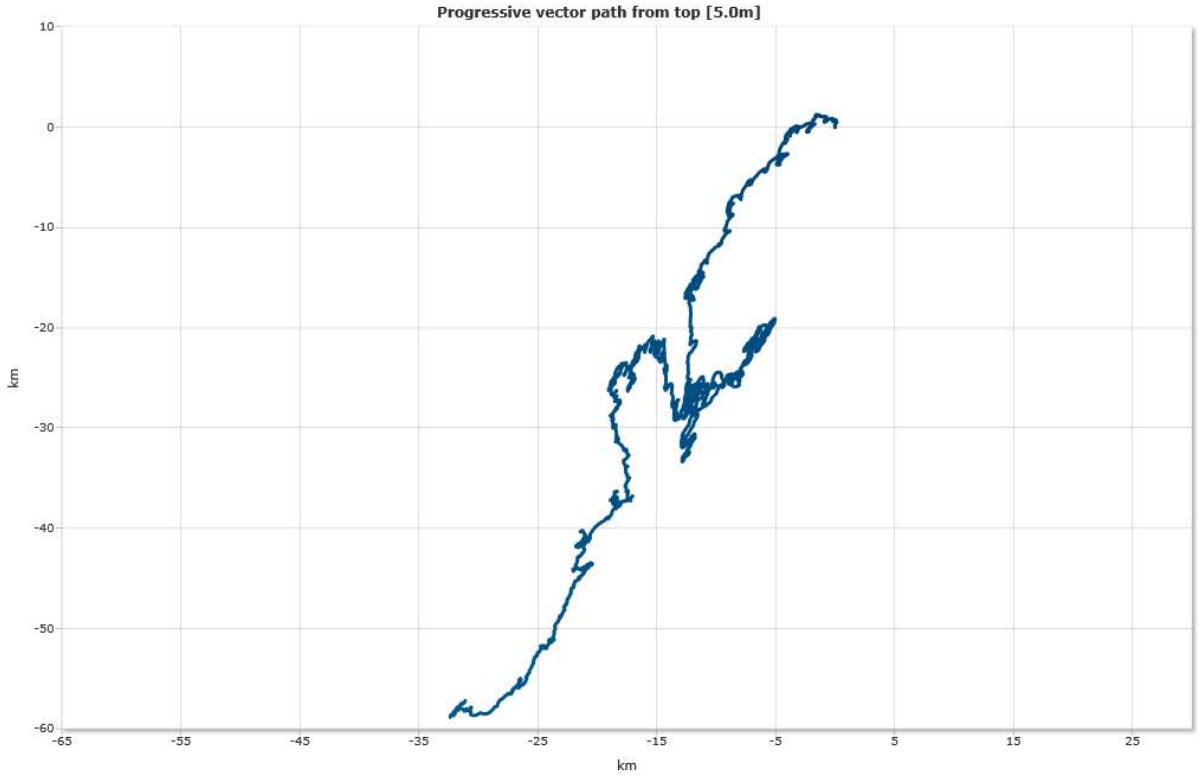


Bottom [15.0m]

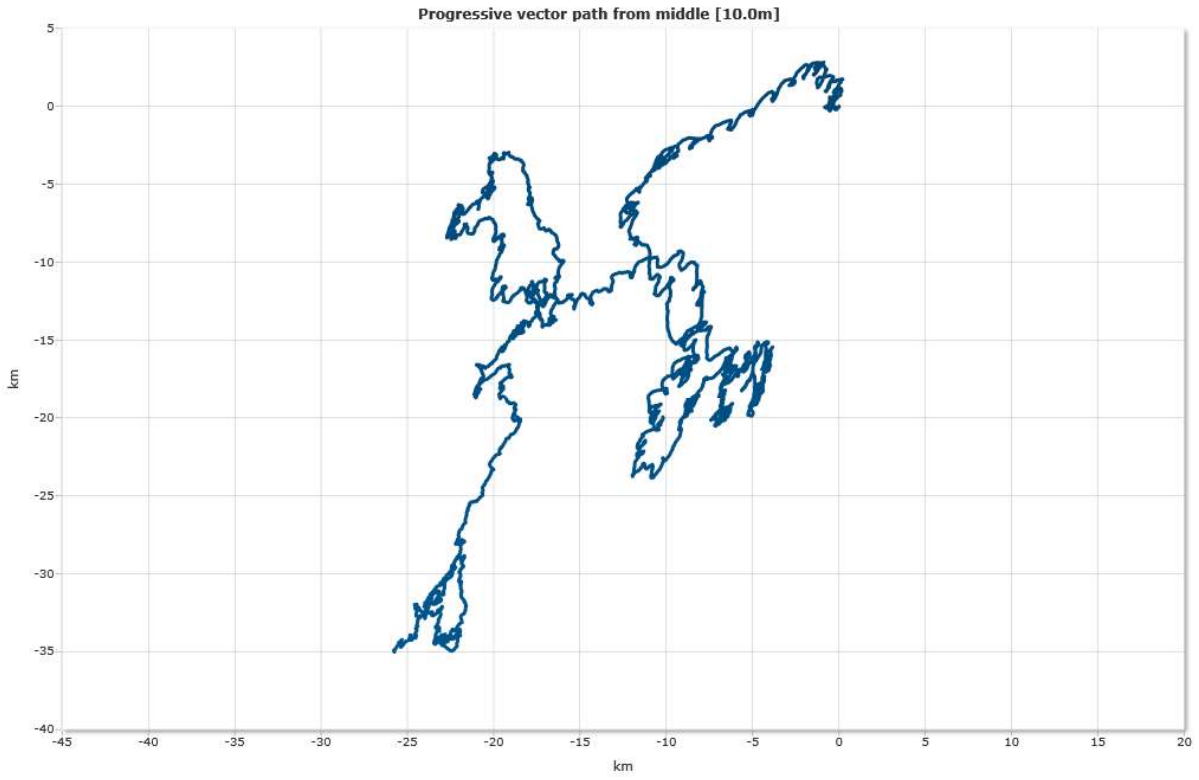

Flow per day from bottom [15.0m] (m^3/m^2/d)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
350
300
250
200
150
100
50
0

Progressive vector

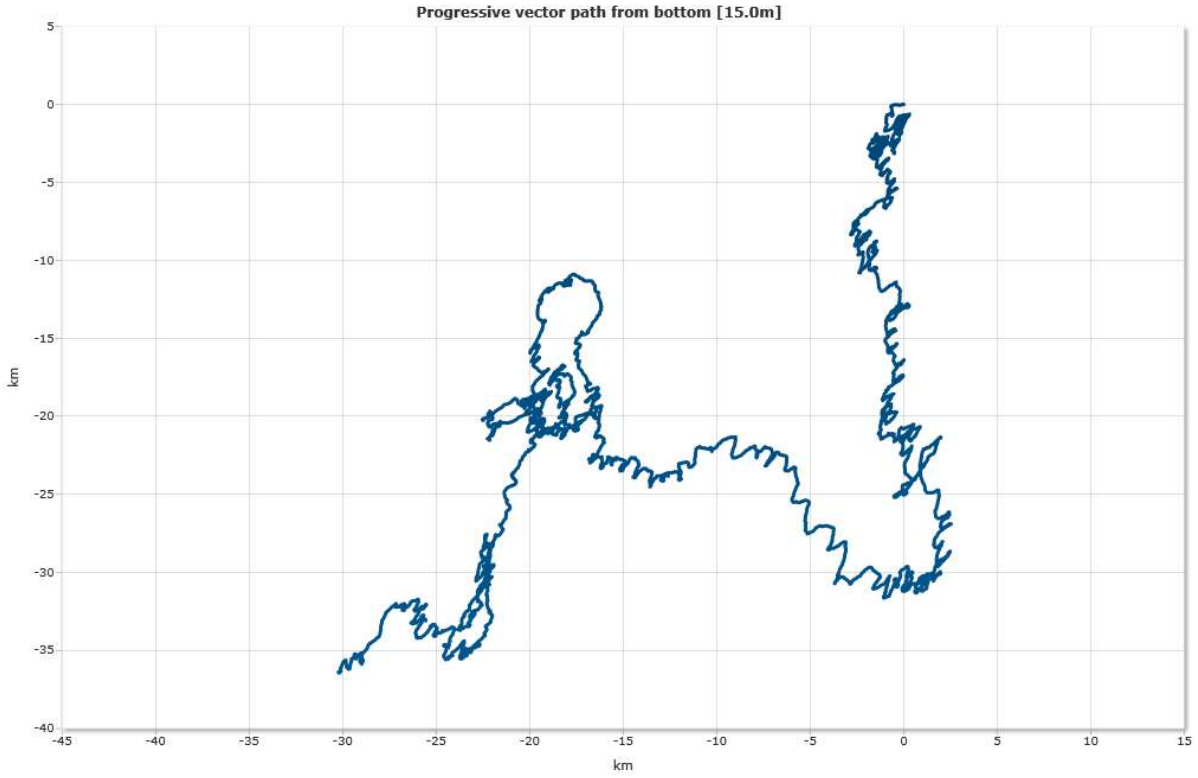
Top [5.0m]



Middle [10.0m]

