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Principal Component Analysis of ADCP and Moored CTD Data in Three Parts with Variations: Lancaster Sound

by

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Contents

Abstract

van der Baaren, A. and S. J. Prinsenberg. 2006. Principal Component Analysis of ADCP and Moored CTD Data in Three Parts with Variations: Lancaster Sound. *Can. Tech. Rep. Hydrogr. Ocean Sci. 246*: x+313 p.

A continuation of the study in low frequency variability in Lancaster Sound (van der Baaren et al, 2003) is presented. This report describes principal component analyses (PCA) of ADCP data measured in Lancaster Sound from 1998 to 2002 where PCA was performed using all depth bins for time series of three years (1998-2001); PCA of data from 2001-2002; and PCA using ADCP and moored conductivity, temperature, and depth (CTD) profiler data from 1998-2002 at selected depths. The variance accounted for by the first four modes is similar to results given in van der Baaren et al (2003).

Résumé

van der Baaren, A. et Prinsenberg, S. J. « Principal Component Analysis of ADCP and Moored CTD Data in Three Parts with Variations: Lancaster Sound ». Dans *Can. Tech. Rep. Hydrogr. Ocean Sci.* n^{o} 246 (2006), x + 313 p.

Le présent rapport porte sur la poursuite de l’étude de la variabilité des basses fréquences dans le détroit de Lancaster (van der Baaren *et al*, 2003). On y décrit les analyses en composantes principales (ACP) des données d’ADCP recueillies dans le détroit de Lancaster de 1998 à 2002. Cette analyse a été effectuée d’après toutes les plages de profondeurs rattachées à des séries chronologiques de trois ans (de 1998 à 2001), ainsi qu’au moyen de données recueillies de 2001 à 2002, de données d’ADCP et de données de conductivité, de température et de profondeur (CTP) obtenues avec un profileur amarré de 1998 à 2002, à des profondeurs choisies. L’écart pour les quatre premiers modes est similaire aux résultats présentés par van der Baaren *et al* (2003).

Preface

Lancaster Sound is found in the Canadian Arctic Archipelago (Figure A). It is 75 km wide (north to south) and is a connecting passage between the Arctic Ocean and the northwest Atlantic. It is felt that the transport through Lancaster Sound is important to understanding climate variability in the Arctic (Prinsenberg and Hamilton, 2005; Prinsenberg and Bennett, 1987). To more closely investigate the transport and other processes in the region, an extensive array of oceanographic instruments has been deployed there since 1998 as part of a long-term study (Hamilton et al. 2002; 2003; 2004). One of these mooring arrays is shown in Figure B when only moorings at the south and north shores were deployed. Later, in 2001-2002, additional moorings ¼ way across and ½ way across the sound were added for completeness. The data reports published by Hamilton et al describe each year's mooring configuration.

van der Baaren et al. (2003) published a technical report describing long-term variability within Lancaster Sound. Data for this study were from ADCP and moored CTD (Microcat) instruments from the 1998-2001 field seasons. This current report is a follow-up of the 2003 report. The method of principal component analysis (PCA) used in the 2003 report is extended to include all the bin depths of the 1998-2001 ADCP data (Part 1). Also in Part 1, the 2000-2001 field season data are analysed with PCA of only ADCP data for 3 depth regions in the south and 3 depth regions in the north. In Part 2 the 1998-2002 ADCP data are analysed similarly for only the south shore mooring at 4 depth regions. Finally, in Part 3, 2001-2002 ADCP and Microcat data are analysed using PCA for selected depths and 1998-2002 ADCP and Microcat data are analysed with PCA at 2 depths in the south. Each part of this report will contain a brief description of the mooring data, analysis, and results.

ADCP data were resolved to alongshore components (eastward to 105^o). It was not possible to obtain an accompanying cross-channel current for 1998-2001 since ADCP direction data were missing for a large part of 2000 due to compass failure (Hamilton et al., 2003). Only using alongshore currents was judged adequate because previous studies had observed currents to be mostly parallel to shore (Prinsenberg, 1998) and Hamilton et al. (2002, 2003) showed that the variance of the alongshore current was close to 4 or 5 times that of the cross-strait variance.

The moored Microcat data from the same moorings and from moorings adjacent to the ADCP sites also resulted in virtually continuous yearly records for up to four years.

The ADCP and Microcat data were collected from separate moorings that were replaced annually over the four years 1998-2002. Times of recovery and consequent redeployment of the instruments produced gaps (10-14 days) in what would have been continuous yearly data records. The ADCP data had their gaps filled by a tidal prediction based on analysis of adjacent records (Roger Pettipas, personal communication). For the Microcat CTD data, averaging the data for the day prior to and the day following the start and end of each gap and then linearly interpolating between these two average values completed the multi-year time series. Since interest was in periods longer than 2 weeks, a more comprehensive approach such as that which was used for the ADCP data was not necessary.

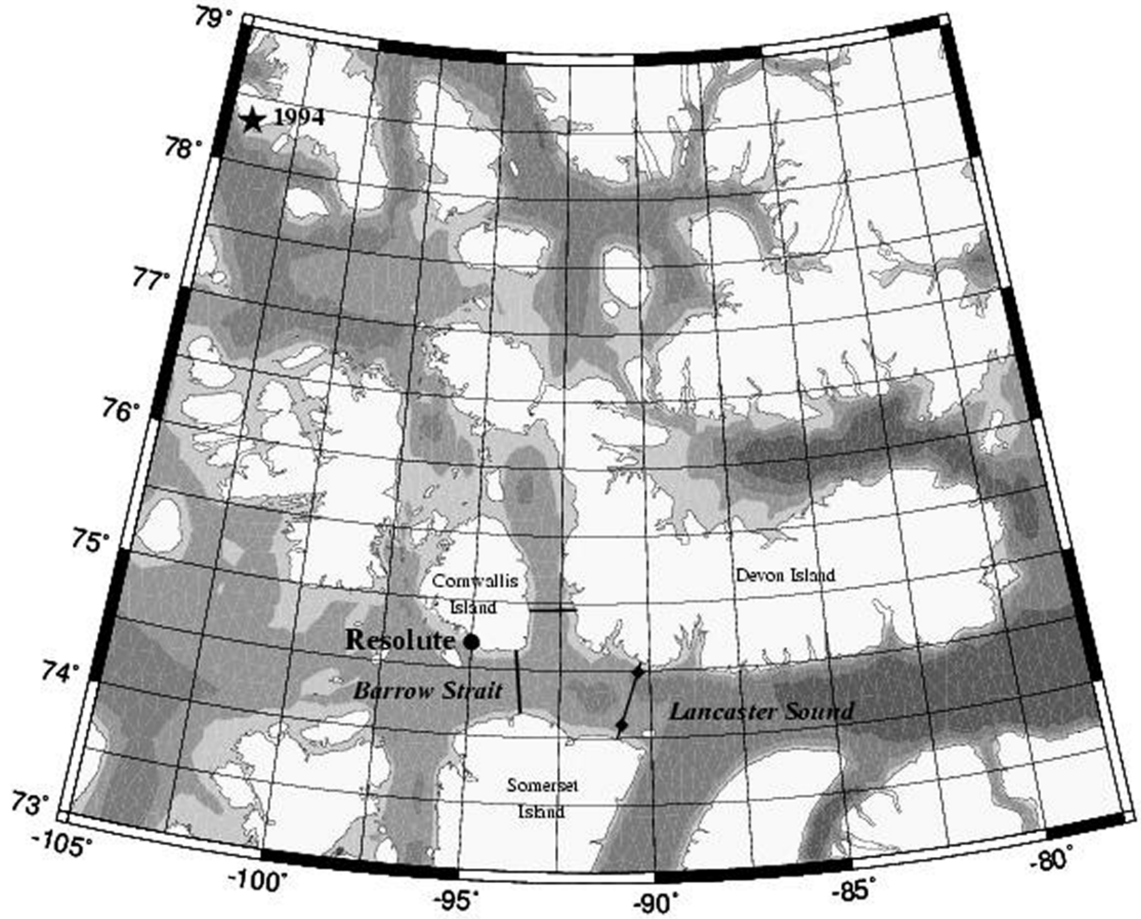

Figure A Location of data transects (black lines) in Canadian Arctic Archipelago including Lancaster Sound. Mooring locations for 1998-2001 are depicted by small dots; 2001-2002 moorings include 2 sites between the small dots.

ADCP "raw" time series were 2-hourly. Data were low-pass filtered and decimated to 14-day time intervals. Cross-correlations were performed for parameters of interest (normally horizontal velocity and/or density at various depths). The variance of the data records was computed and PCA performed as described in each section. For details of data processing and analysis, the reader is asked to consult closely van der Baaren et al (2003) since the analysis in this report follows the same procedure (in some cases skipping the spectral analysis). In Part 2, however, due to the change in mooring configurations extra processing to determine the principal axis of variance is included. Therefore, if processing deviates from the methods described in van der Baaren et al (2003) it will be described here in the appropriate section. Lastly, for all sections, data from the uppermost ADCP bins has been found to be questionable. These data were not included in PCA unless stated in the text.

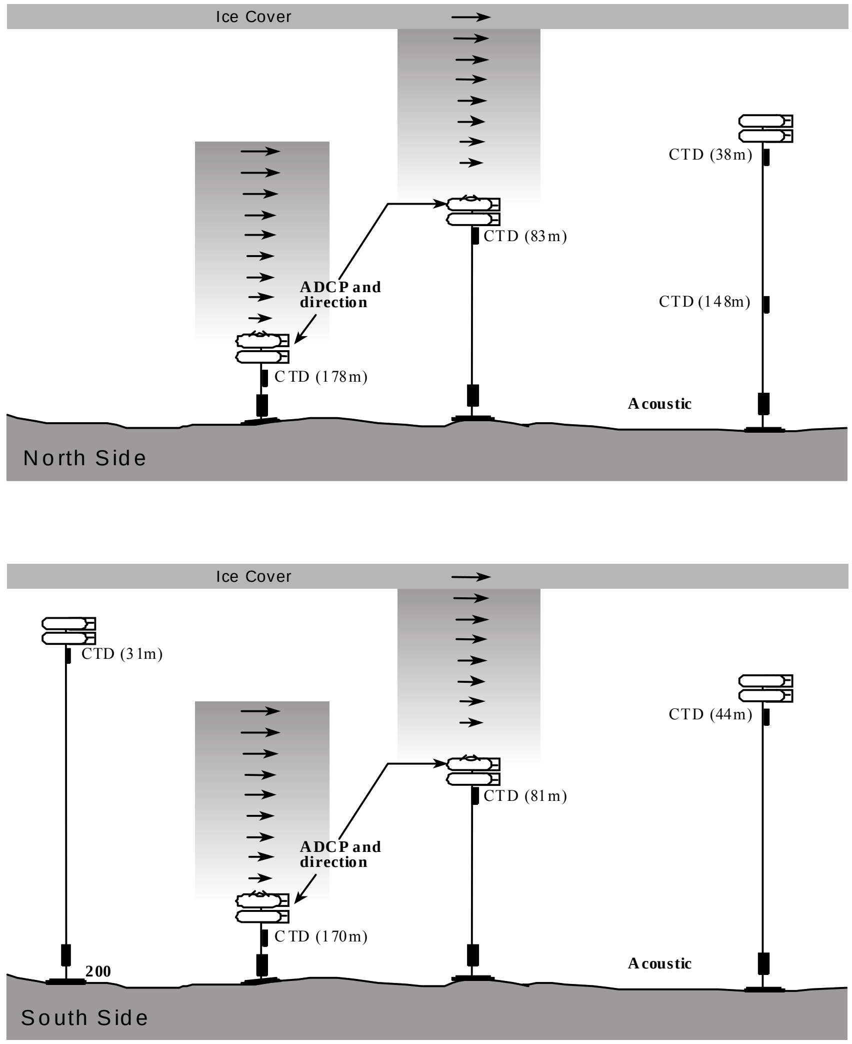

Figure B Mooring diagram showing instruments which sampled the data used in this study (amended from Hamilton et al., 2002).

References

Hamilton, J., S. Prinsenberg, and L. Malloch, 2002. Moored current meter and CTD observations from Barrow Strait, 1998-1999. *Can. Data Rep. Hydrogr. Ocean Sci*. 157: v+65 p.

Hamilton, J., S. Prinsenberg, and L. Malloch, 2003. Moored current meter and CTD observations from Barrow Strait, 1999-2000. *Can. Data Rep. Hydrogr. Ocean Sci*. 161: v+60 p.

Hamilton, J., S. Prinsenberg, and L. Malloch, 2004. Moored current meter and CTD observations from Barrow Strait, 2000-2001. *Can. Data Rep. Hydrogr. Ocean Sci*. 165: v+59 p.

Prinsenberg, S. J. and J. Hamilton, 2005. "Monitoring the volume, freshwater, and heat fluxes passing through Lancaster Sound of the Canadian Arctic Archipelago", *Atmos-Ocean*, 43(1), 1-22.

Prinsenberg, S. J. and E. B. Bennett, 1987. "Mixing and transports in Barrow Strait, the central part of the Northwest Passage". *Continental Shelf Research*, Vol. 7, No. 8, pp. 913-935.

Van der Baaren, A., B. Petrie, and S. J. Prinsenberg, 2003. Low Frequency Variability in Lancaster Sound. *Can. Tech. Rep. Hydrogr. Ocean Sci.* 233: xii+124 p.

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Part 1 Principal Component Analysis of ADCP data from Lancaster Sound; 1998 – 2001 At All Bin Depths

1.1 Analysis and Results

In this section, PCA was performed on 1998-2001 (3 years) ADCP data only using all bin depths. In van der Baaren et al. (2003), PCA of ADCP data was performed on three representative depths. The present analysis was performed to see the difference, if any, obtained when using finer vertical resolution.

1.1.1 Summary

Briefly, results of the PCA summarize as follows:

- The south shore mode 1 accounts for >90% for all depths > 25 m except at 73 m (83%) and mode 2 accounts for 96-99% for all depths except at 73 m (83%).
- The north shore mode 1 accounts for 77-95% of variance <62 m; 70-90% of variance from 62 m – 74 m; and 9-43% for > 75 m.
- The north shore mode 2 accounts for >90% for <74 m and 63-96% for >74 m.

1.1.2 Tables of data variance

Table 1-1 Variance of north shore data for all bins, 14-day sampling interval

Variance : north shore							
		using 1 mode		using 2 modes		using 3 modes	
Depth (m)	Original series	Residual	% var.	Residual	% var.	Residual	% var.
18	7083.2693	1567.1825	77.8749	357.9657	94.9463	200.7362	97.1661
22	6715.9147	1267.1685	81.1319	211.5480	96.8500	96.1731	98.5680
26	6227.4710	1041.4389	83.2767	128.2344	97.9408	49.4401	99.2061
30	5631.0986	812.8978	85.5641	77.1392	98.6301	33.6236	99.4029
34	4946.5473	586.4262	88.1447	45.3365	99.0835	34.2291	99.3080
38	3979.6117	394.5813	90.0849	89.2788	97.7566	89.2779	97.7566
42	3949.9998	281.0635	92.8845	68.8696	98.2565	63.9734	98.3804
46	3544.8791	197.7370	94.4219	101.1596	97.1463	81.1251	97.7115
50	3144.5507	156.9890	95.0076	129.7393	95.8742	91.6979	97.0839
54	2806.2765	149.0583	94.6884	148.4284	94.7108	95.3470	96.6024
58	2550.7855	176.3409	93.0868	165.3037	93.5195	97.7534	96.1677
62	2282.3479	227.3425	90.0391	171.2408	92.4972	98.7702	95.6724
66	2042.4089	301.7727	85.2247	169.0360	91.7237	101.7004	95.0206
70	1907.5439	395.3578	79.2740	169.3430	91.1225	106.9876	94.3913
74	1836.8287	497.9248	72.8922	166.2915	90.9468	113.7867	93.8053
78	3279.8053	1880.3084	42.6701	1210.5675	63.0903	493.1196	84.9650
82	2609.1465	1484.9718	43.0859	534.8067	79.5026	220.1309	91.5631
86	2363.4552	1478.5590	37.4408	446.9818	81.0878	394.2534	83.3188
90	2483.0464	1599.6213	35.5783	506.8562	79.5873	390.8403	84.2596
94	1842.6683	1154.5989	37.3409	176.7285	90.4091	176.7084	90.4102
98	1706.6542	1104.8109	35.2645	107.5417	93.6987	103.9690	93.9080
102	1620.0694	1058.9445	34.6359	68.4791	95.7731	58.8271	96.3689
106	1597.8450	1086.5470	31.9992	57.9228	96.3749	33.6057	97.8968
110	1556.2210	1107.8550	28.8112	68.6370	95.5895	21.6742	98.6073
114	1522.8363	1130.1487	25.7866	95.4340	93.7331	14.4715	99.0497
118	1486.5004	1139.4046	23.3499	128.4021	91.3621	11.2738	99.2416
122	1425.4863	1123.9379	21.1541	163.2829	88.5455	12.3676	99.1324

Variance : north shore							
		using 1 mode		using 2 modes		using 3 modes	
Depth (m)	Original series	Residual	% var.	Residual	% var.	Residual	% var.
126	1345.3458	1091.6906	18.8543	199.2988	85.1861	16.9274	98.7418
130	1251.9268	1049.5851	16.1624	231.6757	81.4945	23.9266	98.0888
134	1147.0004	986.8610	13.9616	263.1868	77.0543	37.0625	96.7687
142	1122.7429	970.5030	13.5596	406.6913	63.7770	156.7827	86.0357
146	871.6190	793.3136	8.9839	311.3452	64.2797	100.7195	88.4445

Table 1-2 Variance of south shore data for all bins, 14-day sampling interval

Variance : south shore							
		using 1 mode		using 2 modes		using 3 modes	
Depth (m)	Original series	Residual	% var.	Residual	% var.	Residual	% var.
17	14307.0412	3149.8989	77.9836	285.2513	98.0062	254.3682	98.2221
21	13487.6382	2255.6192	83.2764	125.0349	99.0730	92.3913	99.3150
25	12916.7988	1657.2743	87.1696	52.1384	99.5964	32.1699	99.7509
29	12558.3552	1220.6484	90.2802	31.8257	99.7466	17.8495	99.8579
33	12314.7376	900.6628	92.6863	35.0335	99.7155	26.3952	99.7857
37	12115.0353	693.7124	94.2740	46.1649	99.6189	42.4831	99.6493
41	11983.7890	523.2668	95.6335	53.9067	99.5502	52.1626	99.5647
45	11886.9153	389.8344	96.7205	67.3464	99.4334	66.3425	99.4419
49	11782.2041	282.1685	97.6051	77.5028	99.3422	77.3558	99.3435
53	11649.1474	206.2995	98.2291	88.4490	99.2407	87.9837	99.2447
57	11591.6805	150.3547	98.7029	92.7946	99.1995	91.3028	99.2123
61	11451.1162	112.5367	99.0172	91.8481	99.1979	89.9691	99.2143
65	11386.5338	86.6648	99.2389	82.9143	99.2718	81.5976	99.2834
69	11314.5334	75.2557	99.3349	74.6863	99.3399	74.2166	99.3441
73	12708.7388	2122.3300	83.3002	2122.1967	83.3013	300.8646	97.6326
77	11930.9619	848.9542	92.8844	781.5451	93.4494	323.5161	97.2884
81	12021.9623	593.8635	95.0602	517.3006	95.6970	428.0000	96.4398
85	11590.6902	493.1298	95.7455	337.2400	97.0904	305.1035	97.3677
89	11260.1503	311.0943	97.2372	145.4214	98.7085	126.0344	98.8807
93	11396.2600	453.3382	96.0220	197.8162	98.2642	181.1713	98.4103
97	10960.0124	311.5902	97.1570	68.4502	99.3755	67.9399	99.3801
101	10356.4346	365.9989	96.4660	60.5275	99.4156	59.2848	99.4276
105	10106.2143	389.1328	96.1496	55.7726	99.4481	51.5512	99.4899
109	9790.4590	396.1829	95.9534	52.4452	99.4643	42.2317	99.5686
113	9487.2891	415.6177	95.6192	45.1976	99.5236	34.7599	99.6336
117	9155.9443	432.2560	95.2790	43.4496	99.5254	29.6274	99.6764
121	8842.5037	440.3610	95.0200	47.4997	99.4628	27.4580	99.6895
125	8478.4538	439.9142	94.8114	51.5522	99.3920	24.3404	99.7129
129	8063.5670	439.5990	94.5483	55.9745	99.3058	23.7898	99.7050
133	7642.0628	435.4906	94.3014	61.3561	99.1971	24.4385	99.6802
137	7238.0430	433.0998	94.0163	68.8608	99.0486	27.3388	99.6223
141	6892.1047	416.2290	93.9608	74.6117	98.9174	30.5192	99.5572
145	6470.5497	404.6230	93.7467	85.1570	98.6839	38.8524	99.3996
149	6041.4398	399.6513	93.3848	96.7819	98.3980	49.8373	99.1751
153	5599.9597	389.7533	93.0401	114.5374	97.9547	65.5817	98.8289
157	5124.8064	380.6594	92.5722	139.7720	97.2726	88.3410	98.2762
161	4570.5637	371.5199	91.8715	165.4799	96.3794	115.4628	97.4738

1.1.3 PCA all bins, ADCP only, both moorings, 14-day

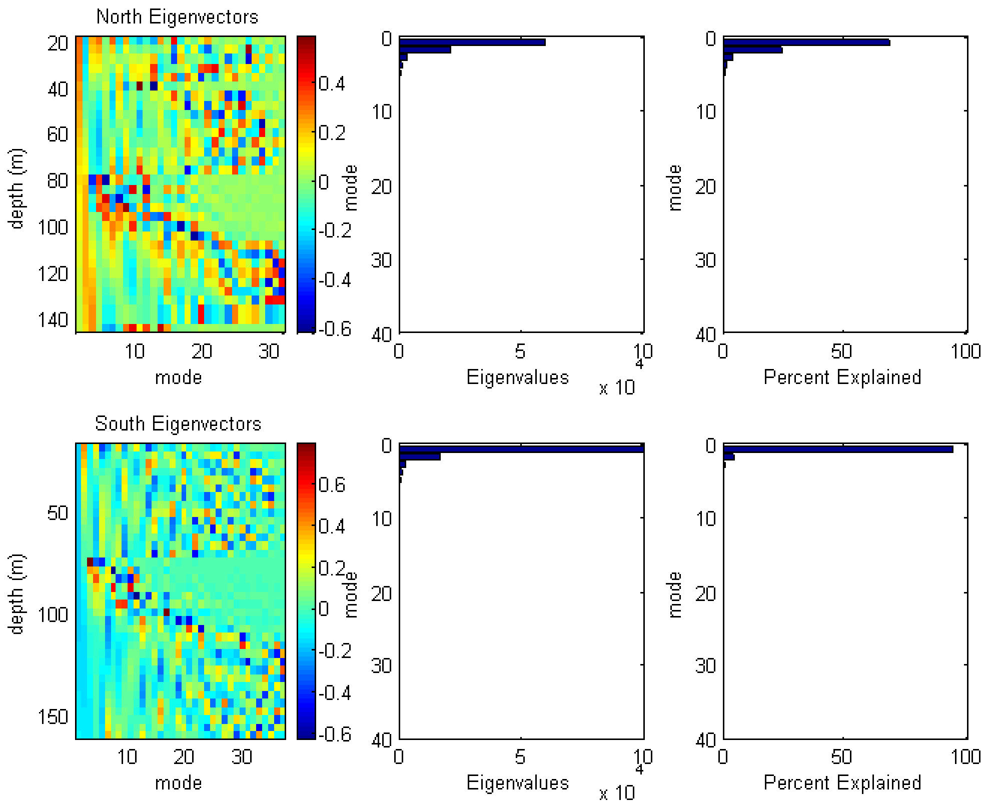

Figure 1-1 Eigenvectors and eigenvalues for PCA of ADCP data, all bins, 14-day sampling interval

Table 1-3 Partial listing of north shore eigenvectors

North	Eigenvectors							
Mode	1	2	3	4	5	6	7	8
18 m	0.30	-0.24	0.21	0.29	-0.03	0.31	-0.22	0.21
22 m	0.30	-0.22	0.18	0.22	-0.01	0.18	-0.12	0.10
26 m	0.30	-0.21	0.15	0.17	0.01	0.08	0.00	0.01
30 m	0.28	-0.19	0.11	0.10	0.03	-0.02	0.11	-0.07
34 m	0.27	-0.16	0.06	0.00	0.02	-0.14	0.17	-0.13
38 m	0.25	-0.12	-0.00	-0.04	0.07	-0.13	0.18	-0.29
42 m	0.25	-0.10	-0.04	-0.14	0.02	-0.23	0.14	-0.12
46 m	0.24	-0.07	-0.08	-0.18	0.01	-0.22	0.11	-0.09
50 m	0.22	-0.04	-0.10	-0.22	0.00	-0.18	0.06	-0.03
54 m	0.21	-0.01	-0.12	-0.24	-0.02	-0.12	-0.00	0.03
58 m	0.20	0.02	-0.14	-0.25	-0.04	-0.05	-0.07	0.09
62 m	0.19	0.05	-0.14	-0.24	-0.05	0.02	-0.13	0.11
66 m	0.17	0.08	-0.14	-0.23	-0.06	0.09	-0.19	0.14
70 m	0.16	0.10	-0.13	-0.21	-0.07	0.16	-0.22	0.18
74 m	0.15	0.13	-0.12	-0.18	-0.07	0.23	-0.22	0.20
78 m	0.15	0.18	-0.45	0.37	-0.57	0.10	0.26	-0.08
82 m	0.14	0.21	-0.30	0.31	-0.09	-0.02	-0.24	-0.29
86 m	0.12	0.22	-0.12	0.24	0.46	-0.29	-0.54	-0.20
90 m	0.12	0.23	-0.18	0.35	0.30	-0.28	0.31	0.55
94 m	0.11	0.22	-0.00	-0.02	0.35	0.18	0.29	0.16
98 m	0.10	0.22	0.03	-0.08	0.16	0.27	0.22	0.04
102 m	0.10	0.22	0.05	-0.07	0.09	0.25	0.10	-0.10
106 m	0.09	0.22	0.08	-0.03	0.06	0.18	0.04	-0.16
110 m	0.09	0.22	0.11	-0.02	0.04	0.13	0.06	-0.15
114 m	0.08	0.22	0.15	-0.02	0.02	0.09	0.05	-0.14
118 m	0.08	0.22	0.18	-0.01	-0.02	0.04	0.04	-0.13
122 m	0.07	0.21	0.21	-0.00	-0.06	0.00	0.01	-0.12
126 m	0.07	0.21	0.23	0.00	-0.09	-0.05	0.00	-0.09
130 m	0.06	0.20	0.24	0.01	-0.13	-0.11	-0.01	-0.04
134 m	0.05	0.19	0.25	0.02	-0.15	-0.16	-0.03	0.00
142 m	0.05	0.16	0.27	-0.00	-0.26	-0.30	-0.12	0.30
146 m	0.04	0.15	0.24	0.01	-0.24	-0.25	-0.05	0.19

Table 1-4 Partial listing of south shore eigenvectors

South	Eigenvectors							
Mode	1	2	3	4	5	6	7	8
17 m	-0.18	0.41	-0.10	0.26	-0.37	-0.22	0.03	0.28
21 m	-0.18	0.36	-0.10	0.17	-0.23	-0.08	0.05	0.06
25 m	-0.18	0.31	-0.08	0.09	-0.11	-0.03	0.02	-0.04
29 m	-0.18	0.27	-0.07	0.02	-0.02	0.02	-0.01	-0.14
33 m	-0.18	0.23	-0.05	-0.05	0.05	0.05	-0.03	-0.18
37 m	-0.18	0.20	-0.03	-0.10	0.10	0.07	-0.06	-0.19
41 m	-0.18	0.17	-0.02	-0.12	0.13	0.09	-0.07	-0.16
45 m	-0.18	0.14	-0.02	-0.15	0.16	0.10	-0.08	-0.11
49 m	-0.18	0.11	-0.01	-0.17	0.18	0.11	-0.06	-0.02
53 m	-0.18	0.08	0.01	-0.18	0.20	0.08	-0.03	0.03
57 m	-0.18	0.06	0.02	-0.19	0.20	0.07	0.01	0.11
61 m	-0.18	0.04	0.02	-0.19	0.18	0.04	0.04	0.14
65 m	-0.18	0.01	0.02	-0.18	0.17	0.01	0.07	0.17
69 m	-0.18	-0.01	0.01	-0.15	0.15	-0.01	0.08	0.19
73 m	-0.17	-0.00	0.77	-0.33	-0.42	-0.06	0.21	-0.02
77 m	-0.18	-0.06	0.39	0.34	-0.02	0.26	-0.63	0.06
81 m	-0.18	-0.07	0.17	0.49	0.17	0.24	0.09	-0.38
85 m	-0.18	-0.10	0.10	0.31	0.21	-0.04	0.60	-0.02
89 m	-0.18	-0.10	0.08	0.19	0.14	-0.08	0.26	-0.01
93 m	-0.18	-0.12	0.07	0.18	0.17	-0.16	-0.13	0.51
97 m	-0.17	-0.12	-0.01	0.11	0.14	-0.13	-0.06	0.21
101 m	-0.17	-0.13	-0.02	-0.00	0.04	-0.28	-0.11	0.04
105 m	-0.17	-0.14	-0.04	-0.03	0.02	-0.27	-0.09	0.01
109 m	-0.16	-0.14	-0.06	-0.04	-0.01	-0.24	-0.10	-0.09
113 m	-0.16	-0.15	-0.06	-0.04	-0.04	-0.21	-0.08	-0.12
117 m	-0.16	-0.15	-0.07	-0.04	-0.06	-0.17	-0.06	-0.15
121 m	-0.15	-0.15	-0.08	-0.03	-0.09	-0.14	-0.06	-0.15
125 m	-0.15	-0.15	-0.09	-0.03	-0.11	-0.10	-0.05	-0.14
129 m	-0.15	-0.15	-0.10	-0.03	-0.13	-0.06	-0.03	-0.13
133 m	-0.14	-0.15	-0.11	-0.02	-0.15	-0.01	-0.01	-0.11
137 m	-0.14	-0.15	-0.12	-0.02	-0.16	0.04	0.01	-0.09
141 m	-0.14	-0.14	-0.12	-0.01	-0.16	0.10	0.02	-0.06
145 m	-0.13	-0.14	-0.12	-0.02	-0.16	0.15	0.05	-0.01
149 m	-0.13	-0.13	-0.12	-0.02	-0.16	0.21	0.06	0.04
153 m	-0.12	-0.13	-0.13	-0.02	-0.16	0.27	0.06	0.11
157 m	-0.12	-0.12	-0.13	-0.03	-0.15	0.33	0.07	0.18
161 m	-0.11	-0.11	-0.13	-0.03	-0.14	0.37	0.08	0.26

Table 1-5 Eigenvalues and % variance accounted for by each mode

NORTH			SOUTH		
Mode	Eigenvalues	Percent Variance Explained	Mode	Eigenvalues	Percent Variance Explained
1	59586.96	67.80	1	353086.11	93.79
2	21118.19	24.03	2	16794.74	4.46
3	3555.47	4.05	3	3041.21	0.81
4	1438.45	1.64	4	1283.41	0.34
5	818.89	0.93	5	805.42	0.21
6	446.47	0.51	6	544.02	0.14
7	274.86	0.31	7	292.15	0.08
8	228.73	0.26	8	187.86	0.05
9	97.97	0.11	9	131.43	0.03
10	78.53	0.09	10	99.79	0.03
11	64.39	0.07	11	60.01	0.02
12	49.60	0.06	12	38.23	0.01
13	33.17	0.04	13	29.64	0.01
14	27.28	0.03	14	19.27	0.01
15	14.98	0.02	15	15.07	0.00
16	11.78	0.01	16	13.95	0.00
17	10.30	0.01	17	7.10	0.00
18	7.10	0.01	18	5.37	0.00
19	5.52	0.01	19	4.58	0.00
20	4.20	0.00	20	3.78	0.00
21	2.95	0.00	21	2.82	0.00
22	1.51	0.00	22	1.97	0.00
23	1.25	0.00	23	1.42	0.00
24	1.06	0.00	24	1.15	0.00
25	0.66	0.00	25	0.93	0.00
26	0.54	0.00	26	0.68	0.00
27	0.35	0.00	27	0.61	0.00
28	0.30	0.00	28	0.47	0.00
29	0.22	0.00	29	0.31	0.00
30	0.09	0.00	30	0.28	0.00
31	0.07	0.00	31	0.25	0.00
32	0.06	0.00	32	0.20	0.00
			33	0.17	0.00
			34	0.13	0.00
			35	0.08	0.00
			36	0.06	0.00
			37	0.04	0.00

