

RAPPORT for STRØMMÅLING



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J.nr.: 0741-08

Lokalitet: Gulestø, Bremanger

Sprednings- og bunnstrøm

Rapport med resultat av strømmålinger utført ved Gulestø, Bremanger kommune.

Rapporten gjelder:

Firma	: Marine Harvest Norway	Adresse	: 6700 Måløy
Lokalitet	: Gulestø		
Kommune	: Bremanger	Fylke	: Sogn og Fjordane
GPS-posisjon	: 61° 45' 548 N / 5° 04' 438 Ø		
Oppdrettstype	: Generelle strømforhold – matfiskanlegg		
Måling av	: Sprednings- og Bunnstrøm (50 + 150 m dyp)		

Strømdata:

Strømdata er målt med SD 6000 med 10 min. måleintervall i to sammenhengende tidsperioder på 39 og 29 døgn (5.mars-14.april + 14.april-13.mai 09) ved to ulike dyp. Se: "Spesifikasjons og resultatoversikt".

Kvalitetssikring:

Ref.: NS 9415 5.12.1.1, 2 og 3. Strømmåling, hardware & -software er kvalitetssikret. Instrumentlogg: ok. Instrumenter ved opptak: teknisk funksjonelle, uten groe på rotor m.v. Datakvalitet: god, uten påvisbare feil. Periodisk svært lav aktivitet på måldata ved bunn kan indikere at måler ikke har stått optimalt rigget (bunnkontakt ell.likn. ?). Rådata er oppbevart ved Fjord-Lab AS.
For nærmere instrumentinfo, se: www.sensordata.net