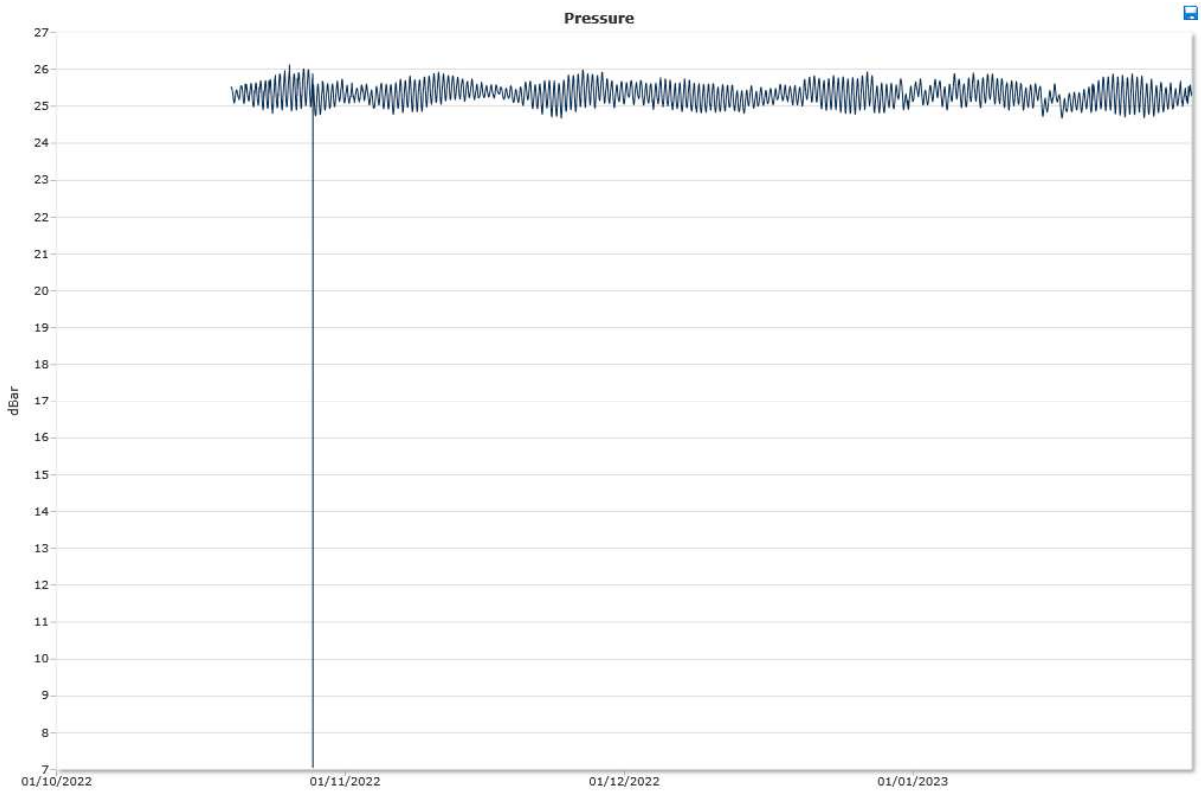


Bottom [15.0m]

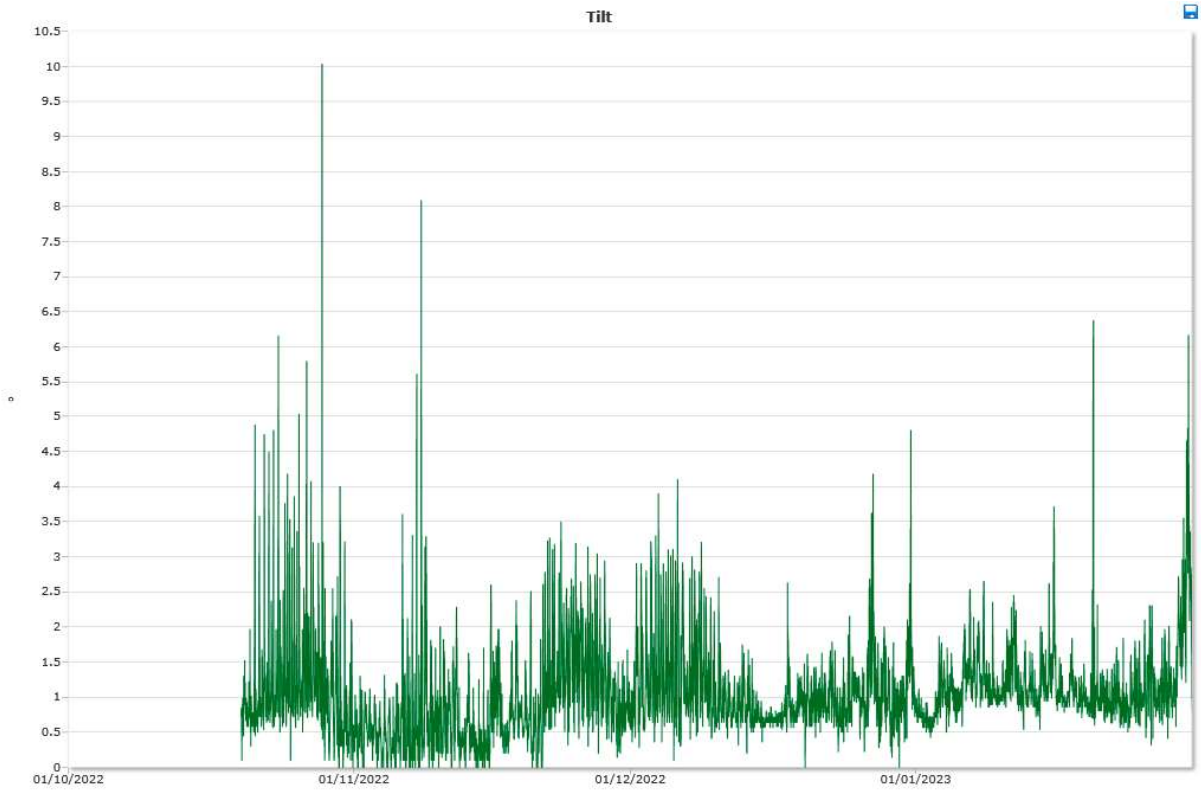

Progressive vector path from bottom [15.0m]
km
km
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
5
10
15

Sensors

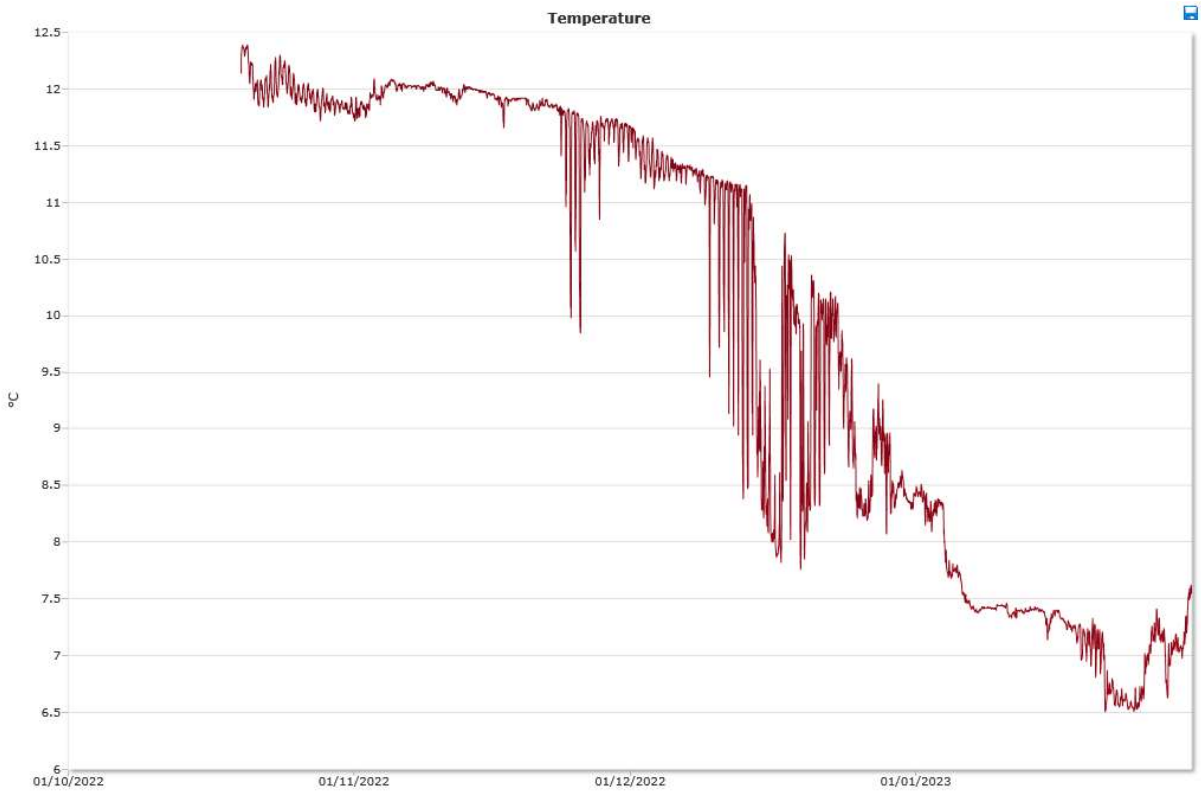
Pressure



Tilt



Temperature



Koløy N, 2. periode

07.02.23 - 13.03.23

06/15/2023
RB
EB

Content

Summary

Details

Instrument

Head Id	AQP 8882
Board Id	AQD13100
Frequency	400000

Configuration

File	koloy01.prf
Start	07.02.2023 15:33
End	13.03.2023 13:33
Data Records	4885
Orientation	UP
Cells	11
Cell Size [m]	2.5
Blanking Distance [m]	1
Average Interval [sec]	00:01:00
Measurement Interval [sec]	00:10:00

Quality

Low Pressure Treshold	0
HighTilt Threshold	30
Expected Orientation	UP
Amplitude Spike Treshold	70
Velocity Spike Treshold	5
SNR Treshold	3
Correlation Treshold	50

Post processing

Selected Start	07.02.2023 15:40
Selected End	13.03.2023 13:20
Compass Offset	0
Pressure Offset	0
Selected Records	4882
Reference	Water Surface
Top Depth [m]	5
Top Invalid Data	0
Middle Depth [m]	10
Middle Invalid Data	0
Bottom Depth [m]	15
Bottom Invalid Data	0

Manually removed data

Start Time	End Time	Comment

Statistics

Top [5.0m]

Mean current [m/s]	0.06
Max current [m/s]	0.25
Min current [m/s]	0.00
Measurements used/total [#]	4882 / 4882
Std.dev [m/s]	0.04
Significant max velocity [m/s]	0.10
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.415
50 year return current [m/s]	0.465
Most significant directions [°]	225°, 210°, 30°, 15°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	675.41m³ / day at 210-225°
Least flow	28.52m³ / day at 120-135°
Neumann parameter	0.20
Residue current	0.01 m/s at 241°
Zero current [%] - [HH:mm]	3.38% - 00:50

Middle [10.0m]

