The Faroese Fisheries Laboratory

Fiskirannsóknarstovan
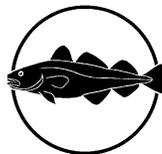
Faroese GEM ADCP Deployments 1999

By

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Introduction

This report documents ADCP measurements in Faroese waters within the Faroese GEM programme in the period February – June 1999. The measurements were acquired at 2 mooring sites shown in Figure 1. These deployments are listed in Table 1. Each deployment is identified by an 8-character label where the first four characters indicate the site (Fig. 1) while the last characters show year and month of deployment.
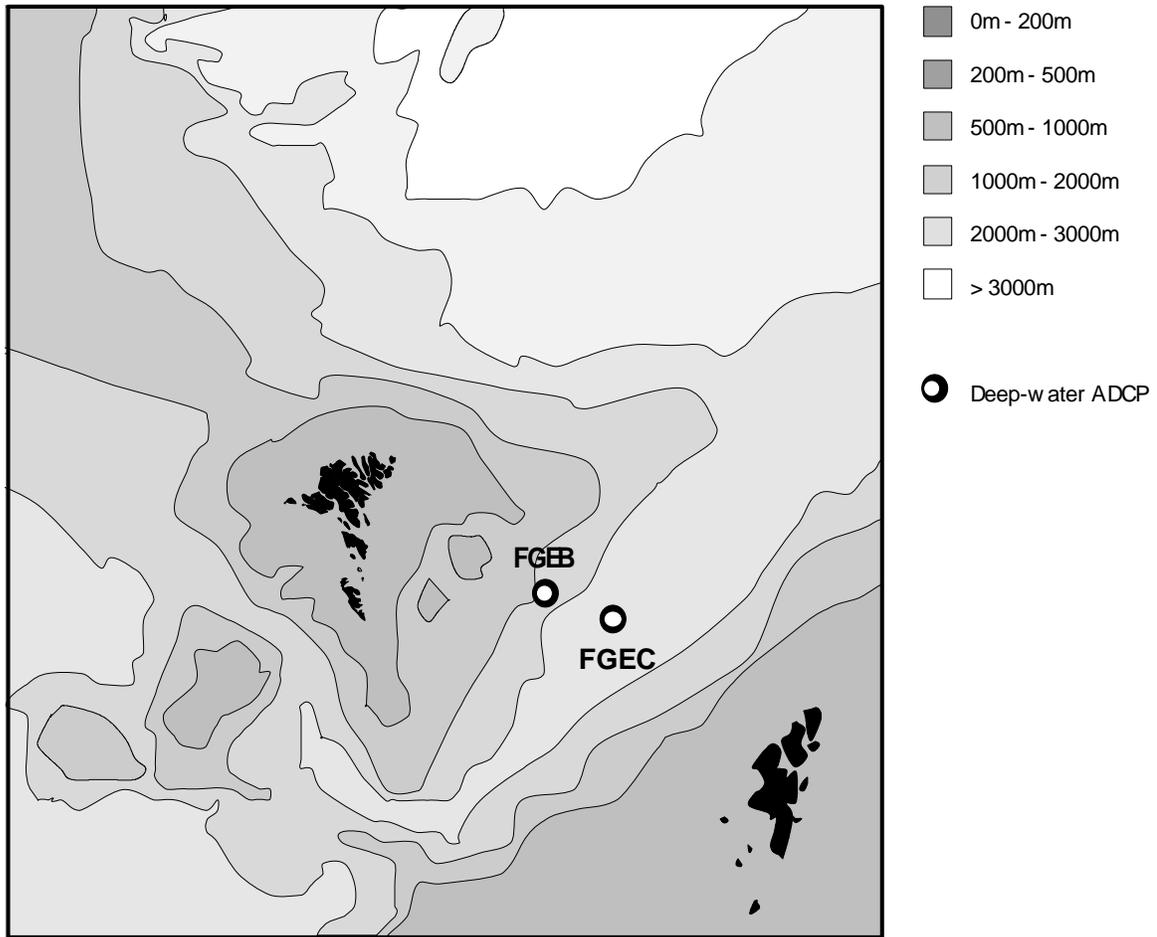

Figure 1. Faroese GEM ADCP mooring sites superposed on a map with the bottom topography. Each site is indicated by a four-letter label.