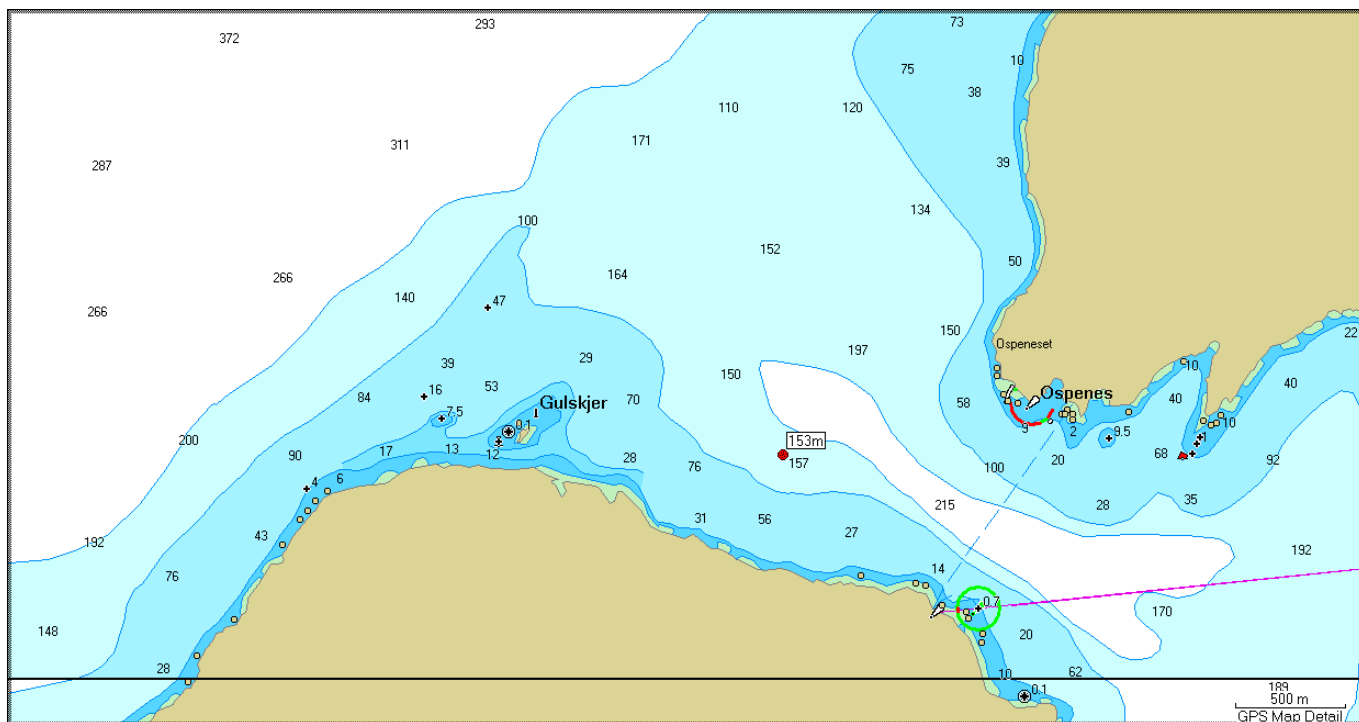
Fjord-Lab AS



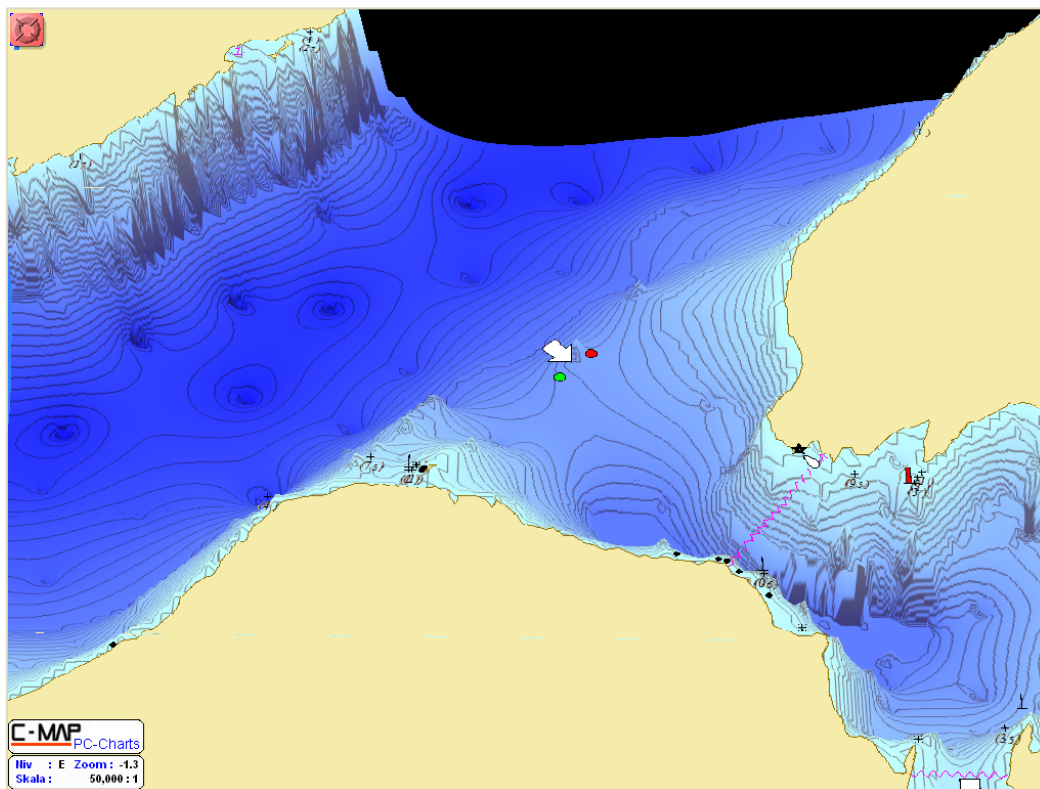
Vedlegg:

Resultatoversikt med statistisk behandling av rådata, Grafiske figurer.

KART



Kart i 2D (over) med posisjon for strømmålerigg, ytterst på anlegget.



Kart i 3D (over) fra Gulestø, sett mot nord/nordvest.

SPESIFIKASJONS- OG RESULTATOVERSIKT.

Firma: Marine Harvest Norway

Lokalitet: Gulestø, Bremanger kommune.

Generelle spesifikasjoner, periode, frekvens og resultater.

Tekst	Overflatestrøm	Spredningsstrøm	Bunnstrøm
Tidsrom for registreringer	-	05.03.2009 - 14.04.2009	14.04.2009 - 13.05.2009
Dybde på målestedet	-	153 m	153 m
Dybde for registreringer	-	50 m	151 m
Posisjon for måler (GPS)	-	61° 45' 548 N / 5° 04' 438 Ø	61° 45' 548 N / 5° 04' 438 Ø
Måler type - nummer	-	SD 6000 – nr 1239	SD 6000 – nr 1239
Type måling	-	Kontinuerlig	Kontinuerlig
Frekvens – varighet*4	-	2 min/10 min - 40 døgn	2 min/10 min - 29 døgn
% strøm mindre enn 1 cm/sek	-	36.5 %	93.9 %
Gjennomsnittsstrøm	-	2.8	1.0
Rest strøm	-	0.9	0.7
Neumanns parameter	-	0.317	0.653
De 4 hyppigst forekommende retninger strømmen går mot (gr.) *	-	315, 300, 255, 150	315, 330, 345, 300
De 4 hyppigst forekommende strømhastighetene (cm /sek) *1	-	0-1, 1-3, 3-4, 4-5	0-1, 1-3, 4-5, 5-6
Mest vannutskiftning / retning / 15 graders sektor.*2	-	18308m ³ ved 315-330 grader. 458m ³ /m ² /døgn	4693m ³ ved 315-330 grader. 162m ³ /m ² /døgn
Minst vannutskiftning / retning / 15 graders sektor.*2	-	601m ³ ved 15-30 grader. 15 m ³ /m ² /døgn	18m ³ ved 90-105 grader. 1m ³ /m ² /døgn
Gjennomsnittlig total vannutskiftning pr.døgn. Alle retninger	-	2443 m ³ /døgn	900m ³ /døgn
Maksimum strøm – signifikant maksimum strøm (cm/sek) *3	-	18.2 - 5.7	5.4 - 1.1