Mean current [m/s]	0.05
Max current [m/s]	0.23
Min current [m/s]	0.00
Measurements used/total [#]	4882 / 4882
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.09
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.386
50 year return current [m/s]	0.433
Most significant directions [°]	210°, 225°, 240°, 30°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	477.52m³ / day at 195-210°
Least flow	37.24m³ / day at 105-120°
Neumann parameter	0.19
Residue current	0.01 m/s at 250°
Zero current [%] - [HH:mm]	3.95% - 00:40

Bottom [15.0m]

Mean current [m/s]	0.04
Max current [m/s]	0.19
Min current [m/s]	0.00
Measurements used/total [#]	4882 / 4882
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.07
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.307

50 year return current [m/s]	0.344
Most significant directions [°]	225°, 240°, 210°, 30°
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	354.89m³ / day at 210-225°
Least flow	47.72m³ / day at 105-120°
Neumann parameter	0.13
Residue current	0.01 m/s at 237°
Zero current [%] - [HH:mm]	4.85% - 00:30

Sensors

	Mean	**Min**	**Max**
Pressure [dbar]	19.96	19.27	20.75
Temperature [°C]	7.98	6.51	8.90
Heading [°]	173.05	0.00	359.80
Pitch [°]	-1.46	-8.90	0.10
Roll [°]	0.21	-2.90	4.90

Direction with return period

Top [5.0m]

Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.063	0.248	0.103	0.409	0.116	0.458
45	0.062	0.216	0.102	0.357	0.115	0.400
90	0.033	0.098	0.054	0.162	0.060	0.181
135	0.039	0.201	0.065	0.332	0.072	0.373
180	0.067	0.243	0.111	0.402	0.124	0.450
225	0.073	0.252	0.120	0.415	0.135	0.465
270	0.041	0.116	0.067	0.192	0.075	0.215
315	0.038	0.101	0.063	0.166	0.071	0.186

Middle [10.0m]

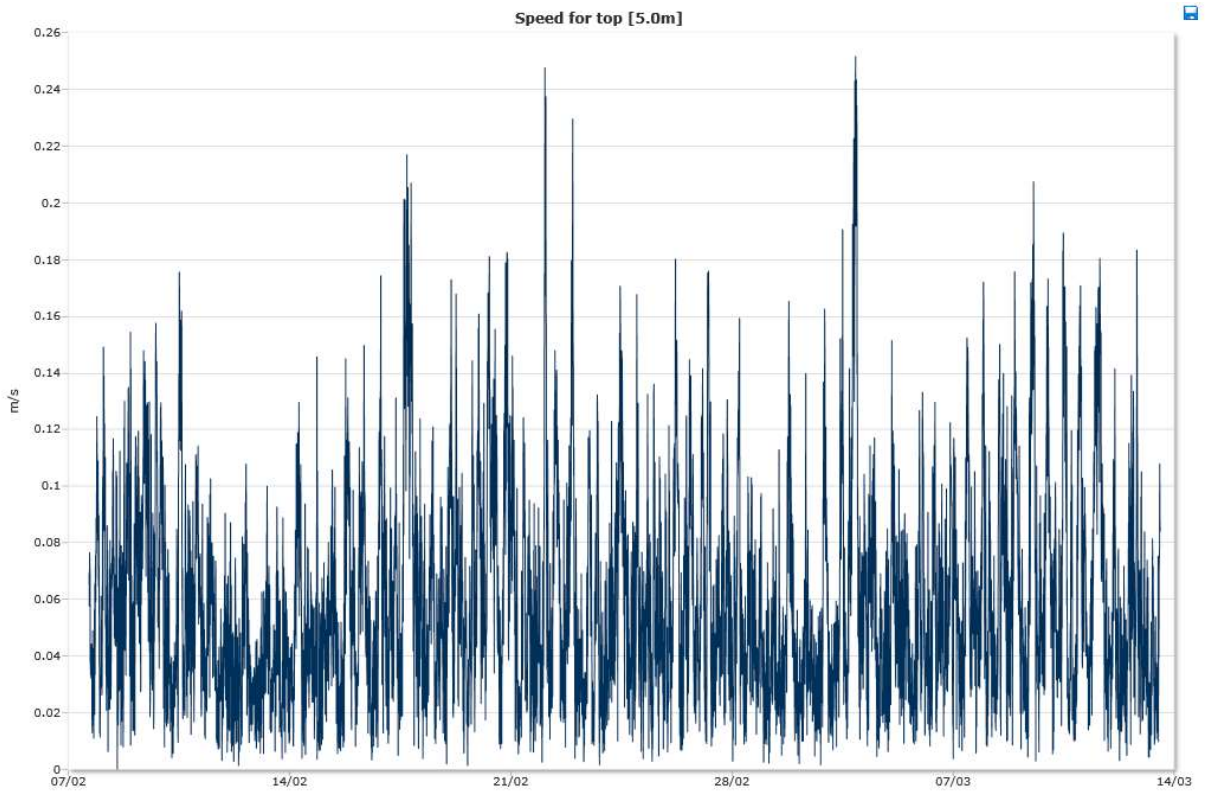
Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.055	0.204	0.091	0.337	0.103	0.378
45	0.059	0.234	0.097	0.386	0.109	0.433
90	0.032	0.100	0.052	0.165	0.059	0.185
135	0.034	0.125	0.056	0.207	0.063	0.232
180	0.056	0.179	0.092	0.296	0.103	0.332
225	0.059	0.178	0.097	0.294	0.108	0.330
270	0.040	0.143	0.065	0.236	0.073	0.264
315	0.035	0.105	0.057	0.173	0.064	0.195

Bottom [15.0m]

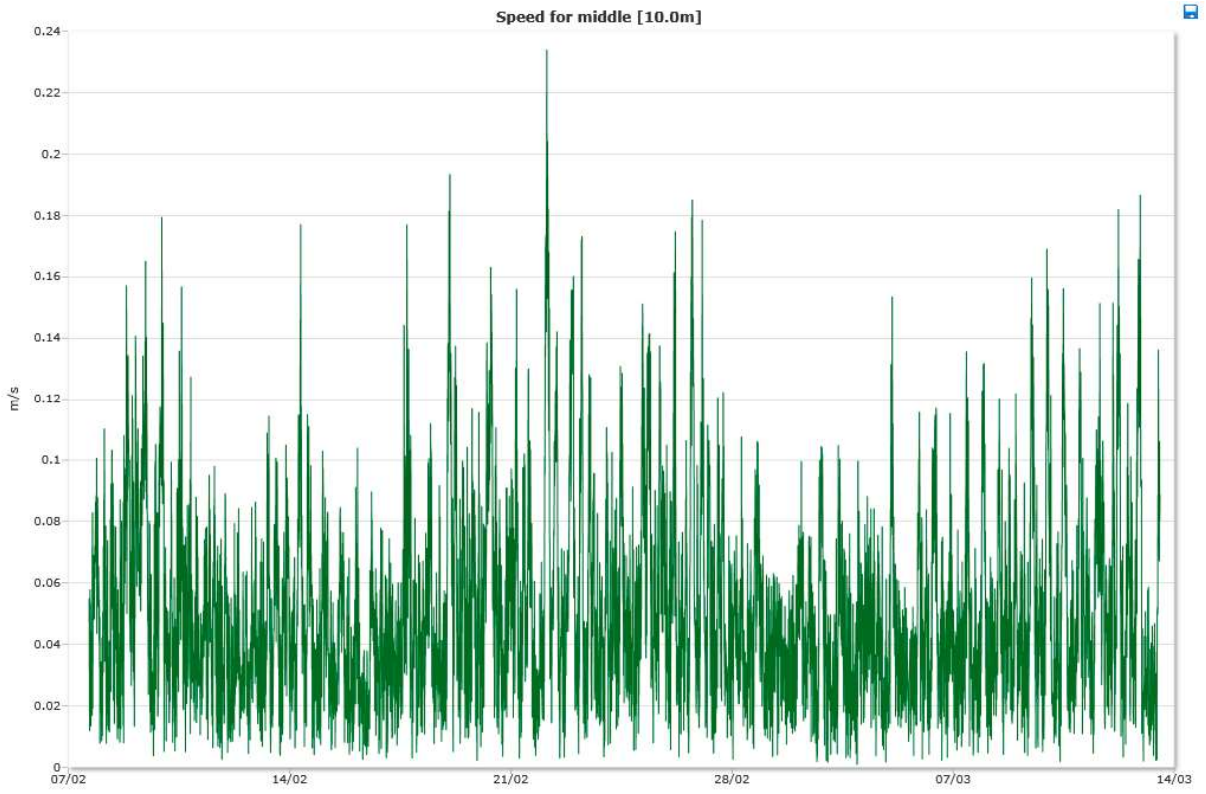
Direction	Mean	Max	Mean 10y	Max 10y	Mean 50y	Max 50y
0	0.047	0.157	0.077	0.259	0.087	0.290
45	0.051	0.186	0.085	0.307	0.095	0.344
90	0.031	0.081	0.050	0.134	0.057	0.150
135	0.033	0.094	0.054	0.155	0.060	0.174
180	0.047	0.159	0.078	0.262	0.087	0.294
225	0.051	0.141	0.085	0.233	0.095	0.261
270	0.039	0.122	0.065	0.201	0.073	0.225
315	0.033	0.116	0.054	0.192	0.061	0.215

