HAVSTOVAN
FAROE MARINE RESEARCH INSTITUTE

Current measurements on the Faroe Shelf 2011

Tórshavn · January 2013

Karin Margretha H. Larsen

Bogi Hansen

Hjálmar Hátún

Regin Kristiansen

and Ebba Mortensen

HAVSTOVAN NR.: 13-01
TECHNICAL REPORT

Contents

Introduction

In 2001 the Faroe Marine Research Institute (FAMRI) received 5-years funding from The Faroes Partnership for the MEMFIS project that was to develop a marine ecosystem model for the Faroe shelf. The main goal was to investigate what controls the highly variable primary production on the Faroe shelf. After three years, the model results indicated that the exchange of shelf water was the main factor controlling the shelf primary production (Eliasen et al, 2005). The MEMFIS project, therefore, continued as the FASE project with the aim to obtain temperature, salinity, and current measurements of the exchanges through the Faroe Shelf Front. In 2008 the FAMRI received a funding from the Faroese Oil Industry Group (FOIB) for a trawl resistand bottom mount (TRBM) for current measurements on the shelf within the FASE project.

In this report the third ADCP deployment using the TRBM is documented. The first and second deployments are documented in Larsen et al, 2009 and Larsen et al, 2011, respectively.

The ADCP was deployed in March 2011 on the south western part of the shelf (FASC1103). The ADCP compass could not be calibrated properly before the deployment and therefore a calibration mooring (FASC1106) was deployed close to the ADCP for half a day at the end of the deployment. The FASC1106 deployment is also documented in this report, as well as the calibration of the ADCP compass. Finally, the deployment of a Seabird Microcat at coastal station Skopun (SKOP1103) is documented. Table 1 lists the details of each mooring. All deployments are identified by an 8-character label where the first four characters indicate the site while the last characters show year and month of deployment. Figure 1 shows the location of the deployments.

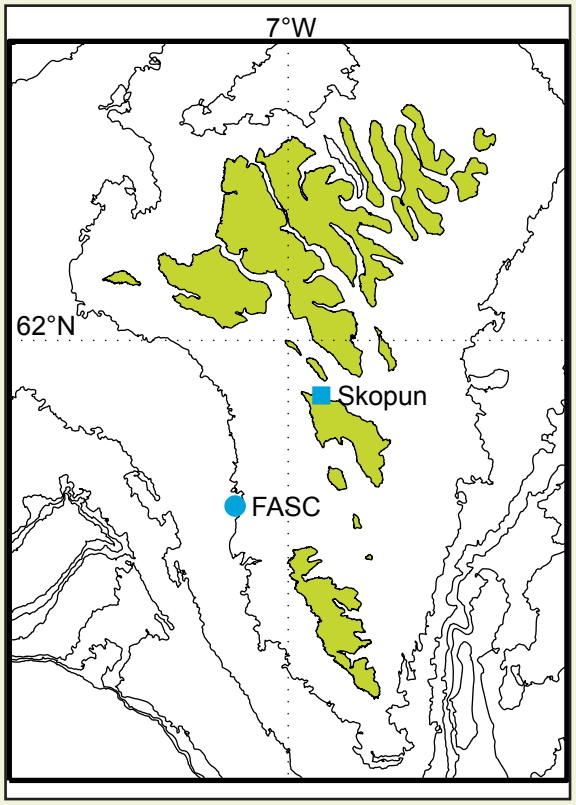


Figure 1. Map of the study area. The FASC location is indicated by a blue dot and coastal station Skopun is indicated by a blue square.

Table 1. List of deployments with information on duration and range of valid data. All depths are in meters.

Deployment	Bottom depth	Int. min.	Valid data period	Dur. days	No. bins	Depthrange	Instrument type
FASC1103	105	20	2011 03 10 - 2011 08 23	166	23	10 - 98	ADCP
-		5			-	104	Starmon
SKOP1103	18	5	2011 03 07 - 2011 11 17	255	-	4	Microcat
FASC1106	110	5	2011 06 12 - 2011 06 13	½	-	35 - 85	2xAanderaa

Quality control and calibration

The ADCP data at FASC1103 have been quality controlled by a standard procedure based upon consideration of ADCP performance (error velocity etc.) and data variation with time in relation to neighbouring bins (spikes). The editing has been done manually using an interactive graphical software package developed by the FAMRI, based upon MATLAB. Similar software packages are developed for the Aanderaa, MicroCat and Starmon data. The editing has been done with a philosophy of minimal interference. Thus, only observations which were considered clearly erroneous were flagged. The usual practice for ADCP data series is that these are edited up to the level where about 50% of the observations are found to be valid. Here one additional bin is included, although it was heavily influenced by noise during some periods. The shallowest bin included must, therefore, be treated with this in mind. The direction has been corrected for magnetic declination and compass offset, by adding a constant as indicated in the header of the data file (p. 13). The value of the constant was found from the calibration rig FASC1106. FASC1106 was equipped with two traditional Aanderaa current meters (for more detail see p. 21-29) and simultaneous measurements of direction at two depth levels from the ADCP and the two Aanderaa current meters are shown in Figure 2 a, b for both uncorrected and corrected ADCP direction. The instrument depths at sites FASC1103 and FASC1106 are found from the ship mounted echo sounder.

The Aanderaa speed and direction data have been calibrated using calibration coefficients from the manufacturer. Temperatures and pressure data are uncalibrated. In an Aanderaa current meter, several speed and compass readings are taken during each sampling interval, while the temperature readings are taken once at the end of the interval only. At the end of the interval, the instrument stores a vector average of the velocity for the whole sampling interval, as well as the temperature readings. In the data file, the time of each record is the middle of the speed-averaging interval. During the calibration procedure the direction has been corrected for magnetic declination, by adding a constant. The actual correction is stored in the meta data document. The data have been quality controlled by a standard procedure similar to the ADCP data.

Data from the Microcat instrument at SKOP1103 have also been quality controlled by the standard procedure mentioned above. Upon recovery of the instrument a sea squirt (ascidiacea) was situated at the water intake. This may have influenced the conductivity measurements that are suspicous throughout the deployment period and left uncorrected.

The temperature data from a Starmon instrument at FASC1103 have been quality controlled in a similar manner as the other data.

Report format

This report contains a section with some preliminary results from the data and comparison of contemporary measurements. Then, there are a number of pages for each deployment where the first page has a drawing of the mooring and details of the deployment. After that, there are some pages describing the data from the individual instruments on the mooring.

The ADCP data (FASC1103) begin with a page with detailed error statistics for the deployment, which indicates also how many “long” (i.e. several consecutive ensembles) error gaps are for each bin. On the next page, there is for each bin listed the average speed (scalar average) and velocity magnitude and direction (vectorial average) as well as the fraction of “good” ensembles (in parts per thousand). This is followed by a frequency distribution of speeds for each bin, which lists the frequency (in parts per thousand) of speeds (scalar) exceeding specified values. Then there are some pages listing tidal constituents. These pages contain five tables with data for the constituents M2, S2, N2, O1, and K1. Each table lists for each bin the amplitude and Greenwich phase lag for the east and north velocity components and lists also major and minor semi-axes of the tidal ellipse for the constituent as well as its inclination (Fig. 3), Greenwich phase lag and sense of rotation (cyclonic = C, anticyclonic = A). The tidal constants were computed by an adapted version of the Foreman FORTRAN package.

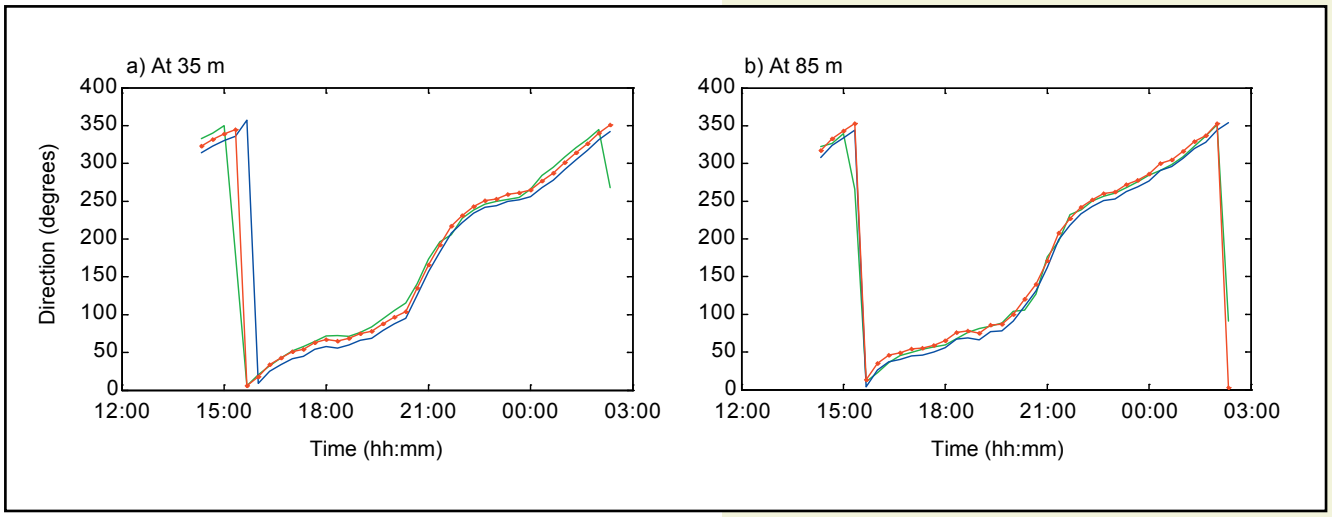


Figure 2. Direction at a) 35 m depth and b) 85 m depth from the ADCP at FASC1103 and from the two Aanderaa current meters on FASC1106. The Aanderaa direction (green) is corrected for magnetic declination while the ADCP data are shown uncorrected (blue) and with a constant added (+9° - red). For each level a linear regression was calculated for the period from 16:00 - 02:00 hours where the direction increases continuously. The regression analysis resulted in an offset of 12.7° and 4.9° for the upper and lower level, respectively and thus an average of +9°. The offset difference between the levels is rather large, but is within the accuracy of the instruments.

