Daily Current Series from the Deep Eastern Gotland Basin (1993 – 2008)

E. Hagen and G. Plüschke

1. Introduction

This report presents data of current measurements initiated by three research projects of the Institute for Baltic Sea Research Warnemuende (IOW) to study low-frequency fluctuations in deep currents of the Eastern Gotland Basin. The first of them was the interdisciplinary 'Gotland Basin Experiment' (GOBEX, 1993-1996), cf. Hagen (1996), Zülicke & Hagen (1997), and Emeis & Struck (1998). The second one focused on hydrographic phenomena expected on spatial scales with a diameter of several kilometres. It was denoted 'Meso-Scale Dynamics', (MESODYN, 1997-2000) and is described in more detail by Reißmann (1999), Hagen & Feistel (2001), and Reißmann (2005). Related field campaigns focused on spatiotemporal changes in thermohaline properties of the deep mass field and associated circulation patterns in the Arkona Basin, the Bornholm Basin, the Stolpe Furrow, and the Eastern Gotland Basin (EGB). Unfortunately, intense fishing activities prevented long-term records of currents in the three shallower basins. Consequently, such measurements were carried out preferentially in deep layers of the EGB although the existence of hydrogen sulphide required special mooring techniques. Logistic frame conditions limited all long-term current records at only one position located above the north-eastern topographic flank of the deep EGB denoted NE-1 and NE in Fig.1. These activities could be continued during the third project denoted 'Deep Rim Currents in the Eastern Gotland Basin' (RAGO, 2006 -2008) residing in its synthesis-stage. Other long-term records of deep currents came from biological studies carried out in the central EGB between 2004 and 2007. One Aanderaa recording current meter (RCM) was mounted few metres beneath a sediment trap moored in vicinity of the central HELCOM monitoring station 271 (57°20'N, 20°03'E) where the overall water depth is about 245 m, Reißmann (1999). Records from this position are labelled 'CENTRAL' in this report, Fig.1. Due to different recovering/ deployment episodes of related sediment traps and slight changes in the overall water depth around the target depth, the actual measuring horizon of this RCM fluctuated by few metres. However, such little discrepancies have been neglected and these measurements are considered to be 60 m above the bottom. All other sub-surface strings were equipped with 3-5 RCMs at positions echo-sounded to be in the range between 200 and 240 m, depth, Fig.1. The only exception was the string deployed at 70 m depth above the southern flank of the so-called 'Klints Bank' during four days in April 1998. For completeness, these series have been included on the base of hourly averages.

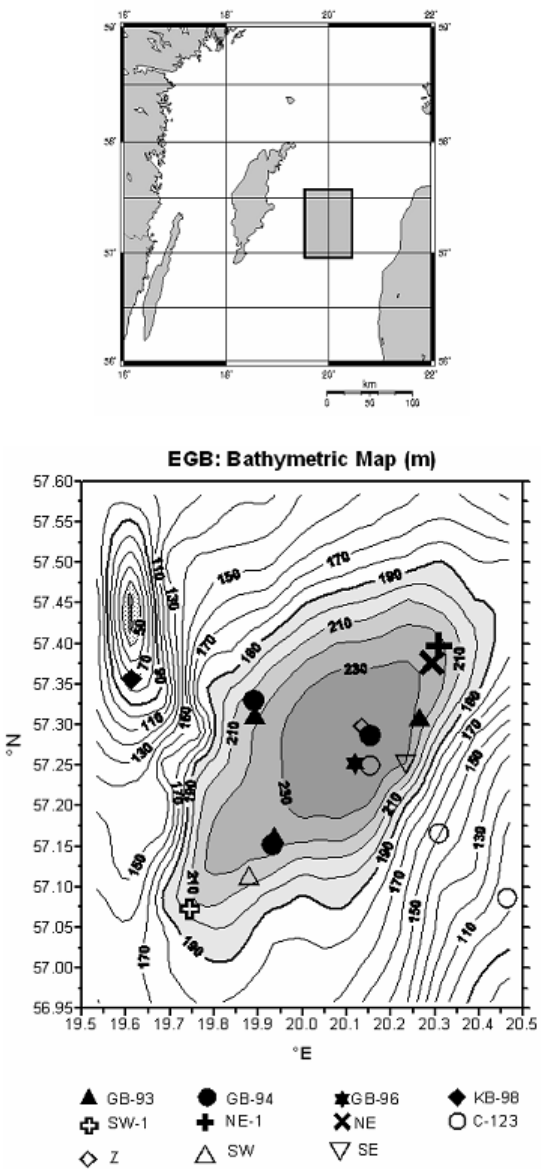

Fig.1
Study area in the central Eastern Gotland Basin (upper panel) and its bathymetric contours (m) showing shallow water areas of the 'Klints Bank' as well as the so-called 'Gotland Deep' in the centre; positions of moored sub-surface strings were equipped with Aanderaa recording current meters during several field campaigns carried out between1993 and 2008 whereby assigned projects and used string abbreviations are compiled in Table 1.

The schematic of exposed sub-surface strings, which were equipped with three RCMs at the mooring position denoted NE-1 and NE in Fig.1, is shown exemplary in Fig.2. Their position was seen to be suitable to study low-frequency changes in deep rim currents.

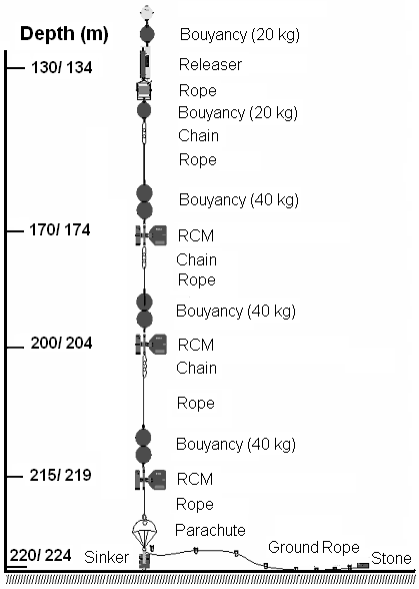

Fig.2
Schematic of sub-surface strings equipped with three recording current meters (RCM) deployed at the positions NE-1/ NE shown in Fig.1.

Project	Identifier	Start	End	Days	Strings	Levels
GOBEX	GB-93(1/2/3)	30.11.1993	11.12.1993	12	3	3/ 2/ 3
	GB-94(1/2/3)	12.08.1994	25.09.1994	45	3	1/ 3/ 3
	GB-96	07.03.1996	02.06.1996	88	1	1
MESODYN	SW-1	30.08.1997	14.09.1998	381	1	1
	NE-1	30.08.1997	20.07.1998	325	1	1
	KB-98	26.04.1998	27.04.1998	2	1	5
	C-00(1/2/3)	20.04.2000	29.04.2000	9/9/10	3	1/ 2/ 4
CENTRAL	Z1	16.11.2004	14.02.2005	101	1	1
	Z2	02.11.2005	30.10.2007	729	1	1
RAGO	SW	08.05.2006	29.03.2007	326	1	3
	SE	08.05.2006	29.03.2007	326	1	3
Long-Term	NE	31.08.1999	30.03.2008		1	3
	NE-P1	01.05.2000	30.10.2005	2009	1	2
	NE-P2	09.05.2002	19.10.2003	529	1	3
	NE-P3	23.03.2004	30.10.2005	587	1	3
	NE-P4	28.09.2006	21.12.2007	450	1	3
	NE-L	31.08.1999	30.10.2005	2253	1	1

Table1.
Project abbreviation, mooring identifier, starting and ending day of resulting series, overall length, the number of deployed strings, and the number of associated measuring levels at positions labelled in Fig.1.

2. Data Base

Mechanically operating current meter types RCM-7/8 exhibit a resolution of ±1 cm/s while that of the electronic type RCM-9 is better by the factor of about three (±0.3 cm/s). The used sampling interval (SI) resulted from particular project-tasks and varied between 1 minute (short-term records) and 1 hour (long-term records). Resulting time-series of current speed and current direction were decomposed into those of the zonal component (u, positive to the east) and the meridional component (v, positive to the north). All records, which were based on sampling rates shorter than an hour, were transformed into hourly series. These hourly series were used to compute the daily averages pointing to the UTC-noonday. Missing data were completed by linear interpolation between neighbouring values. Such gaps of 3-4 hours were caused by the time needed for recovering and deploying consecutive strings. Resulting recording lengths are shown in Fig.3.

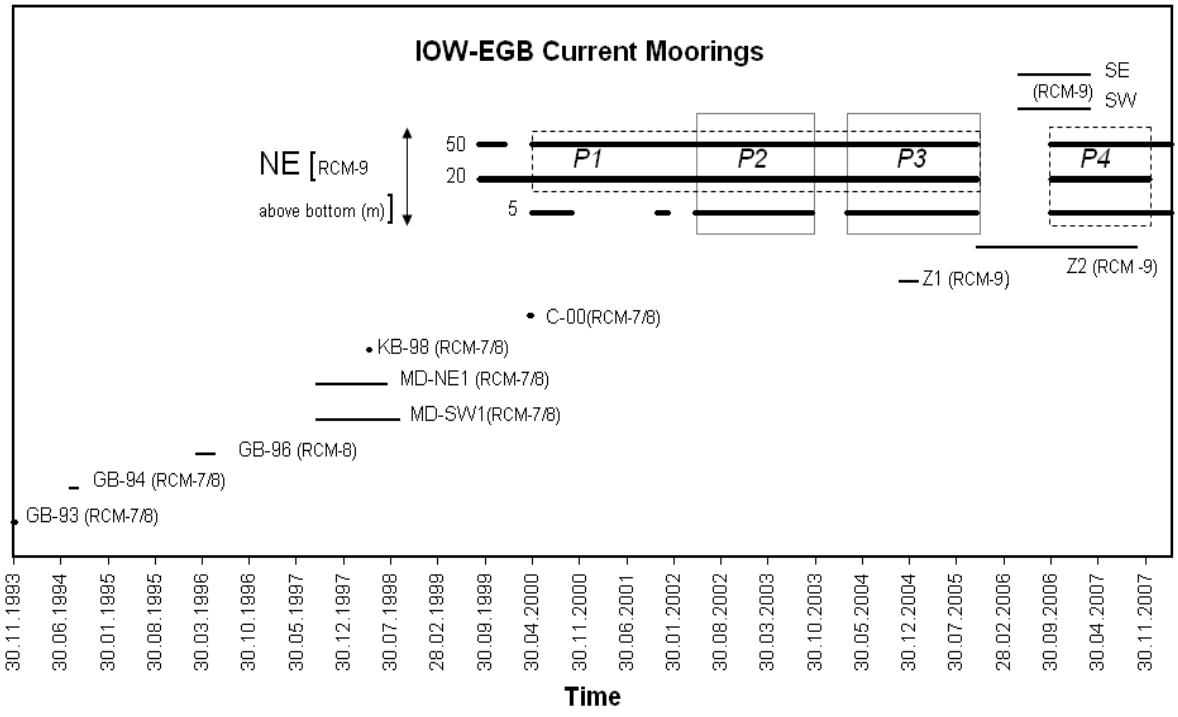

Fig.3
Lengths of daily current series recorded by Aanderaa recording current meters (RCM-7/8/9) within deep layers of the Eastern Gotland Basin at positions shown in Fig.1; long- term series only result from the position NE equipped with three RCMs mounted at 5, 20, and 50 m above the sea bed (220/ 224 m) as shown schematically in Fig.2; complete measuring periods for all three horizons are labelled P2, P3, and P4 while P1 reflects a somewhat longer series from two RCMs deployed 20 and 50 m above the bottom; the longest continuous time series (denoted NE-L in Table 1) covers 2253 days and results from the 20m-horizon.

In the following, the presentation of each measuring campaign starts with a map showing bathymetric contours and the corresponding string position. The accompanying table explains the mooring identifier (project/ campaign/ string abbreviation), the position (°N, °E), the water depth (m), the sampling interval (SI, min=minute, h=hour), and the first and the last complete measuring day. Appropriate overall statistics include the recording length (N), the arithmetic mean, the standard deviation (STD), the skewness and the kurtosis (vanishing for a Gaussian frequency distribution), the maximum (Max.), the minimum (Min.), and the total range of fluctuations (Max.-Min.), cf. Wilks (1995).
Daily series of both current components are plotted versus the time to elucidate roughly the variability in zonal (u) and meridional currents (v) while progressive vector diagrams (PVD) characterize the time history of currents at different measuring horizons labelled by their distance above the sea bed. Different sub-series of the presented data sets were used in previously published studies, frequently in context to corresponding temperature records and snapshot surveys of quasi-synoptic hydrographic surveys, cf. Mittelstaedt (1996), Stips (1996), Zülicke et al (1998), Feistel et al (2003a), Feistel et al (2003b), Hagen & Feistel (2004), Feistel et al (2004), Hagen (2005), Reissmann (2006), Feistel et al (2006), Hagen & Feistel (2007), and Wieczorek et al (2008). Finally, the longest continuous record of deep currents (NE-L, 2253 days, 20 m above the sea bed) is presented by several supplementary graphs to give a certain impression about characteristic temporal scales at this position. All daily series of zonal/meridional current components, which are tabulated in Table 1, have been attached in the appendix by EXEL-spreadsheets.

Acknowledgements
We like to express our gratitude to all scientists in charge of the IOW-HELCOM-Baltic-Monitoring-Programme (COMBINE) conducted on behalf of the 'Bundesamt für Seeschifffahrt und Hydrographie (BSH)'. They always supported the mooring activities carried out during many years at the NE-position. Dr. Falk Pollehne and U. Hehl kindly replenished data from the campaign 'CENTRAL'. The project 'GOBEX' was partially funded by the 'Kultusministerium Mecklenburg-Vorpommern' (contract 0710, MG04, 68101-05) and records of the measuring campaign GB-93 were kindly provided by Dr. E. Mittelstaedt (BSH-Hamburg). Activities of the project 'MESODYN' were organizationally accompanied by the Federal Ministry of Education, Scientific Research and Technology of Germany (BMBF), while the still running project RAGO was broadly financed by the 'Deutsche Forschungsgemeinschaft (DFG, No HA 1900/3-2)'.

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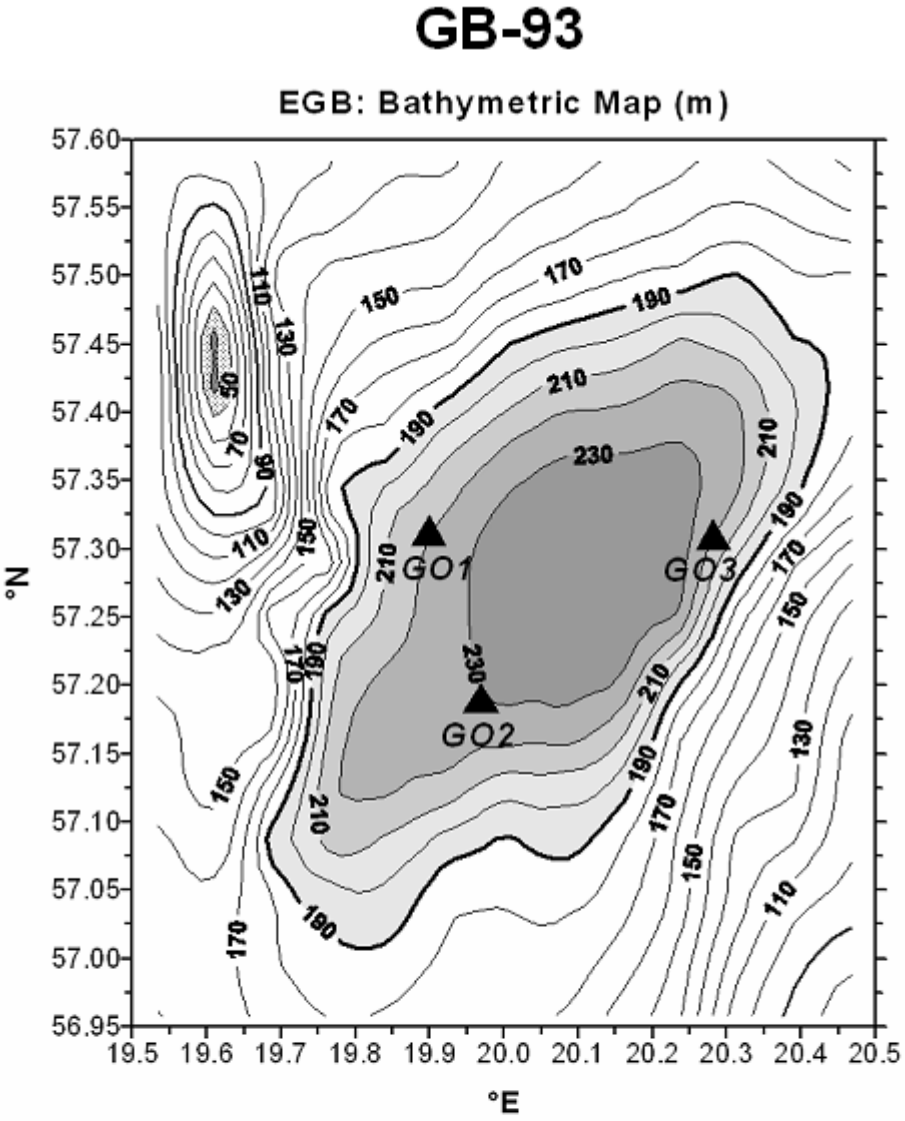
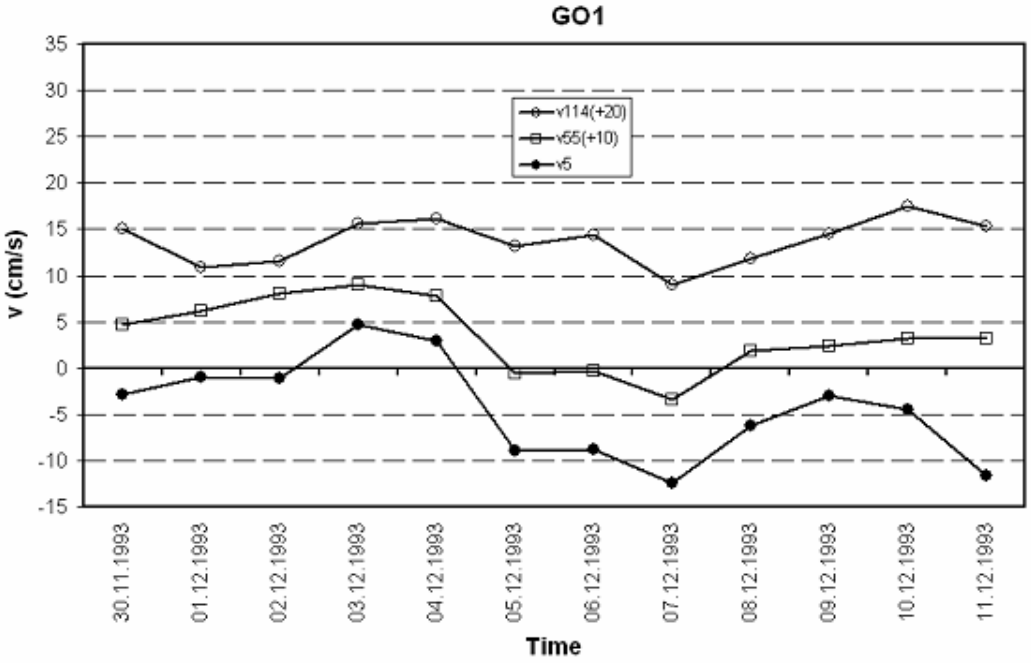
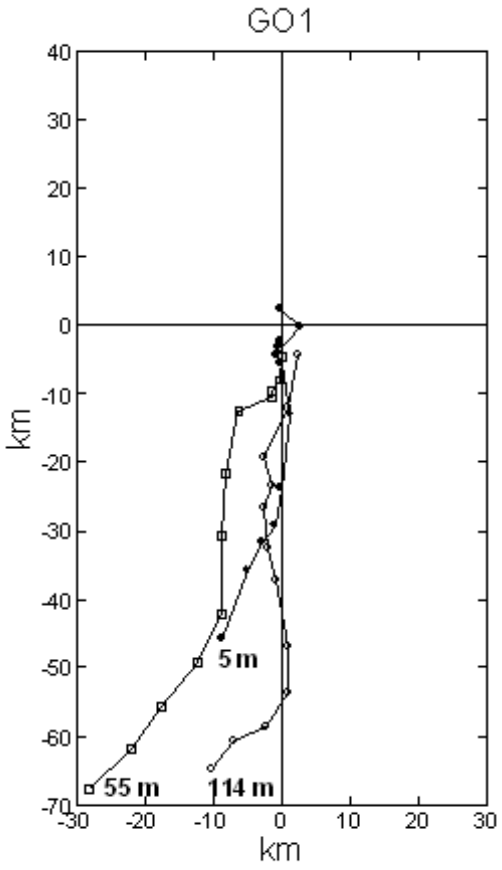
4. Graphics



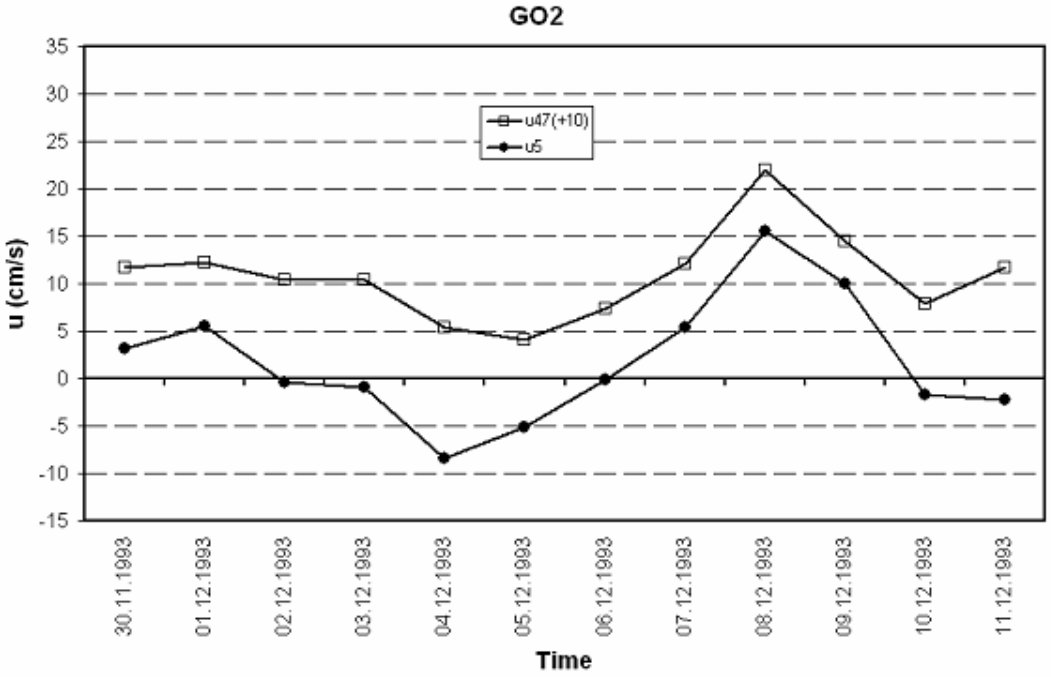
	GO1	GO2	GO3
Lat.(°N)	57°19'	57°10'	57°19'
Long.(°E)	19°53'	19°56'	20°19'
Depth (m)	220	230	220
SI (min)	10	10	10
Start	30.11.1993	30.11.1993	30.11.1993
End	11.12.1993	11.12.1993	11.12.1993

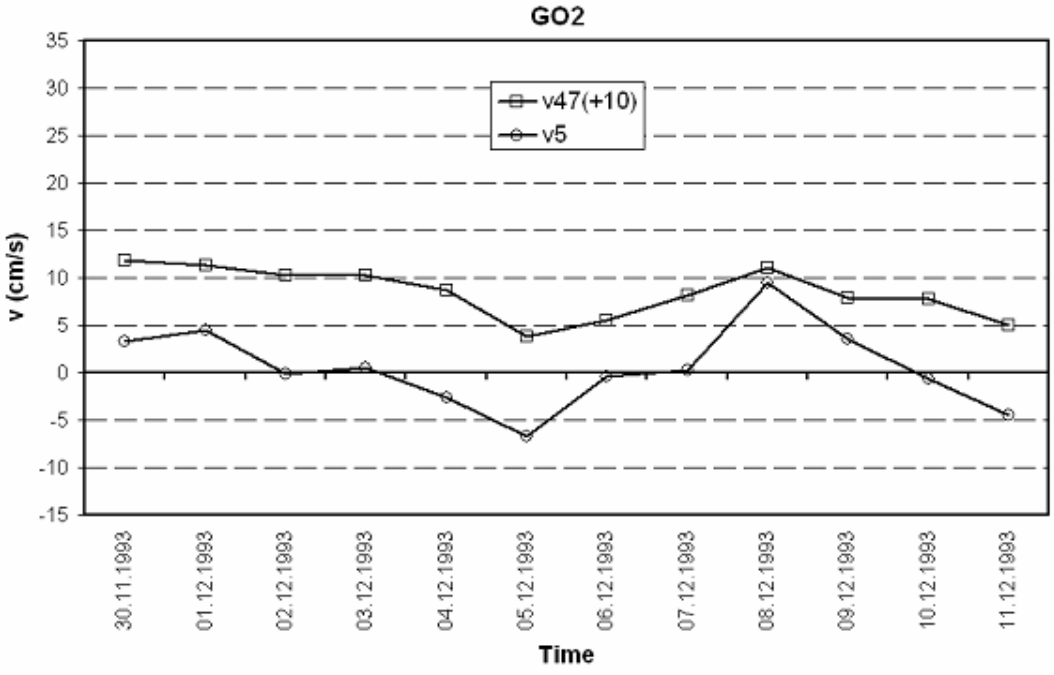

GO1
u114(+20)
u55(+10)
u5
u (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
05.12.1993
06.12.1993
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time


GO1
v114(+20)
v55(+10)
v5
v (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
05.12.1993
06.12.1993
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time



GO1-93						
Above Bottom (m)	u114	v114	u55	v55	u5	v5
N (d)	12,00	12,00	12,00	12,00	12,00	12,00
Mean (cm/s)	-0,99	-6,25	-2,74	-6,53	-0,84	-4,42
STD (cm/s)	2,77	2,48	2,75	3,81	2,22	5,42
Skewness	-0,19	-0,42	-0,40	-0,17	0,60	0,09
Kurtosis	-1,31	-0,74	-1,44	-0,91	0,27	-0,96
Min. (cm/s)	-5,53	-10,99	-7,28	-13,41	-4,38	-12,50
Max. (cm/s)	2,86	-2,48	0,15	-1,06	4,05	4,69
Range (cm/s)	8,39	8,51	7,43	12,35	8,43	17,19


GO2
u47(+10)
u5
u (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
05.12.1993
06.12.1993
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time


GO2
v47(+10)
v5
v (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
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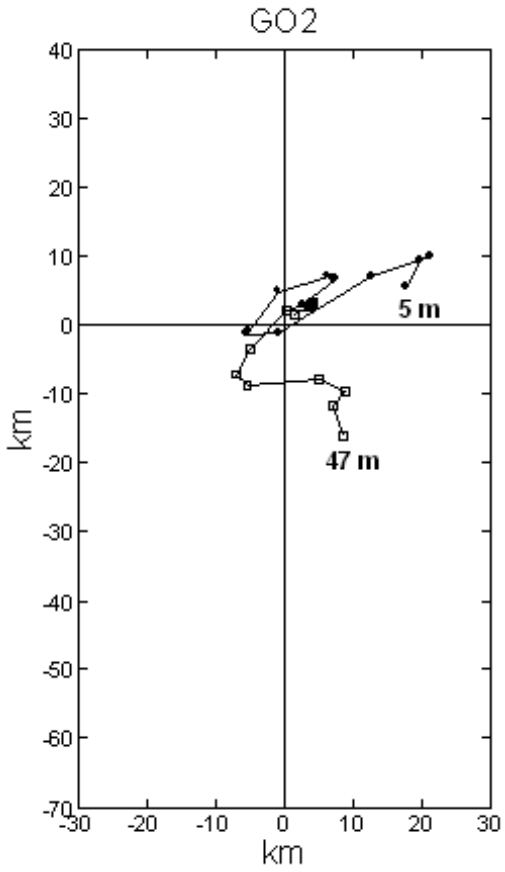
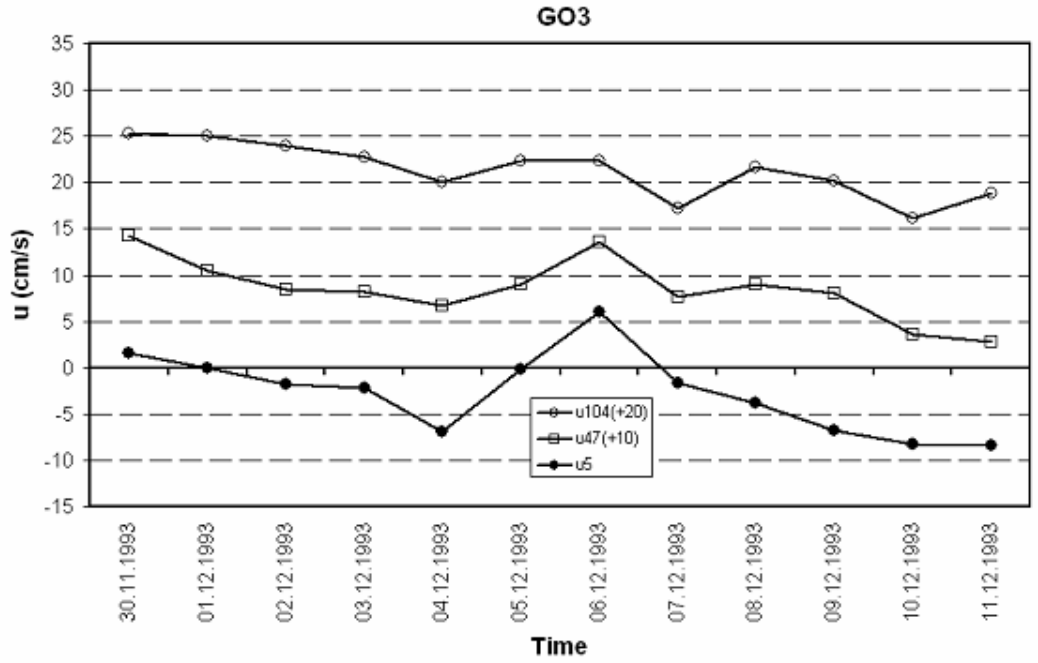
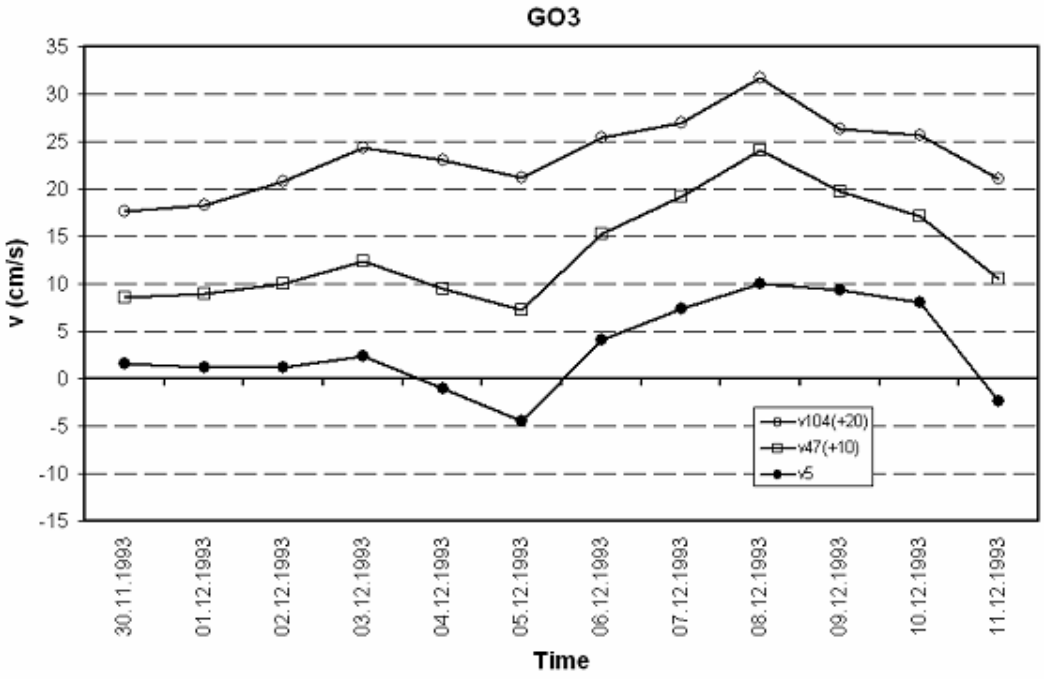
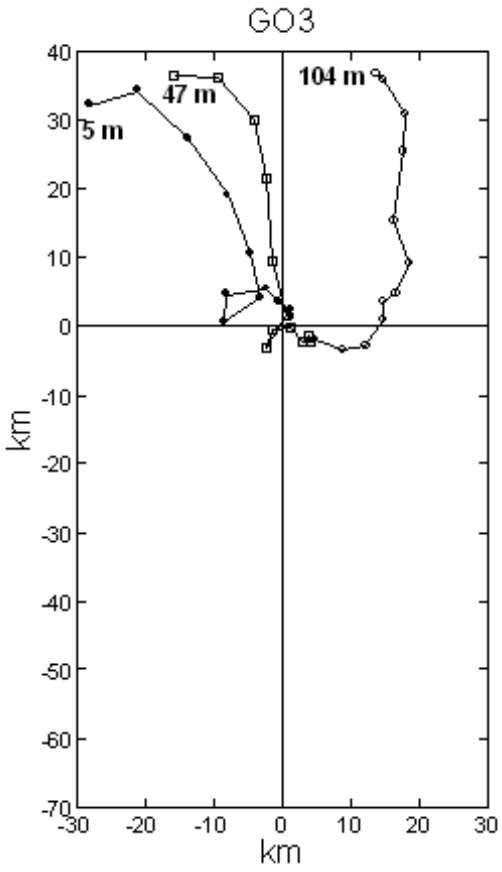
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time



