



# STRAUMMÅLING

NS 9425-2

## LOKALITET BØØY

Radøy kommune



2012/05/09



## Resipientanalyse AS

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<i>Lokalitetsnamn, lokalitetsnr.og biomasse tillatelse</i> <b>Bøøy – Nytt aktuelt lokalitetsområde</b>		<i>Dato, rapport</i> 04 / 06 – 2012
<i>Kommune</i> Radøy kommune		<i>Dato, felt</i> Utsett: 30 / 03 – 2012 Opptak: 09 / 05 – 2012
<i>Oppdragsgjevar</i> Blom Fiskeoppdrett AS og Skjærgårdsfisk AS		<i>Rapport nr.</i> 762 – 2012
<i>Oppdragsart</i> Straummåling		<i>Rapportsider</i> 63
<i>Personell feltundersøking</i> Frode Berge-Haveland, Resipientanalyse AS Martin Blom, Blom Fiskeoppdrett AS		<b>Høgste målte vasstraum:</b>  Ved 5 meters djup: <b>0,408 m/s MOT vest (270°).</b>  Ved 15 meters djup: <b>0,320 m/s MOT nord (0°).</b>
Den gjennomsnittlege <b>Vassutskiftingstraumen</b> i måleperioden: <b>5 til 7 cm/s</b> mellom 5 og 15 meters djup.	Den gjennomsnittlege <b>Spreiingsstraumen</b> i måleperioden med Doppler:                      og med Propell: <b>4 til 5 cm/s – 1,1 cm/s</b> 20 til 35 meters djup - 50 meters djup.	Den gjennomsnittlege <b>Botnstraumen</b> i måleperioden: <b>1,2 cm/s</b> 80 meters djup.
<i>Samandrag</i>  Ein Nortek 400kHz Aquadopp profilerande strømmålar blei sett ut på ca. 40 meters djup. Ein SD6000 propell strømmålar stod på 50 meters djup og målte spreingsstraum og ein SD6000 propell strømmålar stod på 80 meters djup. Der var ca. 85 meter djupt ved målepunktet. Doppler strømmålar målte oppover i vassøyla. Straummåling i vassutskiftingslaget går MOT Aust og MOT Vest. Spreiingsstraumen går også i hovudsak MOT ei Aust og Vestleg retning. Den gjennomsnittlege vassutskifting og spreingsstraum kan karakteriserast som middels sterk. Den gjennomsnittlege spreingsstraumen ved 50 metersdjup og botnstraumen var svært svak.		
<i>Fagansvarleg i Resipientanalyse</i>  Frode Berge-Haveland <i>Cand. Scient. Marin mikrobiolog</i> Daglegleiar i Resipientanalyse		<i>Kvalitetsansvarleg i Resipientanalyse</i>  Kjetil Aursland <i>Cand. Scient. Mikrobiolog</i> Kvalitetsleiar i Resipientanalyse

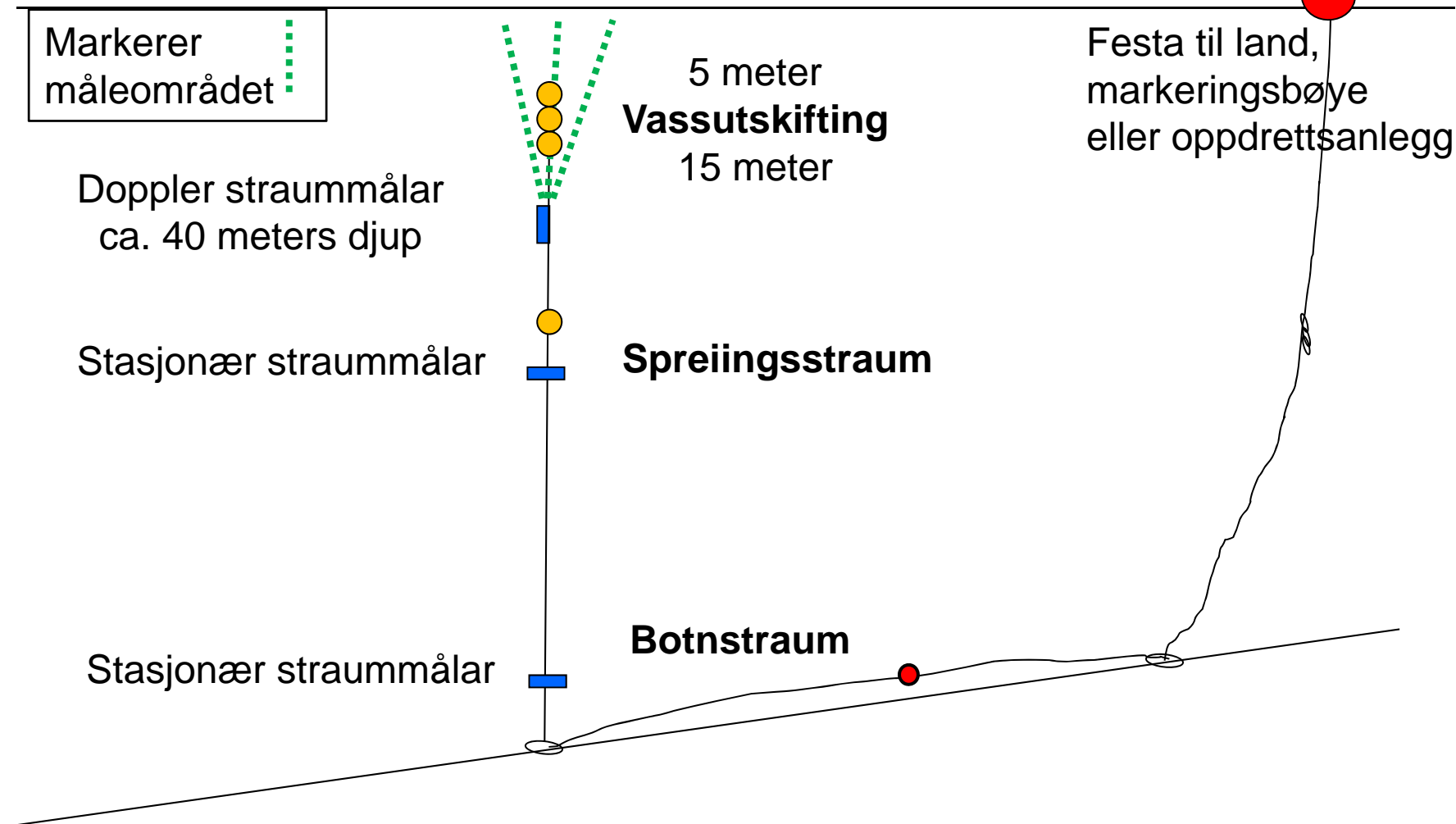
## INNHALD

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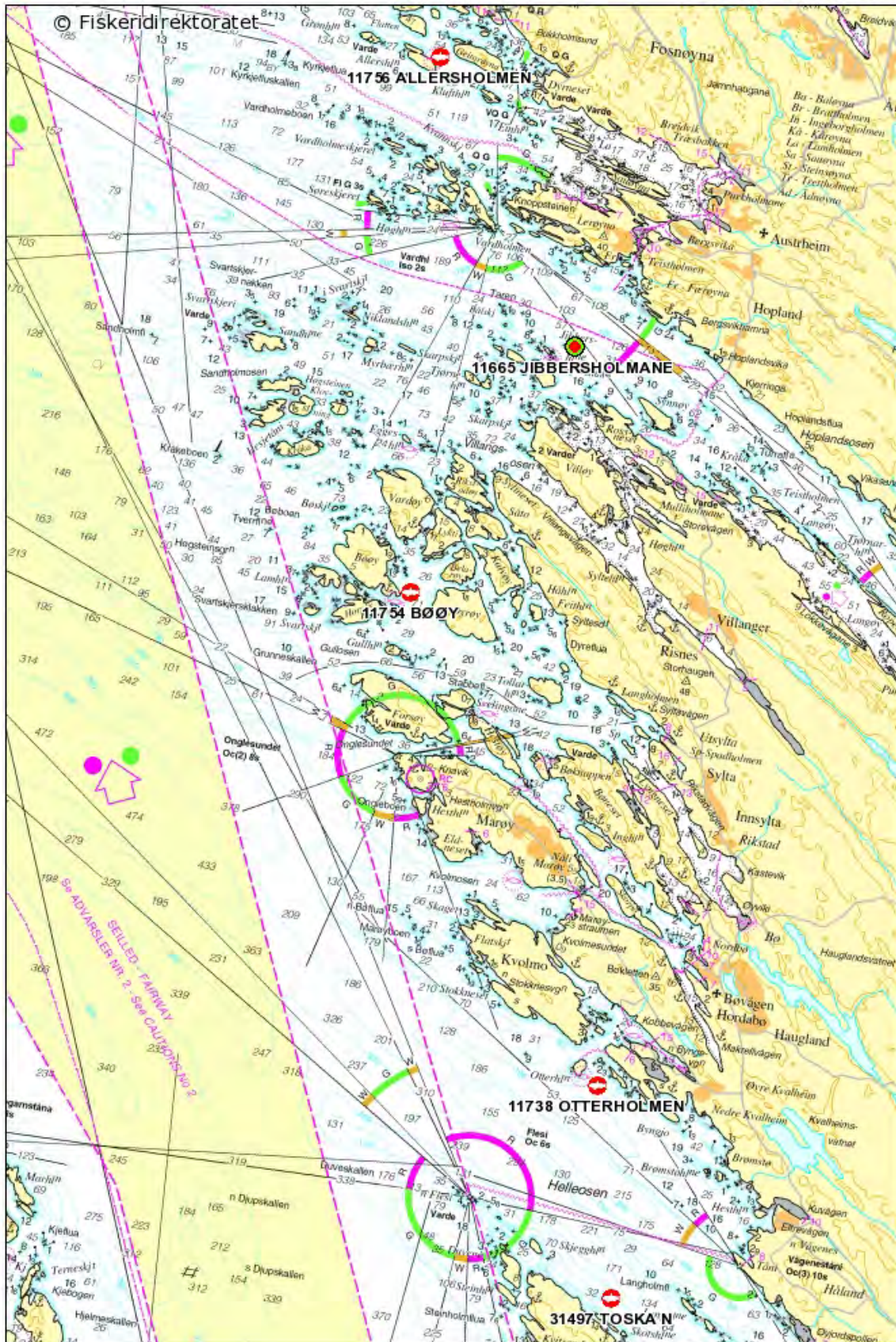
<b>1.0</b>	<b>Skisse for utsett av strømmålar</b>	<b>1</b>
<b>2.0</b>	<b>Kart</b>	<b>2</b>
	Figur 2.1 Sjøkart (1: 50 000) over resipientområdet	2
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<b>3.0</b>	<b>Vassutskiftningsstraum med Doppler Profiler</b>	<b>5</b>
<b>4.0</b>	<b>Spreiingsstraum med Doppler Profiler</b>	<b>27</b>
<b>4.0</b>	<b>Spreiingsstraum med SD6000 propell strømmålar</b>	<b>49</b>
<b>4.0</b>	<b>Botnstraum med SD6000 propell strømmålar</b>	<b>56</b>

Skisse for utsetting av straummålarar ved ny lokalitet "up lokking" posisjon

Overflatebøye A1  
Oppdrift 18 kg



02.06.2012



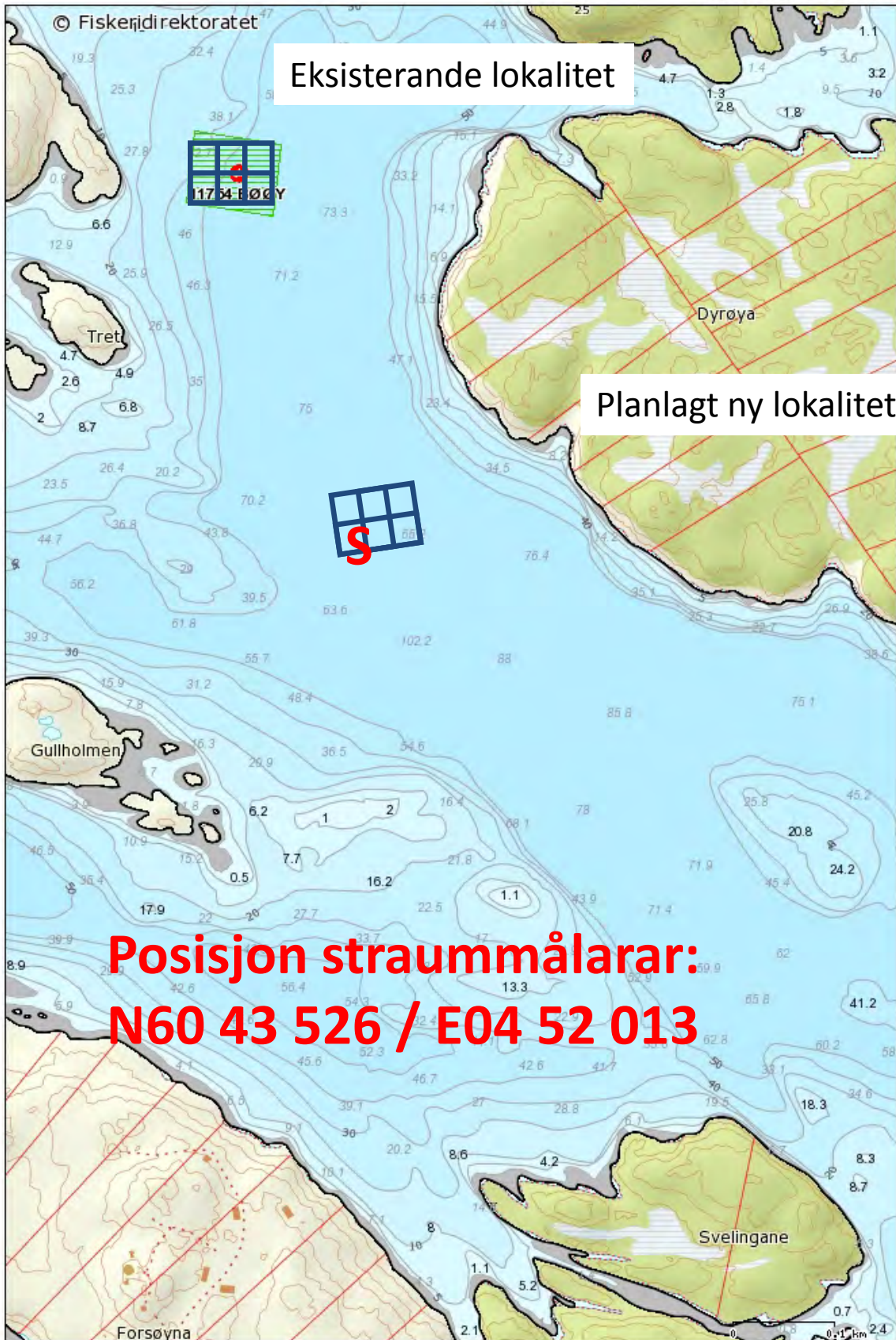
Målestokk: 50 000

02.06.2012



Målestokk: 10 000

02.06.2012



# Straummåling Bøøy

Vassutskifting

02.06.2012

Resipientanalyse AS

Frode Berge-Haveland



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## Summary

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## Details

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### Instrument

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Head Id	AQP 5338
Board Id	AQD 9568
Frequency	400000

### Configuration

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Start	29.03.2012 13:00
End	09.05.2012 20:40
Data records	5951
Longitude	4° 52,01'E
Latitude	60° 43,53'N
Orientation	DOWN
Cells	40
Cell size(m)	2
Blanking distance(m)	0,99
Average interval(sec)	60
Measurement interval(sec)	600

### Quality

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

### Post processing

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Selected Start	30.03.2012 11:30
Selected End	09.05.2012 13:50
Compass Offset	0
Pressure Offset	0
Selected Records	5775
Reference	Water Surface
Top Depth(m)	5
Top invalid data	572
Middle Depth(m)	10
Middle invalid data	1
Bottom Depth(m)	15
Bottom invalid data	1

## Statistics

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### Top [5,0m]

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Mean current [m/s]	0.07
Max current [m/s]	0.37
Min current [m/s]	0.00
Measurements [#]	5203
Std.dev [m/s]	0.04
Significant max velocity [m/s]	0.12
Significant min velocity [m/s]	0.03
10 year return current [m/s]	0.612
50 year return current [m/s]	0.687
Most significant directions [°]	90.00, 105.00, 75.00, 60.00
Most significant speeds [m/s]	0.10, 0.05, 0.15, 0.20
Most flow	22332.83m <sup>3</sup> by 75-90°.
Least flow	4736.44m <sup>3</sup> by 345-360°.

### Middle [10,0m]

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Mean current [m/s]	0.06
Max current [m/s]	0.30
Min current [m/s]	0.00
Measurements [#]	5774
Std.dev [m/s]	0.04
Significant max velocity [m/s]	0.10
Significant min velocity [m/s]	0.03
10 year return current [m/s]	0.497
50 year return current [m/s]	0.557
Most significant directions [°]	90.00, 105.00, 75.00, 120.00
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	21831.49m <sup>3</sup> by 75-90°.
Least flow	3982.77m <sup>3</sup> by 210-225°.

### Bottom [15,0m]

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Mean current [m/s]	0.05
Max current [m/s]	0.23
Min current [m/s]	0.00
Measurements [#]	5774
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.08
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.378
50 year return current [m/s]	0.423
Most significant directions [°]	90.00, 75.00, 105.00, 315.00
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	14950.75m <sup>3</sup> by 75-90°.
Least flow	4109.31m <sup>3</sup> by 180-195°.

## Direction with return period

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### Top [5,0m]

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<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,055	0,143	0,090	0,236	0,101	0,265
45	0,078	0,320	0,128	0,528	0,144	0,592
90	0,098	0,371	0,161	0,612	0,180	0,687
135	0,069	0,302	0,115	0,499	0,128	0,559
180	0,064	0,205	0,106	0,338	0,119	0,379
225	0,061	0,231	0,100	0,382	0,113	0,428
270	0,061	0,182	0,101	0,301	0,113	0,337
315	0,066	0,178	0,108	0,294	0,121	0,329

### Middle [10,0m]

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<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,047	0,192	0,077	0,317	0,086	0,356
45	0,059	0,206	0,097	0,339	0,109	0,380
90	0,076	0,301	0,125	0,497	0,141	0,557
135	0,058	0,224	0,096	0,370	0,107	0,415
180	0,051	0,154	0,084	0,254	0,094	0,285
225	0,047	0,133	0,077	0,220	0,086	0,246
270	0,055	0,214	0,091	0,353	0,102	0,395
315	0,057	0,187	0,094	0,308	0,105	0,346

### Bottom [15,0m]

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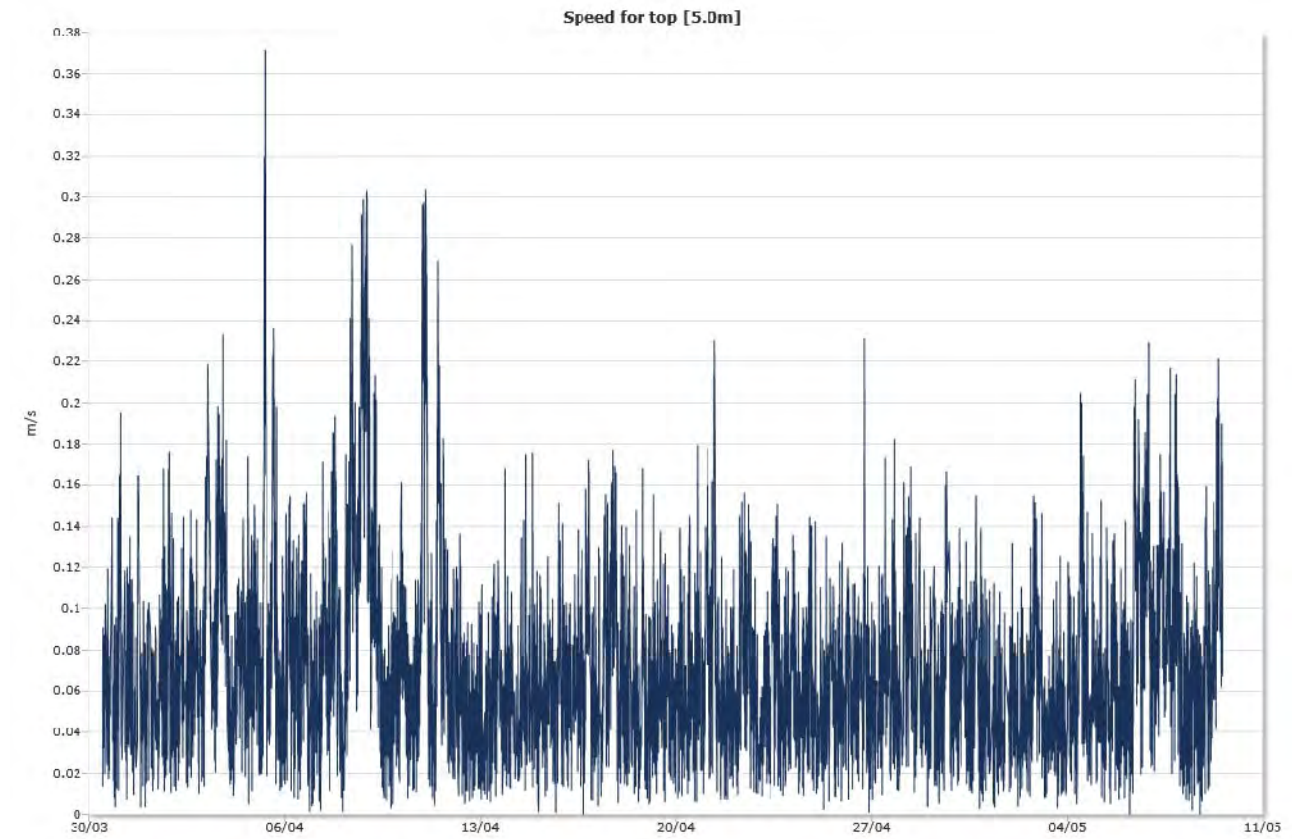
<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,043	0,161	0,070	0,266	0,079	0,298
45	0,048	0,229	0,079	0,378	0,089	0,423
90	0,058	0,199	0,096	0,329	0,108	0,368
135	0,045	0,142	0,075	0,235	0,084	0,263
180	0,041	0,130	0,067	0,214	0,075	0,240
225	0,040	0,114	0,066	0,188	0,074	0,211
270	0,048	0,158	0,079	0,261	0,089	0,293
315	0,051	0,205	0,084	0,338	0,094	0,379