*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 min., hvert y min. gir måleren et gj.snitt av verdiene for 5 målinger.

Spredningsstrøm

TEMPERATURE

File name: Gules50m.SD6

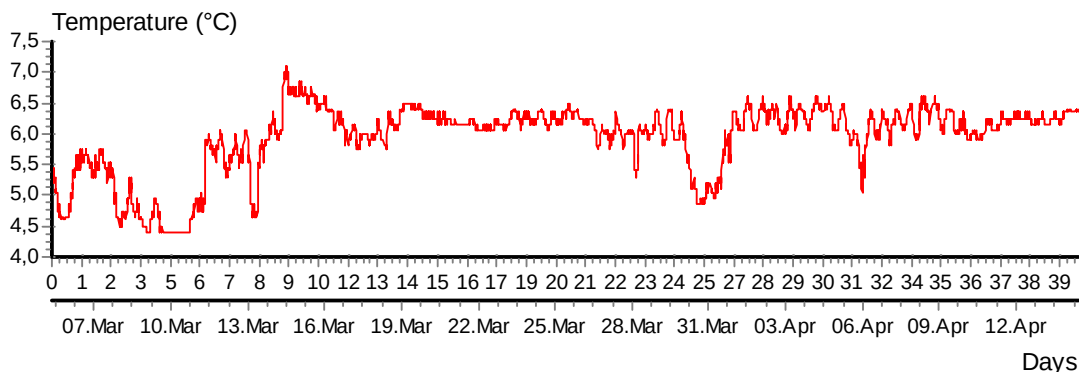
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



CURRENT SPEED

File name: Gules50m.SD6

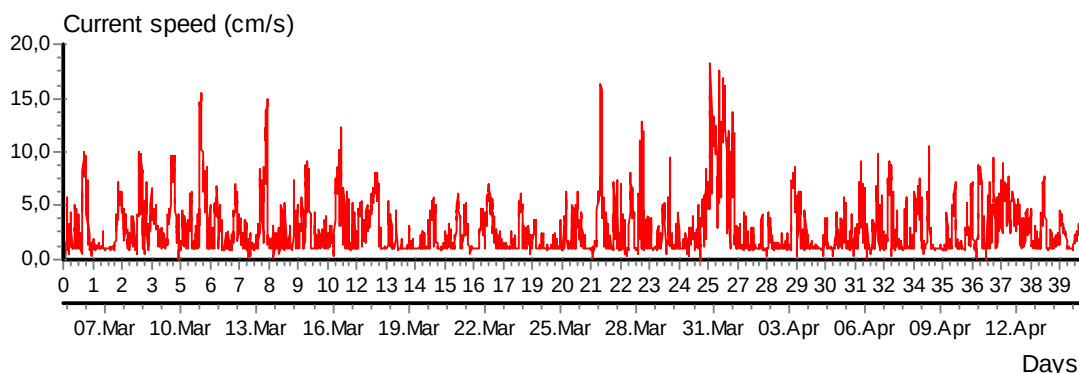
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