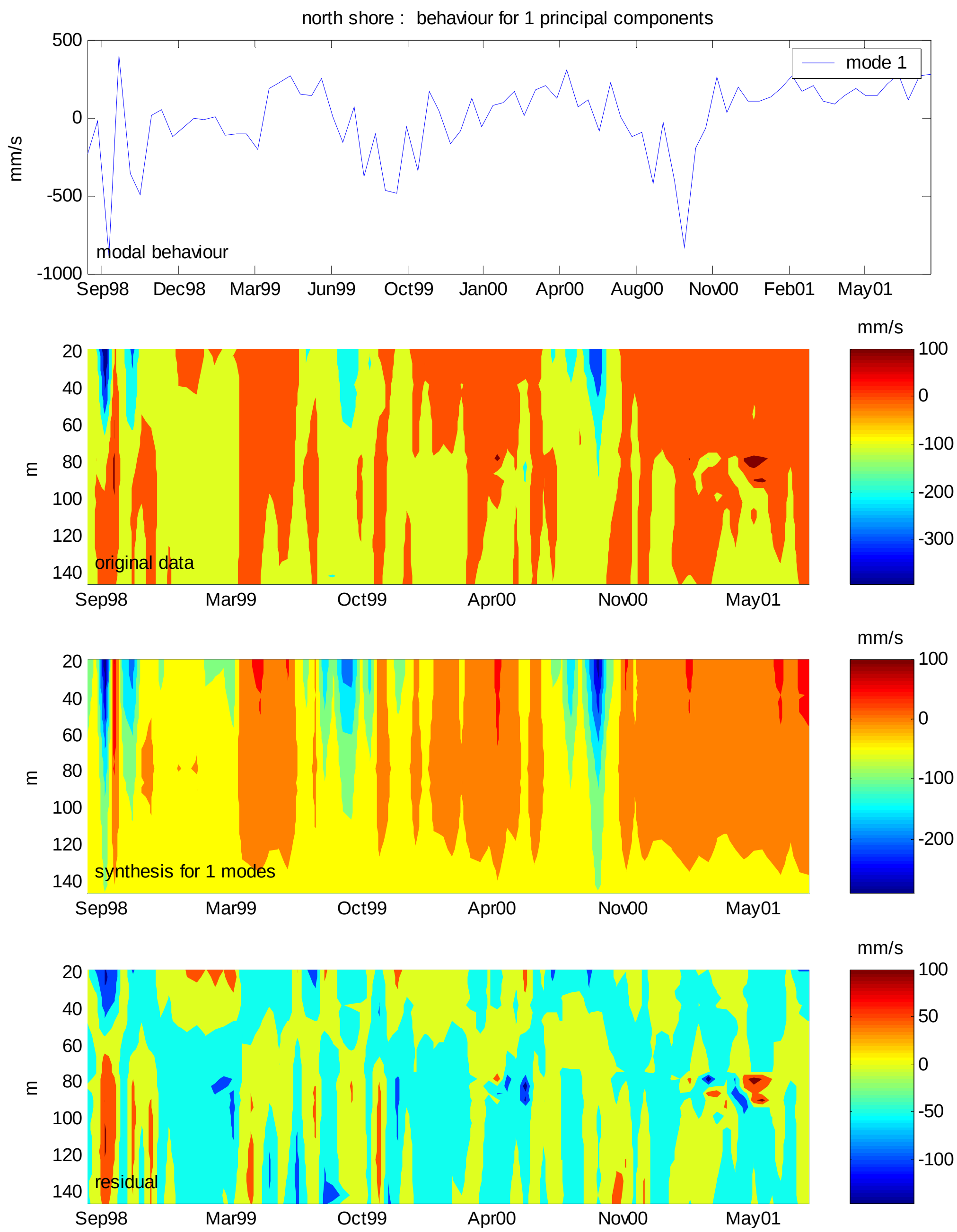

Figure 1-2 Recreation of north shore time series using mode 1

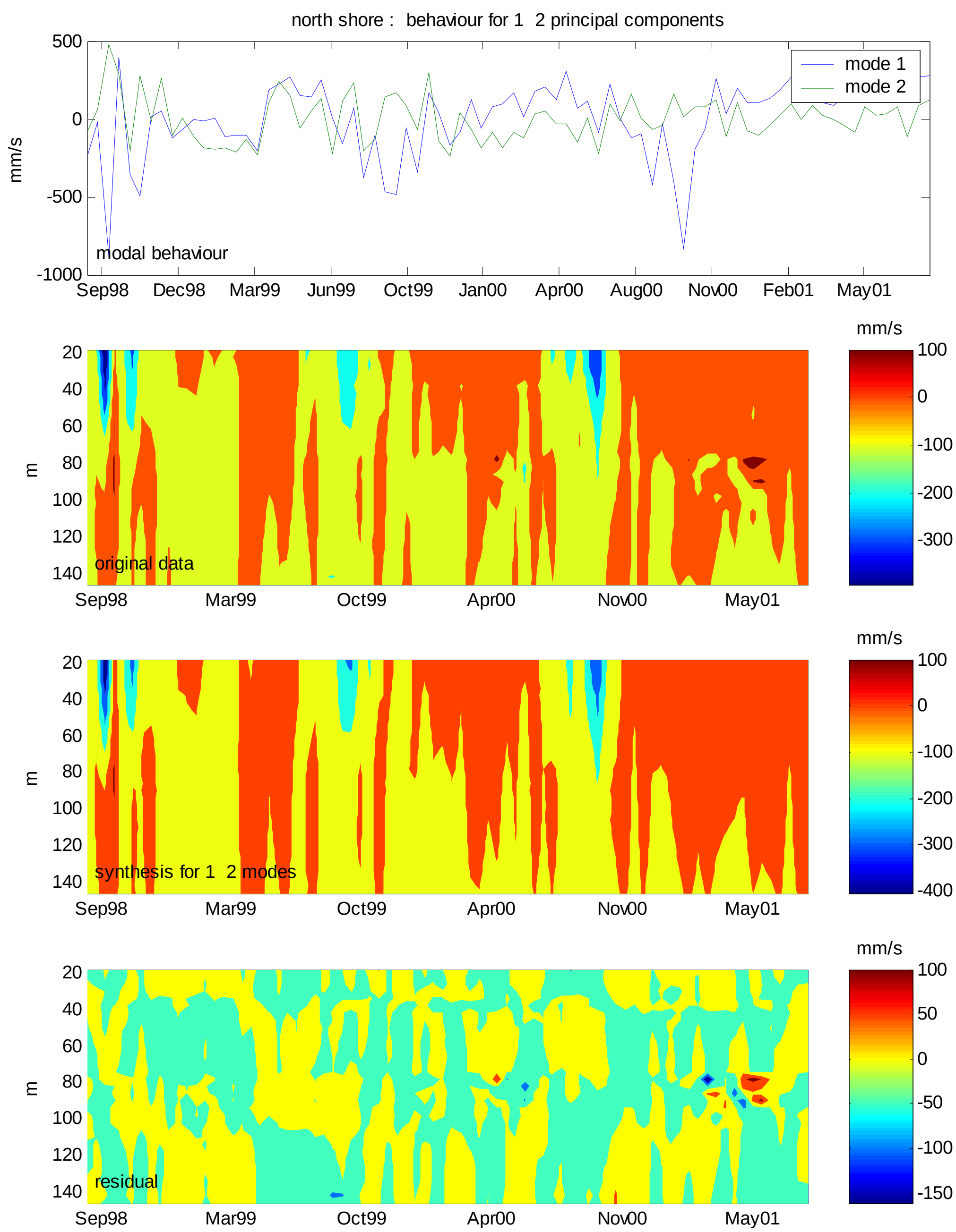

Figure 1-3 Recreation of north shore time series using modes 1 and 2

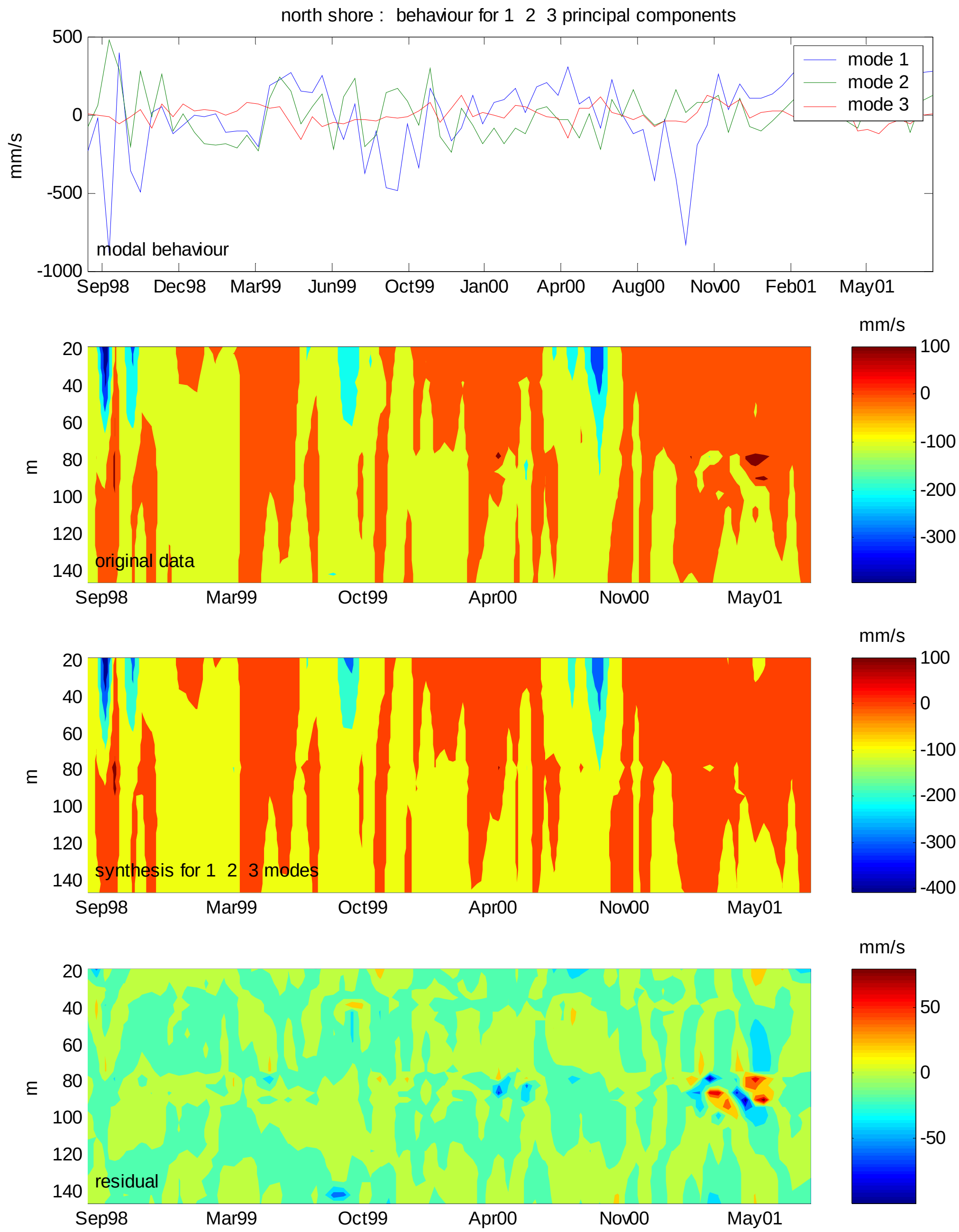

Figure 1-4 Recreation of north shore time series using modes 1, 2, and 3

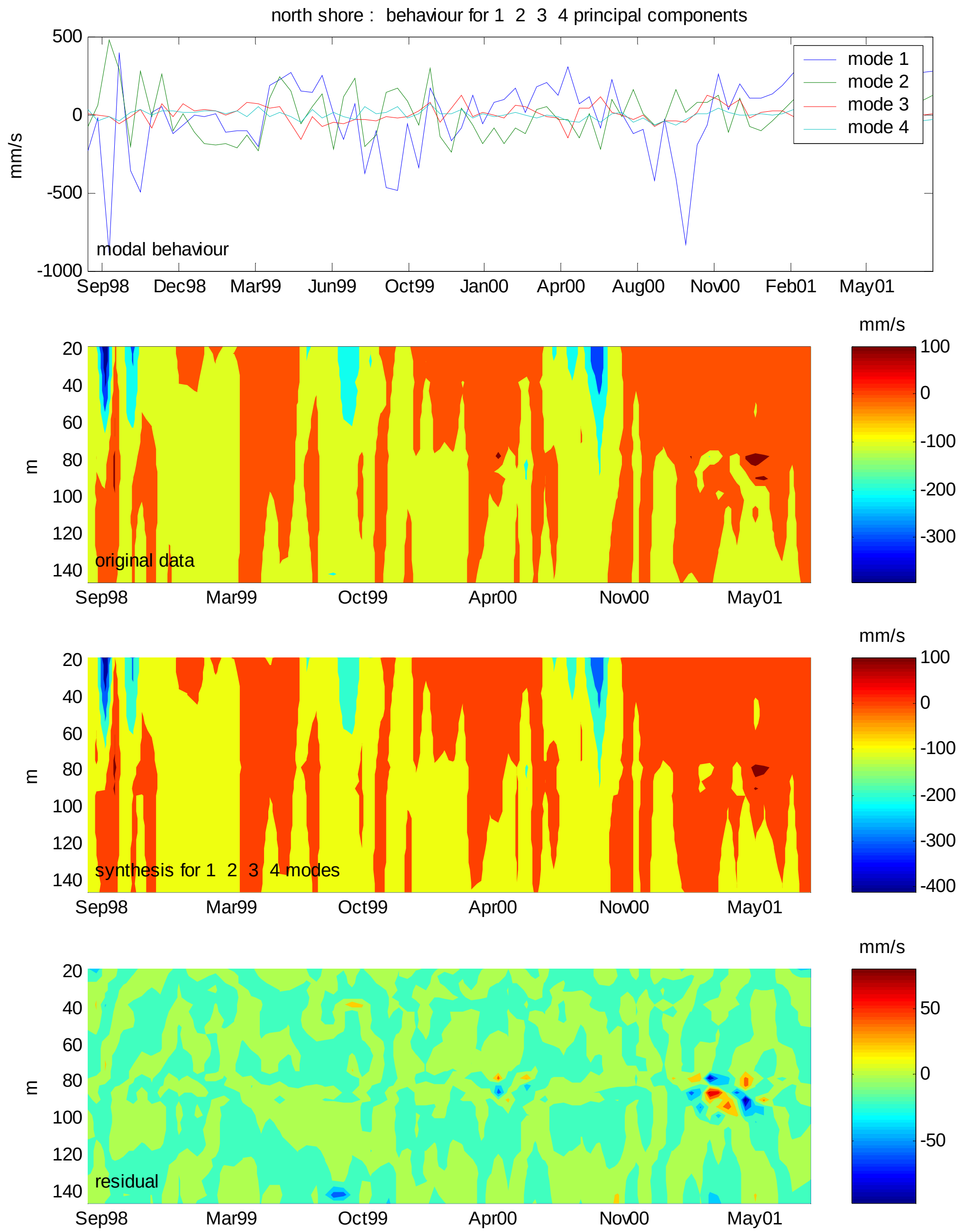

Figure 1-5 Recreation of north shore time series using modes 1, 2, 3, and 4

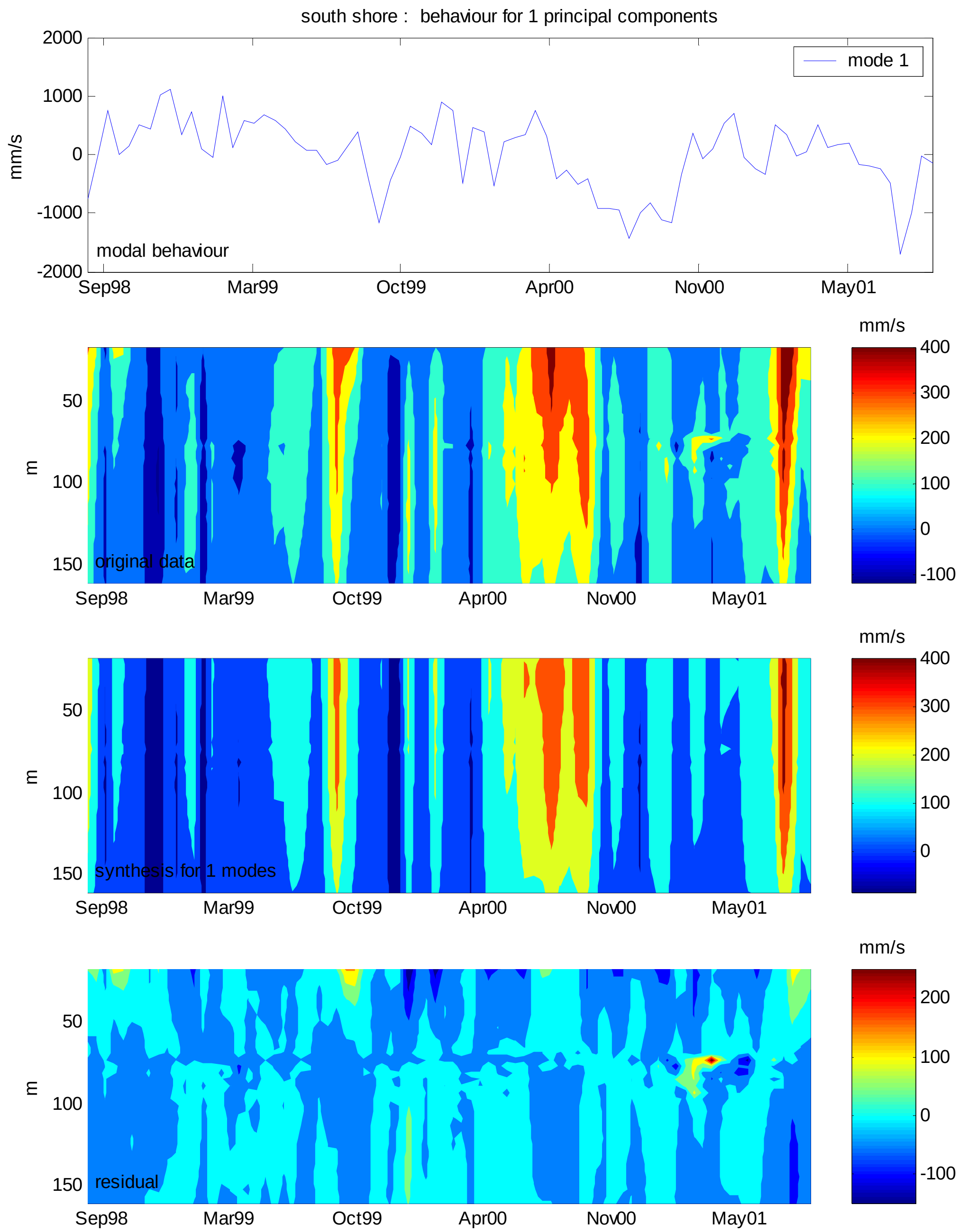

Figure 1-6 Recreation of south shore time series using mode 1

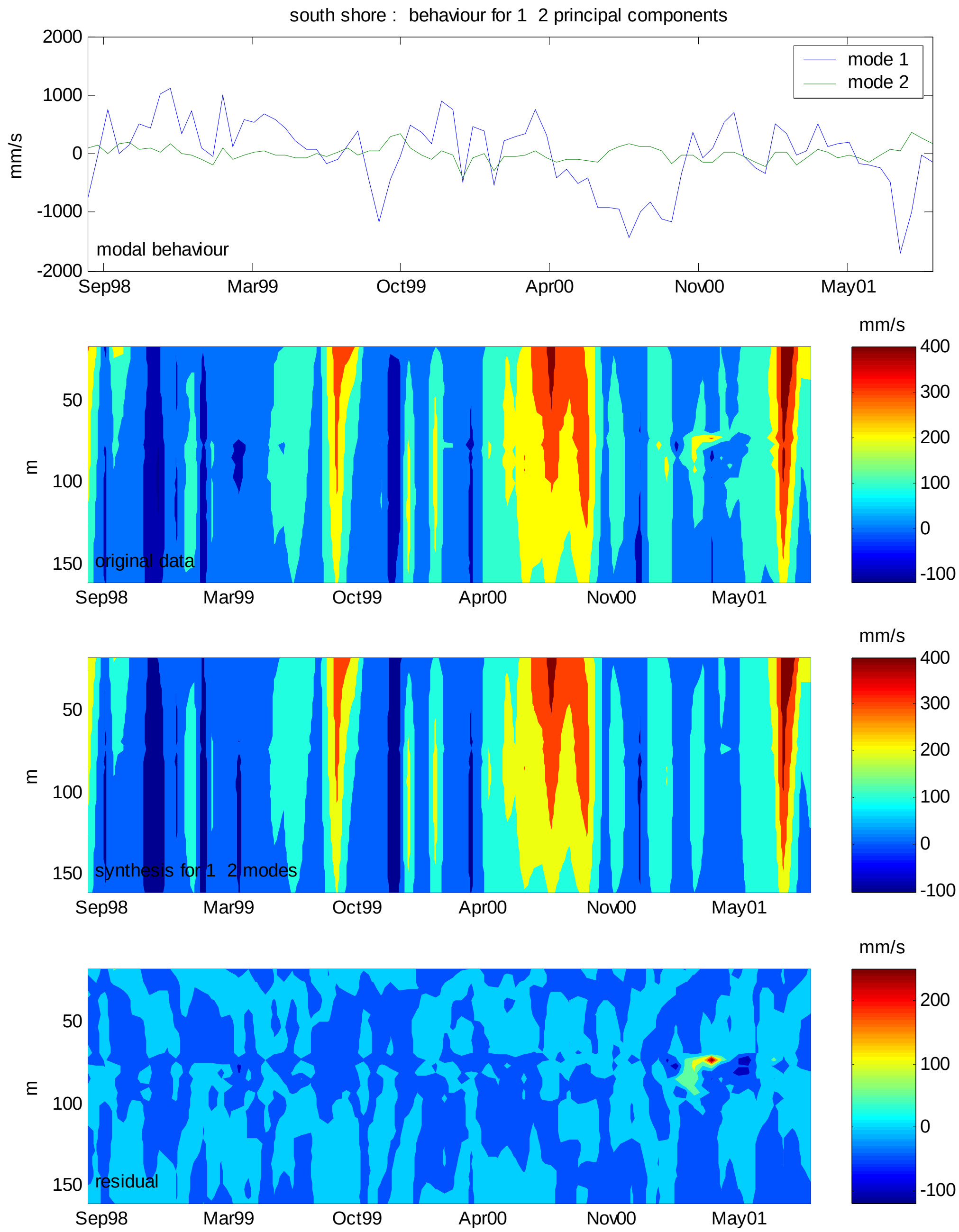

Figure 1-7 Recreation of south shore time series using modes 1 and 2

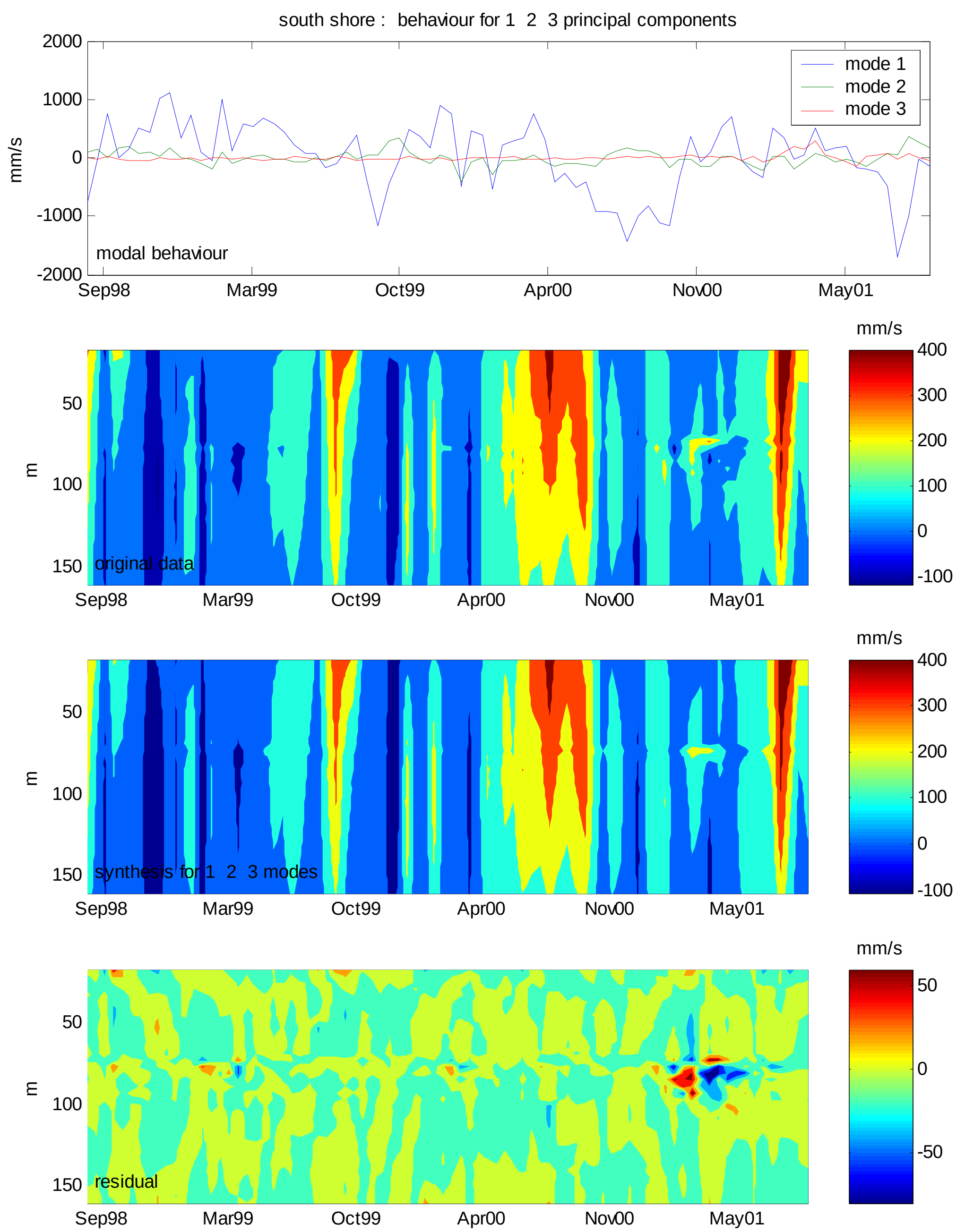

Figure 1-8 Recreation of south shore time series using modes 1, 2, and 3

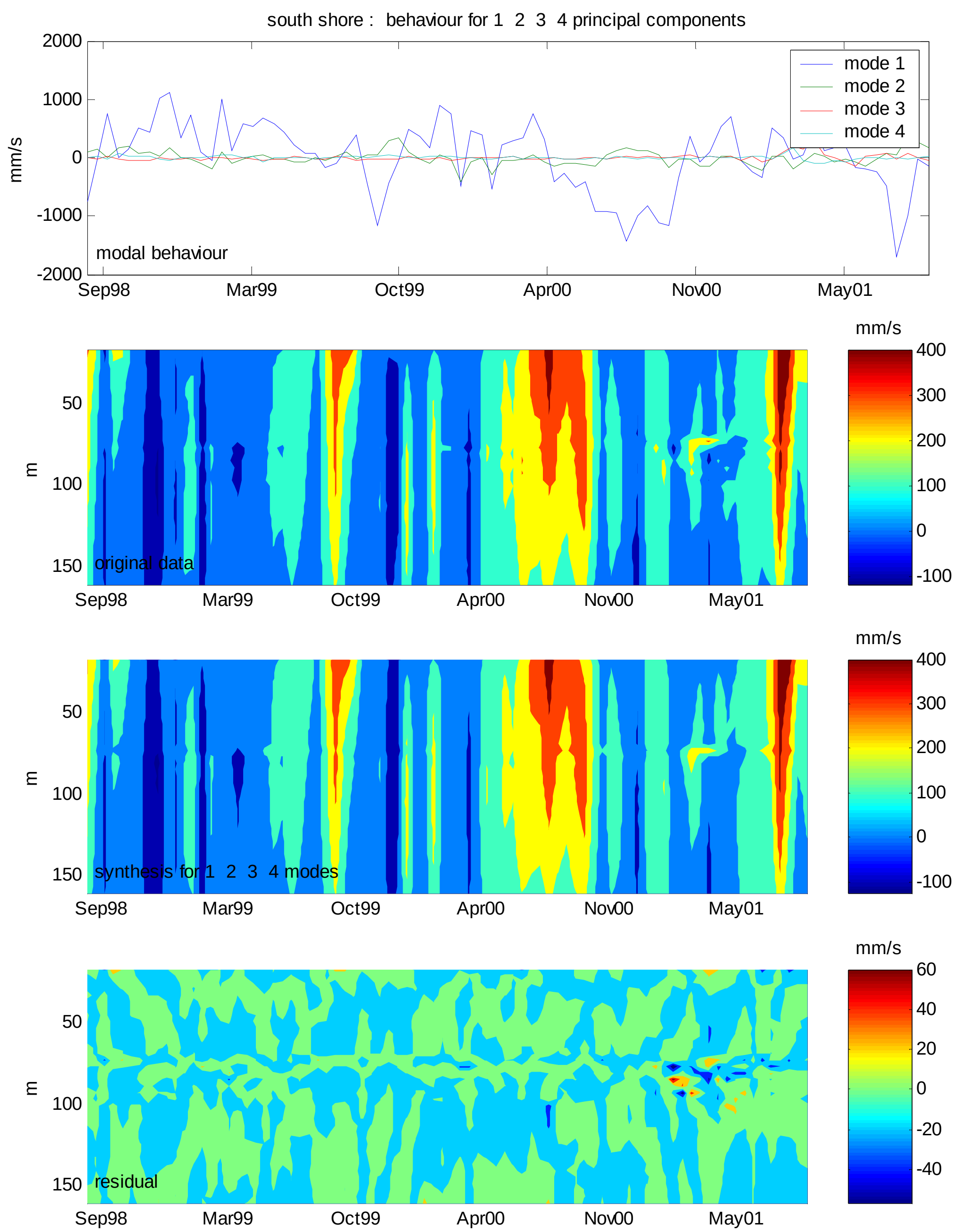

Figure 1-9 Recreation of south shore time series using modes 1, 2, 3, and 4

1.1.4 Cross-correlations original data (2-hourly)

Bins for analysis were chosen by looking at time series of the original data:

- north bins = all except 6, 10, 14, 138, 150, and 154 m;
- south bins = all except 5, 9, and 13 m.

Matlab function:

```
function good = set_good_bins(data)
switch data.which,
case 'north',
      good = setdiff(data.bin_depths,[6 10 14 138 150 154]);
case 'south',
      good = setdiff(data.bin_depths,[5 9 13]);
end
return
```

1.1.4.1 North shore 2-hourly data with north shore 2-hourly data (note that tides included here)

- good correlation ($r^2 \geq 64\%$) <60 m correlated with <60 m; 60-75 m correlated with >80 m; and >80 m correlated with <130m
- poor correlation ($r^2 \leq 64\%$) <50 m correlated with >80 m

Table 1-6 Cross-correlation coefficients (r) of north shore correlation with north shore (2-hourly data)

bin	18	22	26	30	34	38	42	46	50	54	58
18	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8
22	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8
26	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
30	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9
34	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
38	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9
42	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9
46	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
50	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
54	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
58	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0

bin	82	86	90	94	98	102	106	110	114	118	122	126	130	134	142	146
82	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
86	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
90	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8
94	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
98	0.8	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
102	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9
106	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
110	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
114	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
118	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
122	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
126	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
130	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
134	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
142	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
146	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0

bin	62	66	70	74	78
82	0.8	0.8	0.8	0.8	0.9
86	0.8	0.8	0.8	0.8	0.9
90	0.8	0.8	0.8	0.9	0.9
94	0.8	0.8	0.9	0.9	0.8
98	0.8	0.9	0.9	0.9	0.8
102	0.9	0.9	0.9	0.9	0.8
106	0.9	0.9	0.9	0.9	0.8
110	0.8	0.9	0.9	0.9	0.8
114	0.8	0.9	0.9	0.9	0.7
118	0.8	0.9	0.9	0.9	0.7
122	0.8	0.8	0.9	0.9	0.7
126	0.8	0.8	0.9	0.9	0.7
130	0.8	0.8	0.8	0.9	0.7
134	0.8	0.8	0.8	0.9	0.7
142	0.8	0.8	0.8	0.8	0.7
146	0.8	0.8	0.8	0.8	0.7

bin	18	22	26	30	34	38	42	46	50	54	58
82	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
86	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8
90	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
94	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
98	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
102	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
106	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
110	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.8
114	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
118	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
122	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
126	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
130	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8
134	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8
142	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8
146	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8

1.1.4.2 South shore 2-hourly data with south shore 2-hourly data (note that tides included here)

- good correlation ($r^2 \geq 64\%$) <70 m correlated with <70 m; 30-70 m correlated with >70 m; and >70 m correlated with >70m
- poor correlation ($r^2 \leq 64\%$) <30 m with >135 m

Table 1-7 Cross-correlation coefficients (r) of south shore correlation with south shore (2-hourly data)

bin	17	21	25	29	33	37	41	45	49	53	57	61	65	69
17	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
21	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
25	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
29	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
33	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9
37	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
41	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
45	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
49	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
53	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
57	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
61	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
65	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
69	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0

bin	73	77	81	85	89	93	97	101	105	109	113
73	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
77	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8
81	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
85	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9
89	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
93	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9
97	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
101	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
105	0.9	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
109	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
113	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
117	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
121	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
125	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
129	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
133	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
137	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
141	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
145	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
149	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
153	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
157	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
161	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9

bin	117	121	125	129	133	137	141	145	149	153	157	161
73	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
77	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
81	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
85	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
89	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
93	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
97	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
101	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
105	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
109	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
113	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
117	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
121	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
125	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
129	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
133	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
137	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
141	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
145	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
149	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
153	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
161	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0

bin	29	33	37	41	45	49	53	57	61	65	69
69	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
73	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
77	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9
81	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
85	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
89	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
93	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
97	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
101	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
105	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
109	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
113	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
117	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
121	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
125	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
129	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
133	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
137	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
141	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
145	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
149	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
153	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
157	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
161	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9

bin	17	21
137	0.7	0.8
141	0.7	0.8
145	0.7	0.8
149	0.7	0.8
153	0.7	0.8
157	0.7	0.7
161	0.7	0.7

1.1.4.3 North shore 2-hourly data with south shore 2-hourly data (note that tides included here)

- poor correlation ($r^2 \leq 64\%$) all bins

Table 1-8 Cross-correlation coefficients (r) of north shore correlation with south shore (2-hourly data)

bin	17	21	25	29	33	37	41	45	49	53	57	61	65	69	73	77
18	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
22	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
26	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
30	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.2
34	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3
38	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
42	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
46	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
50	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.3
54	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3
58	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3
62	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
66	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
70	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
74	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
78	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3
82	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
86	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
90	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
94	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
98	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
102	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.3
106	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3
110	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3
114	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3
118	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3
122	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3
126	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
130	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
134	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3
142	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3
146	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3

bin	81	85	89	93	97	101	105	109	113	117	121	125	129	133	137	141
18	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
22	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
26	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
30	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
34	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
38	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
42	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
46	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
50	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
54	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
58	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
62	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
66	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
70	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
74	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
78	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
82	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
86	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
90	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
94	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
98	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
102	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
106	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
110	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
114	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
118	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
122	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
126	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
130	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
134	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
142	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
146	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6

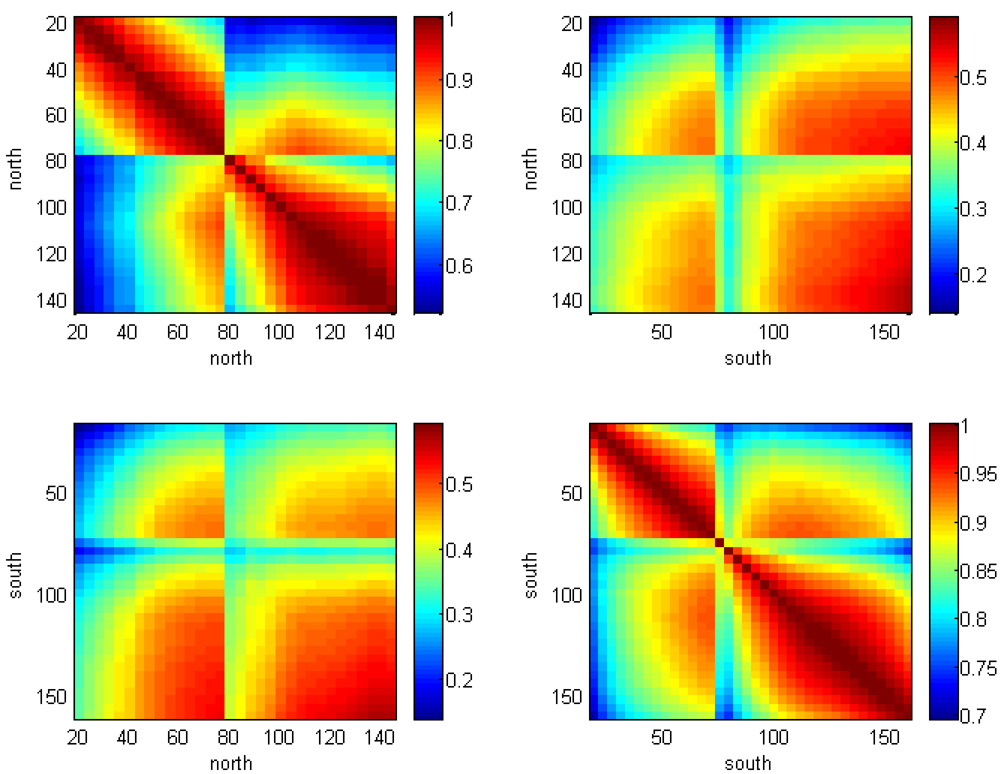

Figure 1-10 Cross-correlation of each mooring, all bins, 2-hourly data

1.1.5 Cross-correlations original data (6-hourly; no tides)

Tides were removed with a Cartwright filter as in previous analysis (van der Baaren, et al. 2003)

1.1.5.1 North shore 6-hourly data with north shore 6-hourly data (note that tides removed here)

- good correlation (r^2>64%) <58 m correlated with <68 m; 62-82 m correlated with 62-82 m; 82-118 m correlated with 82-118 m; and 86-126 m correlated with 122-126 m
- poor correlation (r^2<64%) <62 m correlated with >86 m