Time series

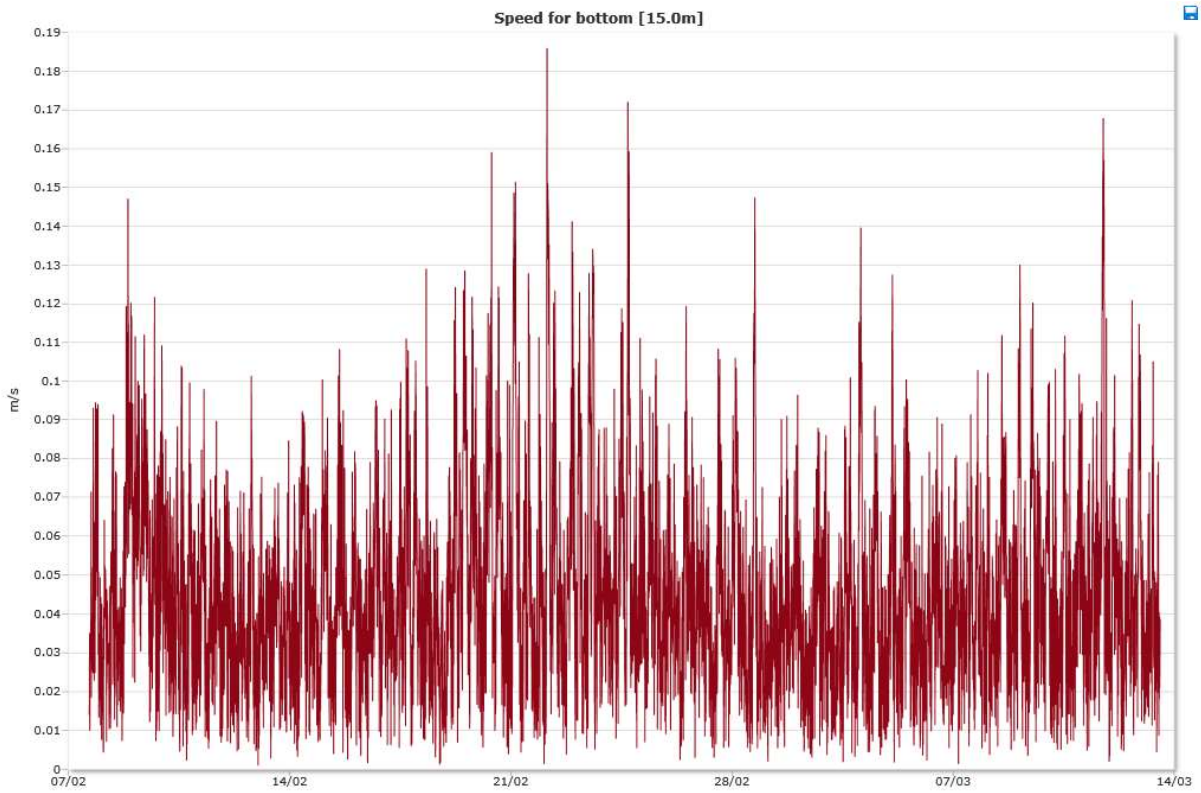
Top [5.0m]



Middle [10.0m]

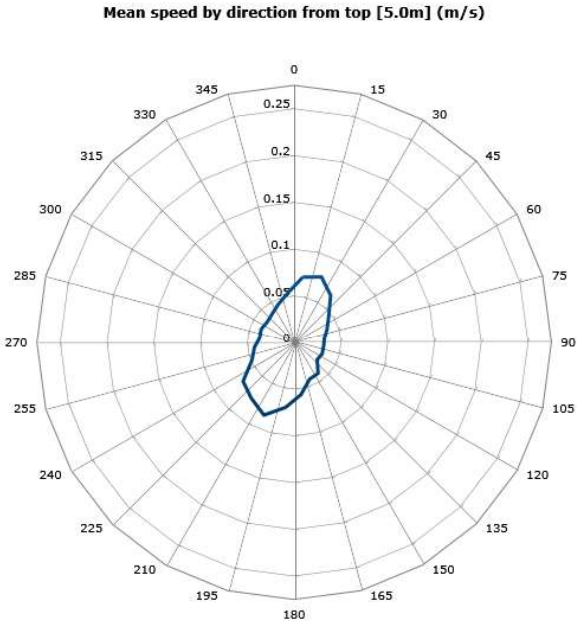


Bottom [15.0m]

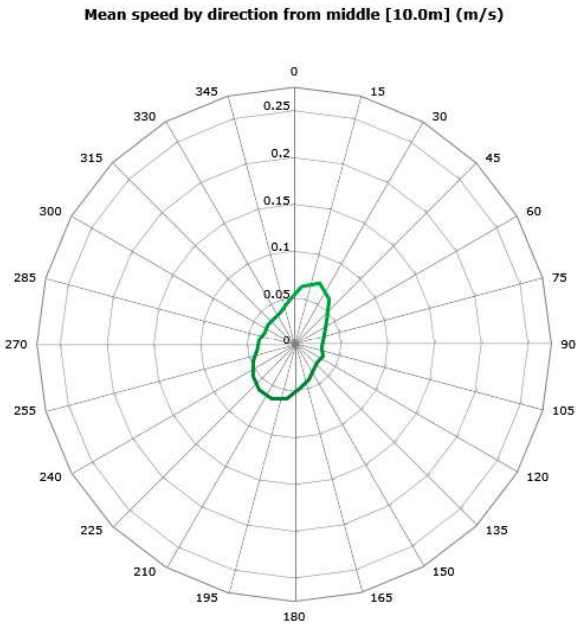

Speed for bottom [15.0m]
m/s
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
07/02
14/02
21/02
28/02
07/03
14/03

Mean speed - roseplot

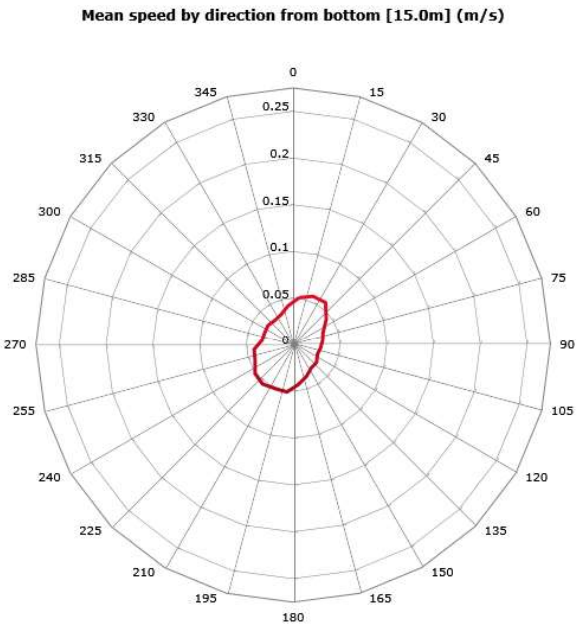
Top [5.0m]



Middle [10.0m]

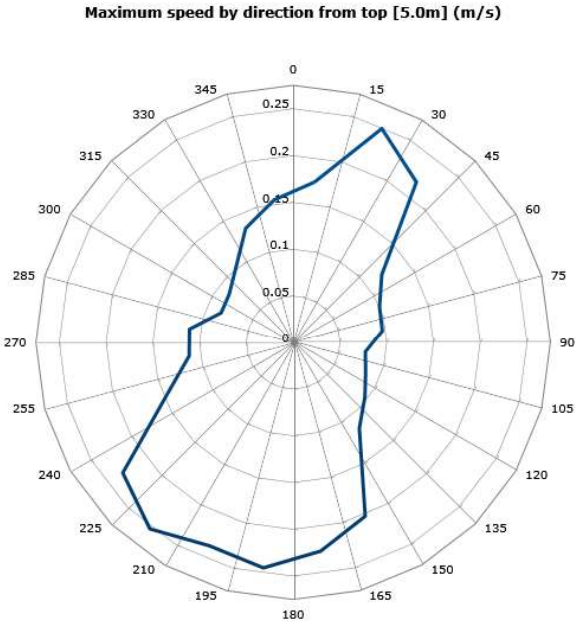


Bottom [15.0m]

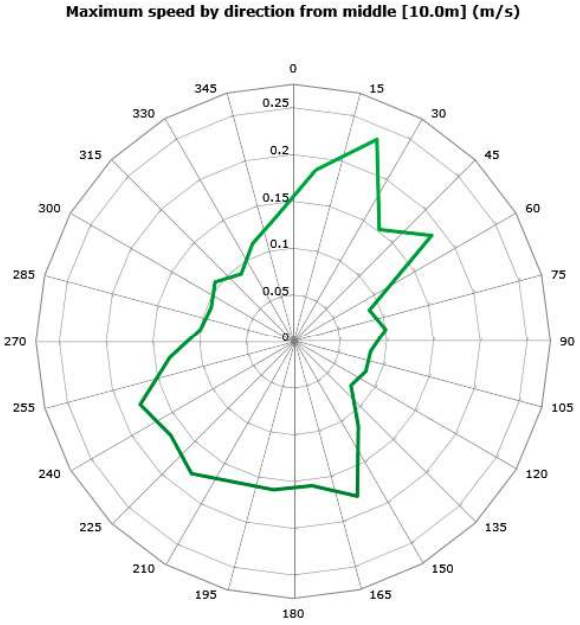

Mean speed by direction from bottom [15.0m] (m/s)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
0.25
0.2
0.15
0.1
0.05
0

Max speed - roseplot

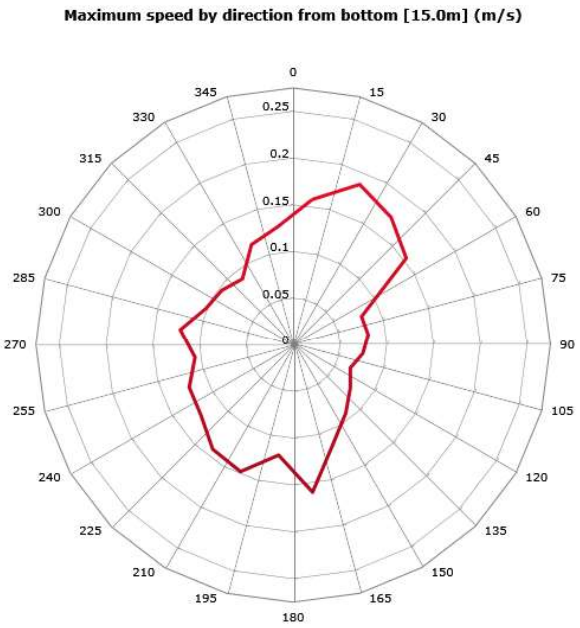
Top [5.0m]



Middle [10.0m]