The Starmon data from the FASC1103 deployment are presented with a plot of the temperature.

The description of the Aanderaa current meter data includes first a text page listing metadata information in the header and showing the list of parameters in the data file, with a tally of the number of records flagged and not flagged for error in each parameter. Any comments to the data are then listed. The rest of the text page describes features of the velocity observations in the series. First is shown the residual current, defined as the vectorial average of all non-flagged records. Then is a table listing the directional current distribution as relative numbers of observations in parts per thousand. The table also lists for each direction interval, the total number (in ppt), the relative flux (direction weighted by the speed), the average speed and the maximum speed. Then one page shows plots of the velocity data as a function of time and one page shows the progressive vector diagram. Due to the short deployment a tidal analysis was not possible.

The Microcat data from the SKOP1103 deployment are presented by a page showing plots of temperature and salinity. Since the salinity data are suspisious the T-S diagram is not shown.

Preliminary results

In this section, a few preliminary results are presented where data from FASC1103 are compared to data from coastal station Skopun.

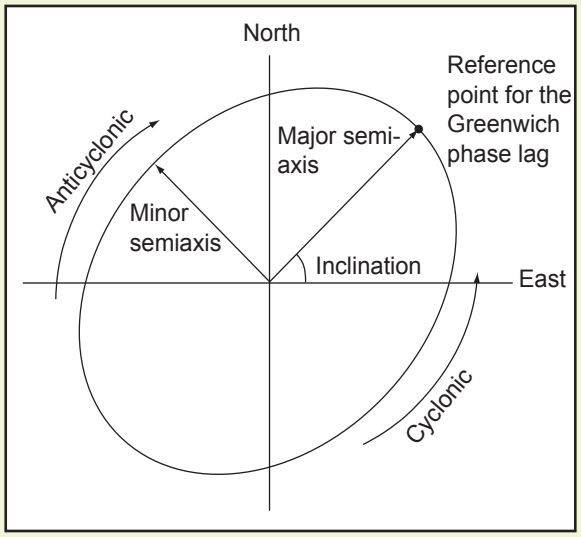


Figure 3. Parameters of the tidal ellipse for a given constituent. The reference point for the Greenwich phase lag is always chosen to be above the east-west axis.

Temperatures and primary production

The MicroCat at SKOP1103 was deployed before the mooring at FASC1103 and also recovered later and we therefore have a full overlap for the FASC1103 deployment period. Temperature from the two moorings are plotted in Figure 4, which also shows the chlorophyll *a* data from coastal station Skopun. In the first period, temperatures at FASC are higher than at Skopun until early May when there is a temperature drop at FASC. For the next three weeks the temperatures are quite similar at the two locations and at the same time there is a small spring bloom observed at Skopun. But the chlorophyll *a* quickly declines again at the same time as the temperatures at the two locations start to diverge - but now the FASC temperatures are lower than the Skopun temperatures. This situation remains for the rest of the FASC deployment.

These observations are one more indication of the interplay between temperatures on- and off-shelf, i.e variable shelf circulation, and its influence on the on-shelf phytoplankton production as has also been observed in previous years (Larsen et al, 2009; Larsen et al, 2011). The responsible processes are not evident from these observations only. A number of other observations from the area to the west of the Faroes exist for this same period, but these will be joined and analysed in a separate report.

Progressive Vector Diagrams

Progressive Vector Diagrams (PVD) from six layers from the ADCP at FASC1103 are plotted in Figure 5. The three deepest layers shown have a quite similar direction indicating a bottom layer with a barotropic nature. The three upper layers are veering clockwise from mid-depth and up, but this veering mainly occurs in the first two months of the deployment. From May and onwards all six PVD's are nearly parallel to each other, thus indicating barotropic flow. This is in contrast to previous observations in this project at FASA and FASB (Larsen et al, 2009; Larsen et al, 2011), which have a clockwise veering in the bottom layer from the bottom and upwards (at FASB only in periods), but those observations were at somewhat more off-shelf and deeper locations.

Also, the direction at FASC1103 is north-easterly and towards a more on-shelf direction than at FASA and FASB. Those directions were more north-westerly and along topography. A closer look at the local topography at FASC (Figure 1) reveals that the bottom contours south of FASC actually go slightly east of north.

The PVD's in Figure 5 are quite regular with only a few small on-shelf excursions. If we look at the three shallowest bins (Figure 6) a different picture is seen for the surface bin centered at 10m depth. This layer mainly follows the others until approximately a week into June, when it completely changes direction for some days and then kind of undulates between this new north-westerly direction and the original north-easterly direction. In early May this layer also has a westward direction for some days and this period coincides with the period of the chlorophyll *a* peak in Figure 4.

Since this is the surface layer and the last good bin in the data set, we have to be careful when interpreting these results. But, three CTD sections across the FASC1103 mooring show that the water column is vertically homogeneous in late May, but is stratified with a shallow surface layer in mid June and early July (not shown). These sections thus support the peculiar behaviour of the surface layer. On the other hand, data in the surface layers are often good for a few hours and then bad (or non existing) for a few hours and so is also the case here - at least in some periods. If this fluctuation between good and bad data is related to the time of the day (for instance due to vertical micgration of plankton) then on- and off-shelf flow should be equally represented. But if the fluctuation is related to the tides then the good data might be overrepresented when the flow is off-shelf, which in turn creates a bias in the residual flow. This is not studied further here, but will be analysed in the separate report mentioned above.

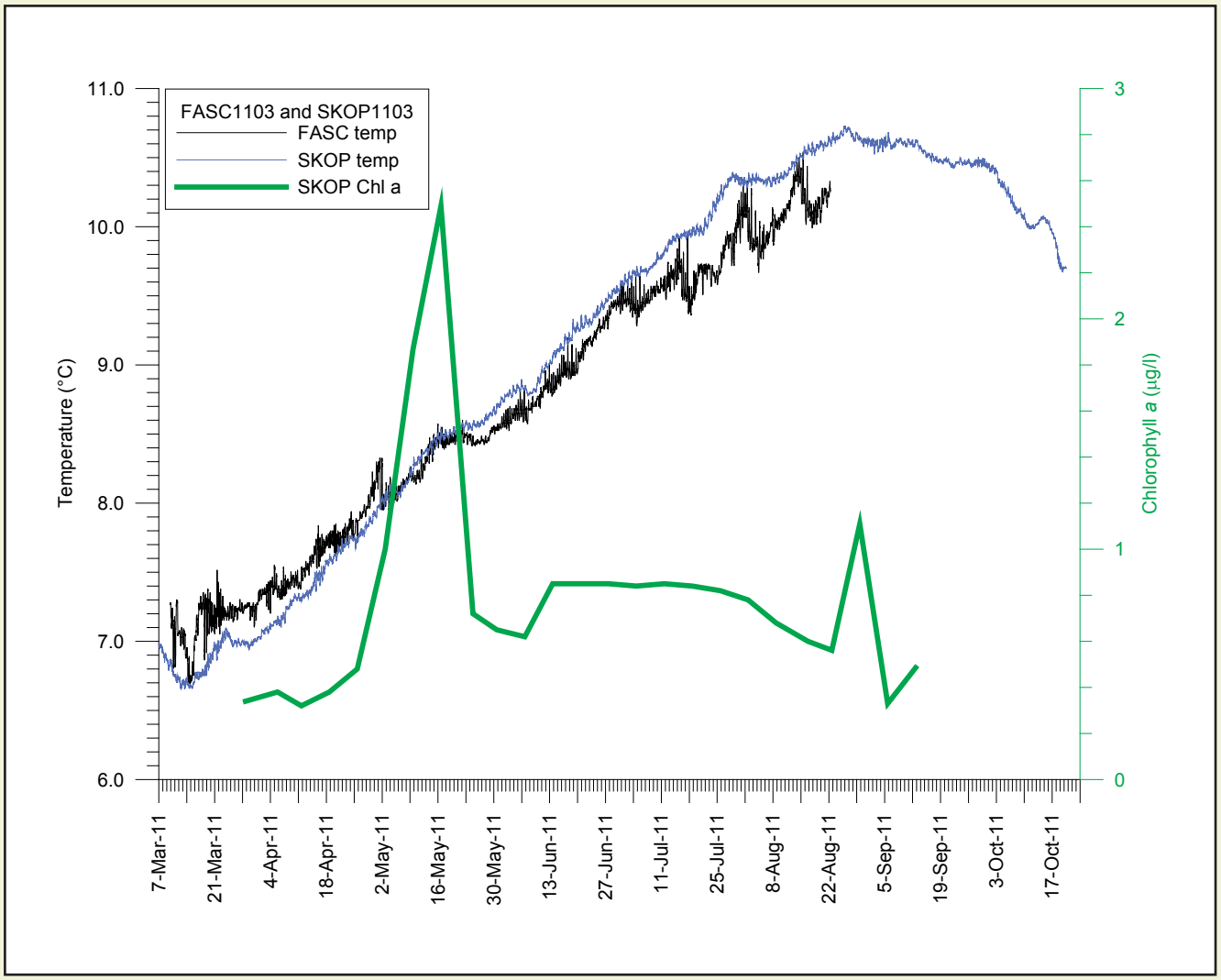


Figure 4. Temperature from the Starmon (sea floor) at FASC1103 (black) and from the MicroCat at SKOP1103 (blue). Also shown is the chlorophyll a (green) at coastal station Skopun.