At each site, 75 kHz RDI Broadband ADCP's were placed in the top of single-point moorings. For each deployment the ADCP measures the velocity averaged over a number (21 - 23) of depth layers ("bins") which were 25m. At 10 minutes intervals the ADCP records the data from all bins into "ensembles". In these deployments, each ensemble is based only upon one ping.

Table 1. List of Faroese GEM ADCP deployments in the period February – June 1999 with information on duration and range of valid data.

Deployment	Bottom depth	Int. min.	Valid data period	Dur. days	No bins	Depthrange	Comments
FGEB9902	779	10	1999 02 21-1999 06 11	109	23	85- 635	
FGEC9902	1195	10	1999 02 22-1999 06 11	109	21	146- 646	

Quality control and calibration

The data 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 Faroese Fisheries Laboratory (FFL), based upon MATLAB. Generally, the series have been edited up to the level where about 50% of the observations were found to be valid. Bins above this level have not been included.

Report format

For each deployment the report contains several pages, beginning with a page that has a drawing of the mooring and details of the deployment. After that there is a page which for each bin lists the average speed (scalar average) and velocity magnitude and direction (vectorial average) as well as the fraction of "good" ensembles (in parts per thousand). On the next page there is a more detailed error statistics for the deployment, which indicates also, how many "long" (i.e. several consecutive ensembles) error gaps are for each bin. 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. Finally, there are 2-3 pages listing tidal constituents. These pages contain 5 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 axes of the tidal ellipse for the constituent as well as its inclination (Fig. 2) and sense of rotation (cyclonic = C, anticyclonic = A). The tidal constants were computed by an adapted version of the Foreman FORTRAN package.
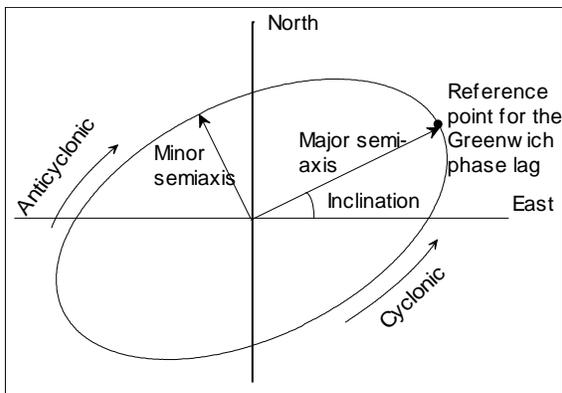
Figure 2. Parameters of the tidal ellipse for a given constituent. The reference point for the Greenwich phase lag is always chosen to be above the east-west axis.

Deployment Id: FGEB9902

Project: GEM - ADCP

Latitude: 61°35.450′N

Longitude: 004°21.880′W

Echo sounding depth: 799m

Bottom depth corr.: 779m

Time of deployment: 21/02 -1999 2135UTC

Time of recovery: 11/06 - 1999 0825UTC

ADCP:

Instrument no.: RDI ADCP 1642

Instrument frequency: 75kHz

Height above bottom: 108m

Depth: 671m (corr.)

Time of first data: 21/02 - 1999 2150UTC

Time of last data: 11/06 - 1999 0820UTC

Sample interval: 10 min

No. of ensembles: 15760

Pings per ens.: 1

Binlength: 25m

Depth of first bin: 635 (corr.)