GO2-93				
Above Bottom (m)	u47	v47	u5	v5
N (d)	12,00	12,00	12,00	12,00
Mean (cm/s)	0,81	-1,55	1,72	0,54
STD (cm/s)	4,66	2,64	6,62	4,29
Skewness	0,85	-0,41	0,60	0,33
Kurtosis	0,94	-1,02	-0,17	-0,04
Min. (cm/s)	-5,97	-6,24	-8,38	-6,67
Max. (cm/s)	11,95	1,80	15,57	9,43
Range (cm/s)	17,92	8,04	23,95	16,10

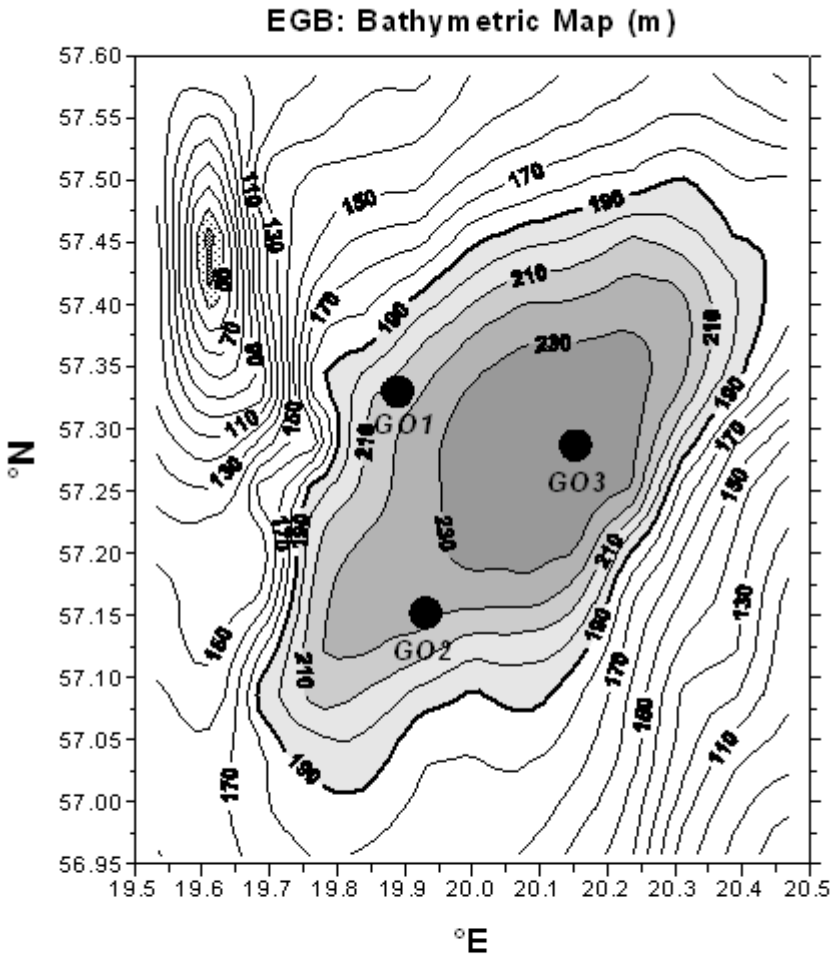

GO3
u (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
u104(+20)
u47(+10)
u5
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
05.12.1993
06.12.1993
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time


GO3
v (cm/s)
35
30
25
20
15
10
5
0
-5
-10
-15
v104(+20)
v47(+10)
v5
30.11.1993
01.12.1993
02.12.1993
03.12.1993
04.12.1993
05.12.1993
06.12.1993
07.12.1993
08.12.1993
09.12.1993
10.12.1993
11.12.1993
Time

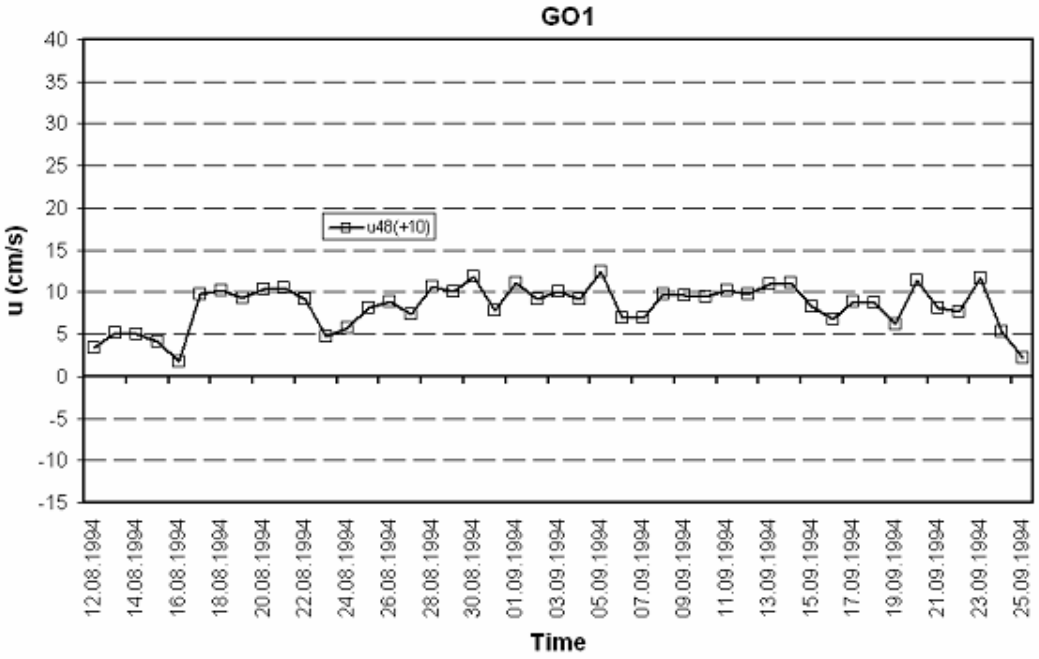


GO3-93						
Above Bottom (m)	u104	v104	u47	v47	u5	v5
N (d)	12,00	12,00	12,00	12,00	12,00	12,00
Mean (cm/s)	1,31	3,54	-1,53	3,53	-2,72	3,10
STD (cm/s)	2,89	4,01	3,36	5,41	4,35	4,71
Skewness	-0,34	0,34	0,06	0,62	0,34	0,07
Kurtosis	-0,89	-0,37	-0,32	-0,92	-0,55	-1,15
Min. (cm/s)	-3,81	-2,40	-7,25	-2,70	-8,35	-4,48
Max. (cm/s)	5,24	11,75	4,29	14,03	6,05	9,95
Range (cm/s)	9,05	14,15	11,54	16,73	14,40	14,43

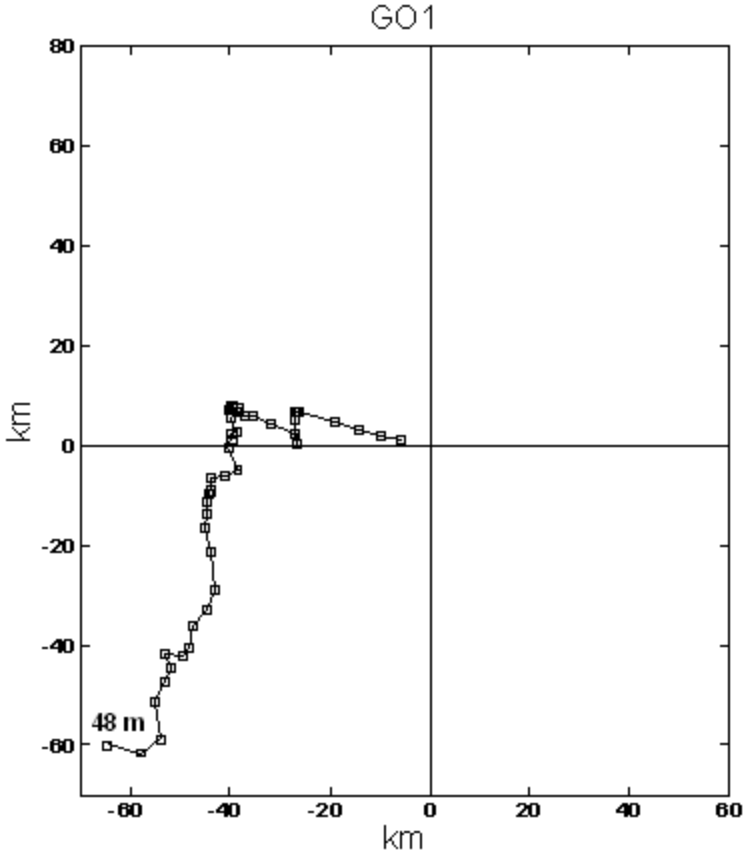
GB-94



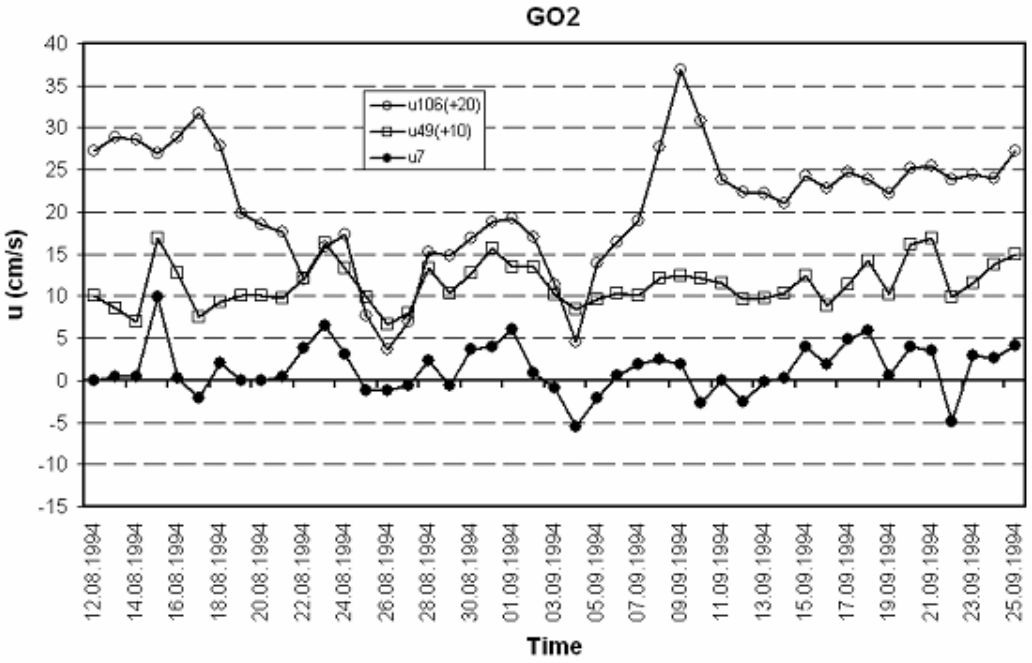
	GO1	GO2	GO3
Lat.(°N)	57°20'	57°09'	57°17'
Long.(°E)	19°54'	19°56'	20°09'
Depth (m)	217	225	243
SI (min)	10	10	10
Start	12.08.1994	12.08.1994	12.08.1994
End	25.09.1994	25.09.1994	25.09.1994

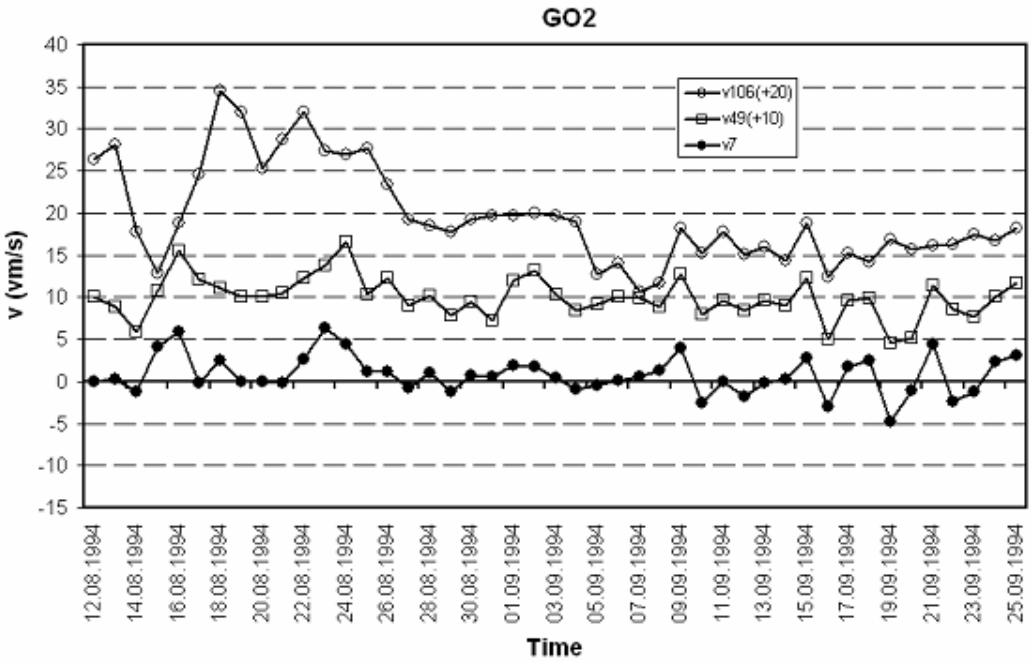

GO1
u (cm/s)
u48(+10)
Time

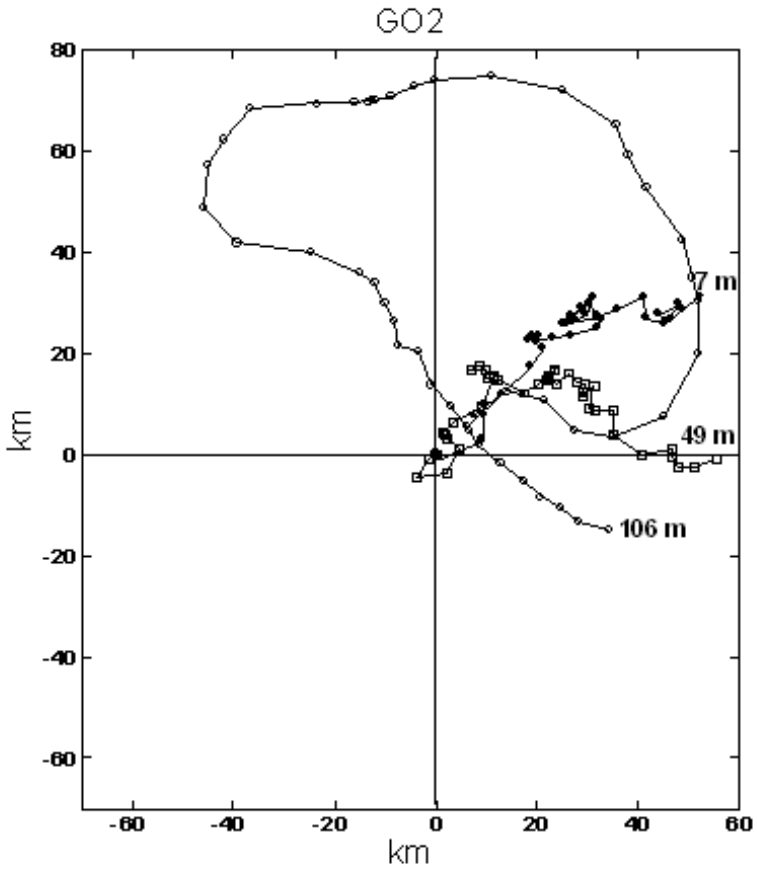

GO1
v (cm/s)
v48(+10)
Time



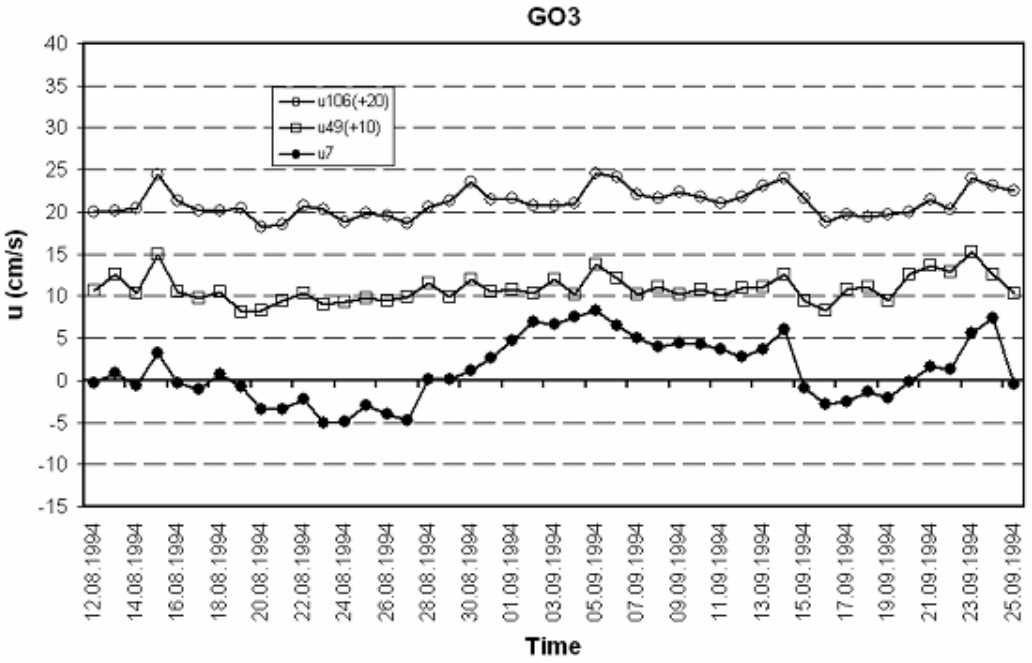
GO1-94		
Above Bottom (m)	u48	v48
N (d)	45,00	45,00
Mean (cm/s)	-1,66	-1,54
STD (cm/s)	2,59	2,78
Skewness	-0,78	-0,62
Kurtosis	-0,08	-0,09
Min. (cm/s)	-8,23	-8,68
Max. (cm/s)	2,37	2,62
Range (cm/s)	10,60	11,30

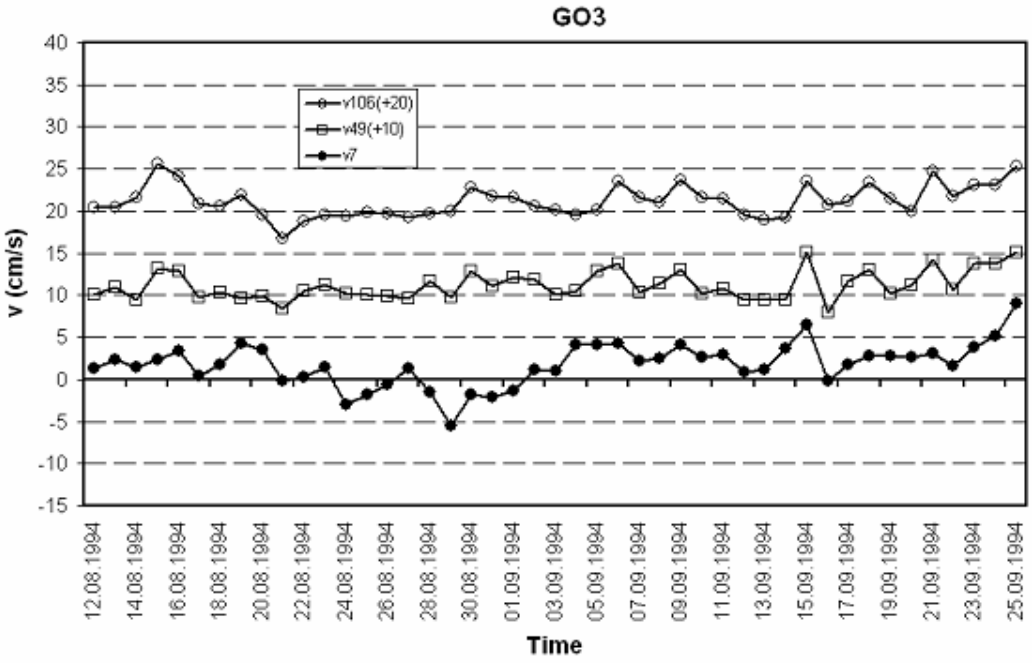

GO2
u106(+20)
u49(+10)
u7
u (cm/s)
Time

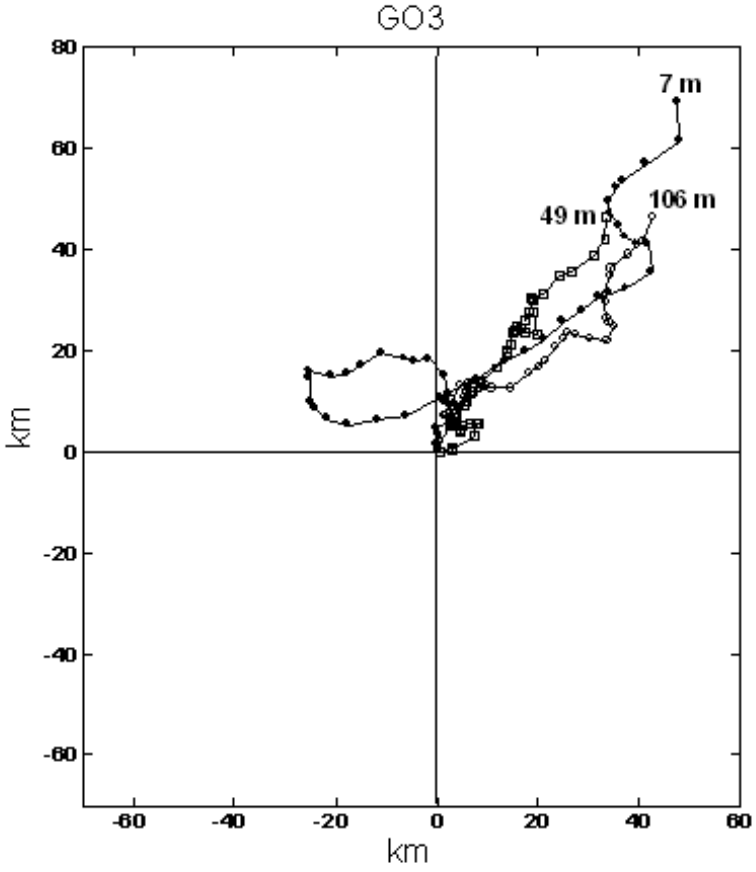

GO2
v106(+20)
w49(+10)
v7
v (vm/s)
Time



GO2-94						
Above Bottom (m)	u106	v106	u49	v49	u7	v7
N (d)	45,00	45,00	45,00	45,00	45,00	45,00
Mean (cm/s)	0,88	-0,38	1,42	-0,02	1,35	0,80
STD (cm/s)	7,28	5,85	2,62	2,46	2,99	2,28
Skewness	-0,44	0,83	0,40	0,19	0,23	0,29
Kurtosis	-0,03	-0,12	-0,49	0,71	0,47	0,21
Min. (cm/s)	-16,25	-9,39	-3,43	-5,49	-5,44	-4,73
Max. (cm/s)	16,92	14,51	6,91	6,65	9,84	6,39
Range (cm/s)	33,17	23,90	10,34	12,14	15,28	11,12