CURRENT SPEED BAR CHART

File name: Gules50m.SD6

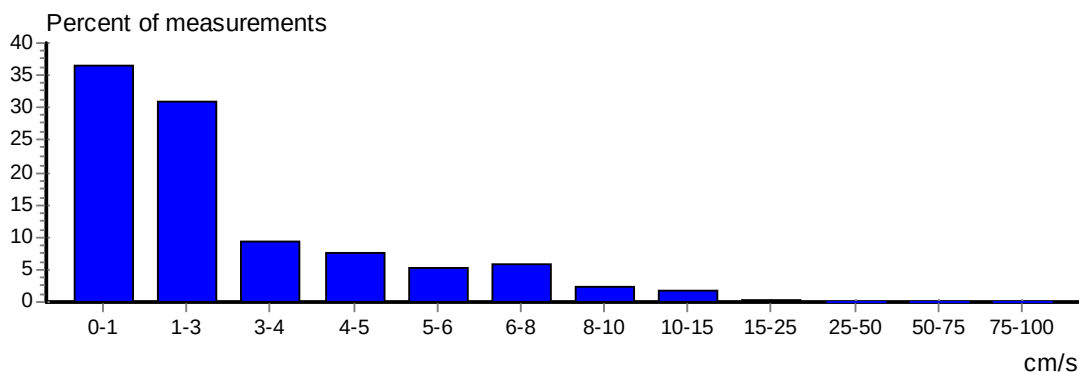
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



CURRENT DIRECTION BAR CHART

File name: Gules50m.SD6

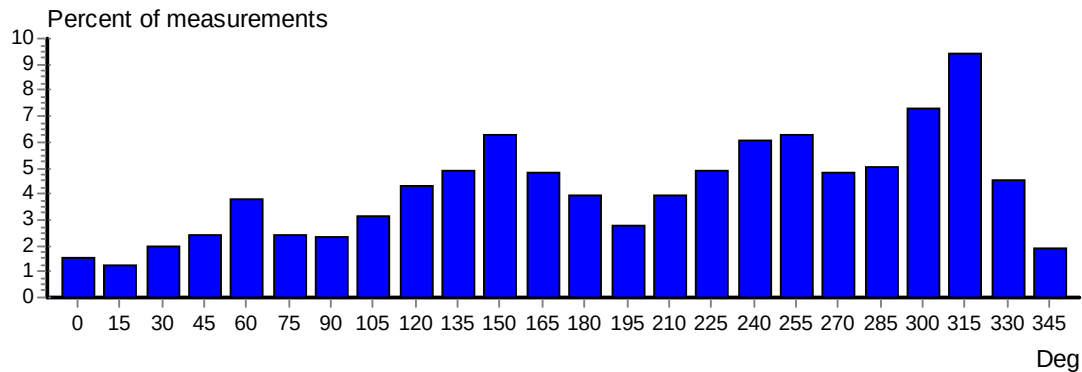
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



PROGRESSIVE VECTOR

File name: Gules50m.SD6

Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

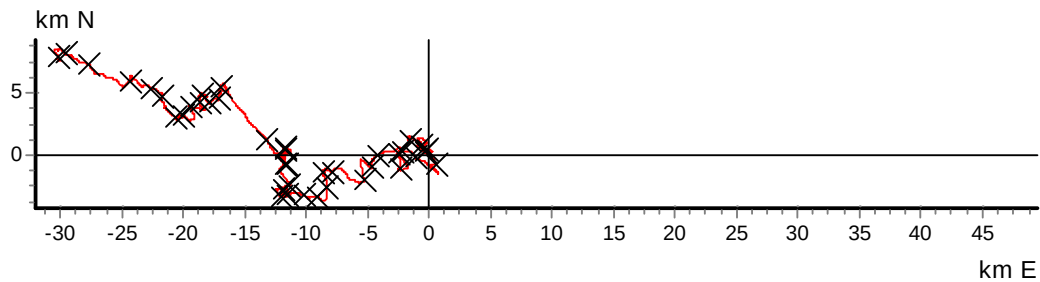
Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09

Neumann parameter: 0.317

Rest speed: 0.9 cm/s

Average speed: 2.8 cm/s

Rest direction: 284 deg.



CURRENT VELOCITY DISTRIBUTION DIAGRAM

File name: Gules50m.SD6

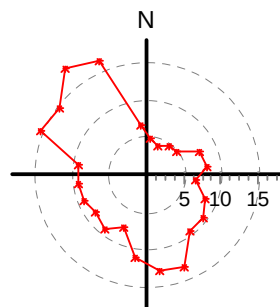
Ref. number: 1239

Series number: 1

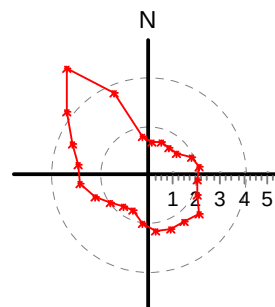
Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