Table 1-9 Cross-correlation coefficients (r) of north shore correlation with north shore (6-hourly data)

bin	18	22	26	30	34	38	42	46	50	54	58
18	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7
22	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8
26	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8
34	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
38	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
42	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
46	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9
50	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
54	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
58	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0

bin	82	86	90	94	98	102	106	110	114	118	122	126
82	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
86	0.9	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
90	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8
94	0.8	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
98	0.8	0.8	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
102	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9
106	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9
110	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
114	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
118	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
122	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
126	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0

bin	62	66	70	74	78	82	86	90	94	98
62	1.0	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.7
66	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8
70	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8
74	0.9	1.0	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8
78	0.8	0.8	0.8	0.8	1.0	0.9	0.8	0.8	0.8	0.7
82	0.8	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.8	0.8
86	0.7	0.8	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.8
90	0.7	0.8	0.8	0.8	0.8	0.9	0.9	1.0	0.9	0.9
94	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	0.9
98	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.9	0.9	1.0
102	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9
106	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.9	0.9	0.9
110	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.9	0.9	0.9
114	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.8	0.9	0.9
118	0.7	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.9	0.9
122	0.6	0.7	0.7	0.8	0.7	0.7	0.8	0.8	0.9	0.9
126	0.6	0.7	0.7	0.7	0.6	0.7	0.8	0.8	0.8	0.9
130	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.8	0.8	0.9
134	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.7	0.8	0.8
142	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8
146	0.5	0.5	0.6	0.6	0.5	0.6	0.6	0.7	0.7	0.8

bin	18	22	26	30	34	38	42	46	50	54	58	62	66	70
74	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0
78	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
82	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
86	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8
90	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8
94	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8
98	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8
102	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8
106	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8
110	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8
114	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8
118	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7
122	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7
126	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7
130	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7
134	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6
142	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6
146	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6

1.1.5.2 South shore 6-hourly data with south shore 6-hourly data (note that tides removed here)

- good correlation ($r^2>64\%$) 17 m correlated with <157 m and 17-153 m correlated with 17-161 m
- poor correlation ($r^2<64\%$) <17 m correlated with >157-161 m

Table 1-10 Cross-correlation coefficients (r) of south shore correlation with south shore (6-hourly data)

bin	17	21	25	29	33	37	41	45	49	53	57	61	65	69
17	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
21	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
29	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
33	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
37	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
41	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
49	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
53	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
57	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
61	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
65	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
69	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
73	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
77	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
81	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
85	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
89	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
93	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
97	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
101	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
105	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0

bin	105	109	113	117	121	125	129	133	137	141	145	149	153	157	161
17	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7
21	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
25	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
29	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
33	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8
37	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
41	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
49	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
53	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
57	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
61	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
65	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
69	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
73	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
77	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
81	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
85	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
89	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
93	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
97	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
101	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
105	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
109	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
113	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
117	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
121	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
125	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
129	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
133	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
137	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
141	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
145	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
149	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
153	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
161	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

bin	157	161
17	0.7	0.7

1.1.5.3 North shore 6-hourly data with south shore 6-hourly data (note that tides removed here)

- very poor correlation (r^2<0.01%) or none at all

Table 1-11 Cross-correlation coefficients (r) of north shore correlation with south shore (6-hourly data)

bin	17	21	25	29	33	37	41	45	49
18	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
22	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
26	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0
30	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0
34	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
38	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1

bin	53	57	61	65	69
18	-0.1	-0.1	-0.1	-0.1	-0.0
22	-0.1	-0.1	-0.0	-0.0	-0.0
26	-0.0	-0.0	-0.0	-0.0	-0.0
30	-0.0	-0.0	-0.0	-0.0	-0.0
34	-0.0	-0.0	0.0	0.0	0.0
38	0.0	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0	0.0

bin	17	21	25	29	33	37	41	45	49	53
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
50	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
54	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
58	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
62	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
66	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
70	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
74	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
78	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
82	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
86	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
90	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
94	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
98	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
102	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
106	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
110	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
114	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1
118	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
122	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
126	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
130	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
142	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

bin	57	61	65	69	73	77	81	85	89	93	97	101	105
38	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
42	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
46	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
54	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
58	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
62	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
66	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
70	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
74	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
78	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
82	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
86	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
90	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
94	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
98	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
102	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
106	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
110	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
114	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
118	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
122	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
126	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
142	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

bin	105	109	113	117	121	125	129	133	137	141	145	149	153	157	161
42	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
46	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
54	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
58	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
62	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
66	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
70	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
74	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
78	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
82	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
86	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
90	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
94	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
98	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
102	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
106	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
110	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
114	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
118	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
122	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
126	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
130	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
134	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
142	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
146	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

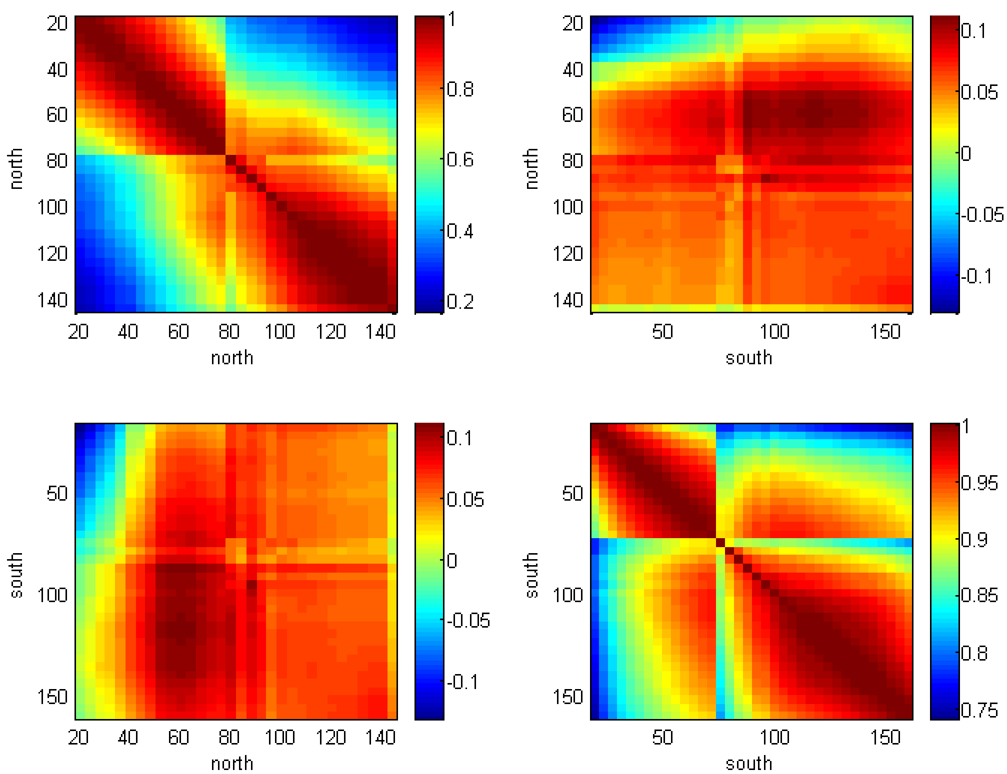

Figure 1-11 Cross-correlation of each mooring, all bins, 6-hourly (note difference in scales)

1.1.6 Cross-correlations 14-day data (low-pass filtered)

1.1.6.1 North shore 14-day data with north shore 14-day (low-pass filtered)

- good correlation ($r^2>0.64\%$) <60 m with <60 m and >100 m with >100 m
- poor correlation ($r^2<0.64\%$) >60-100 m with >60 m and <60 m with > 60 m

Table 1-12 Cross-correlation of north shore with north shore (14-day data)

bin	18	22	26	30	34	38	42	46	50	54	58
18	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
22	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8
26	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8
30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8
34	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
38	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
42	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
46	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
50	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
54	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
58	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0

bin	102	106	110	114	118	122	126	130	134	142	146
102	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8
106	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8
110	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.8
114	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
118	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
122	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
126	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
130	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0
134	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
142	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
146	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0

bin	62	66	70	74	78	82	86	90	94	98
62	1.0	1.0	1.0	0.9	0.7	0.7	0.7	0.7	0.7	0.7
66	1.0	1.0	1.0	1.0	0.8	0.8	0.7	0.7	0.7	0.7
70	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.7	0.8	0.8
74	0.9	1.0	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8
78	0.7	0.8	0.8	0.8	1.0	0.9	0.7	0.8	0.7	0.7
82	0.7	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.8	0.8
86	0.7	0.7	0.8	0.8	0.7	0.9	1.0	0.9	0.9	0.8
90	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	0.9	0.8
94	0.7	0.7	0.8	0.8	0.7	0.8	0.9	0.9	1.0	1.0
98	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.8	1.0	1.0
102	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.8	1.0	1.0
106	0.6	0.7	0.8	0.8	0.7	0.8	0.9	0.8	0.9	1.0
110	0.6	0.7	0.7	0.8	0.6	0.8	0.8	0.8	0.9	1.0
114	0.6	0.6	0.7	0.7	0.6	0.7	0.8	0.8	0.9	0.9
118	0.5	0.6	0.7	0.7	0.6	0.7	0.8	0.8	0.9	0.9
122	0.5	0.6	0.6	0.7	0.5	0.7	0.8	0.7	0.9	0.9
126	0.5	0.5	0.6	0.7	0.5	0.7	0.7	0.7	0.8	0.9
130	0.4	0.5	0.6	0.6	0.5	0.6	0.7	0.7	0.8	0.9
134	0.4	0.5	0.5	0.6	0.4	0.6	0.7	0.6	0.8	0.8
142	0.4	0.4	0.5	0.5	0.4	0.5	0.6	0.6	0.7	0.7
146	0.3	0.4	0.4	0.5	0.4	0.5	0.6	0.6	0.7	0.7

bin	18	22	26	30	34	38	42	46	50	54	58
62	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0
66	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0
70	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9
74	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9
78	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7
82	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7
86	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6
90	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6
94	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6
98	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6
102	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.6
106	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6
110	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
114	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.5
118	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5
122	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4
126	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4
130	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
134	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
142	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3
146	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3

1.1.6.2 South shore 14-day data with south shore 14-day (low-pass filtered)

- good correlation ($r^{2>}$0.64%)

Table 1-13 Cross-correlation of south shore with south shore (14-day data)

bin	17	21	25	29	33	37	41	45	49	53	57	61	65	69
17	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
21	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
29	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
33	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
37	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
41	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
49	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
53	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
57	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
61	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
65	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
69	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
73	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
77	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
81	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
85	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
89	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
93	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
97	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
101	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
105	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
109	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
113	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
117	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
121	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
125	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
129	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
133	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
137	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
141	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
145	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
149	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
153	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
157	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
161	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0

bin	73	77	81	85	89	93	97	101	105	109	113	117
17	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
21	0.8	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8
25	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
29	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
33	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
37	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
41	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
49	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9
53	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
57	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
61	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
65	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
69	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
73	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
77	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
81	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
85	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
89	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
93	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
97	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
101	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
105	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
109	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
113	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

117	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
121	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
125	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
129	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
133	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
137	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
141	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
145	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
149	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
153	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
161	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

bin	121	125	129	133	137	141	145	149	153	157	161
17	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
21	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
25	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
29	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
33	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
37	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
41	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
49	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
53	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
57	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
61	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
65	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
69	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
73	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
77	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
81	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
85	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
89	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
93	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
97	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
101	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
105	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
109	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
113	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
117	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
121	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
125	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
129	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
133	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
137	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
141	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
145	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
149	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
153	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
161	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

1.1.6.3 North shore 14-day data with south shore 14-day (low-pass filtered)

- very poor correlation (r^2<0.01%) or none at all

Table 1-14 Cross-correlation of north shore with south shore (14-day data)

bin	17	21	25	29	33	37	41	45	49	53	57	61
18	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
22	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
26	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
30	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1
34	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
38	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
42	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0
46	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0
50	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
54	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
58	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
62	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
66	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
70	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0
74	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
78	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
86	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
90	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
94	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
98	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
102	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
106	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
110	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
114	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
118	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0
122	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
126	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
130	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
134	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
142	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
146	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

bin	65	69	73	77	81	85	89	93	97	101	105	109
18	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
22	-0.2	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
26	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
30	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
34	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0
38	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
42	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
46	-0.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
58	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
62	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
66	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	0.0	0.0	0.1	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	-0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0
78	0.0	0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0
82	-0.0	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
86	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0
90	-0.0	-0.0	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
94	-0.0	-0.0	0.0	-0.0	-0.1	-0.0	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1
98	-0.0	-0.0	0.0	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
102	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1
106	-0.0	-0.0	0.0	-0.1	-0.1	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1
110	-0.0	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1
114	-0.0	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1
118	-0.1	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
122	-0.1	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
126	-0.1	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
130	-0.1	-0.1	-0.0	-0.1	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
134	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
142	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2
146	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

bin	113	117	121	125	129	133	137	141	145	149	153	157	161
18	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
22	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
26	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
30	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
34	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
38	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0
70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
74	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0
82	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
86	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
90	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1
94	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
98	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
102	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
106	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
110	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
114	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
118	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
122	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
126	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
130	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
134	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
142	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
146	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1

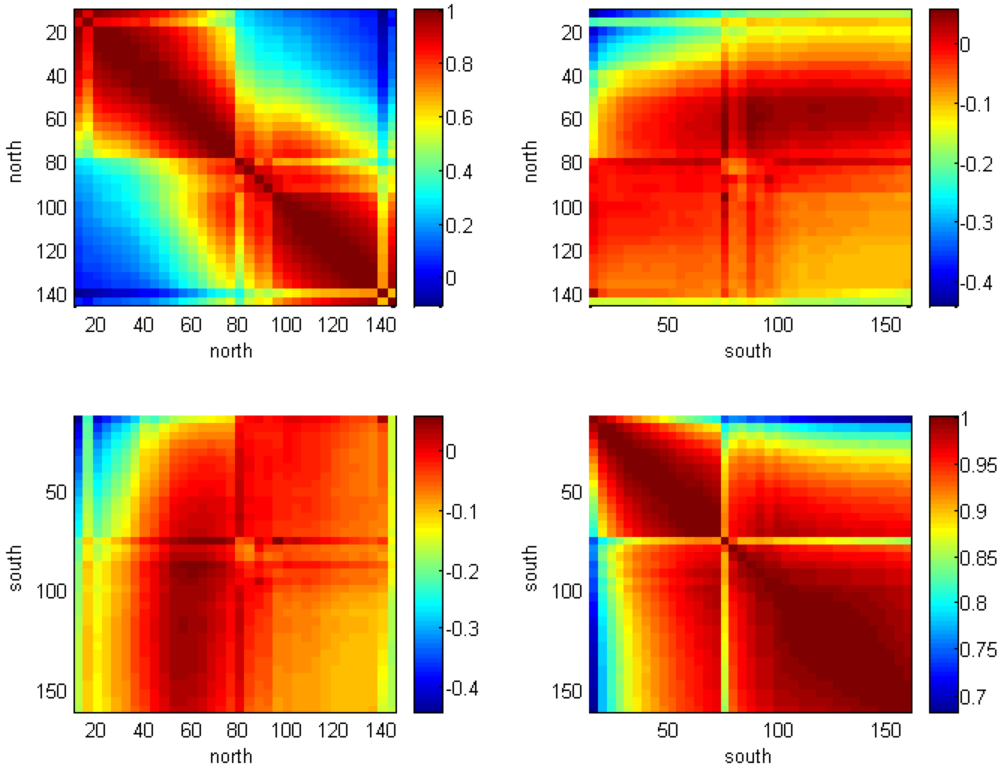

Figure 1-12 Cross-correlation of each mooring for all bins, 14-day intervals

1.1.7 Fit annual harmonic to 2-hourly ADCP time series, all bins

Note that northern bins 6, 10, 14, 138, 150, and 154 m have bad values too numerous to include these bins in graphics. Southern bins 5, 9, and 13 m have bad values too numerous to include these bins in the graphics. The shallower bins are known to be unreliable at times.

Table 1-15 Coefficients for harmonic fit for north shore

North				
bin	beta0	beta1	beta2	beta2 + 180
6.000000	-2.886999	5.599071	68.805300	251.805300
10.000000	-2.609159	7.879786	73.101341	256.101341
14.000000	-1.620943	5.987438	77.196413	260.196413
18.000000	-1.744844	7.931456	80.238294	263.238294
22.000000	-1.864443	7.415640	82.953241	265.953241
26.000000	-1.901175	6.939527	85.304772	268.304772
30.000000	-1.882963	6.485696	87.204228	270.204228
34.000000	-1.773772	5.878967	90.361794	273.361794
38.000000	-1.736283	4.956116	93.943905	276.943905
42.000000	-1.479741	4.996078	97.397250	280.397250
46.000000	-1.302888	4.615963	101.339374	284.339374
50.000000	-1.091668	4.231780	105.845427	288.845427
54.000000	-0.889478	3.917409	108.866432	291.866432
58.000000	-0.695288	3.644671	112.285075	295.285075
62.000000	-0.520410	3.351706	115.473423	298.473423
66.000000	-0.335802	3.004401	118.324531	301.324531
70.000000	-0.181859	2.662886	120.958451	303.958451
74.000000	-0.137791	2.409050	123.134950	306.134950
78.000000	-0.427054	2.101185	-221.174803	-38.174803
82.000000	-0.402548	-1.967560	-26.218768	156.781232
86.000000	-0.407890	-1.794991	-20.940457	162.059543
90.000000	-0.401197	-1.641428	-16.377772	166.622228
94.000000	-0.442369	-1.410123	-15.015115	167.984885
98.000000	-0.493894	-1.160784	-15.669279	167.330721
102.000000	-0.543386	-0.945257	-19.426313	163.573687
106.000000	-0.581603	-0.796082	-22.277689	160.722311
110.000000	-0.661320	-0.675618	-22.978475	160.021525
114.000000	-0.787340	-0.507260	-26.116046	156.883954
118.000000	-0.905899	-0.358813	-35.601837	147.398163
122.000000	-1.049007	0.260072	-964.480229	-781.480229
126.000000	-1.169267	0.193997	107.820732	290.820732
130.000000	-1.302640	0.164780	78.741656	261.741656
134.000000	-1.405827	0.189602	46.620214	229.620214
138.000000	-3.580706	-0.367033	81.776648	264.776648
142.000000	-1.761556	0.578338	46.210915	229.210915
146.000000	-1.697090	0.301833	18.582079	201.582079
150.000000	-1.650865	0.618864	-11.493384	171.506616
154.000000	-1.355921	1.108725	-31.009305	151.990695

Table 1-16 Coefficients for harmonic fit for south shore

South				
bin	beta0	beta1	beta2	beta2 + 180
5.000000	5.053981	-7.241143	77.389413	260.389413
9.000000	10.327210	-15.300149	62.233533	245.233533
13.000000	11.591770	-14.305145	56.894538	239.894538
17.000000	12.731342	-12.475050	49.996204	232.996204
21.000000	13.083407	-11.727252	46.983926	229.983926
25.000000	13.171694	-11.272516	44.724040	227.724040
29.000000	13.208933	-10.896672	42.853834	225.853834
33.000000	13.175814	-10.599545	41.538057	224.538057
37.000000	13.108290	-10.312694	40.821406	223.821406
41.000000	13.018717	-10.075463	40.274818	223.274818
45.000000	12.880976	-9.854984	39.677295	222.677295
49.000000	12.718645	-9.659727	38.822138	221.822138
53.000000	12.552890	-9.356624	38.094965	221.094965
57.000000	12.429082	-9.206191	37.232649	220.232649
61.000000	12.307888	-9.017901	36.297283	219.297283
65.000000	12.225129	-8.854452	35.911826	218.911826
69.000000	11.921151	-8.373107	34.399366	217.399366
73.000000	11.082416	-8.577881	28.885563	211.885563
77.000000	13.323323	-8.982217	20.007921	203.007921
81.000000	12.974200	-8.590857	21.442759	204.442759
85.000000	12.818878	-8.230960	21.602865	204.602865
89.000000	12.596929	-7.968389	22.649723	205.649723
93.000000	12.142828	-7.743065	25.961623	208.961623
97.000000	11.796594	-7.612102	28.853164	211.853164
101.000000	11.518160	-7.291285	29.947382	212.947382
105.000000	11.387148	-7.104409	29.858284	212.858284
109.000000	11.247587	-6.919063	30.076859	213.076859
113.000000	11.067055	-6.713468	30.761060	213.761060
117.000000	10.846200	-6.507922	31.236537	214.236537
121.000000	10.638811	-6.353461	31.107524	214.107524
125.000000	10.419647	-6.183966	31.075569	214.075569
129.000000	10.176150	-6.001757	30.596690	213.596690
133.000000	9.911394	-5.822548	30.308692	213.308692
137.000000	9.627893	-5.659431	29.811647	212.811647
141.000000	9.398955	-5.513707	30.104543	213.104543
145.000000	9.133616	-5.345932	30.150995	213.150995
149.000000	8.871636	-5.125415	30.405880	213.405880
153.000000	8.617215	-4.868275	30.997645	213.997645
157.000000	8.337873	-4.633265	31.293389	214.293389
161.000000	7.959434	-4.320007	31.223772	214.223772

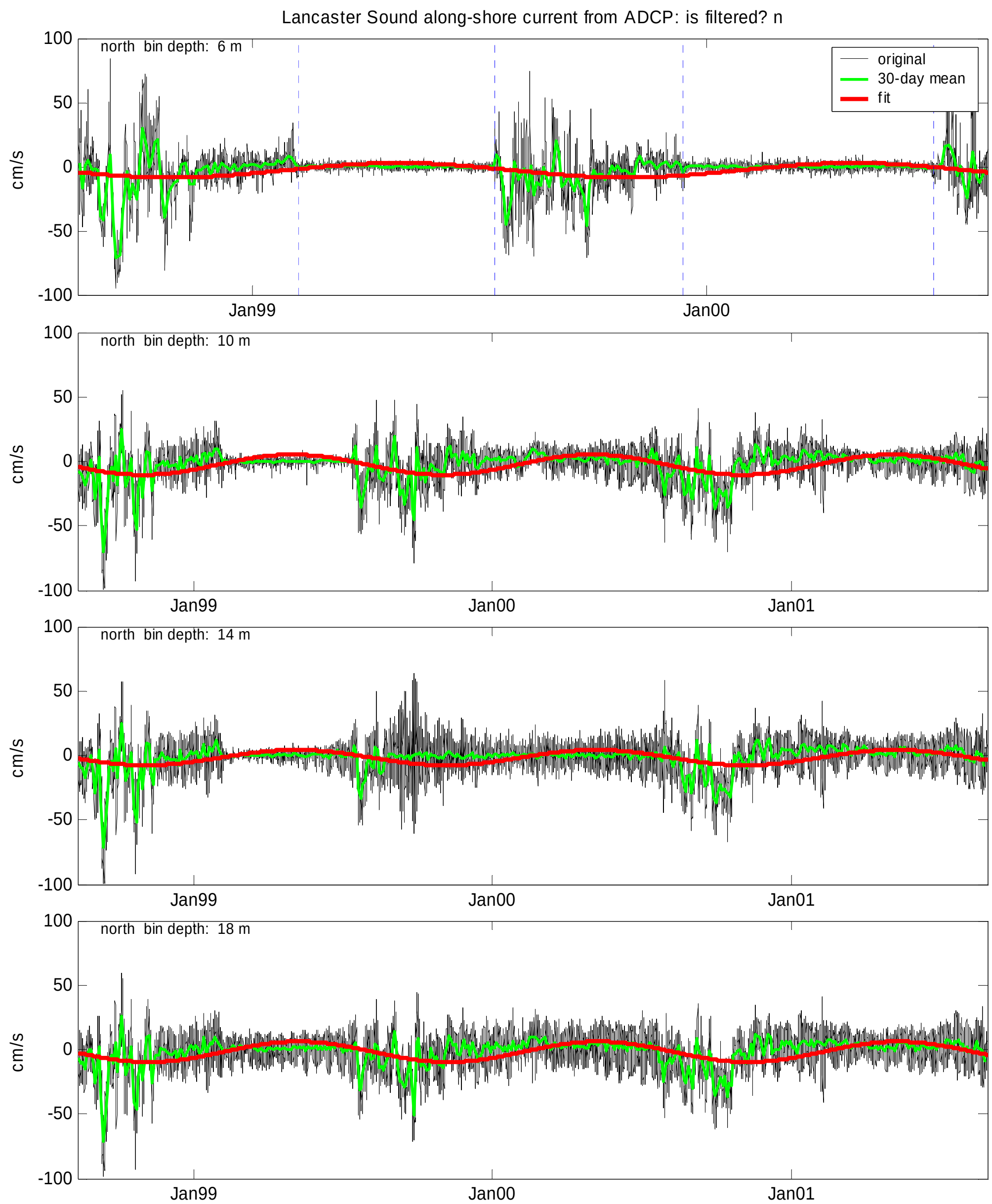

Figure 1-13 Fit of annual harmonic to north shore 2-hourly data, 6 to 18 m; 30-day mean is in green

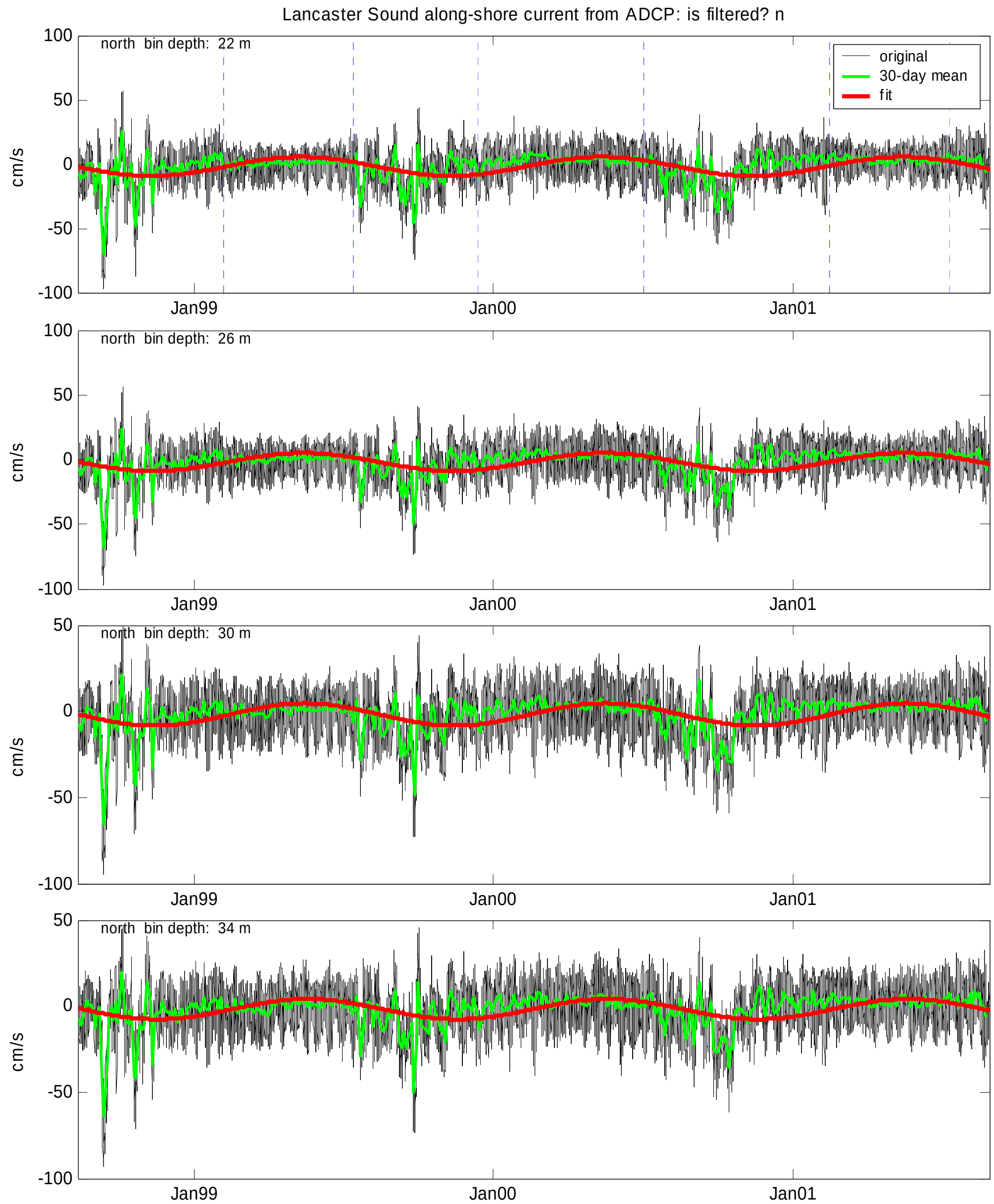

Figure 1-14 Fit of annual harmonic to north shore 2-hourly data, 22 to 34 m; 30-day mean is in green

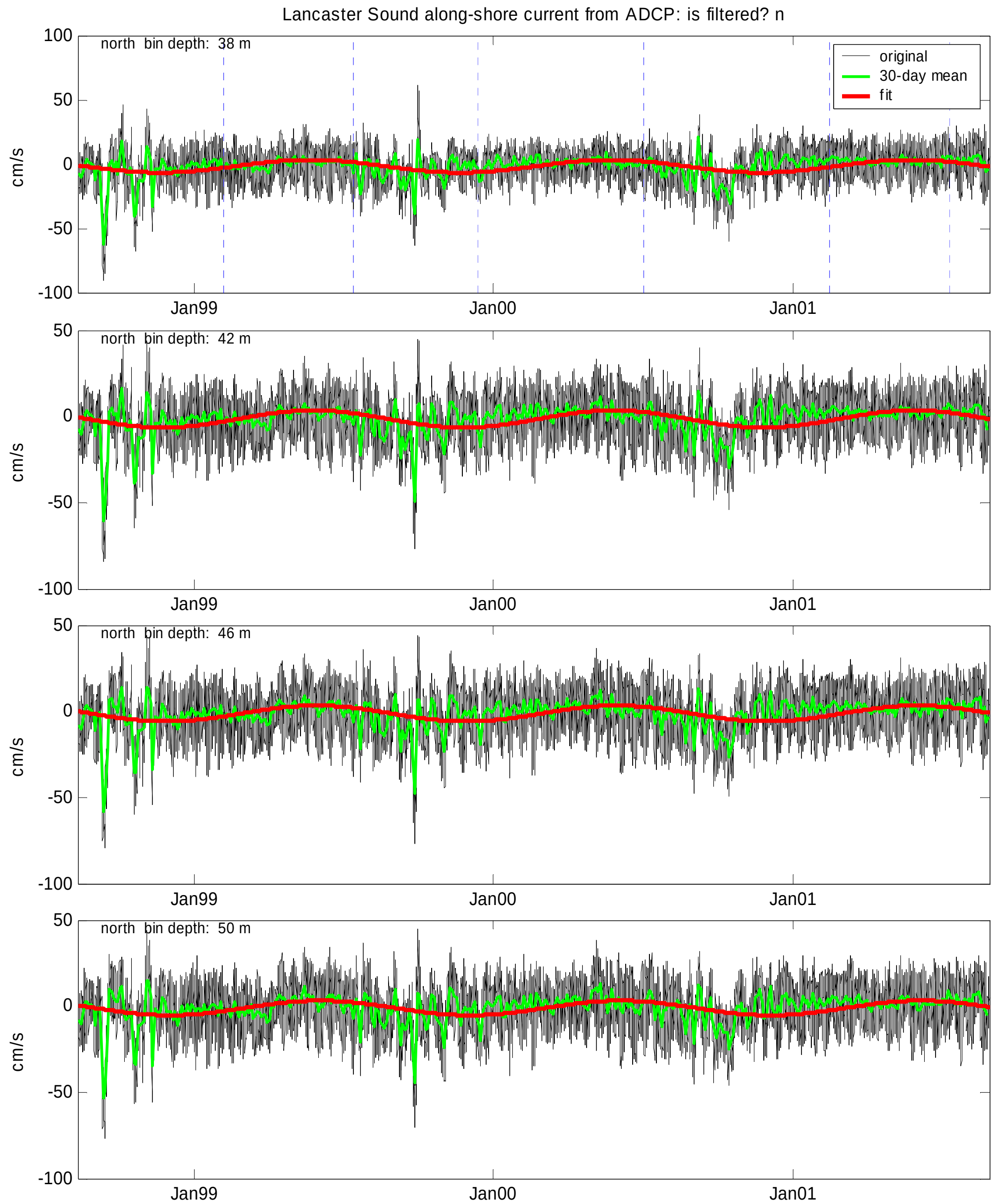

Figure 1-15 Fit of annual harmonic to north shore 2-hourly data, 38 to 50 m; 30-day mean is in green

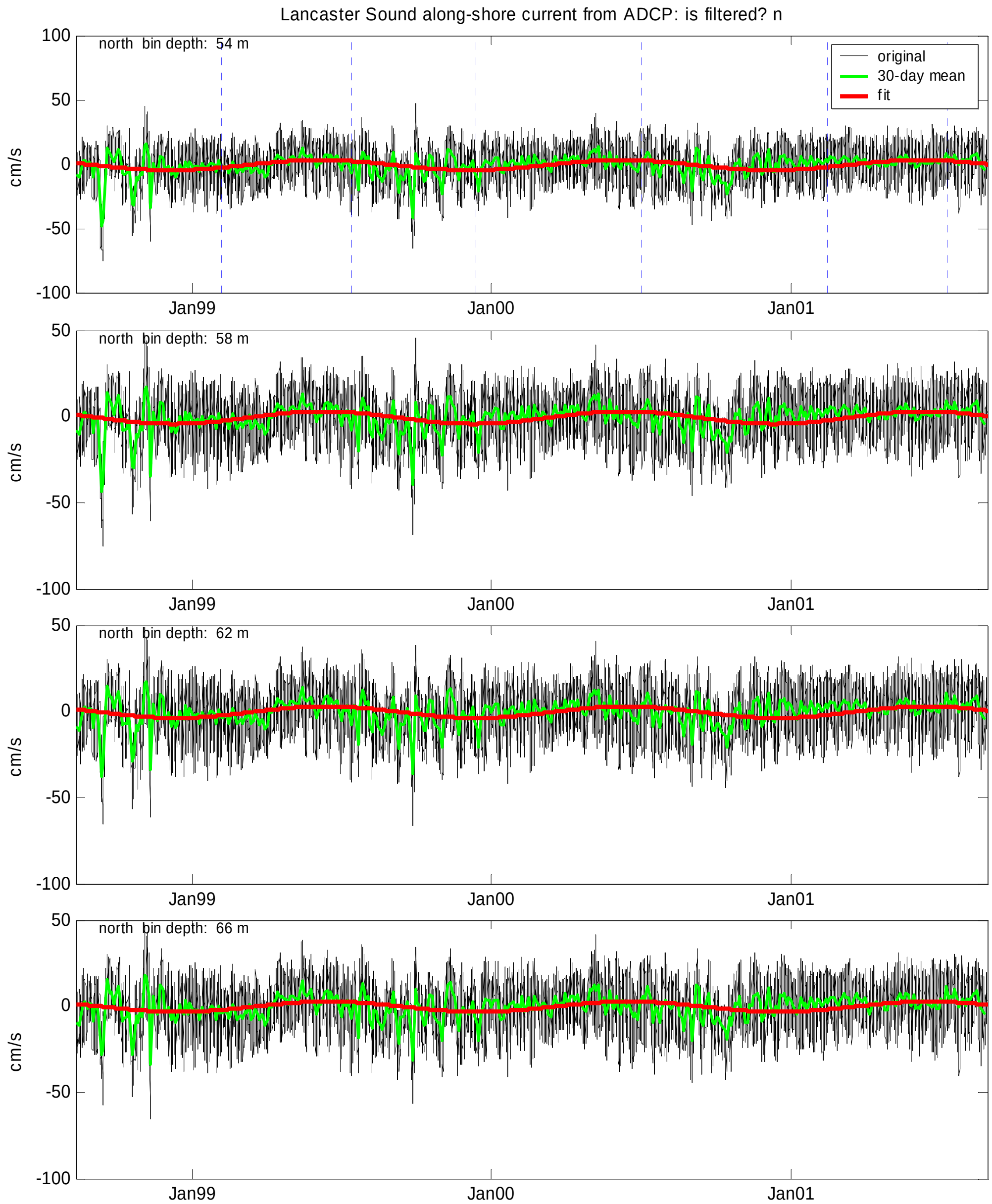

Figure 1-16 Fit of annual harmonic to north shore 2-hourly data, 54 to 66 m; 30-day mean is in green