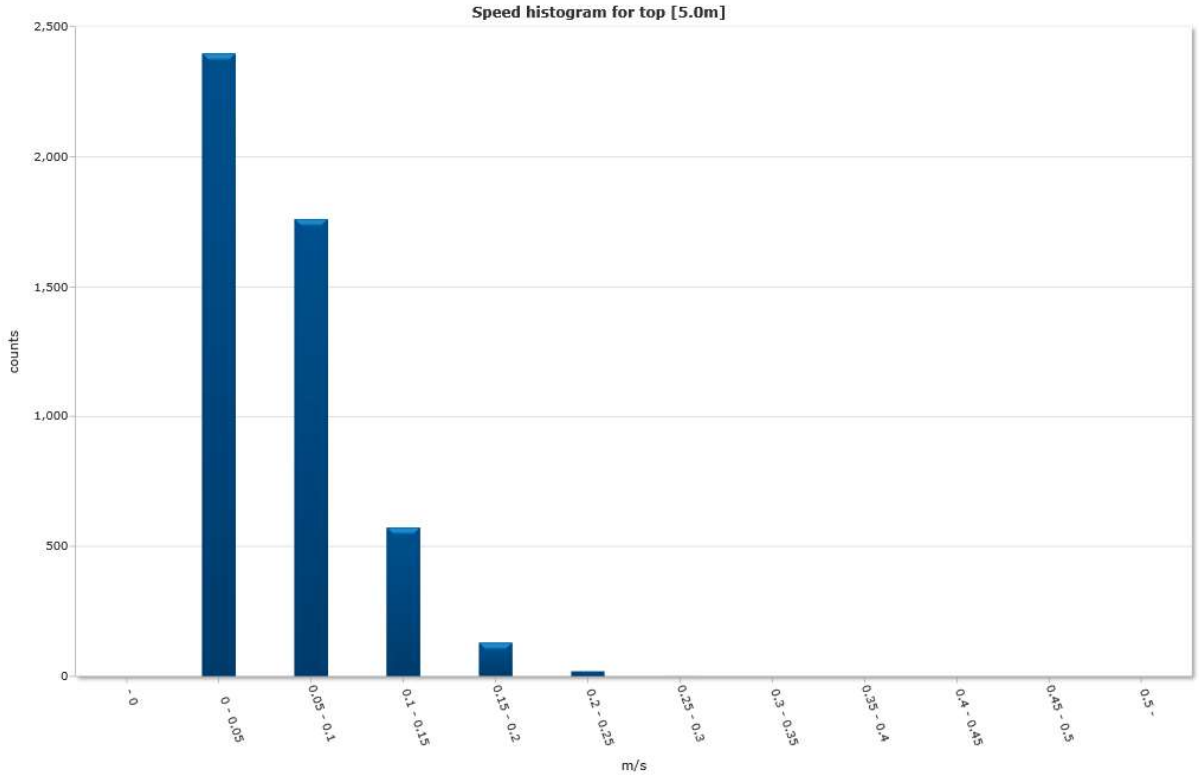


Bottom [15.0m]

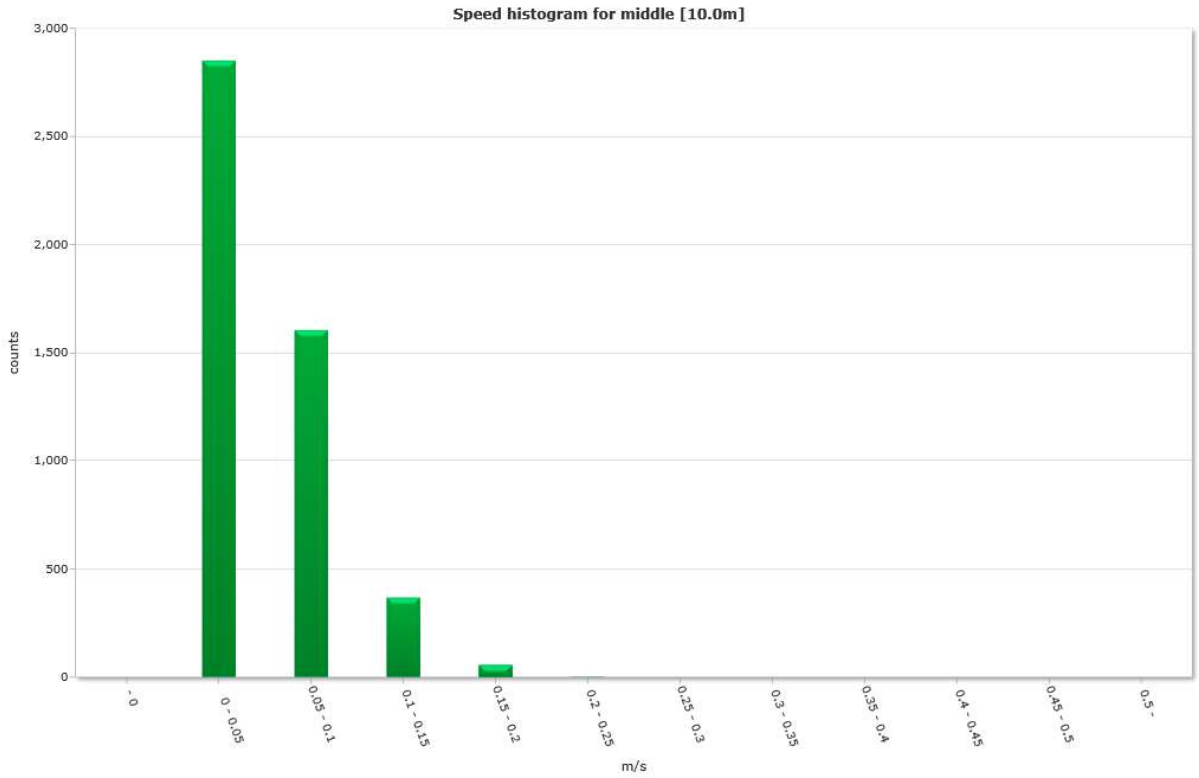

Maximum speed by direction from bottom [15.0m] (m/s)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
0.25
0.2
0.15
0.1
0.05
0

Speed histogram

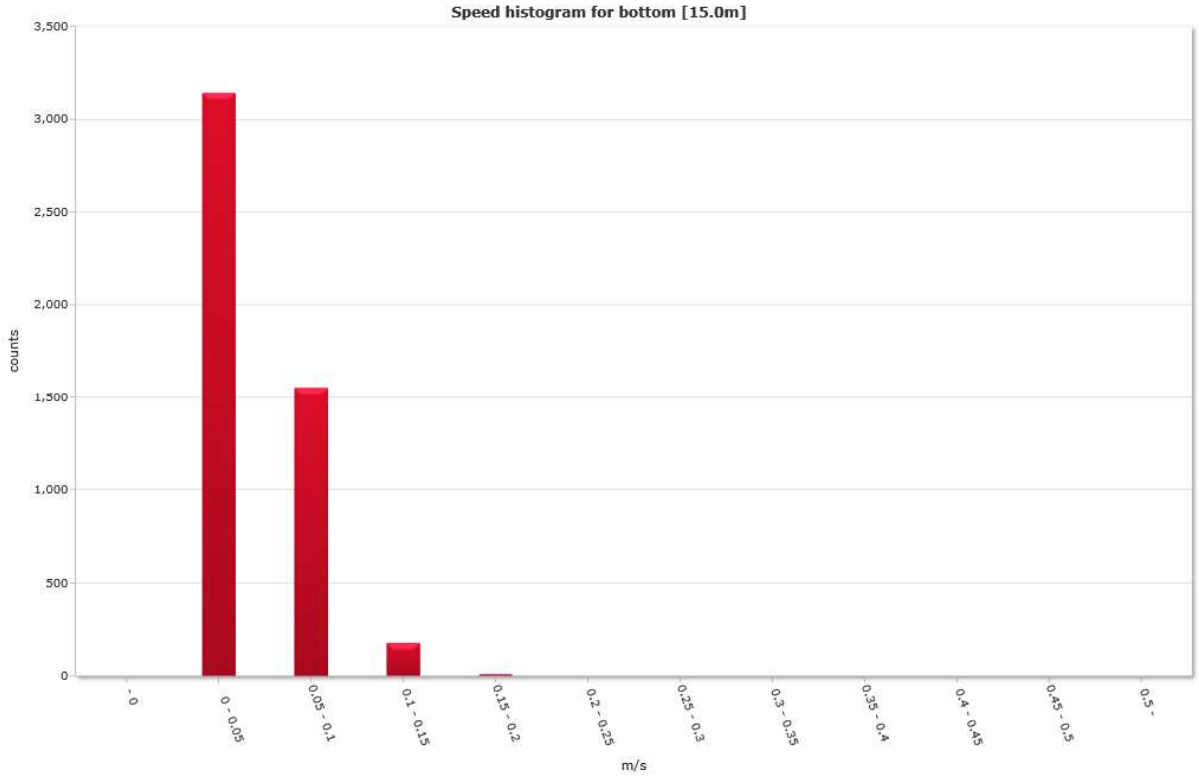
Top [5.0m]



Middle [10.0m]

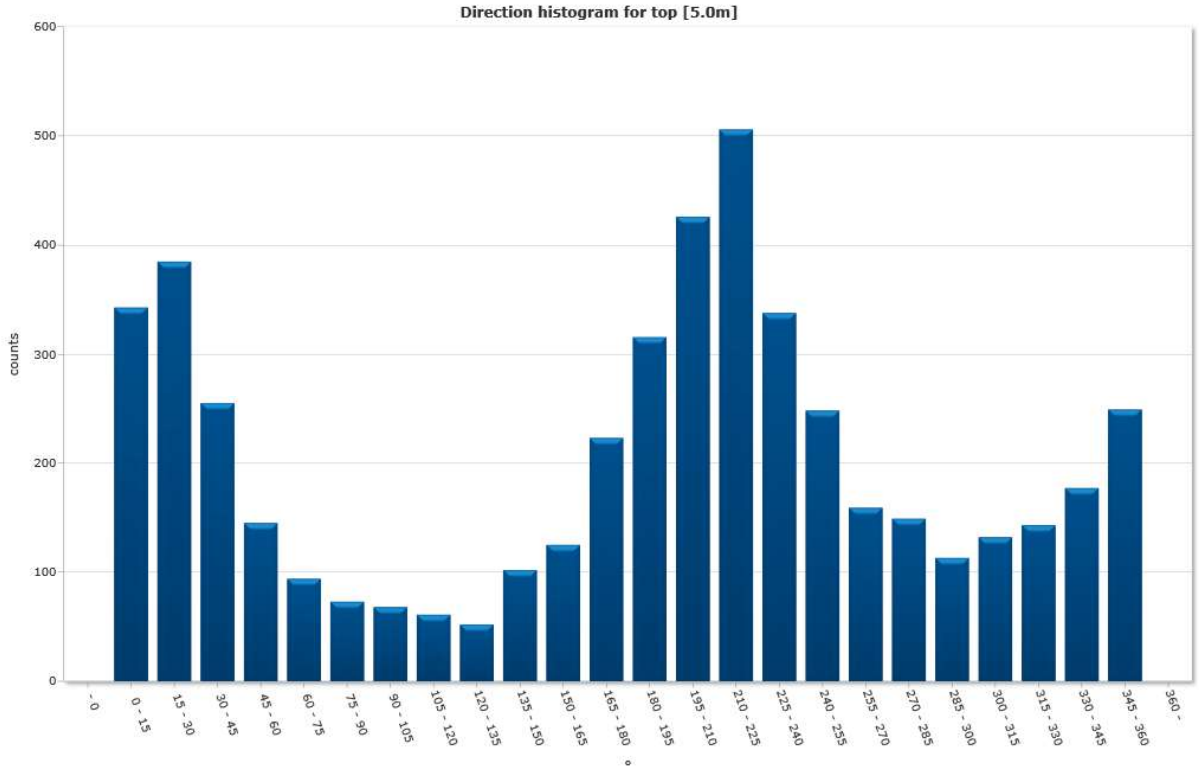


Bottom [15.0m]