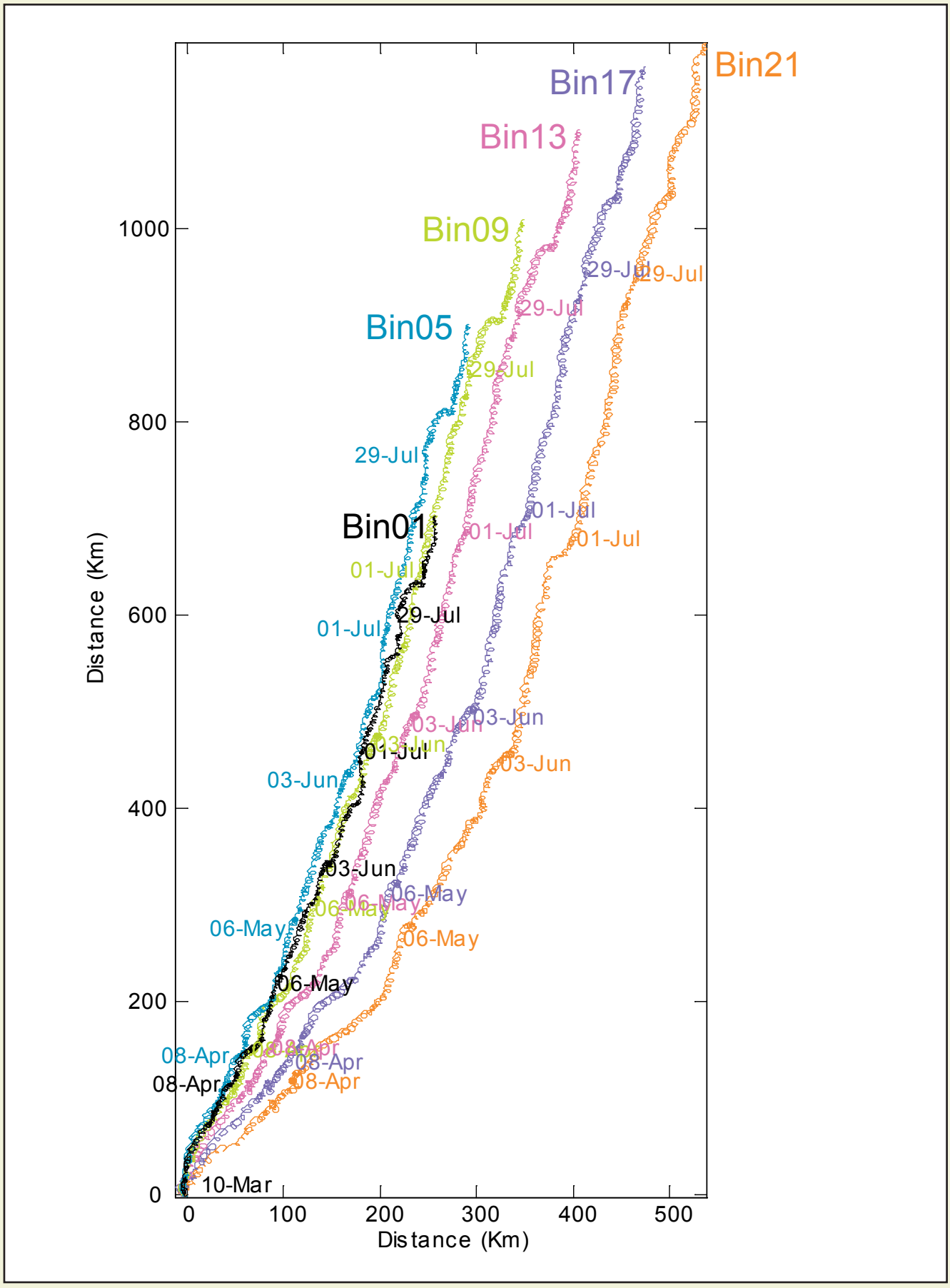


Figure 5. Progressive Vector Diagrams (for all non-flagged values) from every fourth layer starting at Bin 01. The layers and depths are Bin 01 at 98m, Bin 05 at 82m, Bin 09 at 66m, Bin 13 at 50m, Bin 17 at 34m and Bin 21 at 18m. The PVD starts in the lower left corner on the 10. March and dates are added every 4 weeks.

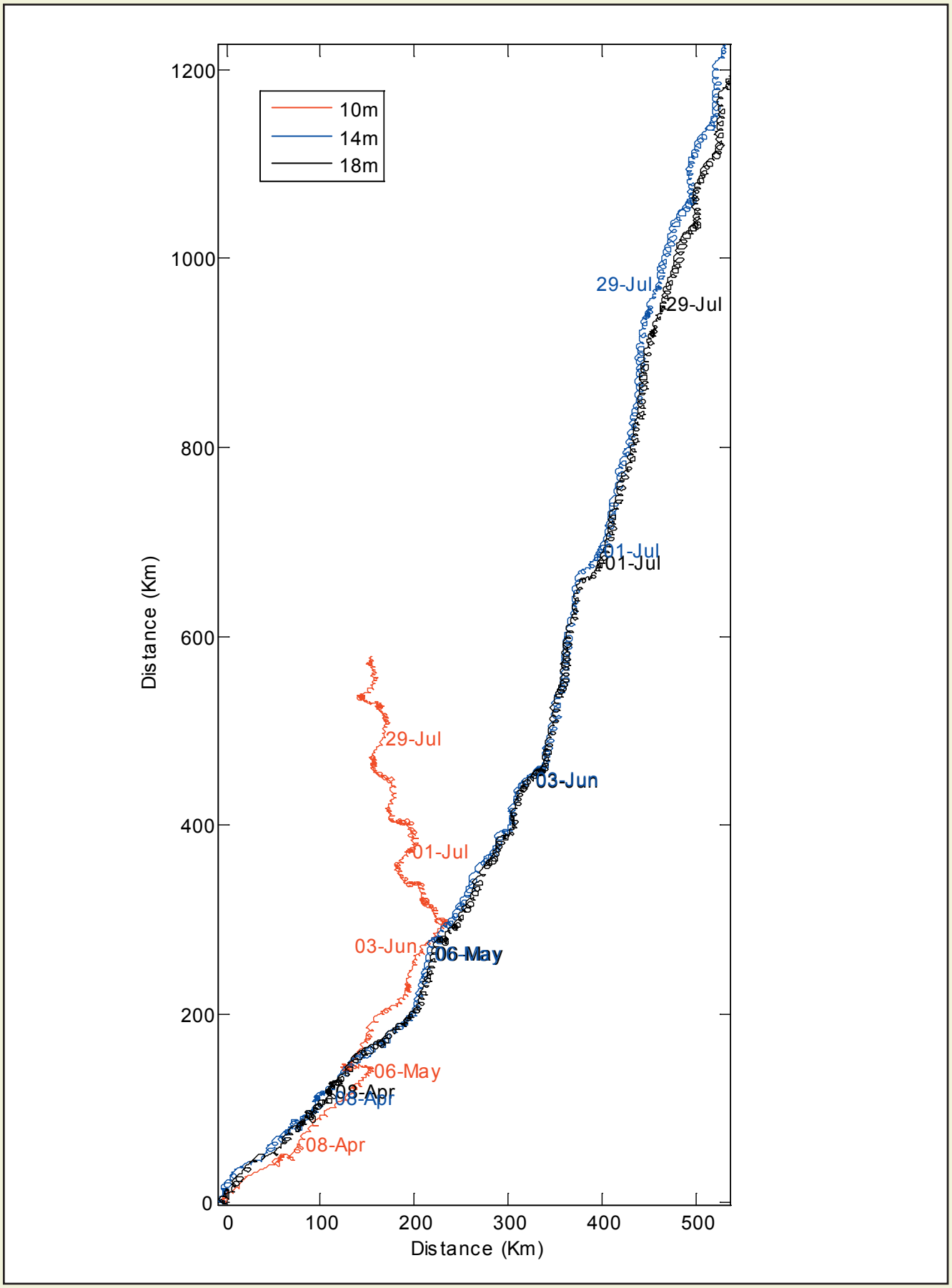


Figure 6. Progressive Vector Diagrams (for all non-flagged values) from the three uppermost layers at FASC1103. The depths of the layers are indicated in the legend. Note that the surface layer (red) has large gaps (mainly in March and April) and therefore has a shorter PVD than the other two layers.

Refererences

Eliasen, S. K., Gaard, E., Hansen, B. and Larsen, K. M. H. 2005. A »horizontal Sverdrup mechanism« may control the spring bloom around small oceanic islands and over banks. Journal of Marine Systems, 56: 352-362.

Larsen, K. M. H., Hansen, B., Kristiansen, R., Mortensen, E. 2009. Current measurements on the Faroe Shelf 2008 - 2009. Havstovan nr. 09-04. Technical Report.

Larsen, K. M. H., Hátún, H., Debes, H. D. 2011. Current measurements on the Faroe Shelf 2010. Havstovan nr. 11-01. Technical Report.

FASC1103 data

Latitude: 61° 43.230´N

Longitude: 07° 11.430´W

Echo sound depth: 102 m

Bottom depth corr.: 105 m

Time of deployment: 10/3-2011 1536 UTC

Time of recovery: 23/8 - 2011 0426 UTC

ADCP:

Instrument no.: RDI WH Sentinel ADCP 0936

Instrument frequency: 300 kHz

Height above bottom: 1 m

Depth: 104 m (corr.)

Time of first data: 10/3 – 2011 1600 UTC

Time of last data: 23/8 – 2011 0400 UTC

Sample interval: 20 min

No. of ensembles: 11917

Pings per ens.: 50

Binlength: 4 m

Depth of first bin: 98 m (corr.)

No. of bins: 23

Starmon:

Instrument no.: 0656

Height above bottom: 1 m

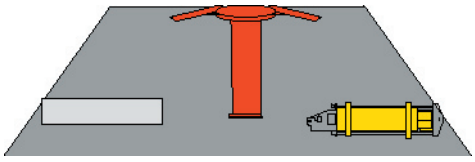
Time of first data: 10/3 - 2011 1550 UTC

Time of last data: 23/8 - 2011 0425 UTC

Sample interval: 5 min

No. of ensembles: 47672

Instrument depth: 104 m



Data:

Ok

FASC1103 ADCP 0936

Error statistics for deployment: FASC1103 updated 2012/02/08

Surface distance not available
Heading, pitch and roll not edited
Temperature edited by KMHL in Oct 2011
Velocity edited up to and including bin 23 by KMHL in Oct 2011
Intensity edited up to and including bin 23 by KMHL in Oct 2011

Total number of ensembles: 11917
Interval between ensembles: 20 min
Original number of bins: 28
Number of acceptable velocity bins: 23
Number of acceptable intensity bins: 23

Flagged values have been replaced by error codes: -999.99 for temperature, -999 for velocity and intensity. For observations where velocity is flagged, error codes have been inserted into speed, direction and vertical velocity files

Number of temperature ens. flagged: 0

Below are for each bin listed ensembles flagged for intensity in number and for velocity in number and % of total ens.number. For velocity is also shown the number of gaps of various lengths (gap length = number of consecutive flagged ens.)