Maximum velocity (cm/s)
per 15 deg sector



Mean velocity (cm/s)
per 15 deg sector

CURRENT VELOCITY DISTRIBUTION DIAGRAM

File name: Gules50m.SD6

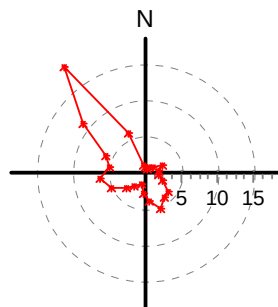
Ref. number: 1239

Series number: 1

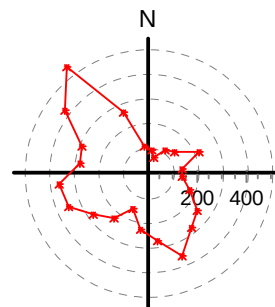
Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



Relative water flux (%)
per 15 deg sector



Number of measurements
per 15 deg sector

STICK DIAGRAM

File name: Gules50m.SD6

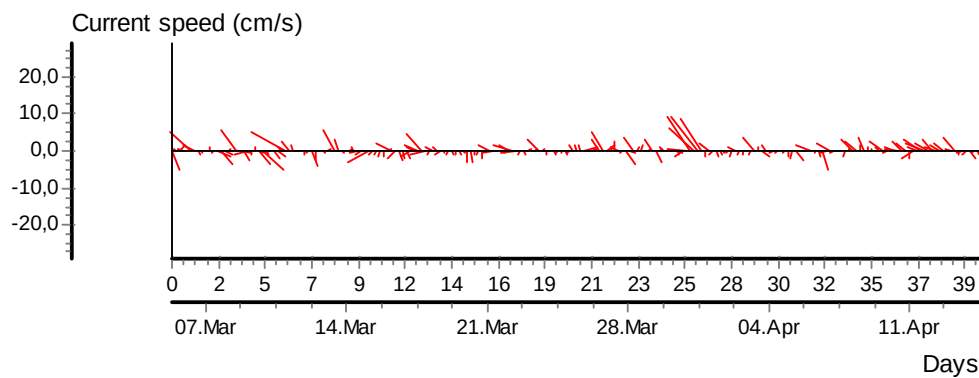
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09



CURRENT SPEED / DIRECTION MATRIX

File name: Gules50m.SD6

Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 5773

Data displayed from: 08:28 - 05.Mar-09 To: 10:28 - 14.Apr-09

	Current speed groups													Total flow	
	1	3	4	5	6	8	10	15	25	50	75	100	Sum%	m³/m²	%
0	54	32	2	1	0	0	0	0	0	0	0	0	1.5	732	0.7
15	38	28	3	1	0	0	0	0	0	0	0	0	1.2	601	0.6
30	63	44	2	3	0	0	0	0	0	0	0	0	1.9	962	1.0
45	77	52	5	3	1	0	0	0	0	0	0	0	2.4	1229	1.3
60	131	50	15	10	4	10	0	0	0	0	0	0	3.8	2542	2.6
75	54	56	15	8	5	1	1	0	0	0	0	0	2.4	1782	1.8
90	49	59	14	7	4	3	0	0	0	0	0	0	2.4	1697	1.7
105	65	72	23	12	3	2	4	0	0	0	0	0	3.1	2401	2.5
120	77	92	26	20	12	8	13	0	0	0	0	0	4.3	4027	4.1
135	105	103	21	21	16	9	9	0	0	0	0	0	4.9	4260	4.4
150	152	108	29	21	28	16	6	1	0	0	0	0	6.3	5382	5.5
165	124	89	16	20	9	11	4	5	0	0	0	0	4.8	3923	4.0
180	92	92	20	13	7	1	2	1	0	0	0	0	3.9	2784	2.8
195	84	58	8	6	1	2	0	0	0	0	0	0	2.8	1572	1.6
210	117	86	9	7	8	0	1	0	0	0	0	0	3.9	2356	2.4
225	145	80	26	16	11	4	1	0	0	0	0	0	4.9	3337	3.4
240	156	100	29	28	11	21	6	0	0	0	0	0	6.1	5114	5.2
255	118	102	49	36	28	30	1	0	0	0	0	0	6.3	6233	6.4
270	67	96	39	33	16	24	3	0	0	0	0	0	4.8	4946	5.1
285	61	92	43	35	24	22	9	2	2	0	0	0	5.0	5921	6.1
300	72	109	49	46	39	58	24	24	0	0	0	0	7.3	10840	11.1
315	70	81	63	77	51	89	42	59	12	0	0	0	9.4	18308	18.7
330	79	66	29	18	17	23	14	15	1	0	0	0	4.5	5754	5.9
345	58	41	4	2	2	1	0	0	0	0	0	0	1.9	1028	1.1
Sum%	36.5	31.0	9.3	7.7	5.1	5.8	2.4	1.9	0.3	0.0	0.0	0.0			