No. of bins: 28
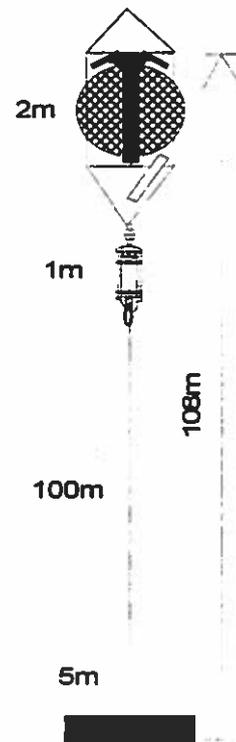
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Deployment: FGEB9902 updated 1999/10/06
Instrument no.:  1642
Instrument freq.:  75
Latitude: 61 35.450 N
Longitude:04 21.880 W
Bottom depth:   779
Instrument depth:  671
Center depth of first bin:  635
Bin length:  25
Number of bins:  23
Number of first ensemble:     606
Time of first ensemble: 1999 02 21 21 50
Number of last ensemble:   16365
Time of last ensemble:  1999 06 11 08 20
Time between ensembles (min.):    10
All directions have been corrected by adding: -11.0
```

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	635	144	168	115	217	992
2	610	169	165	111	217	992
3	585	194	160	106	217	993
4	560	219	157	103	216	995
5	535	244	157	101	216	995
6	510	269	158	99	216	996
7	485	294	161	97	215	995
8	460	319	163	95	215	995
9	435	344	168	96	214	995
10	410	369	177	97	212	994
11	385	394	186	100	210	990
12	360	419	194	107	210	988
13	335	444	203	116	209	989
14	310	469	212	124	208	987
15	285	494	221	129	208	986
16	260	519	227	134	207	981
17	235	544	231	139	207	974
18	210	569	230	141	208	941
19	185	594	223	137	208	851
20	160	619	209	127	209	742
21	135	644	191	111	209	661
22	110	669	181	102	209	588
23	85	694	165	90	209	531

Error statistics for deployment: FGEB9902 updated 1999/10/06

Surface distance not edited
Heading, pitch and roll not edited
Temperature edited by MCP in July 1999
Velocity edited up to and including bin 23 by MCP in July 1999
Intensity edited up to and including bin 24 by MCP in July 1999
Velocity reedited from bin 17 up to bin 23 by KMHL in Oct 1999

Total number of ensembles: 15760
Interval between ensembles: 10 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 num-
ber of gaps of various lengths (gap length = number of consecutive flagged ens.)

Bin	Int. ens. flgd	Velocity ens. flgd	% flgd	Number of velocity gaps of length									
				1	2	3	4	5	6-10	11-20	21-30	31-50	>50
1	0	119	1	119	0	0	0	0	0	0	0	0	0
2	0	124	1	118	3	0	0	0	0	0	0	0	0
3	0	105	1	105	0	0	0	0	0	0	0	0	0
4	0	78	0	76	1	0	0	0	0	0	0	0	0
5	0	79	1	73	3	0	0	0	0	0	0	0	0
6	0	69	0	67	1	0	0	0	0	0	0	0	0
7	0	79	1	74	1	1	0	0	0	0	0	0	0
8	0	78	0	78	0	0	0	0	0	0	0	0	0
9	1	79	1	77	1	0	0	0	0	0	0	0	0
10	0	98	1	90	2	0	1	0	0	0	0	0	0
11	0	159	1	151	4	0	0	0	0	0	0	0	0
12	1	183	1	169	7	0	0	0	0	0	0	0	0
13	0	180	1	165	6	1	0	0	0	0	0	0	0
14	0	209	1	184	8	3	0	0	0	0	0	0	0
15	0	226	1	189	7	2	1	0	2	0	0	0	0
16	0	306	2	218	15	6	2	0	3	1	0	0	0
17	1	409	3	272	26	9	0	2	4	1	0	0	0
18	2	929	6	361	45	18	10	2	14	9	2	2	0
19	0	2350	15	478	72	24	12	12	28	26	7	17	2
20	0	4060	26	449	78	35	23	10	19	26	21	25	19
21	0	5346	34	400	82	39	12	8	25	15	19	19	44
22	0	6494	41	370	65	25	12	2	22	14	13	13	65
23	0	7392	47	565	122	50	20	13	24	16	15	12	68

Deployment: FGEB9902

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	635	685	320	120	36	9	1	1	0	0	0	0	0	0	0	0	0	0	0