## Time series

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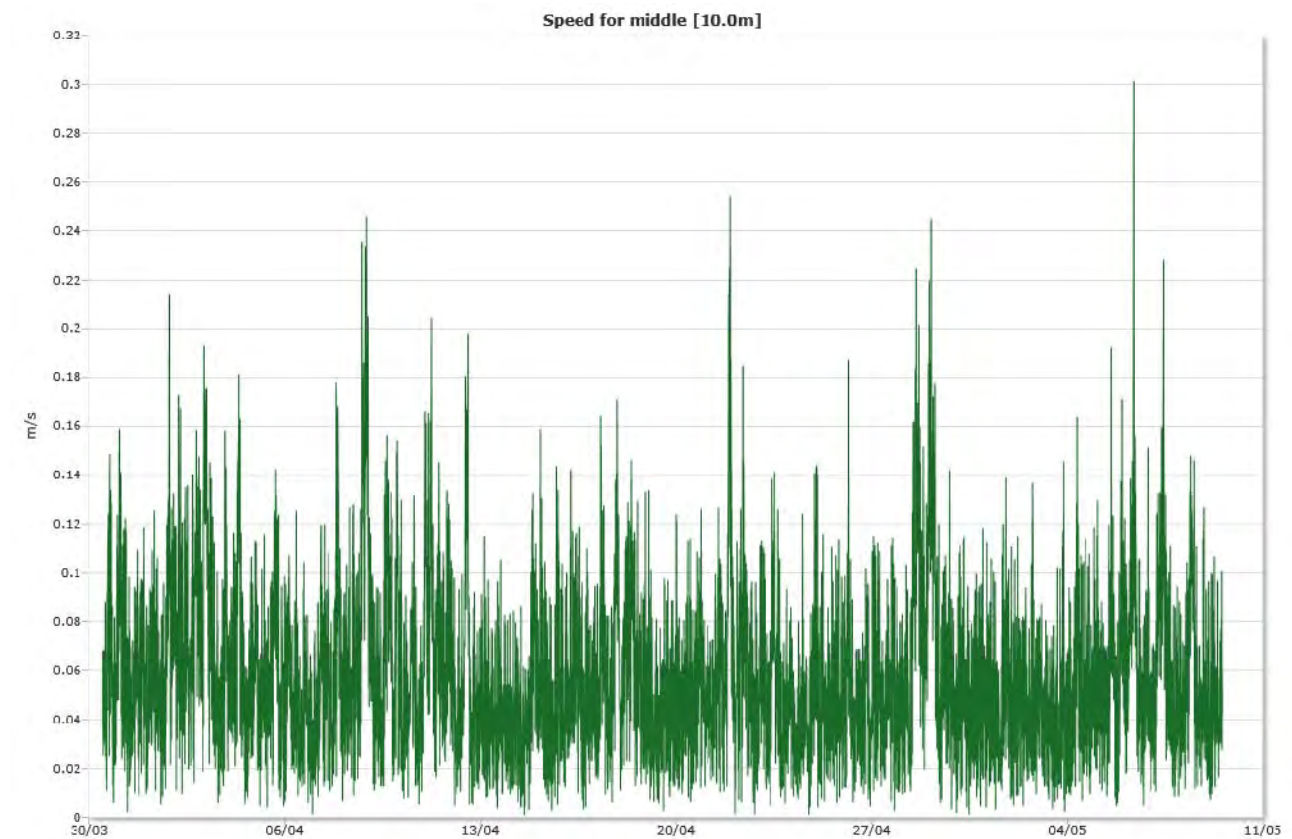
### Top [5,0m]

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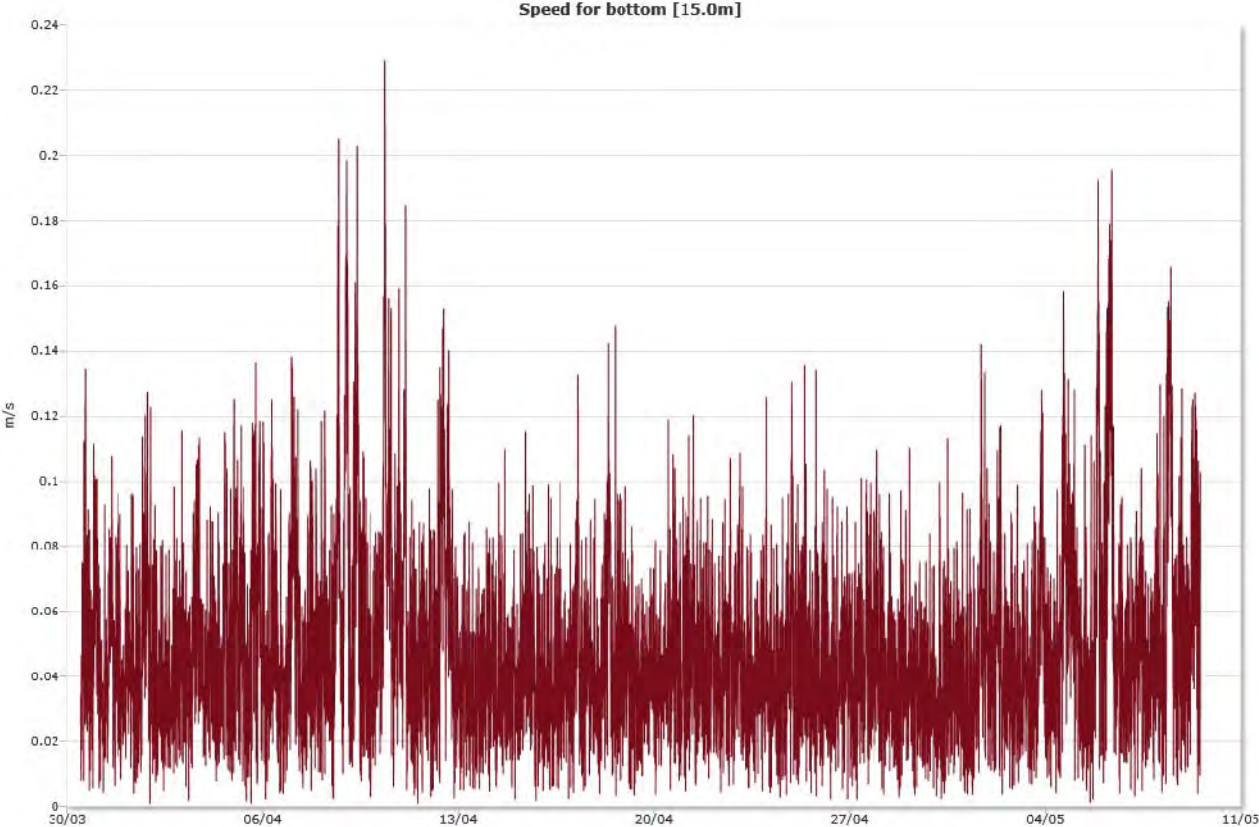


### Middle [10,0m]

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Bottom [15,0m]

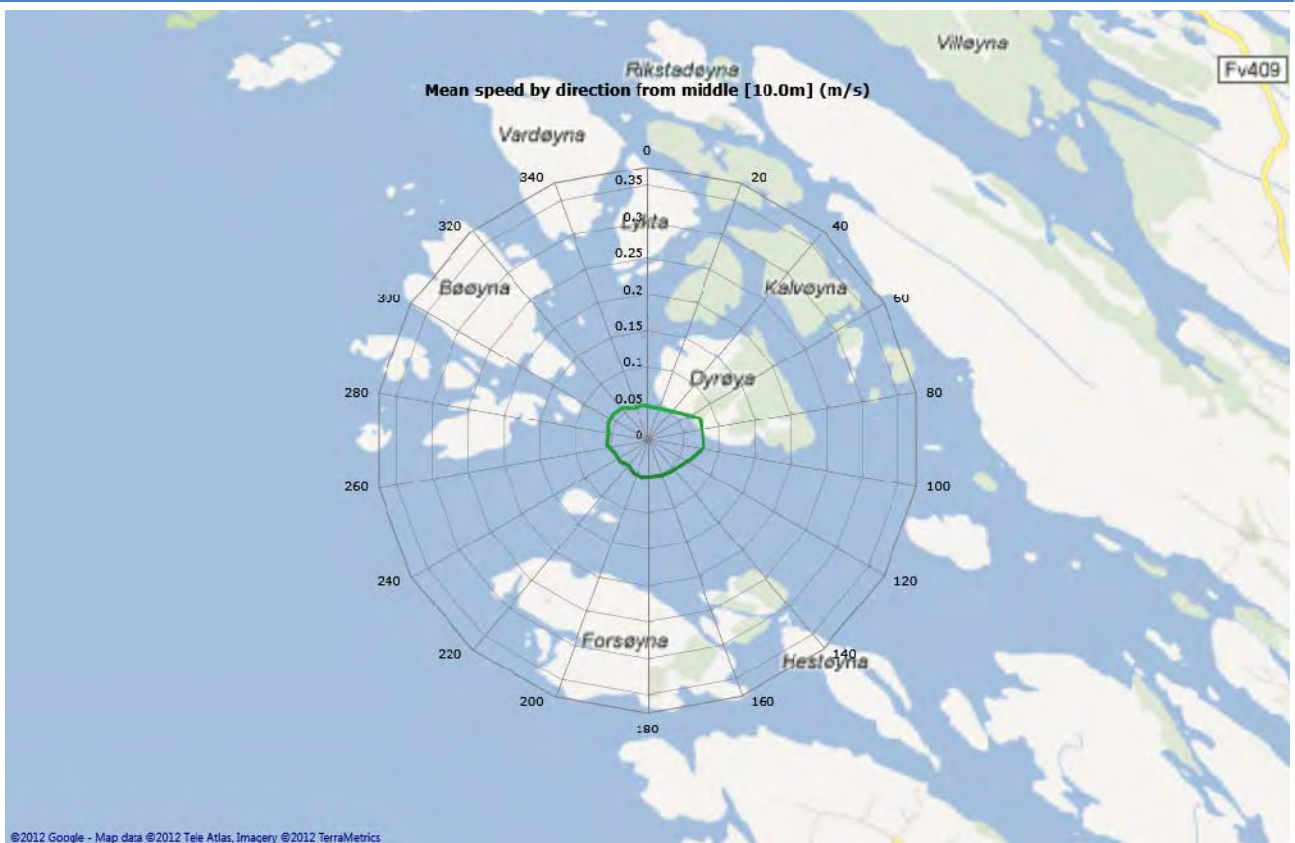


# Mean speed - roseplot

## Top [5,0m]

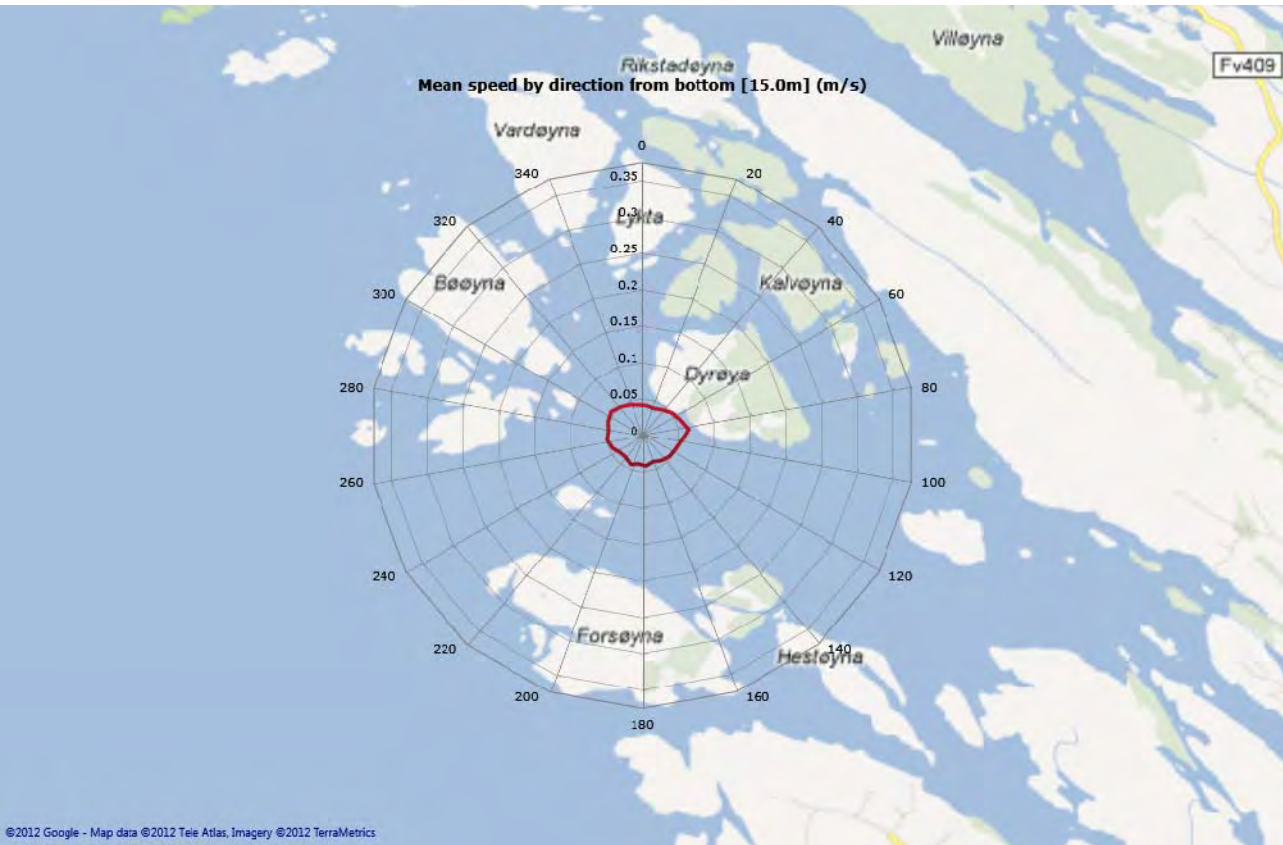


## Middle [10,0m]





Bottom [15,0m]

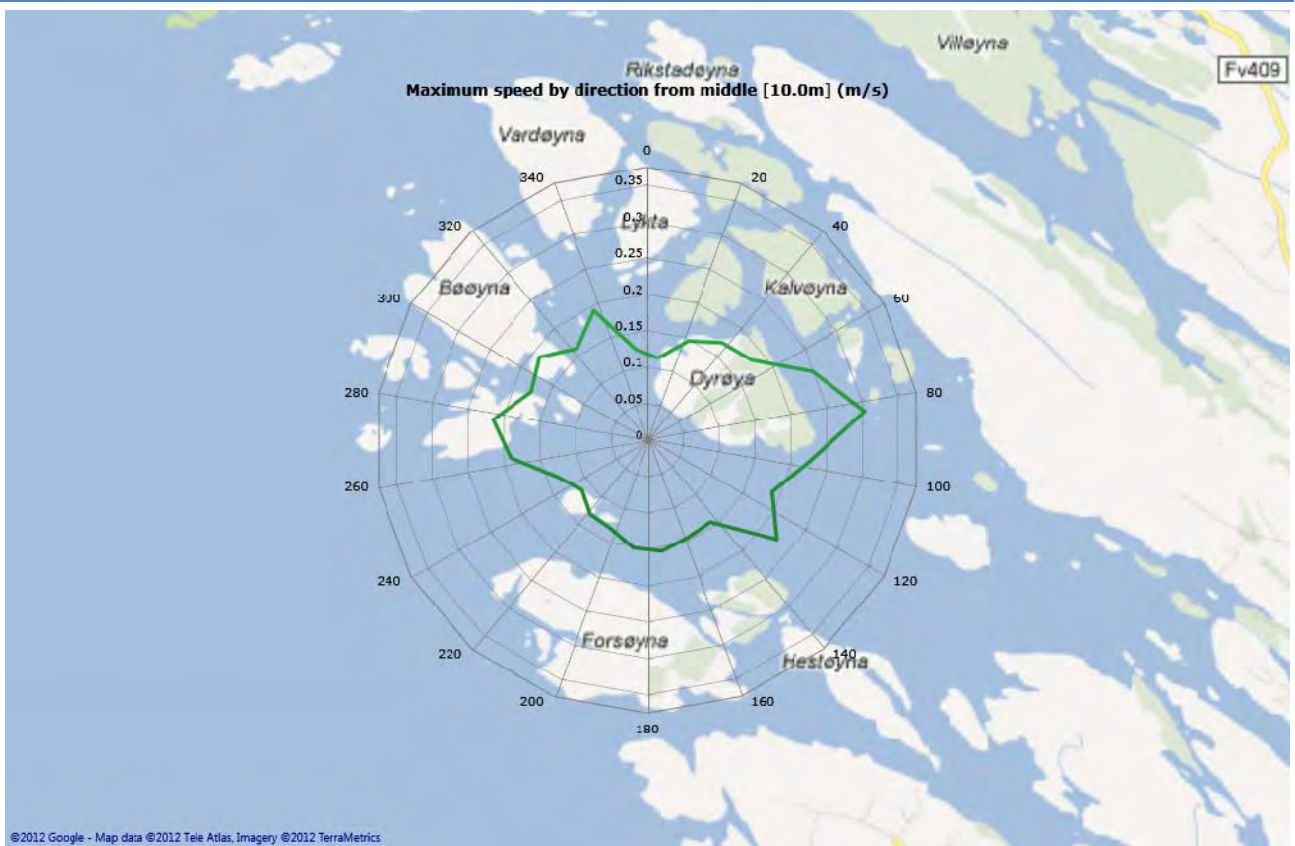


# Max speed - roseplot

## Top [5,0m]



## Middle [10,0m]

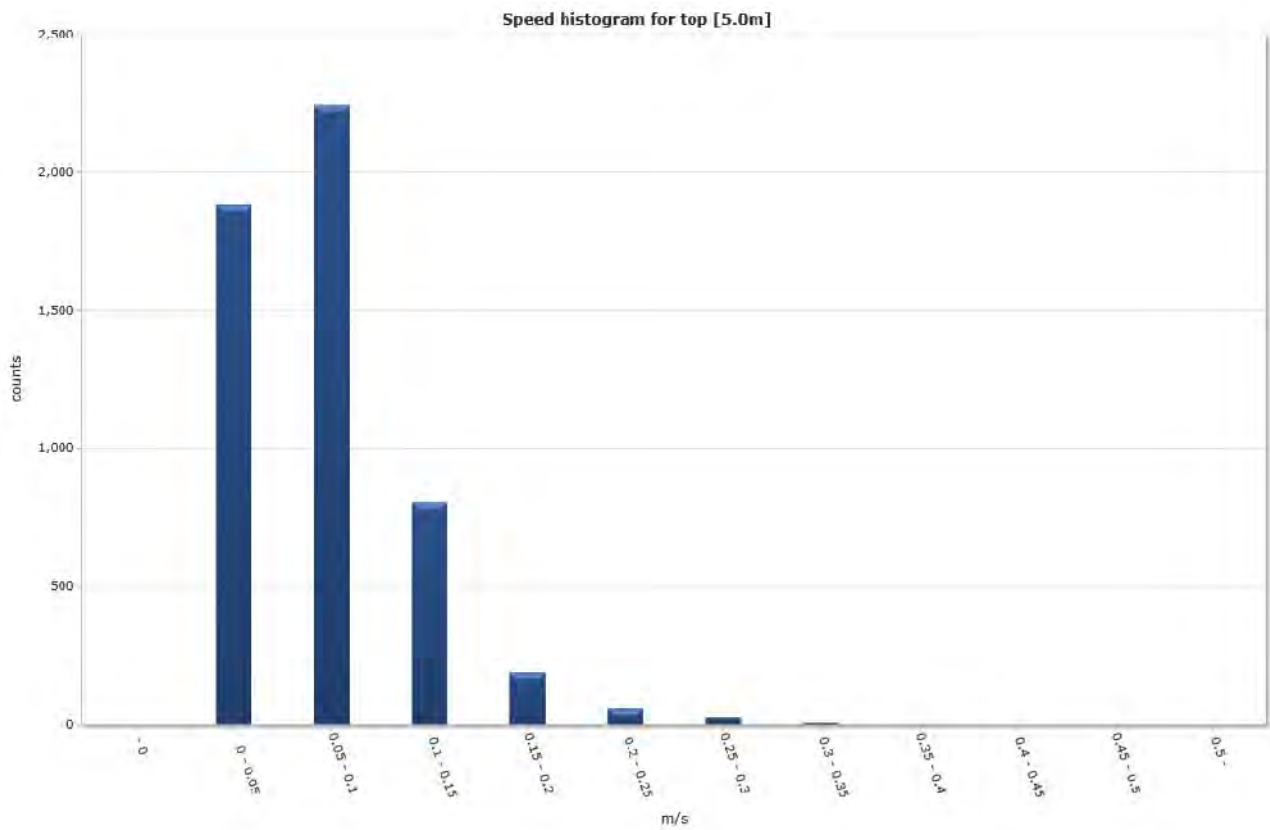


Bottom [15,0m]