STATISTICAL SUMMARY

	Total	East / west	North / south
Mean current speed (cm/s)	2,8	1,9	1,8
Variance (cm/s)²	6,422	3,603	3,960
Standard deviation (cm/s)	2,534	1,898	1,990
Mean standard deviation	0,898	0,984	1,131
Maximum current velocity	18,2		
Minimum current velocity	0,0		
Significant max velocity	5,7		
Significant min velocity	1,0		

Bunnstrøm

TEMPERATURE

File name: Gule153m.SD6

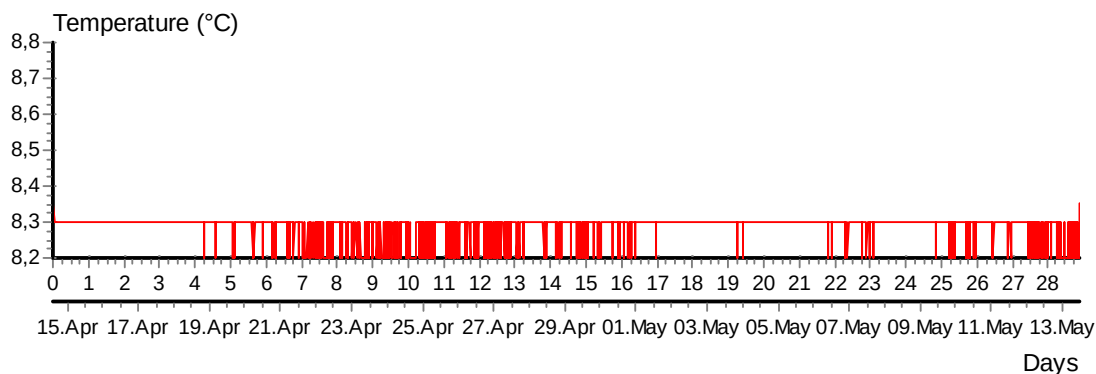
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



CURRENT SPEED

File name: Gule153m.SD6

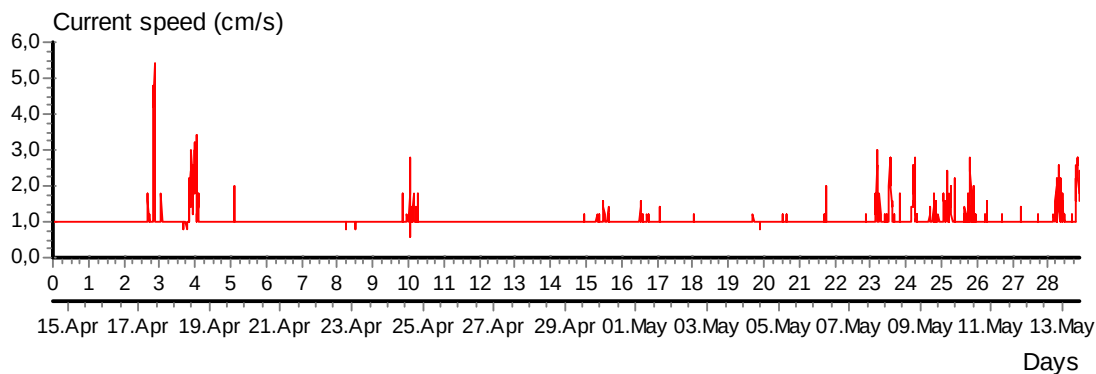
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



CURRENT SPEED BAR CHART

File name: Gule153m.SD6

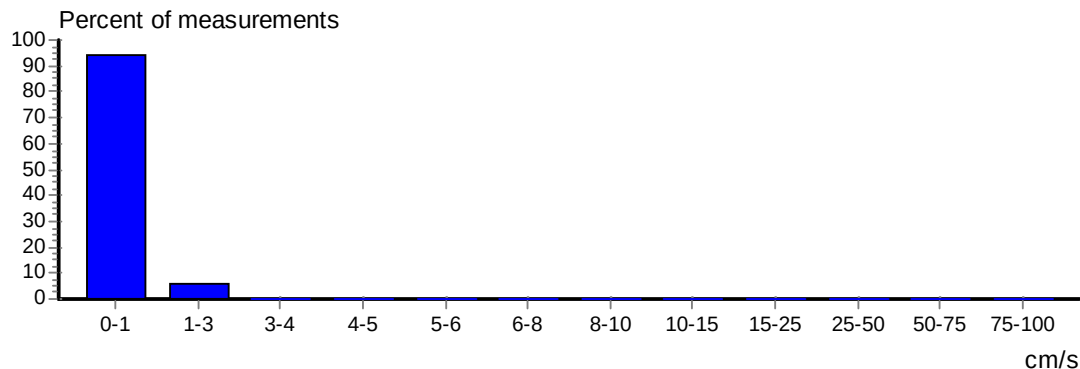
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