Bin	Int. ens. flgd	Velocity ens. flgd	Velocity % flgd	Number of velocity gaps of length 1	2	3	4	5	6-10	11-20	21-30	31-50	>50
1	0	6	0	6	0	0	0	0	0	0	0	0	0
2	0	8	0	8	0	0	0	0	0	0	0	0	0
3	0	8	0	8	0	0	0	0	0	0	0	0	0
4	0	13	0	13	0	0	0	0	0	0	0	0	0
5	0	15	0	15	0	0	0	0	0	0	0	0	0
6	0	8	0	8	0	0	0	0	0	0	0	0	0
7	0	10	0	10	0	0	0	0	0	0	0	0	0
8	0	11	0	9	1	0	0	0	0	0	0	0	0
9	0	12	0	10	1	0	0	0	0	0	0	0	0
10	0	10	0	8	1	0	0	0	0	0	0	0	0
11	0	10	0	8	1	0	0	0	0	0	0	0	0
12	0	13	0	8	1	1	0	0	0	0	0	0	0
13	0	17	0	12	1	1	0	0	0	0	0	0	0
14	0	23	0	18	1	1	0	0	0	0	0	0	0
15	0	48	0	34	4	0	0	0	1	0	0	0	0
16	0	75	1	49	9	0	0	0	1	0	0	0	0
17	0	143	1	73	21	2	0	0	0	0	1	0	0
18	0	212	2	85	24	4	2	2	1	1	1	0	0
19	0	313	3	117	28	6	3	3	1	3	2	0	0
20	0	722	6	187	51	16	5	4	2	3	0	2	3
21	0	1170	10	205	69	21	8	3	4	4	1	1	4
22	0	1657	14	251	88	29	14	4	13	5	2	1	5
23	0	5592	47	729	247	118	61	47	105	42	4	0	9

FASC1103 ADCP 0936

Deployment: FASC1103 updated 2012/02/08
Instrument no.: 936
Instrument freq.: 300
Latitude: 61 43.230 N
Longitude:07 11.430 W
Bottom depth: 105
Instrument depth: 104
Center depth of first bin: 98
Bin length: 4
Number of bins: 23
Number of first ensemble: 145
Time of first ensemble: 2011 03 10 16 00
Number of last ensemble: 12061
Time of last ensemble: 2011 08 23 04 00
Time between ensembles (min.): 20
All directions have been corrected by adding: 9.0

Below is listed for each bin the average speed (scalar average) and the average velocity magnitude and direction formed as a vectorial average of non-flagged (Good) observations. The last column shows the number of good values used in parts per thousand

Bin no.	Depth m	Height m	Speed mm/s	Vel mm/s	Dir deg	Good ppt
1	98	7	255	52	20	999
2	94	11	279	57	19	999
3	90	15	296	61	18	999
4	86	19	311	64	18	999
5	82	23	324	66	18	999
6	78	27	336	69	18	999
7	74	31	347	71	18	999
8	70	35	357	73	19	999
9	66	39	367	75	19	999
10	62	43	376	76	19	999
11	58	47	384	78	20	999
12	54	51	394	81	20	999
13	50	55	402	82	20	999
14	46	59	409	84	20	998
15	42	63	416	86	21	996
16	38	67	423	87	21	994
17	34	71	428	89	22	988
18	30	75	434	91	23	982
19	26	79	439	94	23	974
20	22	83	445	97	24	939
21	18	87	451	101	24	902
22	14	91	457	108	23	861
23	10	95	416	79	15	531

FASC1103 ADCP 0936

Frequency of high speeds.
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Frequency (in parts per thousand) of speeds equal to or exceeding specified vales.

Bin no.	Depth m	Speed (cm/s) 10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
1	98	951	688	289	87	27	8	2	0	0	0	0	0	0	0	0	0	0	0
2	94	959	760	383	133	44	14	5	1	0	0	0	0	0	0	0	0	0	0
3	90	964	797	447	171	57	20	7	2	0	0	0	0	0	0	0	0	0	0
4	86	968	823	504	210	71	26	9	3	0	0	0	0	0	0	0	0	0	0
5	82	971	844	549	249	88	31	11	3	1	0	0	0	0	0	0	0	0	0
6	78	975	861	586	283	103	37	14	5	1	0	0	0	0	0	0	0	0	0
7	74	976	874	620	319	120	43	16	6	1	0	0	0	0	0	0	0	0	0
8	70	979	886	650	346	138	49	18	6	2	1	0	0	0	0	0	0	0	0
9	66	980	896	676	373	158	56	21	8	2	1	0	0	0	0	0	0	0	0
10	62	982	907	696	402	178	64	25	9	3	1	0	0	0	0	0	0	0	0
11	58	983	913	714	428	197	73	28	11	3	1	0	0	0	0	0	0	0	0
12	54	985	918	733	461	219	84	31	12	4	1	0	0	0	0	0	0	0	0
13	50	985	921	745	484	239	94	35	13	4	1	0	0	0	0	0	0	0	0
14	46	987	925	756	504	254	104	39	15	5	2	1	0	0	0	0	0	0	0
15	42	984	925	765	521	271	115	45	16	6	2	1	0	0	0	0	0	0	0
16	38	983	926	770	534	291	126	49	18	7	2	1	0	0	0	0	0	0	0
17	34	978	921	770	543	305	134	51	19	8	3	1	0	0	0	0	0	0	0
18	30	973	919	773	553	321	144	59	21	9	3	1	0	0	0	0	0	0	0
19	26	964	910	770	557	332	156	65	23	10	3	1	0	0	0	0	0	0	0
20	22	931	880	747	547	335	165	69	26	9	3	1	0	0	0	0	0	0	0
21	18	894	847	719	538	334	172	72	27	10	4	2	0	0	0	0	0	0	0
22	14	854	809	692	521	332	176	77	30	11	4	2	0	0	0	0	0	0	0
23	10	523	483	388	271	155	75	31	12	4	1	1	0	0	0	0	0	0	0

FASC1103 ADCP 0936

Harmonic constants for constituent M2 for deployment FASC1103.

Bin	Depth m	E-ampl mm/sec	E-gpl deg	N-ampl mm/sec	N-gpl deg	Major mm/sec	Minor mm/sec	Incl deg	Grphl deg	R
01	98	279	246	186	179	292	164	21	234	A
02	94	308	247	202	179	322	180	20	235	A
03	90	327	247	215	179	341	192	20	236	A
04	86	344	248	226	178	358	203	20	236	A
05	82	359	248	236	178	373	213	19	237	A
06	78	372	249	246	178	386	223	19	238	A
07	74	384	249	255	178	398	233	19	238	A
08	70	395	250	264	178	409	242	19	239	A
09	66	404	251	273	179	418	251	19	239	A
10	62	413	251	281	179	428	259	19	240	A
11	58	422	252	289	179	436	267	19	240	A
12	54	431	253	300	180	446	276	19	240	A
13	50	438	253	307	180	453	284	20	241	A
14	46	444	254	314	181	460	291	20	241	A
15	42	450	255	321	181	466	297	20	242	A
16	38	455	255	328	182	472	304	20	242	A
17	34	459	256	333	182	475	309	20	243	A
18	30	463	257	339	182	479	315	20	243	A
19	26	466	257	344	183	483	320	20	244	A
20	22	470	258	349	183	487	325	21	244	A
21	18	473	259	352	184	490	329	20	244	A
22	14	476	259	356	184	492	332	20	245	A
23	10	462	264	280	178	463	279	4	262	A

Harmonic constants for constituent S2 for deployment FASC1103.

Bin	Depth m	E-ampl mm/sec	E-gpl deg	N-ampl mm/sec	N-gpl deg	Major mm/sec	Minor mm/sec	Incl deg	Grphl deg	R
01	98	98	282	69	217	105	58	25	267	A
02	94	108	282	74	217	115	63	24	268	A
03	90	114	282	78	217	121	66	24	268	A
04	86	119	282	81	216	126	69	23	269	A
05	82	124	282	84	216	131	72	23	269	A
06	78	128	282	86	216	134	75	22	269	A
07	74	131	283	88	216	138	77	22	270	A
08	70	135	283	91	215	141	80	21	271	A
09	66	138	284	93	215	144	83	21	271	A
10	62	141	284	95	215	147	85	21	272	A
11	58	144	284	97	215	150	87	21	272	A
12	54	147	285	101	215	154	90	21	272	A
13	50	150	285	103	215	156	93	21	272	A
14	46	152	286	106	215	159	96	21	273	A
15	42	154	286	108	215	161	98	21	273	A
16	38	156	287	111	216	162	100	21	274	A
17	34	156	288	113	216	163	103	21	274	A
18	30	158	289	115	216	164	105	21	275	A
19	26	158	289	116	217	165	107	22	275	A
20	22	158	290	118	217	165	108	23	275	A
21	18	156	291	119	218	164	108	23	275	A
22	14	155	292	118	219	163	108	24	276	A
23	10	146	297	102	217	148	99	13	288	A

FASC1103 ADCP 0936

Harmonic constants for constituent N2 for deployment FASC1103.

Bin	Depth m	E-ampl mm/sec	E-gpl deg	N-ampl mm/sec	N-gpl deg	Major mm/sec	Minor mm/sec	Incl deg	Grphl deg	R
01	98	58	213	40	157	64	30	28	199	A
02	94	64	213	43	156	70	33	27	200	A
03	90	68	213	45	156	74	35	26	200	A
04	86	71	214	47	155	77	37	26	201	A
05	82	74	214	49	155	80	39	25	201	A
06	78	76	214	51	155	82	41	25	201	A
07	74	78	215	53	154	84	43	25	202	A
08	70	80	216	54	153	86	45	25	202	A
09	66	82	216	56	153	88	47	24	202	A
10	62	84	217	57	153	90	48	24	203	A
11	58	86	217	59	153	91	50	24	203	A
12	54	87	218	60	152	93	52	24	204	A
13	50	89	218	62	152	94	54	23	205	A
14	46	90	219	63	152	95	55	23	205	A
15	42	92	220	64	152	96	56	23	206	A
16	38	93	221	65	152	98	57	22	207	A
17	34	95	221	65	152	99	58	21	208	A
18	30	96	222	66	152	100	59	21	209	A
19	26	97	222	66	152	101	60	20	210	A
20	22	98	223	67	153	102	60	20	211	A
21	18	99	223	67	153	103	61	20	211	A
22	14	100	224	67	153	104	61	19	213	A
23	10	97	228	53	150	98	52	9	223	A

Harmonic constants for constituent O1 for deployment FASC1103.