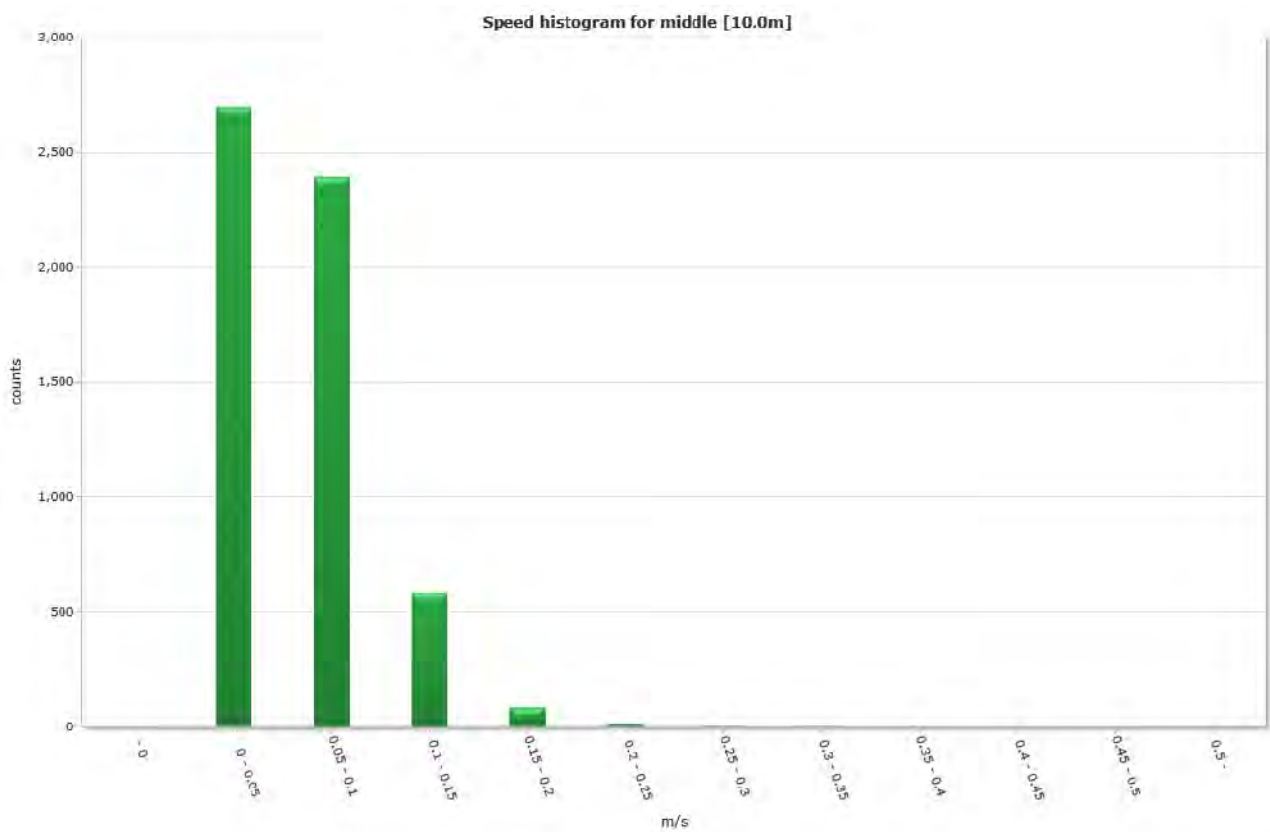


## Speed histogram

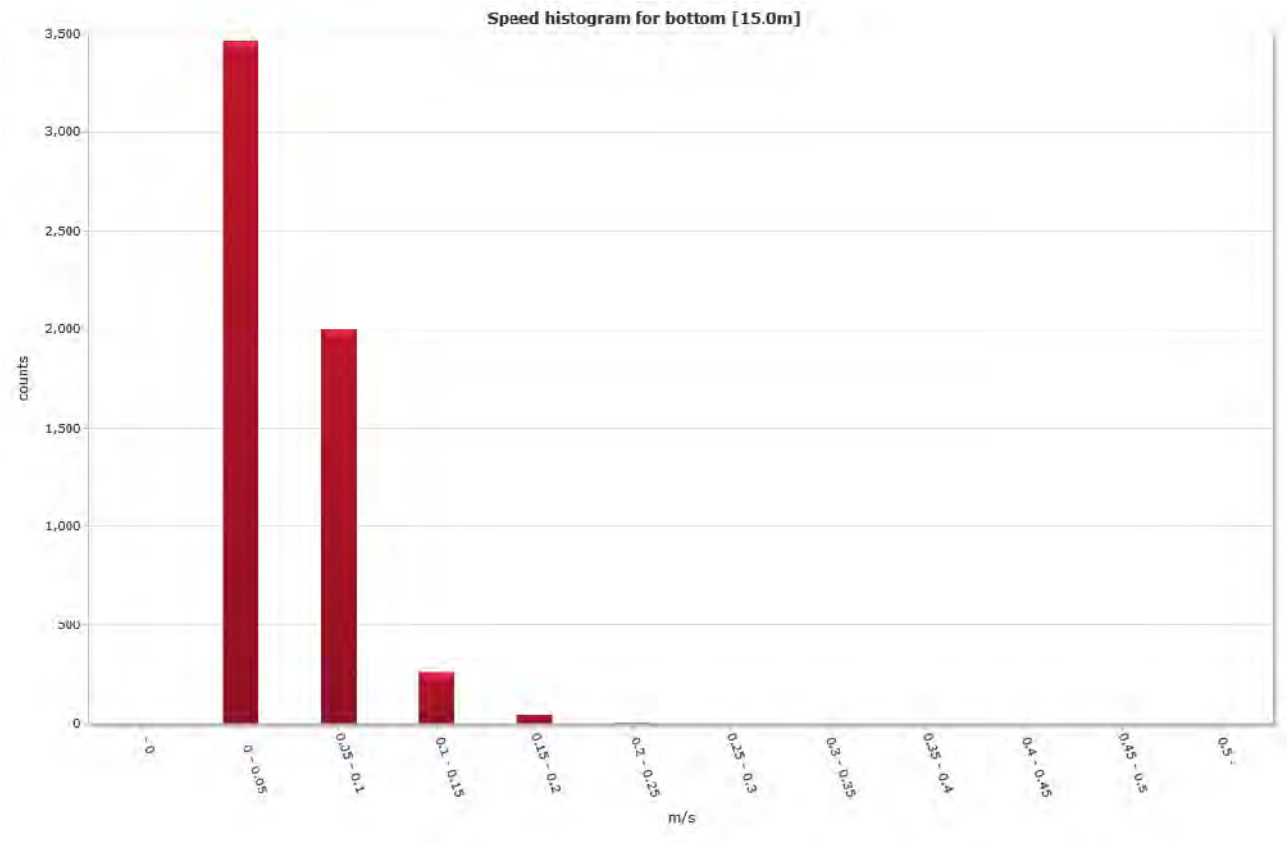
### Top [5,0m]



### Middle [10,0m]

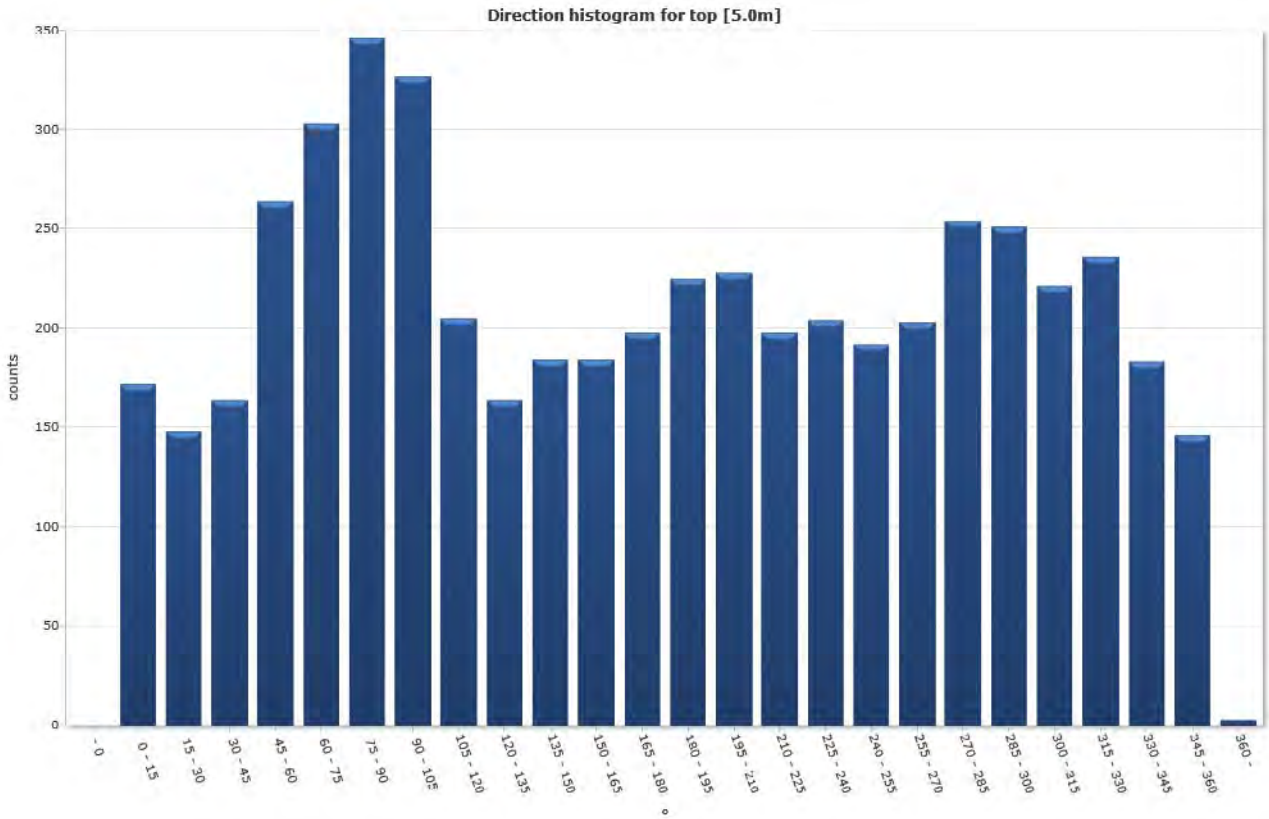


# Bottom [15,0m]

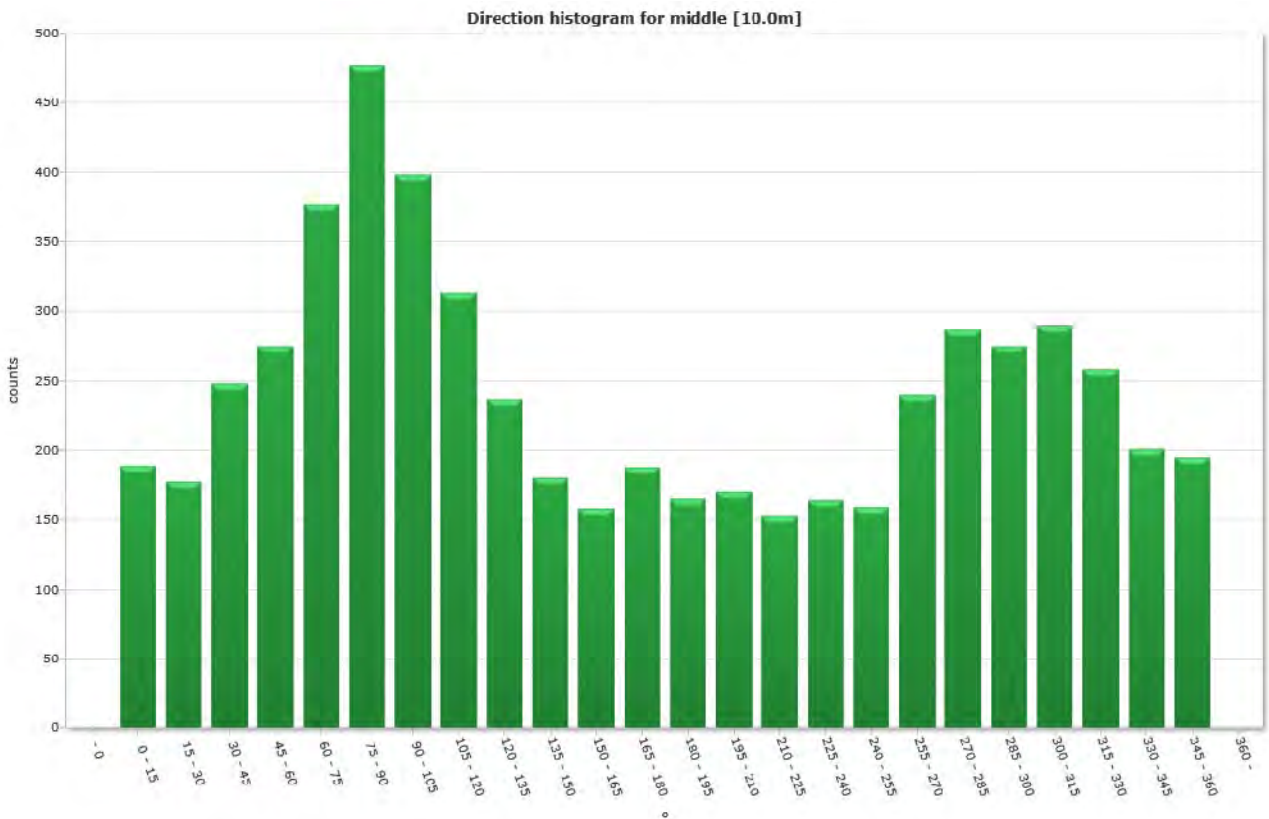


## Direction histogram

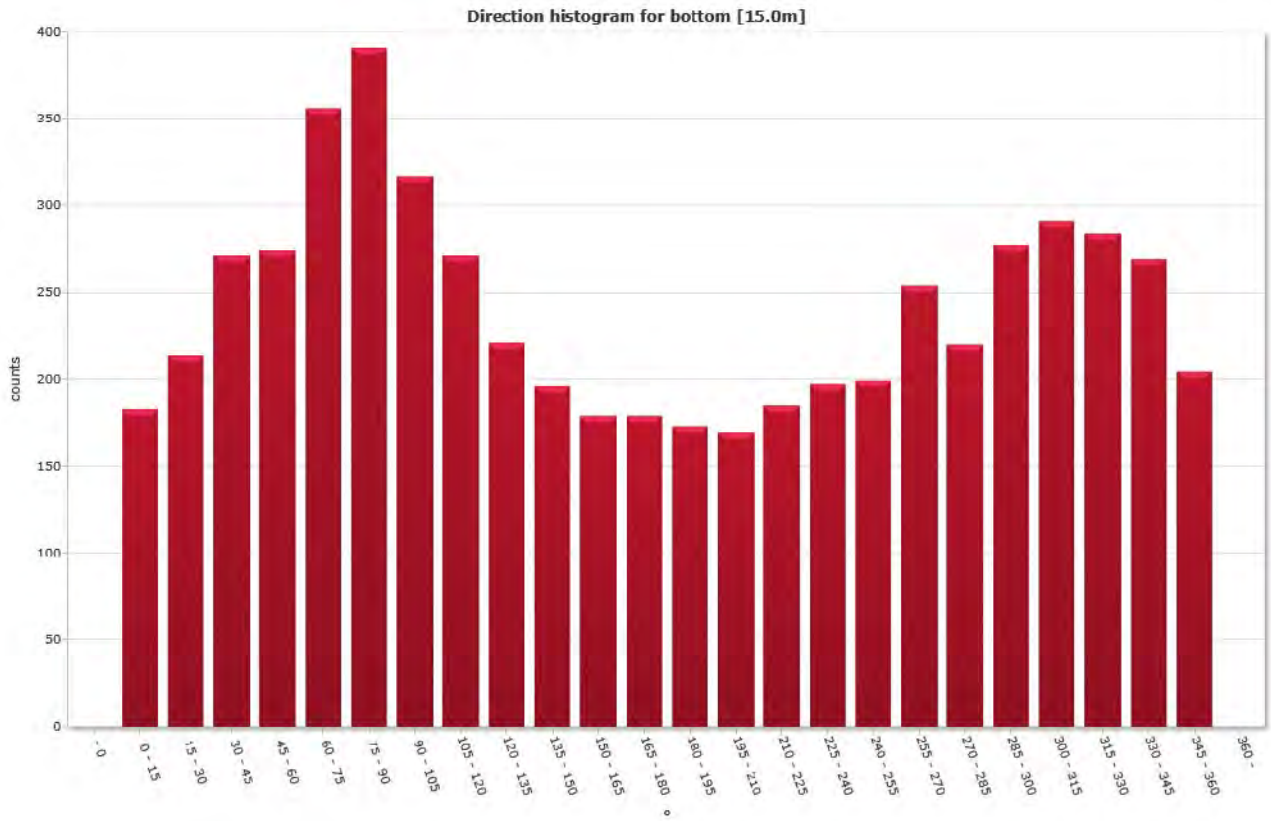
Top [5,0m]



Middle [10,0m]



# Bottom [15,0m]



## Direction/Speed histogram

### Top [5,0m]

		Direction/speed matrix for top [5.0m]																									
°	m/s	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
	0.0																										
	0.05	86	74	57	91	77	55	84	65	58	79	63	77	83	93	85	89	70	90	105	90	57	96	87	70	36.2	1881
	0.10	75	57	74	89	97	122	134	79	79	72	90	86	109	109	91	89	92	90	116	120	131	101	76	63	43.1	2241
	0.15	11	17	29	55	71	94	71	44	24	28	23	29	28	23	19	23	26	23	28	34	31	39	20	13	15.4	803
	0.20	0	0	4	18	29	49	22	13	2	5	7	6	4	2	3	3	4	0	5	7	2	0	0	0	3.6	185
	0.25	0	0	0	8	14	18	9	3	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1.1	55
	0.30	0	0	0	2	11	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	25
	0.35	0	0	0	1	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	7
	0.40	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
	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
	%	3.3	2.8	3.2	5.1	5.8	6.7	6.3	3.9	3.2	3.5	3.5	3.8	4.3	4.4	3.8	3.9	3.7	3.9	4.9	4.8	4.3	4.5	3.5	2.8	100.0	100.0
	Sum	172	148	164	264	303	346	327	205	154	184	184	198	225	228	198	204	192	203	254	251	221	236	183	146	100.0	5200