CURRENT DIRECTION BAR CHART

File name: Gule153m.SD6

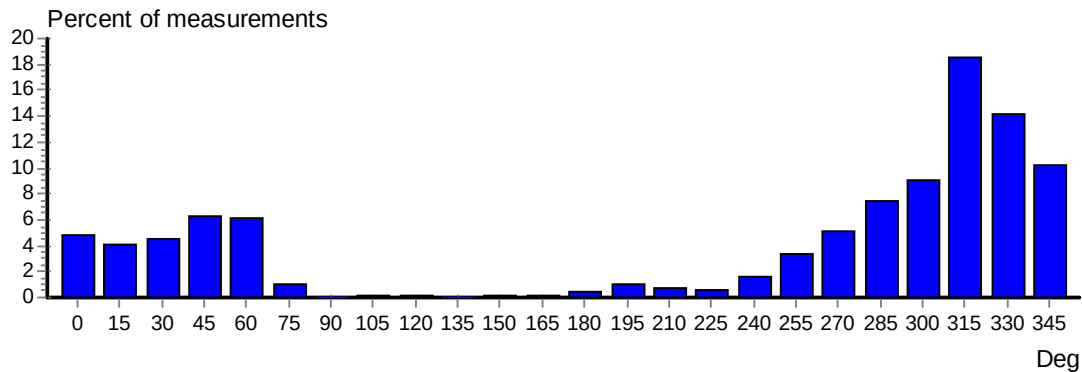
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



PROGRESSIVE VECTOR

File name: Gule153m.SD6

Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

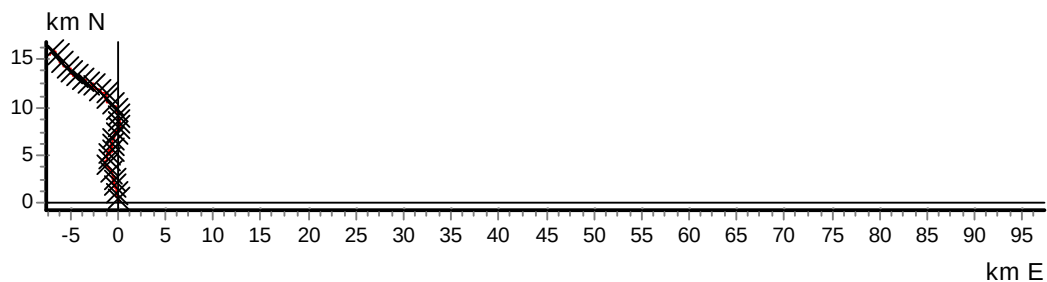
Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09

Neumann parameter: 0.653

Rest speed: 0.7 cm/s

Average speed: 1.0 cm/s

Rest direction: 335 deg.



CURRENT VELOCITY DISTRIBUTION DIAGRAM

File name: Gule153m.SD6

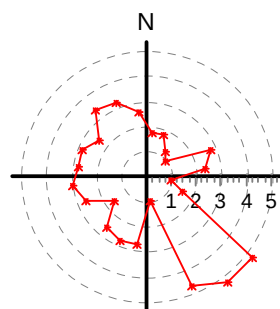
Ref. number: 1239

Series number: 1

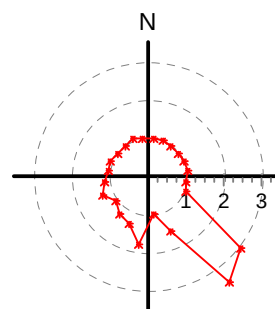
Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



Maximum velocity (cm/s)
per 15 deg sector



Mean velocity (cm/s)
per 15 deg sector

CURRENT VELOCITY DISTRIBUTION DIAGRAM

File name: Gule153m.SD6

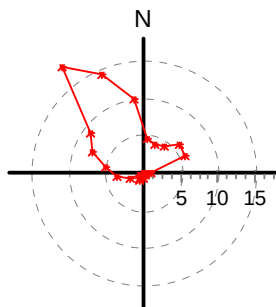
Ref. number: 1239

Series number: 1

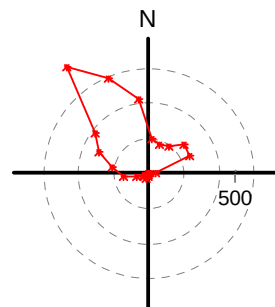
Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