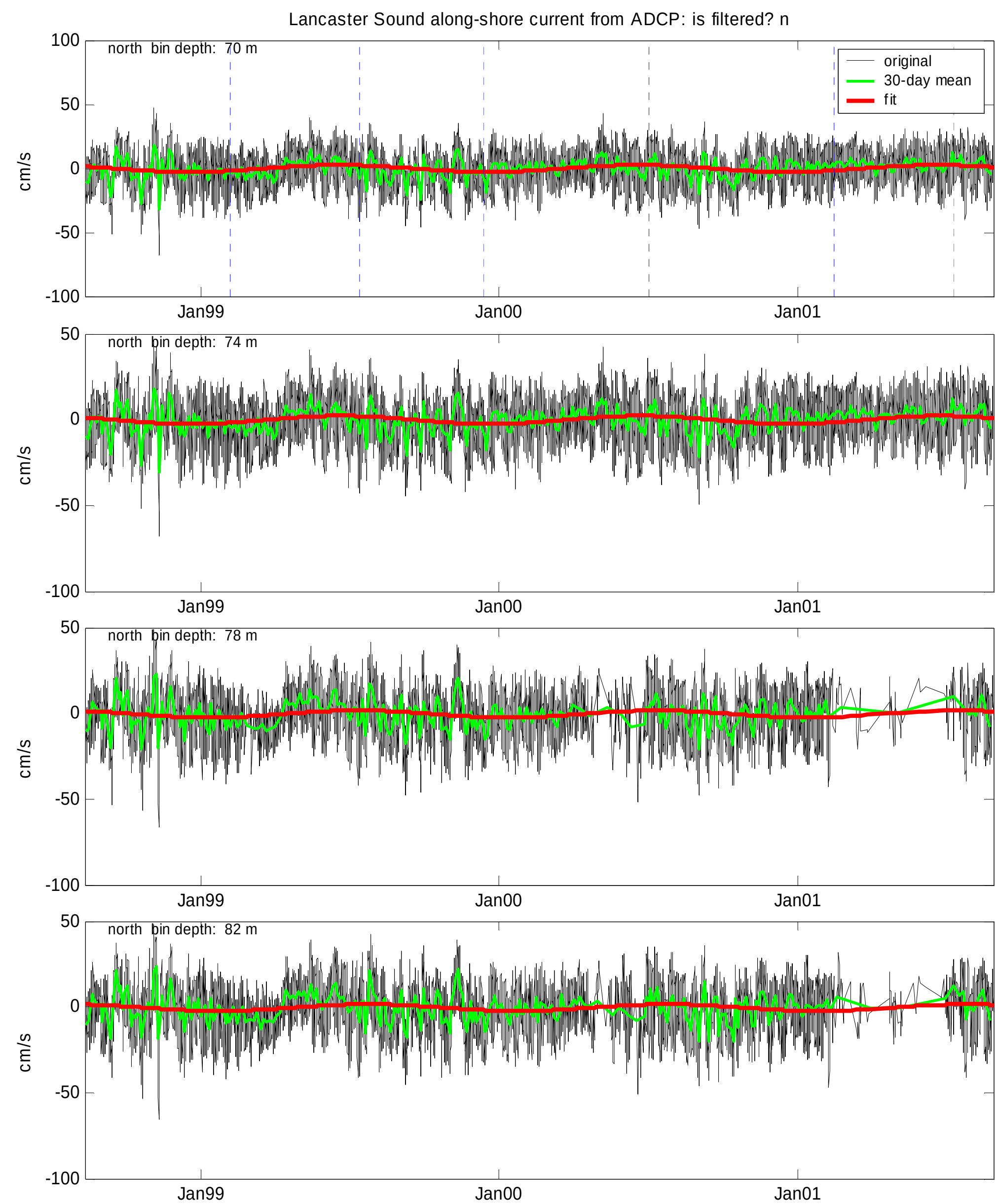

Figure 1-17 Fit of annual harmonic to north shore 2-hourly data, 70 to 82 m; 30-day mean is in green

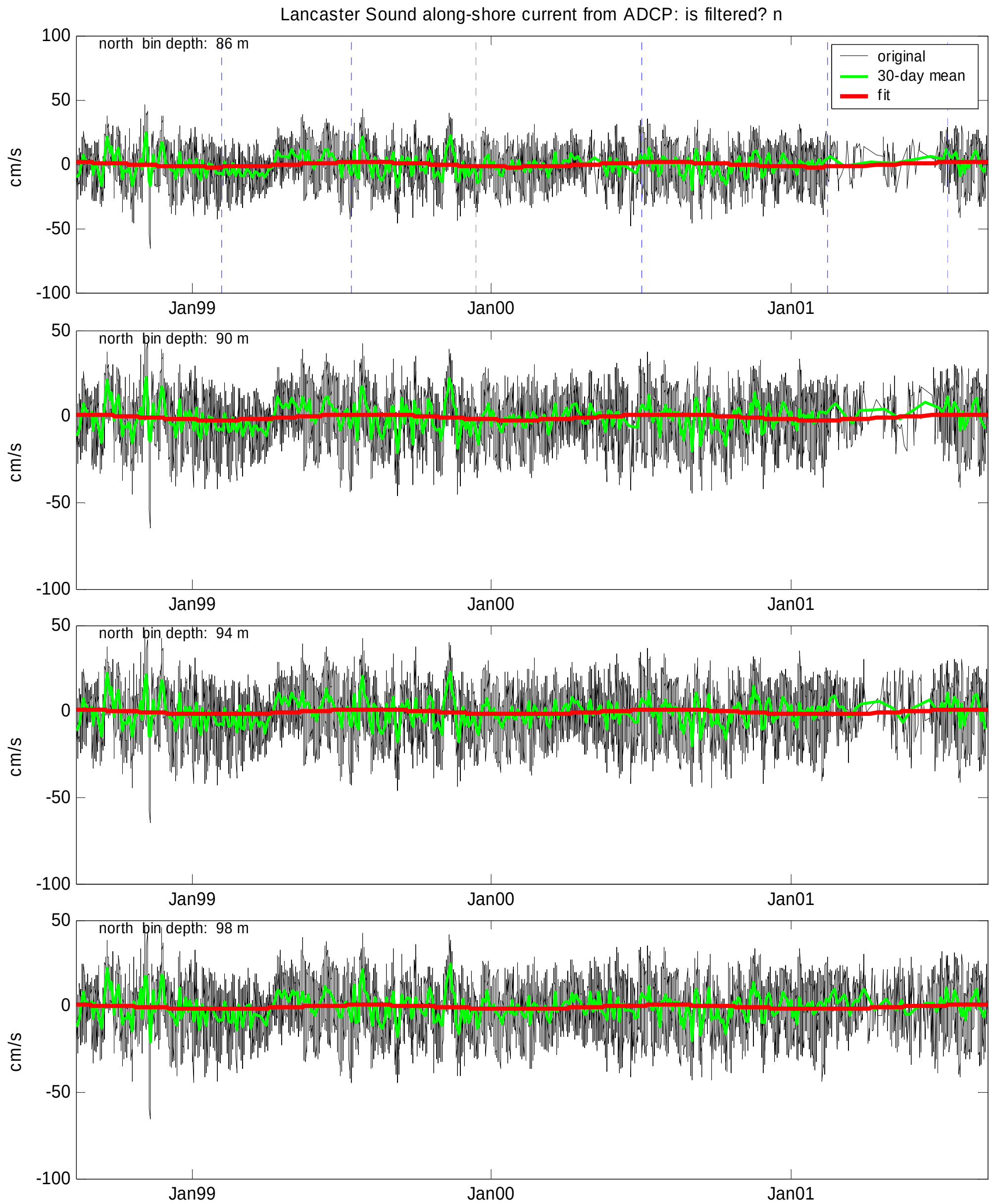

Figure 1-18 Fit of annual harmonic to north shore 2-hourly data, 86 to 98 m; 30-day mean is in green

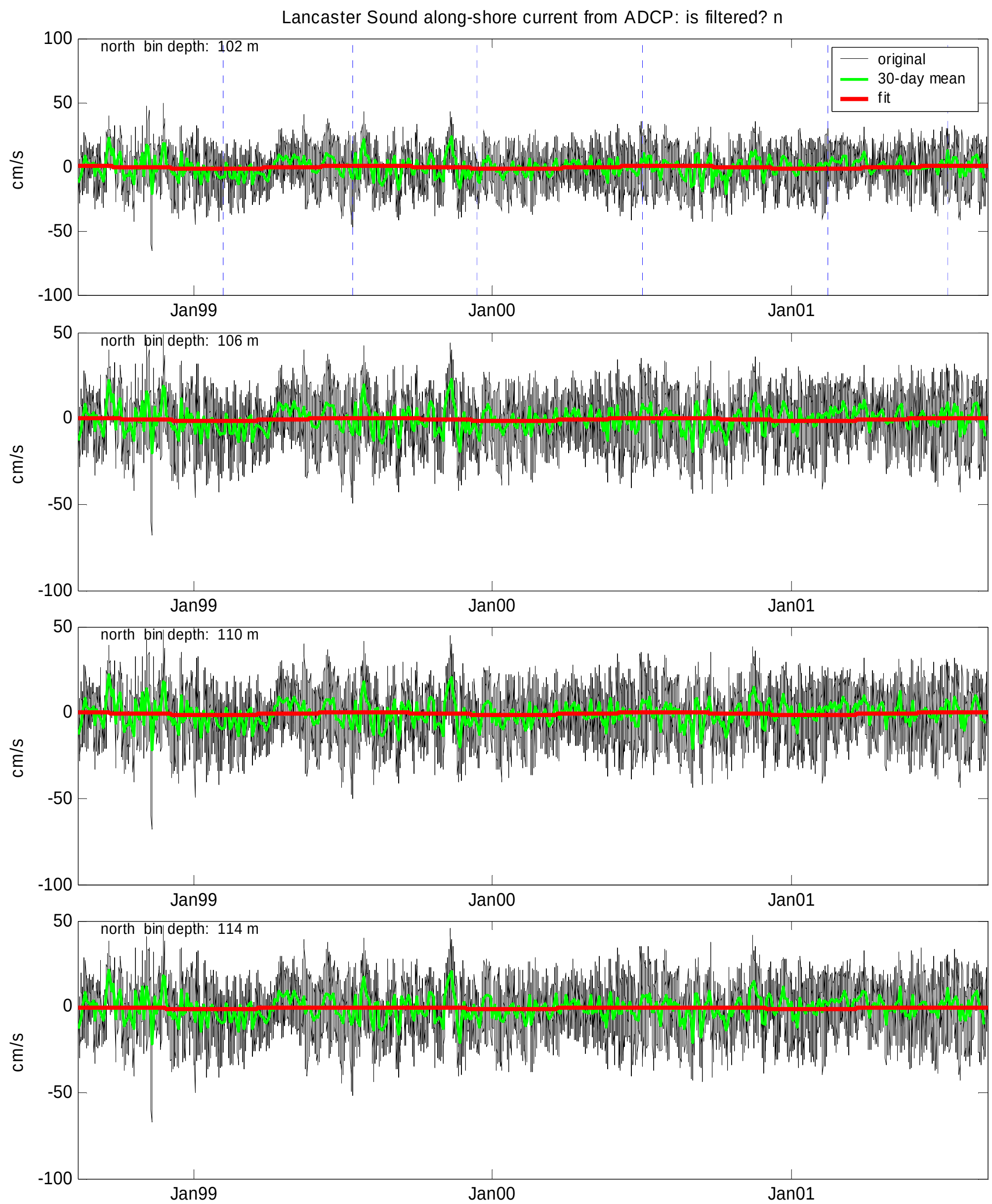

Figure 1-19 Fit of annual harmonic to north shore 2-hourly data, 102 to 114 m; 30-day mean is in green

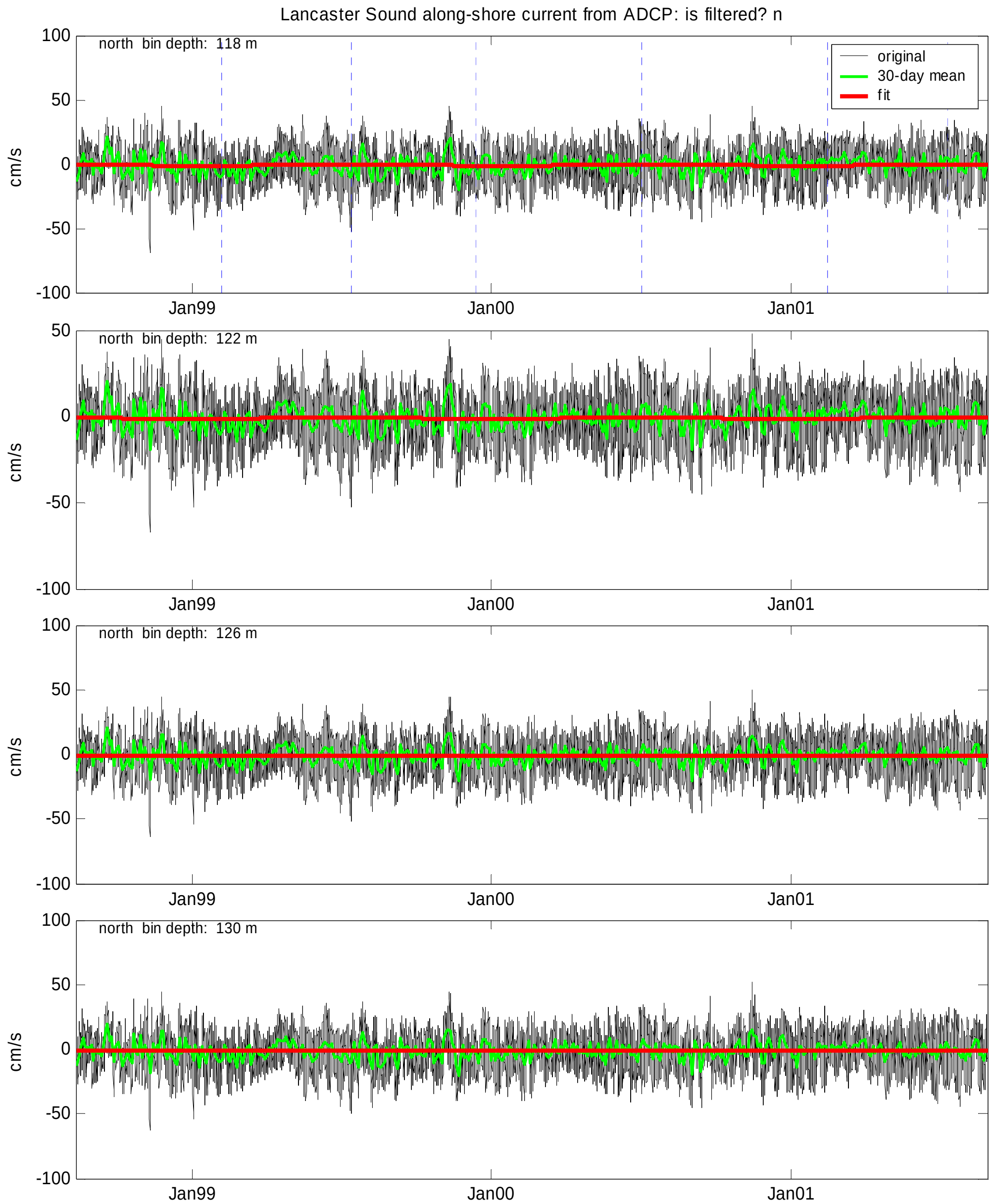

Figure 1-20 Fit of annual harmonic to north shore 2-hourly data, 118 to 130 m; 30-day mean is in green

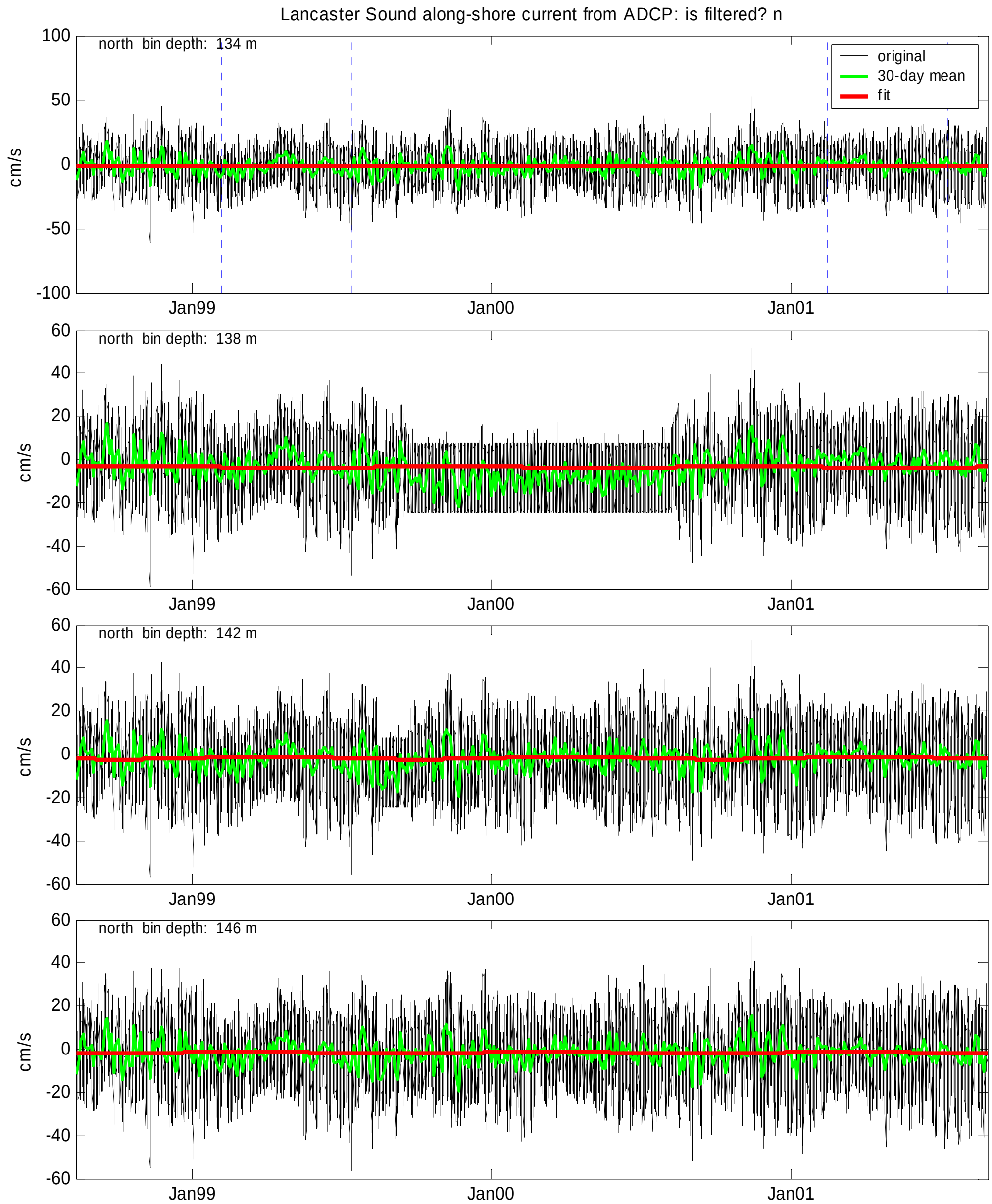

Figure 1-21 Fit of annual harmonic to north shore 2-hourly data, 134 to 146 m; 30-day mean is in green

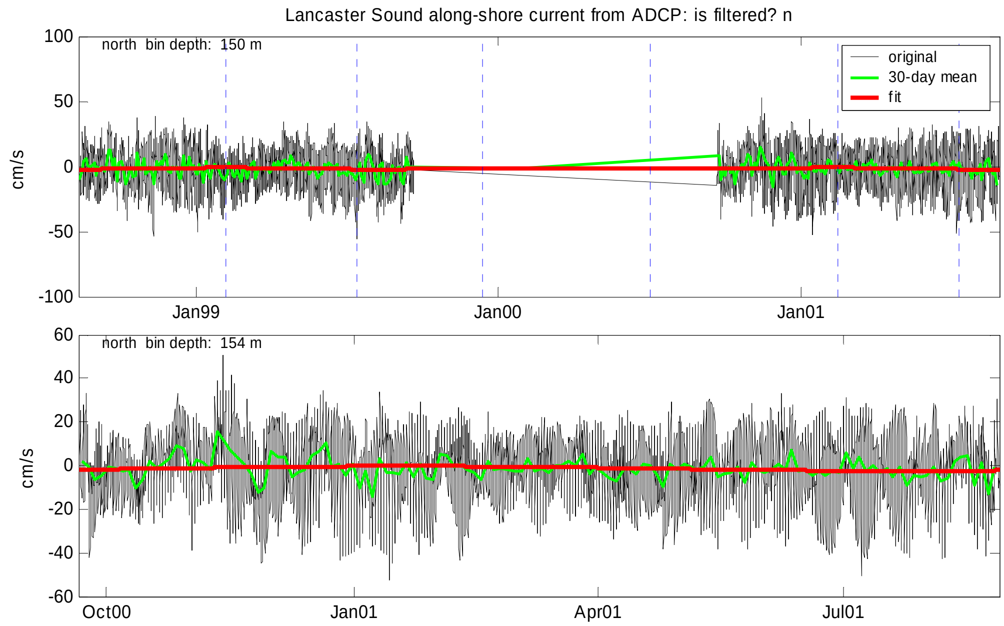

Figure 1-22 Fit of annual harmonic to north shore 2-hourly data, 150 to 154 m; 30-day mean is in green

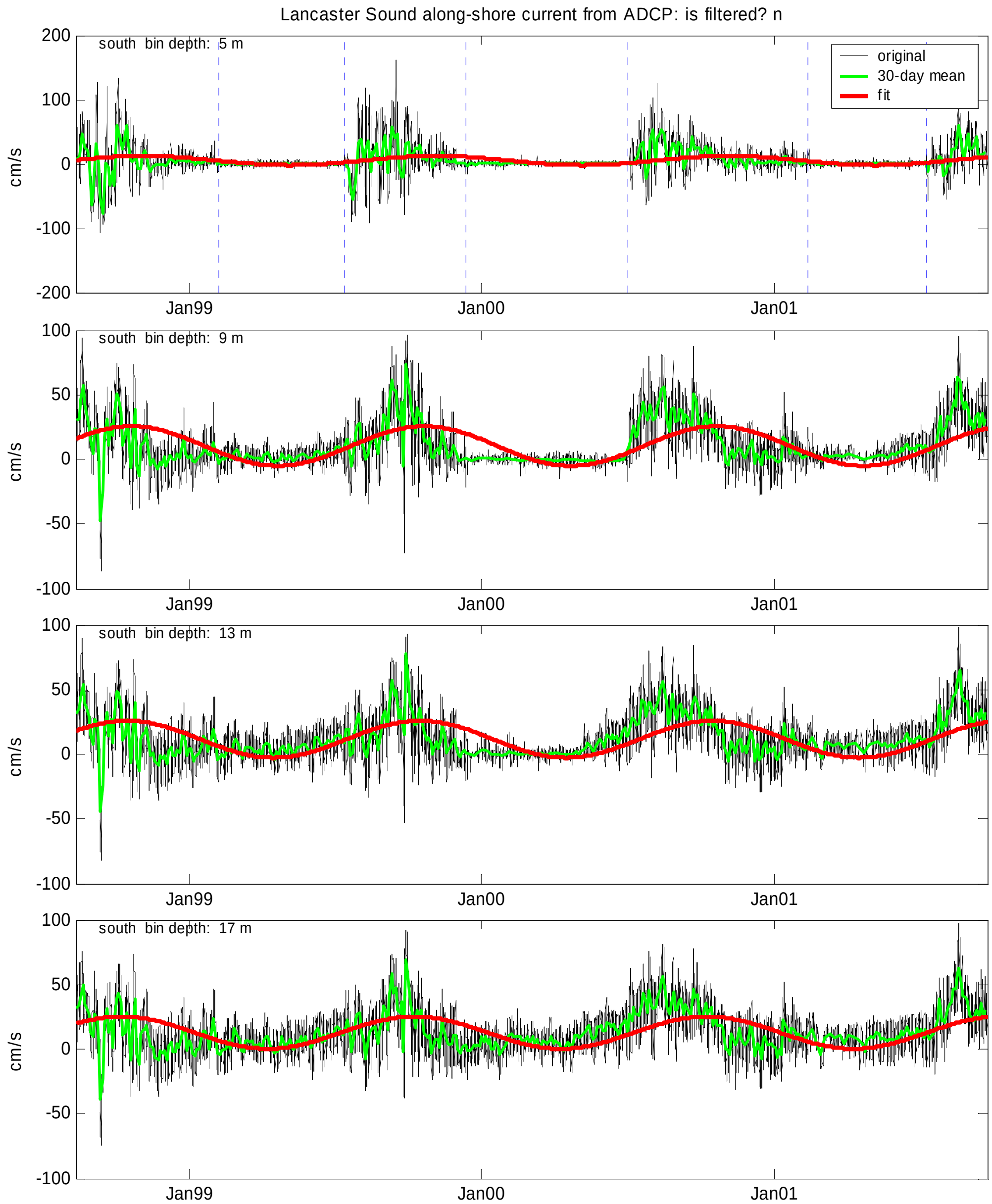

Figure 1-23 Fit of annual harmonic to south shore 2-hourly data, 5 to 17 m; 30-day mean is in green

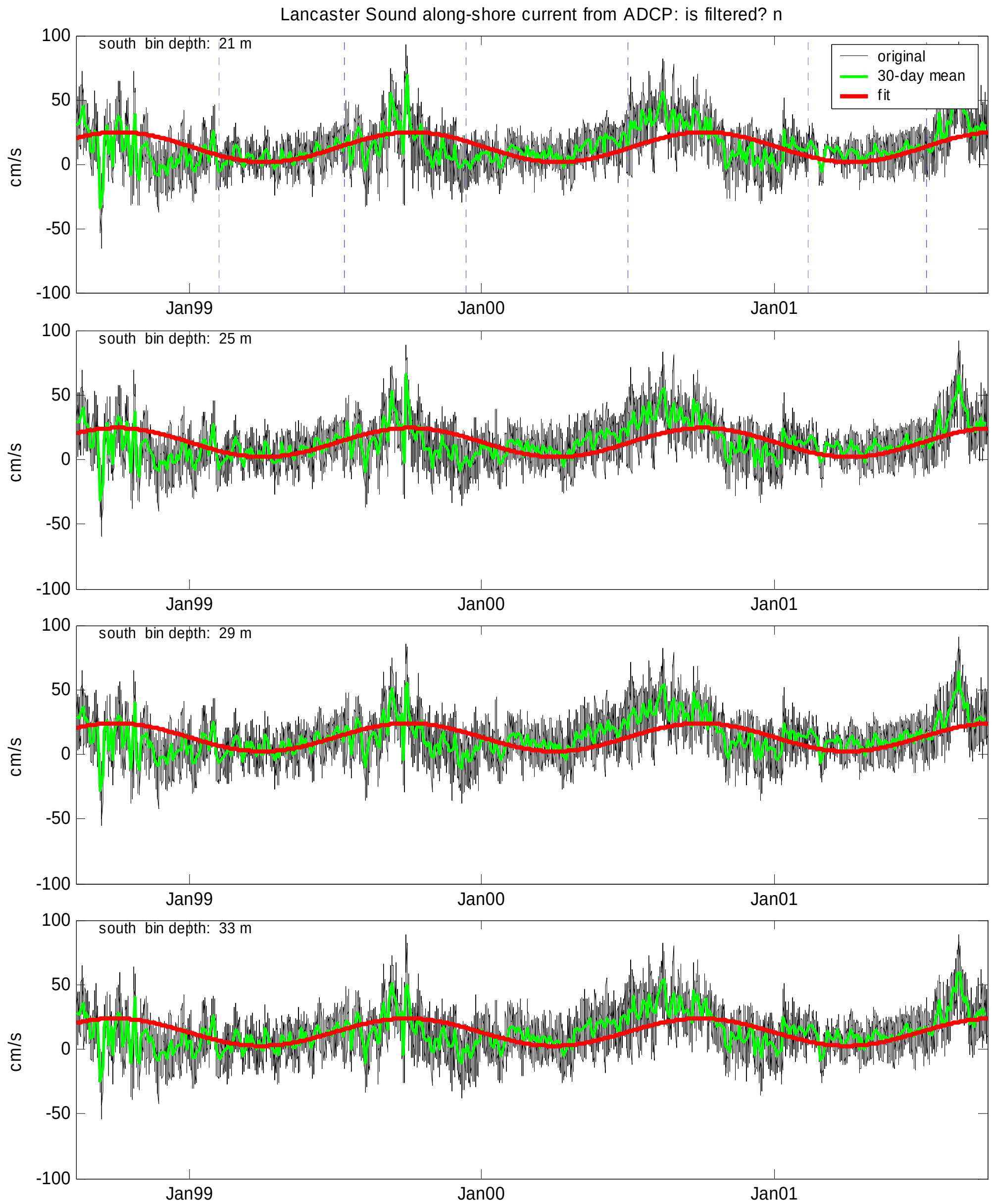

Figure 1-24 Fit of annual harmonic to south shore 2-hourly data, 21 to 33 m; 30-day mean is in green

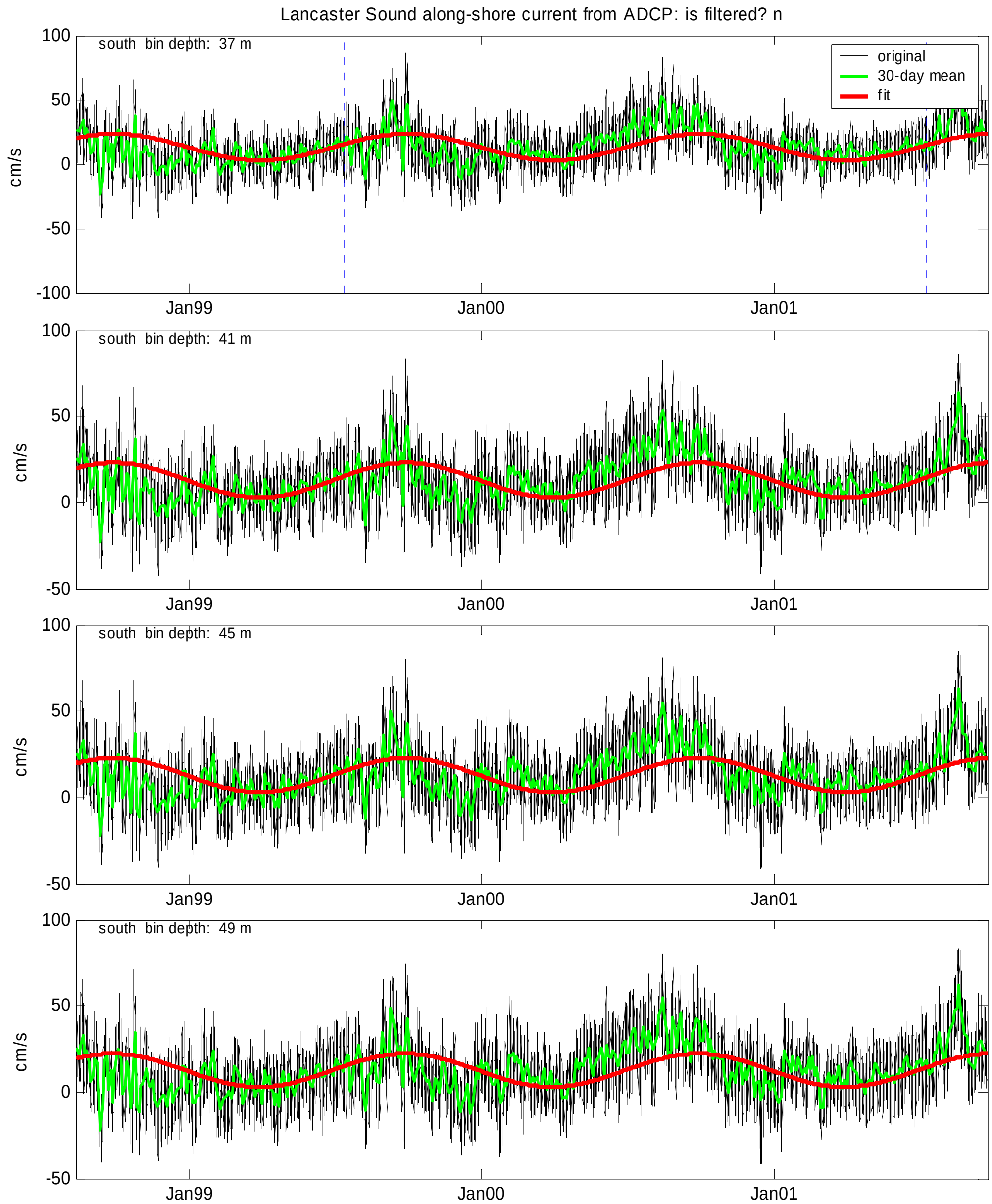

Figure 1-25 Fit of annual harmonic to south shore 2-hourly data, 37 to 49 m; 30-day mean is in green

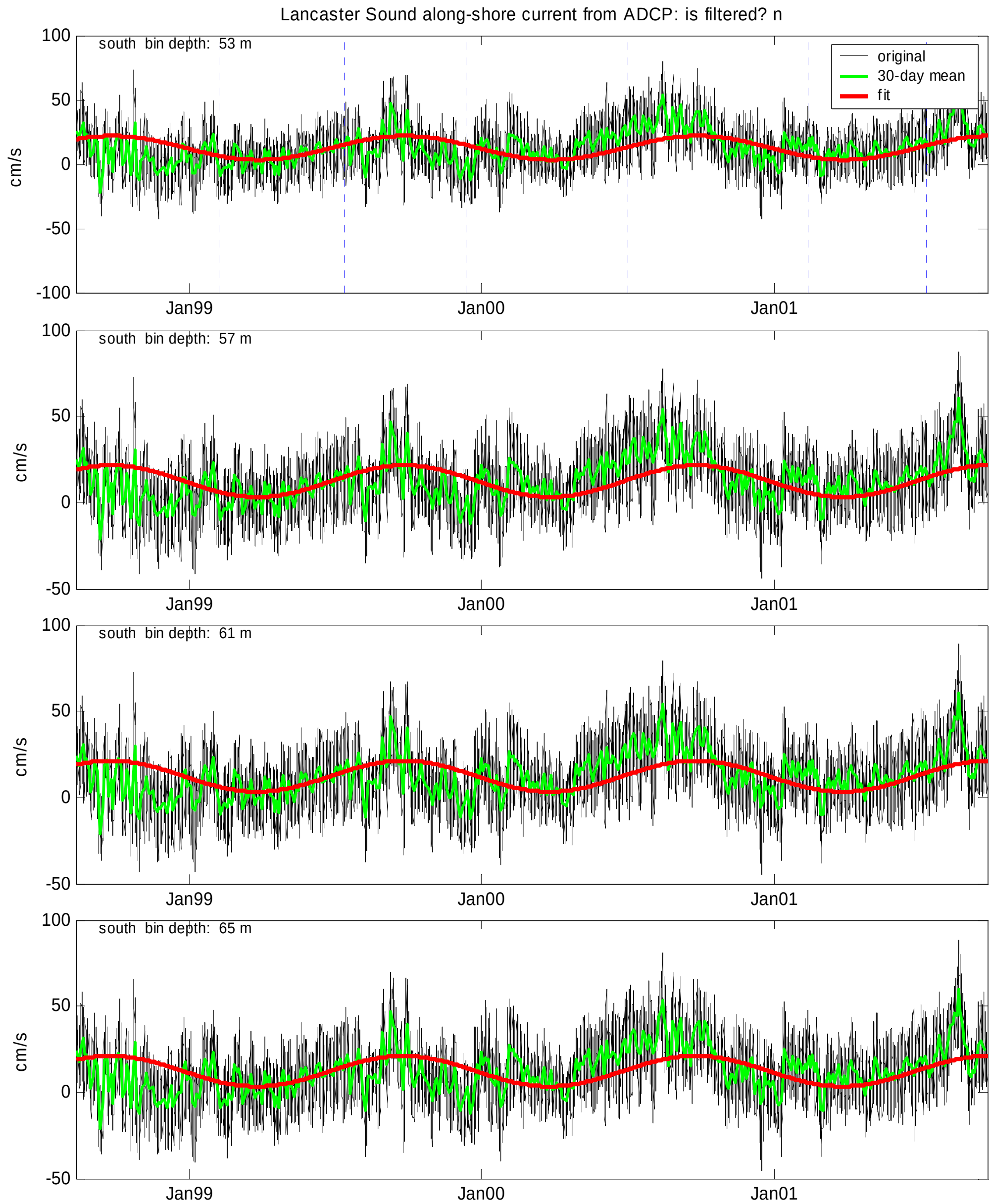

Figure 1-26 Fit of annual harmonic to south shore 2-hourly data, 53 to 65 m; 30-day mean is in green