### Middle [10,0m]

		Direction/speed matrix for middle [10.0m]																									
°	m/s	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
	0.0																										
	0.05	116	104	132	114	112	162	117	117	118	95	82	109	93	94	96	96	90	108	151	119	127	117	118	107	46.7	2694
	0.10	68	69	100	126	167	188	166	148	99	67	67	60	62	69	52	65	64	118	102	124	130	125	74	81	41.4	2391
	0.15	5	4	13	32	75	96	91	39	18	18	9	18	10	7	5	3	5	13	33	29	32	14	8	7	10.1	584
	0.20	0	0	3	3	18	23	19	9	1	0	0	1	0	0	0	0	0	1	0	3	1	2	1	0	1.5	85
	0.25	0	0	0	0	5	5	5	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	17
	0.30	0	0	0	0	0	2	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
	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
	%	3.3	3.1	4.3	4.8	6.5	8.3	6.9	5.4	4.1	3.1	2.7	3.3	2.9	2.9	2.6	2.8	2.8	4.2	5.0	4.8	5.0	4.5	3.5	3.4	100.0	100.0
	Sum	189	177	248	275	377	477	398	313	237	180	158	188	165	170	153	164	159	240	287	275	290	258	201	195	100.0	5774

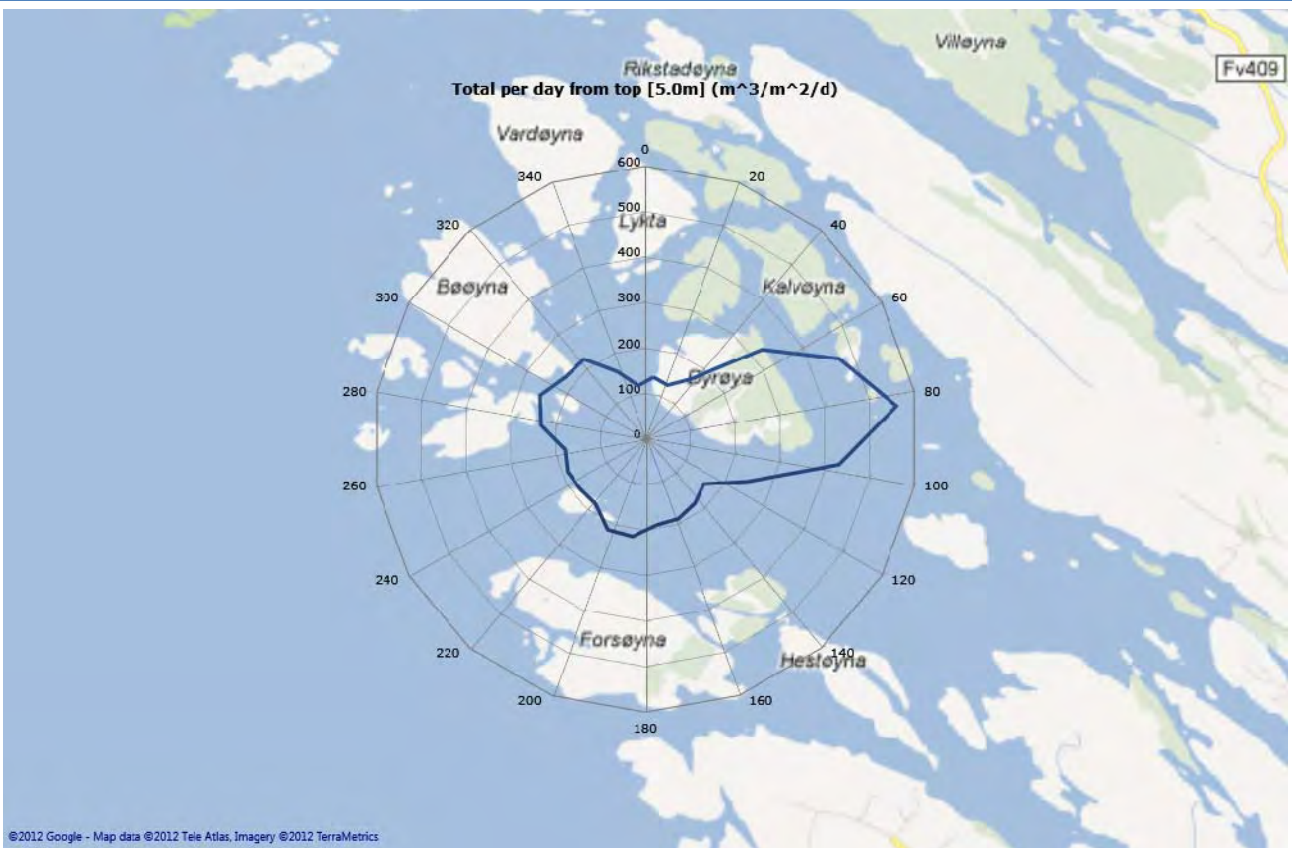


# Bottom [15,0m]

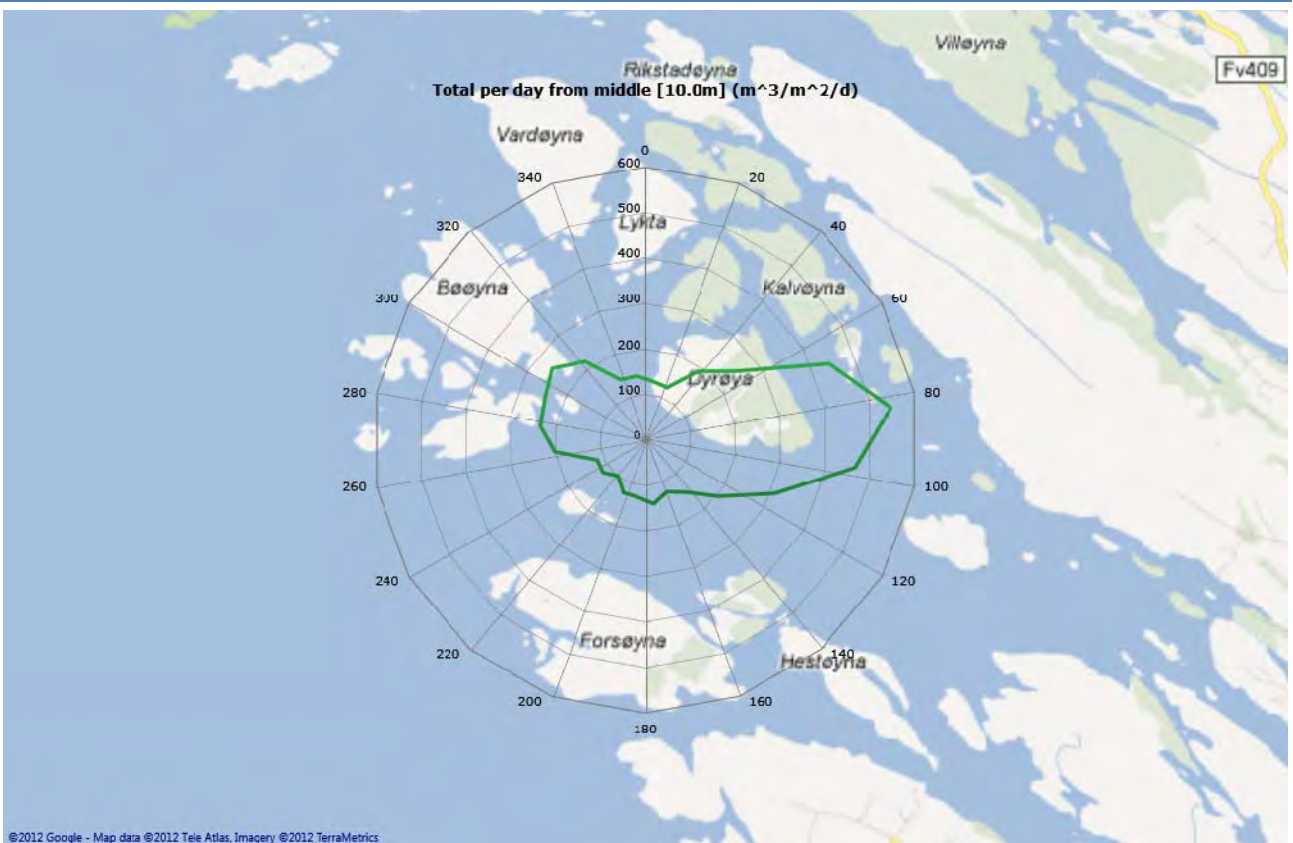
		Direction/speed matrix for bottom [15.0m]																									
m/s		15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	%	Sum
0.0		121	149	168	157	160	183	170	152	129	121	132	124	124	103	131	135	131	147	142	154	145	162	164	138	60.0	3455
0.05		57	61	99	99	146	140	112	106	83	72	45	51	47	62	53	61	64	94	65	101	120	109	93	60	34.6	2000
0.10		2	4	4	15	24	50	27	11	9	3	2	4	2	4	1	1	4	13	12	21	21	12	11	5	4.5	262
0.15		0	0	0	2	6	18	8	2	0	0	0	0	0	0	0	0	0	0	1	1	3	1	1	1	0.8	44
0.20		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.1	3
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
%		3.2	3.7	4.7	4.7	6.2	6.8	5.5	4.7	3.8	3.4	3.1	3.1	3.0	2.9	3.2	3.4	3.4	4.4	3.8	4.8	5.0	4.9	4.7	3.5	100.0	100.0
Sum		183	214	271	274	356	391	317	271	221	196	179	179	173	169	185	197	199	254	220	277	291	284	269	204	100.0	5774

# Flow

## Top [5,0m]



## Middle [10,0m]



Bottom [15,0m]

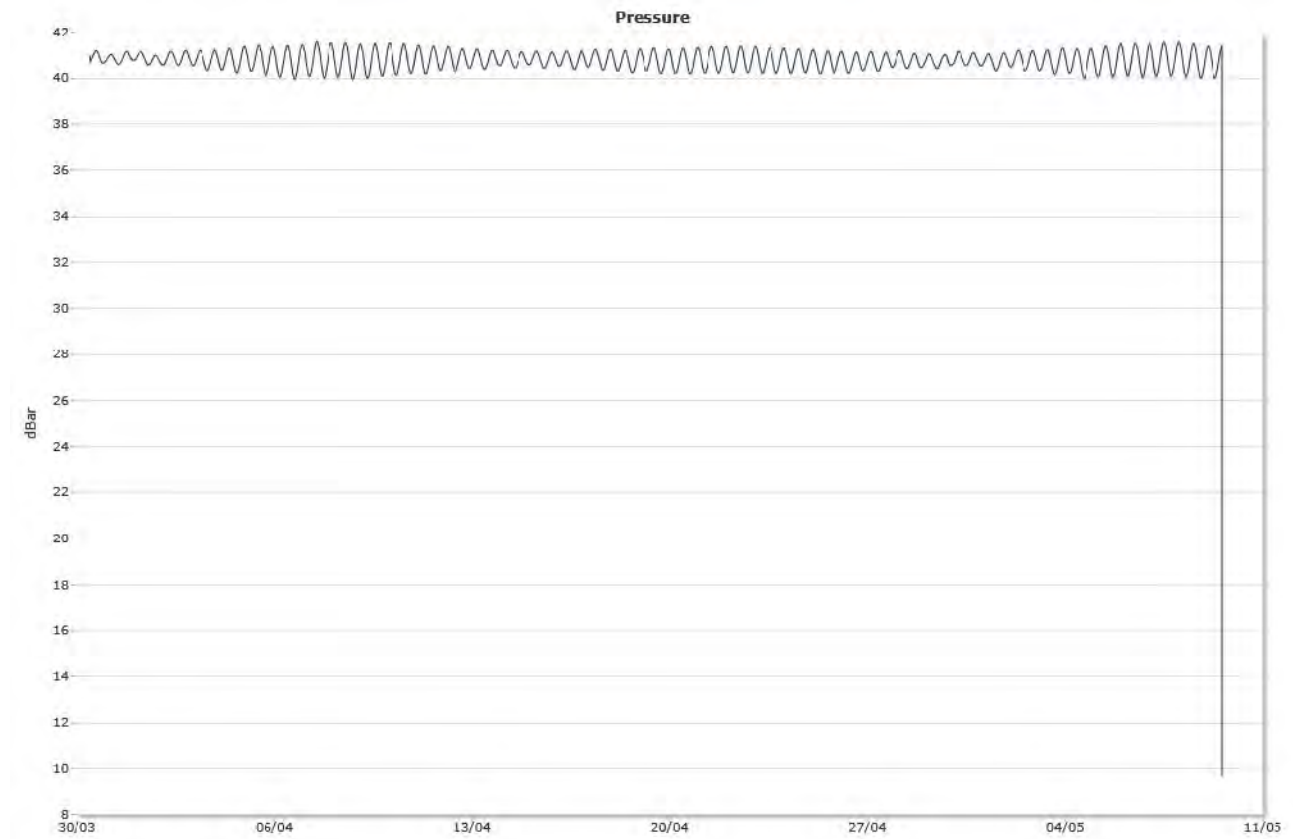


## Sensors

---

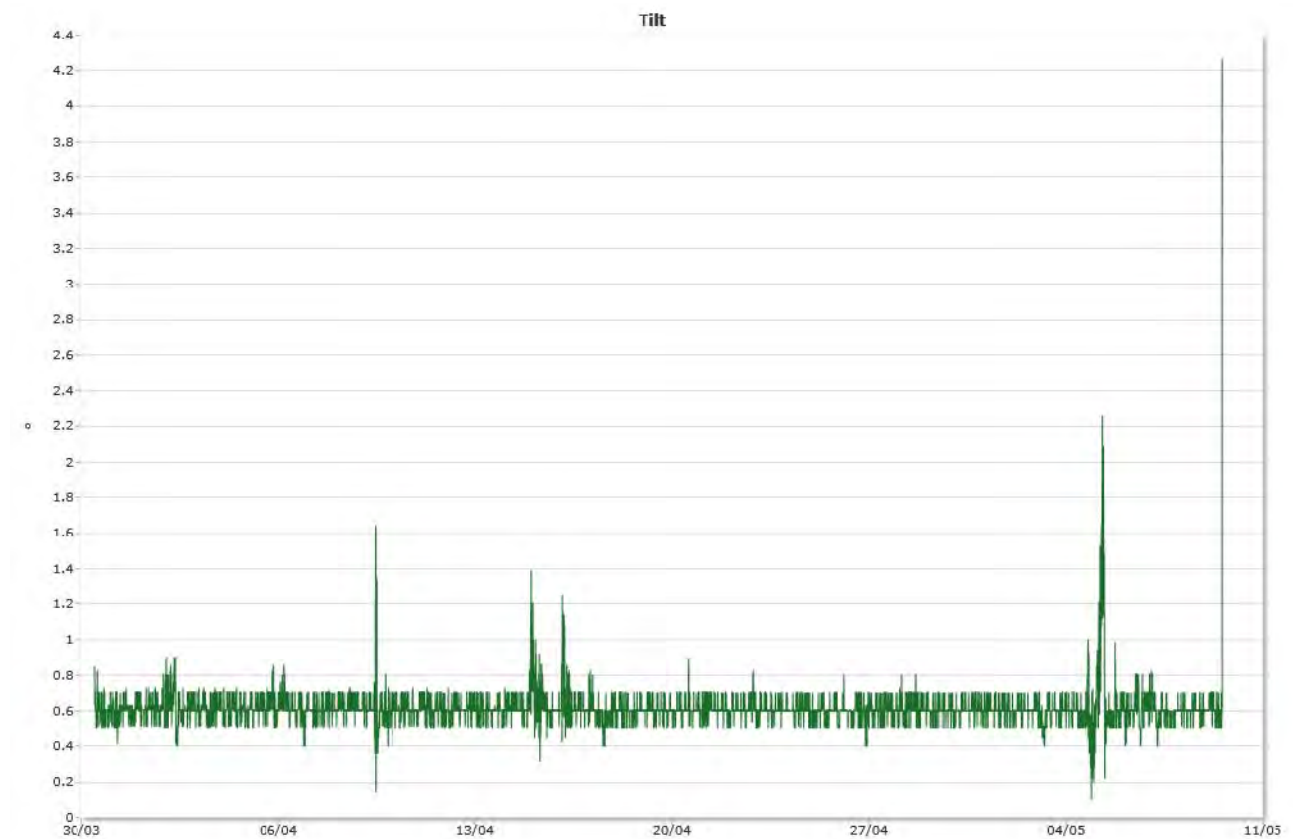
### Pressure

---



### Tilt

---



# Temperature



# Straummåling Bøøy

Spreiingsstraum

02.06.2012

Resipientanalyse AS

Frode Berge-Haveland

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## Summary

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## Details

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### Instrument

---

Head Id	AQP 5338
Board Id	AQD 9568
Frequency	400000

### Configuration

---

Start	29.03.2012 13:00
End	09.05.2012 20:40
Data records	5951
Longitude	4° 52,01'E
Latitude	60° 43,53'N
Orientation	DOWN
Cells	40
Cell size(m)	2
Blanking distance(m)	0,99
Average interval(sec)	60
Measurement interval(sec)	600

### Quality

---

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

### Post processing

---

Selected Start	30.03.2012 11:30
Selected End	09.05.2012 13:50
Compass Offset	0
Pressure Offset	0
Selected Records	5775
Reference	Water Surface
Top Depth(m)	20
Top invalid data	1
Middle Depth(m)	30
Middle invalid data	1
Bottom Depth(m)	35
Bottom invalid data	1

## Statistics

---

### Top [20,0m]

---

Mean current [m/s]	0.05
Max current [m/s]	0.19
Min current [m/s]	0.00
Measurements [#]	5774
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.08
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.315
50 year return current [m/s]	0.353
Most significant directions [°]	75.00, 315.00, 90.00, 300.00
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	12427.63m <sup>3</sup> by 60-75°.
Least flow	3967.20m <sup>3</sup> by 165-180°.

### Middle [30,0m]

---

Mean current [m/s]	0.05
Max current [m/s]	0.27
Min current [m/s]	0.00
Measurements [#]	5774
Std.dev [m/s]	0.03
Significant max velocity [m/s]	0.08
Significant min velocity [m/s]	0.02
10 year return current [m/s]	0.443
50 year return current [m/s]	0.497
Most significant directions [°]	75.00, 90.00, 105.00, 285.00
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	11348.26m <sup>3</sup> by 60-75°.
Least flow	4431.67m <sup>3</sup> by 150-165°.

### Bottom [35,0m]

---

Mean current [m/s]	0.04
Max current [m/s]	0.23
Min current [m/s]	0.00
Measurements [#]	5774
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]	0.382
50 year return current [m/s]	0.428
Most significant directions [°]	285.00, 90.00, 315.00, 300.00
Most significant speeds [m/s]	0.05, 0.10, 0.15, 0.20
Most flow	10045.95m <sup>3</sup> by 60-75°.
Least flow	4783.59m <sup>3</sup> by 135-150°.