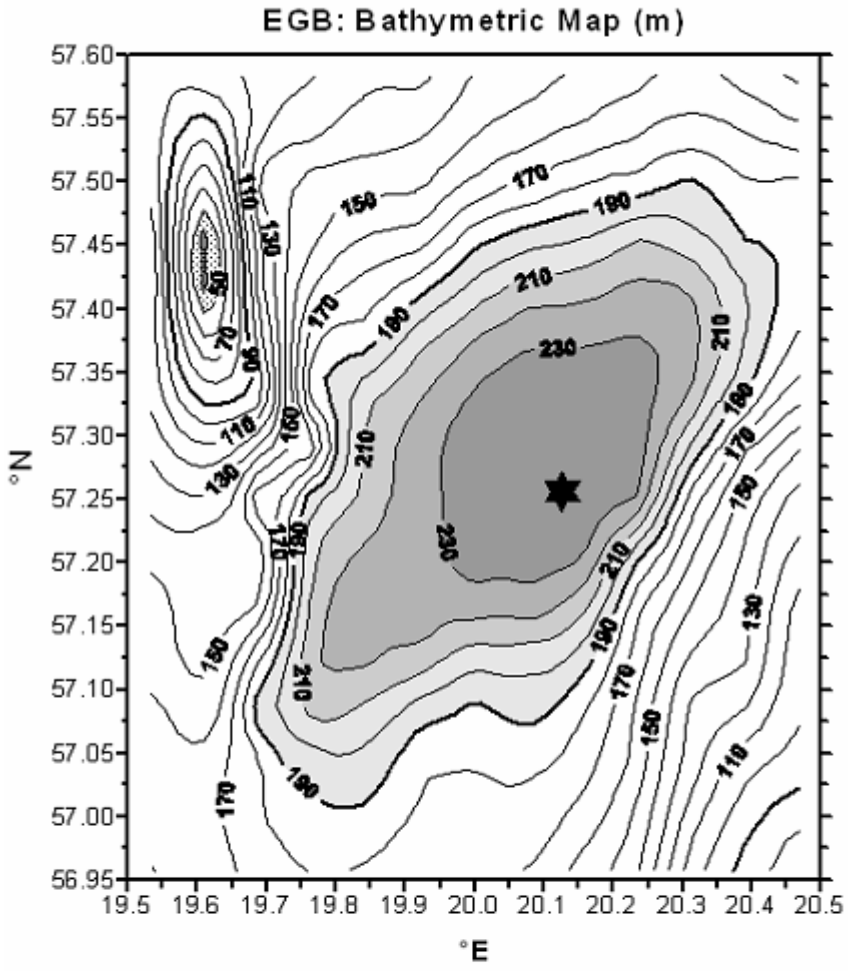

GO3
u106(+20)
u49(+10)
u7
u (cm/s)
Time


GO3
v106(+20)
v49(+10)
v7
v (cm/s)
Time

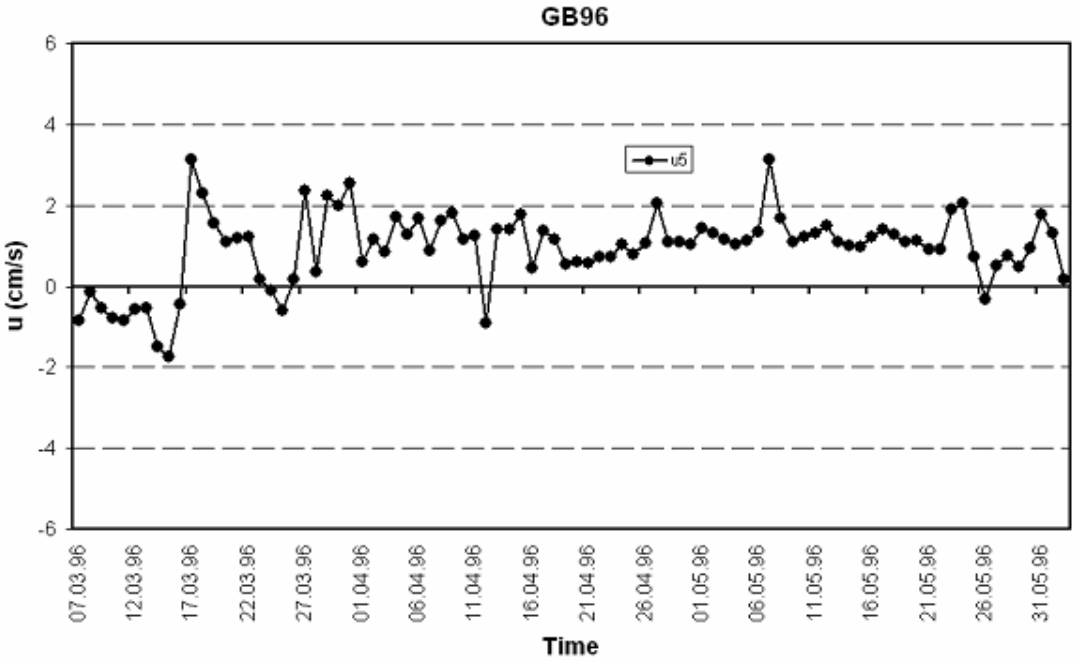


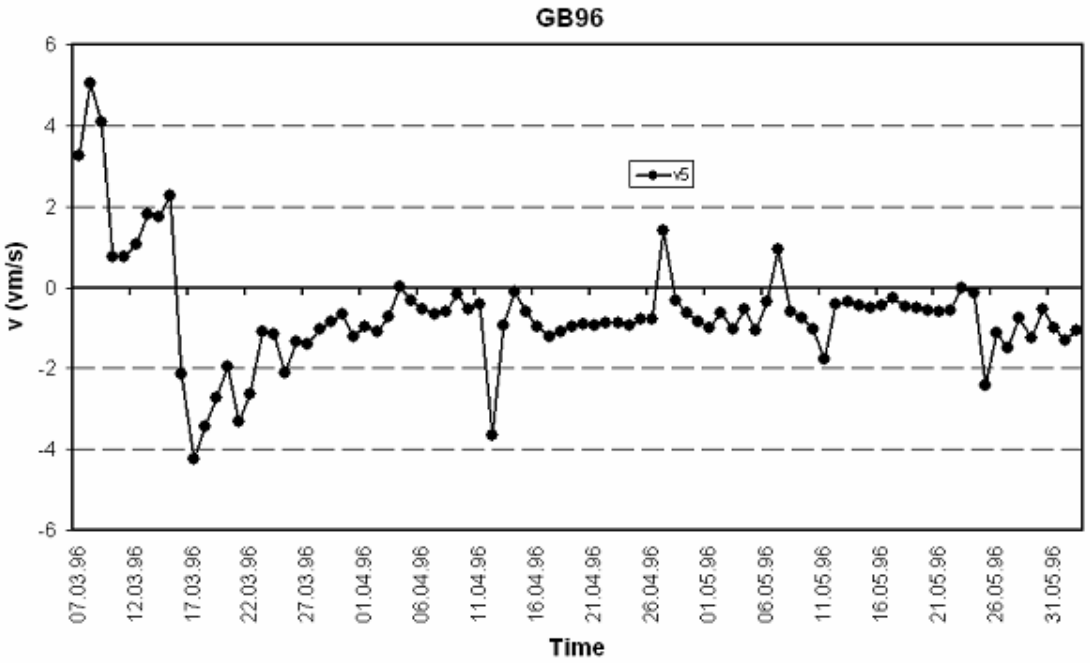
GO3-94						
Above Bottom (m)	u106	v106	u49	v49	u7	v7
N (d)	45,00	45,00	45,00	45,00	45,00	45,00
Mean (cm/s)	1,10	1,19	0,86	1,19	1,22	1,77
STD (cm/s)	1,66	1,90	1,60	1,73	3,77	2,59
Skewness	0,44	0,46	0,79	0,59	0,17	-0,16
Kurtosis	-0,48	-0,06	0,53	-0,50	-1,04	0,99
Min. (cm/s)	-1,84	-3,28	-1,88	-1,98	-5,02	-5,48
Max. (cm/s)	4,63	5,68	5,20	5,13	8,26	8,96
Range (cm/s)	6,47	8,96	7,08	7,11	13,28	14,44

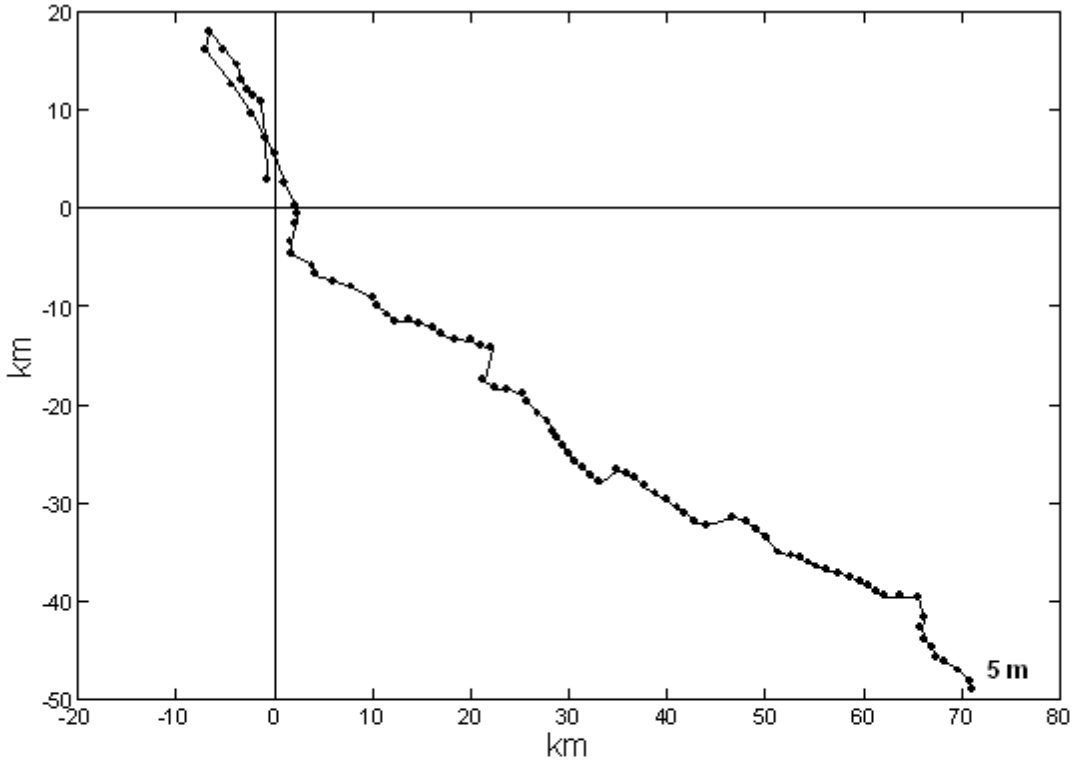
GB-96



GO-96	
Lat.(°N)	57°15'
Long.(°E)	20°08'
Depth (m)	240
SI (min)	20
Start	07.03.1996
End	02.06.1996

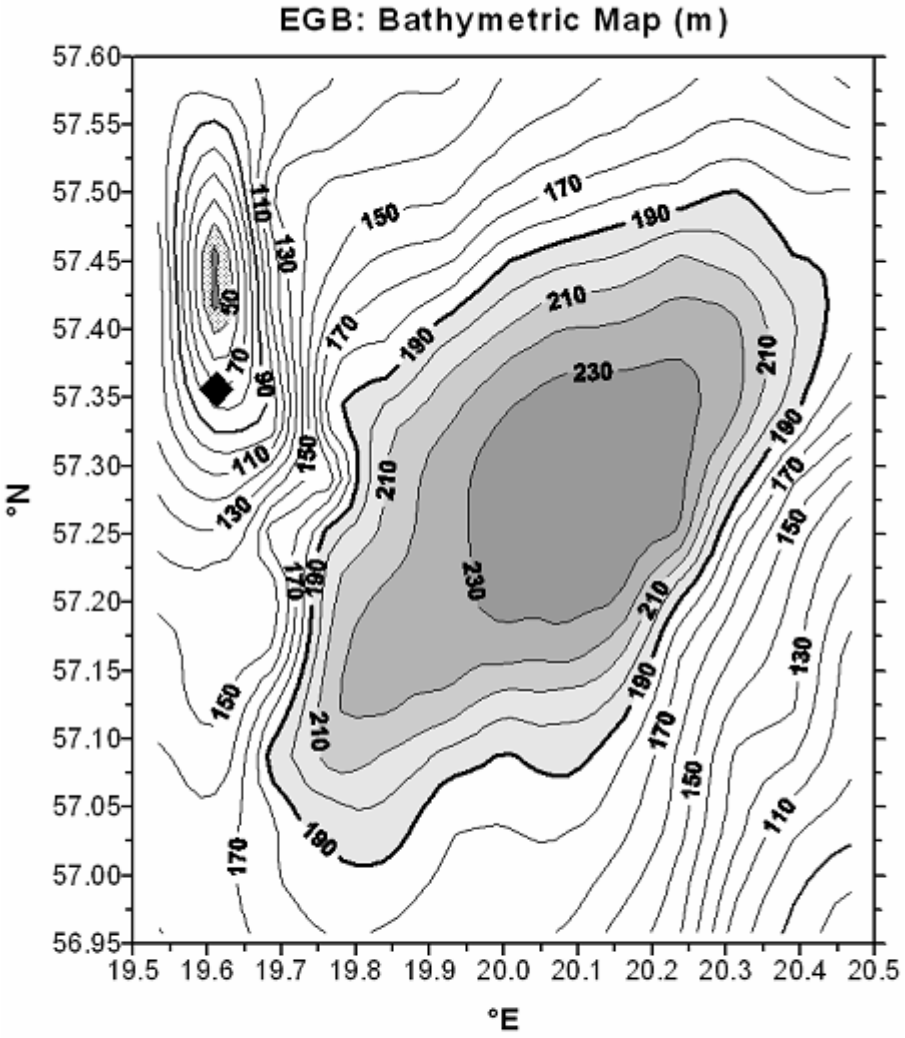

GB96
u (cm/s)
6
4
2
0
-2
-4
-6
u5
07.03.96
12.03.96
17.03.96
22.03.96
27.03.96
01.04.96
06.04.96
11.04.96
16.04.96
21.04.96
26.04.96
01.05.96
06.05.96
11.05.96
16.05.96
21.05.96
26.05.96
31.05.96
Time


GB96
v (vm/s)
6
4
2
0
-2
-4
-6
v5
07.03.96
12.03.96
17.03.96
22.03.96
27.03.96
01.04.96
06.04.96
11.04.96
16.04.96
21.04.96
26.04.96
01.05.96
06.05.96
11.05.96
16.05.96
21.05.96
26.05.96
31.05.96
Time

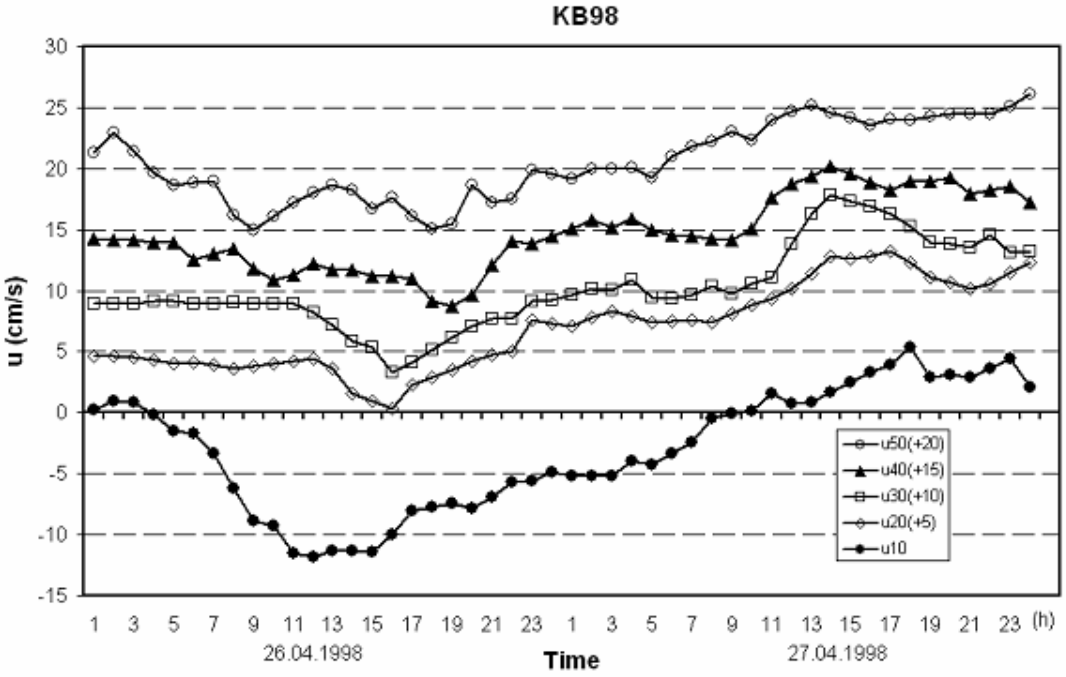


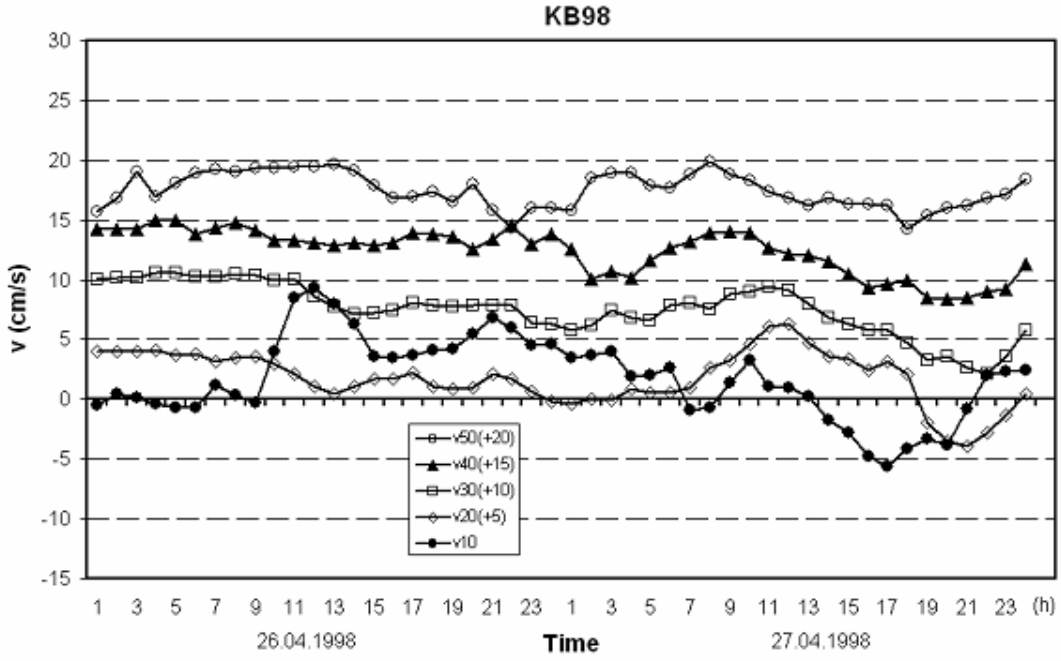
GO-96		
Above Bottom (m)	u5	v5
N (d)	88,00	88,00
Mean (cm/s)	0,93	-0,65
STD (cm/s)	0,92	1,39
Skewness	-0,53	1,18
Kurtosis	0,66	4,40
Min. (cm/s)	-1,74	-4,25
Max. (cm/s)	3,13	5,05
Range (cm/s)	4,87	9,30

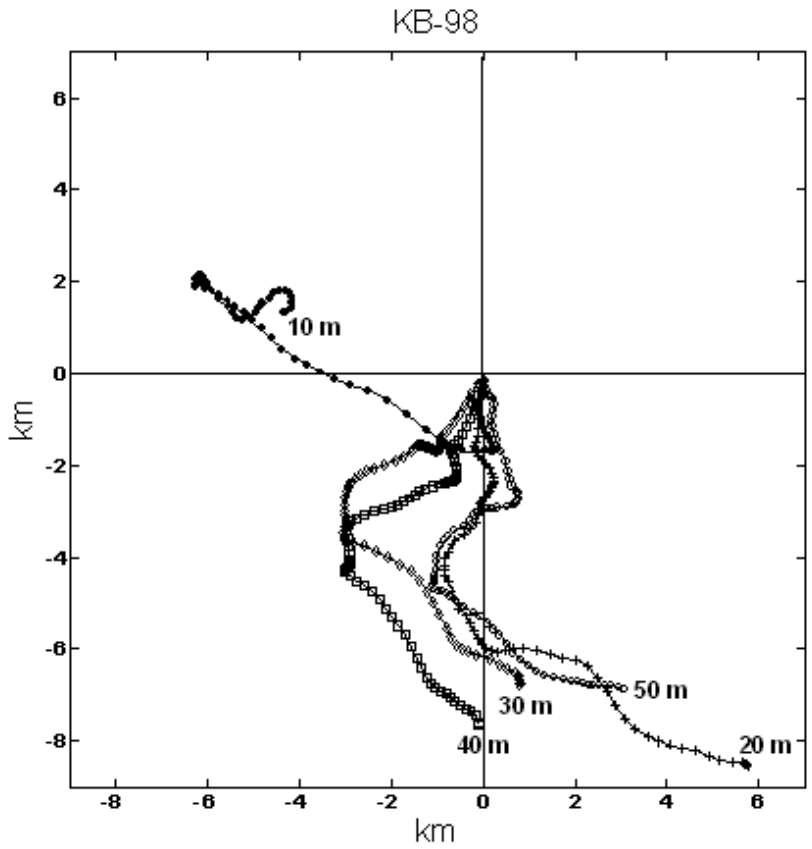
KB-98



	KB-98
Lat. (°N)	57°21'
Long. (°E)	19°37'
Depth (m)	70
SI (min)	1
Start	26.04.1998
End	27.04.1998

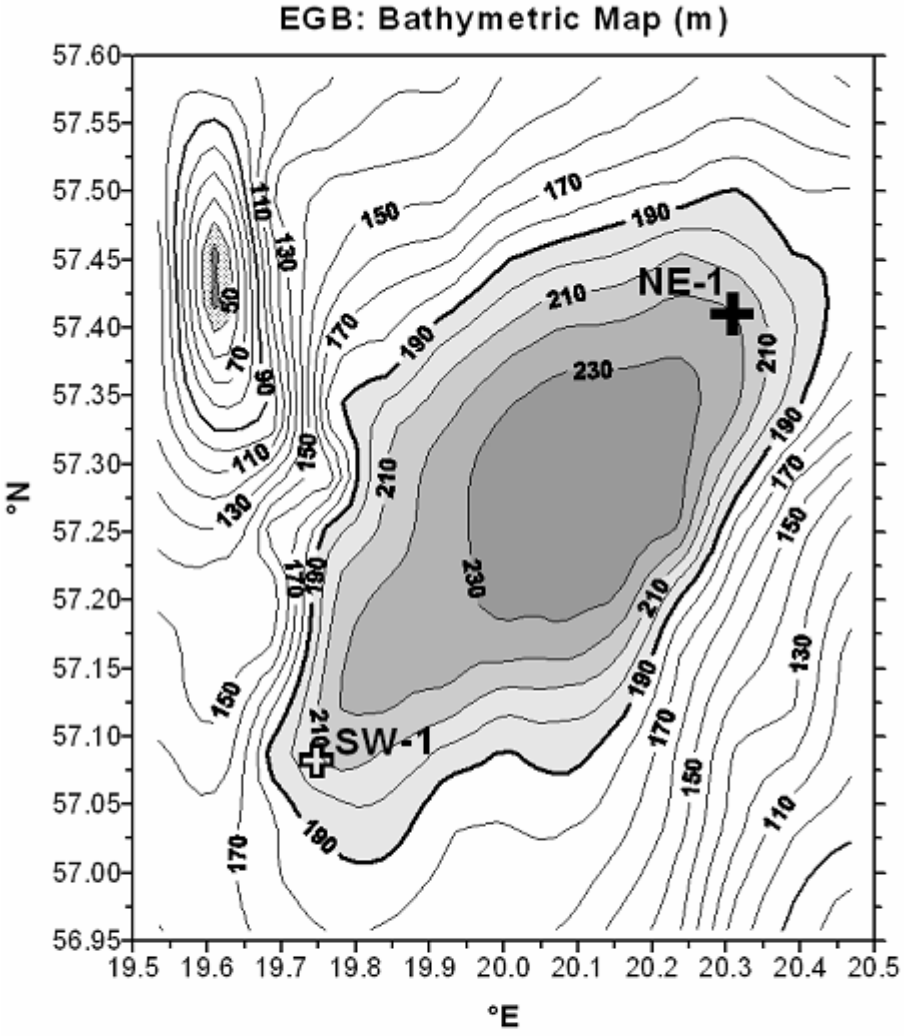

KB98
u (cm/s)
30
25
20
15
10
5
0
-5
-10
-15
1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 (h)
26.04.1998
Time
27.04.1998
u50(+20)
u40(+15)
u30(+10)
u20(+5)
u10


KB98
v (cm/s)
30
25
20
15
10
5
0
-5
-10
-15
1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 (h)
26.04.1998
Time
27.04.1998
v50(+20)
v40(+15)
v30(+10)
v20(+5)
v10

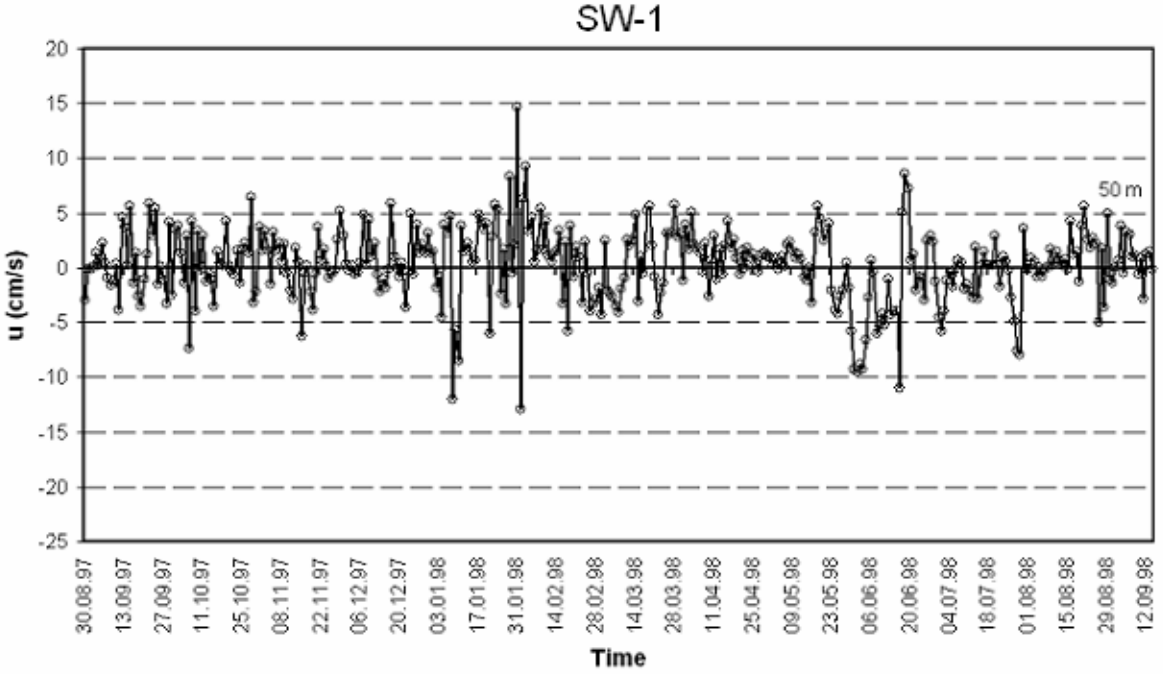


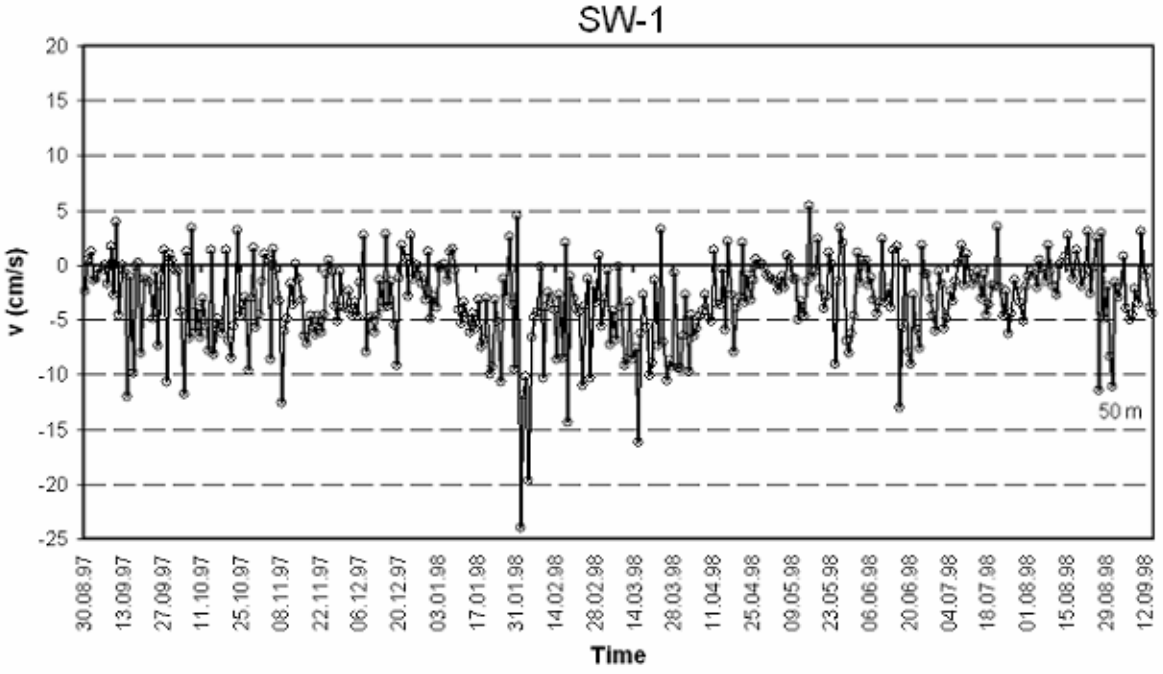
Above Bottom (m)	u50	v50	u40	v40	u30	v30	u20	v20	u10	v10
N (h)	48,00	48,00	48,00	48,00	48,00	48,00	48,00	48,00	48,00	48,00
Mean (cm/s)	0,56	-2,50	-0,30	-2,59	0,25	-2,45	1,94	-3,20	-2,95	1,77
STD (cm/s)	3,20	1,47	3,08	1,93	3,48	2,20	3,56	2,25	5,05	3,44
Skewness	-0,01	-0,22	0,09	-0,73	0,44	-0,58	0,19	-0,49	-0,22	0,00
Kurtosis	-1,23	-0,87	-0,95	-0,69	-0,31	-0,17	-1,09	0,21	-1,16	-0,33
Min. (cm/s)	-4,98	-5,80	-6,25	-6,62	-6,71	-7,88	-4,64	-8,93	-11,85	-5,59
Max. (cm/s)	6,13	-0,15	5,20	0,01	7,82	0,62	8,19	1,29	5,37	9,31
Range (cm/s)	11,11	5,65	11,45	6,63	14,53	8,50	12,83	10,22	17,22	14,90

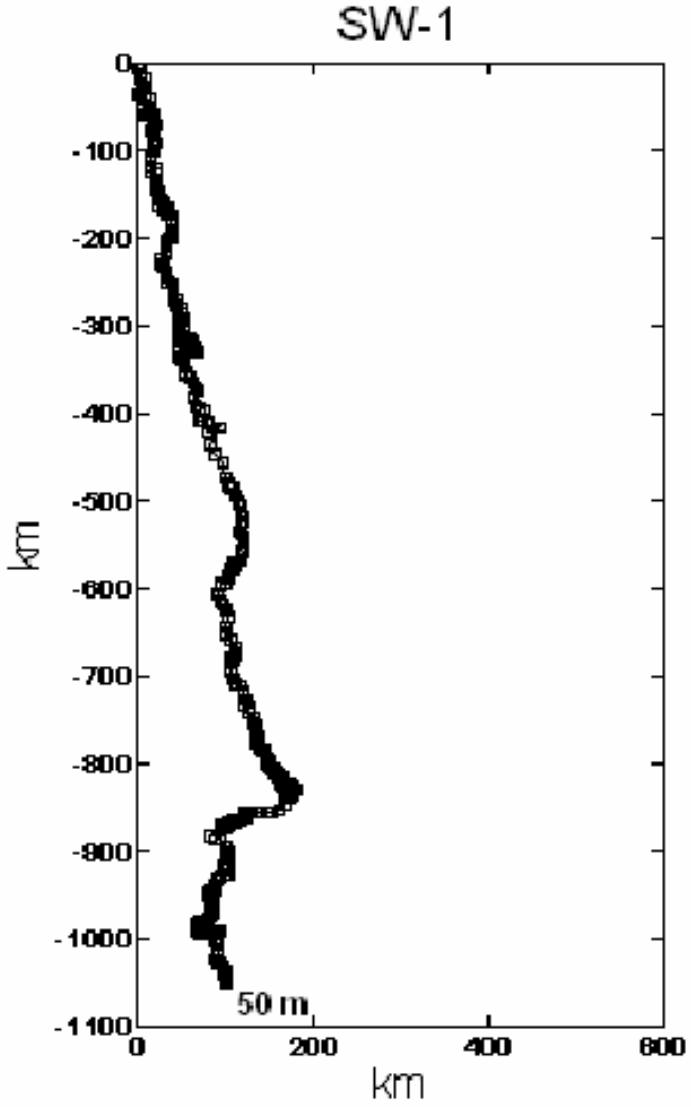
SW/NE-1



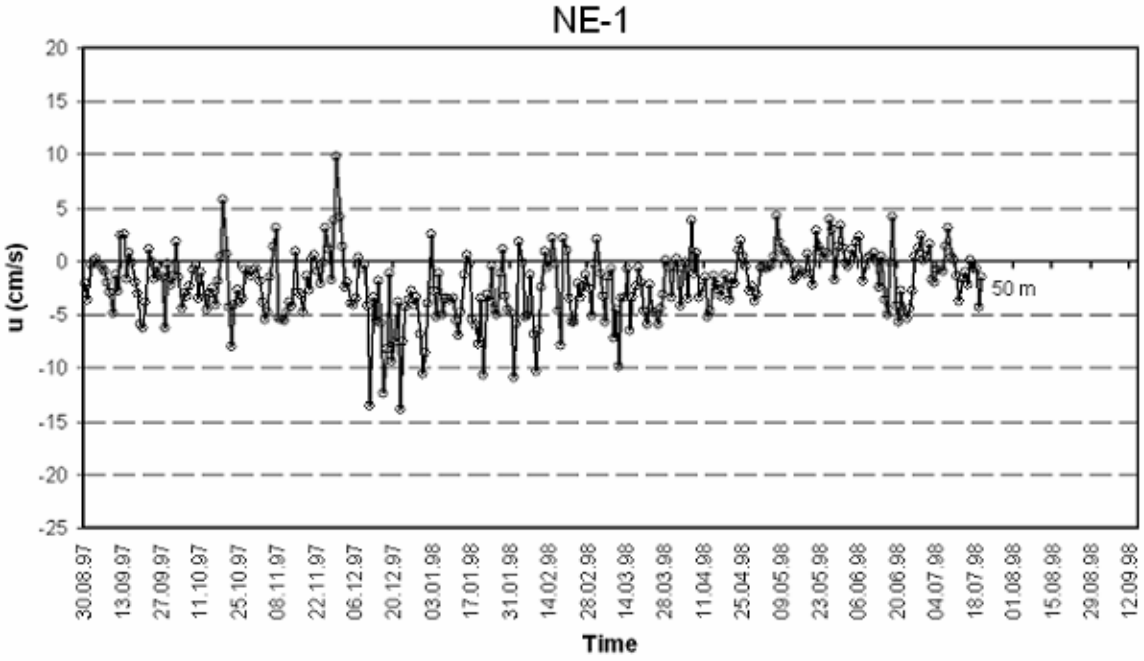
	SW-1	NE-1
Lat. (°N)	57°05'	57°26'
Long. (°E)	19°45'	20°21'
Depth (m)	220	220
SI (h)	1	1
Start	30.08.1997	30.08.1997
End	14.09.1998	20.07.1998