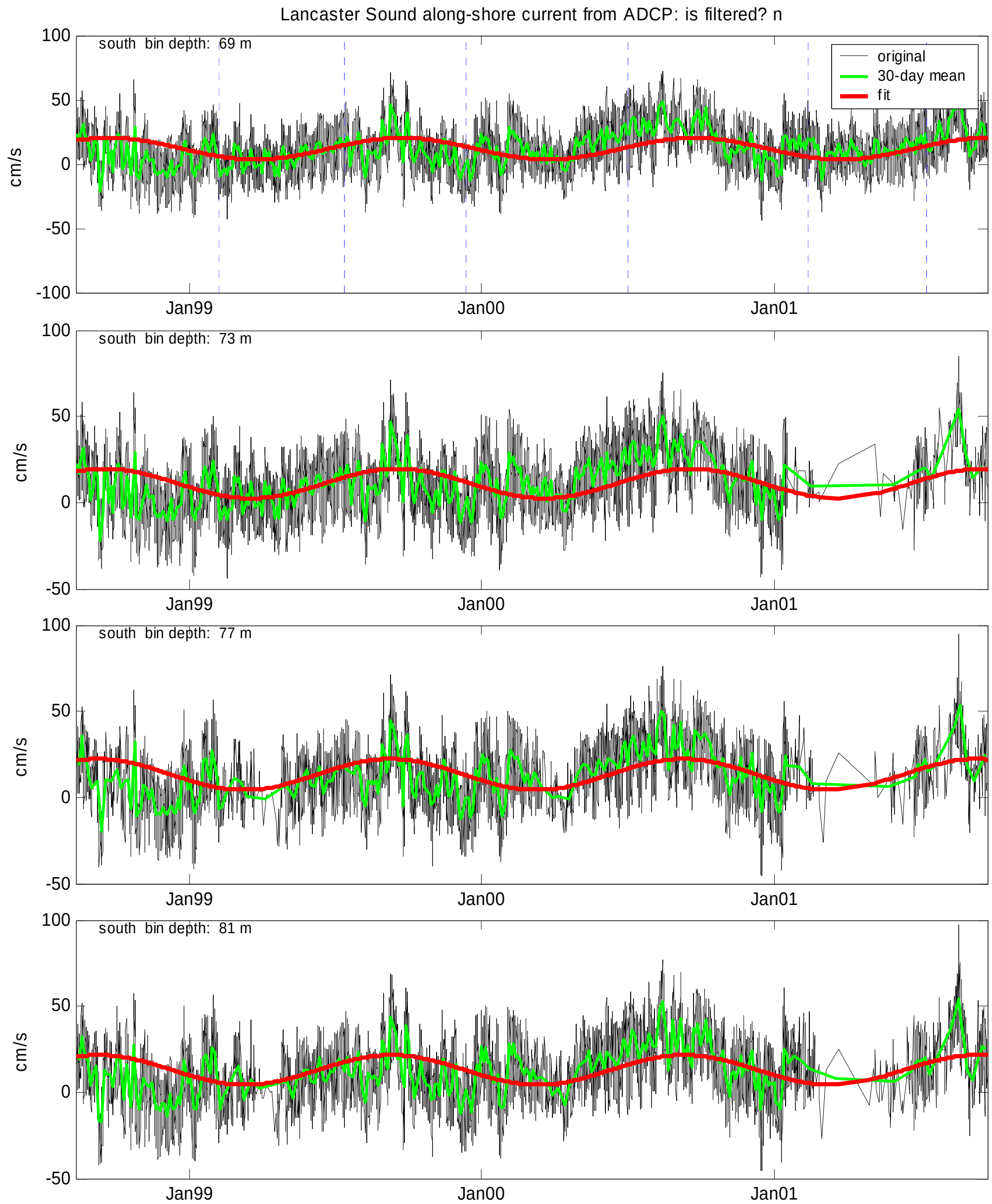

Figure 1-27 Fit of annual harmonic to south shore 2-hourly data, 69 to 81 m; 30-day mean is in green

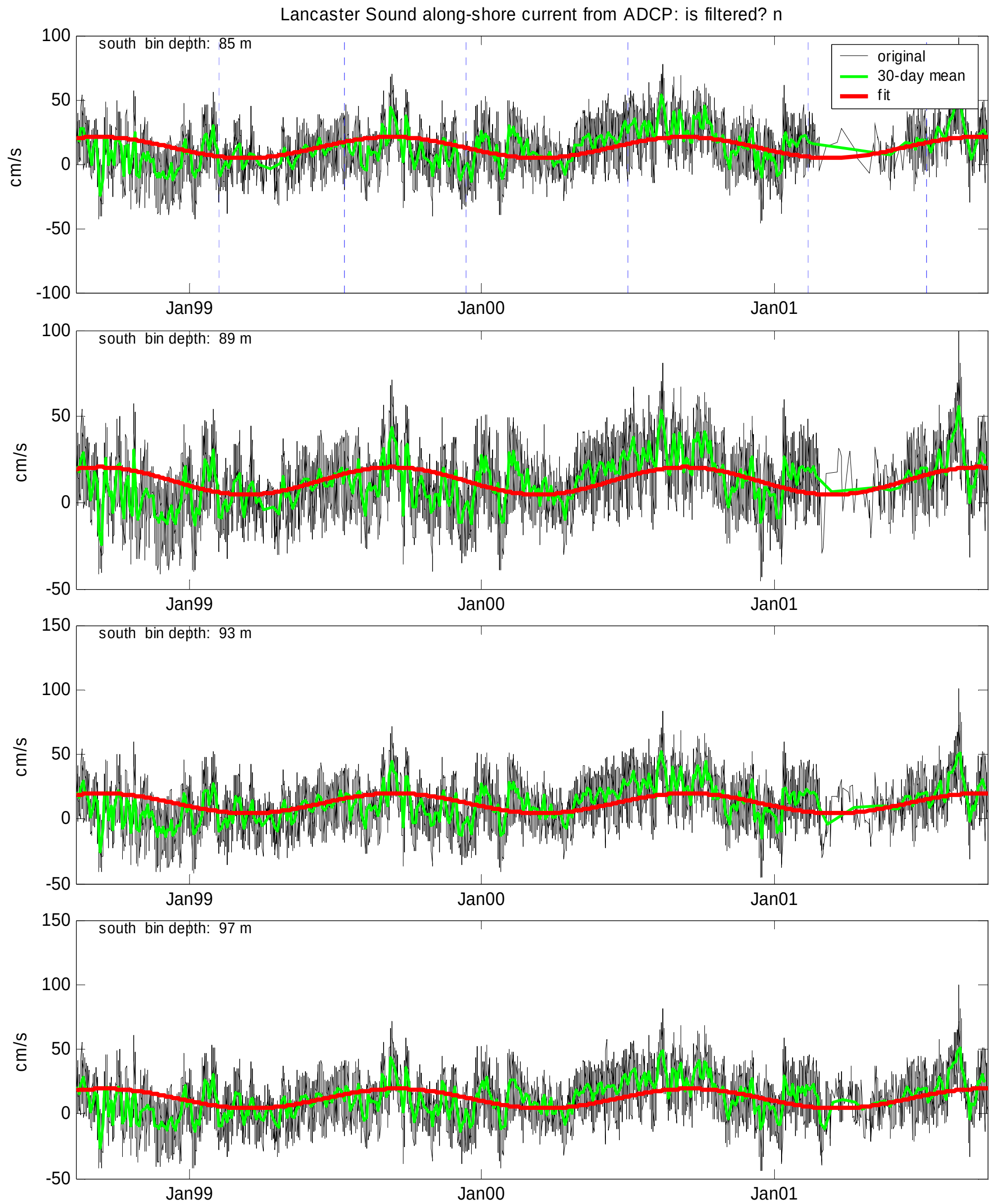

Figure 1-28 Fit of annual harmonic to south shore 2-hourly data, 85 to 97 m; 30-day mean is in green

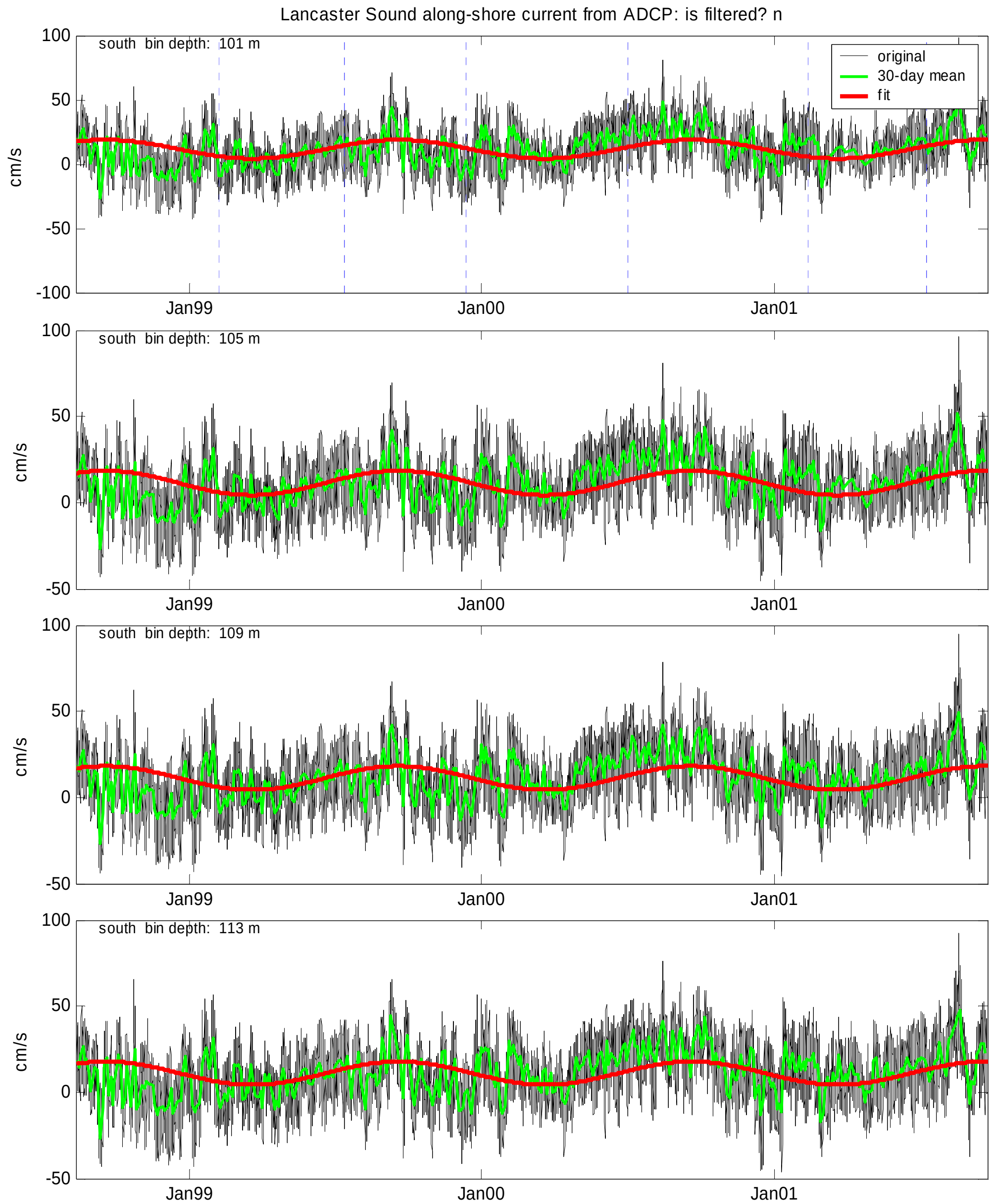

Figure 1-29 Fit of annual harmonic to south shore 2-hourly data, 101 to 113 m; 30-day mean is in green

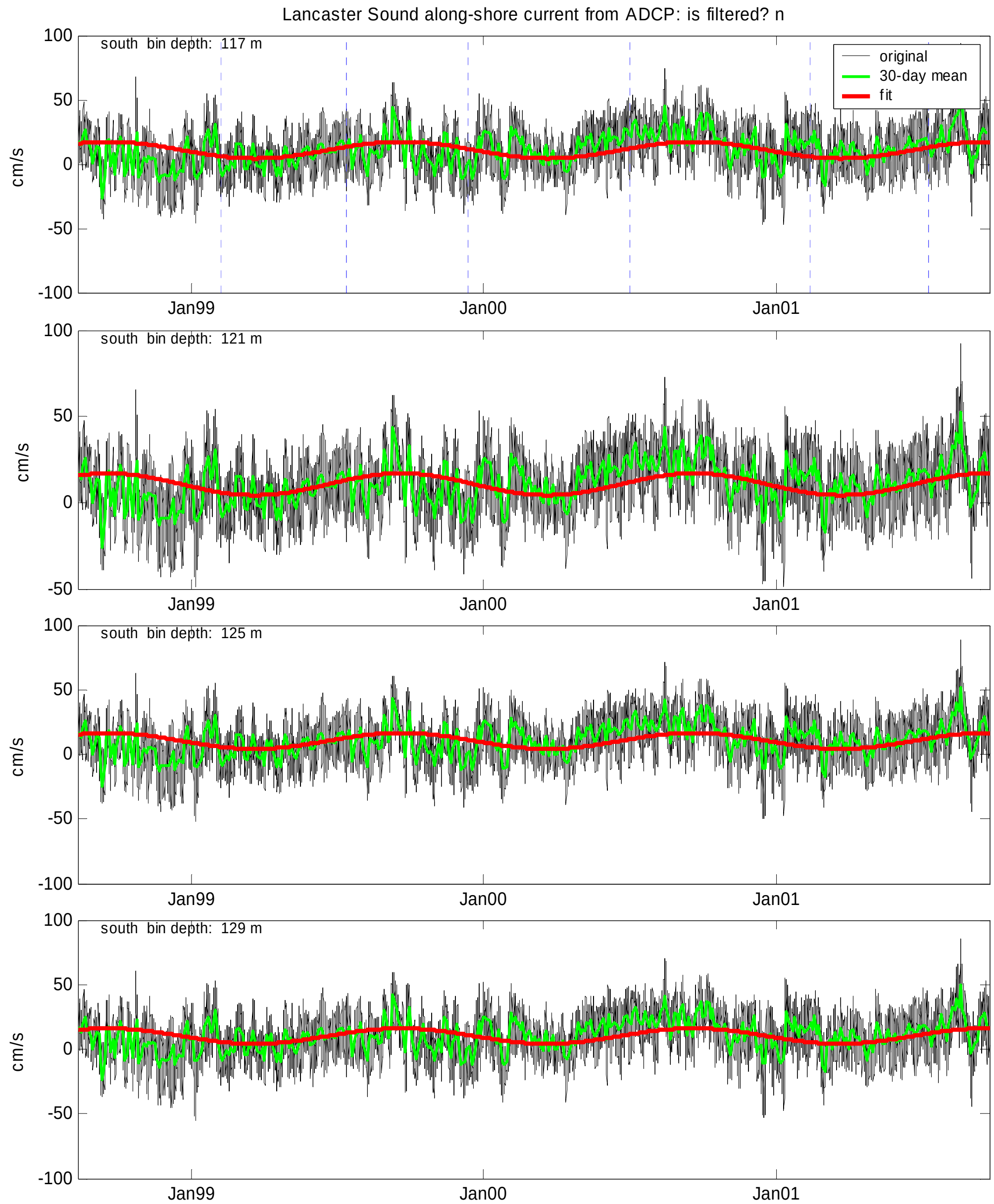

Figure 1-30 Fit of annual harmonic to south shore 2-hourly data, 117 to 129 m; 30-day mean is in green

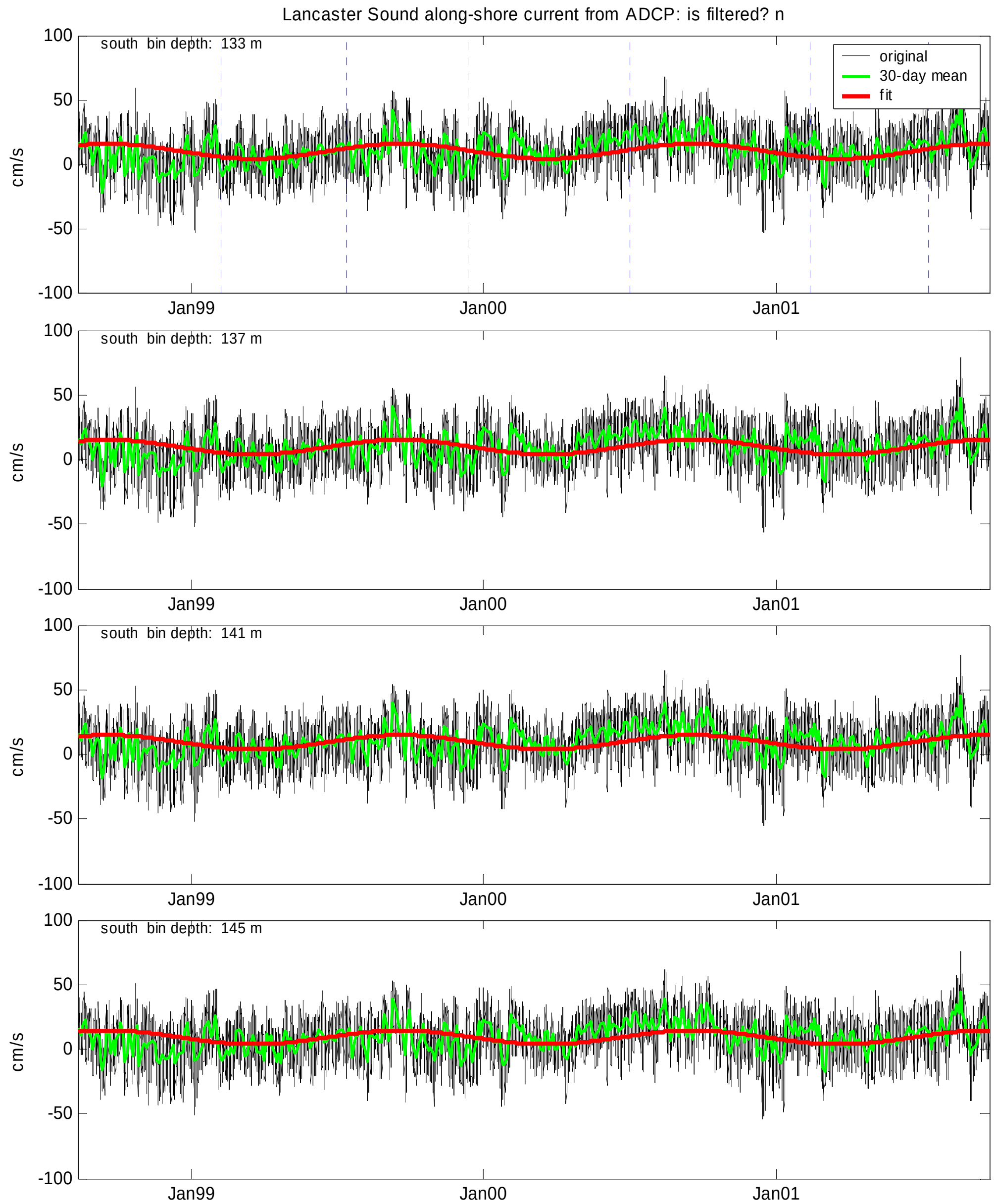

Figure 1-31 Fit of annual harmonic to south shore 2-hourly data, 133 to 145 m; 30-day mean is in green

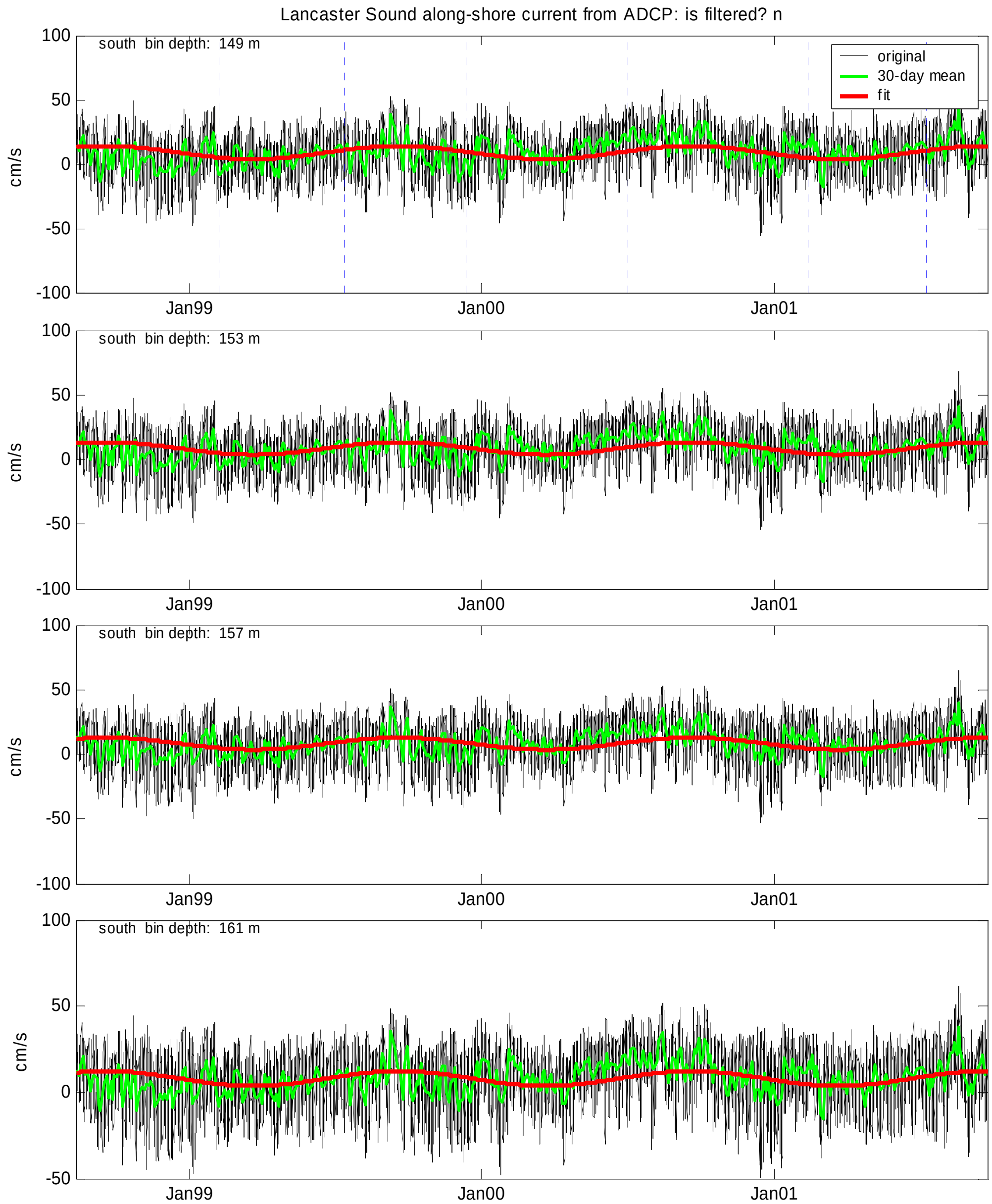

Figure 1-32 Fit of annual harmonic to south shore 2-hourly data, 149 to 161 m; 30-day mean is in green

1.1.8 Variance of original data (2-hourly) and low-pass filtered data (14-day)

Table 1-17 Variance of original data (2-hourly) and low-pass filtered data (14-day)

variance:	NORTH		variance:	SOUTH	
depth	raw	filtered	depth	raw	filtered
18	21788.74	7083.27	17	30009.72	14307.04
22	21902.76	6715.91	21	29833.77	13487.64
26	21723.43	6227.47	25	29856.55	12916.80
30	21389.94	5631.10	29	29770.70	12558.36
34	20927.63	4946.55	33	29728.27	12314.74
38	18628.19	3979.61	37	29780.13	12115.04
42	20190.80	3950.00	41	29969.89	11983.79
46	19891.67	3544.88	45	30266.76	11886.92
50	19632.88	3144.55	49	30447.63	11782.20
54	19342.99	2806.28	53	30562.83	11649.15
58	19097.05	2550.79	57	30772.82	11591.68
62	18721.96	2282.35	61	30954.15	11451.12
66	18327.20	2042.41	65	31067.86	11386.53
70	18111.18	1907.54	69	30883.16	11314.53
74	17949.97	1836.83	73	29773.19	12708.74
78	18222.73	3279.81	77	28112.61	11930.96
82	17899.52	2609.15	81	29544.98	12021.96
86	18216.13	2363.46	85	29406.98	11590.69
90	18606.71	2483.05	89	30088.09	11260.15
94	18800.29	1842.67	93	30541.14	11396.26
98	19236.47	1706.65	97	30640.75	10960.01
102	19670.50	1620.07	101	30322.54	10356.43
106	19966.36	1597.85	105	30405.44	10106.21
110	20156.98	1556.22	109	30369.56	9790.46
114	20266.14	1522.84	113	30277.45	9487.29
118	20437.05	1486.50	117	30039.72	9155.94
122	20512.89	1425.49	121	29727.57	8842.50
126	20551.07	1345.35	125	29331.30	8478.45
130	20607.34	1251.93	129	28911.20	8063.57
134	20717.94	1147.00	133	28493.85	7642.06
142	21300.21	1122.74	137	28119.23	7238.04
146	21294.19	871.62	141	27822.23	6892.10
			145	27460.37	6470.55
			149	27038.48	6041.44
			153	26659.91	5599.96
			157	26284.61	5124.81
			161	25632.92	4570.56

1.1.9 Fit annual harmonic to low-pass filtered 14-day ADCP time series, all bins

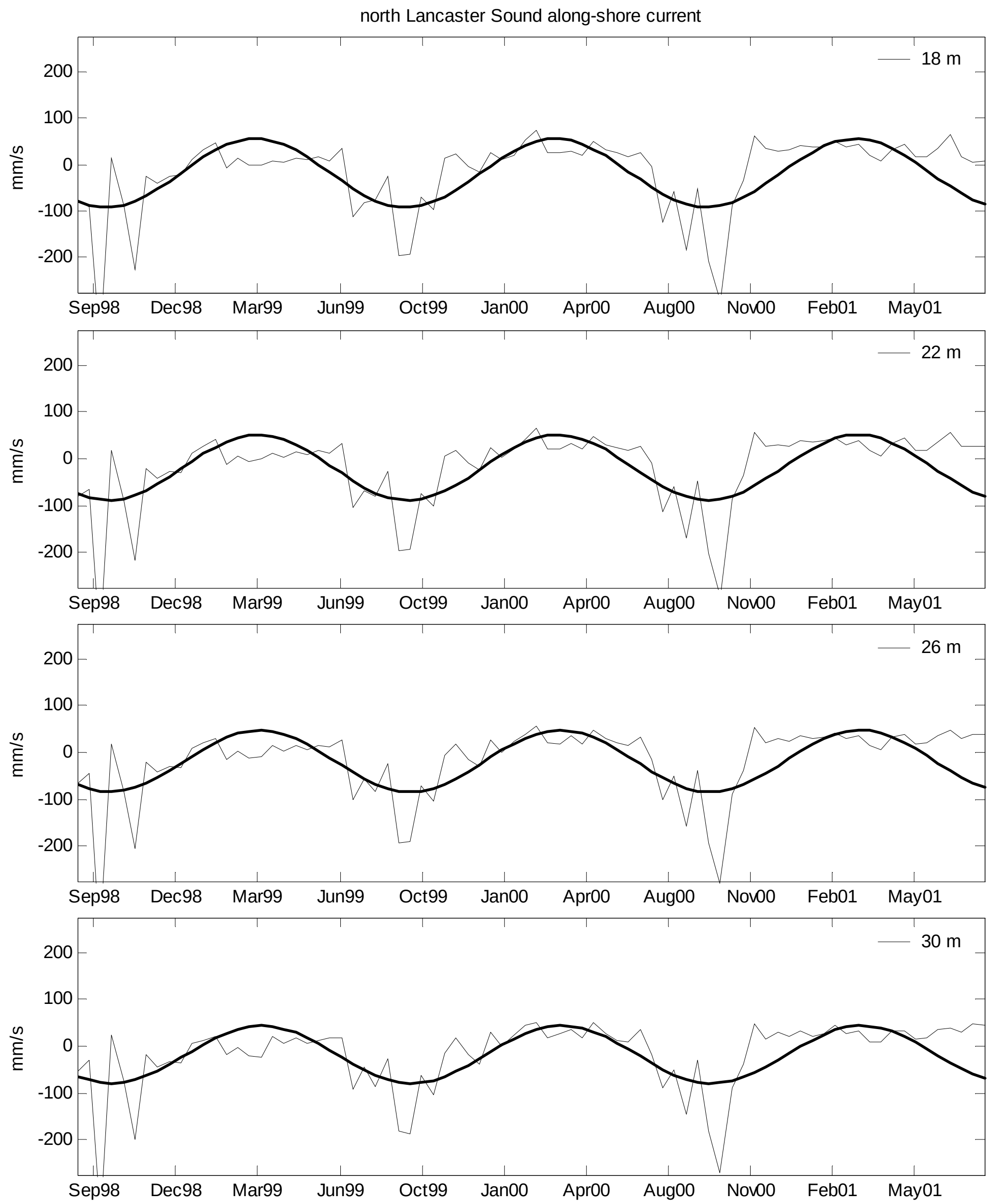

Figure 1-33 North shore low-pass filtered data with annual harmonic superimposed: 18 to 30 m

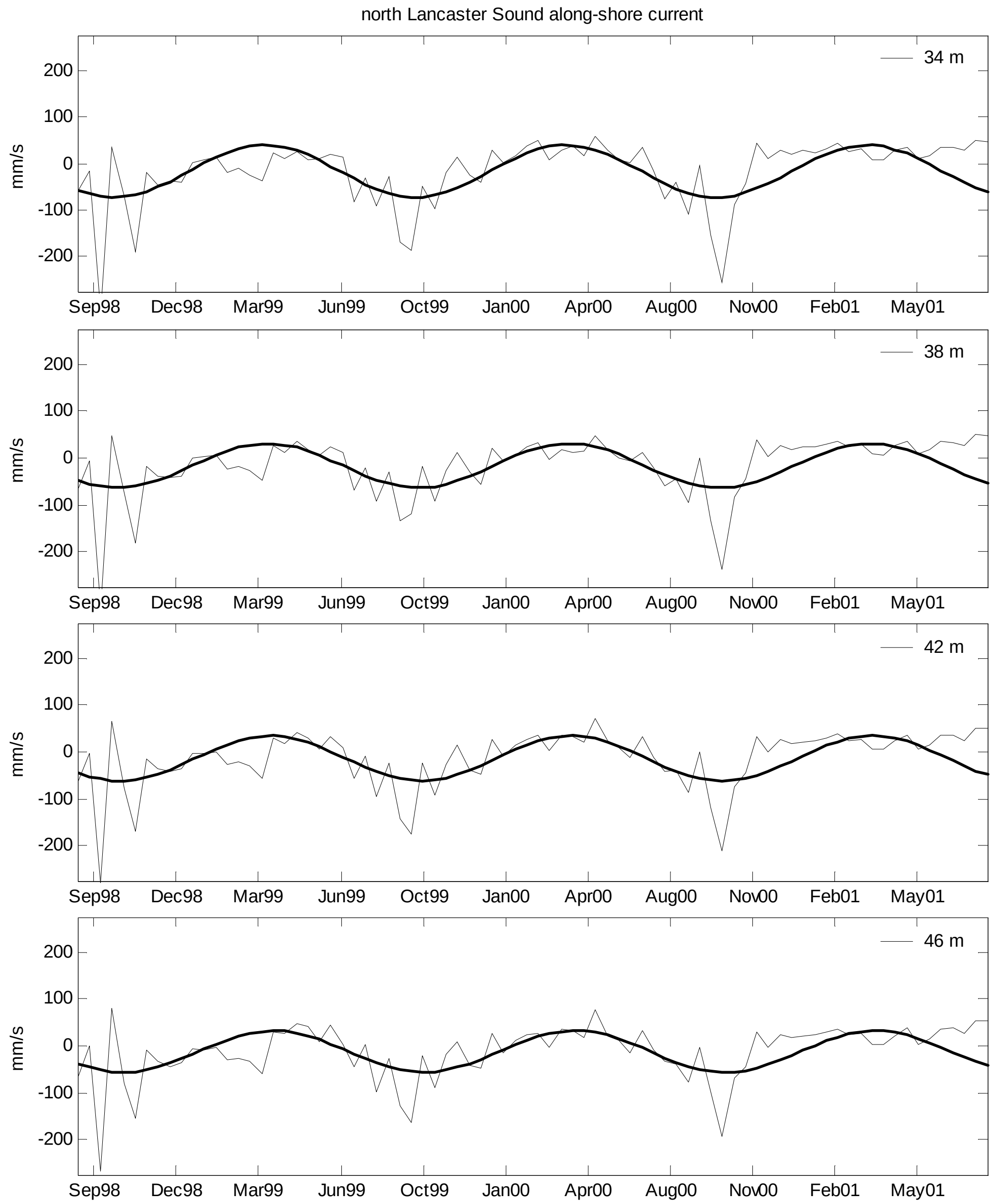

Figure 1-34 North shore low-pass filtered data with annual harmonic superimposed: 34 to 46 m

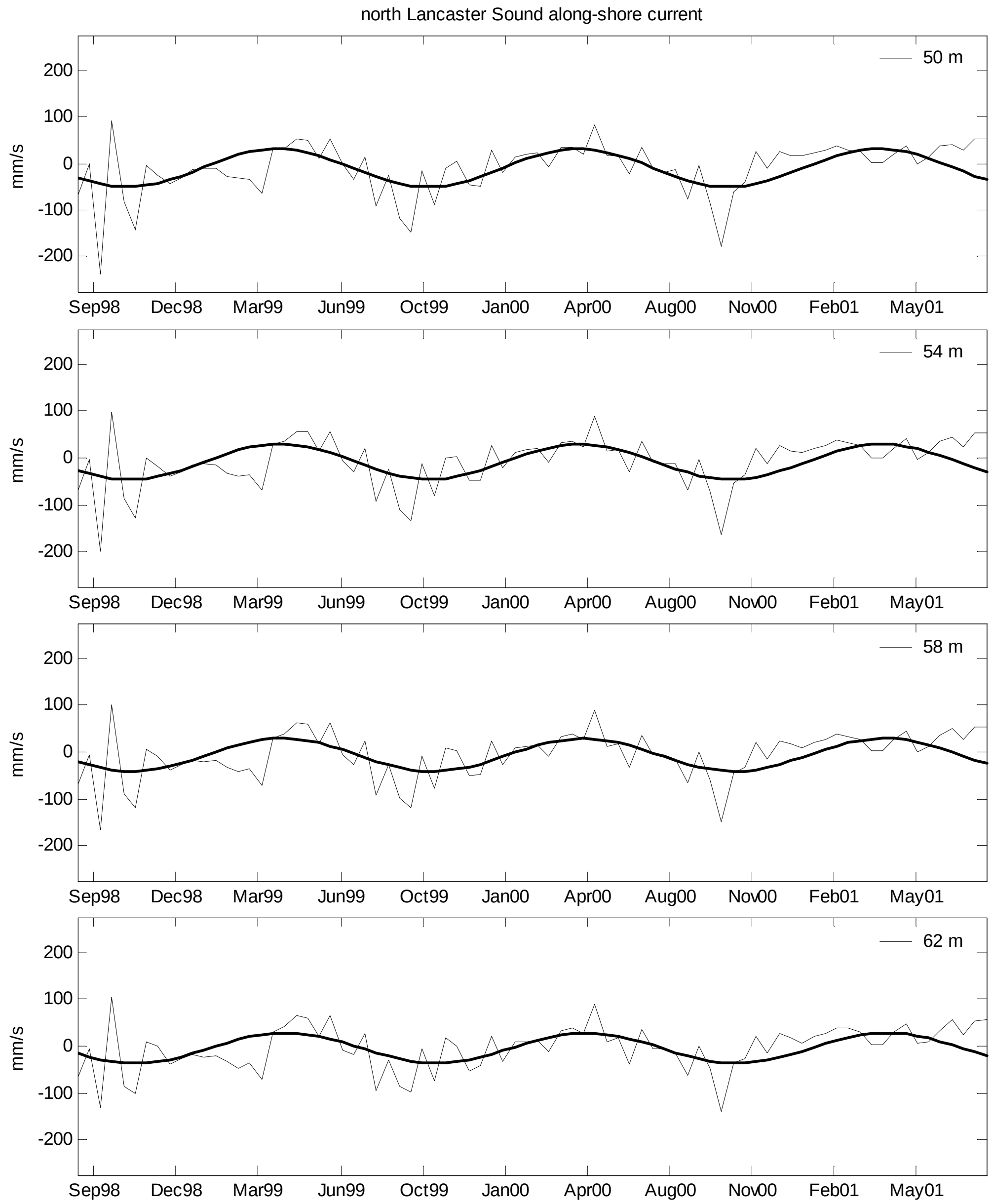

Figure 1-35 North shore low-pass filtered data with annual harmonic superimposed: 50 to 62 m