## Direction with return period

---

### Top [20,0m]

---

<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,043	0,144	0,072	0,238	0,080	0,266
45	0,053	0,150	0,087	0,247	0,097	0,277
90	0,059	0,185	0,098	0,305	0,110	0,342
135	0,046	0,138	0,076	0,228	0,085	0,256
180	0,044	0,142	0,072	0,234	0,081	0,262
225	0,043	0,123	0,070	0,203	0,079	0,228
270	0,053	0,191	0,087	0,315	0,097	0,353
315	0,052	0,165	0,085	0,272	0,096	0,305

### Middle [30,0m]

---

<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,044	0,180	0,073	0,297	0,081	0,333
45	0,056	0,221	0,092	0,365	0,103	0,409
90	0,060	0,269	0,100	0,443	0,112	0,497
135	0,044	0,192	0,073	0,318	0,082	0,356
180	0,042	0,135	0,070	0,222	0,078	0,249
225	0,045	0,171	0,074	0,283	0,082	0,317
270	0,047	0,130	0,077	0,214	0,086	0,240
315	0,046	0,143	0,077	0,236	0,086	0,265

### Bottom [35,0m]

---

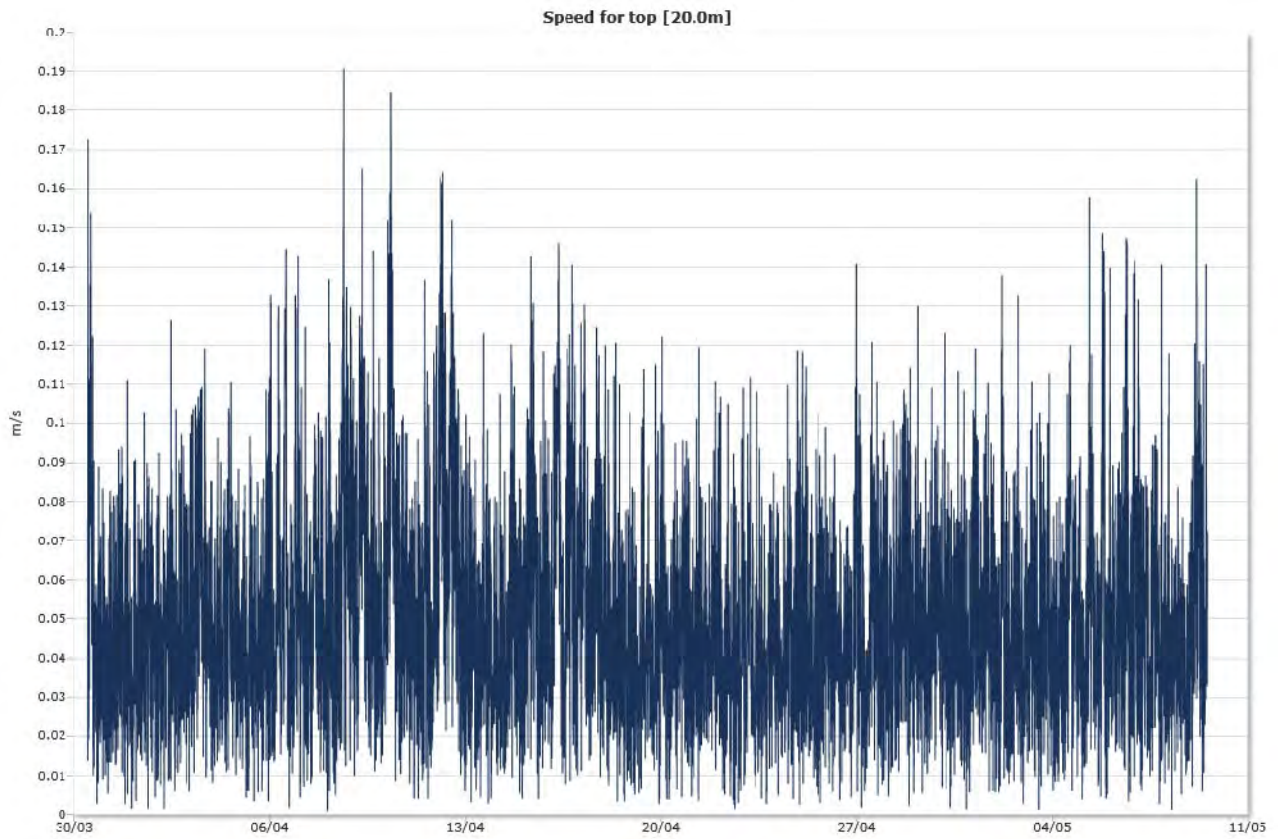
<b>Direction</b>	<b>Mean</b>	<b>Max</b>	<b>Mean 10y</b>	<b>Max 10y</b>	<b>Mean 50y</b>	<b>Max 50y</b>
0	0,038	0,192	0,063	0,316	0,071	0,355
45	0,053	0,218	0,088	0,360	0,098	0,403
90	0,054	0,231	0,090	0,382	0,101	0,428
135	0,041	0,153	0,067	0,252	0,075	0,282
180	0,041	0,114	0,067	0,189	0,075	0,211
225	0,039	0,123	0,064	0,203	0,072	0,228
270	0,040	0,112	0,066	0,185	0,074	0,208
315	0,040	0,142	0,067	0,235	0,075	0,263

## Time series

---

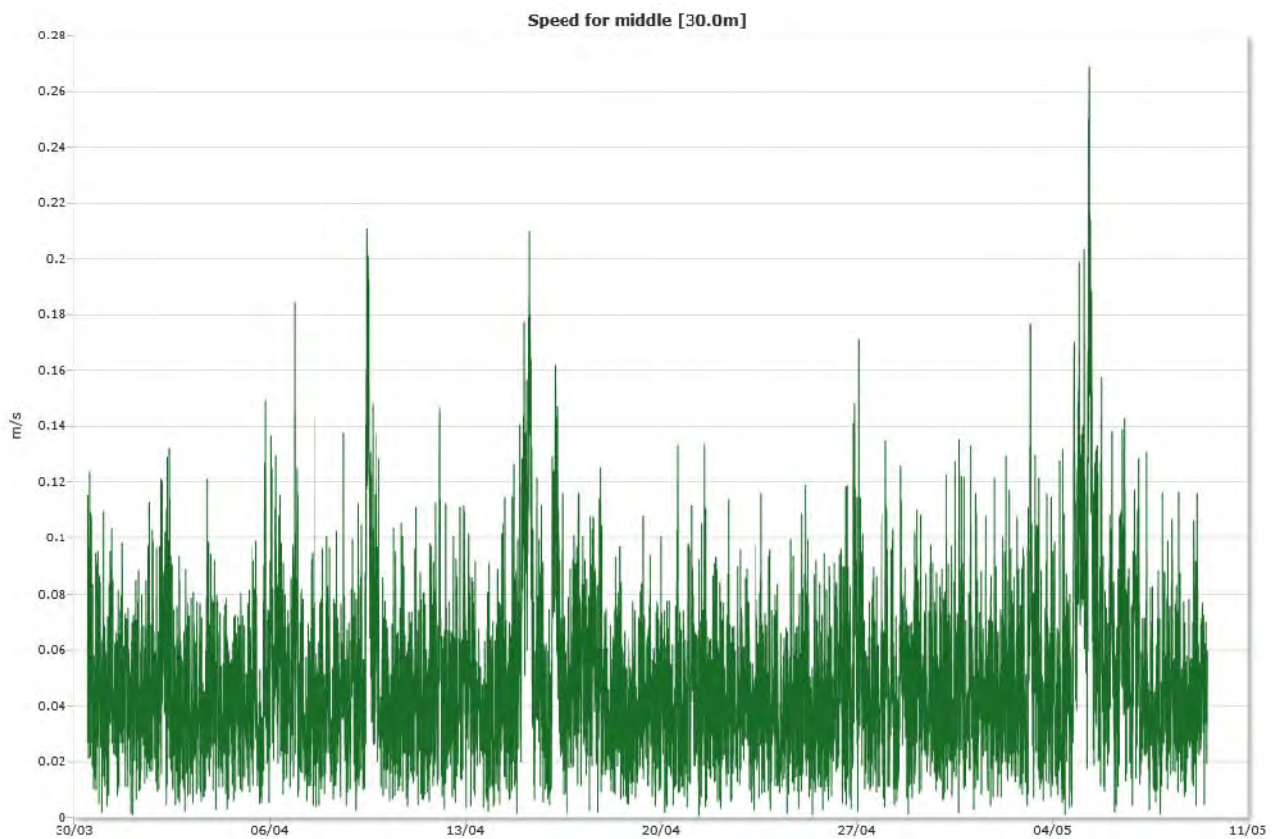
### Top [20,0m]

---

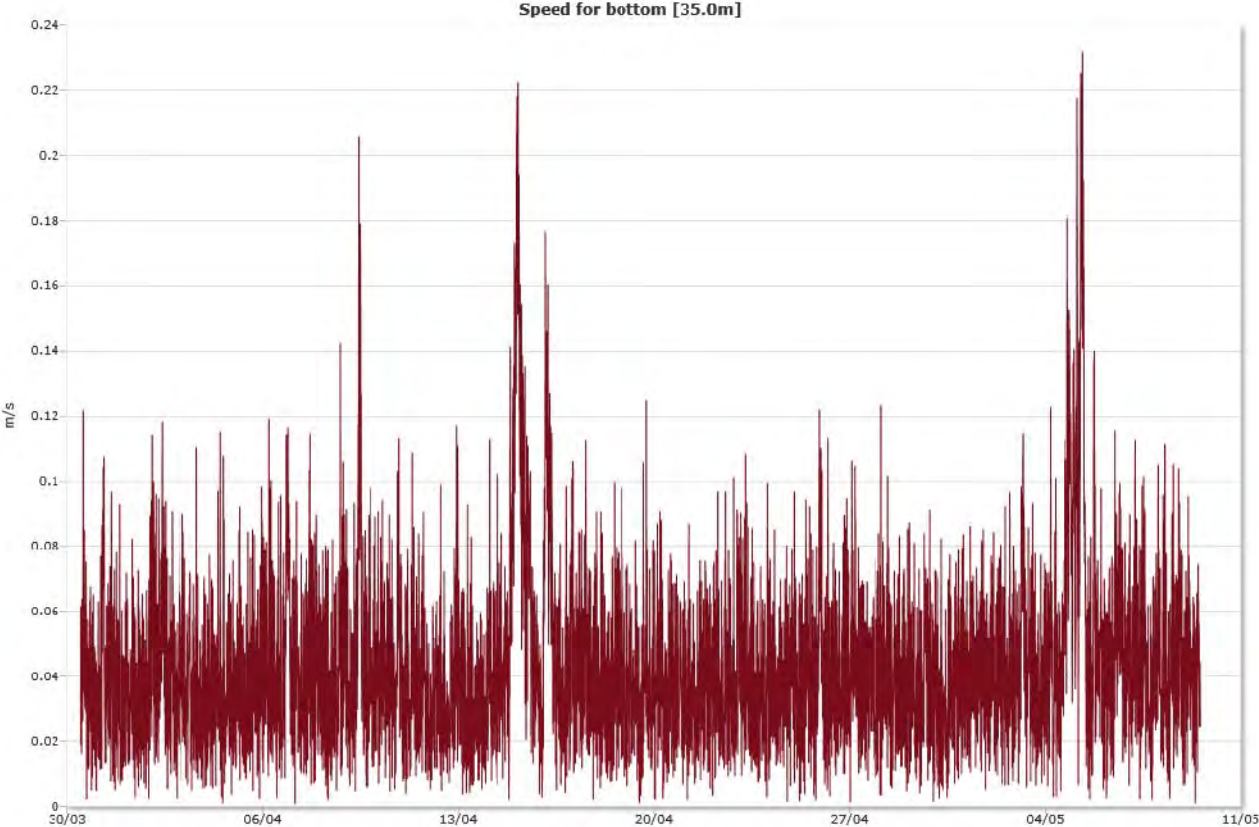


### Middle [30,0m]

---



Bottom [35,0m]

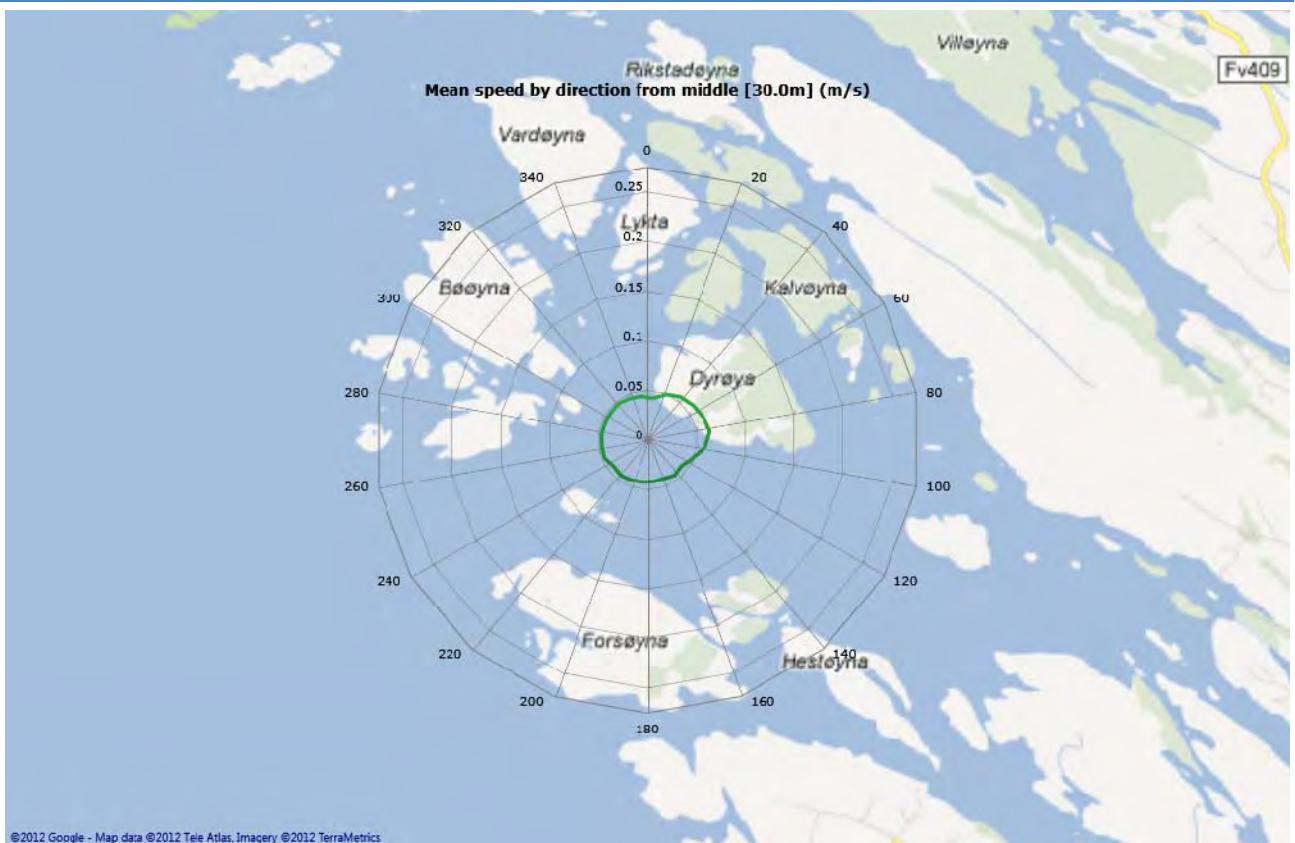


# Mean speed - roseplot

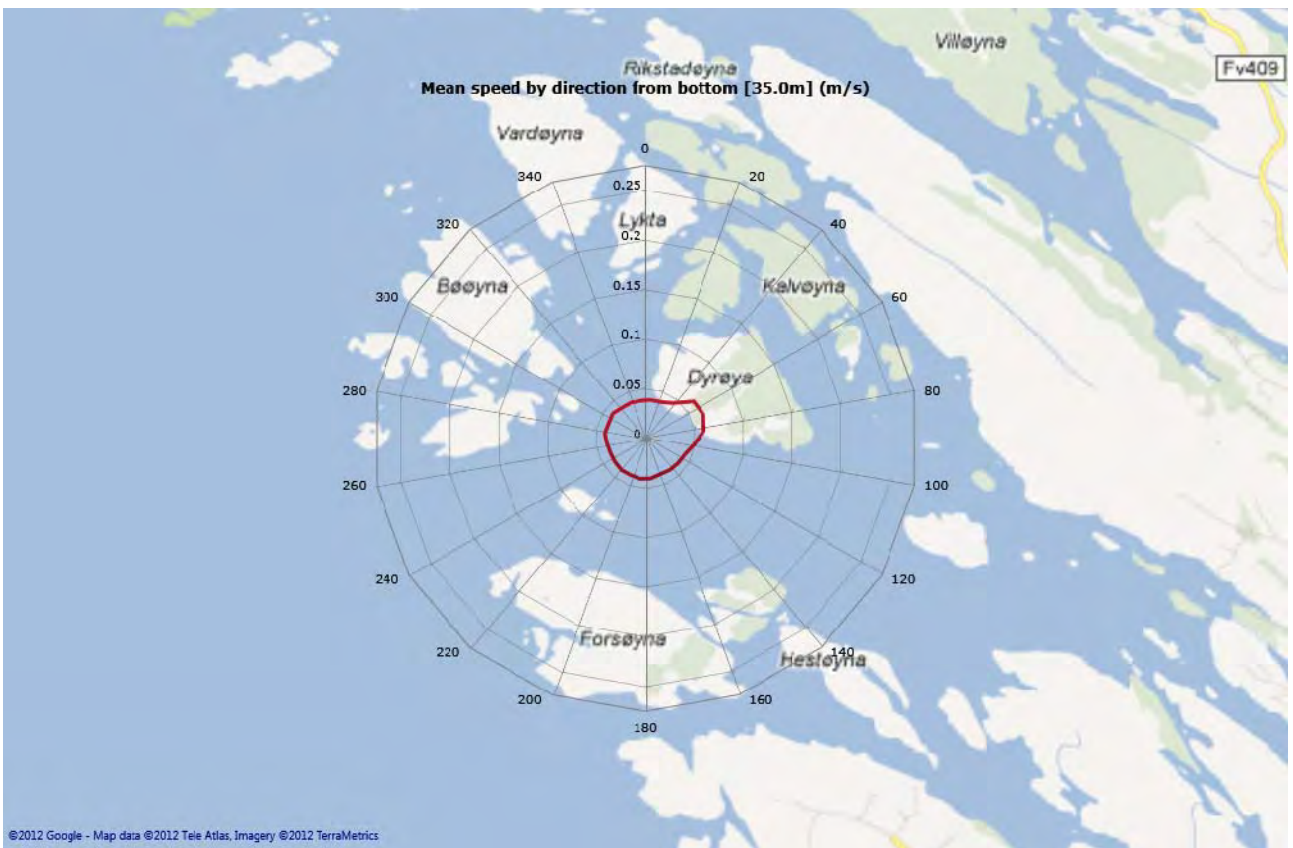
## Top [20,0m]



## Middle [30,0m]



Bottom [35,0m]



# Max speed - roseplot

## Top [20,0m]



## Middle [30,0m]



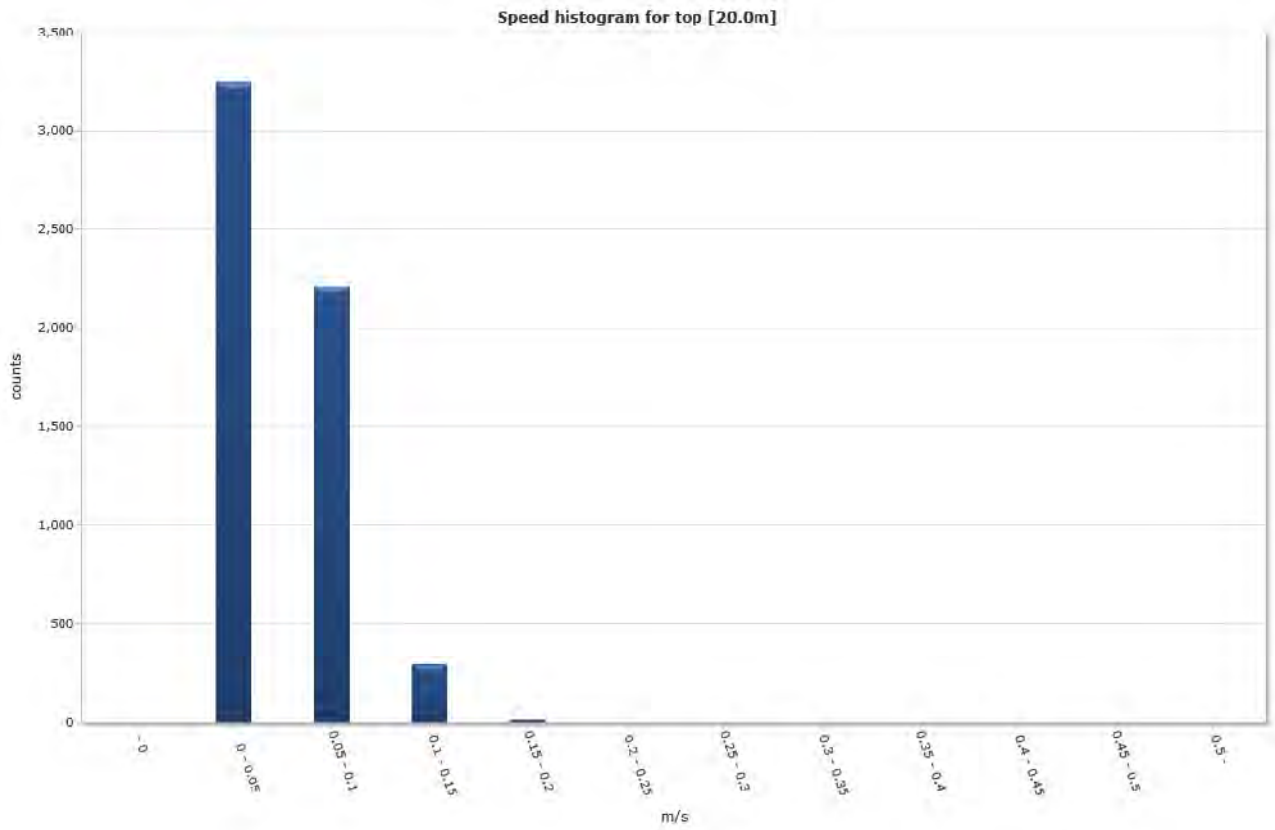


Bottom [35,0m]