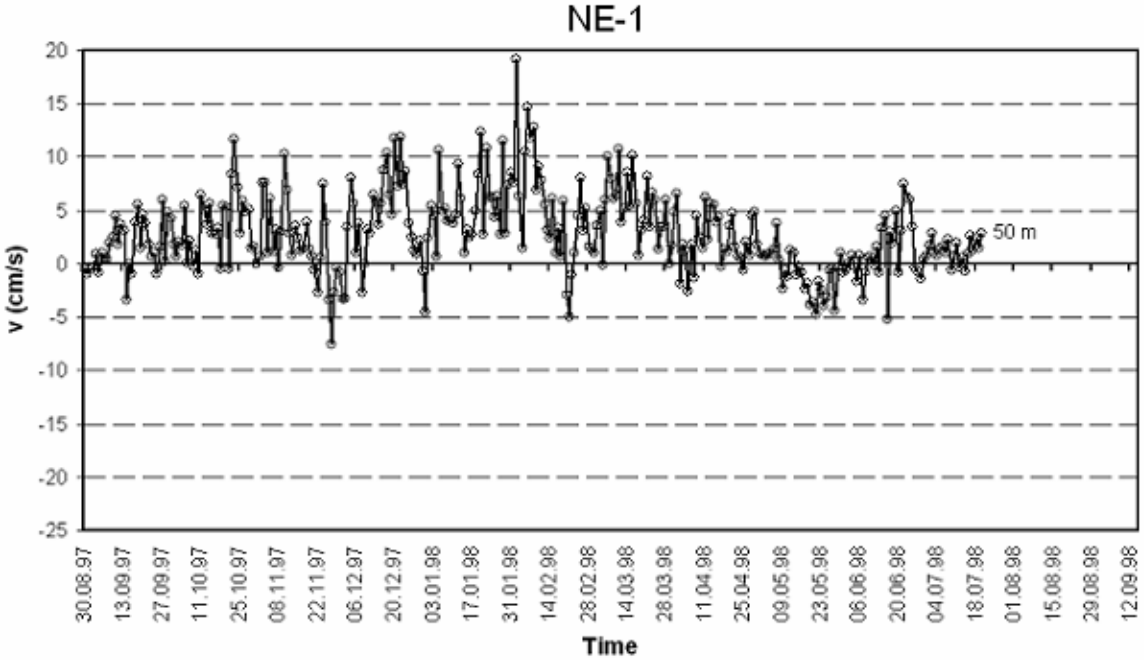

SW-1
u (cm/s)
20
15
10
5
0
-5
-10
-15
-20
-25
50 m
30.08.97
13.09.97
27.09.97
11.10.97
25.10.97
08.11.97
22.11.97
06.12.97
20.12.97
03.01.98
17.01.98
31.01.98
14.02.98
28.02.98
14.03.98
28.03.98
11.04.98
25.04.98
09.05.98
23.05.98
06.06.98
20.06.98
04.07.98
18.07.98
01.08.98
15.08.98
29.08.98
12.09.98
Time

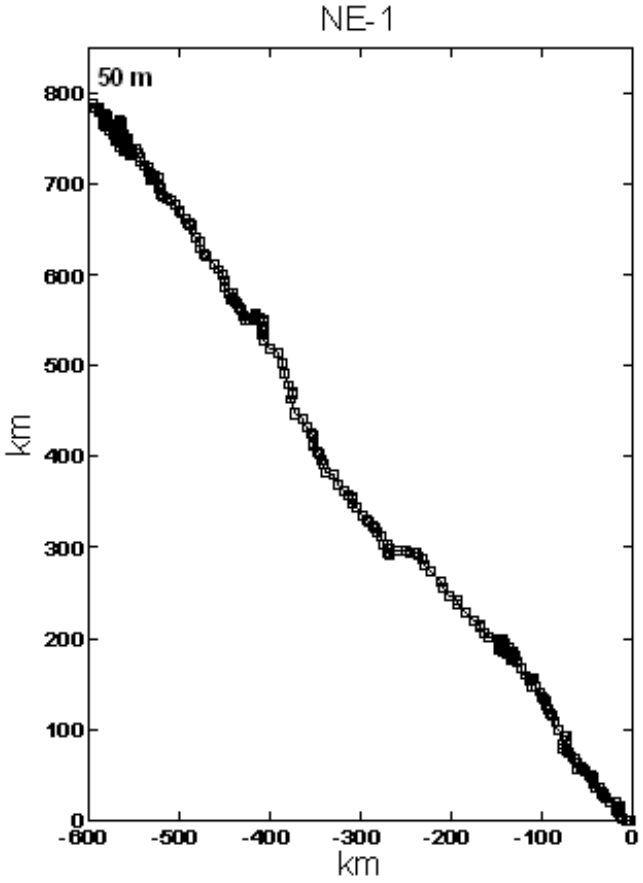

SW-1
v (cm/s)
20
15
10
5
0
-5
-10
-15
-20
-25
50 m
30.08.97
13.09.97
27.09.97
11.10.97
25.10.97
08.11.97
22.11.97
06.12.97
20.12.97
03.01.98
17.01.98
31.01.98
14.02.98
28.02.98
14.03.98
28.03.98
11.04.98
25.04.98
09.05.98
23.05.98
06.06.98
20.06.98
04.07.98
18.07.98
01.08.98
15.08.98
29.08.98
12.09.98
Time



SW-1		
Above Bottom (m)	u50	v50
N (d)	381,00	381,00
Mean (cm/s)	0,31	-3,19
STD (cm/s)	3,31	3,85
Schiefe	-0,45	-1,00
Kurtosis	2,11	2,52
Min. (cm/s)	-12,94	-23,96
Max. (cm/s)	14,73	5,47
Range (cm/s)	27,67	29,43

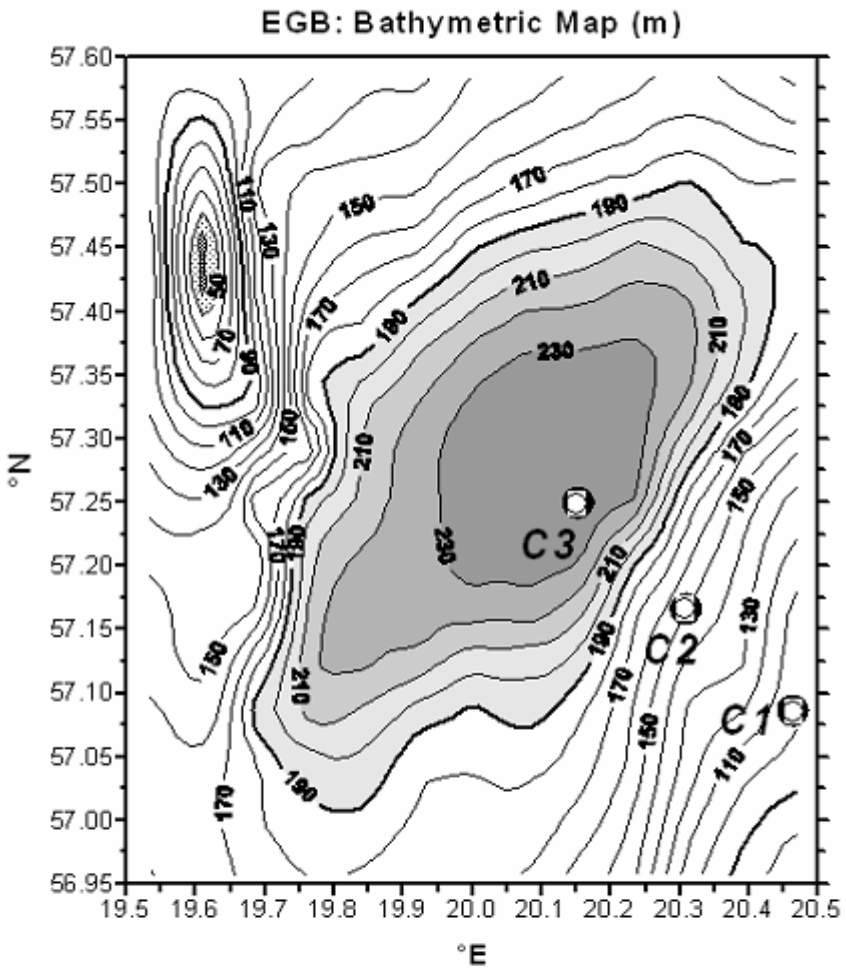

NE-1
u (cm/s)
20
15
10
5
0
-5
-10
-15
-20
-25
50 m
30.08.97
13.09.97
27.09.97
11.10.97
25.10.97
08.11.97
22.11.97
06.12.97
20.12.97
03.01.98
17.01.98
31.01.98
14.02.98
28.02.98
14.03.98
28.03.98
11.04.98
25.04.98
09.05.98
23.05.98
06.06.98
20.06.98
04.07.98
18.07.98
01.08.98
15.08.98
29.08.98
12.09.98
Time


NE-1
v (cm/s)
20
15
10
5
0
-5
-10
-15
-20
-25
50 m
30.08.97
13.09.97
27.09.97
11.10.97
25.10.97
08.11.97
22.11.97
06.12.97
20.12.97
03.01.98
17.01.98
31.01.98
14.02.98
28.02.98
14.03.98
28.03.98
11.04.98
25.04.98
09.05.98
23.05.98
06.06.98
20.06.98
04.07.98
18.07.98
01.08.98
15.08.98
29.08.98
12.09.98
Time

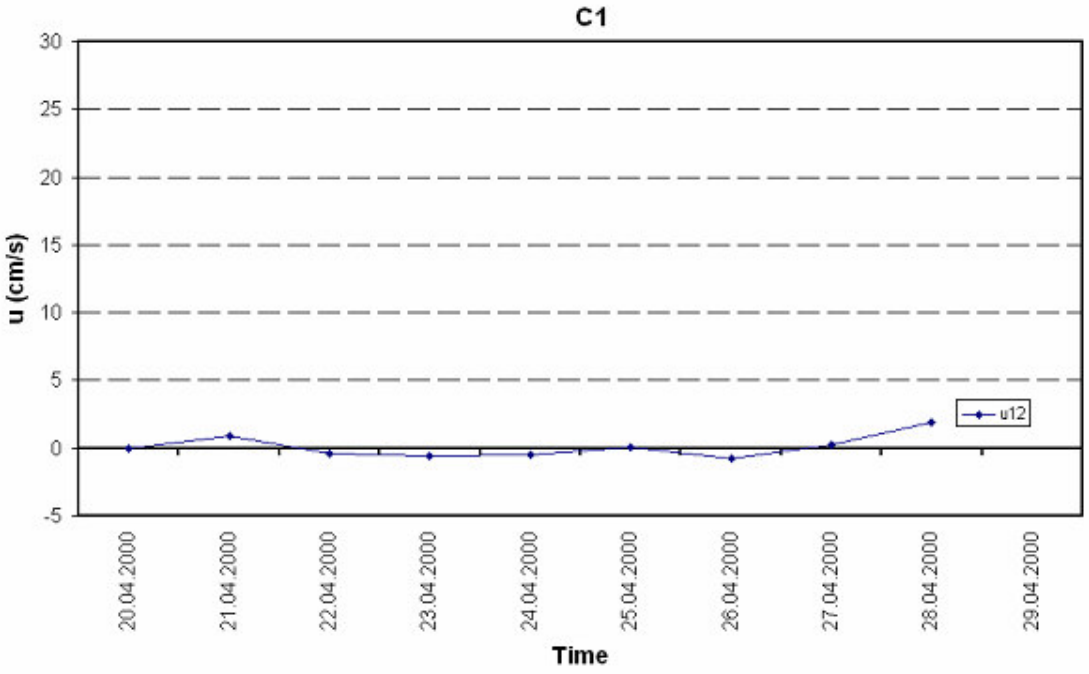


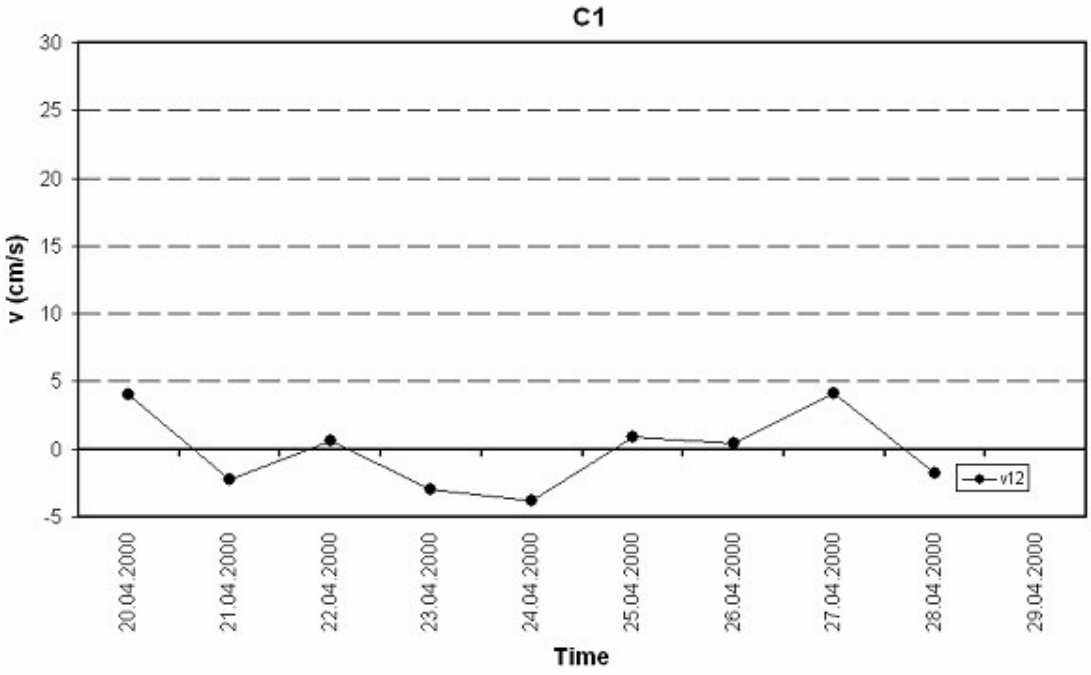
NE-1	u50	v50
Above Bottom (m)	u50	v50
N (d)	325,00	325,00
Mean (cm/s)	-2,12	2,81
STD (cm/s)	3,10	3,72
Schiefe	-0,45	0,63
Kurtosis	1,58	1,05
Min. (cm/s)	-13,92	-7,48
Max. (cm/s)	9,86	19,15
Range (cm/s)	23,78	26,63

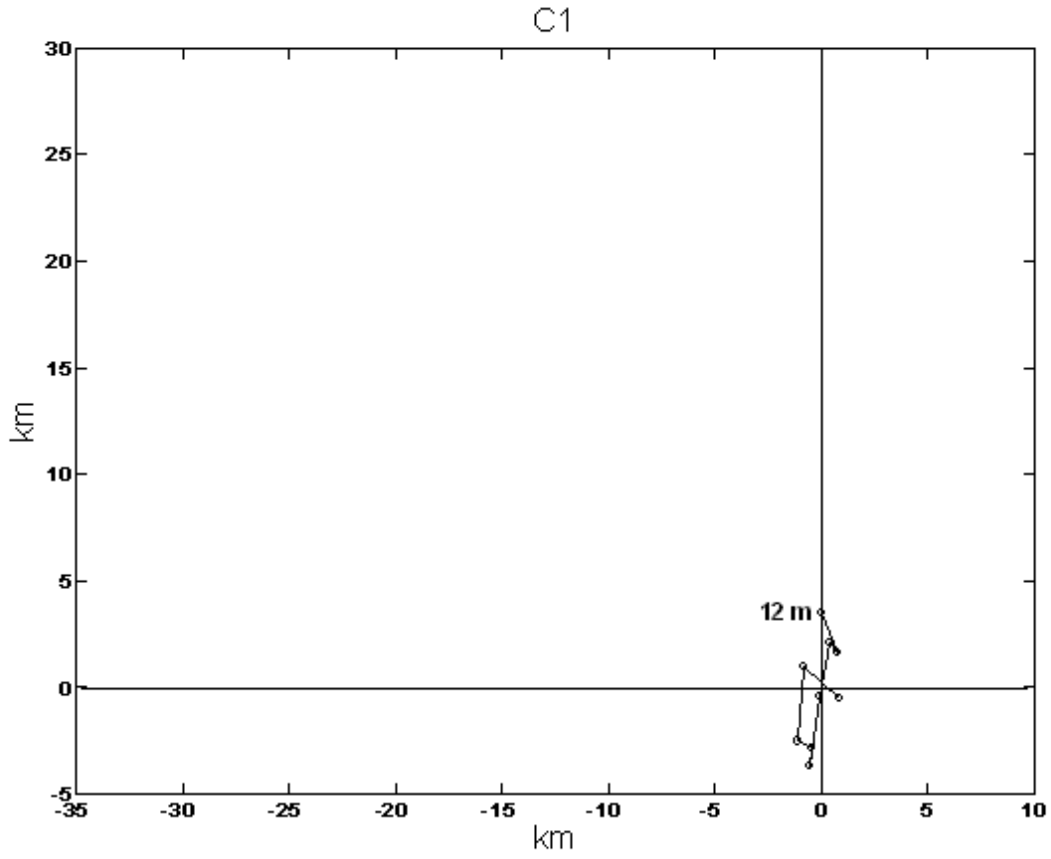
C-00



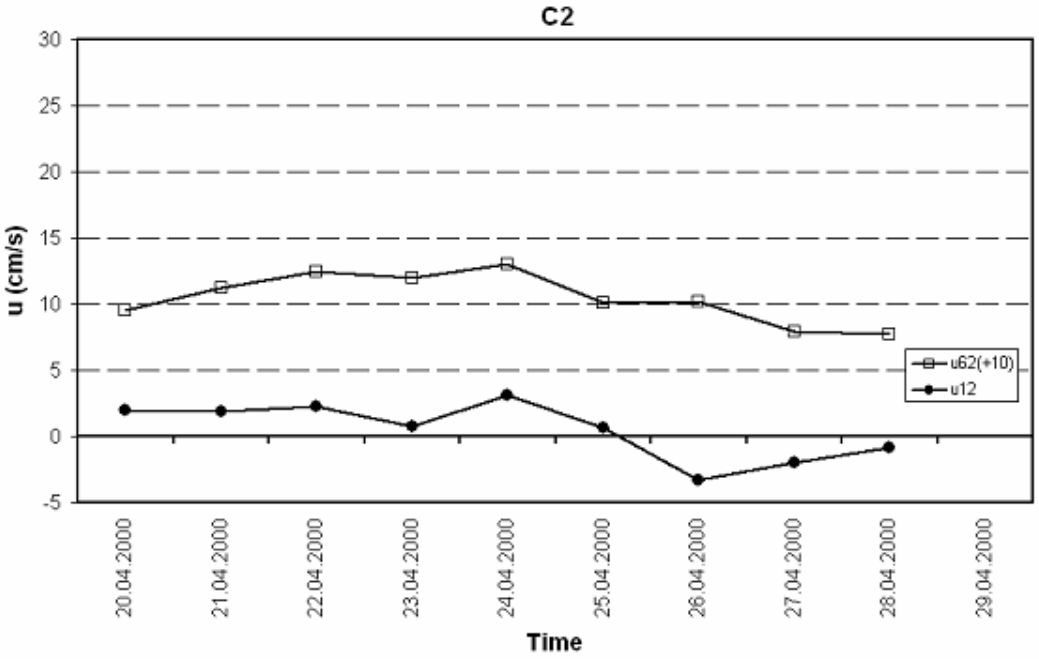
	C1	C2	C3
Lat. (°N)	57°05'	57°10'	57°15'
Long. (°E)	20°28'	20°19'	20°09'
Depth (m)	102	152	237
SI (min)	2	2	2
Start	20.04.2000	20.04.2000	20.04.2000
End	28.04.2000	28.04.2000	29.04.2000

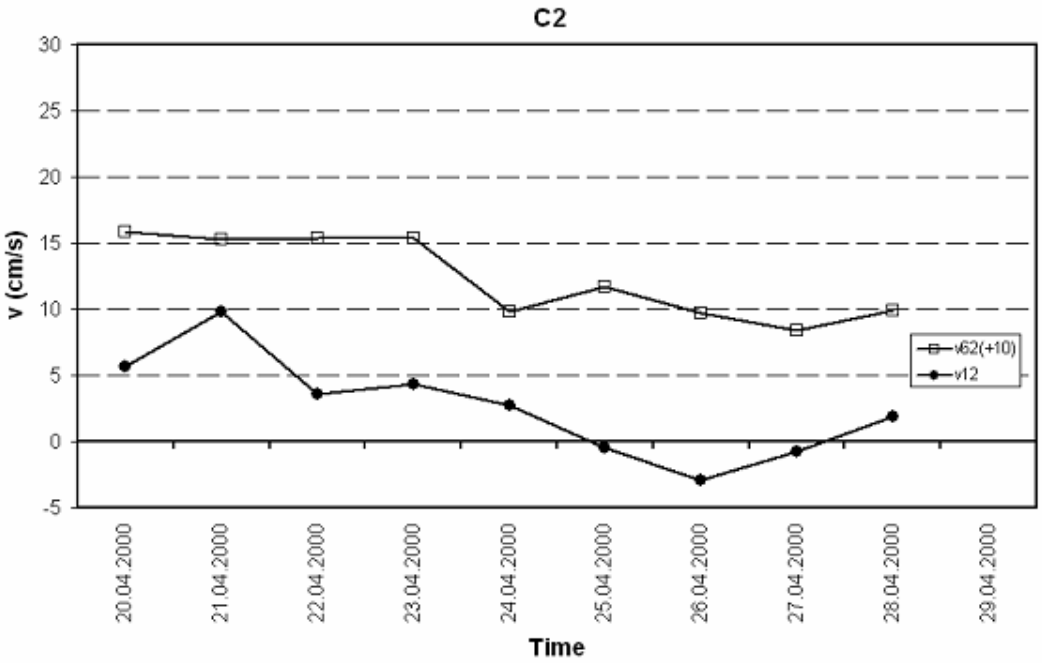

C1
30
25
20
15
10
5
0
-5
u (cm/s)
u12
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time

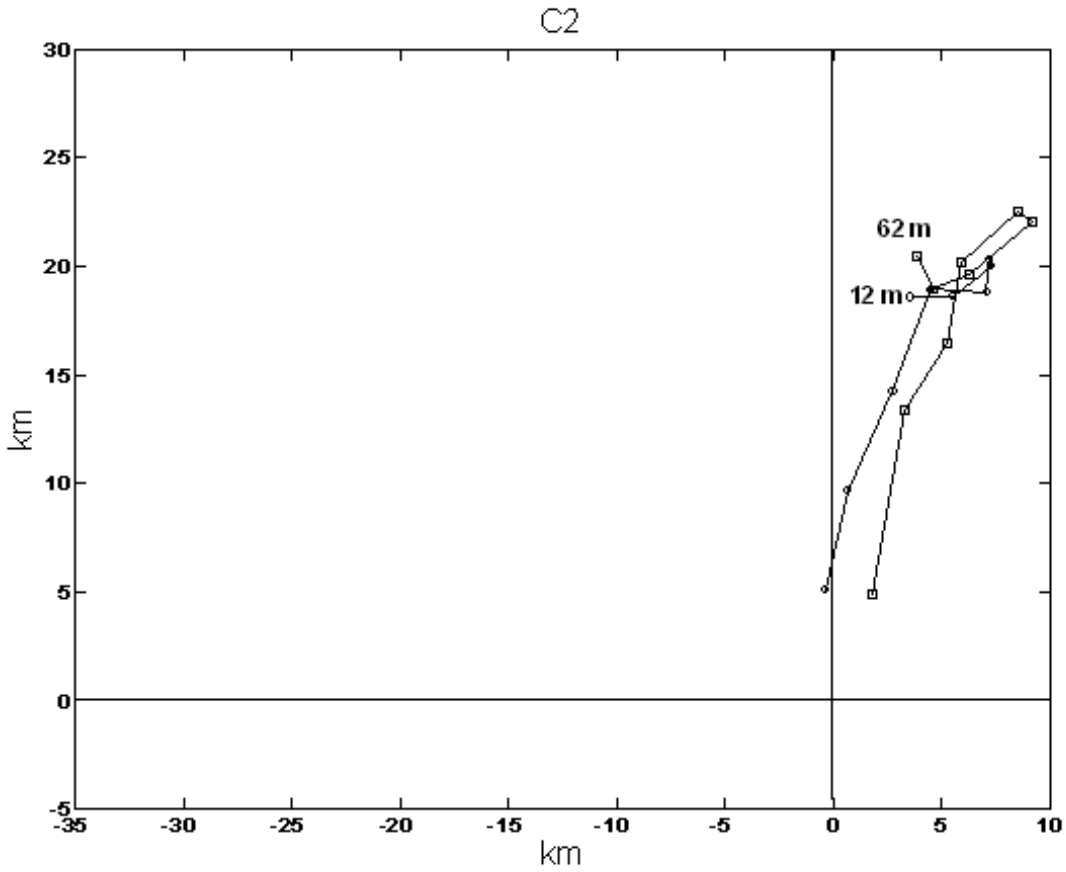

C1
30
25
20
15
10
5
0
-5
v (cm/s)
v12
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time



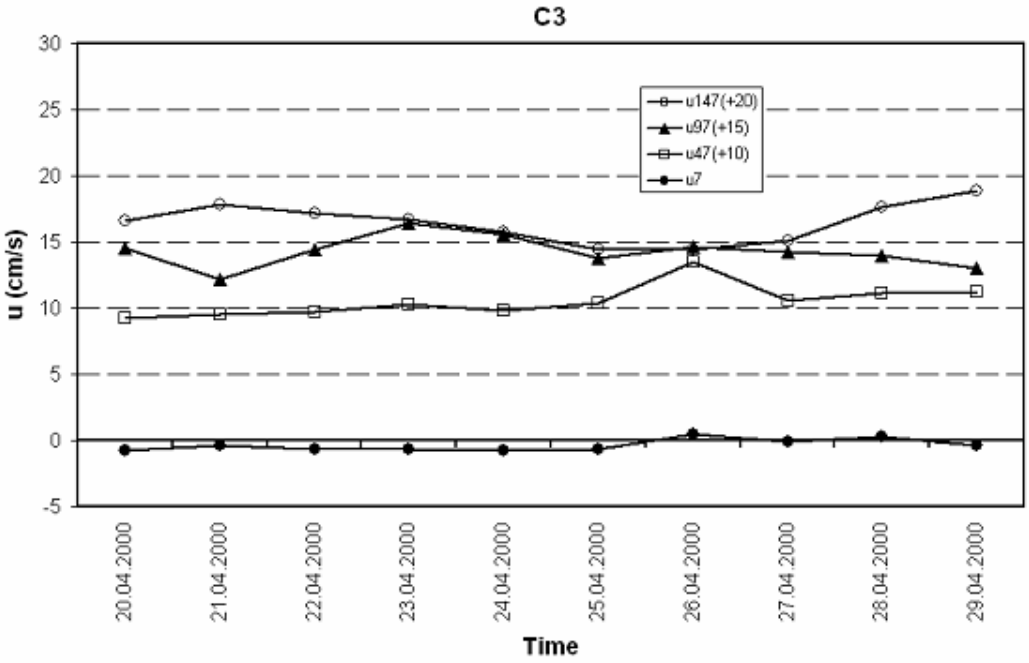
C1		
Above Bottom (m)	u12	v12
N (d)	9,00	9,00
Mean (cm/s)	0,11	-0,07
STD (cm/s)	0,85	2,87
Skewness	1,15	0,31
Kurtosis	0,41	-1,16
Min. (cm/s)	-0,73	-3,76
Max. (cm/s)	1,94	4,12
Range (cm/s)	2,67	7,88