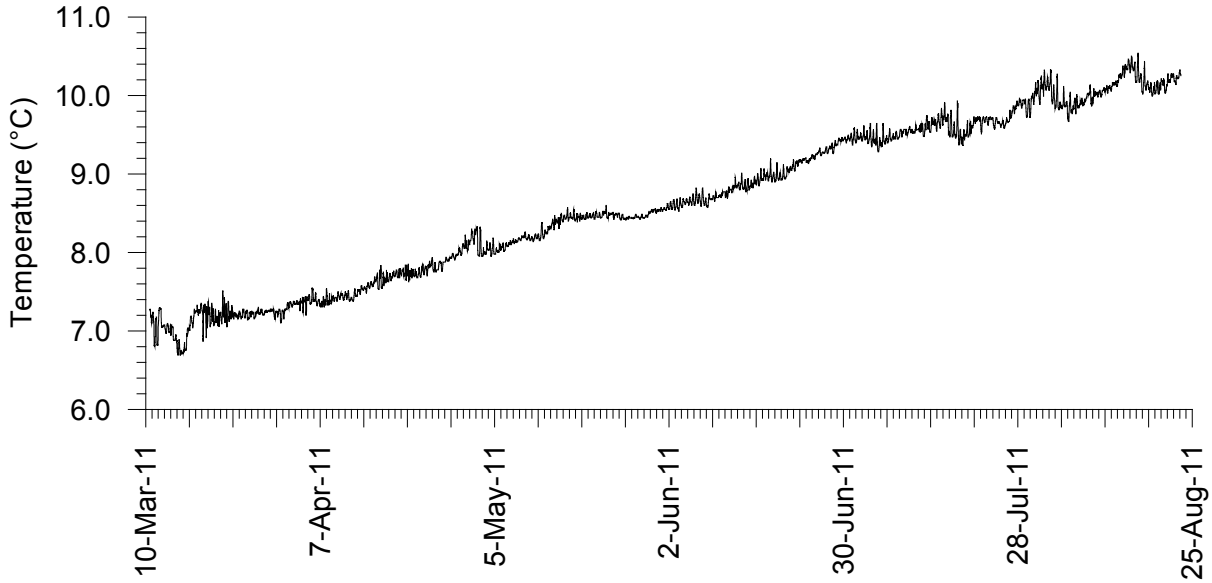
Bin	Depth m	E-ampl mm/sec	E-gpl deg	N-ampl mm/sec	N-gpl deg	Major mm/sec	Minor mm/sec	Incl deg	Grphl deg	R
01	98	32	304	38	255	45	20	52	274	A
02	94	35	304	40	255	48	22	51	275	A
03	90	38	304	41	255	51	23	49	276	A
04	86	40	304	43	255	53	24	48	277	A
05	82	42	304	43	254	55	25	46	278	A
06	78	44	304	44	254	56	26	45	279	A
07	74	46	304	45	254	58	27	44	280	A
08	70	47	304	45	254	58	28	43	281	A
09	66	48	304	45	253	59	28	42	281	A
10	62	49	305	45	252	59	29	41	282	A
11	58	49	304	45	252	60	29	40	282	A
12	54	49	304	44	251	59	29	40	282	A
13	50	50	304	44	250	59	30	39	282	A
14	46	50	303	43	249	59	30	38	282	A
15	42	50	302	43	248	59	30	37	281	A
16	38	50	301	42	247	58	29	37	281	A
17	34	50	300	42	246	58	29	36	281	A
18	30	50	300	41	244	58	29	35	280	A
19	26	51	299	41	243	58	29	34	280	A
20	22	50	298	40	242	57	29	34	279	A
21	18	50	296	40	241	57	28	34	278	A
22	14	49	295	40	239	56	29	34	276	A
23	10	55	295	34	239	59	26	24	284	A

FASC1103 ADCP 0936

Harmonic constants for constituent K1 for deployment FASC1103.

Bin	Depth m	E-ampl mm/sec	E-gpl deg	N-ampl mm/sec	N-gpl deg	Major mm/sec	Minor mm/sec	Incl deg	Grphl deg	R
01	98	30	166	26	110	35	18	37	145	A
02	94	34	167	27	110	39	20	34	147	A
03	90	36	166	28	110	41	21	33	148	A
04	86	38	166	29	111	43	21	32	149	A
05	82	40	166	30	110	44	22	31	150	A
06	78	41	167	30	110	45	23	30	151	A
07	74	42	167	30	110	46	23	29	151	A
08	70	43	167	31	109	47	24	28	152	A
09	66	44	167	31	108	48	24	28	152	A
10	62	44	167	31	108	48	25	27	152	A
11	58	45	167	31	106	48	25	27	152	A
12	54	45	166	32	104	49	26	26	152	A
13	50	45	166	32	103	49	26	26	151	A
14	46	46	165	32	101	49	27	25	151	A
15	42	46	164	33	100	49	28	26	149	A
16	38	46	163	33	98	49	28	25	148	A
17	34	46	162	33	97	49	28	25	147	A
18	30	46	162	33	96	49	28	26	146	A
19	26	46	160	34	95	50	29	27	143	A
20	22	47	160	36	94	51	30	28	142	A
21	18	47	157	37	92	51	31	30	137	A
22	14	46	157	37	91	51	31	30	138	A
23	10	47	164	32	90	49	30	18	153	A

FASC1103 Starmon 0656



SKOP1103 data

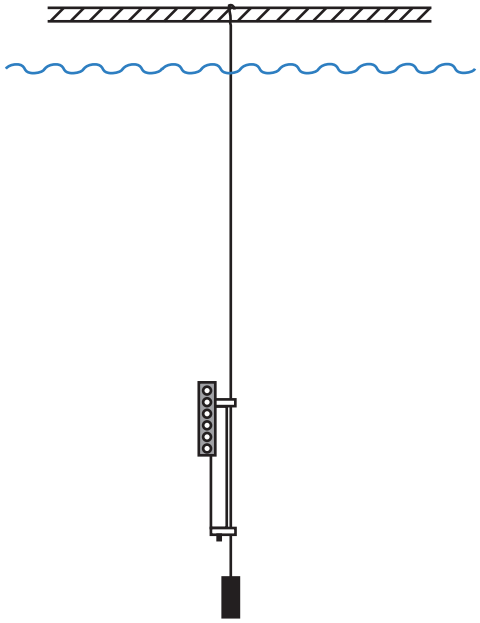
Latitude: 61°54.438´N

Longitude: 006°52.830´W

Bottom depth: 18 m

Time of deployment: 07/03-2011

Time of recovery: 17/11 - 2011 1035 UTC



Micro Cat:

Instrument no.: 4568

Time of first data: 07/03 - 2011 1805 UTC

Time of last data: 17/11 - 2011 1020 UTC

Sample interval: 5 min

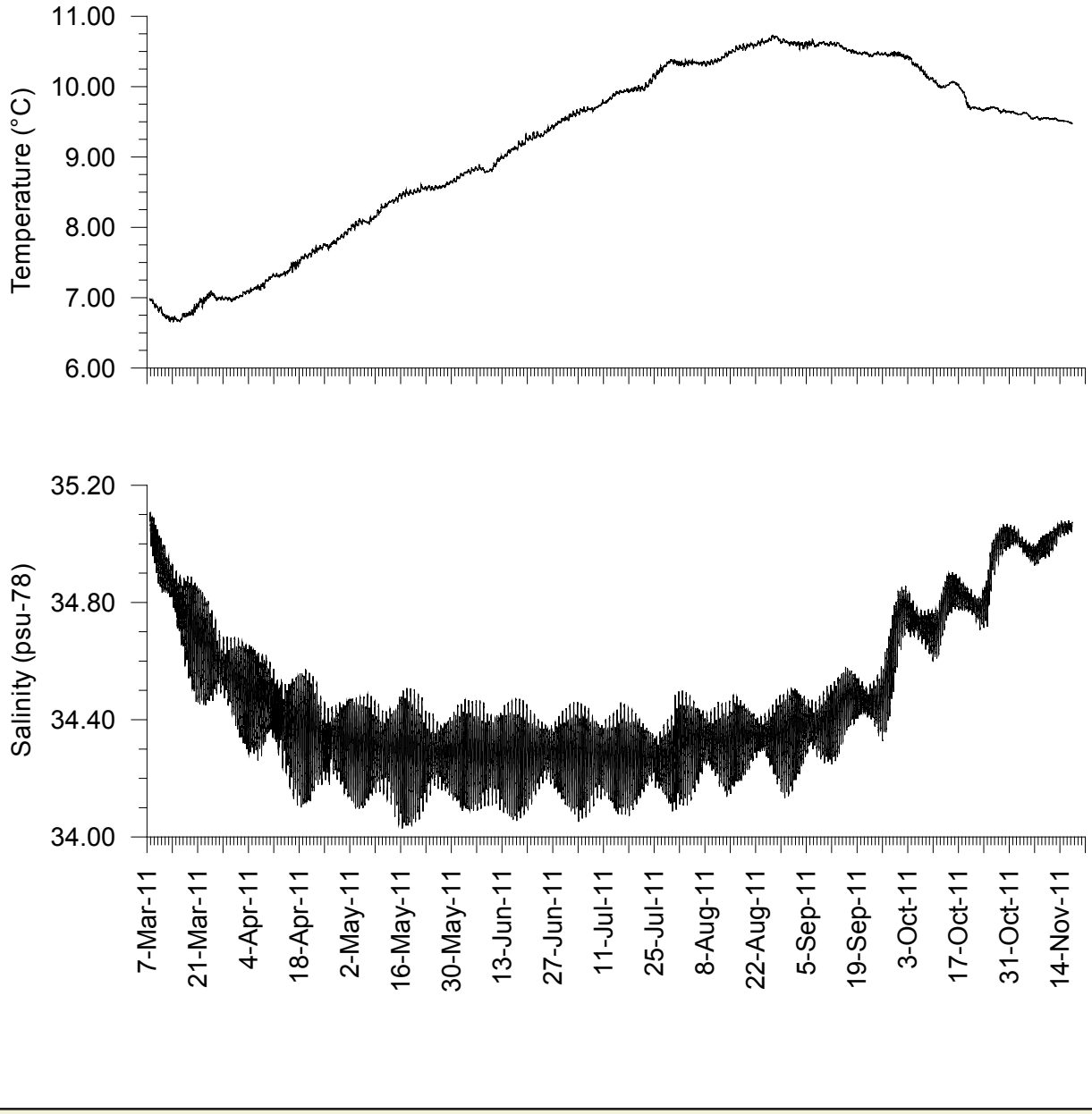
No. of ensembles: 73348

Instrument depth: 4 m

Data:

Temperature data are ok, but the salinities are too low - probably due to biofouling.