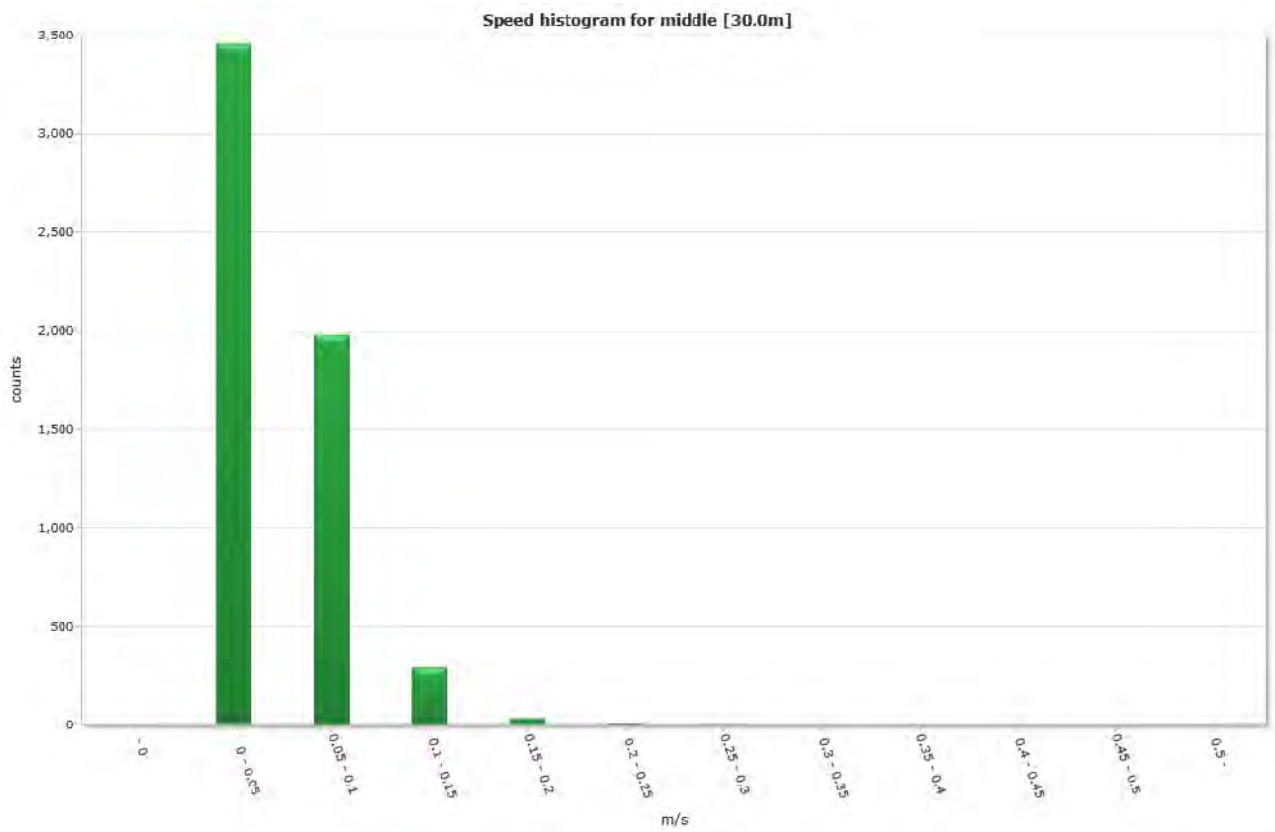


## Speed histogram

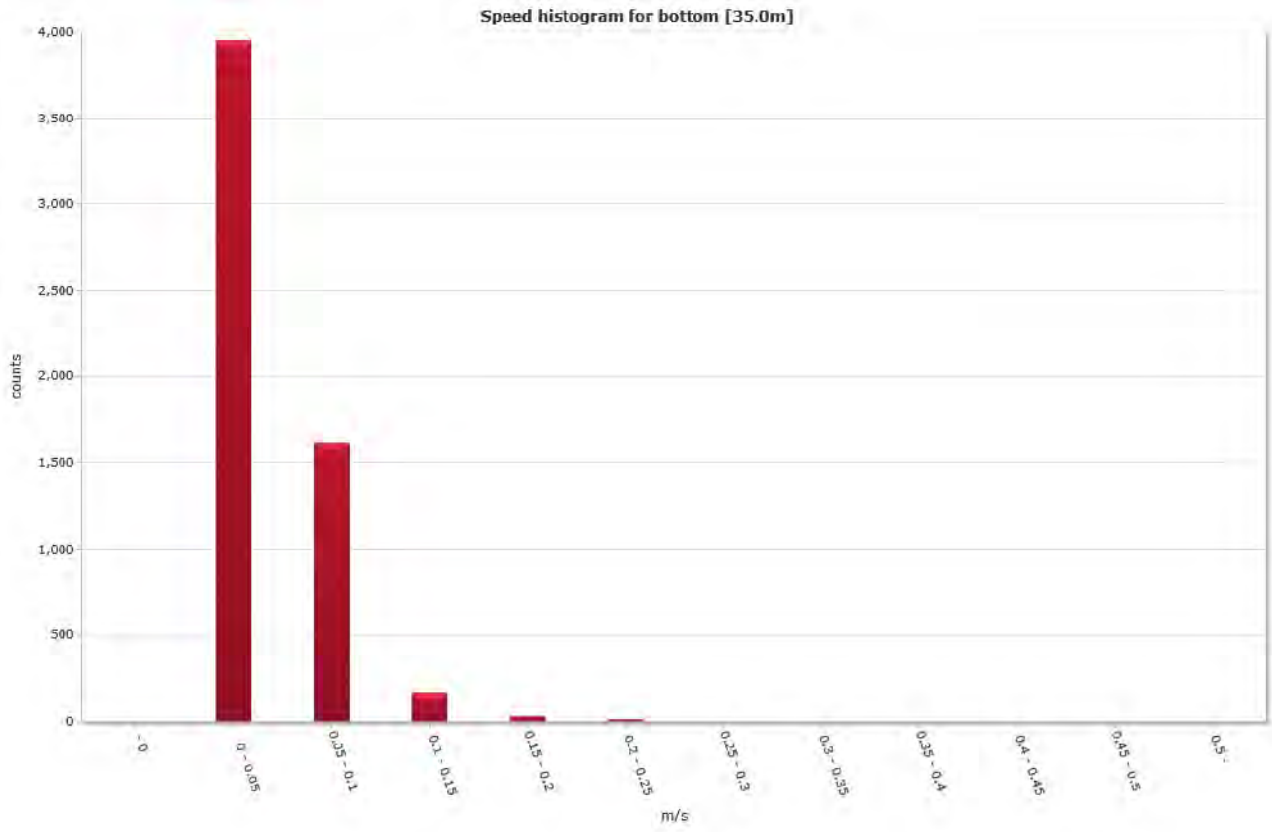
### Top [20,0m]



### Middle [30,0m]

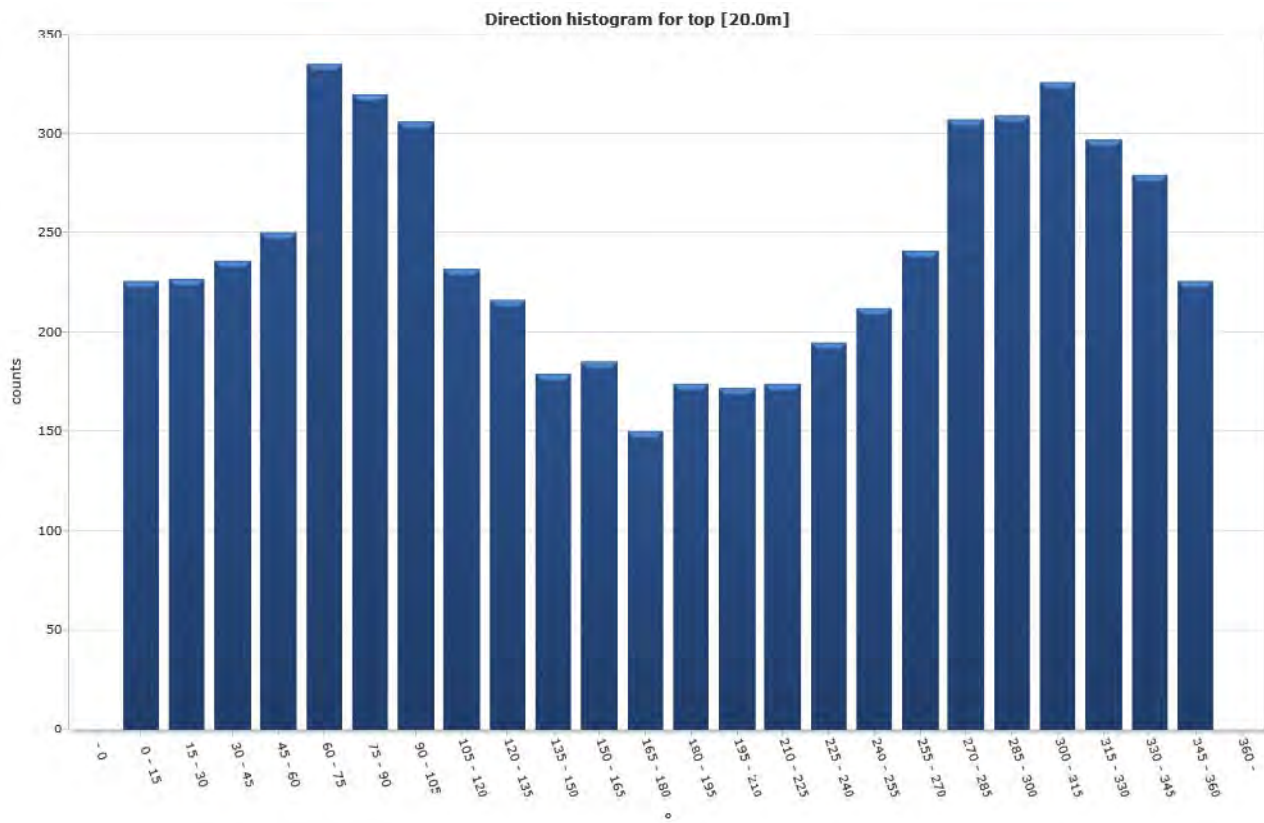


# Bottom [35,0m]

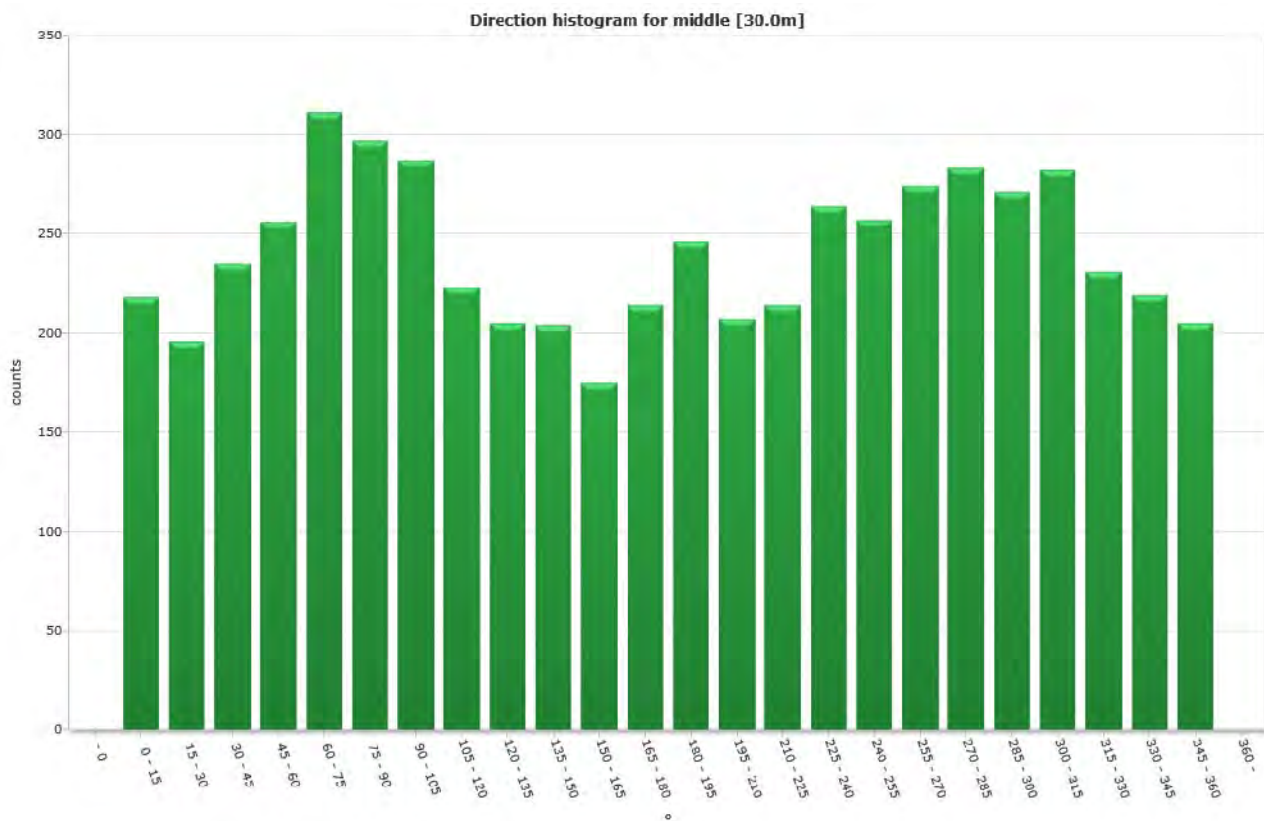


## Direction histogram

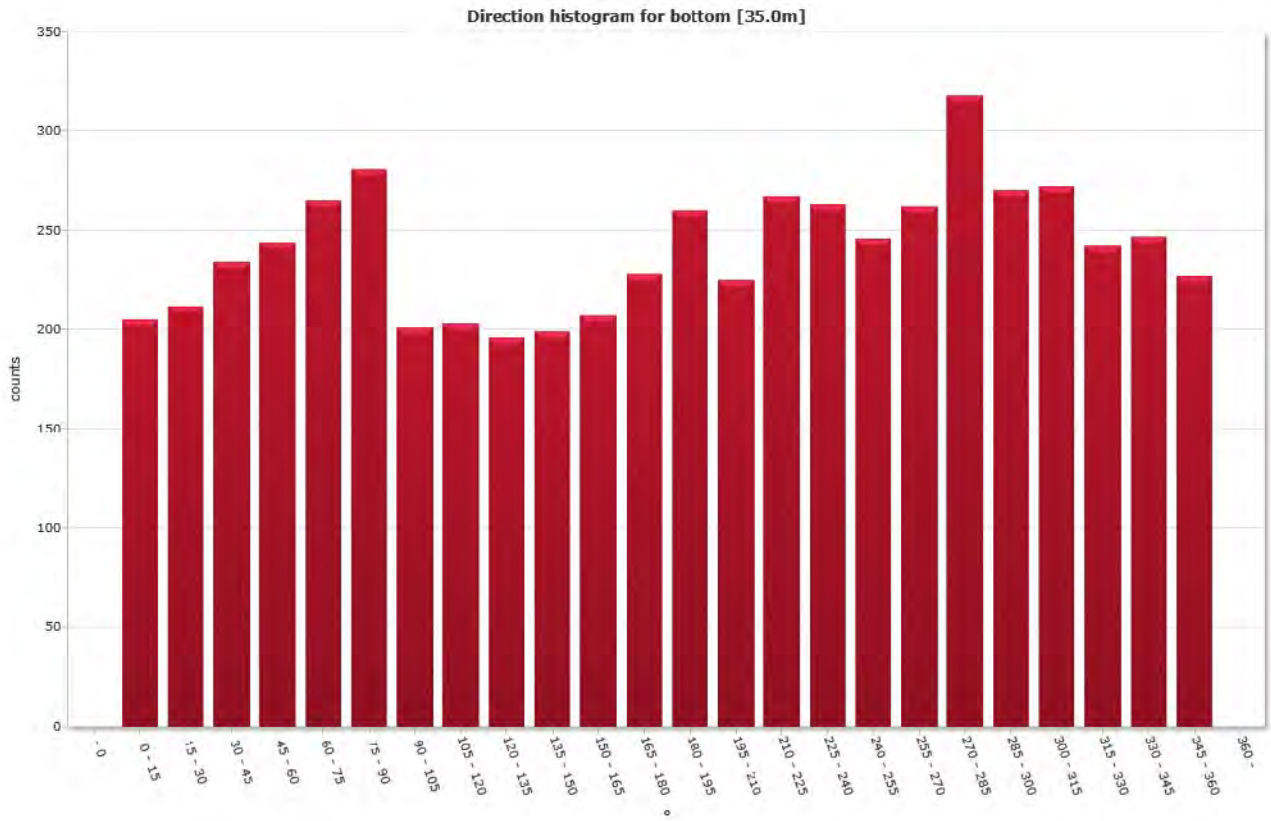
### Top [20,0m]



### Middle [30,0m]



# Bottom [35,0m]



## Direction/Speed histogram

### Top [20,0m]

		Direction/speed matrix for top [20.0m]																											
°	m/s	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		
	0.0																												
	0.05	155	132	145	127	131	145	148	126	124	110	122	104	112	115	120	117	135	138	150	142	165	161	180	146	56.3	3250		
	0.10	70	89	87	104	161	129	120	90	85	65	61	42	60	55	51	71	75	95	129	145	139	124	89	75	38.3	2211		
	0.15	1	6	4	19	42	38	36	15	7	4	2	4	2	2	3	7	2	8	27	21	21	12	10	5	5.2	298		
	0.20	0	0	0	0	1	8	2	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.3	15		
	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		
	%	3.9	3.9	4.1	4.3	5.8	5.5	5.3	4.0	3.7	3.1	3.2	2.6	3.0	3.0	3.0	3.4	3.7	4.2	5.3	5.4	5.6	5.1	4.8	3.9	100.0	100.0		
	Sum	226	227	236	250	335	320	306	232	216	179	185	150	174	172	174	195	212	241	307	309	326	297	279	226	100.0	5774		

### Middle [30,0m]

		Direction/speed matrix for middle [30.0m]																										
°	m/s	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	
	0.0																											
	0.05	153	115	131	128	150	135	150	133	136	121	116	151	166	134	135	176	157	169	163	168	173	137	135	124	59.9	3456	
	0.10	61	70	79	96	104	111	97	72	64	81	58	59	72	69	73	83	92	97	111	95	100	84	77	77	34.3	1982	
	0.15	3	10	18	27	49	39	32	15	5	2	1	4	8	4	5	5	8	8	9	8	9	10	7	3	5.0	289	
	0.20	1	1	5	3	5	10	6	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.6	35	
	0.25	0	0	2	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	9	
	0.30	0	0	0	0	2	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	
	%	3.8	3.4	4.1	4.4	5.4	5.1	5.0	3.9	3.6	3.5	3.0	3.7	4.3	3.6	3.7	4.6	4.5	4.7	4.9	4.7	4.9	4.0	3.8	3.6	100.0	100.0	
	Sum	218	196	235	256	311	297	287	223	205	204	175	214	246	207	214	264	257	274	283	271	282	231	219	205	100.0	5774	