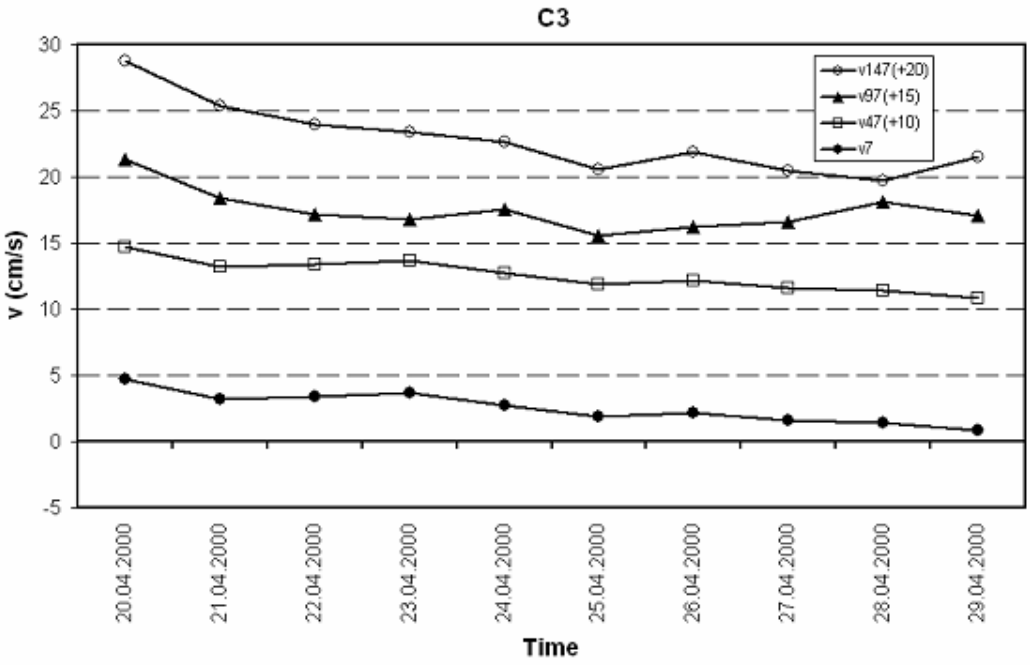

C2
u (cm/s)
30
25
20
15
10
5
0
-5
u62(+10)
u12
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time

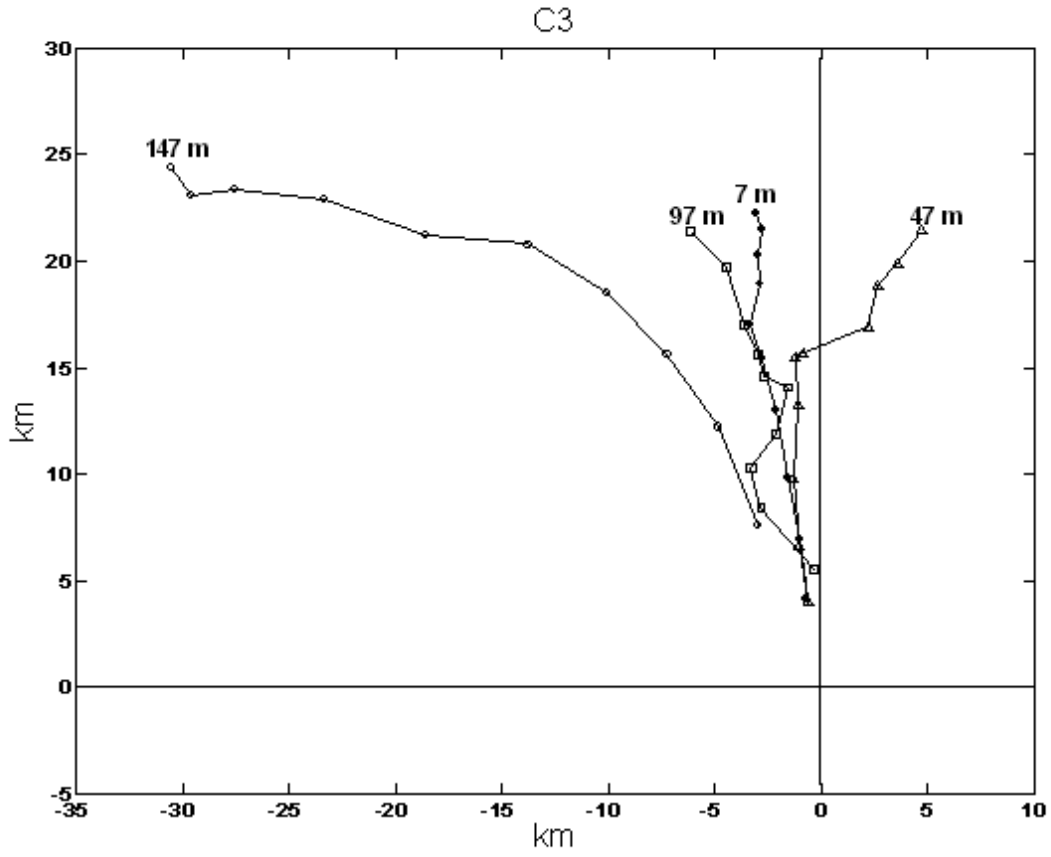

C2
v (cm/s)
30
25
20
15
10
5
0
-5
v62(+10)
v12
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time



C2				
Above Bottom (m)	u62	v62	u12	v12
N (d)	9,00	9,00	9,00	9,00
Mean (cm/s)	0,46	2,39	0,49	2,64
STD (cm/s)	1,88	3,06	2,14	3,82
Skewness	-0,18	0,02	-0,59	0,38
Kurtosis	-1,18	-1,76	-0,89	-0,43
Min. (cm/s)	-2,30	-1,64	-3,29	-2,89
Max. (cm/s)	3,00	5,84	3,11	9,81
Range (cm/s)	5,30	7,48	6,40	12,70


C3
u147(+20)
u97(+15)
u47(+10)
u7
u (cm/s)
30
25
20
15
10
5
0
-5
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time

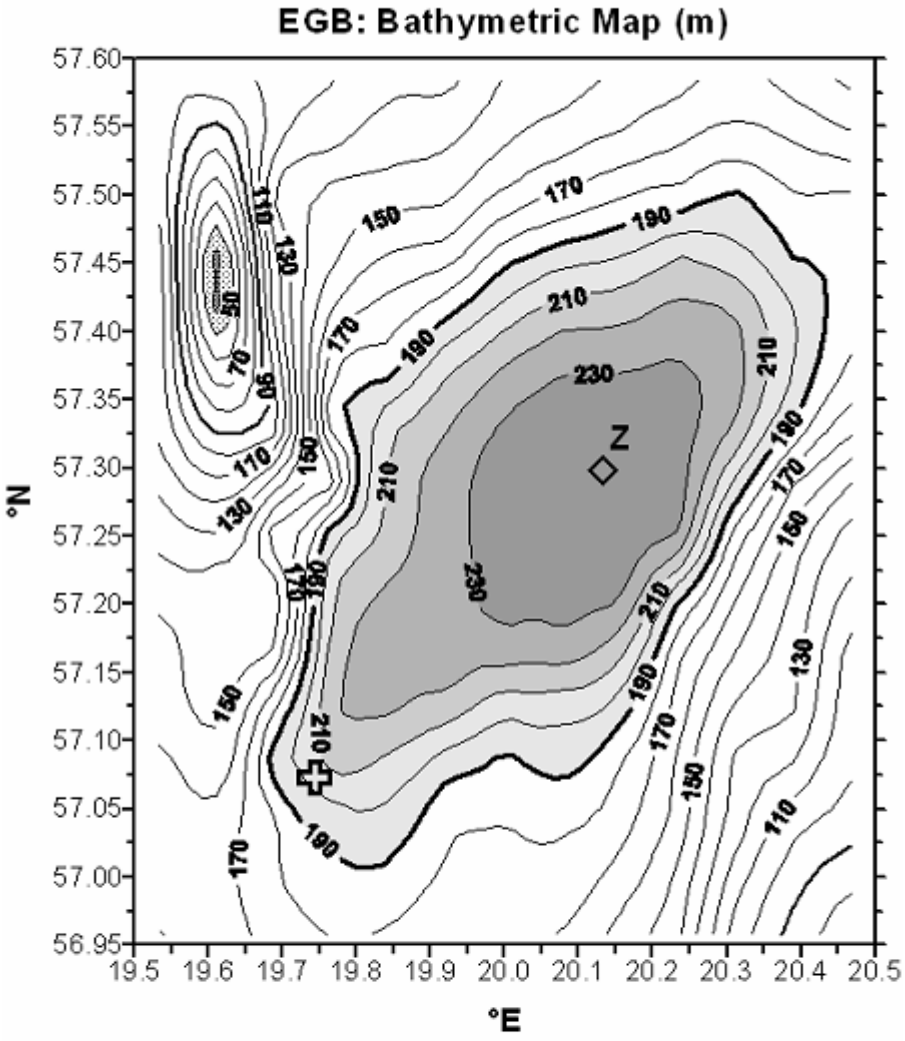

C3
v147(+20)
v97(+15)
v47(+10)
v7
v (cm/s)
30
25
20
15
10
5
0
-5
20.04.2000
21.04.2000
22.04.2000
23.04.2000
24.04.2000
25.04.2000
26.04.2000
27.04.2000
28.04.2000
29.04.2000
Time



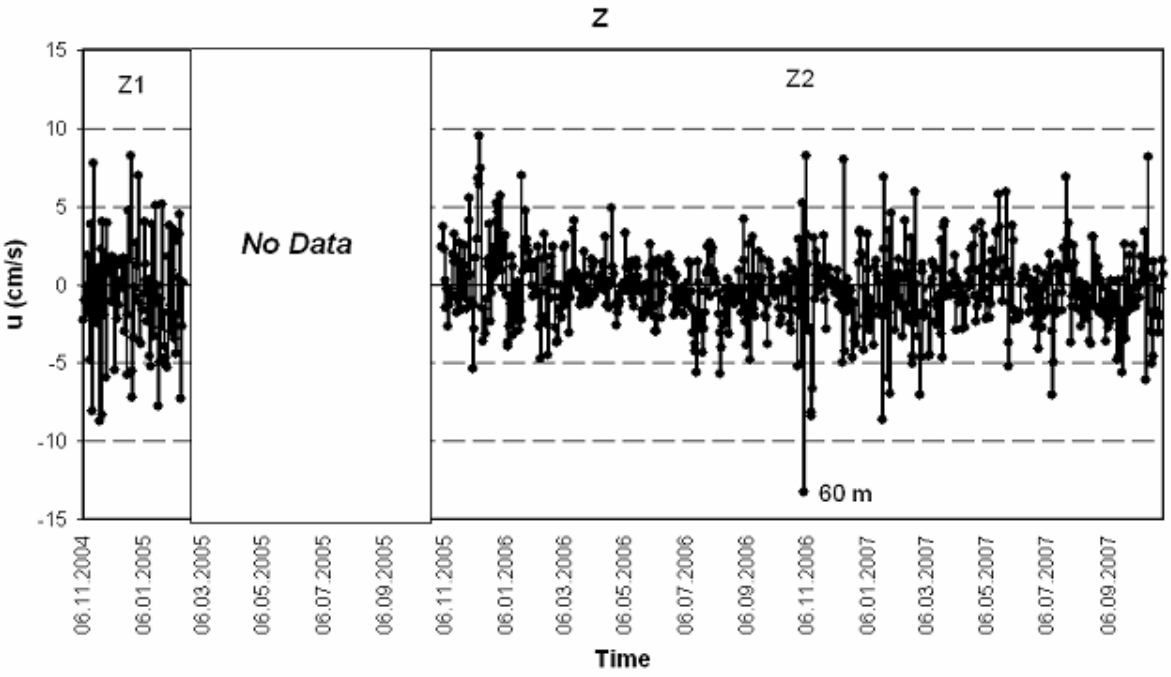
C3

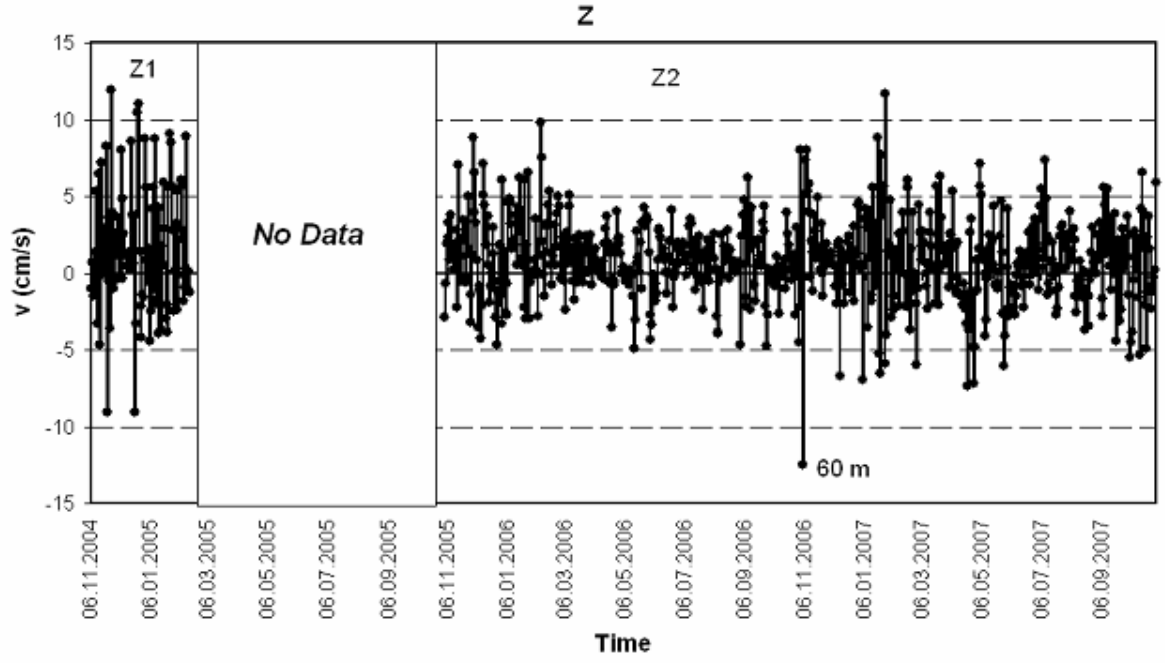
Above Bottom (m)	u147	v147	u97	v97	u47	v47	u7	v7
N (d)	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00
Mean (cm/s)	-3,54	2,83	-0,72	2,48	0,55	2,48	-0,35	2,57
STD (cm/s)	1,49	2,72	1,19	1,60	1,23	1,37	0,45	1,20
Skewness	0,00	1,01	-0,02	1,40	1,42	-0,03	0,90	0,29
Kurtosis	-1,12	0,33	-0,23	1,55	1,45	-0,99	-0,58	-0,82
Min. (cm/s)	-5,56	-0,31	-2,85	0,58	-0,73	0,22	-0,76	0,82
Max. (cm/s)	-1,13	8,80	1,38	6,34	3,52	4,61	0,50	4,75
Range (cm/s)	4,43	9,11	4,23	5,76	4,25	4,39	1,26	3,93

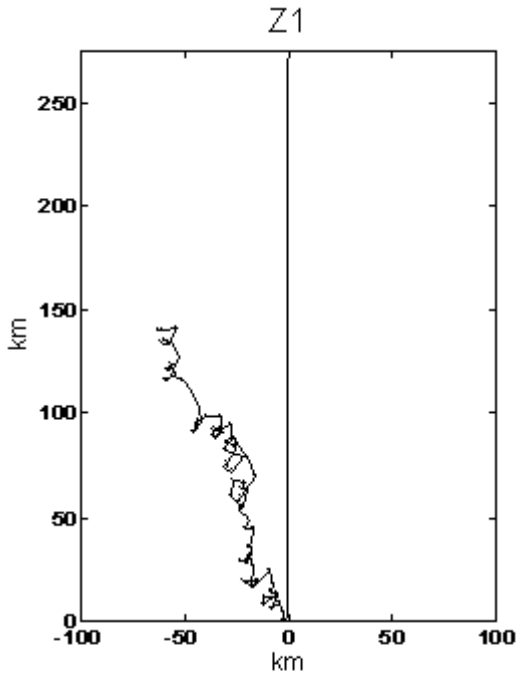
Z



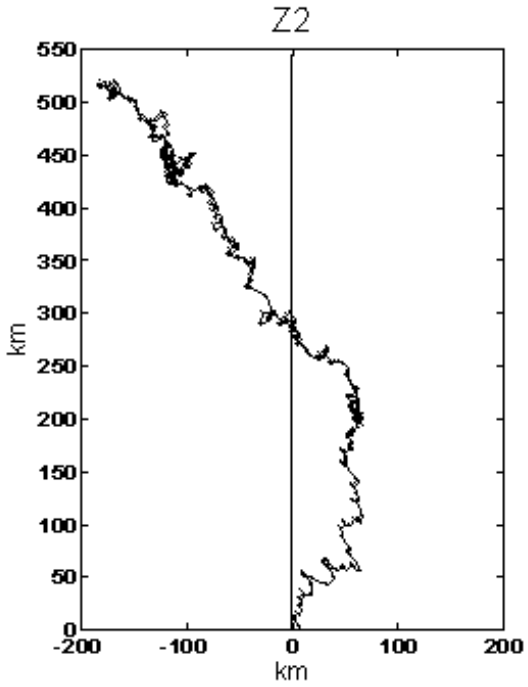
	Z1	Z2
Lat.(°N)	57°19'	57°19'
Long.(°E)	20°09'	20°09'
Depth (m)	185	185
SI (min)	30	30
Start	16.11.2004	02.11.2005
End	14.02.2005	30.10.2007


Z
Z1
Z2
No Data
60 m
u (cm/s)
15
10
5
0
-5
-10
-15
06.11.2004
06.01.2005
06.03.2005
06.05.2005
06.07.2005
06.09.2005
06.11.2005
06.01.2006
06.03.2006
06.05.2006
06.07.2006
06.09.2006
06.11.2006
06.01.2007
06.03.2007
06.05.2007
06.07.2007
06.09.2007
Time


Z
Z1
Z2
No Data
60 m
v (cm/s)
15
10
5
0
-5
-10
-15
06.11.2004
06.01.2005
06.03.2005
06.05.2005
06.07.2005
06.09.2005
06.11.2005
06.01.2006
06.03.2006
06.05.2006
06.07.2006
06.09.2006
06.11.2006
06.01.2007
06.03.2007
06.05.2007
06.07.2007
06.09.2007
Time

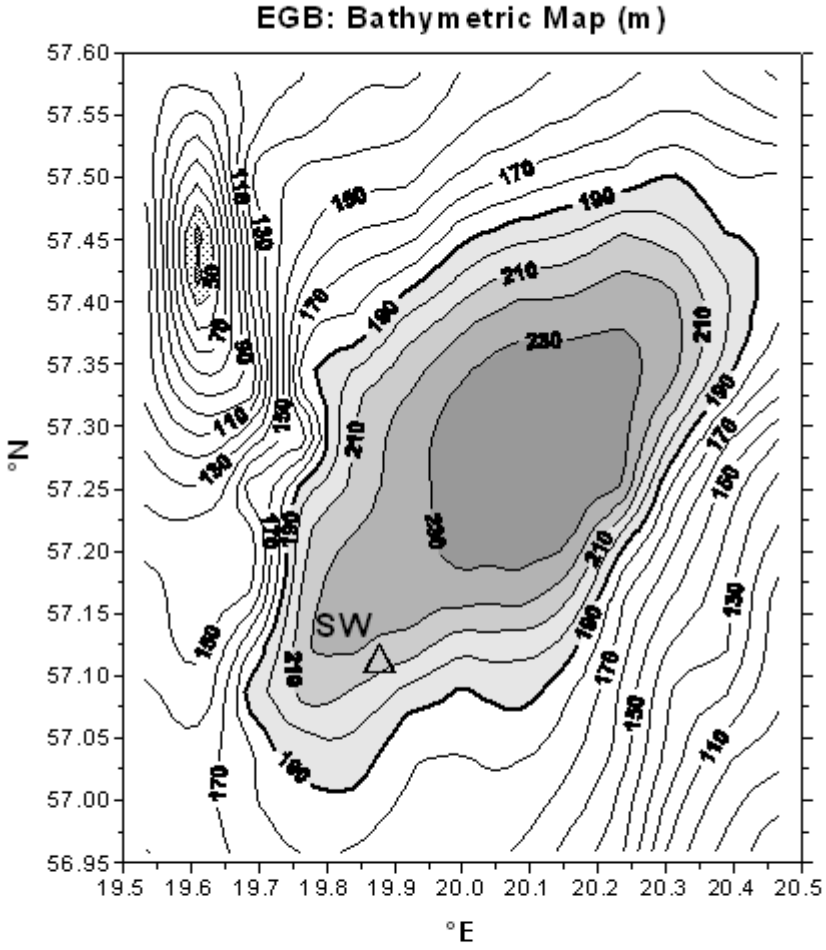


Z1		
Above Bottom	u60	v60
N (d)	101,00	101,00
Mean (cm/s)	-0,72	1,60
STD (cm/s)	3,55	4,11
Skewness	0,00	0,24
Kurtosis	-0,13	0,03
Min. (cm/s)	-8,72	-9,05
Max. (cm/s)	8,23	11,94
Range (cm/s)	16,95	20,99

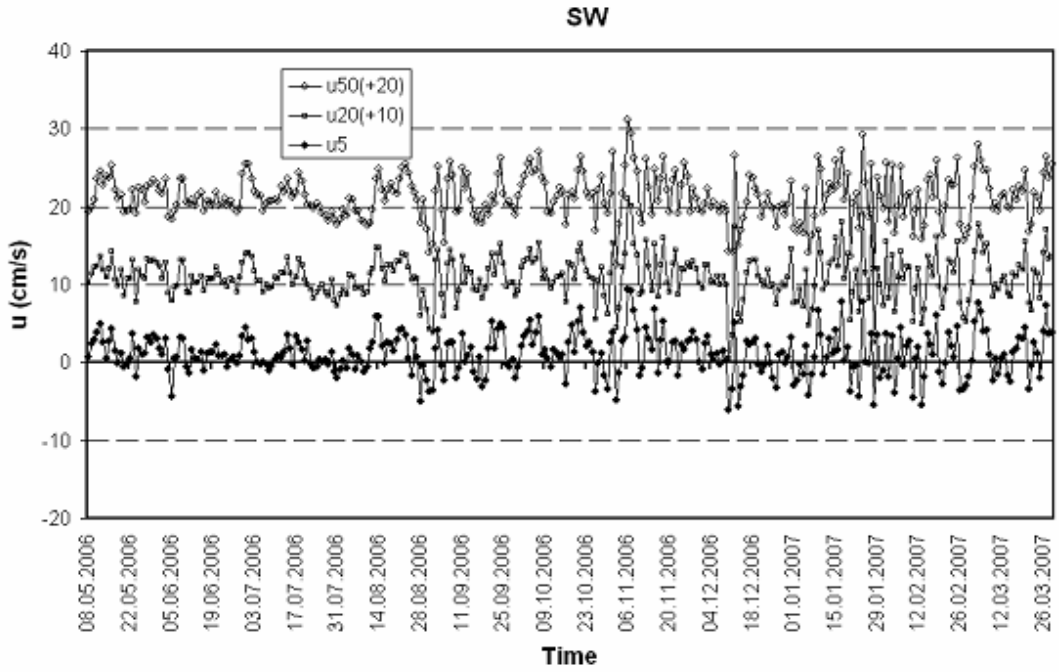


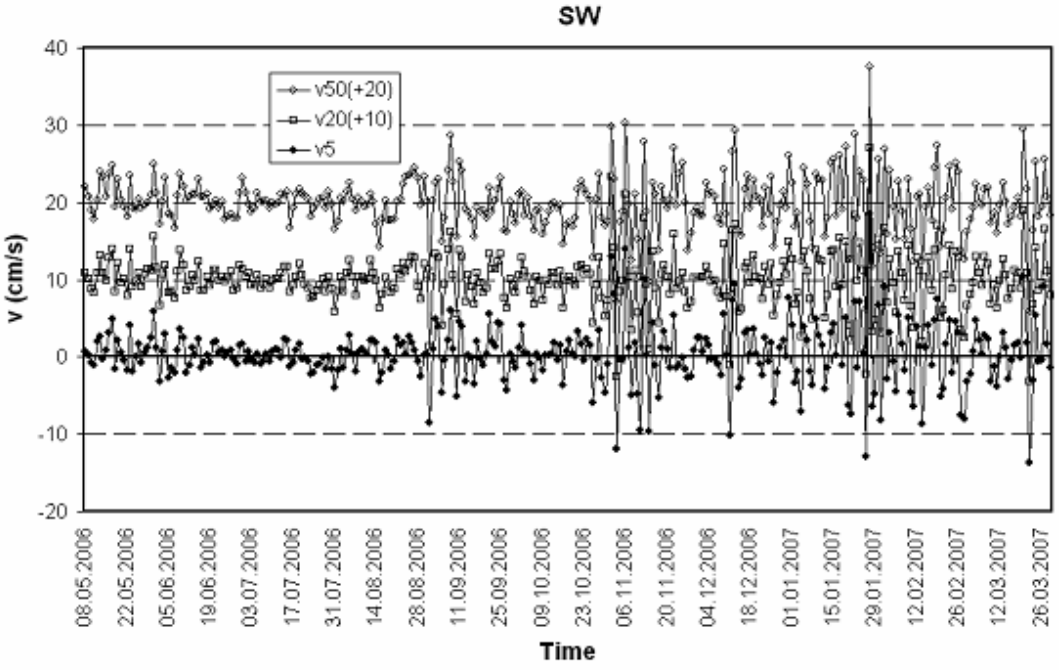
Z2		
Above Bottom	u60	v60
N (d)	729,00	728,00
Mean (cm/s)	-0,27	0,83
STD (cm/s)	2,42	2,61
Skewness	0,12	-0,06
Kurtosis	2,73	1,74
Min. (cm/s)	-13,23	-12,51
Max. (cm/s)	10,00	11,66
Range (cm/s)	23,23	24,17

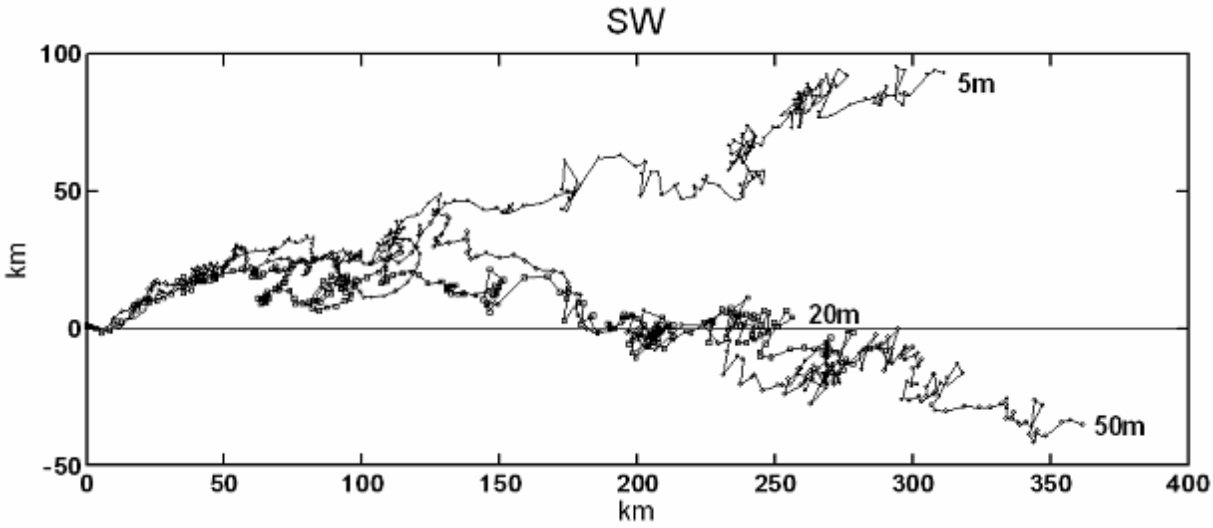
SW



	SW
Lat.(°N)	57°07'
Long.(°E)	19°52'
Depth (m)	217
SI (h)	1
Start	08.05.2006
End	29.03.2007

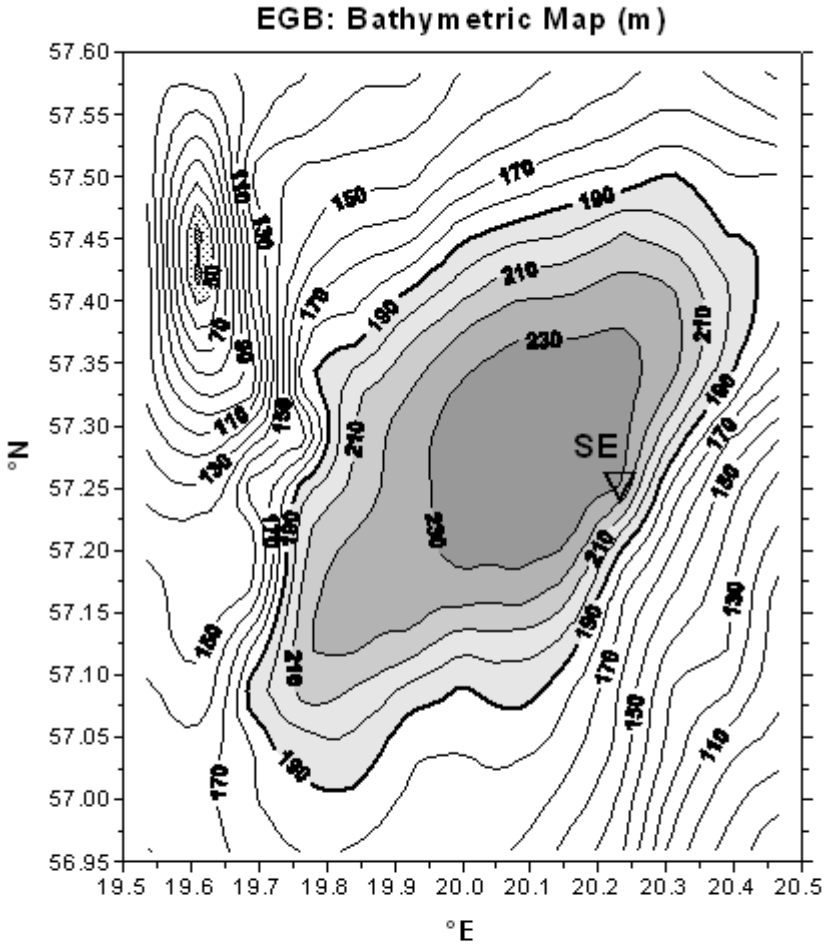

SW
u50(+20)
u20(+10)
u5
u (cm/s)
40
30
20
10
0
-10
-20
08.05.2006
22.05.2006
05.06.2006
19.06.2006
03.07.2006
17.07.2006
31.07.2006
14.08.2006
28.08.2006
11.09.2006
25.09.2006
09.10.2006
23.10.2006
06.11.2006
20.11.2006
04.12.2006
18.12.2006
01.01.2007
15.01.2007
29.01.2007
12.02.2007
26.02.2007
12.03.2007
26.03.2007
Time