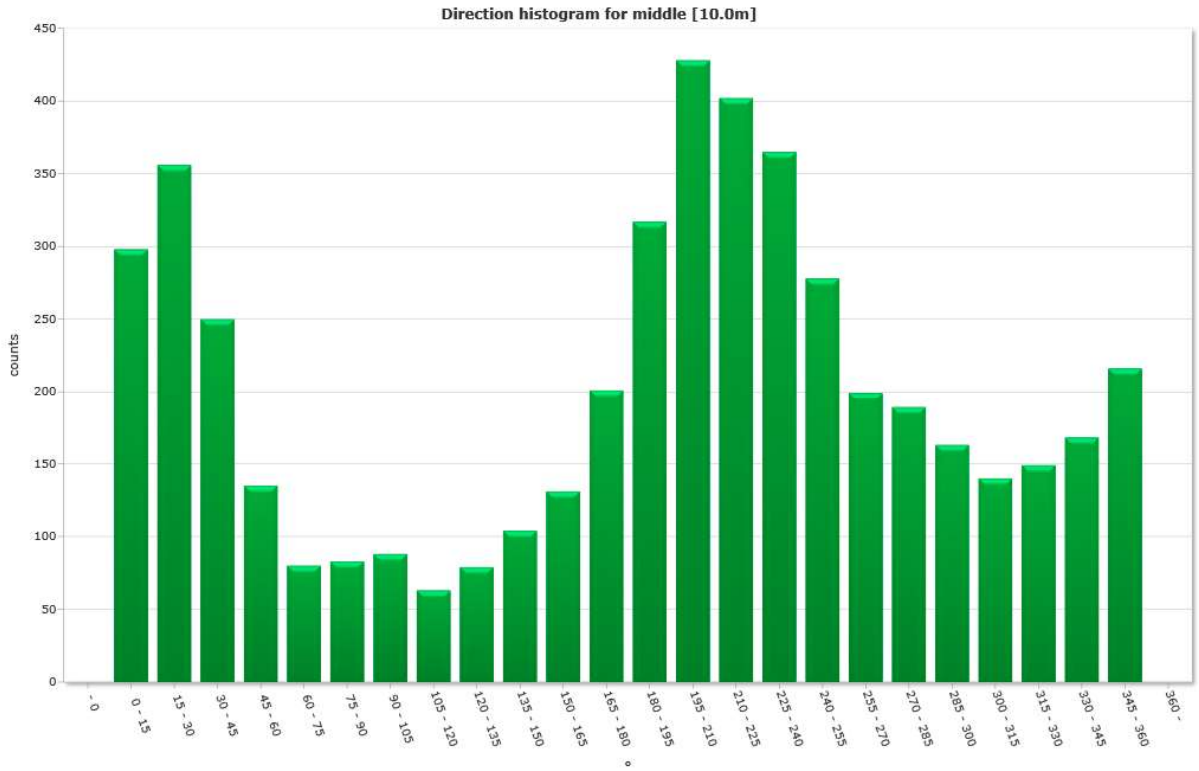

Speed histogram for bottom [15.0m]
counts
3,500
3,000
2,500
2,000
1,500
1,000
500
0
- 0
0 - 0.05
0.05 - 0.1
0.1 - 0.15
0.15 - 0.2
0.2 - 0.25
0.25 - 0.3
0.3 - 0.35
0.35 - 0.4
0.4 - 0.45
0.45 - 0.5
0.5 -
m/s

Direction histogram

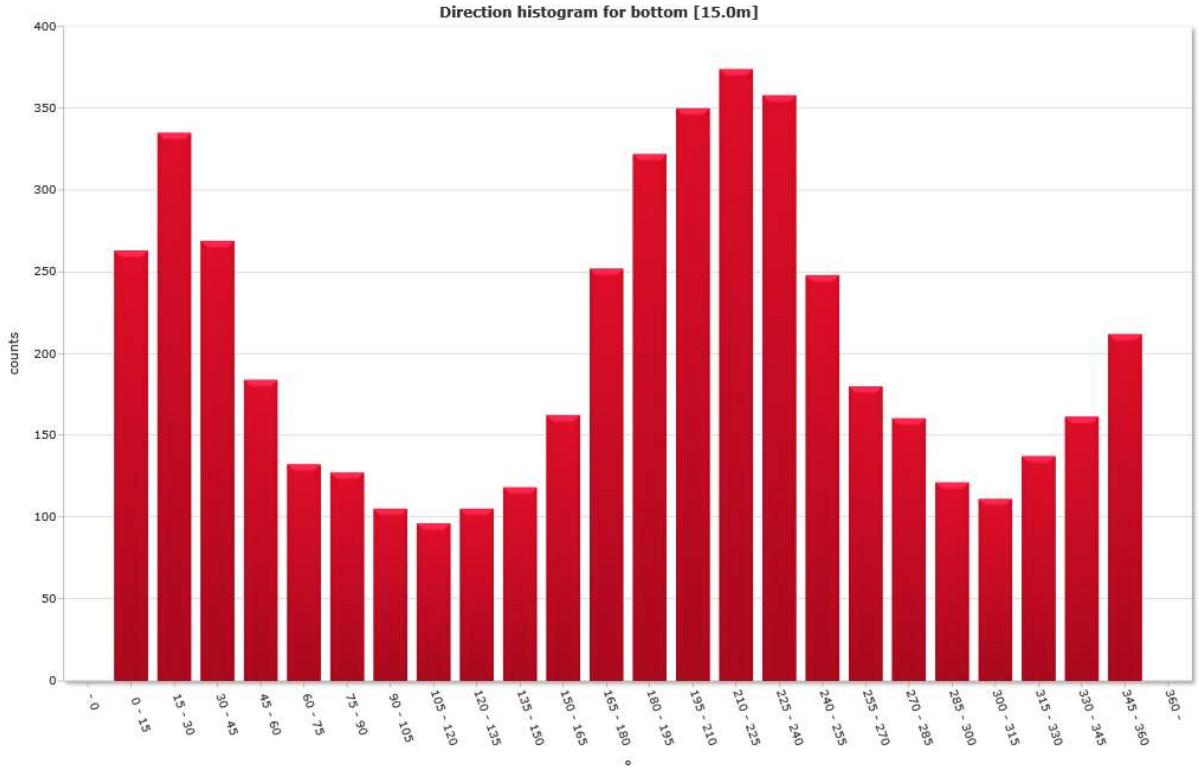
Top [5.0m]



Middle [10.0m]



Bottom [15.0m]


Direction histogram for bottom [15.0m]
counts
400
350
300
250
200
150
100
50
0
- 0
0 - 15
15 - 30
30 - 45
45 - 60
60 - 75
75 - 90
90 - 105
105 - 120
120 - 135
135 - 150
150 - 165
165 - 180
180 - 195
195 - 210
210 - 225
225 - 240
240 - 255
255 - 270
270 - 285
285 - 300
300 - 315
315 - 330
330 - 345
345 - 360
360 -
°

Direction/Speed histogram

Top [5.0m]

° m/s	Direction/speed matrix for top [5.0m]																									
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	110	113	98	89	73	63	59	49	44	68	85	122	125	120	165	112	142	103	116	86	107	112	116	120	49.1	2397
0.10	157	173	115	50	21	10	9	12	8	33	34	70	127	145	200	168	94	55	32	27	25	30	55	111	36.1	1761
0.15	67	75	37	6	0	0	0	0	0	1	5	26	42	122	109	45	12	1	1	0	0	1	6	17	11.7	573
0.20	9	21	4	0	0	0	0	0	0	0	0	3	18	35	27	12	0	0	0	0	0	0	0	1	2.7	130
0.25	0	3	1	0	0	0	0	0	0	0	1	2	4	4	4	1	0	0	0	0	0	0	0	0	0.4	20
0.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.0	1
0.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	7.0	7.9	5.2	3.0	1.9	1.5	1.4	1.2	1.1	2.1	2.6	4.6	6.5	8.7	10.4	6.9	5.1	3.3	3.1	2.3	2.7	2.9	3.6	5.1	100.0	100.0
Sum	343	385	255	145	94	73	68	61	52	102	125	223	316	426	506	338	248	159	149	113	132	143	177	249	100.0	4882

Middle [10.0m]