SKOP1103 MicroCat 4568



FASC1106 data

Latitude: 61°43.595´N
Longitude: 007°11.764´W
Echo sounding depth: 107 m
Bottom depth corr.: 110 m
Time of deployment: 12/06 -2011 14:25 UTC
Time of recovery: 13/06 - 2011 02:46 UTC

Aanderaa (FASC1106-035):

Instrument no.: RCM7 9741
Height above bottom: 75 m
Depth: 35 m (corr.)
Time of first data: 12/06 -2011 14:32 UTC
Time of last data: 13/06 - 2011 02:37 UTC
Sample interval: 5 min
No. of records: 146
Compass declination: -6°

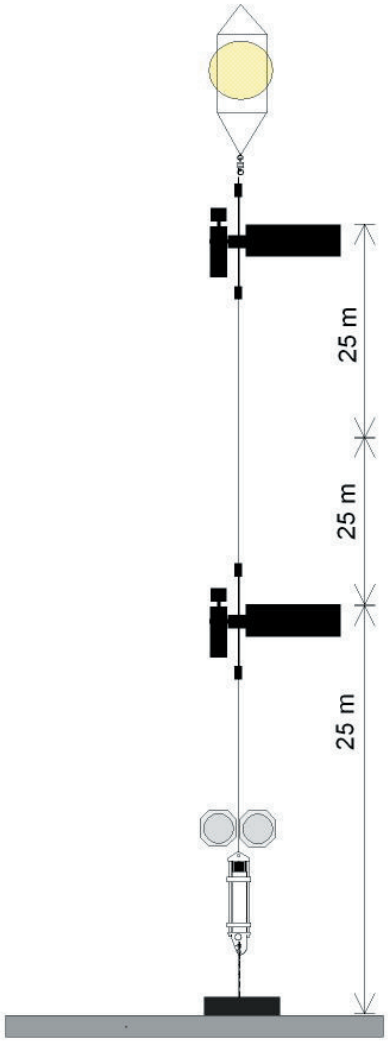
Aanderaa (FASC1106-085):

Instrument no.: RCM7 9742
Height above bottom: 25 m
Depth: 85 m (corr.)
Time of first data: 12/06 -2011 14:32 UTC
Time of last data: 13/06 - 2011 02:37 UTC
Sample interval: 5 min
No. of records: 146
Compass declination: -6°

Data:

Ok.

Temperature and pressure are not calibrated.



FASC1106-035 Aanderaa 9741

Deployment: FASC1106 analyzed from beginning to end
Instrument no.: 9741
Instrument type: Aanderaa
Latitude: 61 43.595 N
Longitude:07 11.764 W
Bottom depth: 110
Instrument depth: 35
Number of records: 146
Time of first record: 2011 06 12 14 32
Time of last record : 2011 06 13 02 37
Time between records (min.): 5.000

Parameters	Records OK	Records flagged
Column 1 : Recno		
Column 2- 4: Date		
Column 5- 6: Time		
Column 7 : Temp	146	0
Column 8 : Speed	146	0
Column 9 : Direct	146	0
Column 10 : Press	146	0

Comments

Temperature and pressure are not calibrated

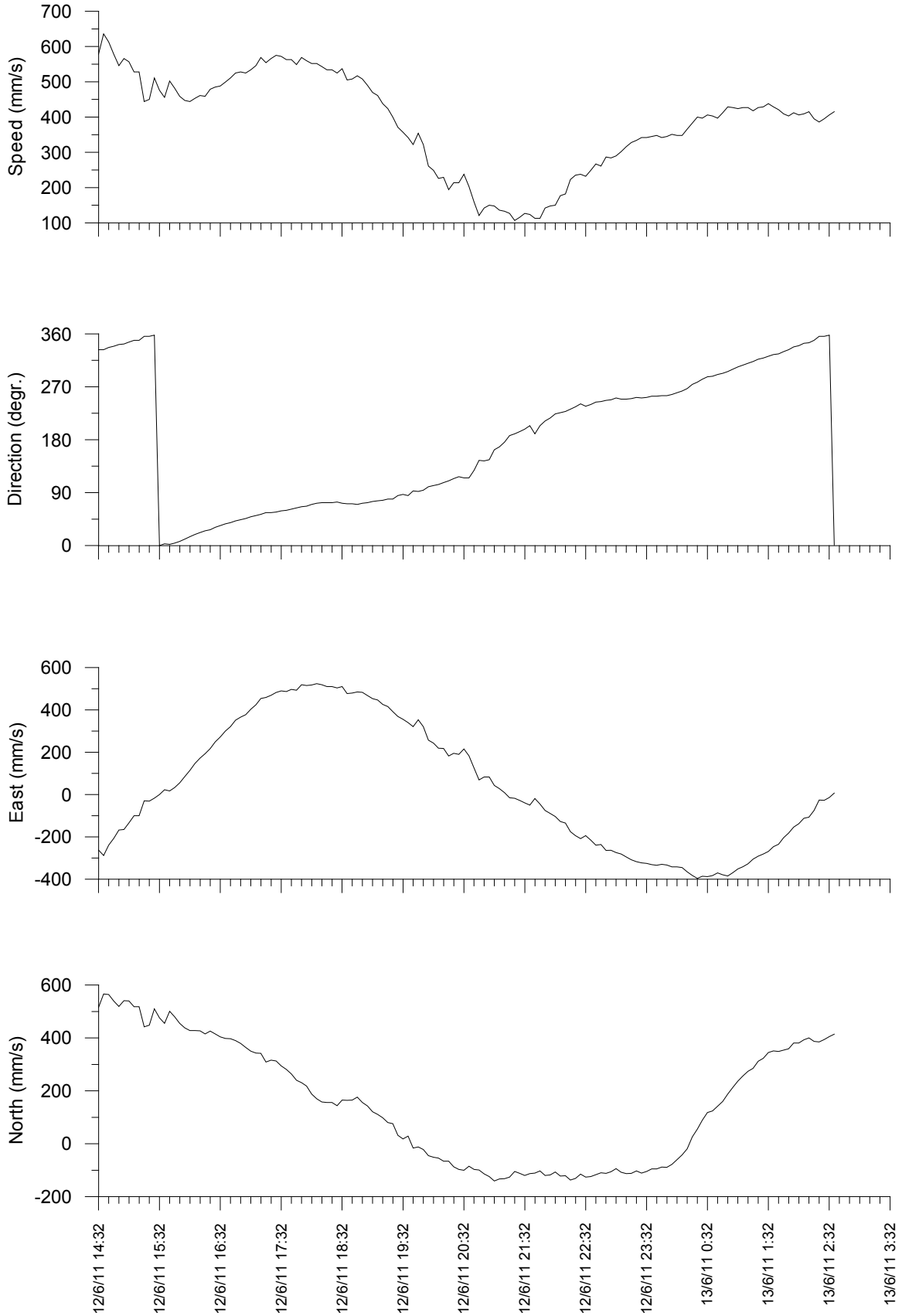
Residual current: 159 mm/sec towards: 13 degrees

DIRECTIONAL CURRENT DISTRIBUTION (for all nonflagged observations in series)

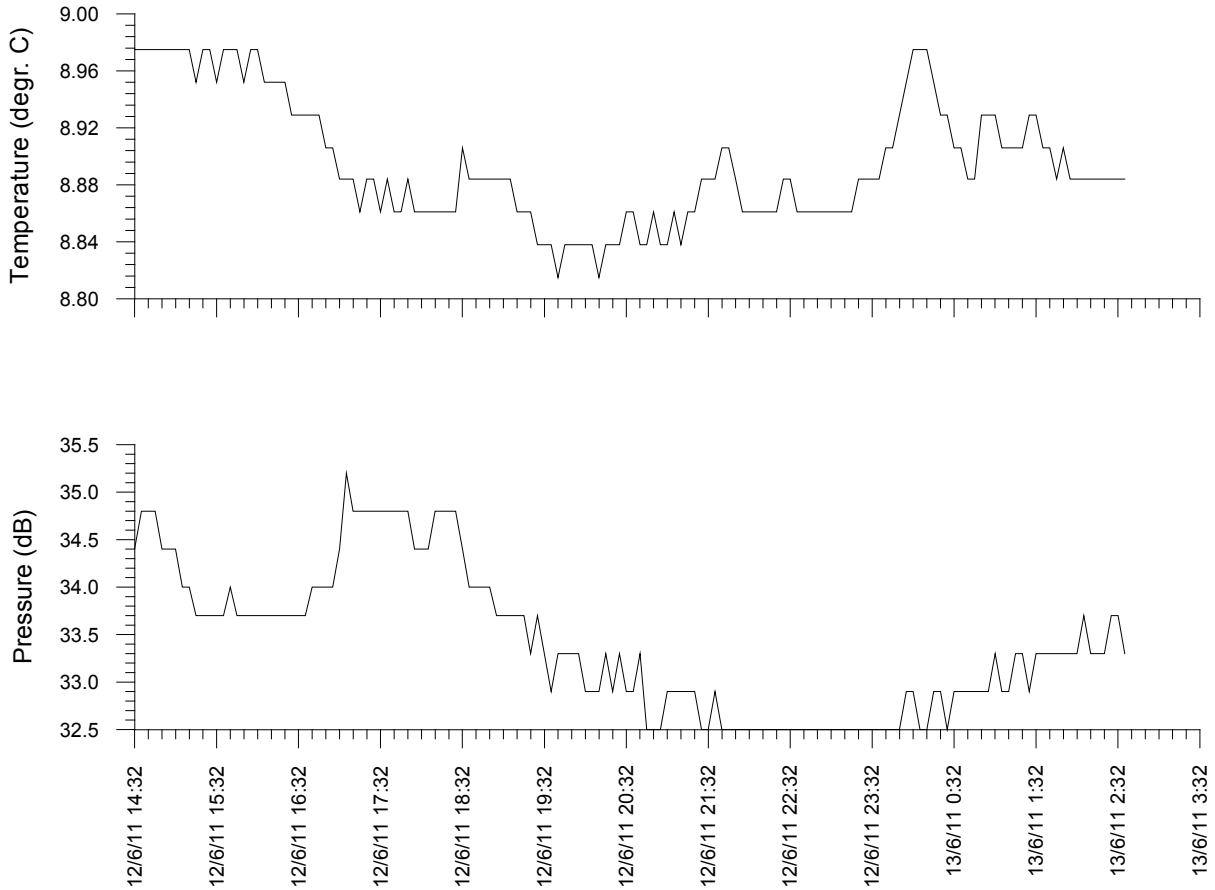
Relative number of observations in parts per thousand (ppt) grouped into speed and direction intervals (of 30 degree width centred around the directions shown)