SW
v50(+20)
v20(+10)
v5
v (cm/s)
40
30
20
10
0
-10
-20
08.05.2006
22.05.2006
05.06.2006
19.06.2006
03.07.2006
17.07.2006
31.07.2006
14.08.2006
28.08.2006
11.09.2006
25.09.2006
09.10.2006
23.10.2006
06.11.2006
20.11.2006
04.12.2006
18.12.2006
01.01.2007
15.01.2007
29.01.2007
12.02.2007
26.02.2007
12.03.2007
26.03.2007
Time

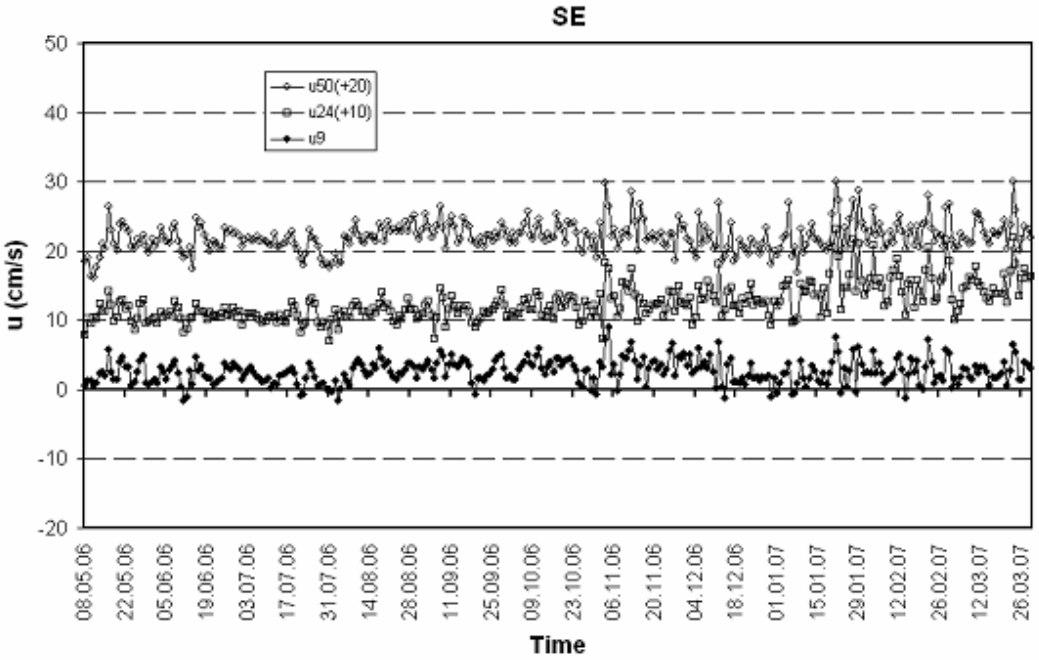


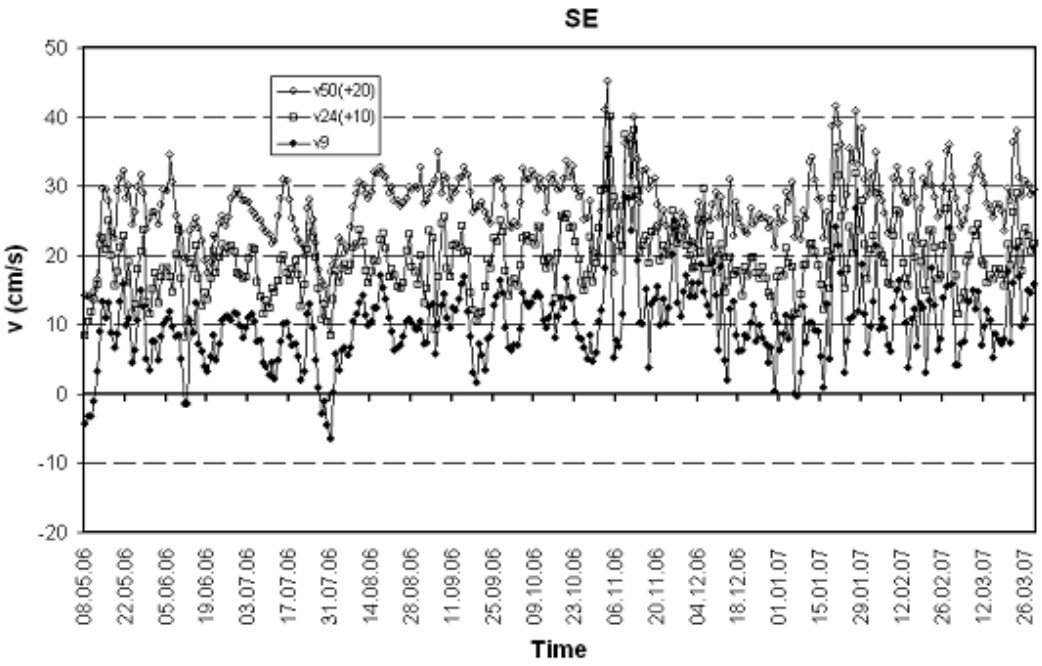
SW						
Above Bottom (m)	u50	v50	u20	v20	u5	v5
N (d)	326,00	326,00	326,00	326,00	326,00	326,00
Mean (cm/s)	1,29	-0,12	1,03	-0,03	1,11	0,33
STD (cm/s)	2,94	3,79	2,84	3,49	2,68	3,81
Skewness	-0,02	-0,08	-0,02	-0,01	0,05	0,15
Kurtosis	0,40	2,63	1,17	3,67	0,25	3,15
Min. (cm/s)	-7,92	-14,20	-9,47	-13,11	-6,14	-13,67
Max. (cm/s)	11,13	17,58	11,11	17,09	9,39	18,46
Range (cm/s)	19,05	31,78	20,58	30,20	15,53	32,13

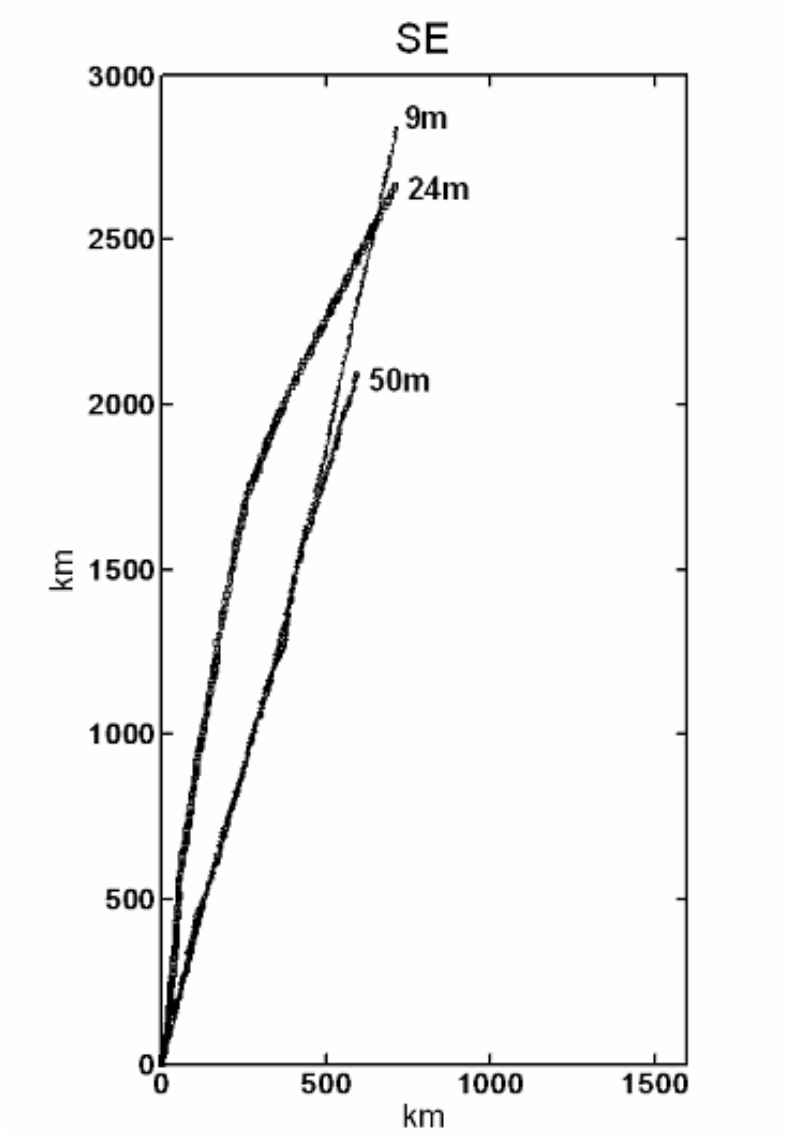
SE



	SE
Lat.(°N)	57°15'
Long.(°E)	20°15'
Depth (m)	221
SI (h)	1
Start	08.05.2006
End	29.03.2007

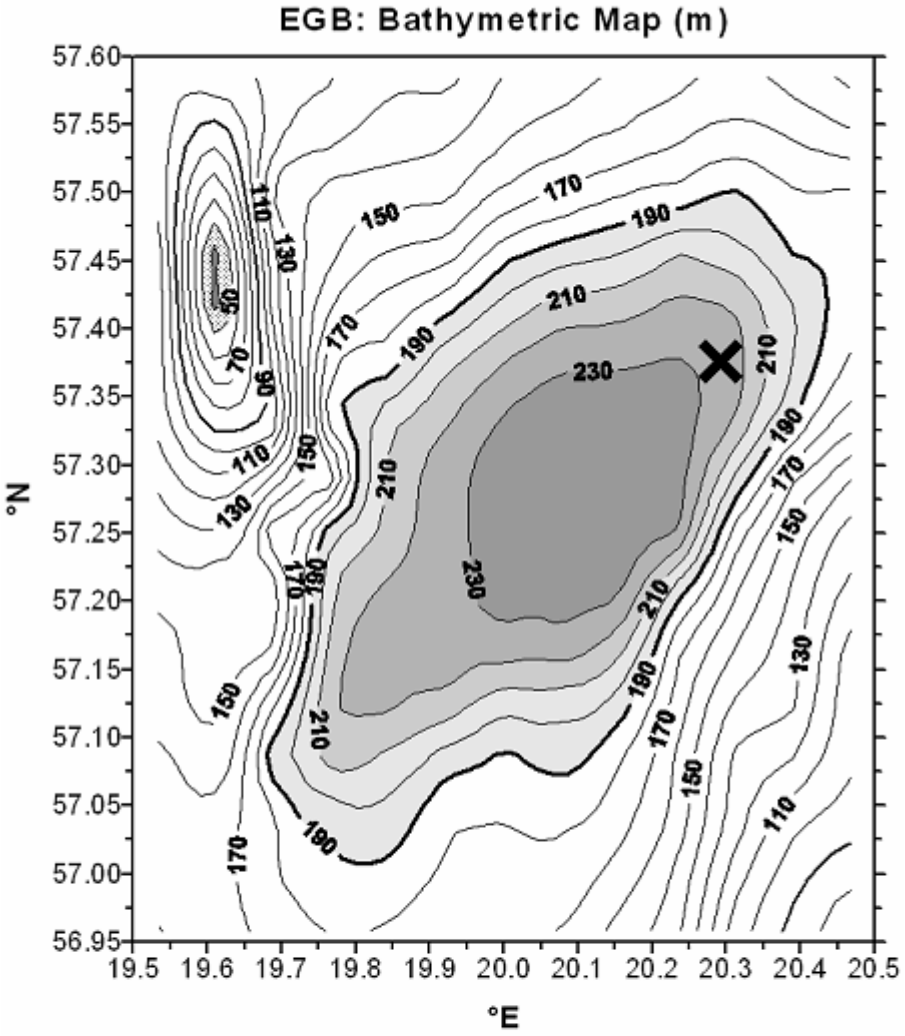

SE
u50(+20)
u24(+10)
u9
u (cm/s)
50
40
30
20
10
0
-10
-20
08.05.06
22.05.06
05.06.06
19.06.06
03.07.06
17.07.06
31.07.06
14.08.06
28.08.06
11.09.06
25.09.06
09.10.06
23.10.06
06.11.06
20.11.06
04.12.06
18.12.06
01.01.07
15.01.07
29.01.07
12.02.07
26.02.07
12.03.07
26.03.07
Time


SE
v50(+20)
v24(+10)
v9
v (cm/s)
50
40
30
20
10
0
-10
-20
08.05.06
22.05.06
05.06.06
19.06.06
03.07.06
17.07.06
31.07.06
14.08.06
28.08.06
11.09.06
25.09.06
09.10.06
23.10.06
06.11.06
20.11.06
04.12.06
18.12.06
01.01.07
15.01.07
29.01.07
12.02.07
26.02.07
12.03.07
26.03.07
Time

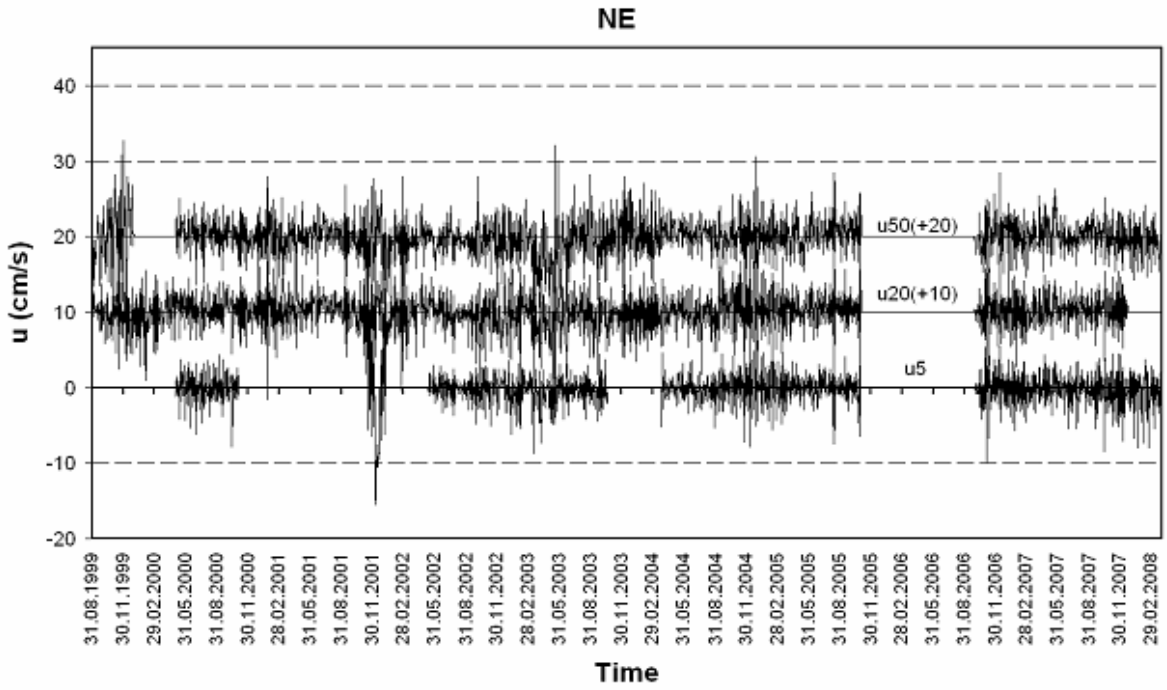


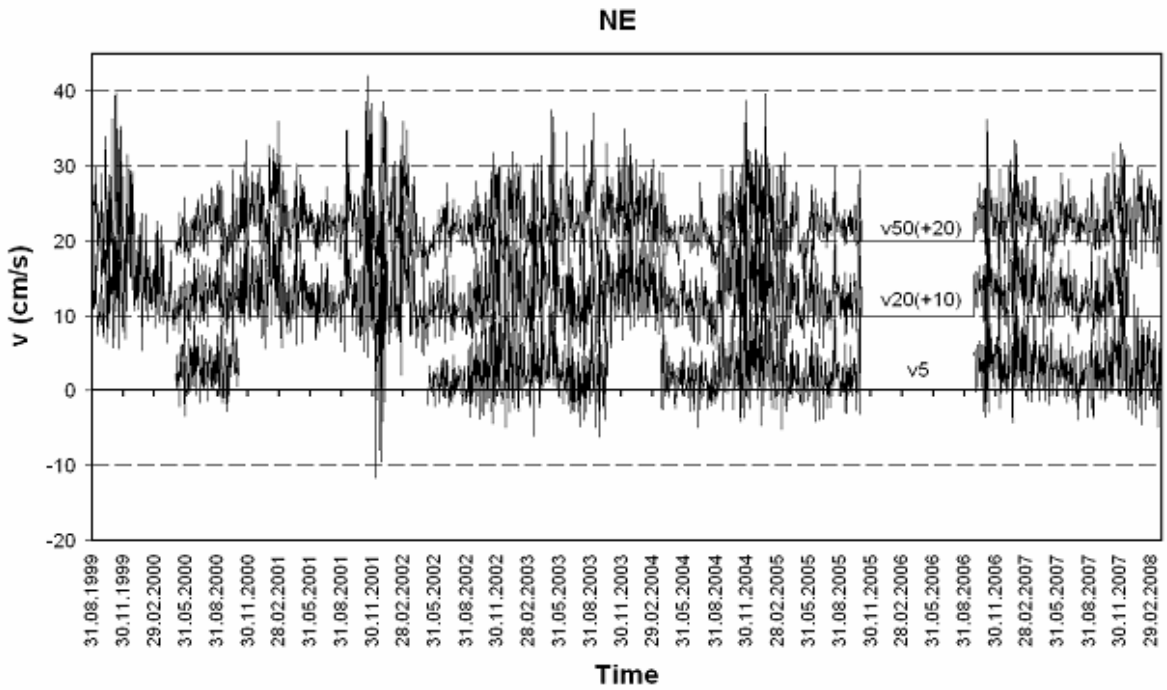
SE						
Above Bottom (m)	u50	v50	u24	v24	u9	v9
N (d)	326,00	326,00	326,00	326,00	326,00	326,00
Mean (cm/s)	2,12	7,42	2,52	9,46	2,55	10,08
STD (cm/s)	2,18	4,77	2,65	4,94	1,75	5,55
Skewness	0,57	0,02	1,16	0,82	0,29	0,49
Kurtosis	1,40	1,08	1,84	1,97	0,27	1,97
Min. (cm/s)	-3,77	-6,46	-2,95	-1,73	-1,70	-6,51
Max. (cm/s)	10,01	25,11	13,17	30,08	9,04	34,22
Range (cm/s)	13,78	31,57	16,12	31,81	10,74	40,73

NE

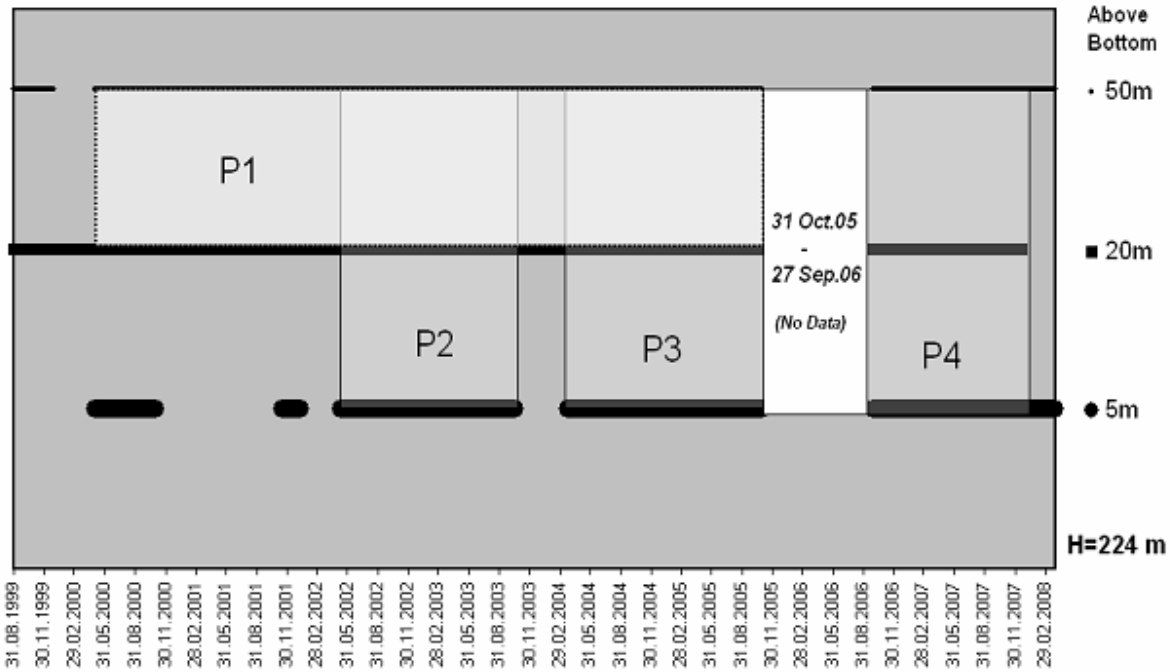


	NE
Lat. (°N)	57°23'
Long. (°E)	20°19'
Depth (m)	224
SI (h)	1
Start	31.08.1999
End	30.03.2008

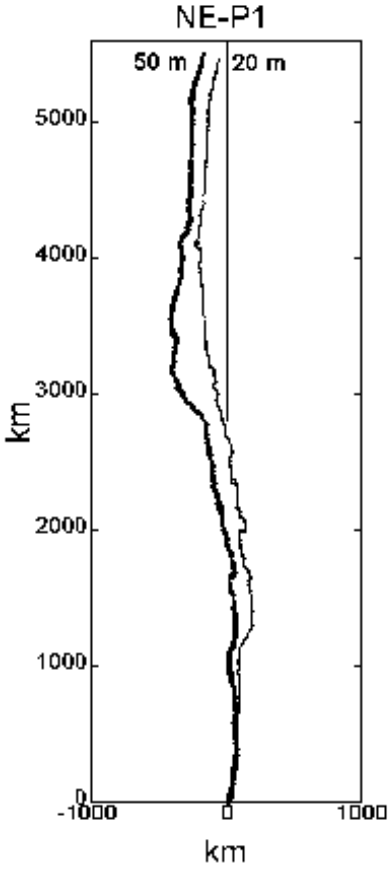

NE
u (cm/s)
40
30
20
10
0
-10
-20
u50(+20)
u20(+10)
u5
31.08.1999
30.11.1999
29.02.2000
31.05.2000
31.08.2000
30.11.2000
28.02.2001
31.05.2001
31.08.2001
30.11.2001
28.02.2002
31.05.2002
31.08.2002
30.11.2002
28.02.2003
31.05.2003
31.08.2003
30.11.2003
29.02.2004
31.05.2004
31.08.2004
30.11.2004
28.02.2005
31.05.2005
31.08.2005
30.11.2005
28.02.2006
31.05.2006
31.08.2006
30.11.2006
28.02.2007
31.05.2007
31.08.2007
30.11.2007
29.02.2008
Time


NE
v (cm/s)
40
30
20
10
0
-10
-20
v50(+20)
v20(+10)
v5
31.08.1999
30.11.1999
29.02.2000
31.05.2000
31.08.2000
30.11.2000
28.02.2001
31.05.2001
31.08.2001
30.11.2001
28.02.2002
31.05.2002
31.08.2002
30.11.2002
28.02.2003
31.05.2003
31.08.2003
30.11.2003
29.02.2004
31.05.2004
31.08.2004
30.11.2004
28.02.2005
31.05.2005
31.08.2005
30.11.2005
28.02.2006
31.05.2006
31.08.2006
30.11.2006
28.02.2007
31.05.2007
31.08.2007
30.11.2007
29.02.2008
Time

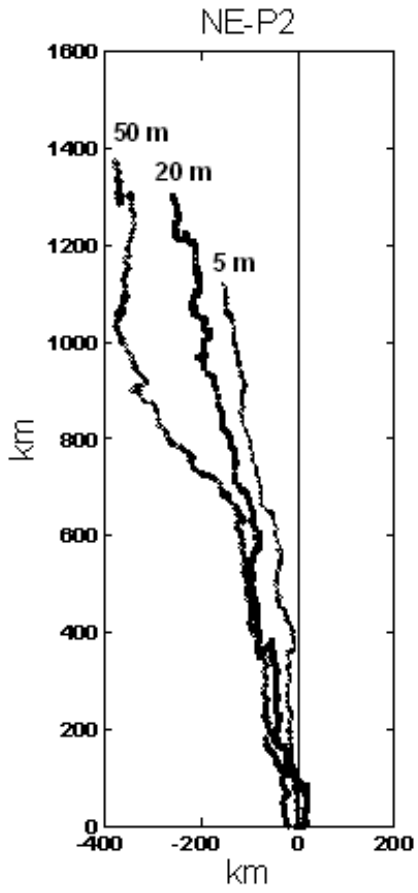
NE-Recordings (31 Aug. 99 - 30 Mar. 08)



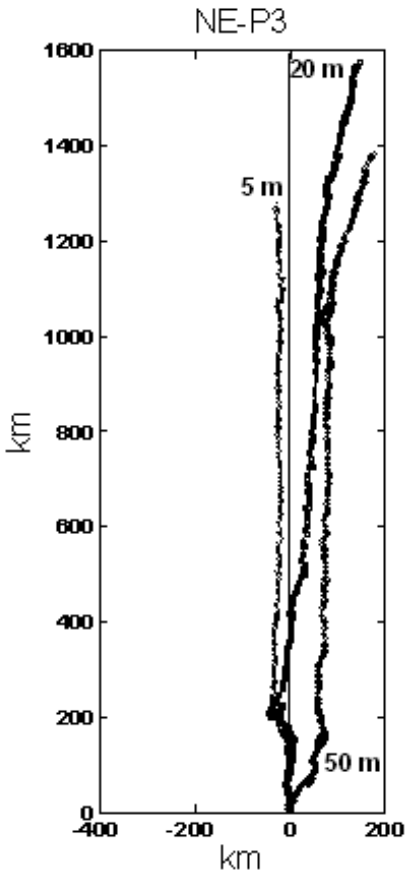
Total Above Bottom (m)	u50	v50	u20	v20	u5	v5
N (d)	2680,00	2680,00	2703,00	2703,00	1907,00	1907,00
Mean (cm/s)	-0,06	3,22	-0,02	3,31	-0,23	3,05
STD (cm/s)	2,63	3,74	2,42	3,99	2,24	3,75
Skewness	-0,47	0,83	-0,29	0,88	-0,66	1,12
Kurtosis	3,11	1,86	2,05	1,47	4,74	3,37
Min. (cm/s)	-15,78	-11,18	-12,44	-7,87	-15,48	-11,65
Max. (cm/s)	12,67	22,05	12,00	24,69	11,29	24,41
Range (cm/s)	28,45	33,23	24,44	32,56	26,77	36,06



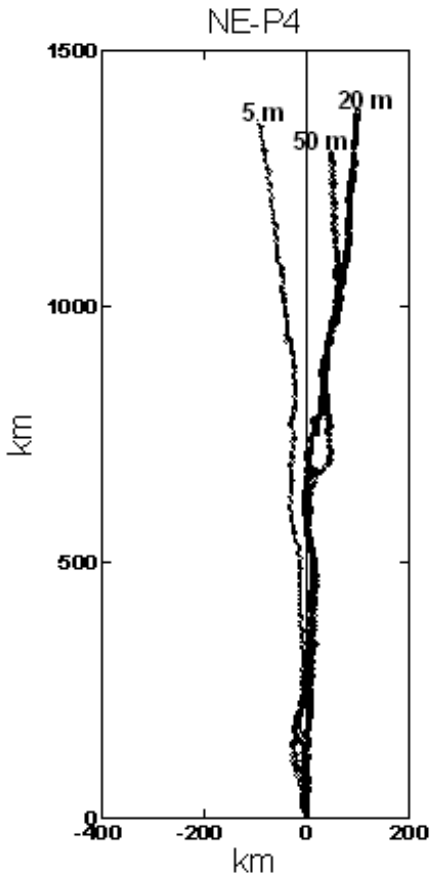
P1 (01.05.2000-30.10.2005)				
Above Bottom (m)	u50	v50	u20	v20
N (d)	2009,00	2009,00	2009,00	2009,00
Mean (cm/s)	-0,10	3,17	-0,03	3,15
STD (cm/s)	2,61	3,78	2,44	4,05
Skewness	-0,59	0,89	-0,28	0,92
Kurtosis	3,37	1,86	2,21	1,57
Min. (cm/s)	-15,78	-11,18	-12,44	-7,87
Max. (cm/s)	12,03	22,05	12,00	24,69
Range (cm/s)	27,81	33,23	24,44	32,56



P2 (09.05.2002-19.10.2003)						
Above Bottom (m)	u50	v50	u20	v20	u5	v5
N (d)	529,00	529,00	529,00	529,00	529,00	529,00
Mean (cm/s)	-0,82	3,00	-0,57	2,84	-0,33	2,44
STD (cm/s)	3,00	3,68	2,59	4,17	1,82	3,41
Skewness	-0,50	0,62	-0,39	0,87	-0,52	0,82
Kurtosis	3,31	1,42	2,45	1,09	1,65	1,14
Min. (cm/s)	-15,78	-11,18	-12,44	-6,20	-8,69	-6,14
Max. (cm/s)	12,03	17,49	11,38	21,90	5,72	16,23
Range (cm/s)	27,81	28,67	23,82	28,10	14,41	22,37