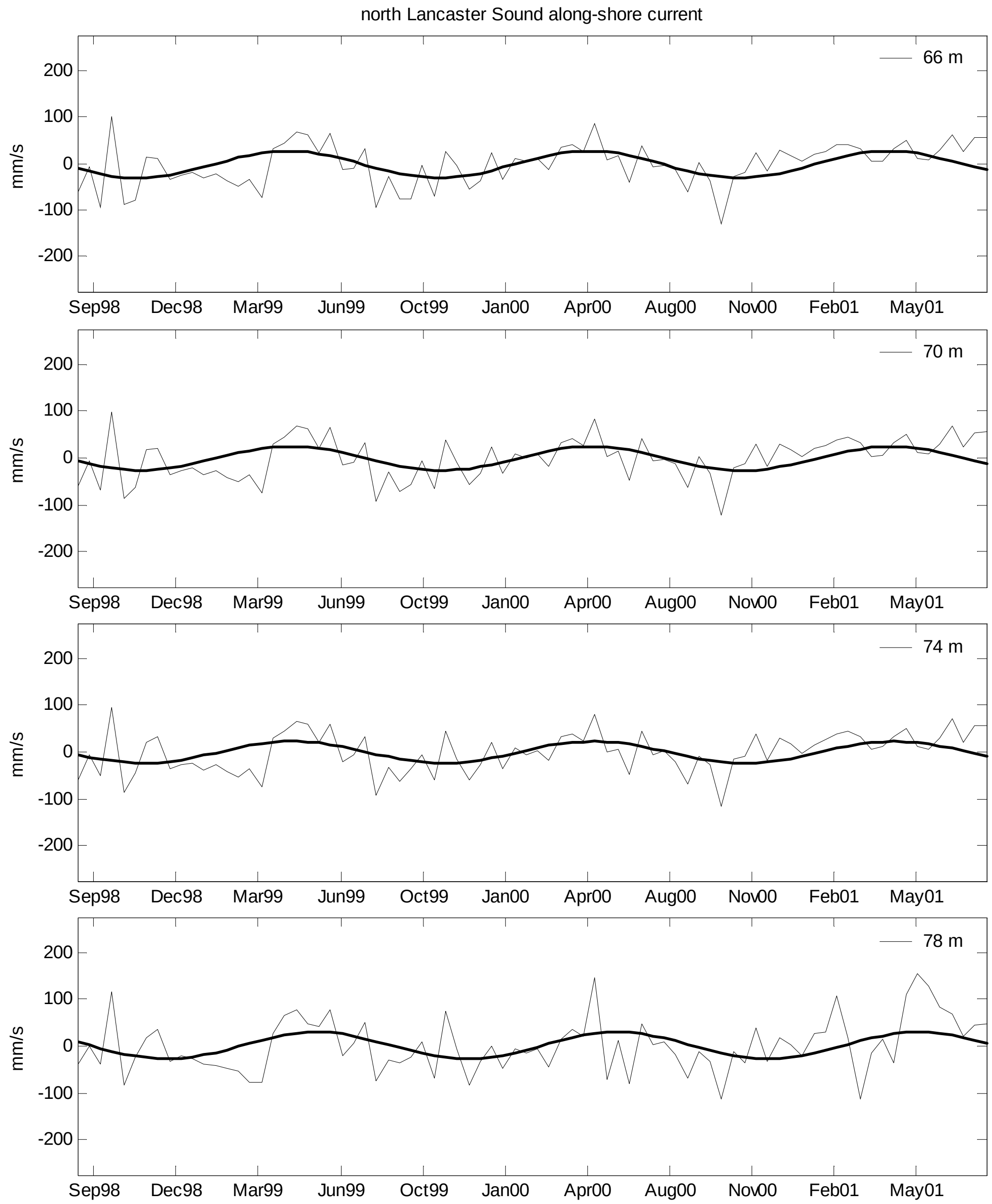

Figure 1-36 North shore low-pass filtered data with annual harmonic superimposed: 66 to 78 m

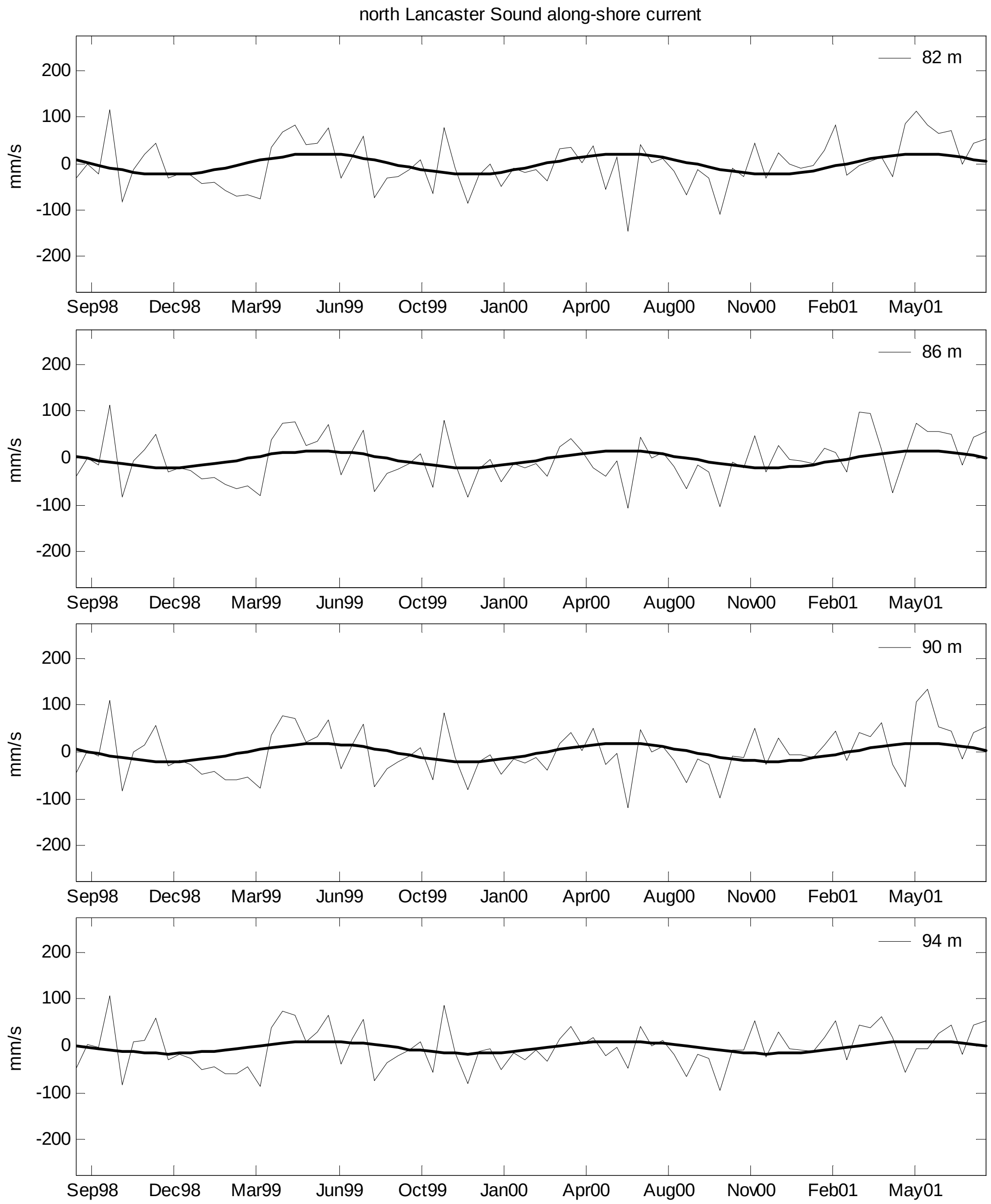

Figure 1-37 North shore low-pass filtered data with annual harmonic superimposed: 82 to 94 m

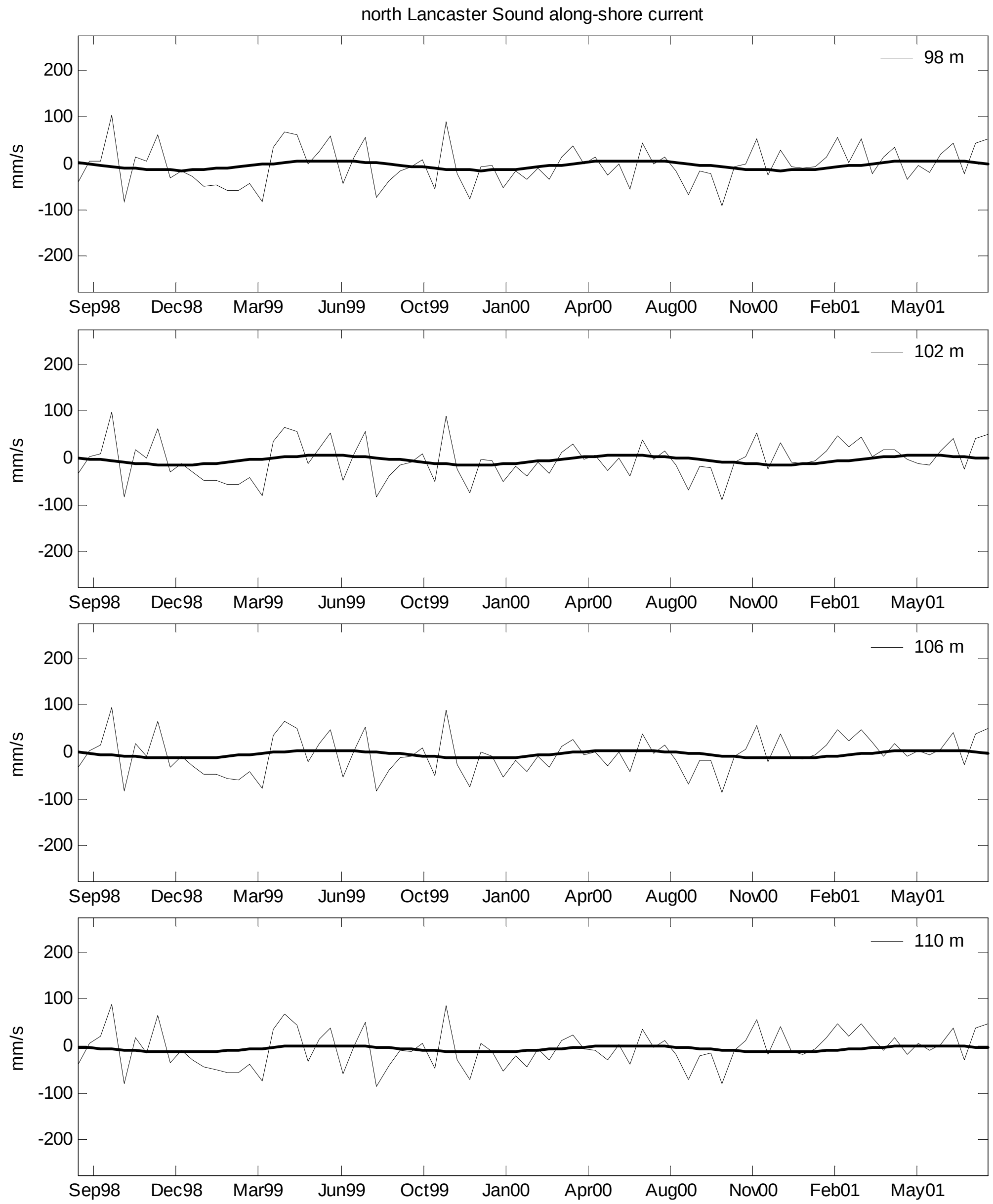

Figure 1-38 North shore low-pass filtered data with annual harmonic superimposed: 98 to 110 m

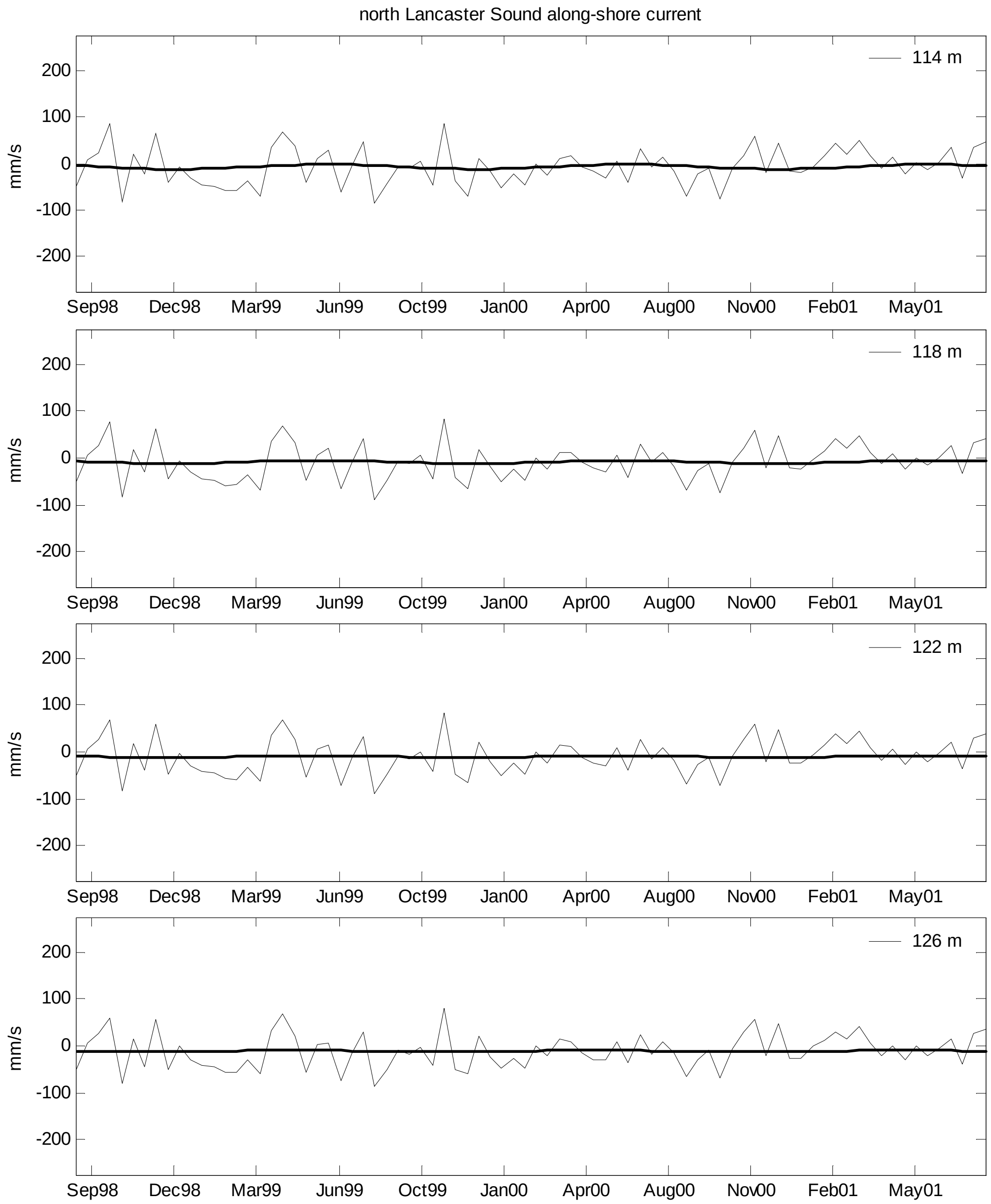

Figure 1-39 North shore low-pass filtered data with annual harmonic superimposed: 114 to 126 m

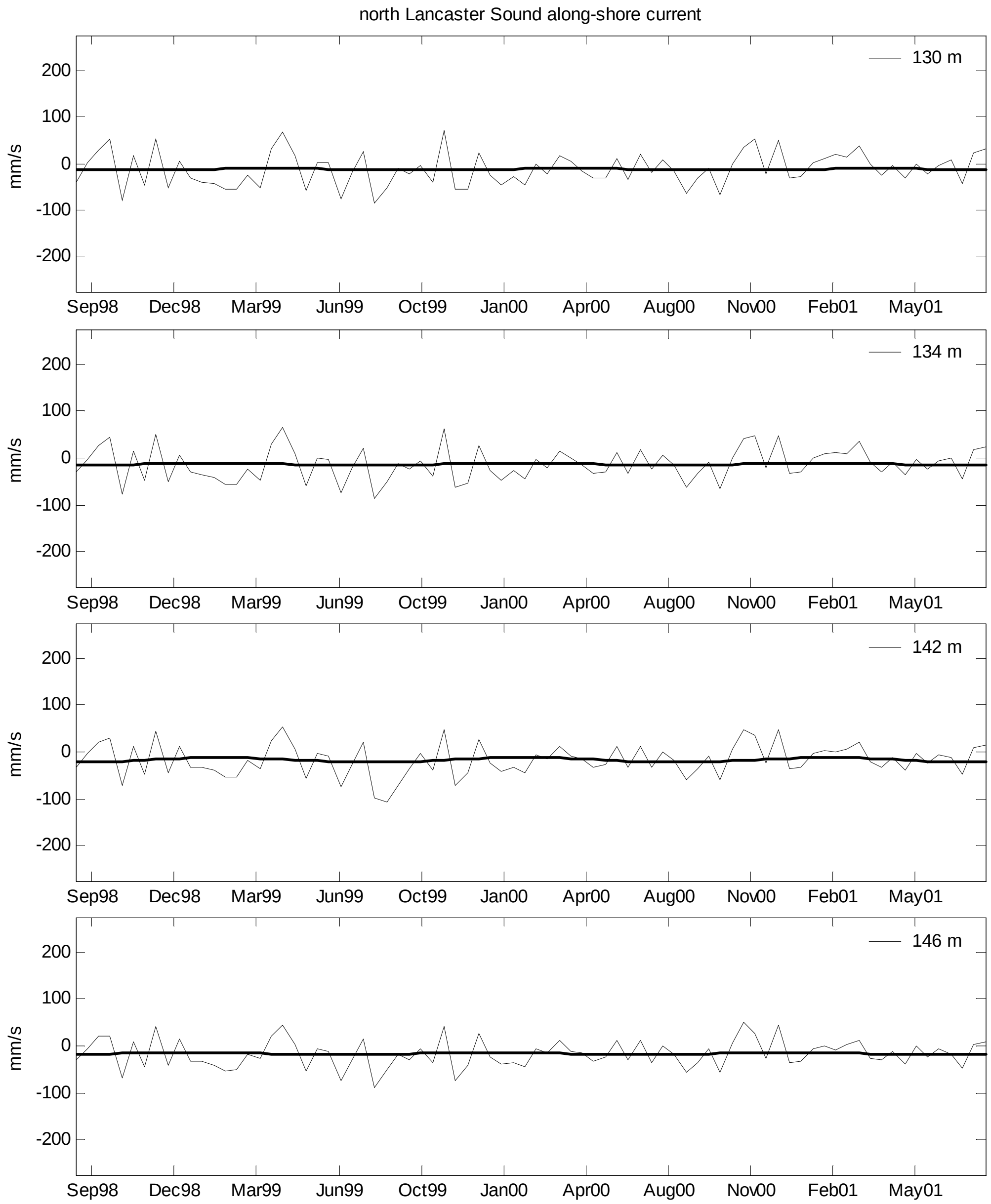

Figure 1-40 North shore low-pass filtered data with annual harmonic superimposed: 130 to 146 m

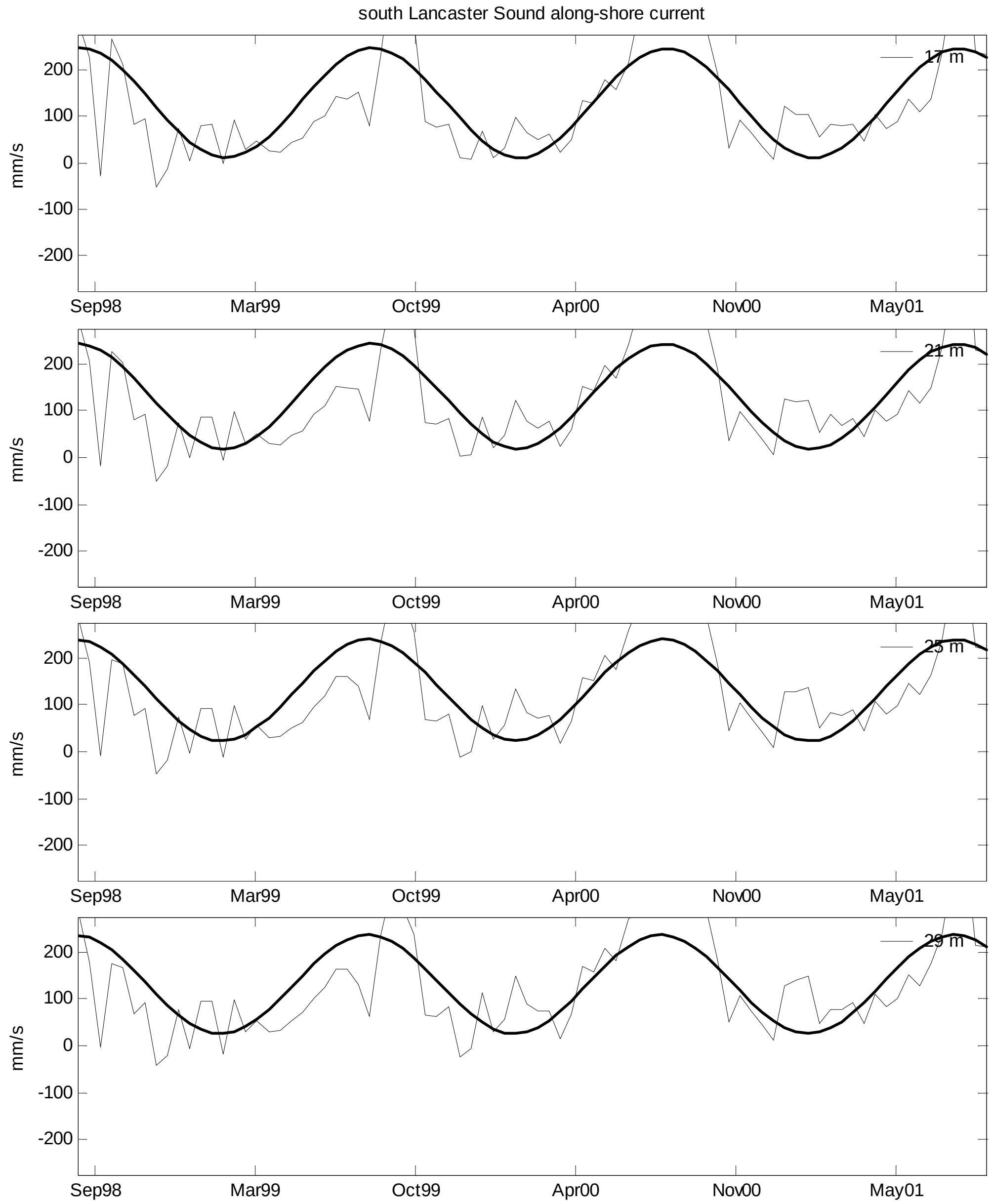

Figure 1-41 South shore low-pass filtered data with annual harmonic superimposed: 17 to 29 m

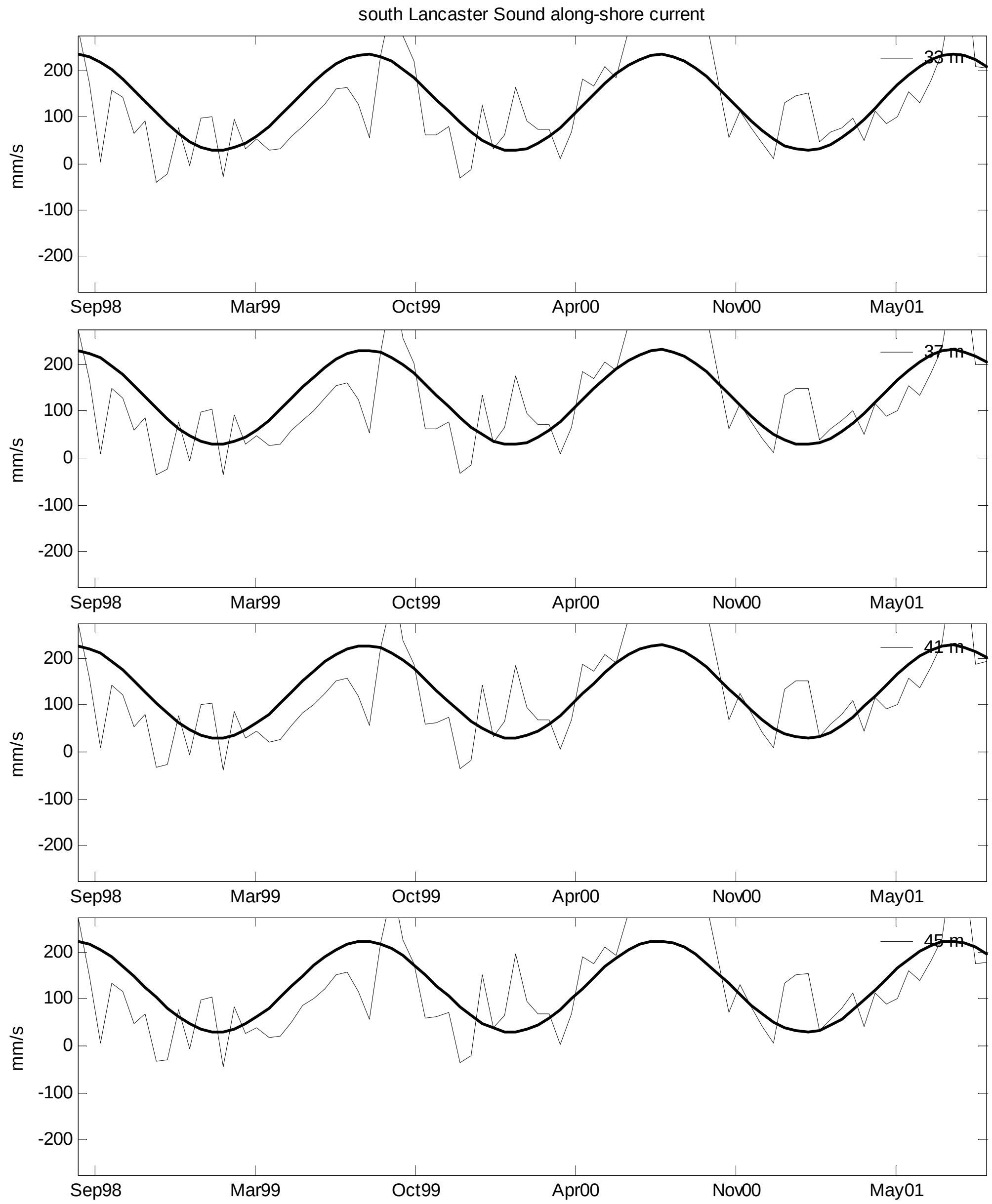

Figure 1-42 South shore low-pass filtered data with annual harmonic superimposed: 33 to 45 m

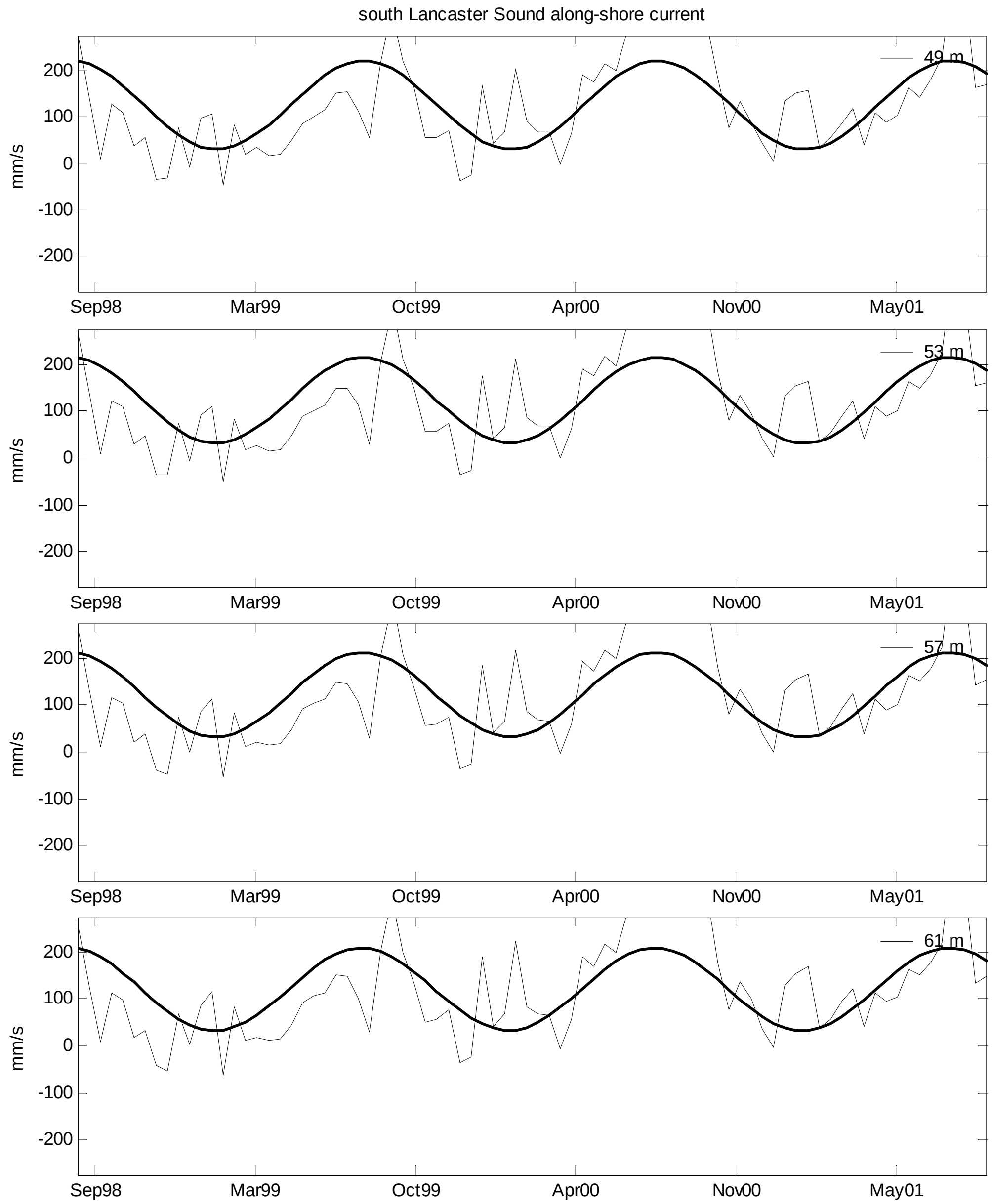

Figure 1-43 South shore low-pass filtered data with annual harmonic superimposed: 49 to 61 m

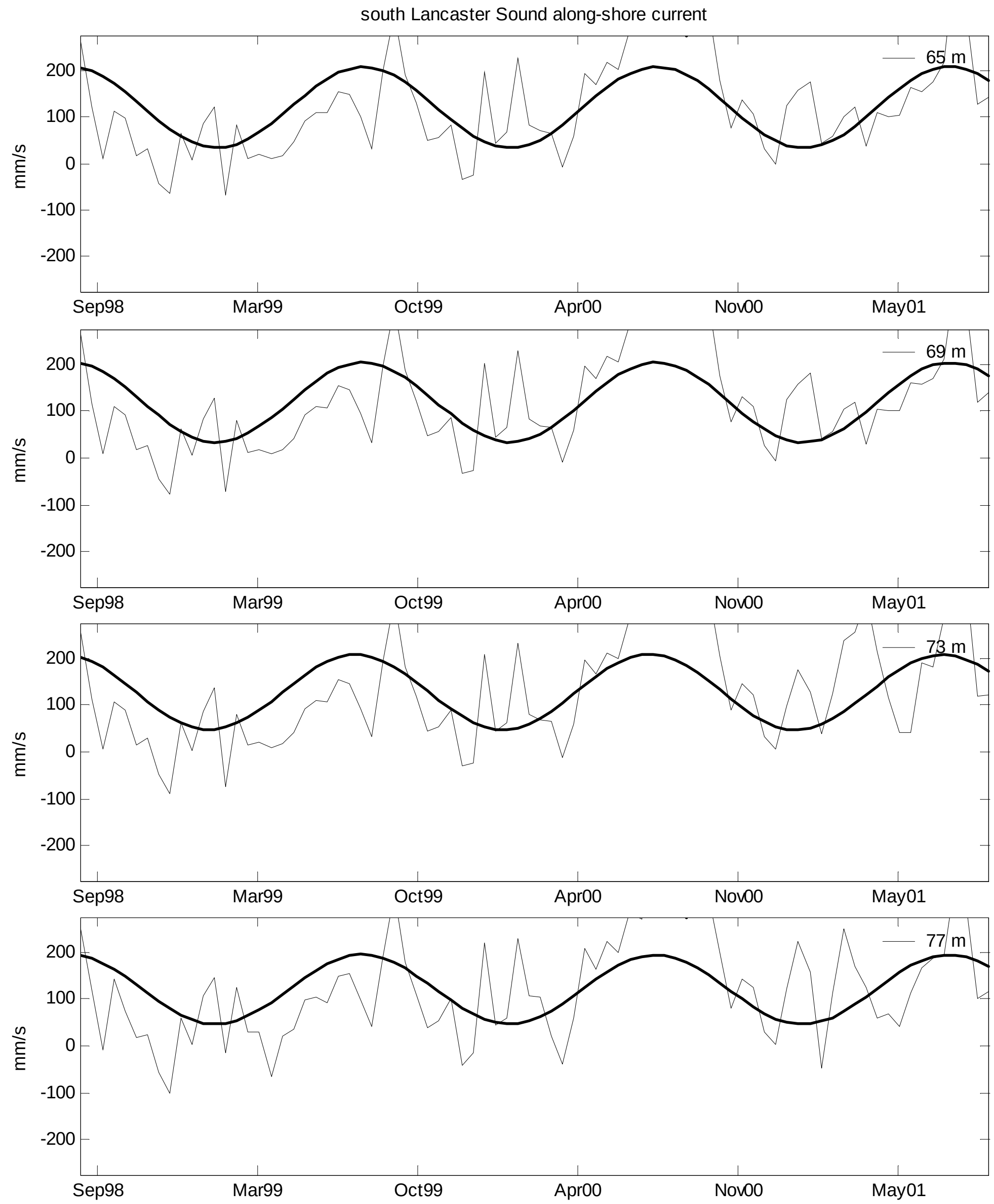

Figure 1-44 South shore low-pass filtered data with annual harmonic superimposed: 65 to 77 m