Speed intervals (mm/s)	Direction intervals 15	45	75	105	135	165	195	225	255	285	315	345	All dir. Tot	Acc
0 - 50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 - 100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 - 150	0	0	0	0	21	21	48	21	0	0	0	0	110	110
150 - 200	0	0	0	7	7	0	0	14	0	0	0	0	27	137
200 - 300	0	0	0	55	0	0	0	27	41	0	0	0	123	260
300 - 400	0	0	27	21	0	0	0	0	96	27	0	21	192	452
400 - 500	75	21	34	0	0	0	0	0	0	34	68	55	288	740
500 - 600	7	82	103	0	0	0	0	0	0	0	0	55	247	986
600 - 700	0	0	0	0	0	0	0	0	0	0	0	14	14	1000
Total (ppt)	82	103	164	82	27	21	48	62	137	62	68	144		
Rel.flux (ppt)	98	143	209	54	10	7	15	31	113	65	75	180		
Avg.spd (mm/s)	461	536	492	252	143	139	118	193	319	406	425	484		
Max.spd (mm/s)	502	575	569	354	159	148	127	249	366	429	438	636		

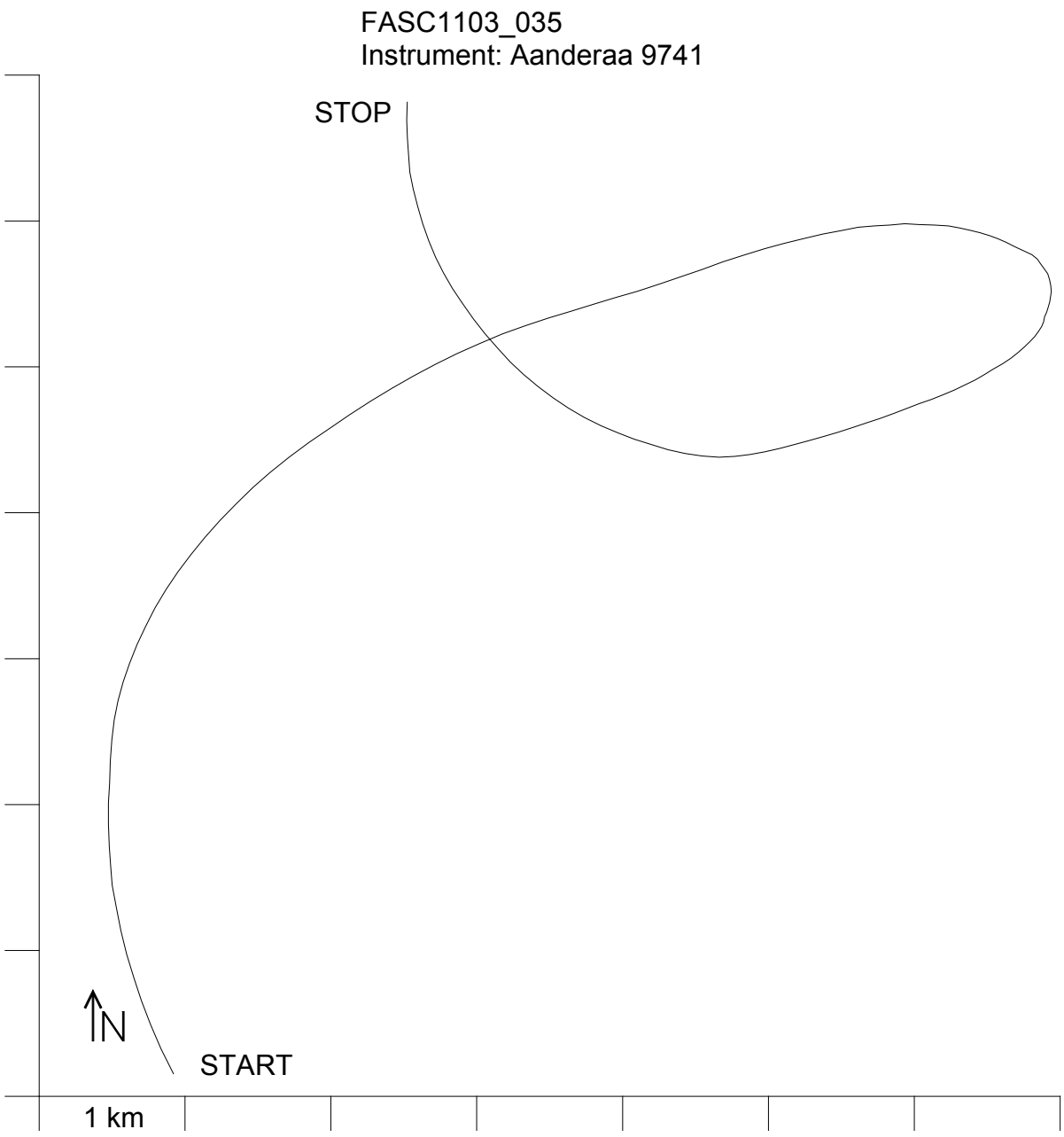
FASC1106-035 Aanderaa 9741



FASC1106-035 Aanderaa 9741



FASC1106-035 Aanderaa 9741



FASC1106-085 Aanderaa 9742

Deployment: FASC1106 analyzed from beginning to end
Instrument no.: 9742
Instrument type: Aanderaa
Latitude: 61 43.595 N
Longitude:07 11.764 W
Bottom depth: 110
Instrument depth: 85
Number of records: 146
Time of first record: 2011 06 12 14 32
Time of last record : 2011 06 13 02 37
Time between records (min.): 5.000

Parameters	Records OK	Records flagged
Column 1 : Recno		
Column 2- 4: Date		
Column 5- 6: Time		
Column 7 : Temp	146	0
Column 8 : Speed	146	0
Column 9 : Direct	146	0
Column 10 : Press	146	0

Comments

Temperature and pressure are not calibrated

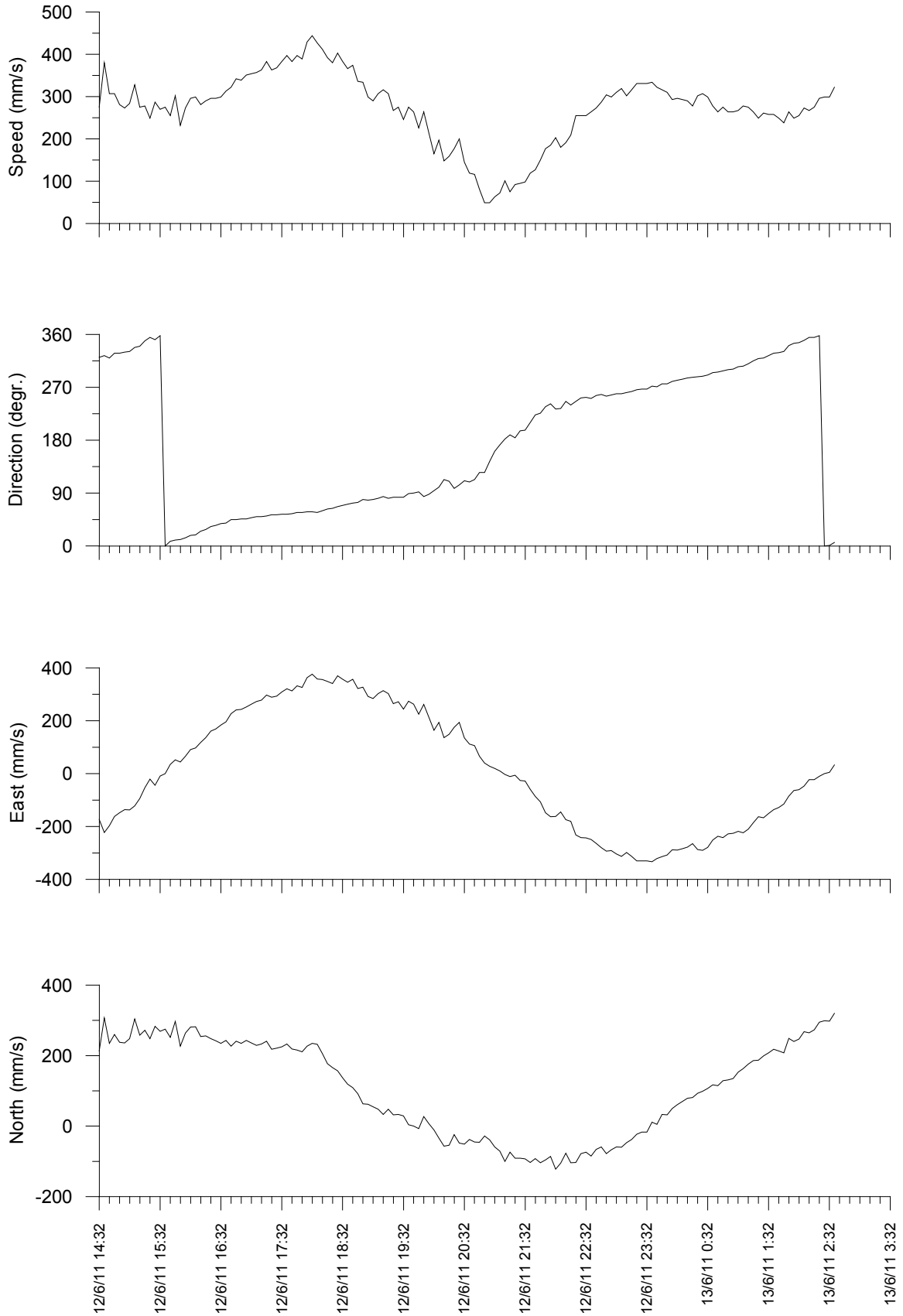
Residual current: 108 mm/sec towards: 4 degrees