2	610	679	306	112	34	8	1	0	0	0	0	0	0	0	0	0	0	0	0
3	585	665	294	105	30	5	1	0	0	0	0	0	0	0	0	0	0	0	0
4	560	649	290	102	28	4	1	0	0	0	0	0	0	0	0	0	0	0	0
5	535	656	284	102	26	6	1	0	0	0	0	0	0	0	0	0	0	0	0
6	510	670	280	102	28	6	1	0	0	0	0	0	0	0	0	0	0	0	0
7	485	683	285	102	28	7	1	0	0	0	0	0	0	0	0	0	0	0	0
8	460	684	302	106	31	6	1	0	0	0	0	0	0	0	0	0	0	0	0
9	435	696	326	116	34	9	2	0	0	0	0	0	0	0	0	0	0	0	0
10	410	730	354	132	41	12	2	1	0	0	0	0	0	0	0	0	0	0	0
11	385	754	379	150	50	16	3	0	0	0	0	0	0	0	0	0	0	0	0
12	360	760	408	171	64	22	5	0	0	0	0	0	0	0	0	0	0	0	0
13	335	777	436	195	71	25	6	1	0	0	0	0	0	0	0	0	0	0	0
14	310	796	466	215	90	29	7	2	0	0	0	0	0	0	0	0	0	0	0
15	285	809	488	239	102	35	11	3	0	0	0	0	0	0	0	0	0	0	0
16	260	810	503	255	112	42	14	5	1	0	0	0	0	0	0	0	0	0	0
17	235	805	500	270	125	49	19	7	1	0	0	0	0	0	0	0	0	0	0
18	210	745	476	264	129	53	19	8	2	0	0	0	0	0	0	0	0	0	0
19	185	639	409	232	114	50	20	9	3	1	0	0	0	0	0	0	0	0	0
20	160	524	327	185	89	40	18	10	3	1	0	0	0	0	0	0	0	0	0
21	135	426	261	140	65	32	15	8	3	1	0	0	0	0	0	0	0	0	0
22	110	358	214	115	57	28	13	6	3	0	0	0	0	0	0	0	0	0	0
23	85	290	166	92	49	23	12	6	2	1	0	0	0	0	0	0	0	0	0

Harmonic constants for constituent M2 for deployment FGEB9902.

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	635	84	230	71	253	108	21	40	240	C
02	610	81	230	72	254	106	22	41	241	C
03	585	81	231	72	254	106	22	42	241	C
04	560	80	231	75	254	108	21	43	242	C
05	535	82	234	77	252	112	17	43	243	C
06	510	83	238	82	250	116	12	44	244	C
07	485	84	241	85	249	119	8	45	245	C
08	460	83	244	90	249	122	5	48	246	C
09	435	83	249	97	249	128	1	49	249	A
10	410	84	256	108	249	136	9	52	252	A
11	385	83	262	114	249	140	15	54	254	A
12	360	79	266	117	252	140	17	56	256	A
13	335	75	270	121	254	142	18	59	258	A
14	310	76	273	123	254	144	21	59	259	A
15	285	80	276	124	255	146	24	58	261	A
16	260	79	277	126	254	147	26	59	260	A
17	235	78	276	122	253	143	26	58	259	A
18	210	75	277	113	253	134	26	57	260	A
19	185	70	278	108	252	126	26	58	259	A
20	160	62	273	97	254	114	18	58	259	A
21	135	53	272	79	254	94	14	57	260	A
22	110	47	262	77	248	89	10	59	252	A
23	85	36	263	66	246	74	9	62	249	A

Harmonic constants for constituent S2 for deployment FGEB9902.

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	635	38	282	31	277	49	2	39	280	A
02	610	36	282	31	280	48	1	41	281	A
03	585	35	282	32	280	48	1	42	281	A
04	560	35	285	33	281	49	2	43	283	A
05	535	36	289	35	282	51	3	44	285	A
06	510	35	291	37	284	51	3	46	288	A
07	485	35	294	38	286	52	3	48	290	A
08	460	33	295	38	289	50	2	49	292	A
09	435	30	294	38	294	48	0	52	294	A
10	410	28	295	39	297	48	0	54	296	C
11	385	26	299	42	297	49	1	59	297	A
12	360	24	306	46	294	51	4	63	296	A
13	335	24	310	47	291	52	7	63	295	A
14	310	25	309	46	291	52	7	62	295	A
15	285	24	312	46	297	52	6	63	300	A
16	260	21	306	45	296	49	3	65	298	A
17	235	20	294	42	291	46	1	65	292	A
18	210	20	290	36	288	41	1	61	289	A
19	185	23	302	39	290	45	4	60	293	A