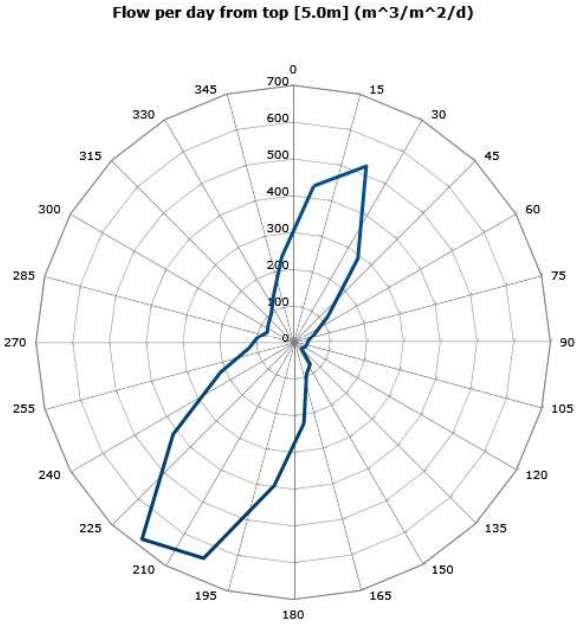
° m/s	Direction/speed matrix for middle [10.0m]																									
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	137	130	118	88	62	71	77	53	64	84	88	122	145	174	164	194	173	151	139	135	116	116	121	129	58.4	2851
0.10	108	147	90	40	18	12	11	10	15	19	41	65	128	189	184	135	91	44	50	28	23	33	46	79	32.9	1606
0.15	42	55	41	5	0	0	0	0	0	1	1	13	40	61	48	33	13	4	0	0	1	0	1	8	7.5	367
0.20	11	22	1	2	0	0	0	0	0	0	1	1	4	4	6	3	1	0	0	0	0	0	0	0	1.1	56
0.25	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	2
0.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	6.1	7.3	5.1	2.8	1.6	1.7	1.8	1.3	1.6	2.1	2.7	4.1	6.5	8.8	8.2	7.5	5.7	4.1	3.9	3.3	2.9	3.1	3.4	4.4	100.0	100.0
Sum	298	356	250	135	80	83	88	63	79	104	131	201	317	428	402	365	278	199	189	163	140	149	168	216	100.0	4882

Bottom [15.0m]

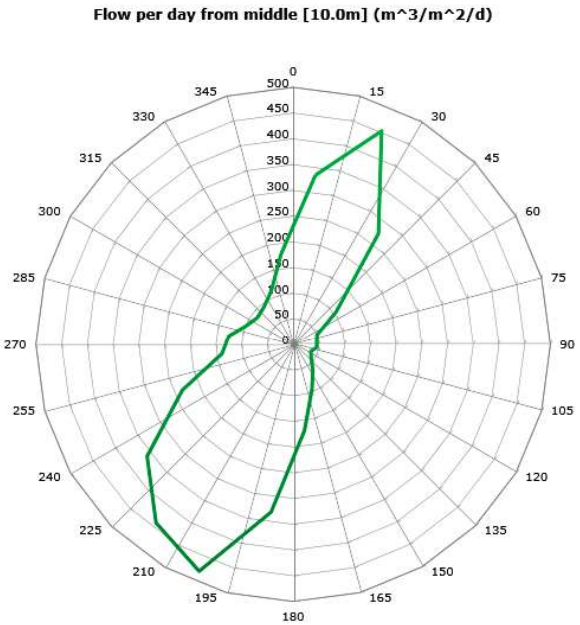
° m/s	Direction/speed matrix for bottom [15.0m]																									
0.00	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.05	147	168	135	116	109	104	95	87	89	99	129	169	159	186	174	178	166	126	125	98	90	119	127	147	64.4	3142
0.10	90	123	103	63	23	23	10	9	16	19	32	73	149	152	181	171	73	51	34	22	21	18	33	62	31.8	1551
0.15	25	39	28	4	0	0	0	0	0	0	1	9	14	12	19	9	9	3	1	1	0	0	1	3	3.6	178
0.20	1	5	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	11
0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
%	5.4	6.9	5.5	3.8	2.7	2.6	2.2	2.0	2.2	2.4	3.3	5.2	6.6	7.2	7.7	7.3	5.1	3.7	3.3	2.5	2.3	2.8	3.3	4.3	100.0	100.0
Sum	263	335	269	184	132	127	105	96	105	118	162	252	322	350	374	358	248	180	160	121	111	137	161	212	100.0	4882

Flow

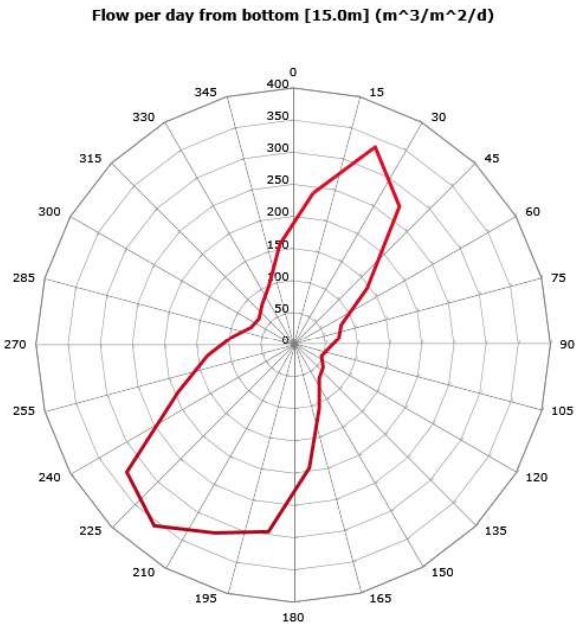
Top [5.0m]



Middle [10.0m]

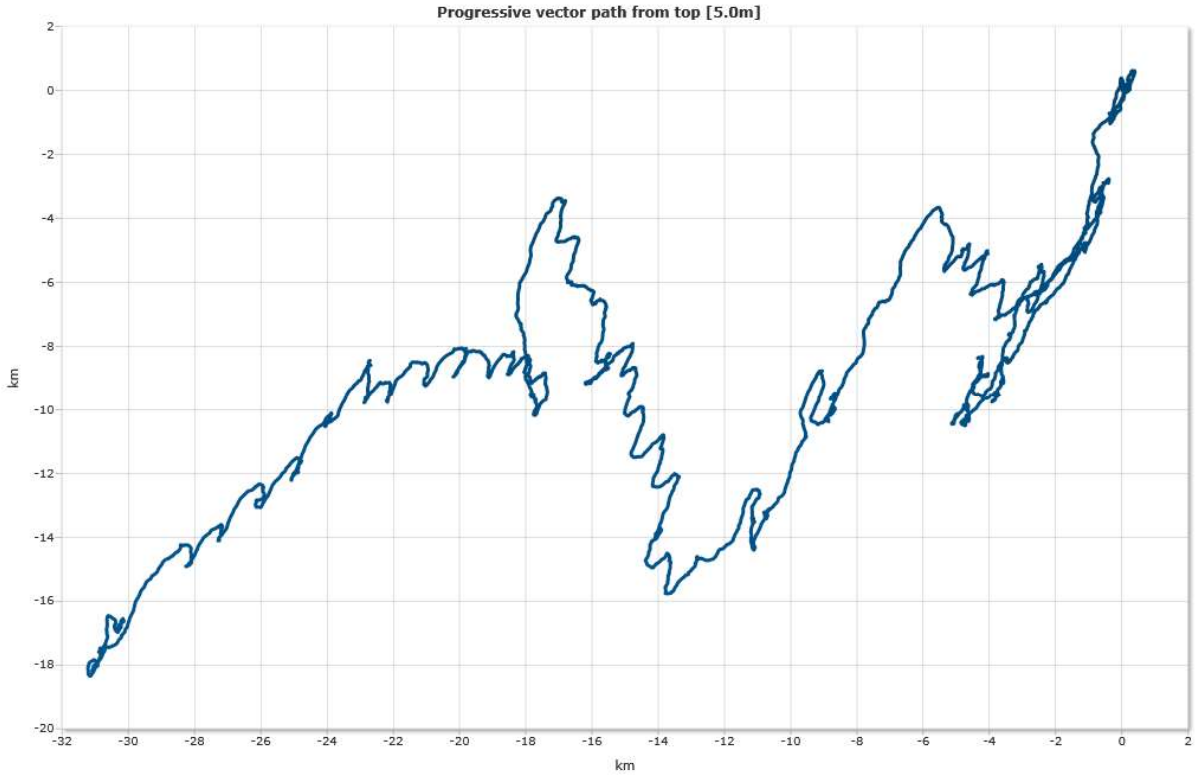


Bottom [15.0m]

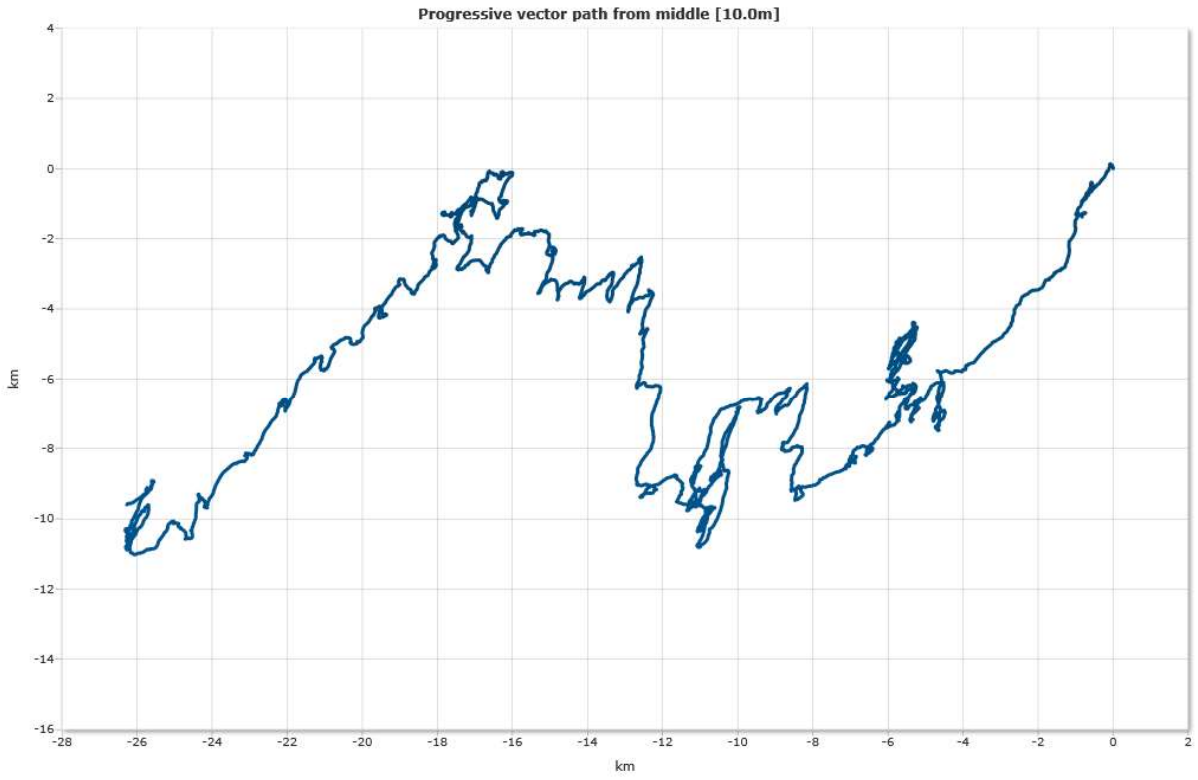

Flow per day from bottom [15.0m] (m^3/m^2/d)
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
400
350
300
250
200
150
100
50
0