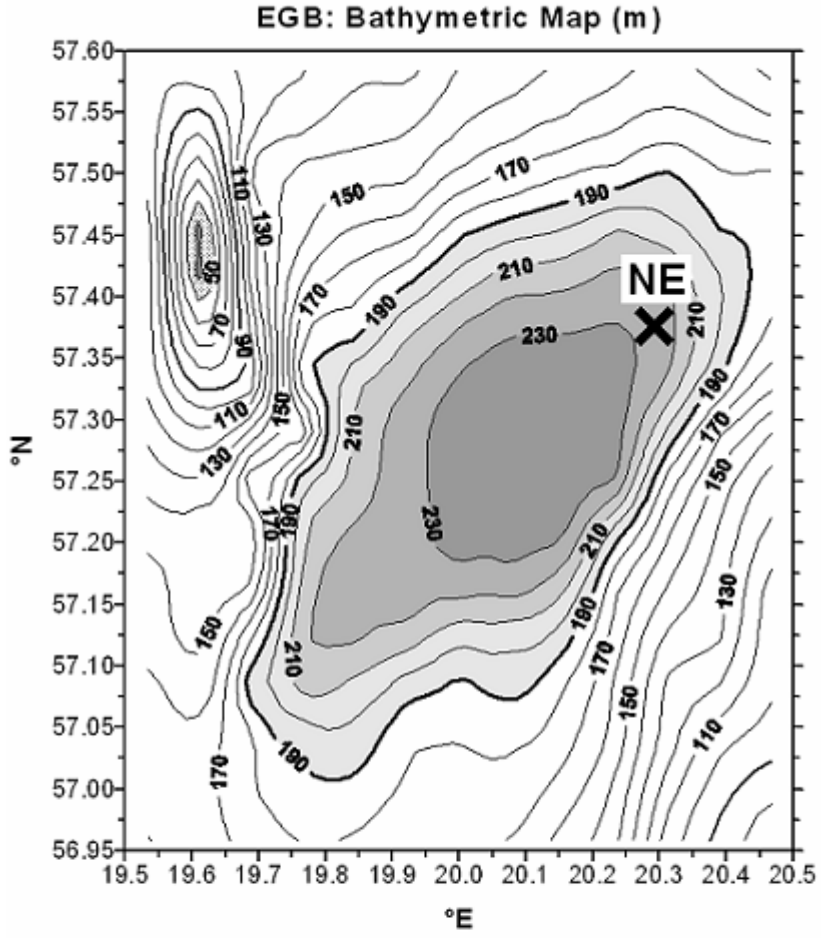


P3 (23.03.2004-30.10.2005)						
Above Bottom (m)	u50	v50	u20	v20	u5	v5
N (d)	587,00	587,00	587,00	587,00	587,00	587,00
Mean (cm/s)	0,35	2,72	0,29	3,10	-0,05	2,51
STD (cm/s)	2,07	3,49	2,42	4,04	1,87	3,33
Skewness	0,33	1,14	0,24	1,03	-0,16	1,14
Kurtosis	1,47	2,43	2,00	1,56	2,19	2,58
Min. (cm/s)	-6,23	-7,94	-8,33	-5,74	-7,78	-5,19
Max. (cm/s)	10,59	19,72	12,00	20,75	8,24	18,50
Range (cm/s)	16,82	27,66	20,33	26,49	16,02	23,69

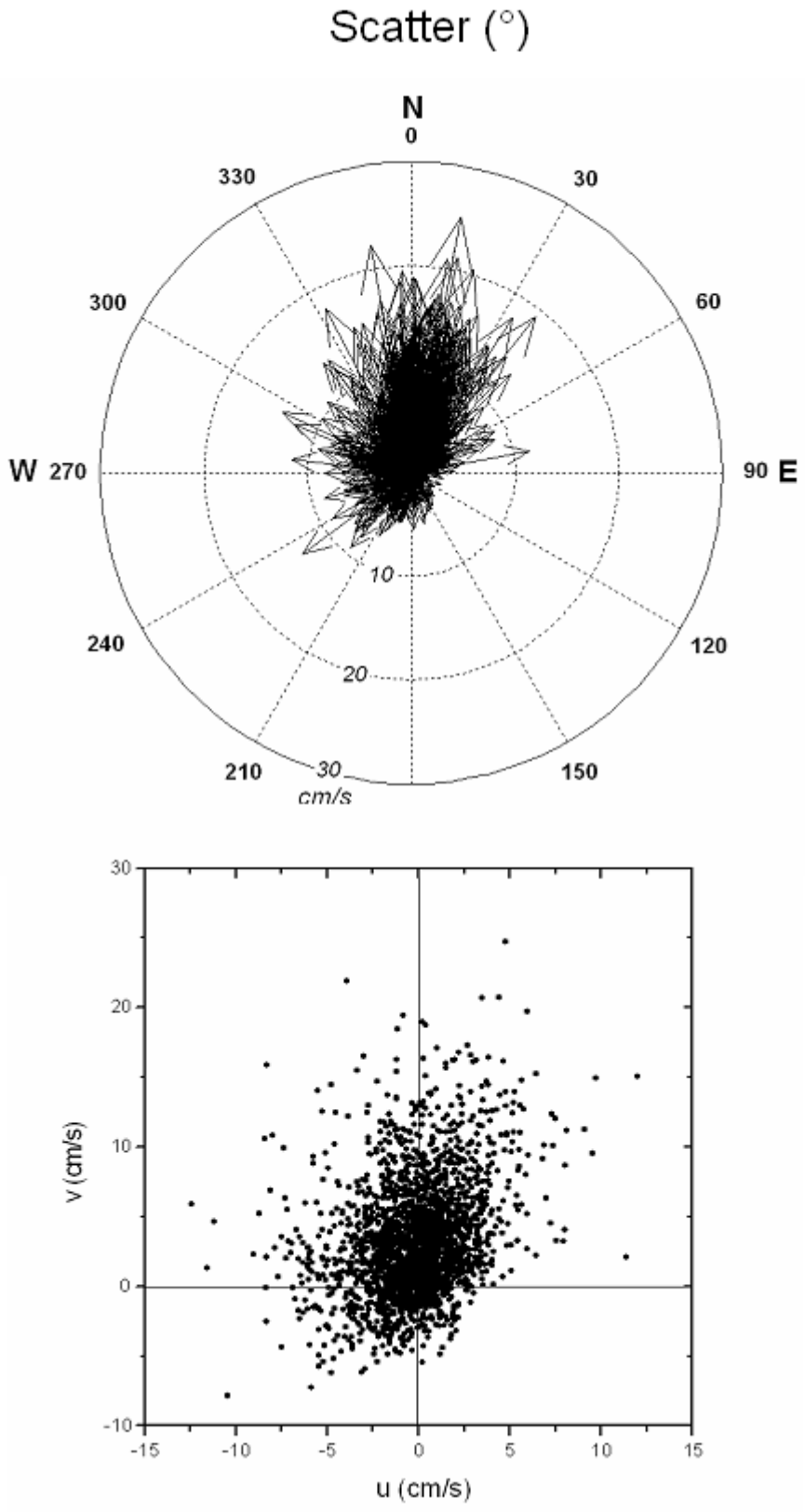


P4 (28.09.2006-21.12.2007)						
Above Bottom (m)	u50	v50	u20	v20	u5	v5
N (d)	450,00	450,00	450,00	450,00	450,00	450,00
Mean (cm/s)	0,13	3,34	0,26	3,55	-0,23	3,50
STD (cm/s)	2,08	3,02	2,15	3,22	2,09	3,27
Skewness	-0,07	0,67	-0,29	0,71	-0,46	0,81
Kurtosis	1,30	1,63	1,62	1,61	1,40	2,01
Min. (cm/s)	-9,58	-6,03	-10,35	-6,95	-9,80	-4,23
Max. (cm/s)	8,45	16,27	7,62	16,58	5,47	19,31
Range (cm/s)	18,03	22,30	17,97	23,53	15,27	23,54

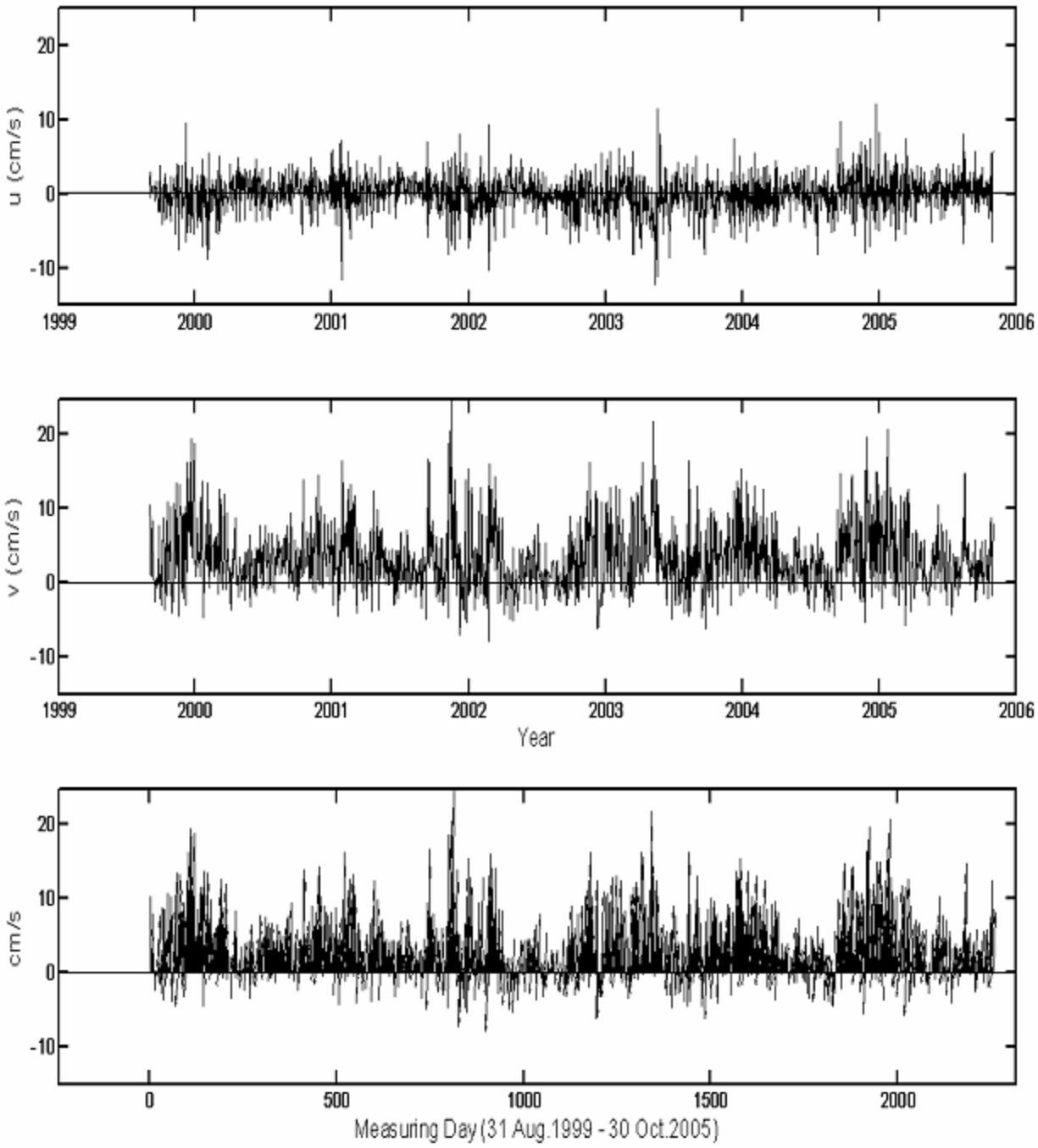
NE - L



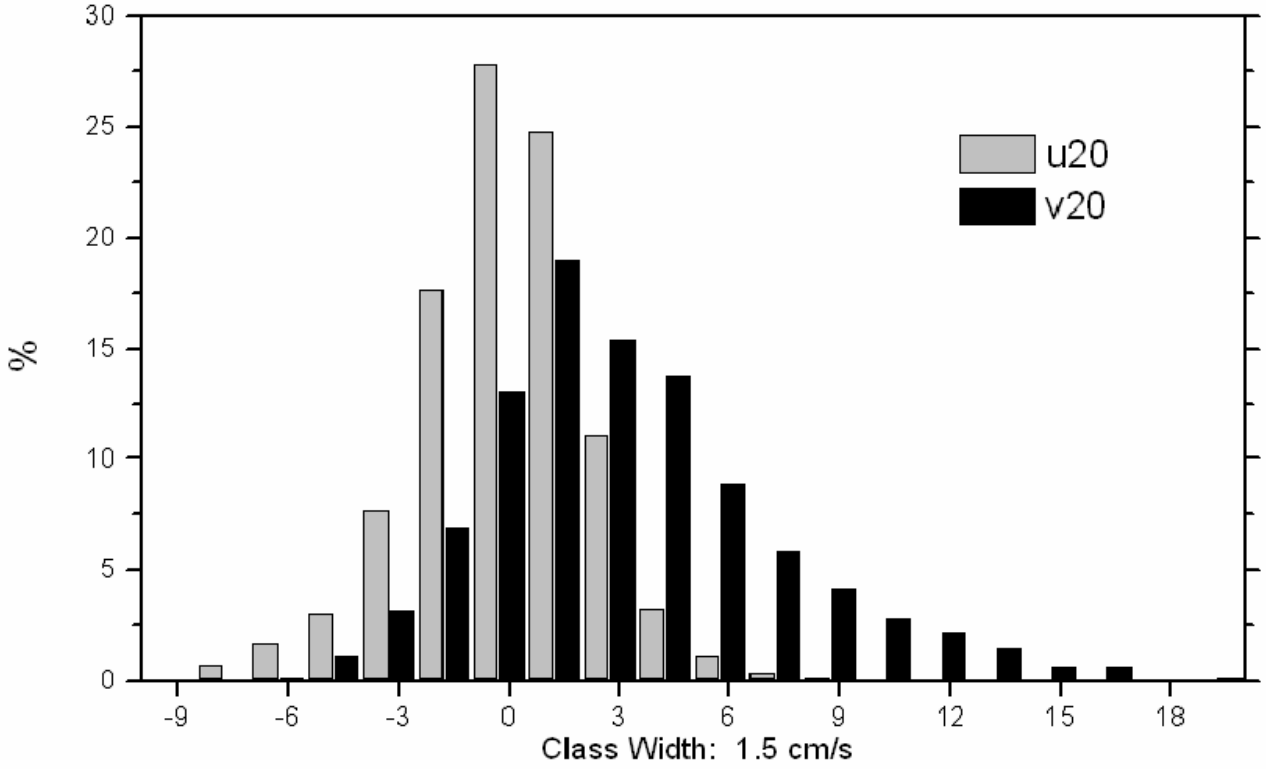
NE		
Above Bottom (m)	u20	v20
N (d)	2253,00	2253,00
Mean (cm/s)	-0,08	3,26
STD (cm/s)	2,46	4,13
Skewness	-0,28	0,91
Kurtosis	2,06	1,38
Min. (cm/s)	-12,44	-7,87
Max. (cm/s)	12,00	24,69
Range (cm/s)	24,44	32,56

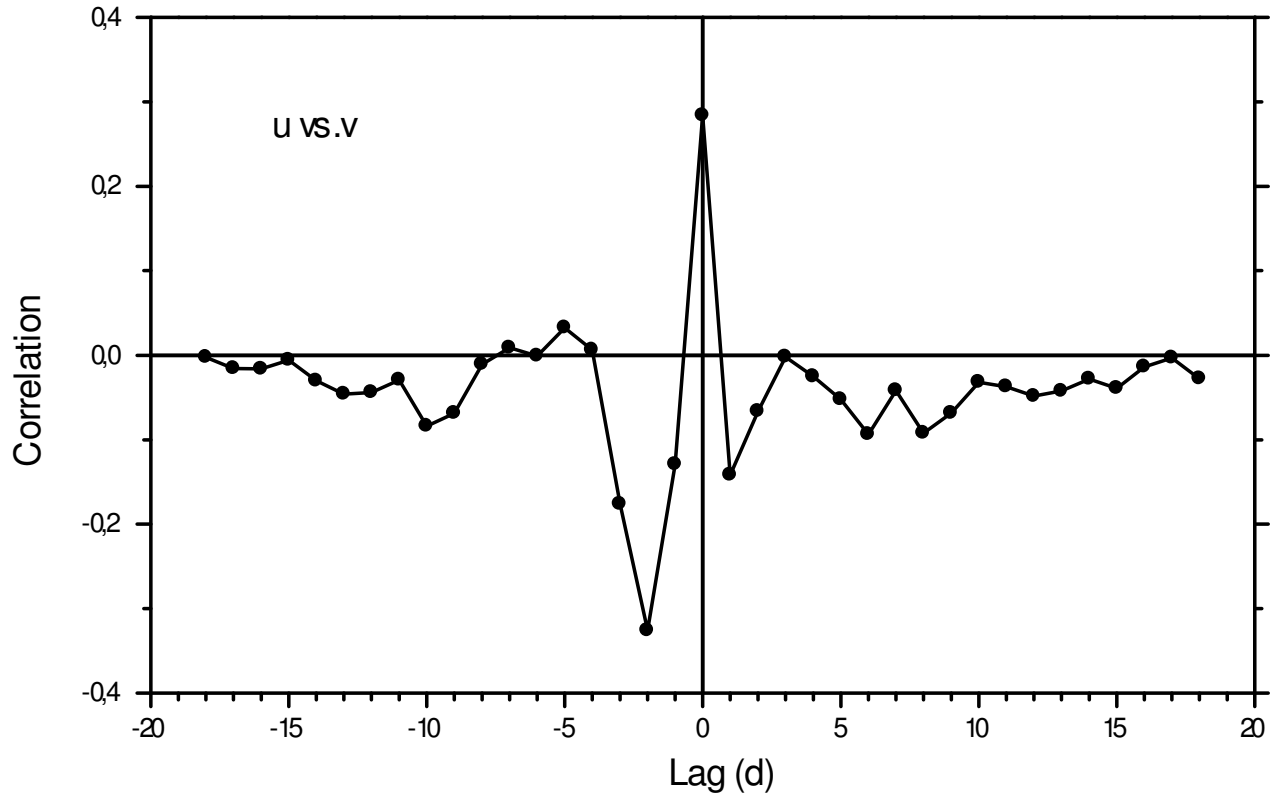

Scatter (°)
N
0
30
60
90 E
120
150
210
240
270 W
300
330
10
20
30
cm/s
v (cm/s)
u (cm/s)
30
20
10
0
-10
-15
-10
-5
0
5
10
15

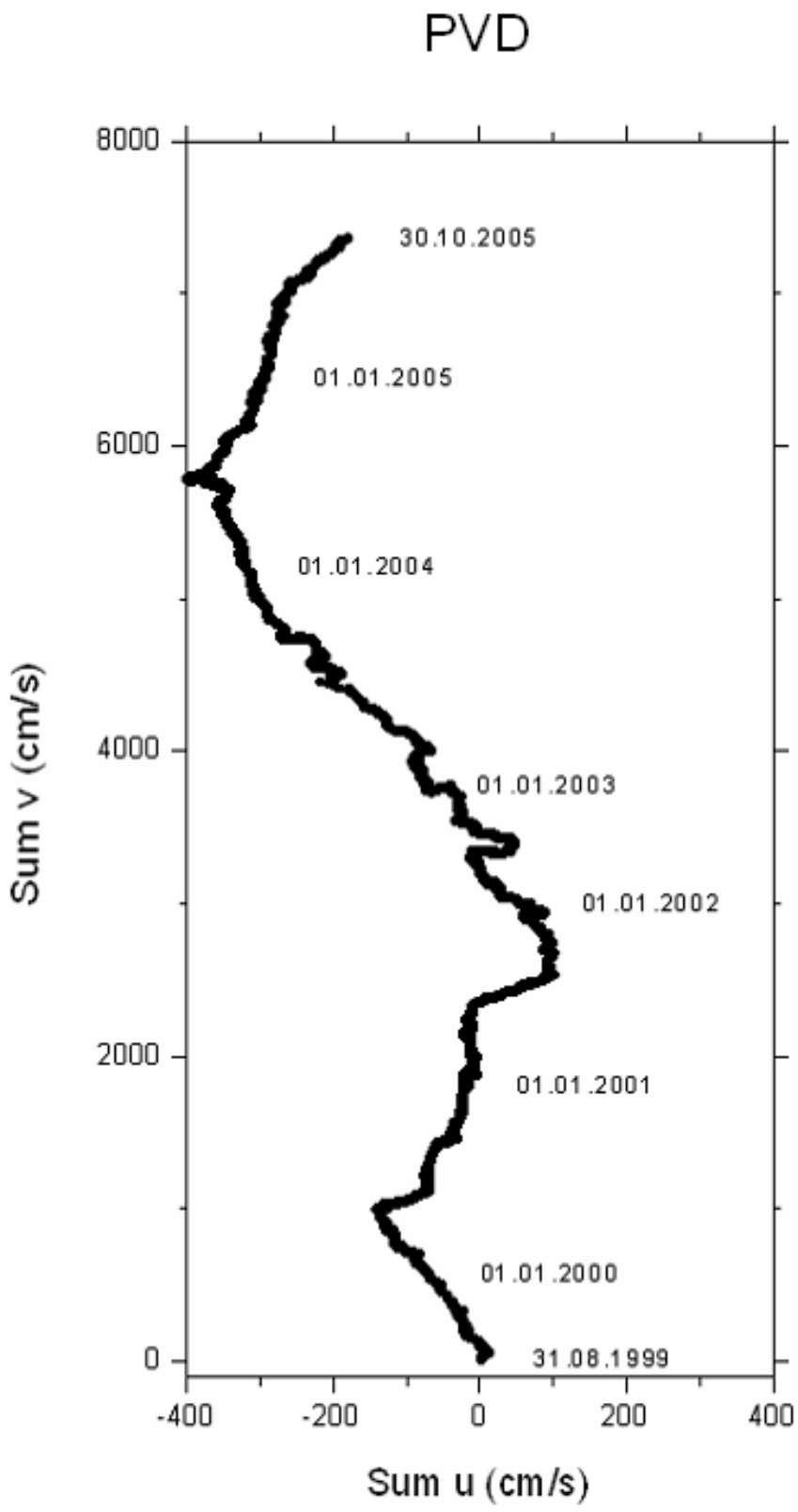
Time Series


u (cm/s)
v (cm/s)
cm/s
20
10
0
-10
1999
2000
2001
2002
2003
2004
2005
2006
Year
0
500
1000
1500
2000
Measuring Day (31 Aug.1999 - 30 Oct.2005)

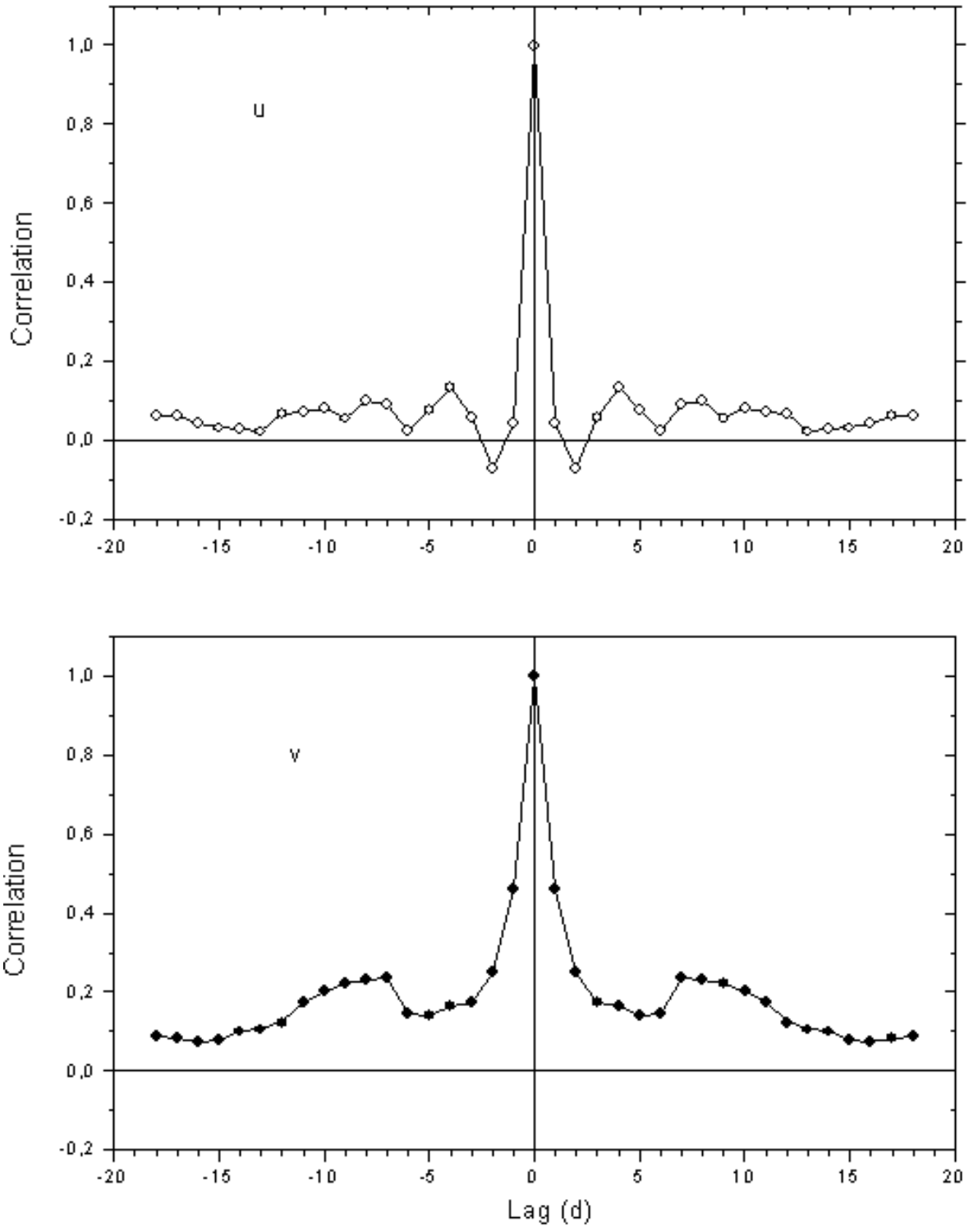
Frequency Distribution/ Lag Correlation



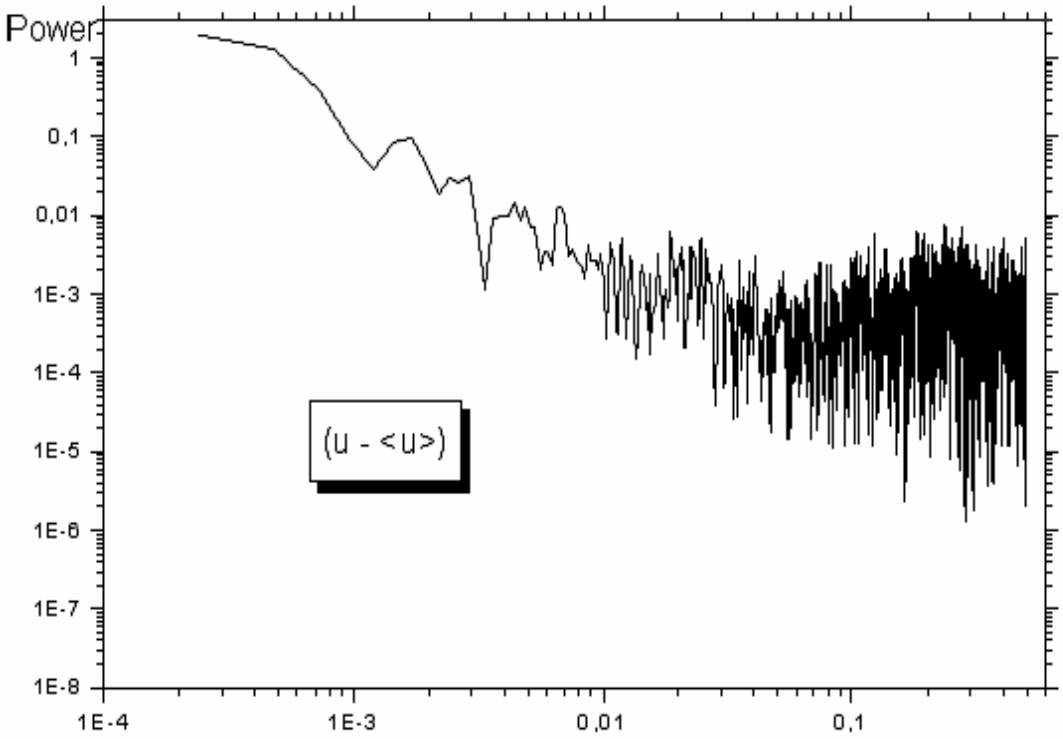


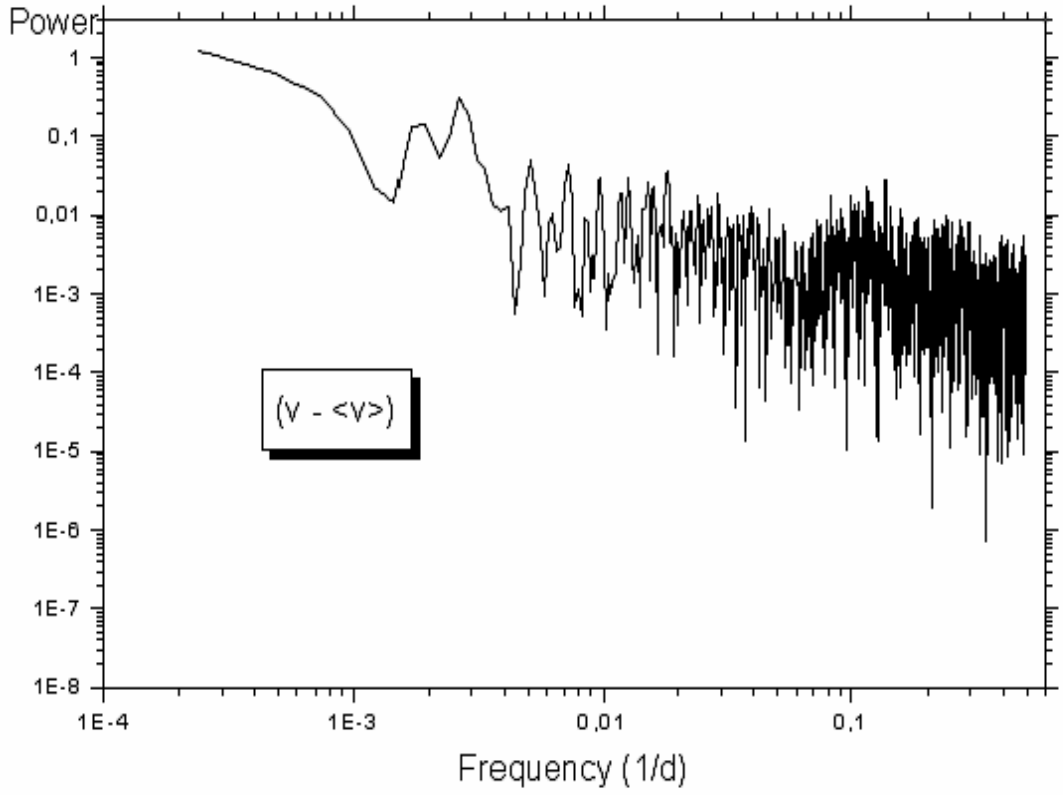

PVD
8000
6000
4000
2000
0
30.10.2005
01.01.2005
01.01.2004
01.01.2003
01.01.2002
01.01.2001
01.01.2000
31.08.1999
Sum v (cm/s)
-400
-200
0
200
400
Sum u (cm/s)