20	160	23	316	34	299	40	5	56	305	A
21	135	22	306	32	305	39	0	56	306	A
22	110	19	289	29	282	34	2	57	284	A
23	85	16	274	30	257	33	4	63	261	A

Harmonic constants for constituent N2 for deployment FGEB9902.

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	635	20	253	31	233	37	6	58	239	A
02	610	22	260	33	231	39	9	58	240	A
03	585	23	263	34	230	39	11	58	239	A
04	560	21	263	33	229	38	10	60	238	A
05	535	19	258	30	232	35	7	59	239	A
06	510	18	253	29	233	34	5	59	238	A
07	485	17	255	29	238	33	4	60	243	A
08	460	17	257	27	237	32	5	59	242	A
09	435	17	244	24	235	29	2	56	238	A
10	410	15	234	23	237	27	1	58	236	C
11	385	13	231	22	240	26	2	61	238	C
12	360	13	233	23	238	27	1	60	237	C
13	335	15	225	19	235	24	2	52	231	C
14	310	15	214	17	235	23	4	49	226	C
15	285	16	210	18	234	24	5	48	224	C
16	260	18	217	19	234	26	4	47	226	C
17	235	16	210	17	238	23	5	47	225	C
18	210	14	203	19	243	23	8	56	230	C
19	185	11	219	18	256	21	6	62	247	C
20	160	13	225	17	255	21	5	53	244	C
21	135	10	224	16	228	19	1	58	227	C
22	110	9	220	13	230	16	1	55	227	C
23	85	10	200	16	213	18	2	59	210	C

Harmonic constants for constituent O1 for deployment FGEB9902.

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	635	3	87	13	2	13	3	89	3	A
02	610	3	73	13	3	13	3	86	3	A
03	585	2	46	12	7	12	2	80	9	A
04	560	3	37	11	11	11	1	76	12	A
05	535	2	3	12	0	12	0	81	0	A
06	510	2	334	9	359	10	1	78	358	C
07	485	3	314	7	353	7	2	70	348	C
08	460	6	324	8	327	10	0	53	326	C
09	435	8	343	10	330	13	1	52	335	A
10	410	8	1	13	335	15	3	59	342	A
11	385	5	21	13	337	13	3	75	340	A
12	360	5	41	14	336	14	5	79	340	A
13	335	5	73	11	347	11	5	88	348	A
14	310	5	90	7	343	7	5	110	330	A
15	285	3	72	5	327	5	2	100	322	A
16	260	2	30	7	335	8	2	79	338	A
17	235	1	355	6	321	6	1	81	322	A
18	210	2	92	2	304	3	1	147	282	A
19	185	6	95	3	303	6	1	155	280	A
20	160	0	268	11	8	11	0	90	8	C
21	135	4	242	9	45	10	1	114	48	C
22	110	9	252	9	350	9	8	133	29	C
23	85	7	261	6	58	9	2	138	71	C

Harmonic constants for constituent K1 for deployment FGEB9902.

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	635	3	130	5	152	6	1	59	146	C
02	610	4	119	8	152	8	2	63	145	C
03	585	3	130	9	161	9	2	71	157	C
04	560	5	158	7	144	9	1	57	148	A
05	535	7	171	10	143	12	3	57	152	A
06	510	6	187	11	149	12	3	65	157	A
07	485	5	183	12	156	13	2	67	160	A
08	460	5	211	13	164	13	3	75	167	A
09	435	6	247	15	170	15	6	84	172	A
10	410	6	272	13	179	13	6	92	179	A
11	385	6	292	11	186	11	5	101	180	A
12	360	2	300	11	153	11	1	99	152	A
13	335	3	85	12	109	12	1	78	108	C
14	310	4	56	12	100	12	3	74	96	C
15	285	4	10	9	111	9	4	95	113	C
16	260	3	336	9	115	9	2	104	117	C
17	235	2	349	12	116	12	2	97	117	C
18	210	5	12	13	89	13	5	84	87	C
19	185	7	334	9	57	9	7	78	48	C
20	160	13	323	23	352	26	6	61	345	C
21	135	22	304	45	324	50	7	65	321	C
22	110	27	307	54	317	60	4	64	315	C
23	85	29	296	60	313	66	8	65	310	C

Deployment Id: FGEC9902

Project: GEM - ADCP

Latitude: 61°32.540′N

Longitude: 003°59.830′W