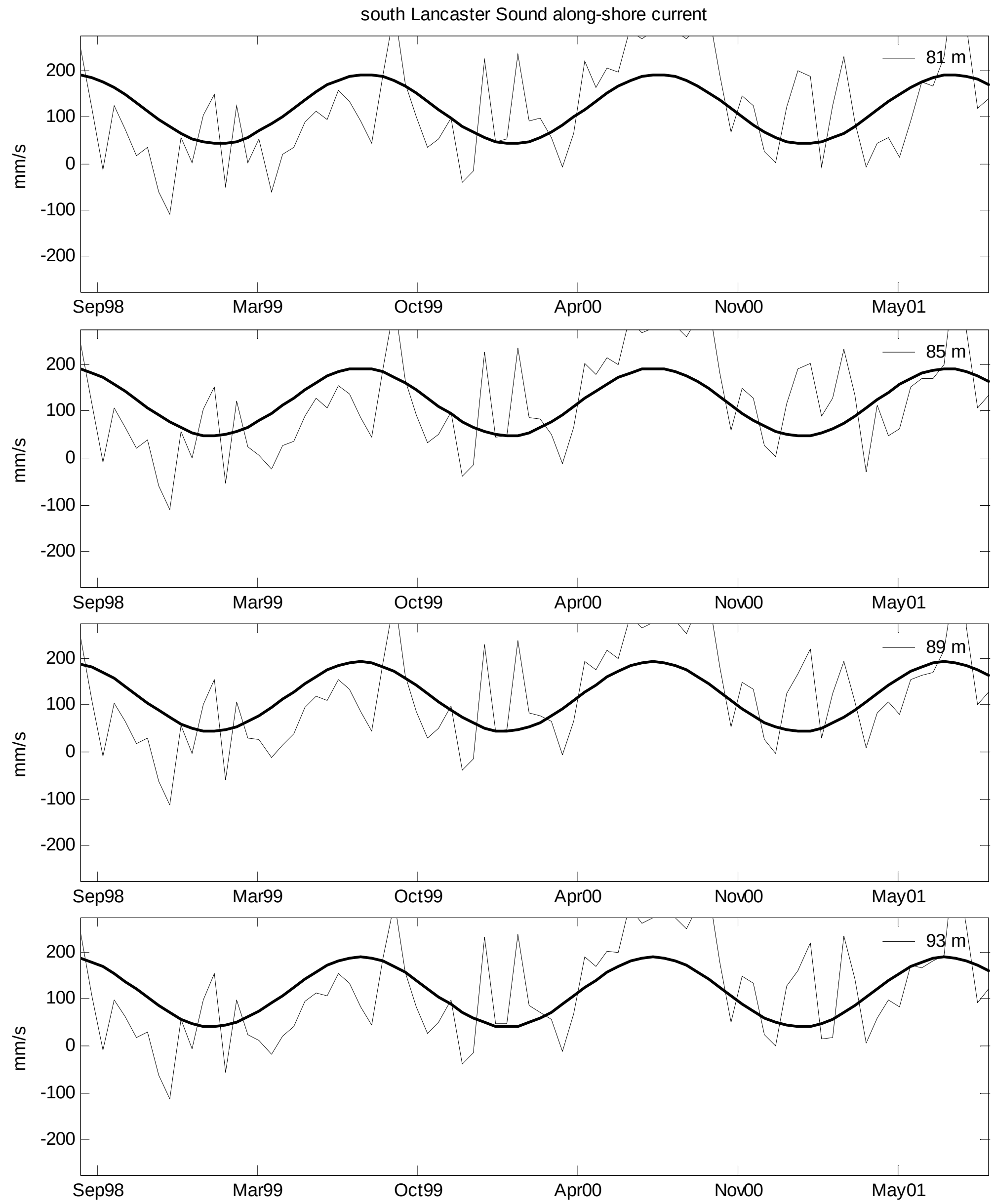

Figure 1-45 South shore low-pass filtered data with annual harmonic superimposed: 81 to 93 m

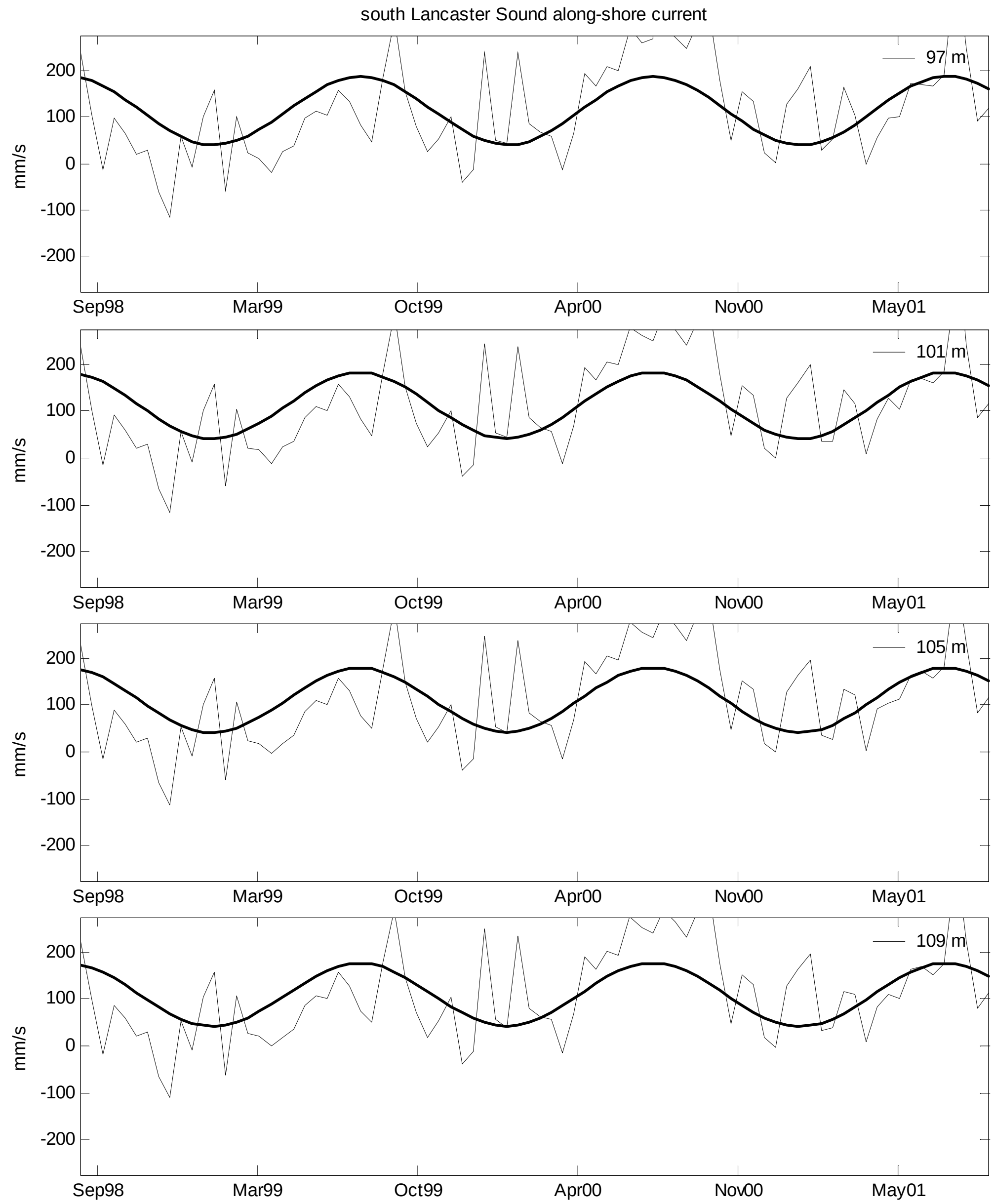

Figure 1-46 South shore low-pass filtered data with annual harmonic superimposed: 97 to 109 m

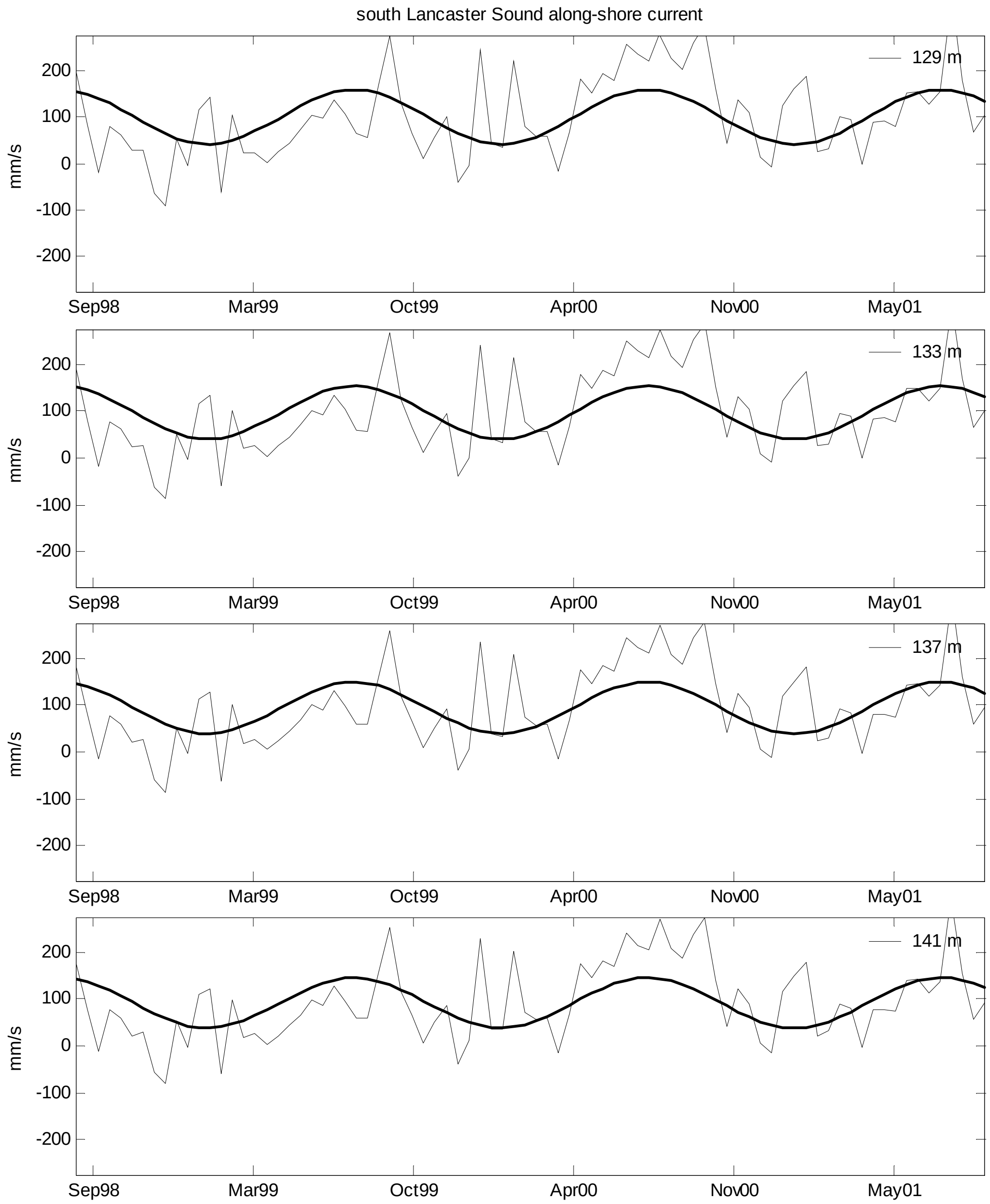

Figure 1-47 South shore low-pass filtered data with annual harmonic superimposed: 129 to 141 m

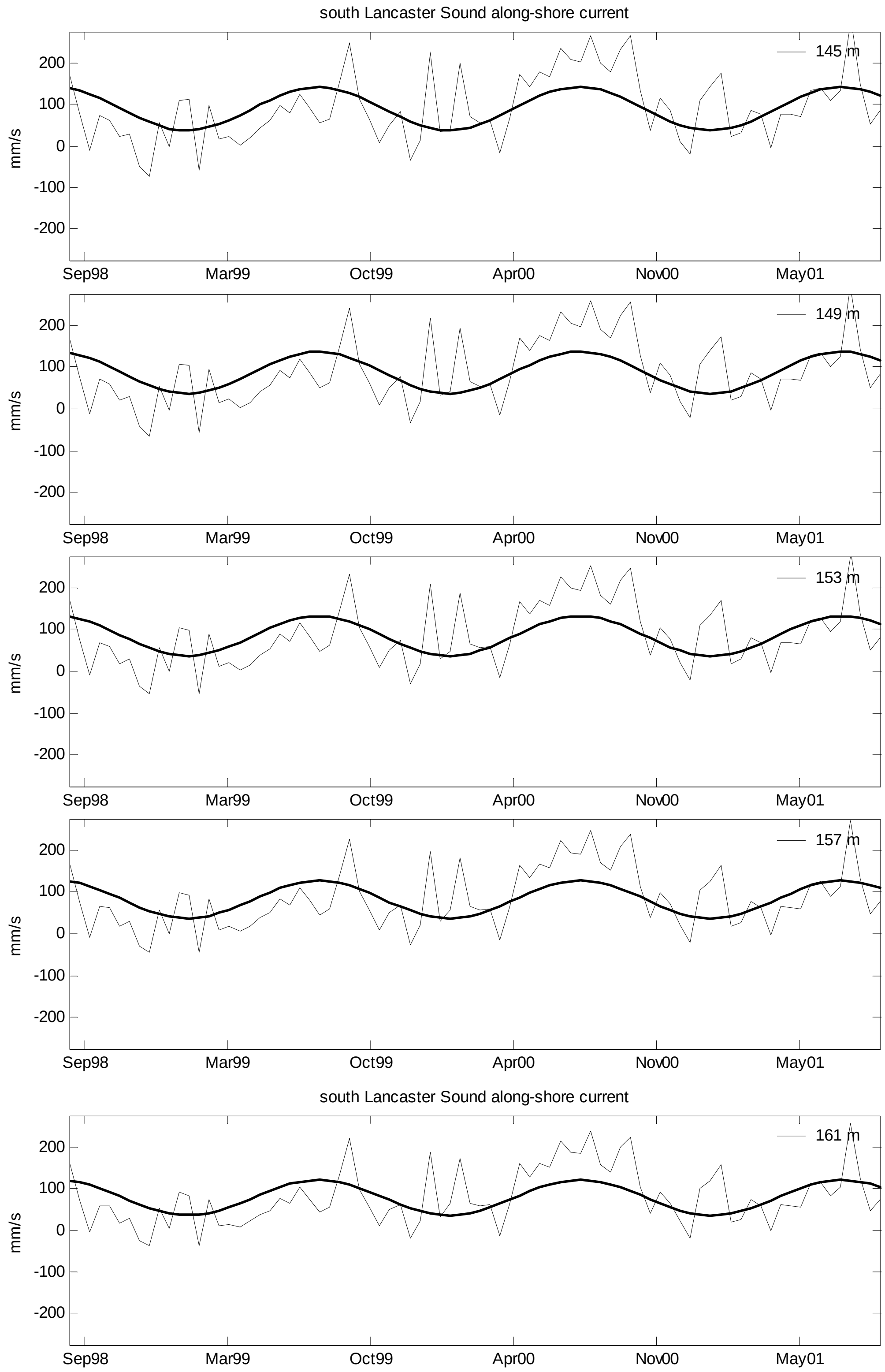

Figure 1-48 South shore low-pass filtered data with annual harmonic superimposed: 145 to 161 m