Autocorrelation

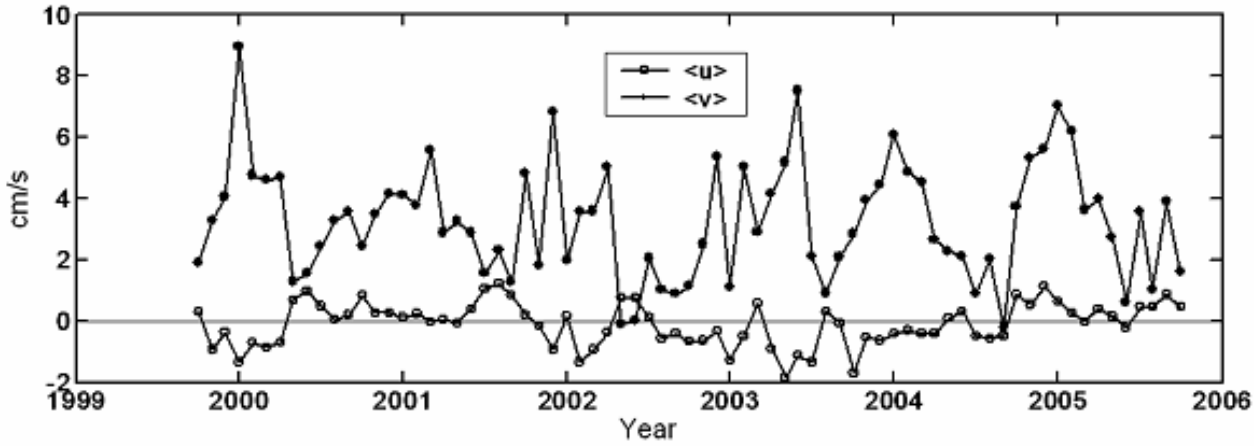


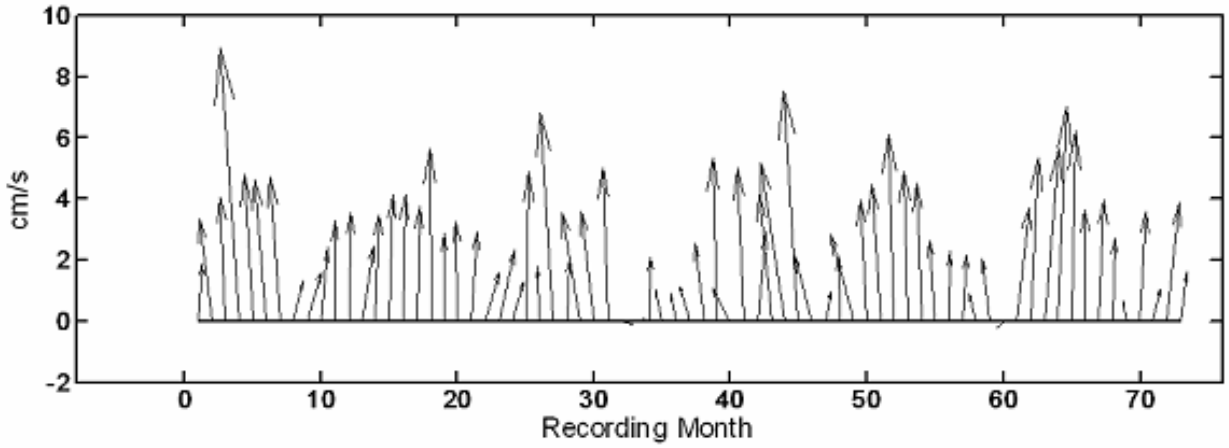
Power Spectra



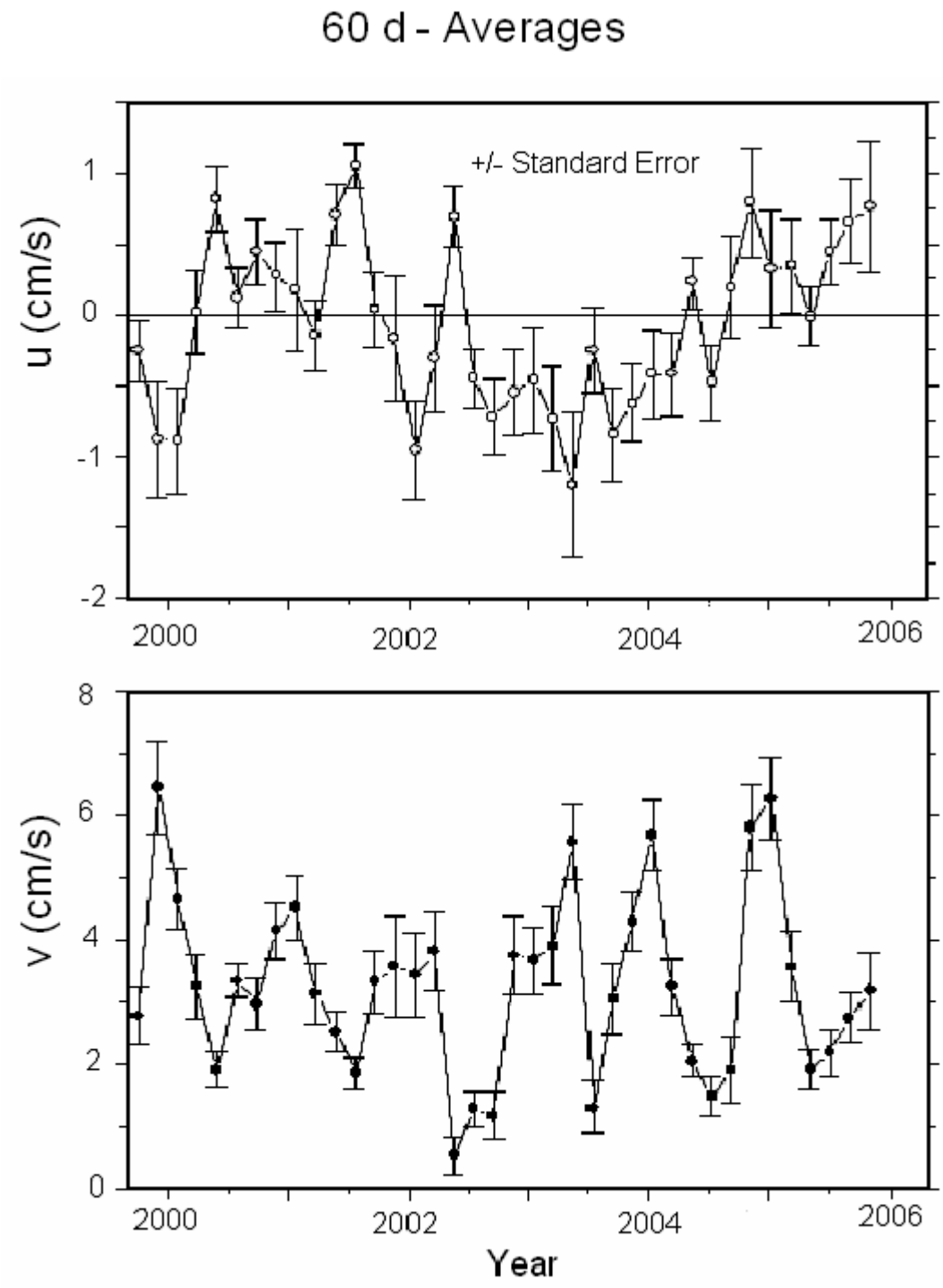


Monthly Averages



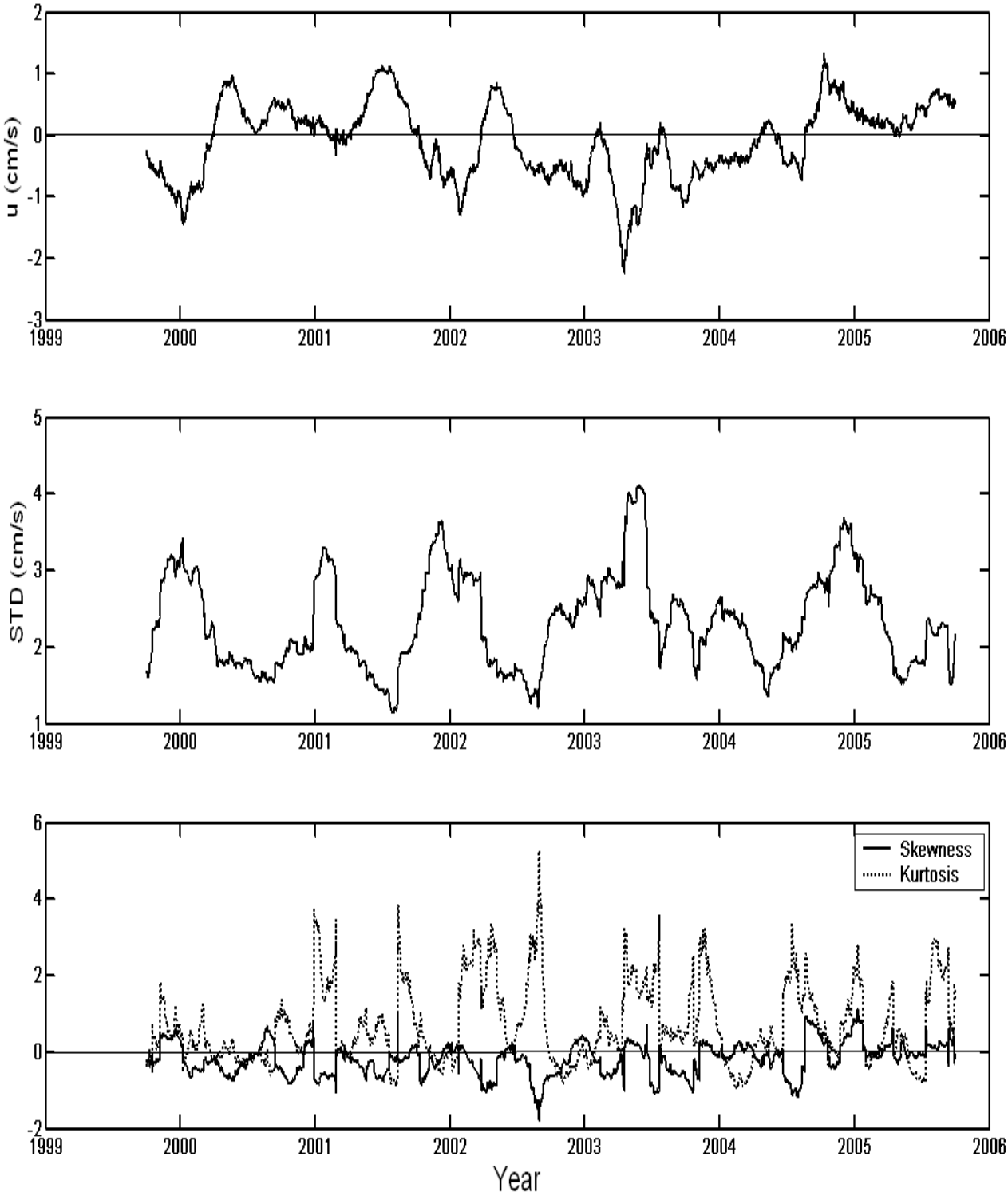


NE-L		
Above Bottom (m)	<u>20	<v>20
N (m)	72,00	72,00
Mean (cm/s)	-0,10	3,29
STD (cm/s)	0,70	1,88
Skewness	-0,29	0,44
Kurtosis	-0,49	0,07
Min. (cm/s)	-1,82	-0,23
Max. (cm/s)	1,20	8,91
Range	3,02	9,14

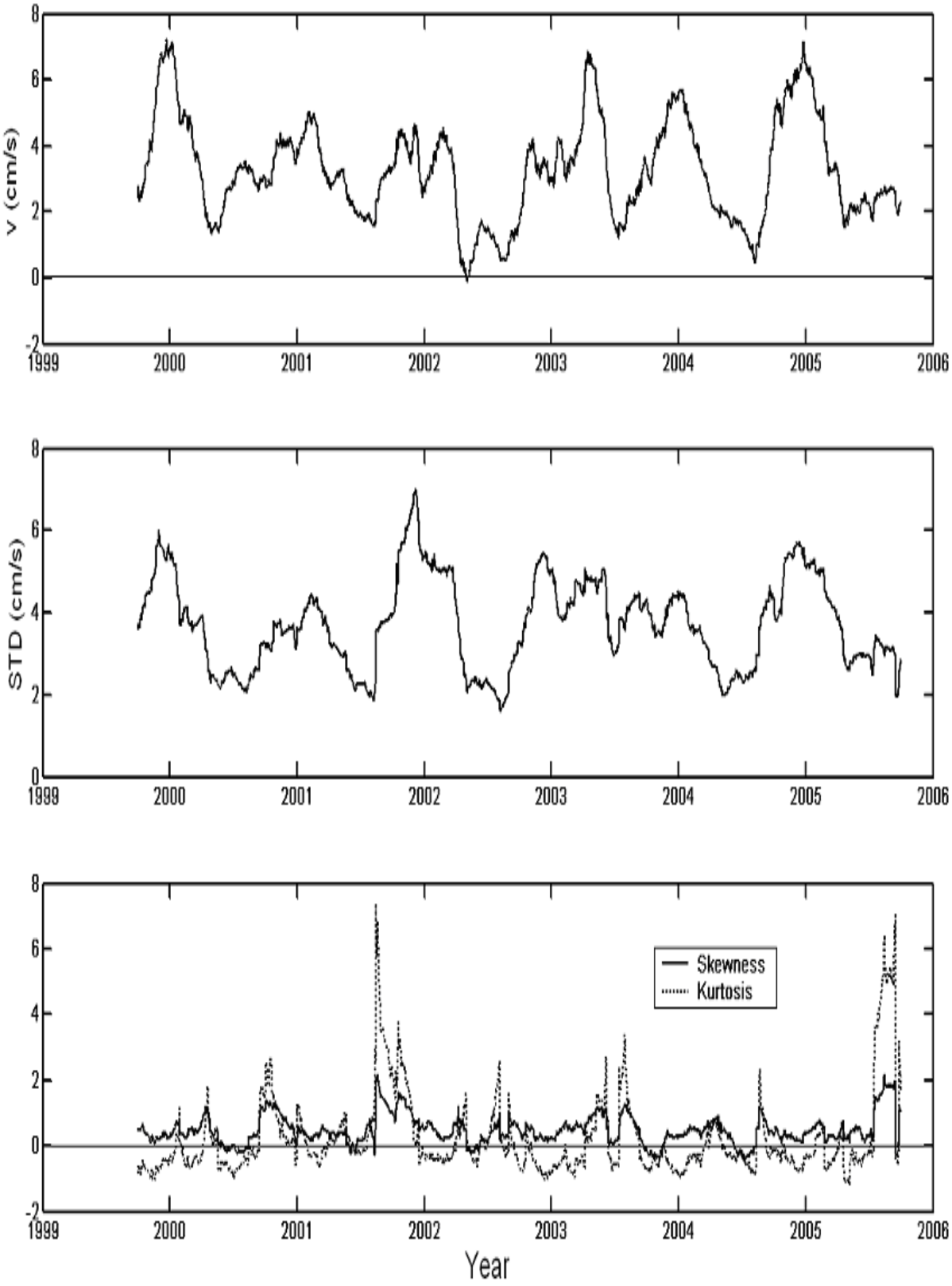

60 d - Averages
+/- Standard Error
u (cm/s)
1
0
-1
-2
2000
2002
2004
2006
v (cm/s)
8
6
4
2
0
2000
2002
2004
2006
Year

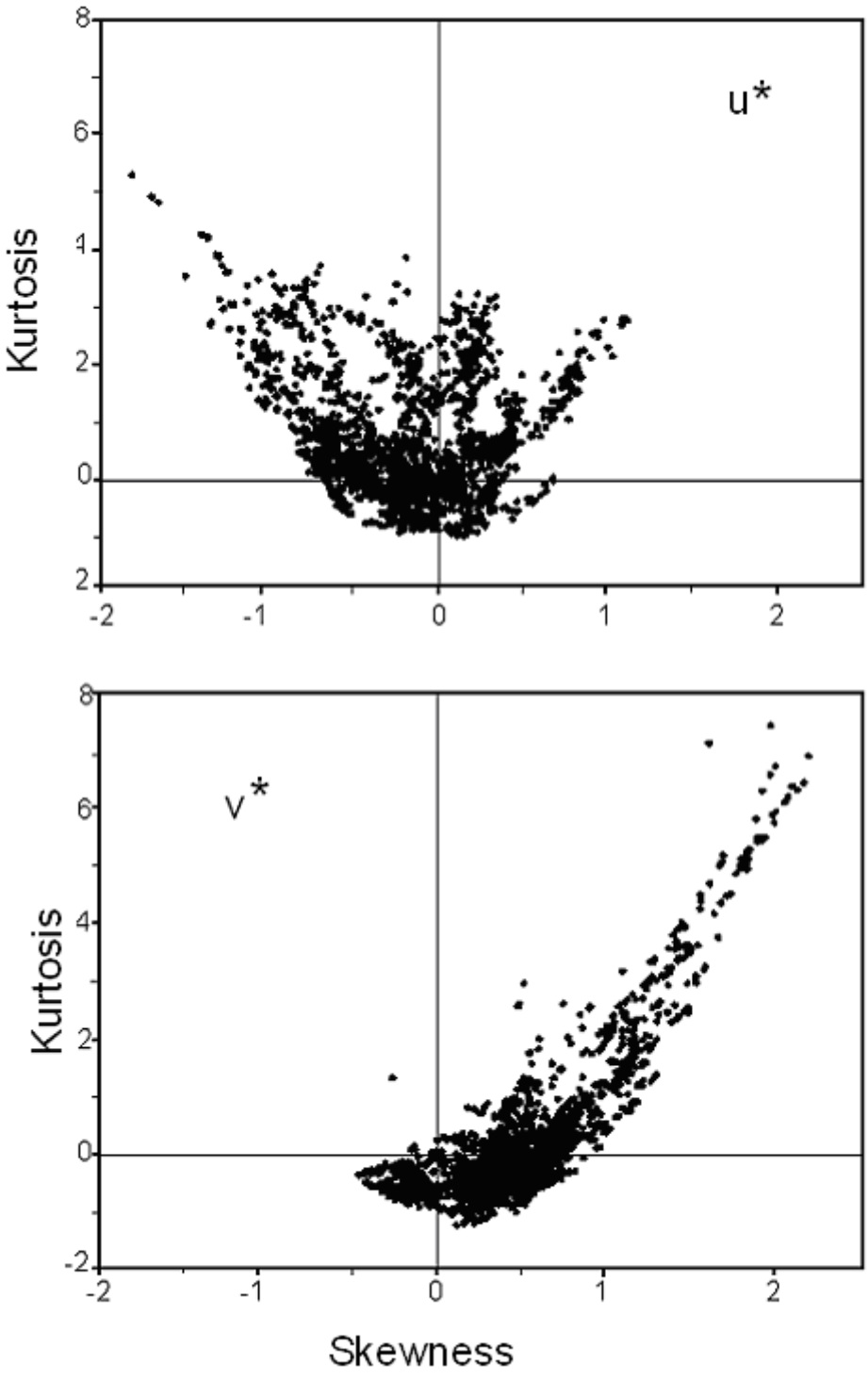
60-Days Running Statistics (*):

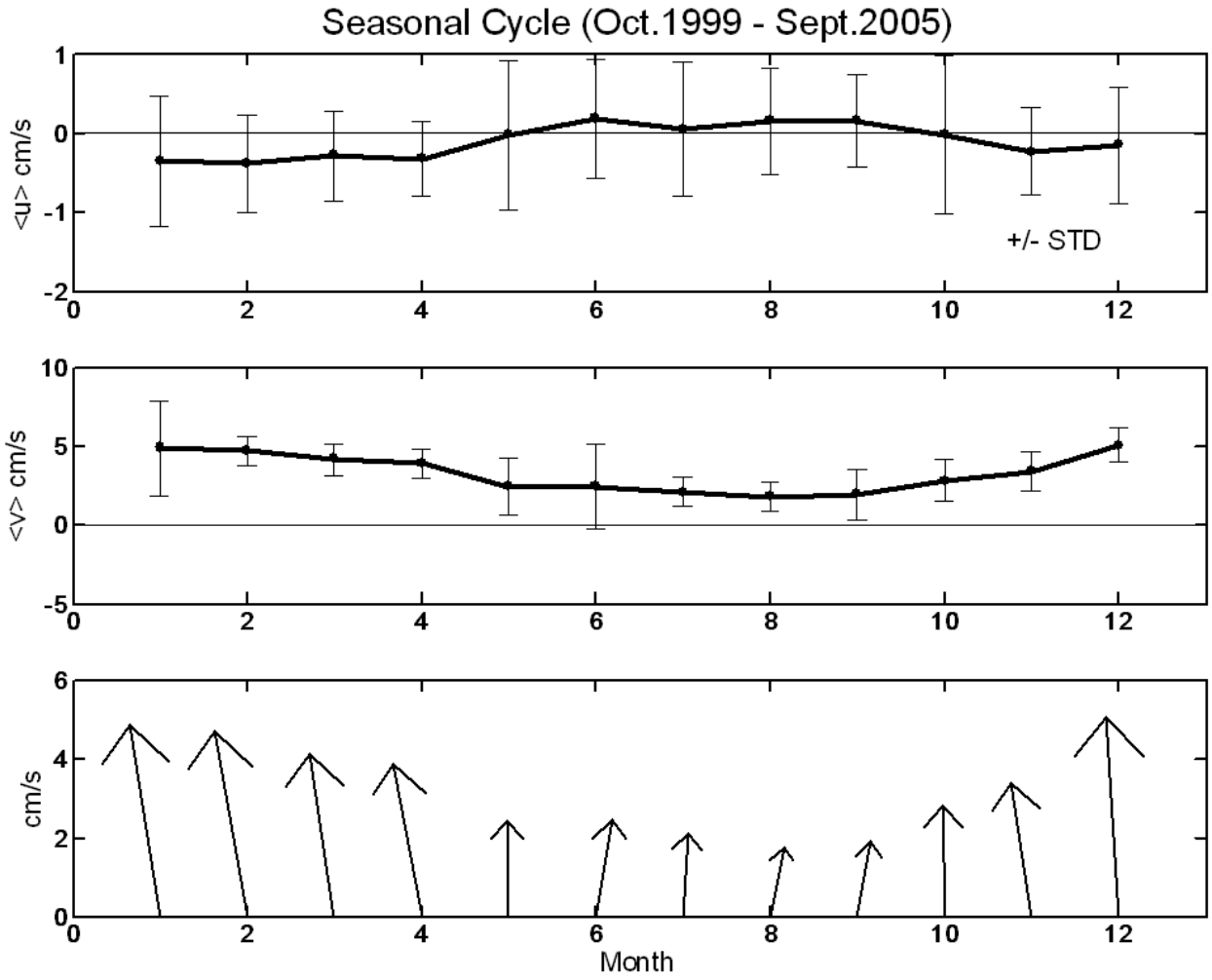
u*

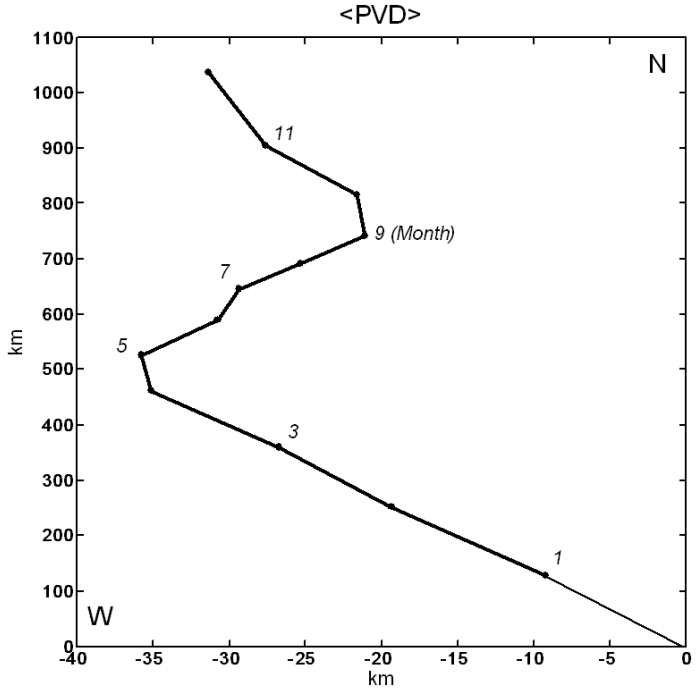


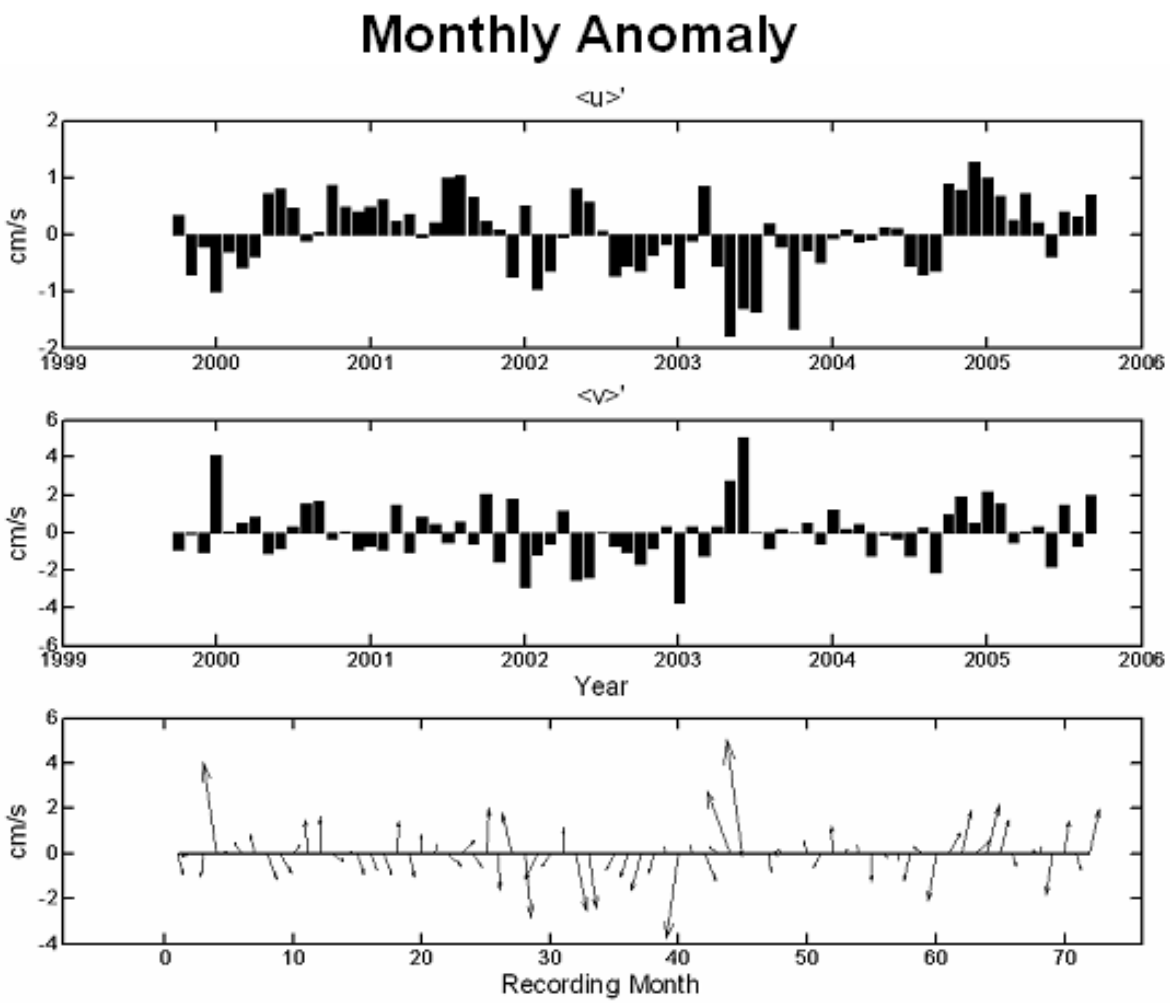
v*

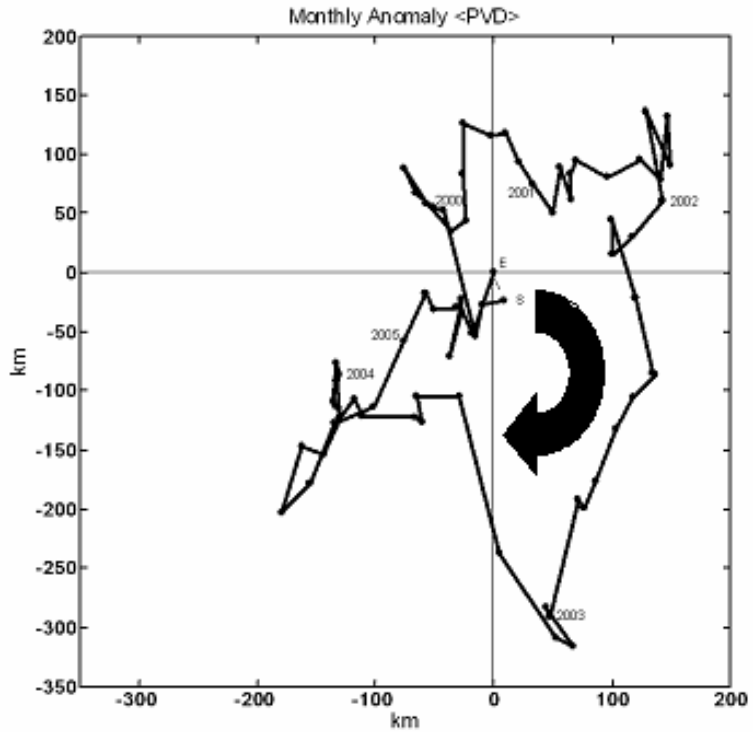

v (cm/s)
STD (cm/s)
Skewness
Kurtosis
1999
2000
2001
2002
2003
2004
2005
2006
Year


u*
v*
Kurtosis
Kurtosis
Skewness
8
6
4
2
0
2
-2
-1
0
1
2


Seasonal Cycle (Oct.1999 - Sept.2005)
<u> cm/s
+/- STD
<v> cm/s
cm/s
Month


<PVD>
N
W
km
km
11
9 (Month)
7
5
3
1


Monthly Anomaly
<u>'
cm/s
<v>'
cm/s
Year
cm/s
Recording Month


Monthly Anomaly <PVD>
km
km

Appendix:

Data Link:

http://www.io-warnemuende.de/baltic2008/documents/chapter20/current_egb