Echo sounding depth: 1210m

Bottom depth corr.: 1195m

Time of deployment: 22/02 -1999 0001UTC

Time of recovery: 11/06 - 1999 1037UTC

ADCP:

Instrument no.: RDI ADCP 1644

Instrument frequency: 75kHz

Height above bottom: 513m

Depth: 682m (corr.)

Time of first data: 22/02 - 1999 0030UTC

Time of last data: 11/06 - 1999 1030UTC

Sample interval: 10 min

No. of ensembles: 15757

Pings per ens.: 1

Binlength: 25m

Depth of first bin: 646m (corr.)

No. of bins: 28

2m

500m   513m

5m

1m

5m

Deployment: FGEC9902 updated 1999/10/07
Instrument no.: 1644
Instrument freq.: 75
Latitude: 61 32.540 N
Longitude:03 59.830 W
Bottom depth: 1195
Instrument depth: 682
Center depth of first bin: 646
Bin length: 25
Number of bins: 21
Number of first ensemble: 622
Time of first ensemble: 1999 02 22 00 30
Number of last ensemble: 16378
Time of last ensemble: 1999 06 11 10 30
Time between ensembles (min.): 10
All directions have been corrected by adding: -11.0

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	646	549	123	24	224	994
2	621	574	124	25	223	994
3	596	599	125	26	221	996
4	571	624	125	27	218	995
5	546	649	127	28	215	996
6	521	674	130	30	211	997
7	496	699	132	31	206	996
8	471	724	139	33	202	997
9	446	749	145	32	199	996
10	421	774	152	33	196	996
11	396	799	158	34	192	991
12	371	824	166	34	190	989
13	346	849	177	41	193	989
14	321	874	191	47	195	985
15	296	899	207	48	194	979
16	271	924	221	49	193	964
17	246	949	237	55	196	931
18	221	974	257	62	199	881
19	196	999	269	56	198	724
20	171	1024	282	44	200	562
21	146	1049	289	33	195	463

Error statistics for deployment: FGEC9902 updated 1999/10/07

Surface distance not edited
Heading, pitch and roll not edited
Temperature edited by MCP in July 1999
Velocity edited up to and including bin 22 by MCP in July 1999
Intensity edited up to and including bin 23 by MCP in July 1999
Velocity reedited from bin 15 up to bin 22 by KMHL in Oct 1999

Total number of ensembles: 15757
Interval between ensembles: 10 min
Original number of bins: 28
Number of acceptable velocity bins: 21
Number of acceptable intensity bins: 21

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 num-
ber of gaps of various lengths (gap length = number of consecutive flagged ens.)

Bin	Int. ens. flgd	Velocity ens. flgd	% flgd	Number of velocity gaps of length									
				1	2	3	4	5	6-10	11-20	21-30	31-50	>50
1	3	87	1	87	0	0	0	0	0	0	0	0	0
2	0	92	1	81	4	1	0	0	0	0	0	0	0
3	1	65	0	65	0	0	0	0	0	0	0	0	0
4	0	75	0	71	2	0	0	0	0	0	0	0	0
5	1	59	0	59	0	0	0	0	0	0	0	0	0
6	0	41	0	41	0	0	0	0	0	0	0	0	0
7	1	60	0	60	0	0	0	0	0	0	0	0	0
8	0	43	0	43	0	0	0	0	0	0	0	0	0
9	0	64	0	62	1	0	0	0	0	0	0	0	0
10	1	66	0	66	0	0	0	0	0	0	0	0	0
11	1	136	1	132	2	0	0	0	0	0	0	0	0
12	0	169	1	144	11	1	0	0	0	0	0	0	0
13	0	174	1	157	7	1	0	0	0	0	0	0	0
14	1	232	1	214	9	0	0	0	0	0	0	0	0
15	1	329	2	218	25	2	2	1	1	2	0	0	0
16	0	574	4	279	29	13	8	3	5	4	2	0	0