# Bottom [35,0m]

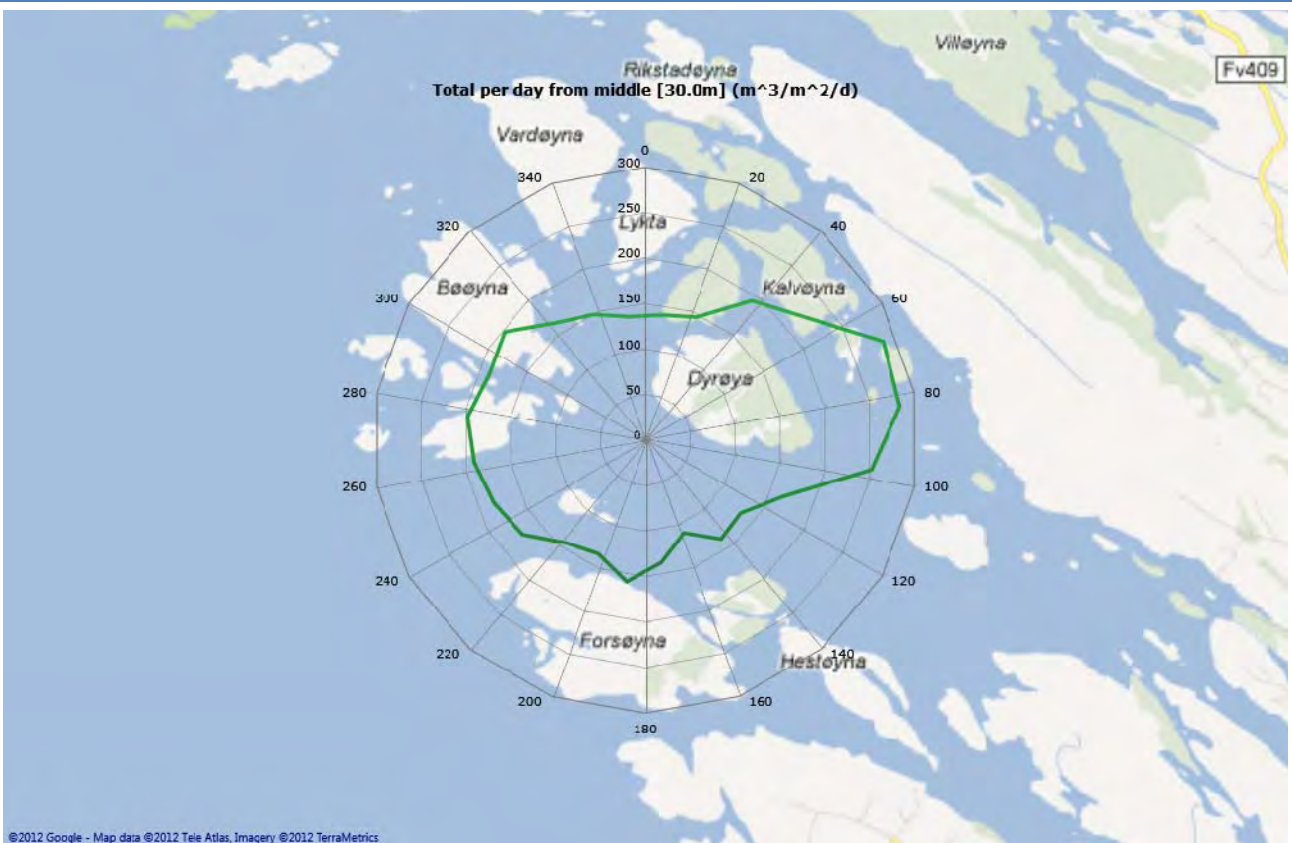
m/s	Direction/speed matrix for bottom [35.0m]																										%	Sum
	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360				
0.0																												
0.05	148	159	153	118	137	155	120	128	135	145	151	163	178	158	185	196	180	199	218	195	195	183	183	169	68.4	3951		
0.10	56	46	68	83	77	83	66	70	56	53	54	63	78	66	81	63	65	63	97	74	75	57	62	56	27.9	1612		
0.15	1	6	9	34	33	32	12	5	4	1	2	2	4	1	1	4	1	0	3	1	2	2	2	2	2.8	164		
0.20	0	1	3	8	9	8	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	33		
0.25	0	0	1	1	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	14		
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		
%	3.6	3.7	4.1	4.2	4.5	4.9	3.5	3.5	3.4	3.4	3.6	3.9	4.5	3.9	4.6	4.6	4.3	4.5	5.5	4.7	4.7	4.2	4.3	3.9	100.0	100.0		
Sum	205	212	234	244	265	281	201	203	196	199	207	228	260	225	267	263	246	262	318	270	272	242	247	227	100.0	5774		

# Flow

## Top [20,0m]



## Middle [30,0m]





Bottom [35,0m]

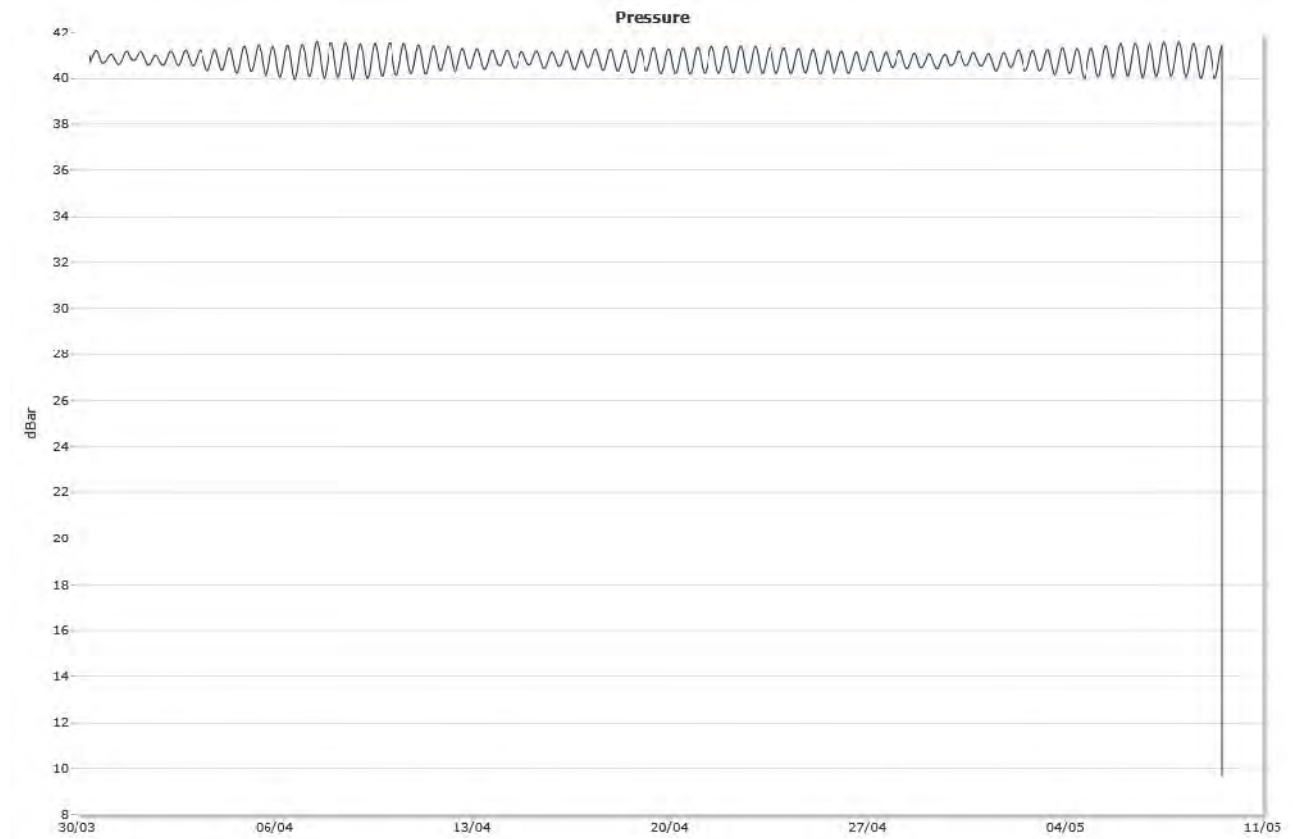


## Sensors

---

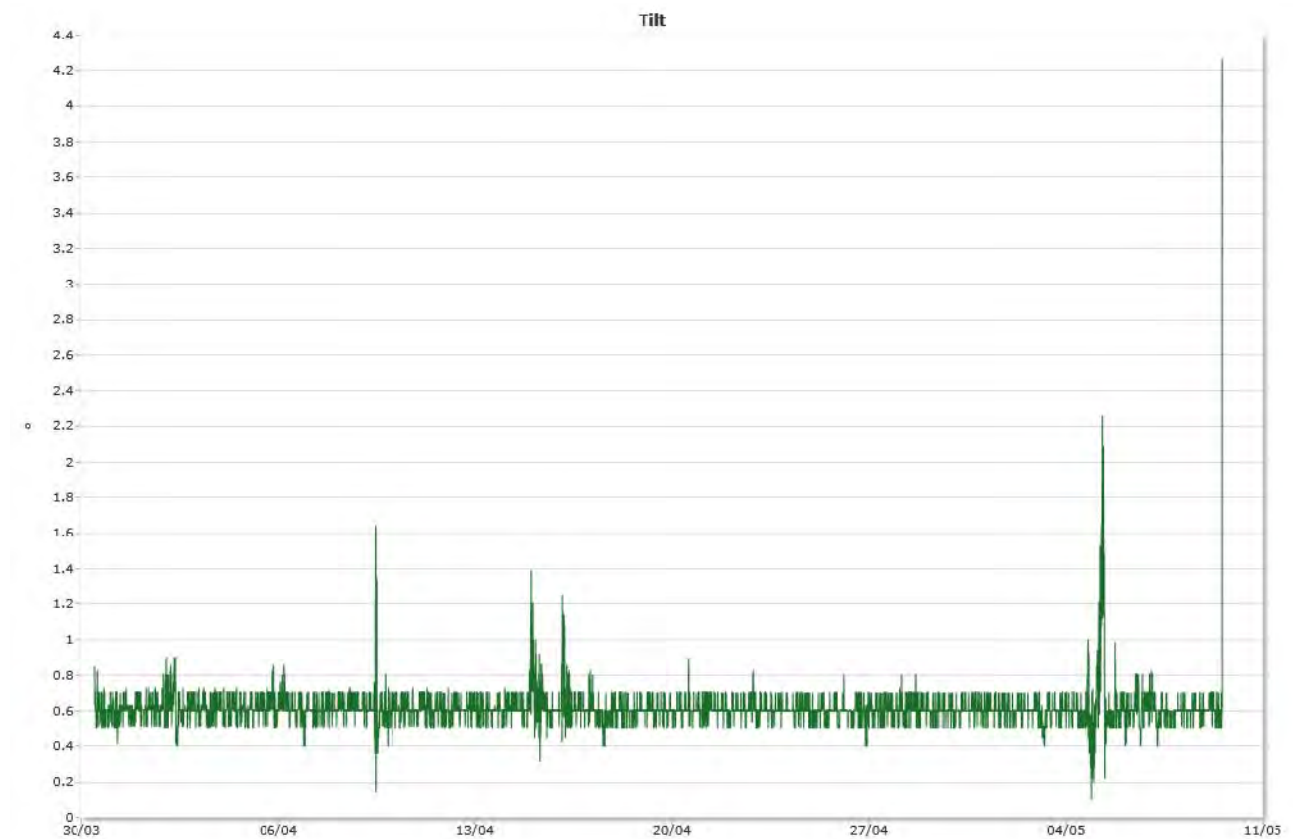
### Pressure

---



### Tilt

---



# Temperature





## Resipientanalyse AS

Foretaksnr.: NO 998 058 376 MVA  
Adresse: Dortledhaugen 156  
5239 Rådal  
Kontaktperson: Frode Berge-Haveland  
Telefon: 40231779  
Epost: [resipientanalyse@online.no](mailto:resipientanalyse@online.no)  
Internett: <http://www.resipientanalyse.no>

Dato: 04/06-2012

### **Lokaliteten: Nye Bøøy, Radøy. Sprednings- og bunnstrøm.**

Som avtalt oversender vi resultatene fra våre strømmålinger utført i området ved Nye Bøøy i Radøy kommune. Vår vurdering av lokaliteten er i hovedsak basert på de viste måledata. Vi anbefaler sterkt at dere studerer de vedlagte data nøye selv. Rådataene finnes oppbevart i vårt arkiv.

### **Firmanavn / Lokalitet. Type oppdrett:**

Firma : Blom Fiskeoppdrett AS  
: og Skjærgårdsfisk AS      Adresse :  
Lokalitet : Nye Bøøy  
Kommune : Radøy      Fylke : Hordaland  
UTM-koordinater : N60 43 526 / E4 52 013  
Oppdrettstype : Generelle strømforhold - matfiskanlegg  
Hva er vurdert : Spredningsstrøm og bunnstrøm.

### **Måleperioder / frekvenser.**

Se vedlegg.

### **Oppsummering fra målingene.**

Se ”Spesifikasjons og resultatoversikt”.

### **Vår vurdering:**

Med hilsen:

Kvalitetssikret av:

Frode Berge-Haveland  
*Cand. Scient.* Marin mikrobiolog  
Daglegleiar i Resipientanalyse AS

Vedlegg og kopi:  
Totalvurdering, resultatoversikt  
Statistisk behandling av rådata.

## SPESIFIKASJONS- OG RESULTATOVERSIKT.

**Firma:**

**Lokalitet: Nye Bøøy, Radøy kommune.**

### Generelle spesifikasjoner, periode, frekvens og resultater.

Tekst	Overflatestrøm	Spredningsstrøm	Bunnstrøm
Tidsrom for registreringer		30.03.2012-09.05.2012	30.03.2012-09.05.2012
Dybde på målestedet. Ca.	85	85	85
Dybde for registreringer (meter). Ca.		50	80
Måler type - nummer		SD6000 - nr1265	SD6000 - nr1245
Type måling	Kontinuerlig	Kontinuerlig	Kontinuerlig
Frekvens – varighet*4		2 min/10 min - 40 døgn	2 min/10 min - 40 døgn
Adresse for arkiv (data)	/N60 43 526 / E4 52 013o	/N60 43 526 / E4 52 013s	/N60 43 526 / E4 52 013b
% strøm mindre enn 1 cm/sek.(ca)		94.4 %	95.9 %
Gjennomsnittsstrøm		1.1	1.2
Rest strøm		0.2	0.9
Neumanns parameter		0.189	0.753
De 4 hyppigst forekommende retningene strømmen beveger seg mot (grader) *1		105, 45, 90, 285	270, 285, 300, 45
De 4 hyppigst forekommende strømhastighetene (cm /sek) *1		0-1, 1-3, 6-8, 3-4	0-1, 1-3, 4-5, 10-15
Mest vannutskiftning / retning / 15 graders sektor.*2		4108m <sup>3</sup> ved 45-60 grader. 103m <sup>3</sup> /m <sup>2</sup> /døgn	17826m <sup>3</sup> ved 270-285 grader. 446m <sup>3</sup> /m <sup>2</sup> /døgn
Minst vannutskiftning / retning / 15 graders sektor.*2		380m <sup>3</sup> ved 330-345 grader. 10m <sup>3</sup> /m <sup>2</sup> /døgn	0m <sup>3</sup> ved 75-90 grader. 0m <sup>3</sup> /m <sup>2</sup> /døgn
Gjennomsnittlig total vannutskiftning pr.døgn. Alle retninger		973m <sup>3</sup> /døgn	1031m <sup>3</sup> /døgn
Maksimum strøm – signifikant maksimum strøm (cm/sek) *3		11.8 - 1.4	22.4 - 1.6

\*1: gruppert i synkende rekkefølge \*2: vann som passerer gjennom hver loddrett plassert kvadratmeter.\*3: gjennomsnittet av 1/3 målingene som viser høyest verdi. \*4:måleren måler hvert x minutt, hvert y minutt gir måleren et gjennomsnitt av verdiene for 5 målinger."

# Spredningsstrøm

## TEMPERATURE

File name: Bøøy 50 meter.SD6

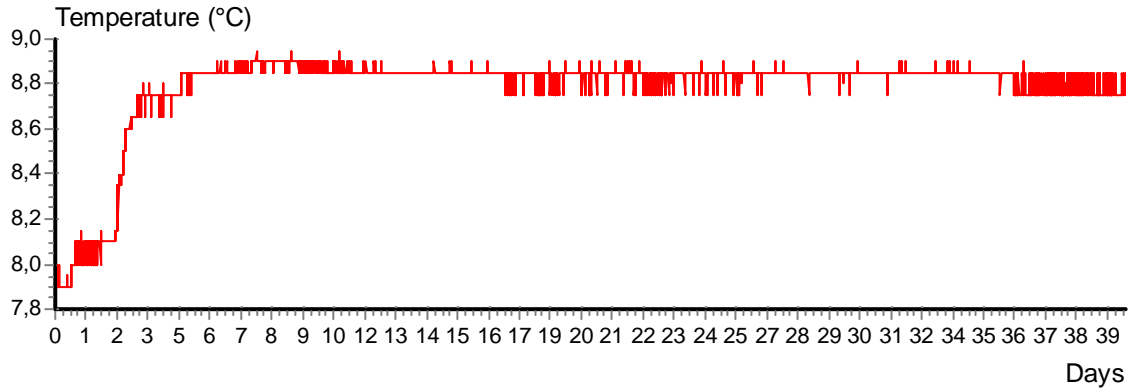
Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12



## CURRENT SPEED

File name: Bøøy 50 meter.SD6

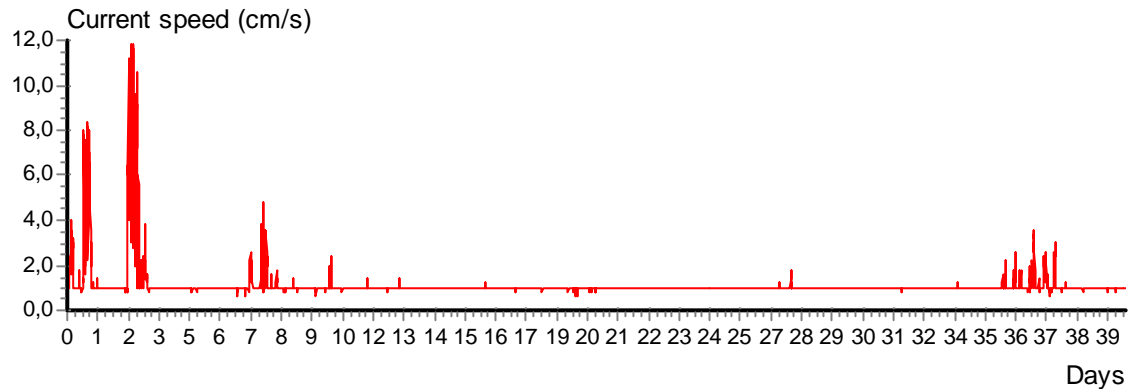
Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12



## CURRENT SPEED BAR CHART

File name: Bøøy 50 meter.SD6

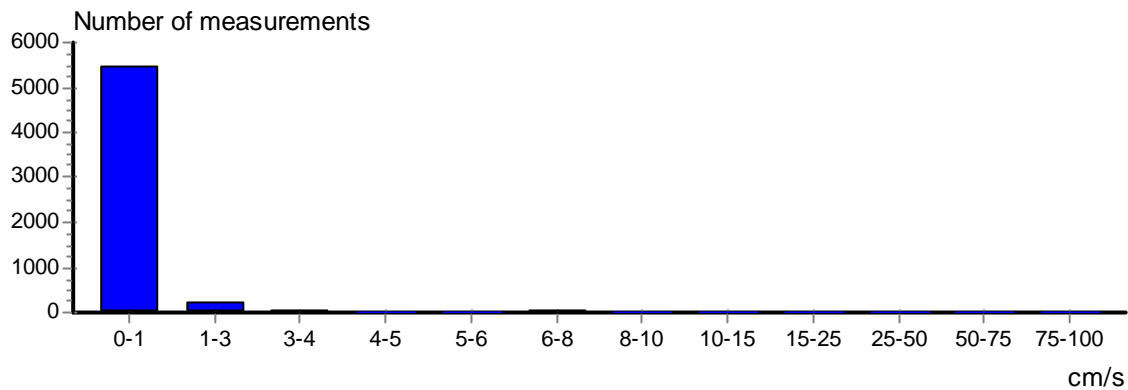
Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12



**CURRENT DIRECTION BAR CHART**

File name: Bøøy 50 meter.SD6

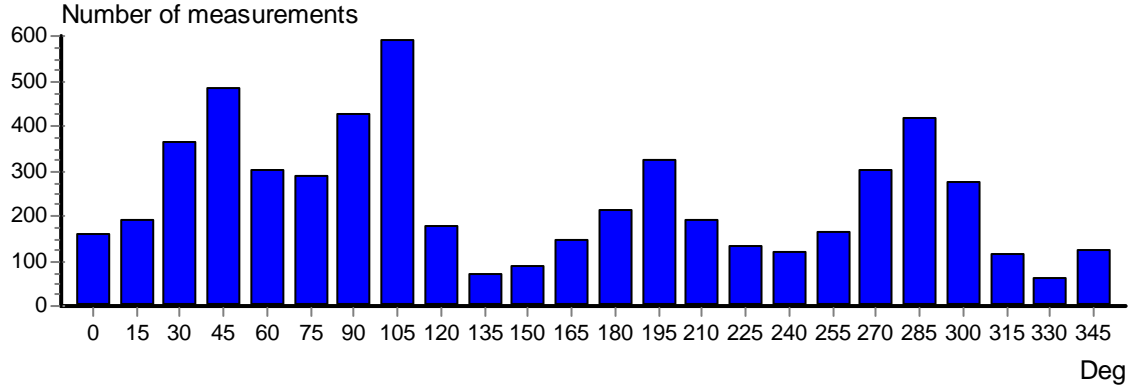
Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12



**PROGRESSIVE VECTOR**

File name: Bøøy 50 meter.SD6

Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

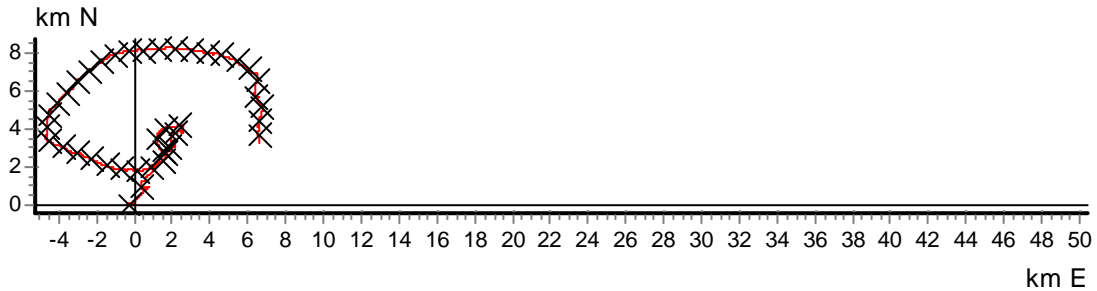
Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12

Neumann parameter: 0.189

Rest speed: 0.2 cm/s

Average speed: 1.1 cm/s

Rest direction: 64 deg.