Progressive vector

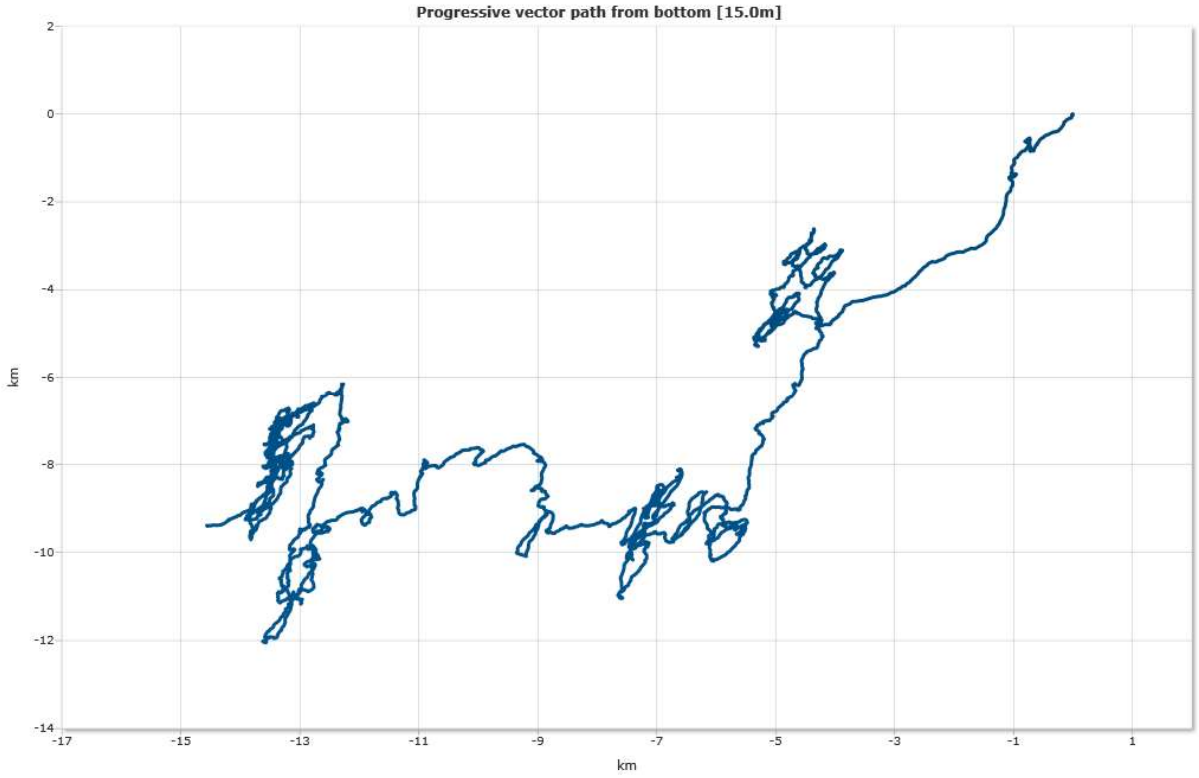
Top [5.0m]



Middle [10.0m]

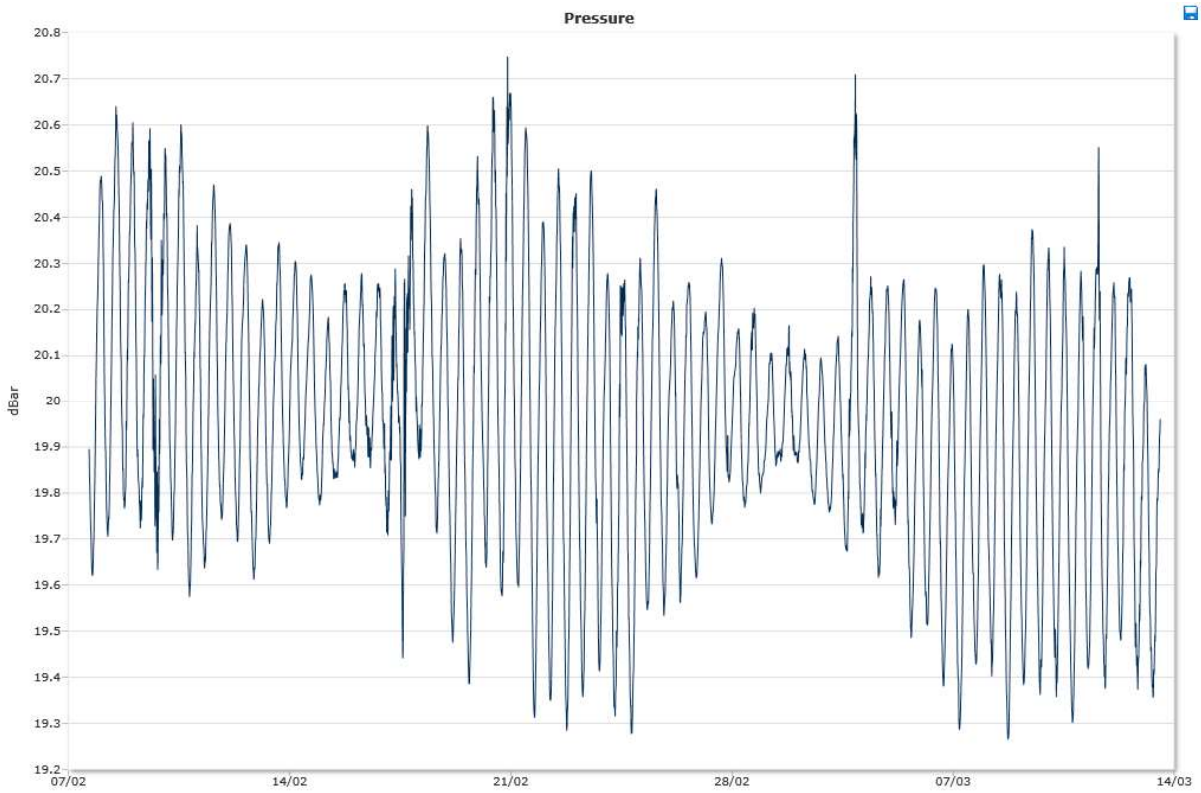


Bottom [15.0m]

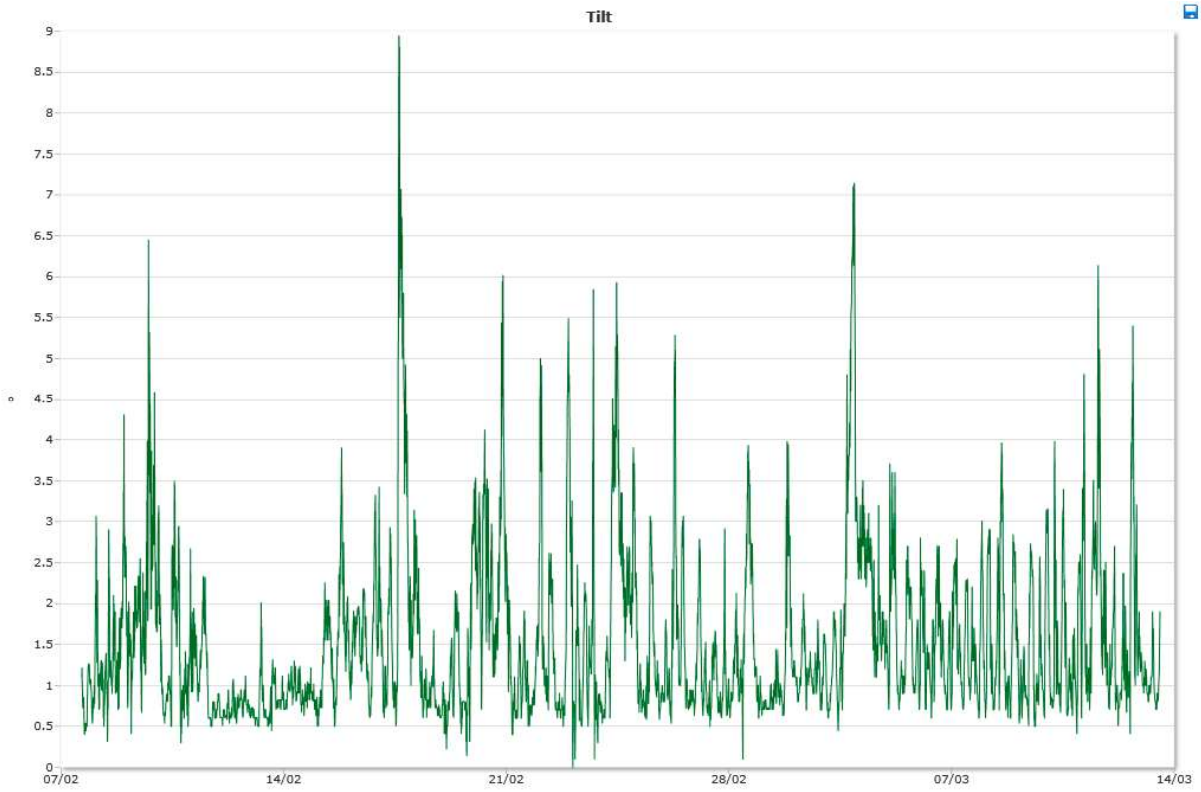

Progressive vector path from bottom [15.0m]
km
km
2
0
-2
-4
-6
-8
-10
-12
-14
-17
-15
-13
-11
-9
-7
-5
-3
-1
1

Sensors

Pressure



Tilt



Temperature