17	0	1088	7	392	75	34	17	6	26	12	0	0	0
18	0	1877	12	489	122	40	30	16	47	22	5	1	0
19	0	4350	28	522	162	94	41	27	99	49	15	22	4
20	0	6900	44	424	130	71	40	37	97	45	22	29	40
21	1	8458	54	348	130	69	42	38	79	21	14	18	75

Deployment: FGEC9902

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	646	560	151	18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	621	572	155	19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	596	580	155	19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	571	581	156	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	546	589	162	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	521	600	176	25	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	496	604	189	28	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	471	632	220	37	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	446	660	244	46	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	421	681	274	62	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	396	696	295	72	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12	371	713	323	90	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0
13	346	731	364	122	34	7	1	0	0	0	0	0	0	0	0	0	0	0	0
14	321	758	409	161	51	12	1	0	0	0	0	0	0	0	0	0	0	0	0
15	296	786	460	206	67	18	2	0	0	0	0	0	0	0	0	0	0	0	0
16	271	801	488	241	89	29	5	0	0	0	0	0	0	0	0	0	0	0	0
17	246	791	509	280	114	42	10	1	0	0	0	0	0	0	0	0	0	0	0
18	221	761	525	314	145	56	18	2	0	0	0	0	0	0	0	0	0	0	0
19	196	635	453	285	140	58	17	4	1	0	0	0	0	0	0	0	0	0	0
20	171	498	362	233	123	62	23	7	2	1	0	0	0	0	0	0	0	0	0
21	146	408	299	198	111	56	25	6	2	0	0	0	0	0	0	0	0	0	0

Harmonic constants for constituent M2 for deployment FGEC9902.

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	646	87	262	98	251	131	12	48	256	A
02	621	89	262	100	251	133	12	48	256	A
03	596	88	262	99	252	132	10	49	256	A
04	571	85	261	97	254	129	8	49	257	A
05	546	83	261	96	255	127	6	49	258	A
06	521	81	261	97	258	126	3	50	259	A
07	496	80	260	98	258	126	3	51	259	A
08	471	80	260	98	257	126	4	51	258	A
09	446	79	260	97	257	125	3	51	258	A
10	421	81	262	99	256	128	6	51	258	A
11	396	80	261	97	258	125	4	50	259	A
12	371	75	261	97	262	123	1	52	261	C
13	346	71	261	98	265	120	4	54	264	C
14	321	69	261	98	264	120	3	55	263	C
15	296	68	262	98	264	119	1	55	263	C
16	271	68	263	97	264	118	2	55	264	C
17	246	67	262	97	265	118	3	55	264	C
18	221	63	264	99	266	117	2	57	265	C
19	196	61	265	90	275	108	9	56	272	C
20	171	61	249	82	284	98	30	55	272	C
21	146	69	241	63	296	83	44	40	265	C

Harmonic constants for constituent S2 for deployment FGEC9902.

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	646	35	303	37	289	50	6	47	296	A
02	621	32	306	37	293	49	6	49	299	A
03	596	29	306	37	296	47	4	52	300	A
04	571	30	305	38	297	48	4	52	300	A
05	546	30	308	39	296	49	5	53	301	A
06	521	28	310	40	301	49	4	54	304	A
07	496	25	311	39	305	46	2	57	307	A
08	471	25	312	41	309	48	1	59	309	A
09	446	23	312	40	310	46	1	60	311	A