**CURRENT VELOCITY DISTRIBUTION DIAGRAM**

File name: Bøøy 50 meter.SD6

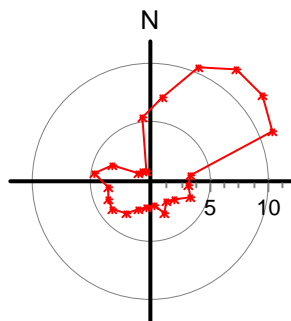
Ref. number: 1265

Series number: 1

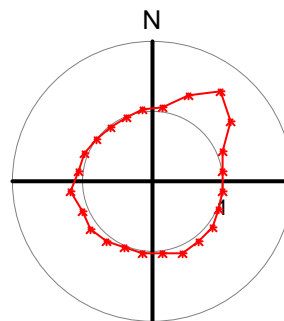
Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12



Maximum velocity (cm/s)  
per 15 deg sector



Mean velocity (cm/s)  
per 15 deg sector

**CURRENT VELOCITY DISTRIBUTION DIAGRAM**

File name: Bøøy 50 meter.SD6

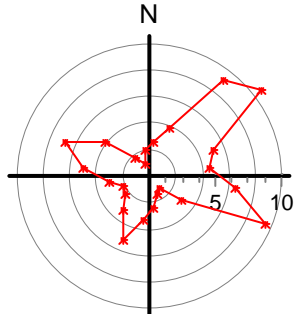
Series number: 1

Number of measurements in data set: 5766

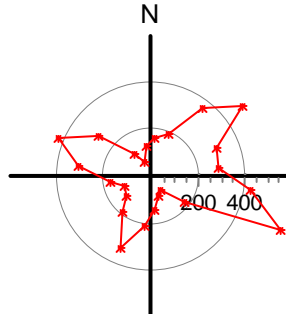
Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12

Ref. number: 1265

Interval time: 10 Minutes



Relative water flux (%)  
per 15 deg sector



Number of measurements  
per 15 deg sector

**STICK DIAGRAM**

File name: Bøøy 50 meter.SD6

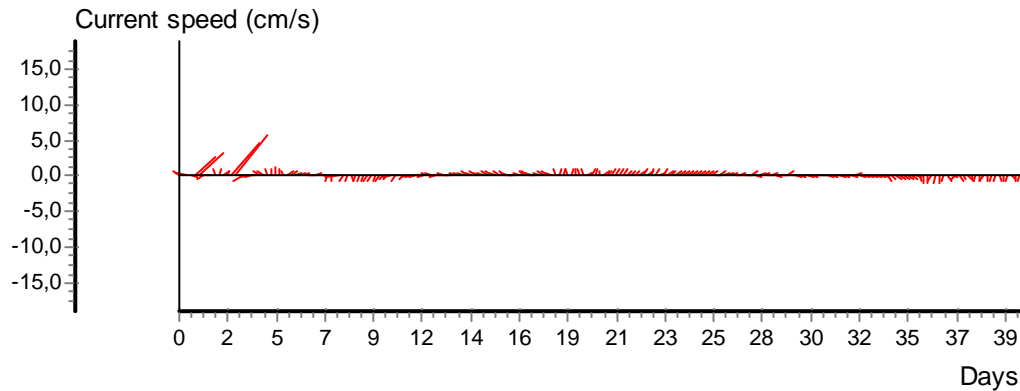
Series number: 1

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12

Ref. number: 1265

Interval time: 10 Minutes





**CURRENT SPEED / DIRECTION MATRIX**

File name: Bøøy 50 meter.SD6

Ref. number: 1265

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:28 - 30.Mar-12 To: 13:18 - 09.May-12

	Current speed groups													Total flow		Max curr
	1	3	4	5	6	8	10	15	25	50	75	100	Sum%	m <sup>3</sup> /m <sup>2</sup>	%	
0	160	0	0	0	1	1	0	0	0	0	0	0	2.8	1033	2.7	7.2
15	179	2	2	2	1	4	1	1	0	0	0	0	3.3	1534	3.9	10.4
30	325	4	1	8	3	16	4	4	0	0	0	0	6.3	3535	9.1	11.8
45	449	4	3	8	5	9	7	2	0	0	0	0	8.4	4108	10.6	11.8
60	297	1	0	1	1	2	0	1	0	0	0	0	5.3	2003	5.1	11.2
75	286	2	1	0	0	0	0	0	0	0	0	0	5.0	1764	4.5	3.4
90	422	3	1	0	0	0	0	0	0	0	0	0	7.4	2573	6.6	3.2
105	580	11	2	0	0	0	0	0	0	0	0	0	10.3	3656	9.4	3.6
120	160	20	0	0	0	0	0	0	0	0	0	0	3.1	1169	3.0	2.6
135	65	8	0	0	0	0	0	0	0	0	0	0	1.3	469	1.2	2.2
150	79	11	0	0	0	0	0	0	0	0	0	0	1.6	599	1.5	3.0
165	131	18	0	0	0	0	0	0	0	0	0	0	2.6	937	2.4	2.0
180	200	14	0	0	0	0	0	0	0	0	0	0	3.7	1327	3.4	2.2
195	308	18	0	0	0	0	0	0	0	0	0	0	5.7	2016	5.2	2.6
210	170	21	1	0	0	0	0	0	0	0	0	0	3.3	1244	3.2	3.4
225	115	15	3	0	0	0	0	0	0	0	0	0	2.3	898	2.3	4.0
240	107	13	1	0	0	0	0	0	0	0	0	0	2.1	796	2.0	3.8
255	144	17	6	0	0	0	0	0	0	0	0	0	2.9	1188	3.1	3.6
270	286	16	1	1	0	0	0	0	0	0	0	0	5.3	1928	5.0	4.8
285	404	14	2	0	0	0	0	0	0	0	0	0	7.3	2638	6.8	3.4
300	275	1	0	0	0	0	0	0	0	0	0	0	4.8	1656	4.3	1.2
315	116	0	0	0	0	0	0	0	0	0	0	0	2.0	692	1.8	1.0
330	64	0	0	0	0	0	0	0	0	0	0	0	1.1	380	1.0	1.0
345	123	0	0	0	1	0	0	0	0	0	0	0	2.2	766	2.0	5.4
Sum%	94.4	3.7	0.4	0.3	0.2	0.6	0.2	0.1	0.0	0.0	0.0	0.0		38909		11.8

**STATISTICAL SUMMARY**

	Total	East / west	North / south
Mean current speed (cm/s)	1,1	0,8	0,6
Variance (cm/s) <sup>2</sup>	0,631	0,385	0,458
Standard deviation (cm/s)	0,794	0,620	0,676
Mean standard deviation	0,706	0,770	1,064
Maximum current velocity	11,8		
Minimum current velocity	0,6		
Significant max velocity	1,4		
Significant min velocity	1,0		

# Bunnstrøm

## TEMPERATURE

File name: Bøøy 80 meter.SD6

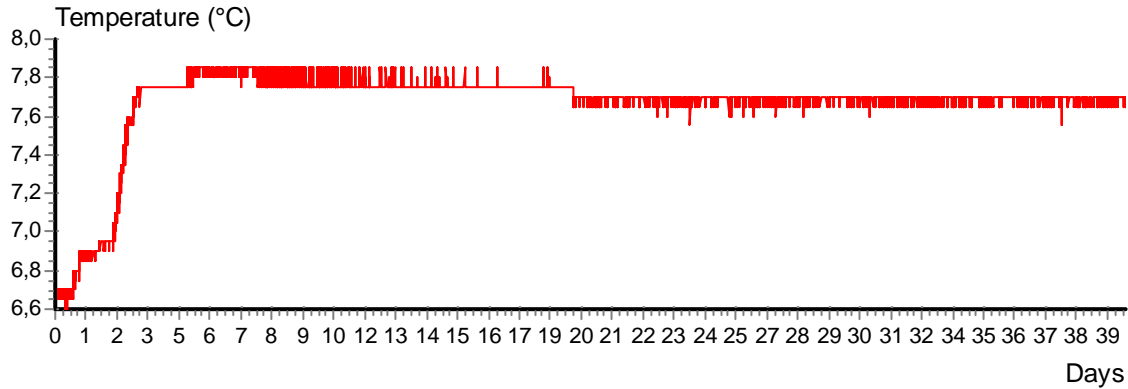
Ref. number: 1245

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12



## CURRENT SPEED

File name: Bøøy 80 meter.SD6

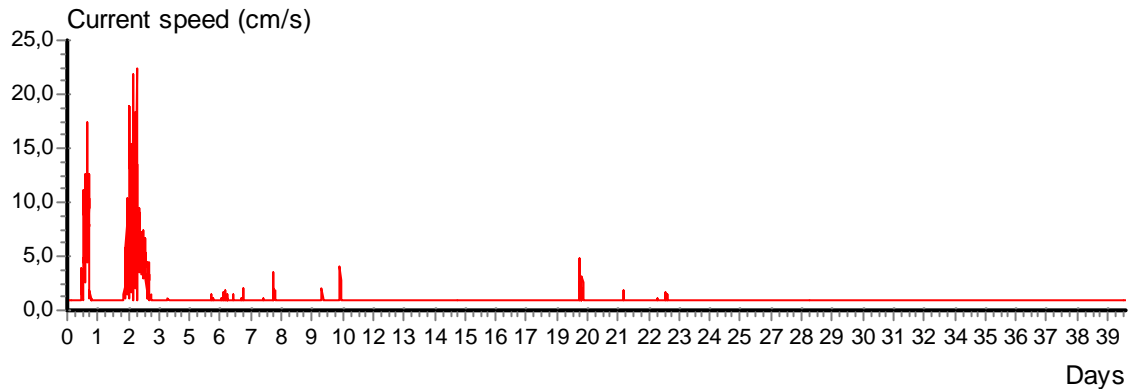
Ref. number: 1245

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12



## CURRENT SPEED BAR CHART

File name: Bøøy 80 meter.SD6

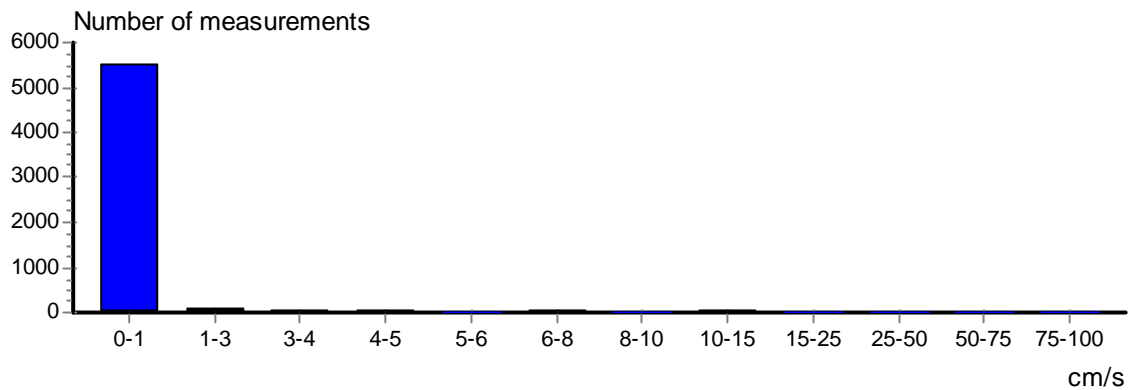
Ref. number: 1245

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12

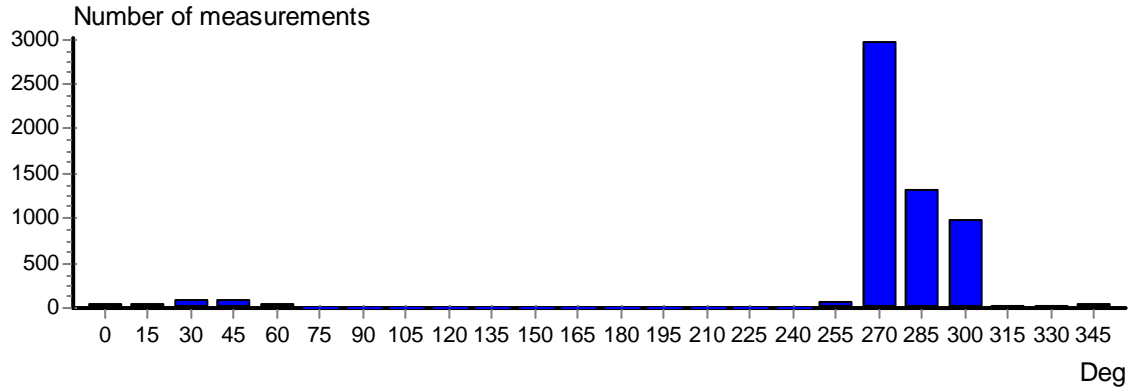


**CURRENT DIRECTION BAR CHART**

File name: Bøøy 80 meter.SD6  
 Series number: 1

Ref. number: 1245  
 Interval time: 10 Minutes

Number of measurements in data set: 5766  
 Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12



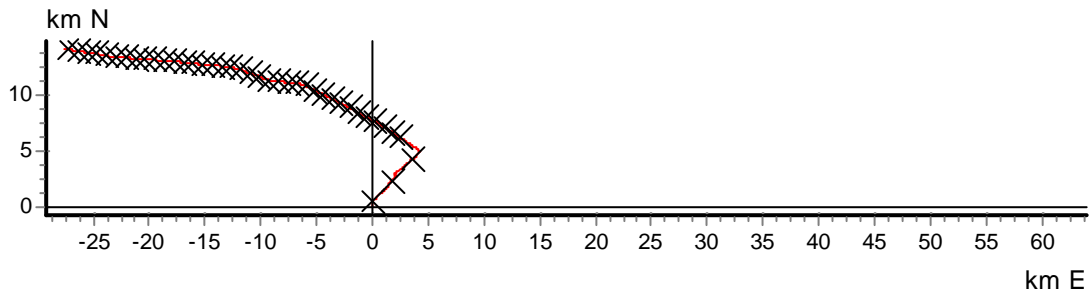
**PROGRESSIVE VECTOR**

File name: Bøøy 80 meter.SD6  
 Series number: 1

Ref. number: 1245  
 Interval time: 10 Minutes

Number of measurements in data set: 5766  
 Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12

Neumann parameter: 0.753      Rest speed: 0.9 cm/s  
 Average speed: 1.2 cm/s      Rest direction: 297 deg.

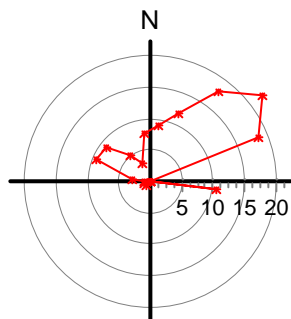


**CURRENT VELOCITY DISTRIBUTION DIAGRAM**

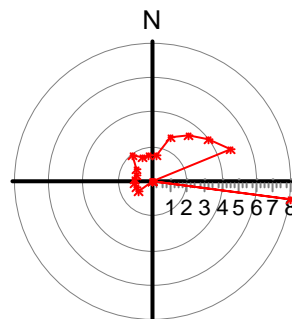
File name: Bøøy 80 meter.SD6  
 Series number: 1

Ref. number: 1245  
 Interval time: 10 Minutes

Number of measurements in data set: 5766  
 Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12



Maximum velocity (cm/s)  
 per 15 deg sector



Mean velocity (cm/s)  
 per 15 deg sector

### CURRENT VELOCITY DISTRIBUTION DIAGRAM

File name: Bøøy 80 meter.SD6

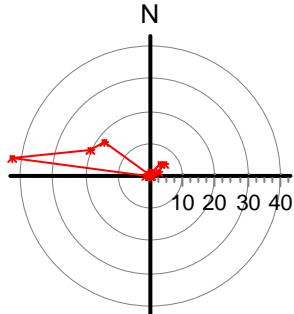
Series number: 1

Number of measurements in data set: 5766

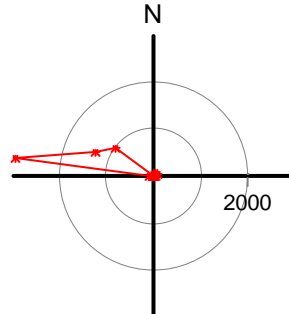
Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12

Ref. number: 1245

Interval time: 10 Minutes



Relative water flux (%)  
per 15 deg sector



Number of measurements  
per 15 deg sector

### STICK DIAGRAM

File name: Bøøy 80 meter.SD6

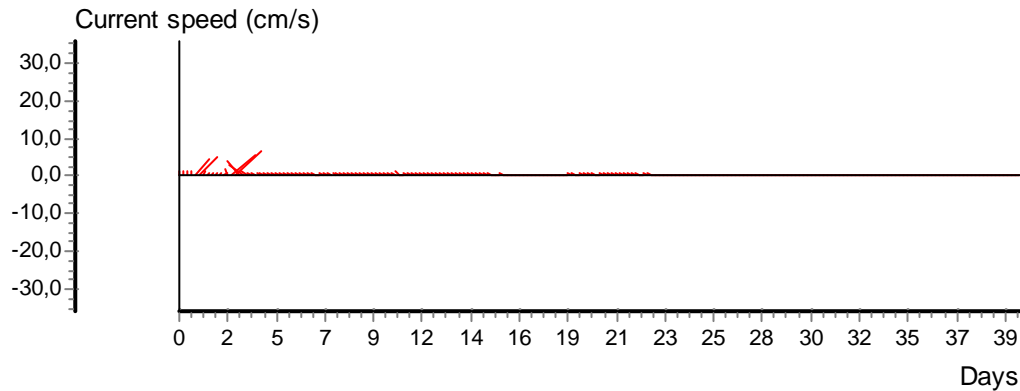
Series number: 1

Number of measurements in data set: 5766

Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12

Ref. number: 1245

Interval time: 10 Minutes



**CURRENT SPEED / DIRECTION MATRIX**

File name: Bøøy 80 meter.SD6

Ref. number: 1245

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5766

Data displayed from: 12:27 - 30.Mar-12 To: 13:17 - 09.May-12

	Current speed groups													Total flow		Max curr
	1	3	4	5	6	8	10	15	25	50	75	100	Sum%	m <sup>3</sup> /m <sup>2</sup>	%	
0	35	4	0	1	0	2	1	0	0	0	0	0	0.7	404	1.0	9.0
15	23	4	0	3	0	3	3	1	0	0	0	0	0.6	611	1.5	11.8
30	65	5	4	3	0	1	4	8	4	0	0	0	1.6	1885	4.6	18.0
45	67	0	1	3	0	5	5	9	6	0	0	0	1.7	2350	5.7	22.4
60	25	0	0	0	2	1	2	5	4	0	0	0	0.7	1150	2.8	18.8
75	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
90	0	0	0	0	1	0	0	1	0	0	0	0	0.0	97	0.2	10.8
105	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
120	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
135	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
150	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
165	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
180	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
195	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
210	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0.0
225	6	0	0	0	0	0	0	0	0	0	0	0	0.1	36	0.1	1.0
240	8	0	0	0	0	0	0	0	0	0	0	0	0.1	48	0.1	1.0
255	74	0	0	0	0	0	0	0	0	0	0	0	1.3	444	1.1	1.0
270	2964	4	0	0	0	0	0	0	0	0	0	0	51.5	17826	43.2	2.8
285	1297	17	4	2	3	2	1	0	0	0	0	0	23.0	8347	20.2	9.4
300	908	37	12	12	12	8	3	0	0	0	0	0	17.2	7290	17.7	9.0
315	10	6	1	1	1	0	0	0	0	0	0	0	0.3	216	0.5	5.2
330	12	7	0	0	0	0	0	0	0	0	0	0	0.3	168	0.4	3.0
345	36	2	2	1	1	1	0	0	0	0	0	0	0.7	380	0.9	7.8
Sum%	95.9	1.5	0.4	0.5	0.3	0.4	0.3	0.4	0.2	0.0	0.0	0.0		41252		22.4

**STATISTICAL SUMMARY**

	Total	East / west	North / south
Mean current speed (cm/s)	1,2	1,1	0,4
Variance (cm/s) <sup>2</sup>	1,732	1,006	0,858
Standard deviation (cm/s)	1,316	1,003	0,926
Mean standard deviation	1,104	0,948	2,238
Maximum current velocity	22,4		
Minimum current velocity	1,0		
Significant max velocity	1,6		
Significant min velocity	1,0		