Relative water flux (%)
per 15 deg sector



Number of measurements
per 15 deg sector

STICK DIAGRAM

File name: Gule153m.SD6

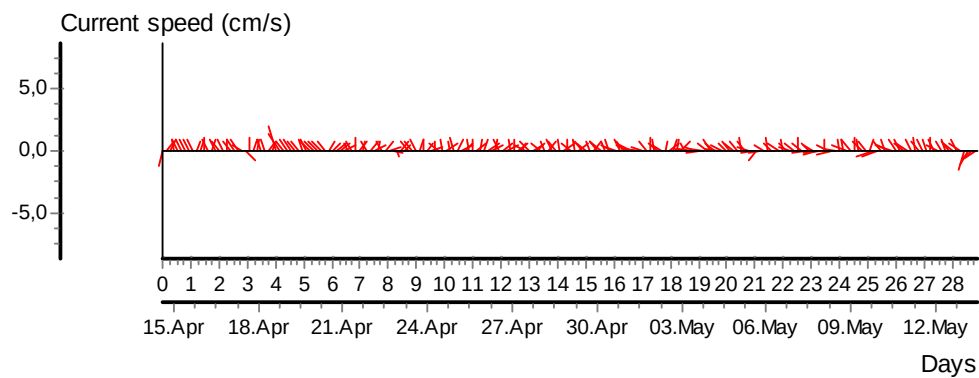
Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09



CURRENT SPEED / DIRECTION MATRIX

File name: Gule153m.SD6

Ref. number: 1239

Series number: 1

Interval time: 10 Minutes

Number of measurements in data set: 4160

Data displayed from: 14:25 - 14.Apr-09 To: 11:35 - 13.May-09

	Current speed groups													Total flow	
	1	3	4	5	6	8	10	15	25	50	75	100	Sum%	m³/m²	%
0	197	4	0	0	0	0	0	0	0	0	0	0	4.8	1219	4.7
15	168	5	0	0	0	0	0	0	0	0	0	0	4.2	1049	4.0
30	190	1	0	0	0	0	0	0	0	0	0	0	4.6	1146	4.4
45	263	0	0	0	0	0	0	0	0	0	0	0	6.3	1577	6.0
60	253	3	0	0	0	0	0	0	0	0	0	0	6.2	1553	5.9
75	38	2	0	0	0	0	0	0	0	0	0	0	1.0	251	1.0
90	3	0	0	0	0	0	0	0	0	0	0	0	0.1	18	0.1
105	8	1	0	0	0	0	0	0	0	0	0	0	0.2	58	0.2
120	1	1	0	1	1	0	0	0	0	0	0	0	0.1	74	0.3
135	1	0	0	1	1	0	0	0	0	0	0	0	0.1	64	0.2
150	6	0	0	1	0	0	0	0	0	0	0	0	0.2	65	0.2
165	7	0	0	0	0	0	0	0	0	0	0	0	0.2	42	0.2
180	3	14	0	0	0	0	0	0	0	0	0	0	0.4	185	0.7
195	26	14	0	0	0	0	0	0	0	0	0	0	1.0	320	1.2
210	23	9	0	0	0	0	0	0	0	0	0	0	0.8	235	0.9
225	22	3	0	0	0	0	0	0	0	0	0	0	0.6	158	0.6
240	39	27	0	0	0	0	0	0	0	0	0	0	1.6	517	2.0
255	116	22	0	0	0	0	0	0	0	0	0	0	3.3	940	3.6
270	193	20	0	0	0	0	0	0	0	0	0	0	5.1	1357	5.2
285	274	34	0	0	0	0	0	0	0	0	0	0	7.4	1944	7.4
300	362	14	0	0	0	0	0	0	0	0	0	0	9.0	2294	8.8
315	744	25	1	0	0	0	0	0	0	0	0	0	18.5	4693	18.0
330	553	38	1	0	0	0	0	0	0	0	0	0	14.2	3734	14.3
345	415	11	0	0	0	0	0	0	0	0	0	0	10.2	2609	10.0
Sum%	93.9	6.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

STATISTICAL SUMMARY

	Total	East / west	North / south
Mean current speed (cm/s)	1,0	0,6	0,7
Variance (cm/s)²	0,060	0,119	0,112
Standard deviation (cm/s)	0,246	0,344	0,335
Mean standard deviation	0,235	0,545	0,462
Maximum current velocity	5,4		
Minimum current velocity	0,6		
Significant max velocity	1,1		
Significant min velocity	1,0		