10	421	23	309	38	313	44	1	60	312	C
11	396	21	303	36	317	42	4	60	313	C
12	371	23	290	34	315	40	8	56	307	C
13	346	24	281	31	312	38	10	54	301	C
14	321	23	289	31	303	38	5	53	298	C
15	296	25	299	30	301	39	1	50	300	C
16	271	25	302	28	304	38	1	48	303	C
17	246	22	286	28	300	35	4	53	295	C
18	221	23	284	24	303	33	6	47	295	C
19	196	21	296	31	320	37	7	56	312	C
20	171	6	299	32	343	32	4	82	342	C
21	146	14	91	16	2	16	14	87	5	A

Harmonic constants for constituent N2 for deployment FGEC9902.

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	646	30	247	27	215	39	11	41	233	A
02	621	31	246	27	214	39	11	41	232	A
03	596	30	244	26	214	39	10	41	231	A
04	571	29	245	26	218	38	9	41	233	A
05	546	29	251	28	221	39	10	43	237	A
06	521	28	256	30	226	39	11	47	240	A
07	496	25	249	27	227	36	7	48	237	A
08	471	23	238	22	226	31	3	43	232	A
09	446	20	227	17	230	27	1	41	228	C
10	421	17	219	17	245	23	5	46	232	C
11	396	11	207	18	260	20	8	67	251	C
12	371	9	192	20	275	20	9	86	273	C
13	346	8	173	21	280	21	8	98	283	C
14	321	8	167	19	274	19	8	99	277	C
15	296	9	195	19	260	20	8	76	254	C
16	271	10	211	22	252	23	6	70	247	C
17	246	8	204	23	264	23	7	79	260	C
18	221	5	162	21	283	21	4	97	284	C
19	196	15	182	33	310	34	11	108	316	C
20	171	23	182	35	292	36	21	109	303	C
21	146	10	253	41	303	41	8	81	301	C

Harmonic constants for constituent O1 for deployment FGEC9902.

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	646	5	360	7	344	8	1	53	350	A
02	621	4	9	6	343	7	2	56	351	A
03	596	5	4	7	338	8	2	59	345	A
04	571	5	8	7	340	9	2	56	349	A
05	546	5	4	7	339	9	2	56	347	A
06	521	6	348	6	345	8	0	46	347	A
07	496	6	356	6	342	8	1	44	349	A
08	471	5	5	7	351	9	1	55	355	A
09	446	5	351	7	2	8	1	58	359	C
10	421	7	345	5	337	8	0	34	342	A
11	396	6	13	6	314	8	4	42	346	A
12	371	5	21	6	336	7	3	49	355	A
13	346	4	359	8	14	9	1	61	10	C
14	321	5	21	10	2	11	1	65	5	A
15	296	4	354	7	336	8	1	63	339	A
16	271	5	360	6	340	8	1	52	347	A
17	246	6	355	7	340	9	1	46	347	A
18	221	7	53	11	328	11	7	85	331	A
19	196	8	78	5	185	8	5	162	247	C
20	171	6	252	14	164	14	6	89	165	A
21	146	25	279	43	169	44	23	106	160	A

Harmonic constants for constituent K1 for deployment FGEC9902.

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	646	2	234	7	172	7	2	82	174	A
02	621	3	178	6	171	6	0	66	172	A
03	596	3	173	8	164	9	0	69	165	A
04	571	4	173	8	167	8	0	65	168	A
05	546	5	171	7	166	9	0	56	168	A
06	521	4	171	8	156	9	1	65	159	A
07	496	5	171	9	138	10	3	63	146	A
08	471	4	182	9	154	10	2	70	158	A
09	446	5	176	11	164	12	1	68	165	A
10	421	5	232	11	167	11	4	76	173	A
11	396	5	236	8	169	8	4	74	177	A
12	371	4	227	8	143	8	4	86	145	A
13	346	5	231	13	122	13	5	98	119	A
14	321	3	262	9	103	10	1	106	101	A
15	296	4	318	2	78	4	2	157	127	C
16	271	6	280	3	61	6	2	157	94	C
17	246	2	197	12	116	12	2	88	116	A
18	221	10	154	29	114	30	6	75	117	A
19	196	4	158	22	133	22	2	80	134	A
20	171	22	50	8	74	24	3	19	52	C
21	146	64	36	13	300	64	13	179	216	A