DIRECTIONAL CURRENT DISTRIBUTION (for all nonflagged observations in series)

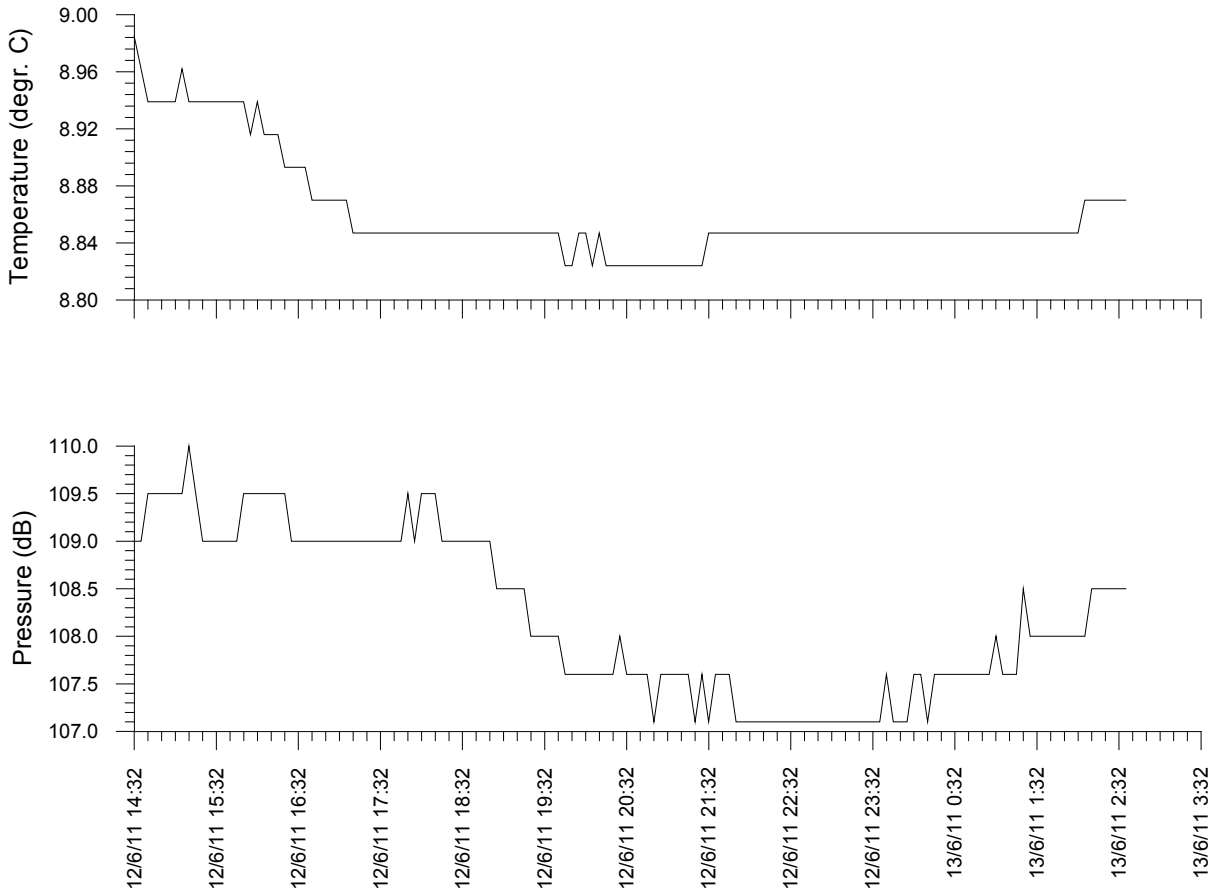
Relative number of observations in parts per thousand (ppt) grouped into speed and direction intervals (of 30 degree width centred around the directions shown)

Speed intervals (mm/s)	Direction intervals 15	45	75	105	135	165	195	225	255	285	315	345	All dir. Tot	Acc
0 - 50	0	0	0	0	14	0	0	0	0	0	0	0	14	14
50 - 100	0	0	0	0	7	14	27	0	0	0	0	0	48	62
100 - 150	0	0	0	27	0	0	14	14	0	0	0	0	55	116
150 - 200	0	0	0	34	0	0	0	14	14	0	0	0	62	178
200 - 300	68	21	62	7	0	0	0	14	48	68	89	96	473	651
300 - 400	14	110	68	0	0	0	0	0	55	41	21	7	315	966
400 - 500	0	27	7	0	0	0	0	0	0	0	0	0	34	1000
Total (ppt)	82	158	137	68	21	14	41	41	116	110	110	103		
Rel.flux (ppt)	86	211	158	42	5	3	15	26	121	119	112	103		
Avg.spd (mm/s)	285	366	315	165	60	68	97	174	283	295	278	273		
Max.spd (mm/s)	322	444	403	226	81	72	119	209	331	334	380	328		

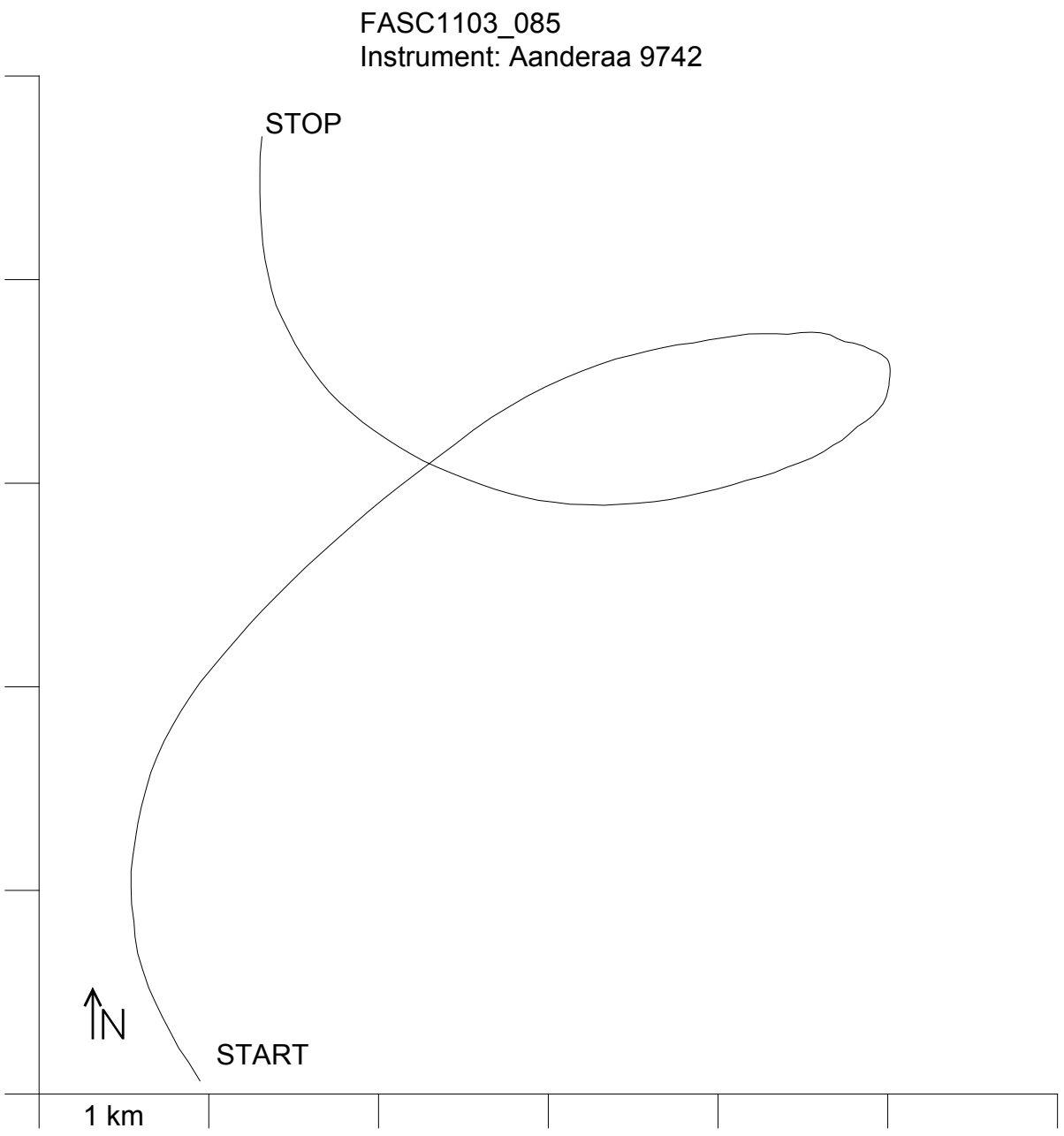
FASC1106-085 Aanderaa 9742



FASC1106-085 Aanderaa 9742



FASC1106-085 Aanderaa 9742



HAVSTOVAN
FAROE MARINE RESEARCH INSTITUTE

P.O. Box 3051 · Nóatún 1
FO-110 Tórshavn
Faroe Islands

Tel +298 35 39 00
hav@hav.fo
www.hav.fo