1.1.10 Spectral analysis

1.1.10.1 Spectra all bins, north shore

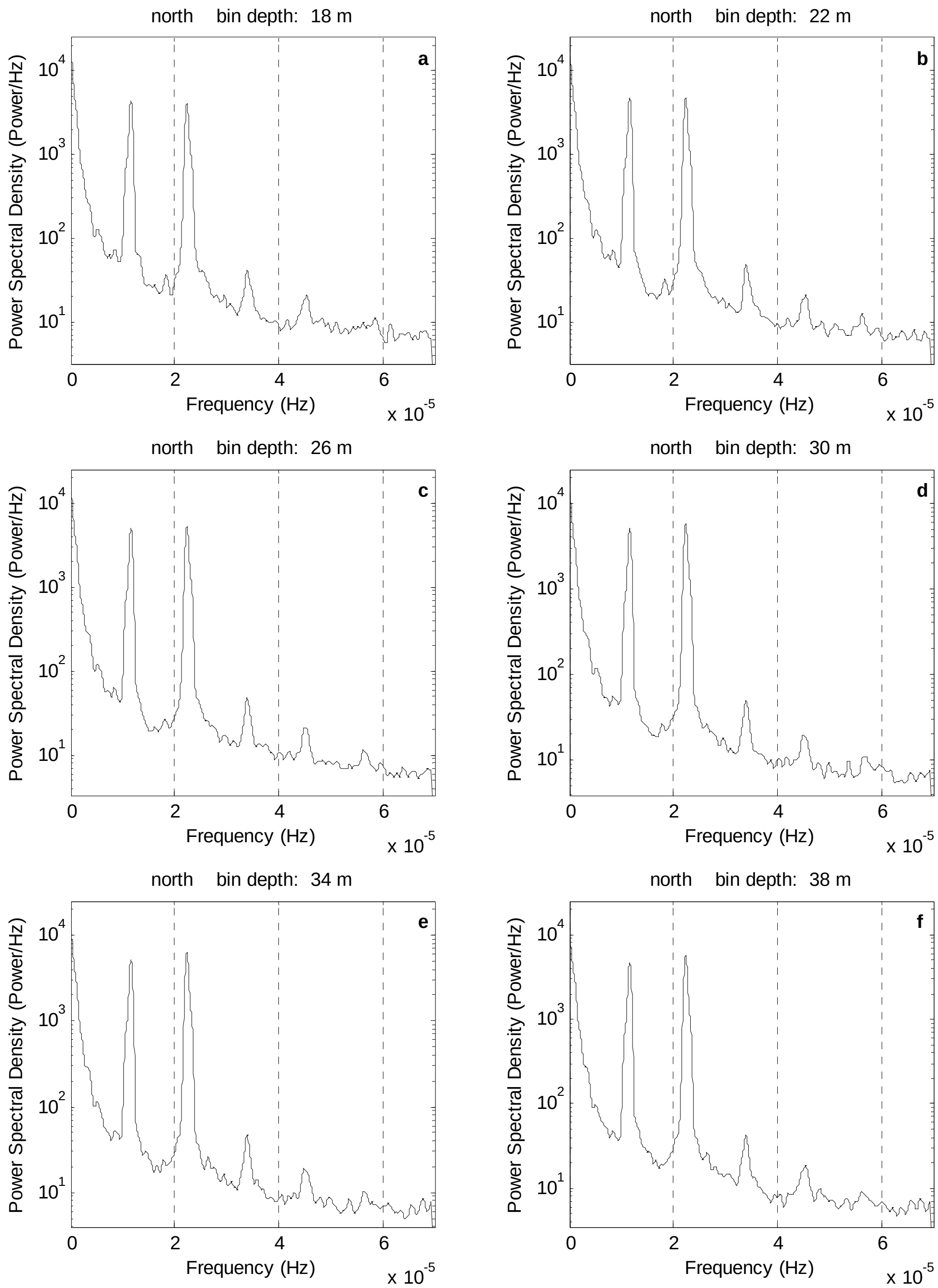

Figure 1-49 North shore spectra: 18 to 38 m

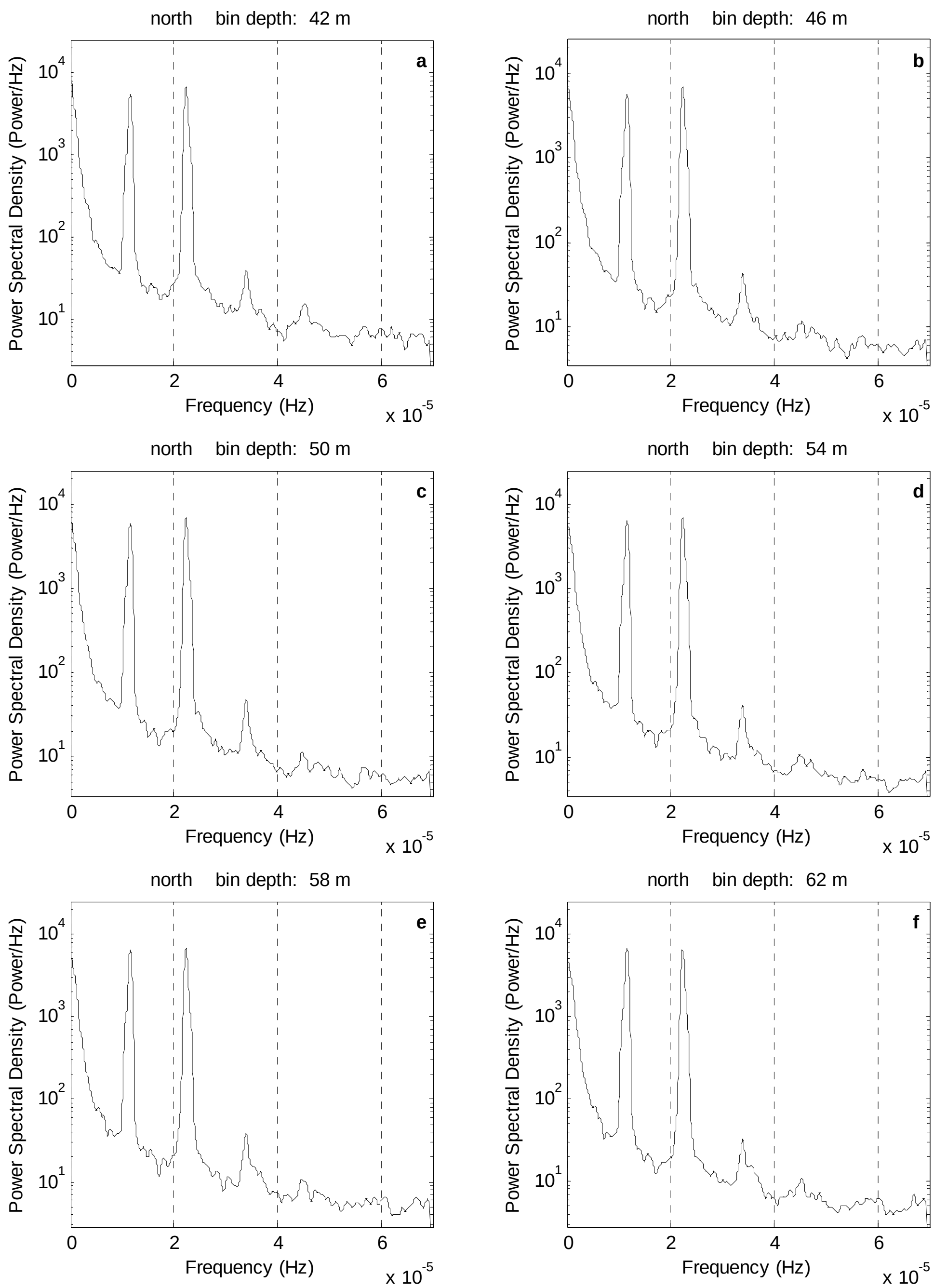

Figure 1-50 North shore spectra: 42 to 62 m

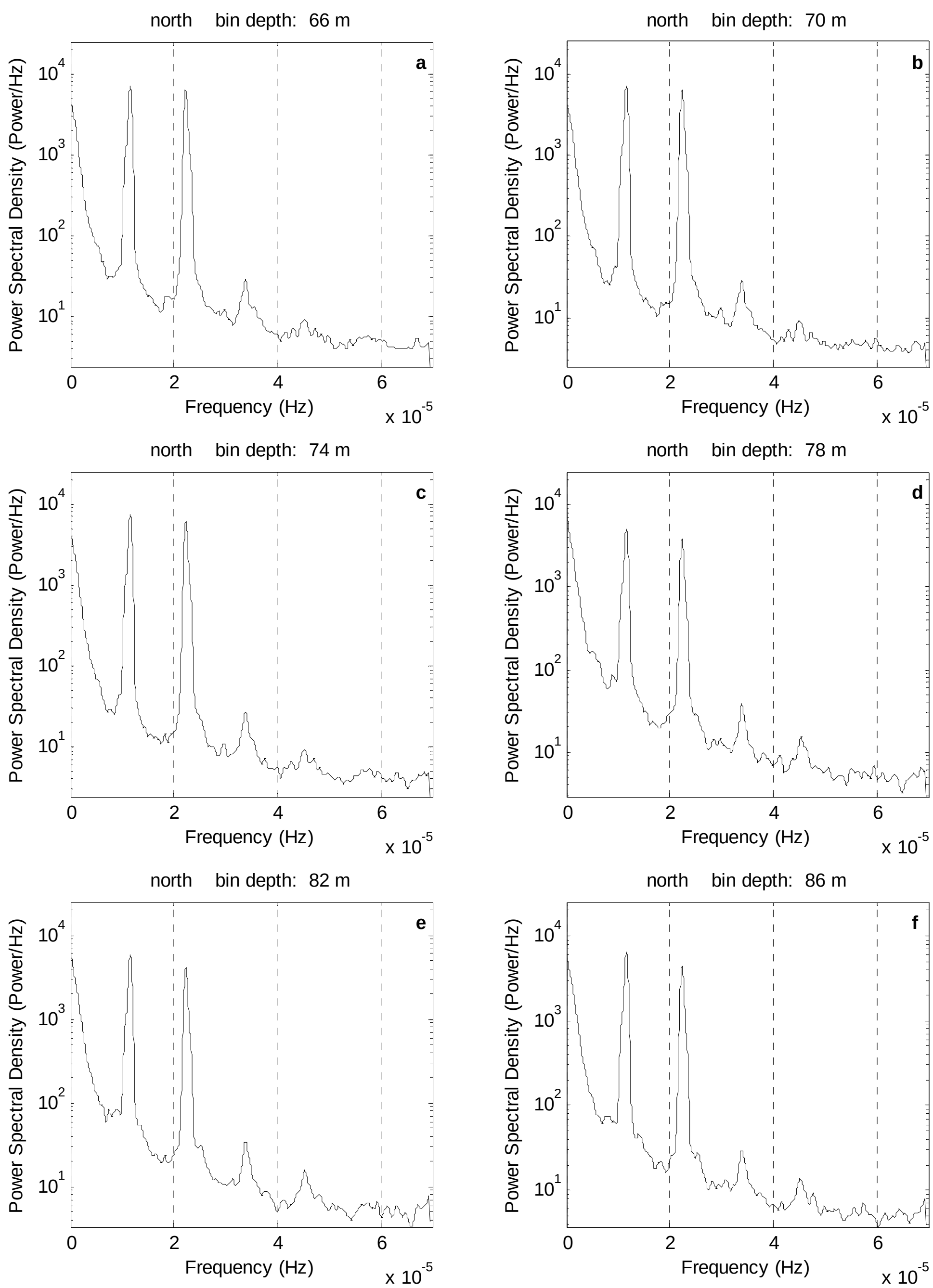

Figure 1-51 North shore spectra: 66 to 86 m

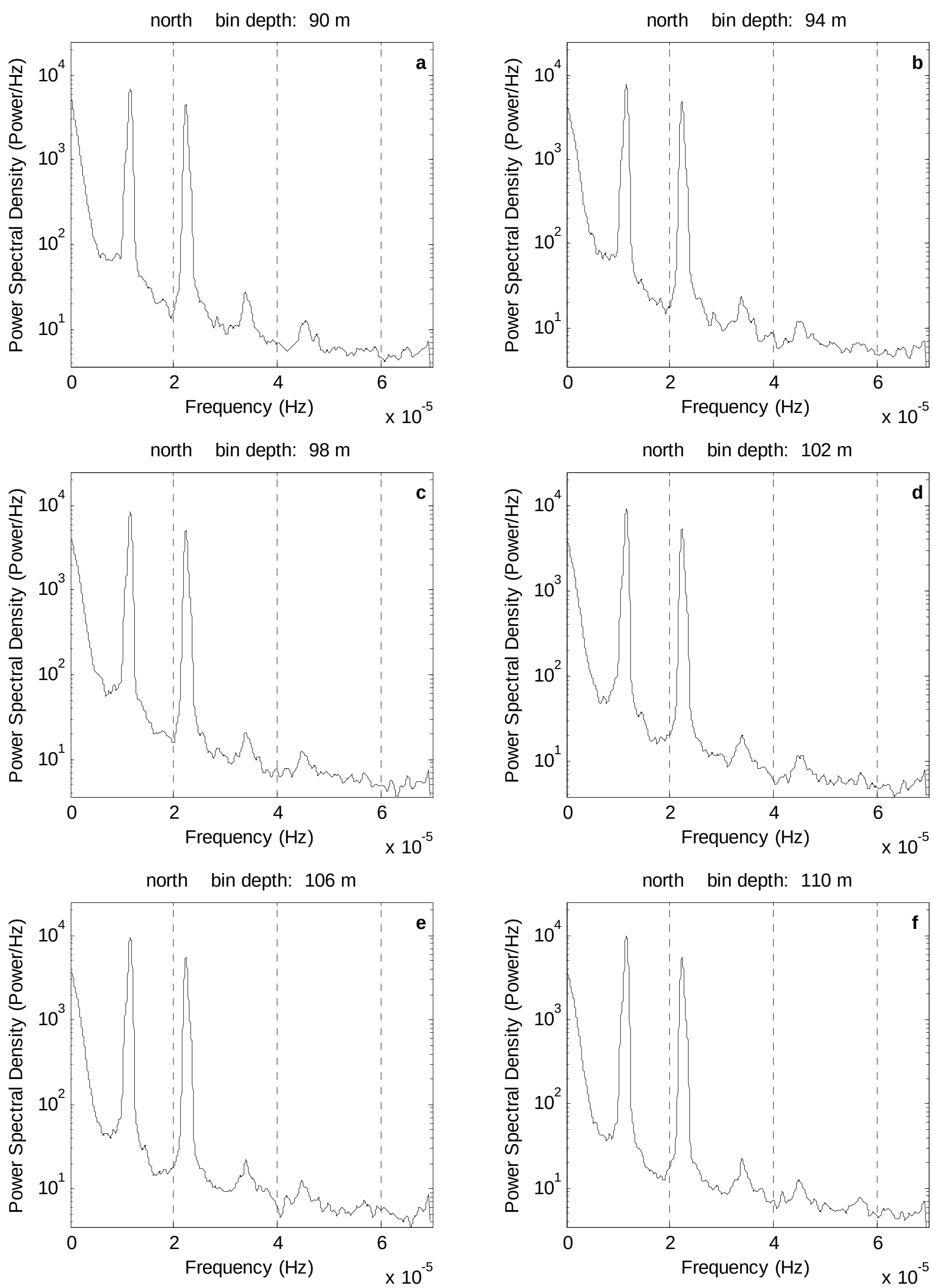

Figure 1-52 North shore spectra: 90 to 110 m

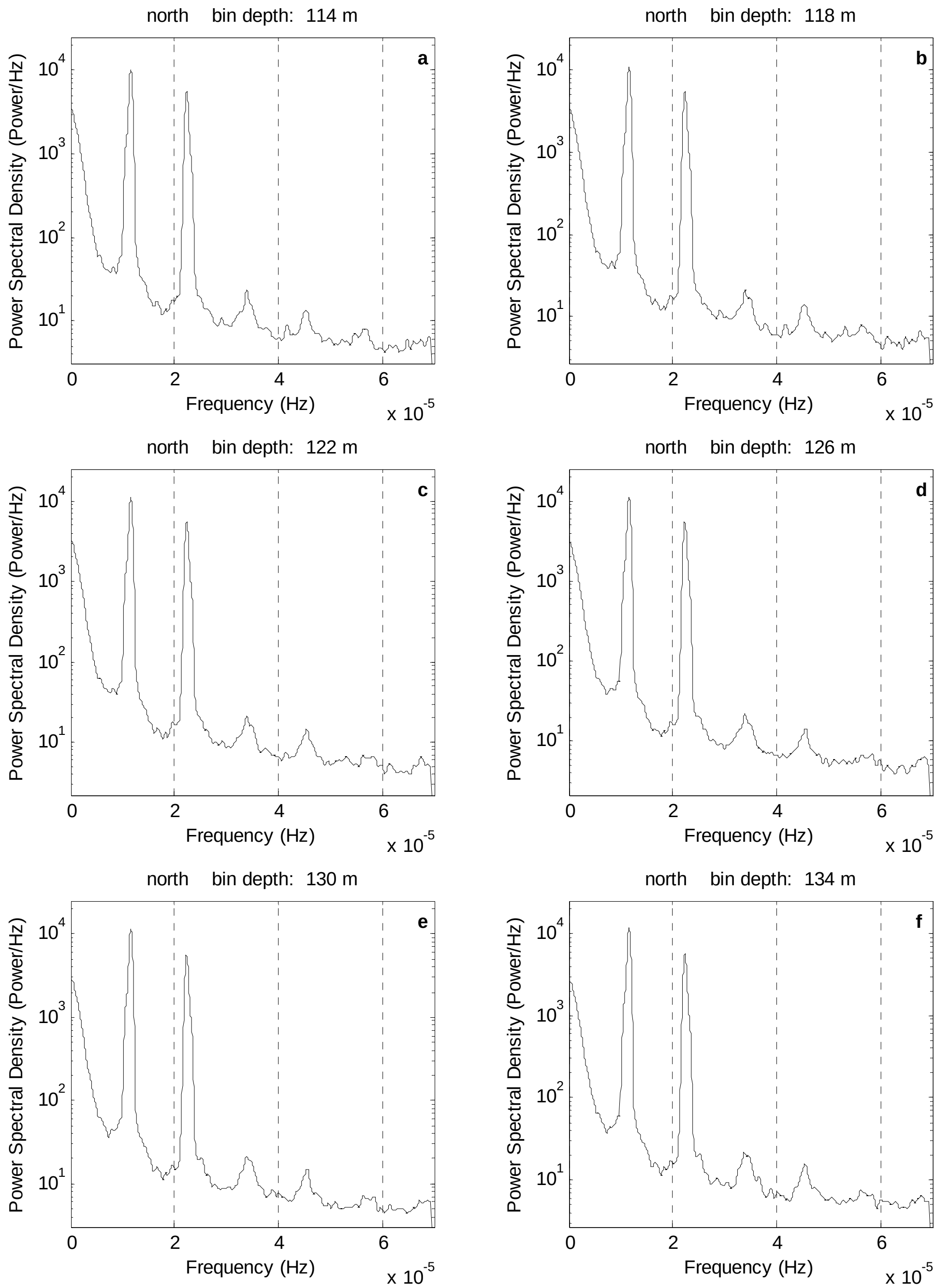

Figure 1-53 North shore spectra: 114 to 134 m

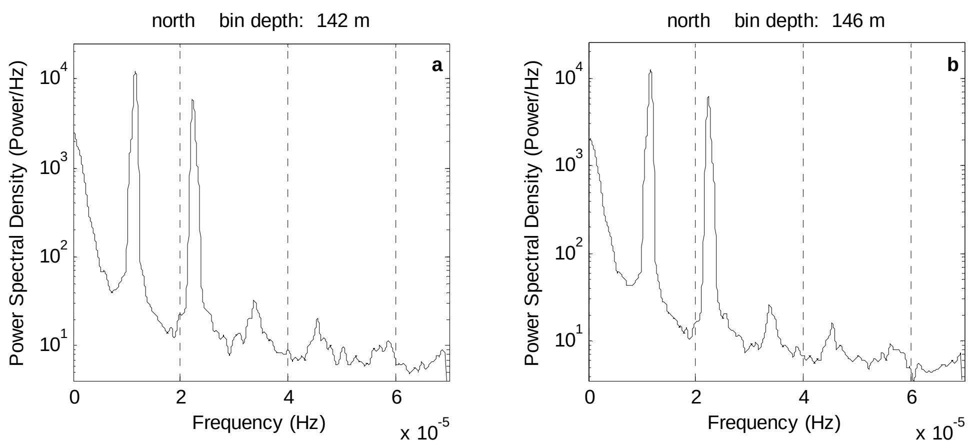

Figure 1-54 North shore spectra: 142 to 146 m

1.1.10.2 Spectra all bins, south shore

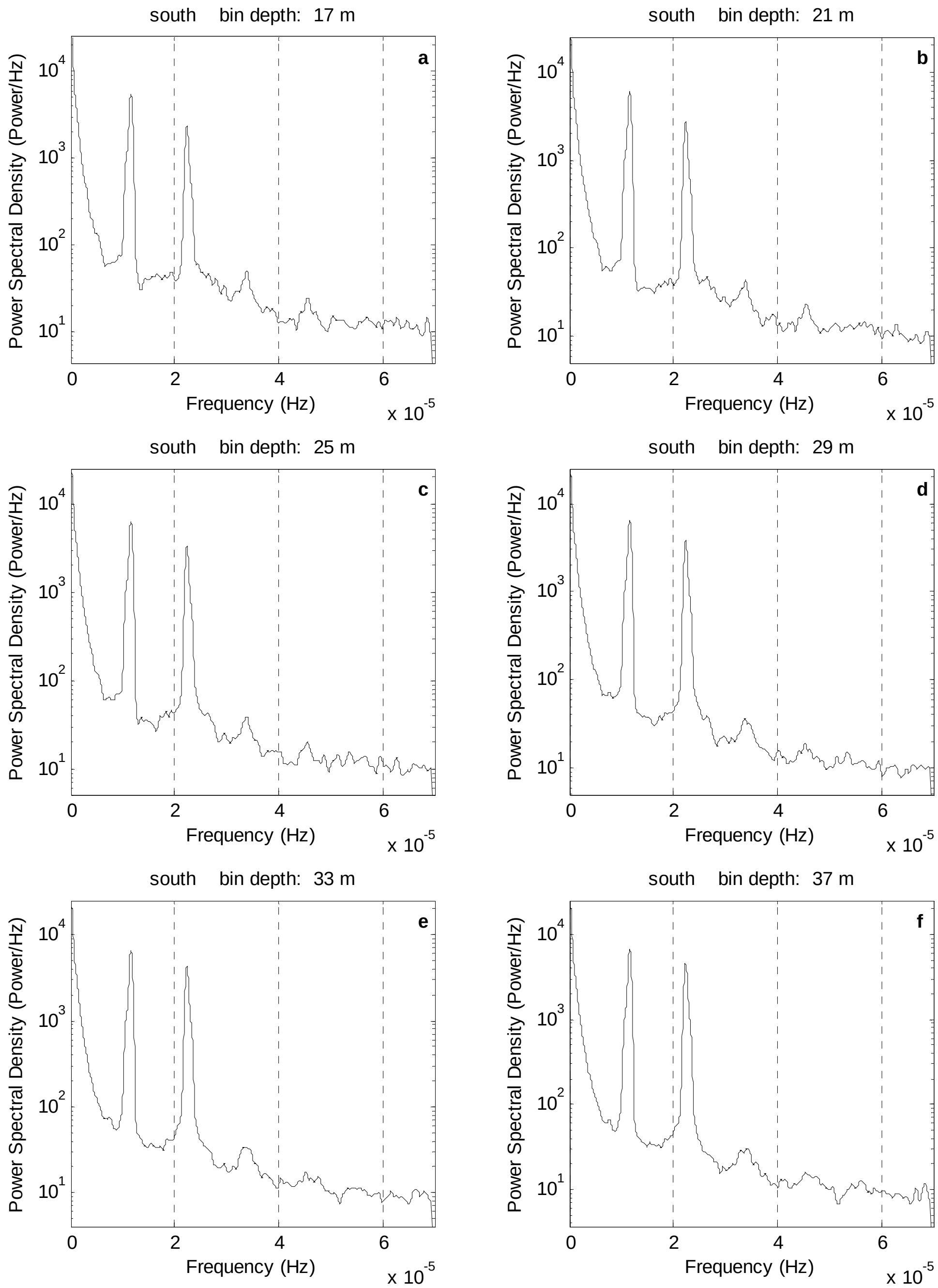

Figure 1-55 South shore spectra: 17 to 37 m

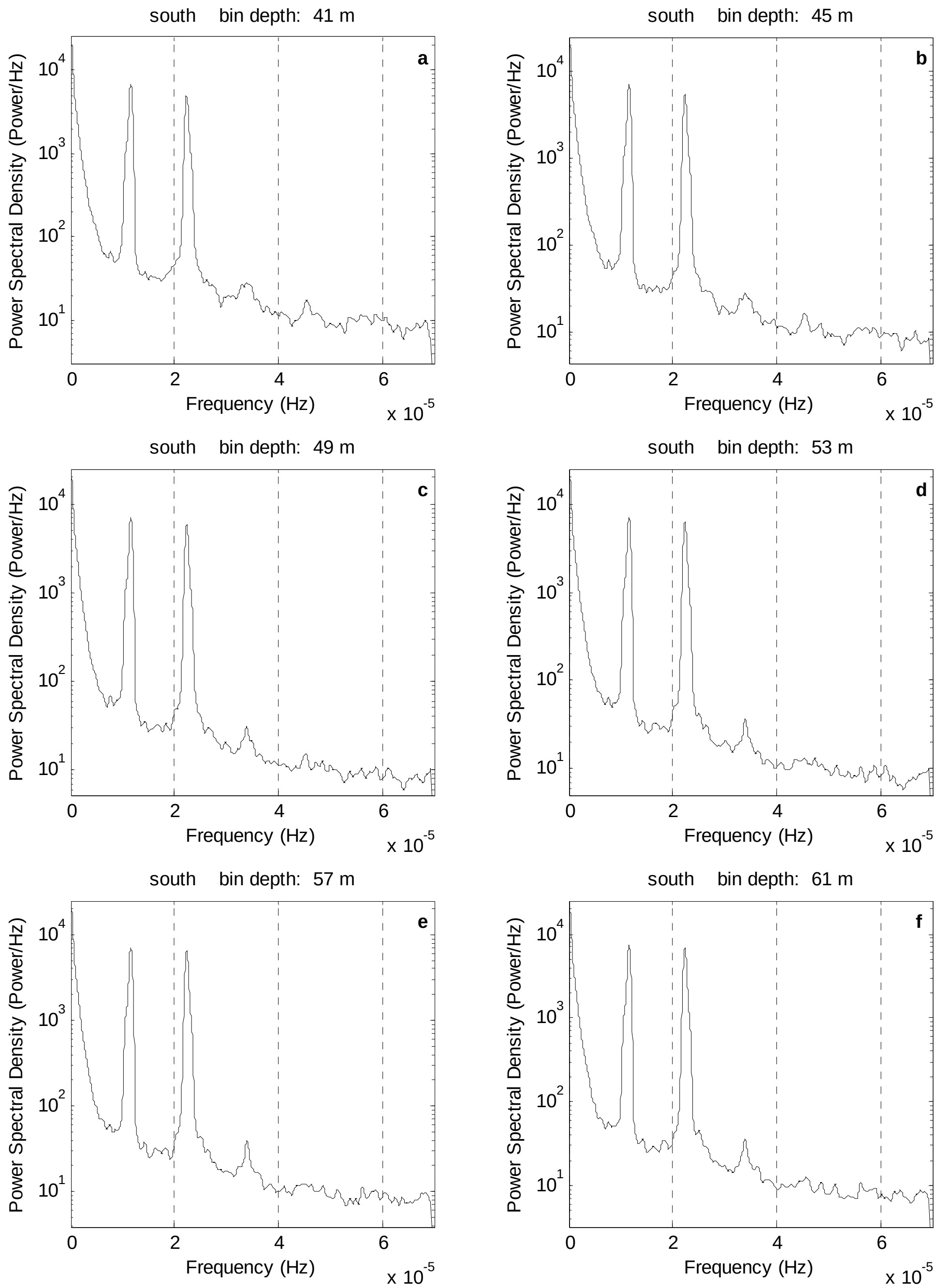

Figure 1-56 South shore spectra: 41 to 61 m

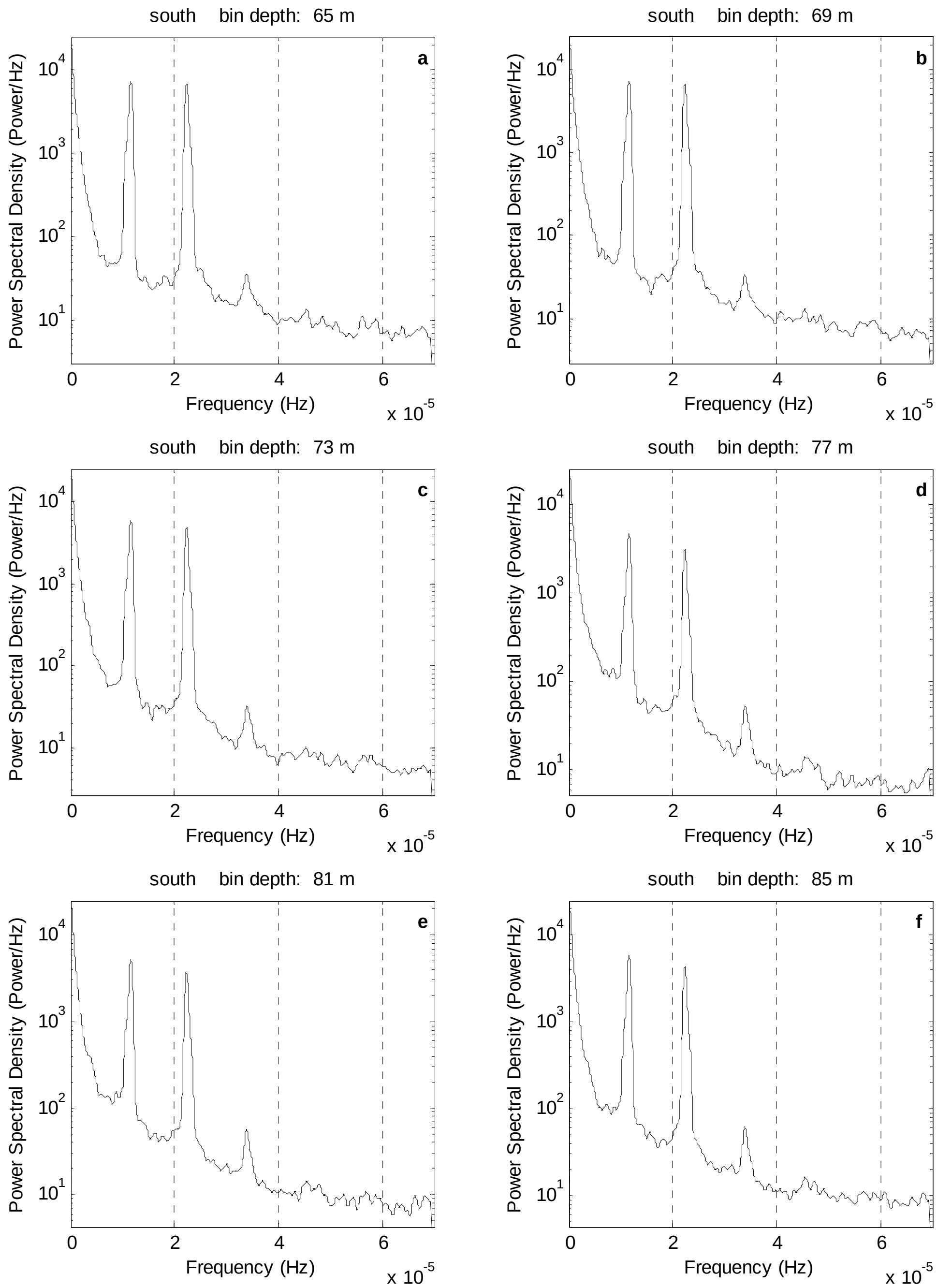

Figure 1-57 South shore spectra: 65 to 85 m

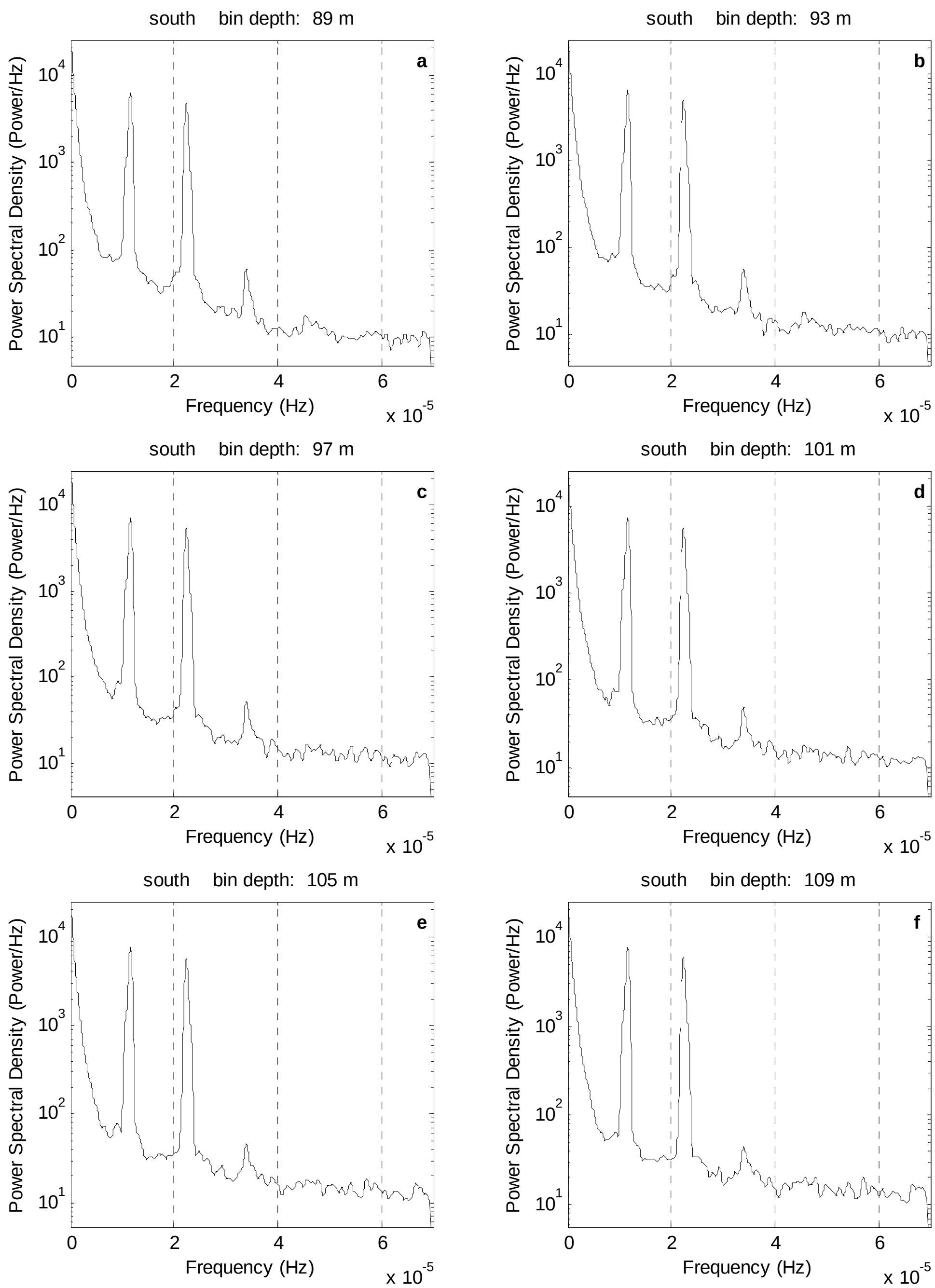

Figure 1-58 South shore spectra: 89 to 109 m

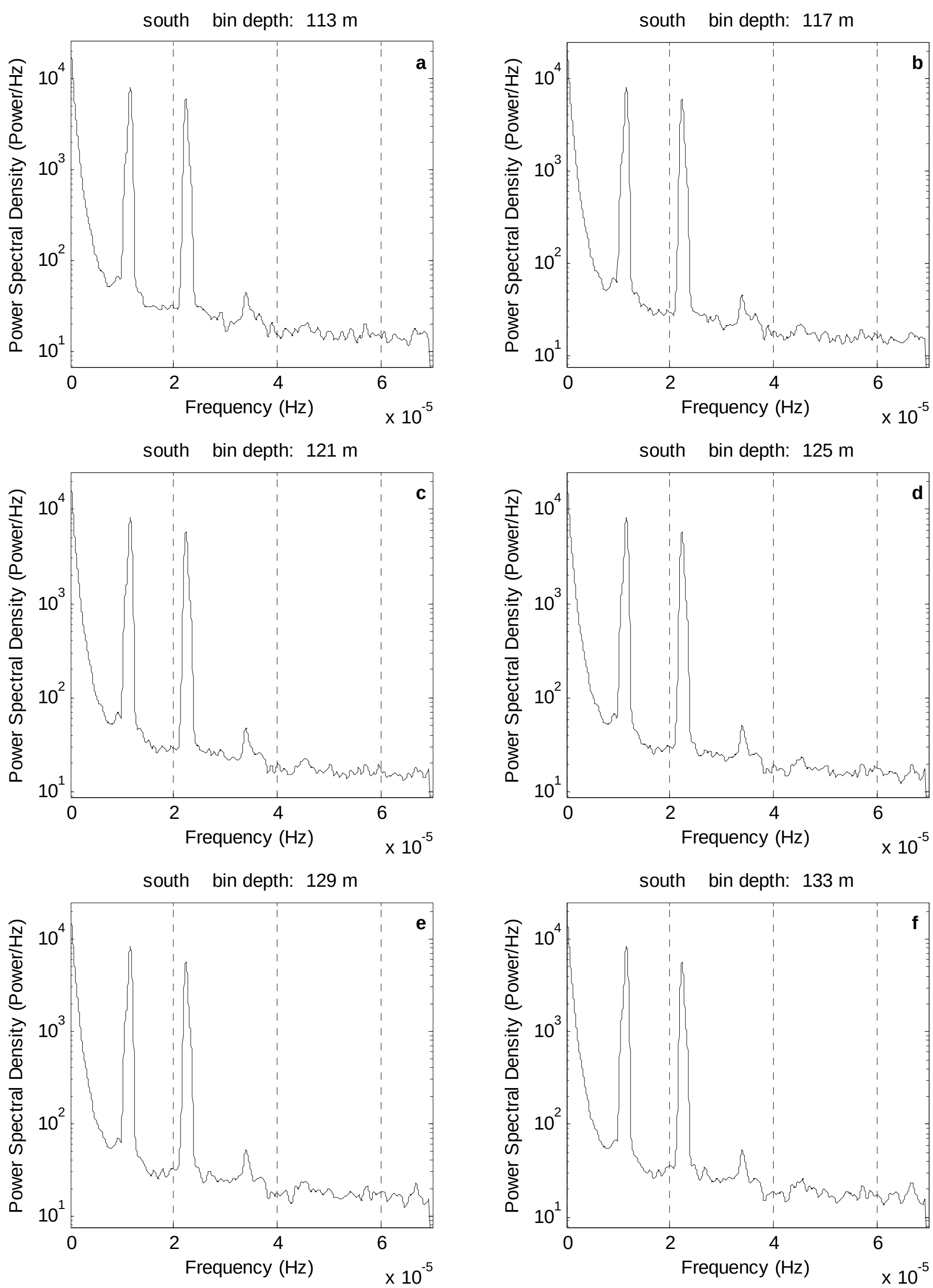

Figure 1-59 South shore spectra: 113 to 133 m

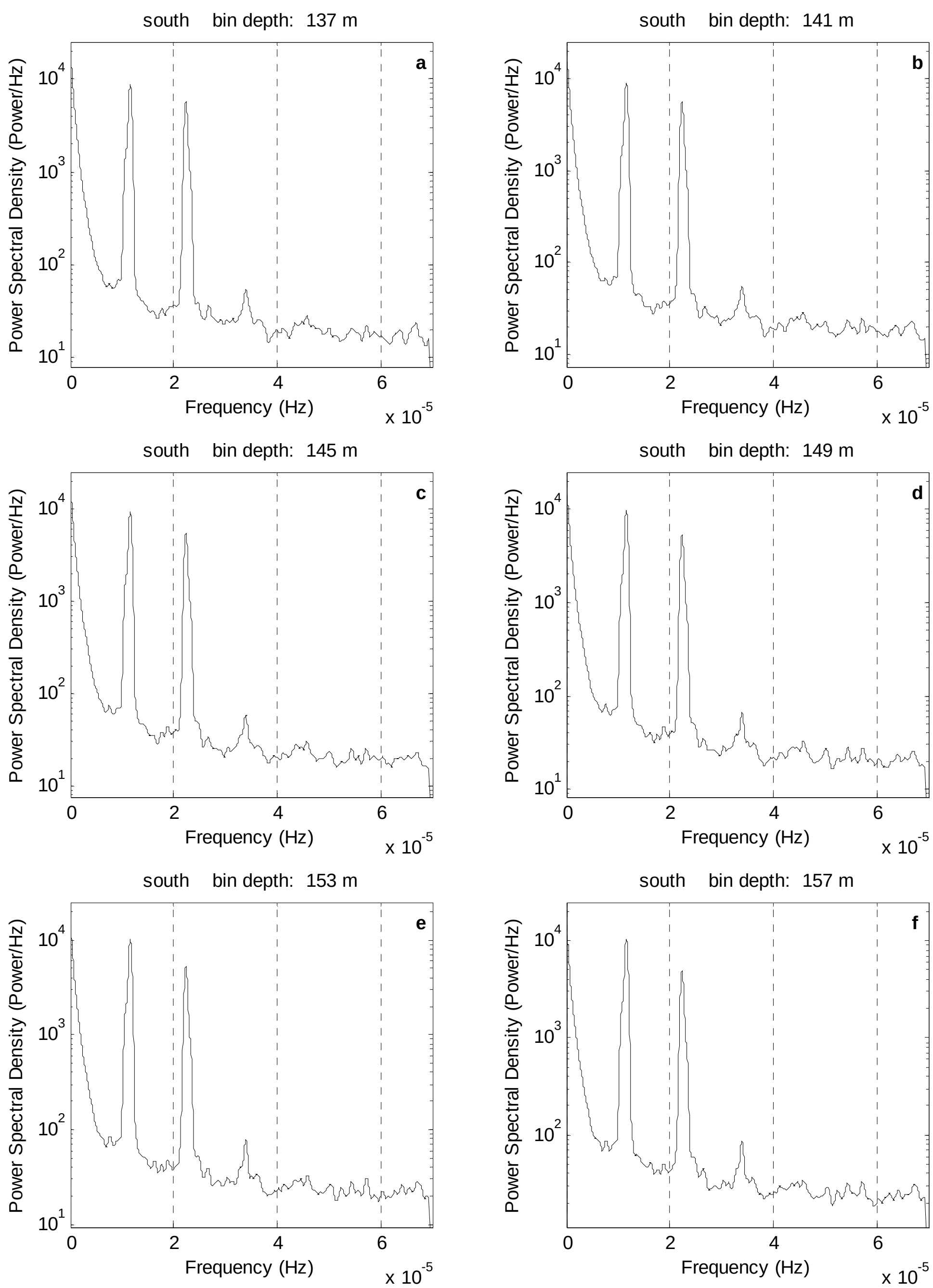

Figure 1-60 South shore spectra: 137 to 157 m

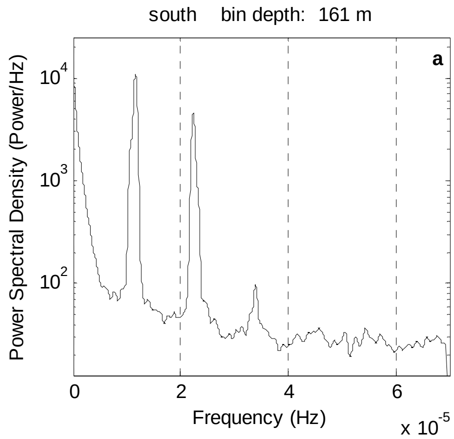

Figure 1-61 South shore spectra: 161 m

Part 2 Principal Component Analysis of ADCP data from Lancaster Sound: a) 1 year (2001–2002) at 3 Levels in South and 3 Levels in North; b) 4 years (1998-2002) at 4 levels in South (including data recorded quarter-way and half-way across)

2.1 Data

Moorings were deployed as shown in Figure 2-1. Moorings 1401 and 1403 are located approximately quarter-way and half-way across the sound from the southern moorings (moorings 1398/1399). ADCP 2-hourly data were resolved, for all bins, into UV components whereby U data were rotated to be alongshore, eastward to 105 ^{o} as before. The low-pass filtered alongshore data, decimated to 14-day intervals, showed that the currents measured at the southern moorings and quarter-way were out of phase by approximately 90^{o} with the alongshore current measured at the mooring that was situated half-way across the channel (see figure below). The principal axes of variance were computed for the UV 2-hourly data to see if the assumption was true that the alongshore direction was the axis of maximum variance. Perhaps the bottom topography influenced the flow to be slightly off the alongshore axis.

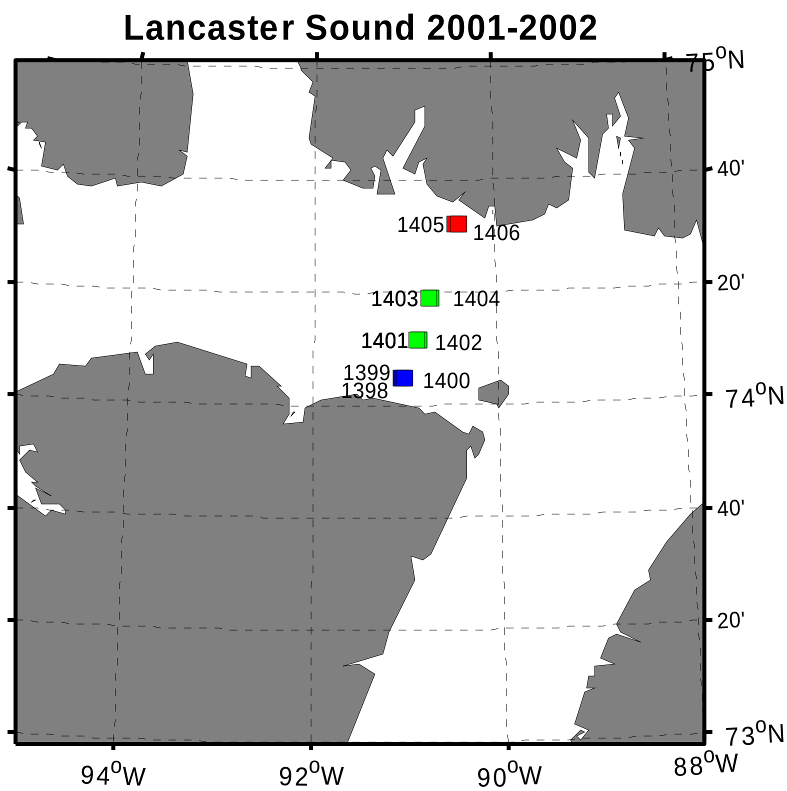

Figure 2-1 Map of moorings for 2001 – 2002 field season in Lancaster Sound

2.2 Analysis and Results

2.2.1 Summary

The PCA was performed on 4 year data set for only the south shore since the northern mooring did not have data for deeper (>70 m) bins. The south shore was dominated by the shallow mode (<70 m, mode 1 accounts for more than 90% variance). For the 2001-2002 data, the eigenvectors did not change signs at the deepest level (125 m) though data were not measured as far down as they had been in previous years; that is, only to 131 m in 2001-2002 since the moorings were deployed at the 150 m contour rather than at the 200 m contour.

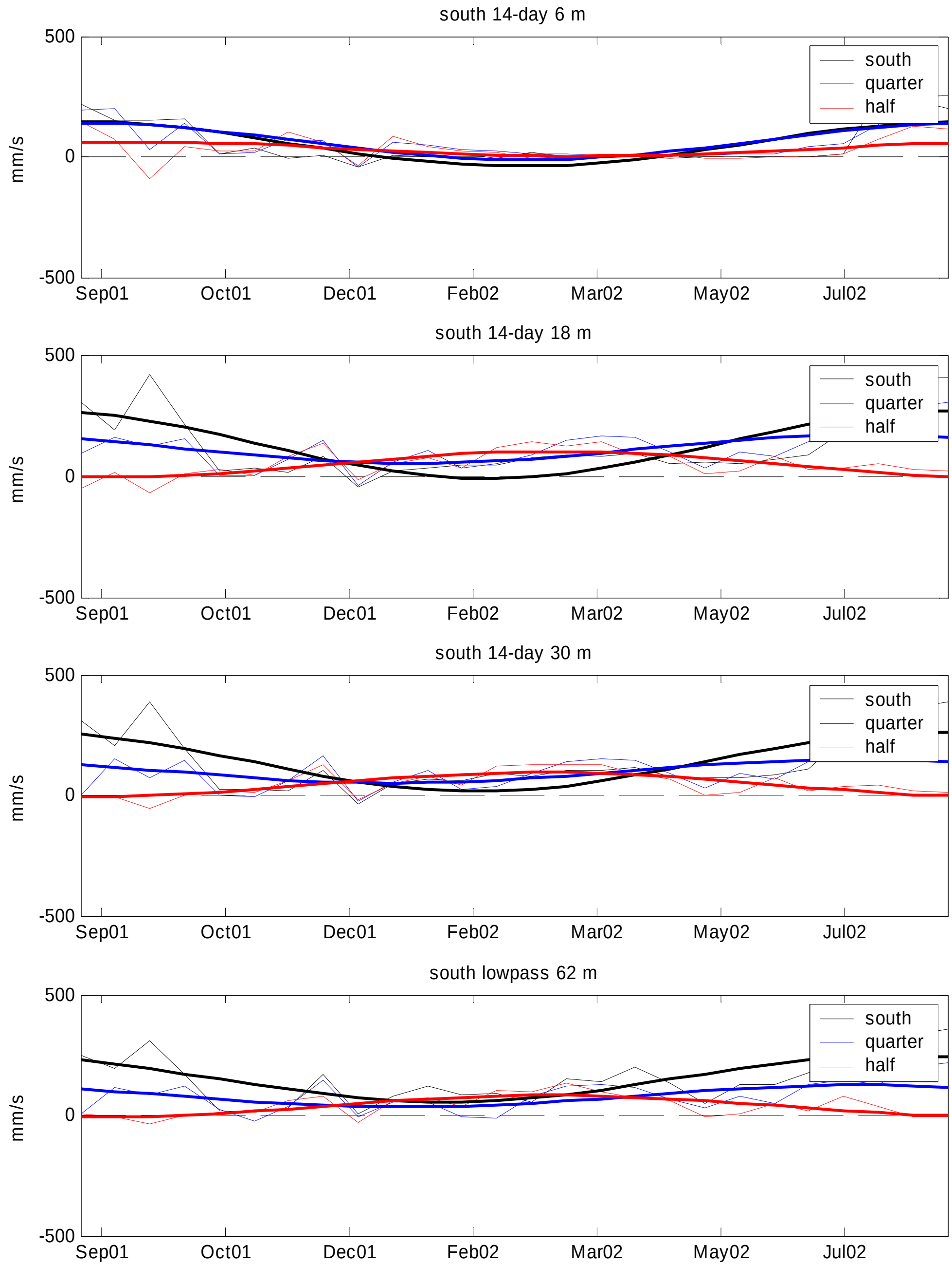

Figure 2-2 Time series of low-pass filtered ADCP data (14-day) at 6, 18, 30, 62 m for southern mooring and moorings at quarter-way (1401)and half-way (1403) across the sound.

The results of the principal axes of variance (PAV) are given later. Ultimately the PAV show that, ignoring the topmost bin, in the south from 50 – 80 m and at > 130 m the principal axes of variance differed from 90^{o} by more than 3^{o} but less than 7^{o}. The same can be said one quarter-way across the channel from 6 - 30 m; halfway at > 10 m; and in the north from 7 - 30 m and > 60 m. The variance represented by the major axis is about twice that of the minor axis (ignoring the top bins). The following graphic depicts the data from the same moorings as those shown in the previous graphic; this time, however, the data have been aligned with their principal axes of variance.

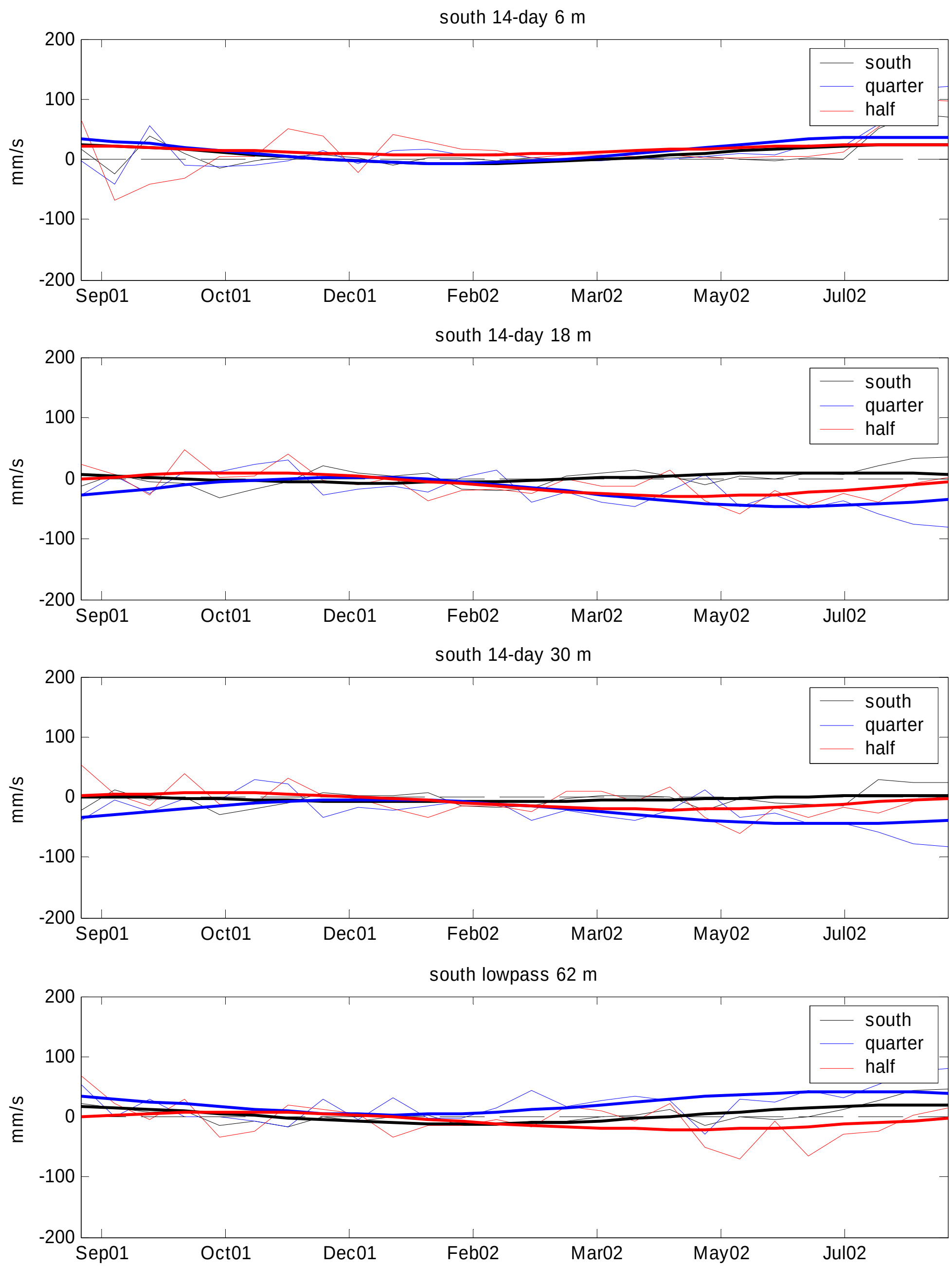

Figure 2-3 Time series of low-pass filtered southern, quarter-way, and half-way mooring data after they have been aligned with the principal axis of variance. Data are from bins 6, 18, 30, and 62 m.

The next graphic is representative data from four moorings recorded at <65 m. The annual harmonic is superimposed for each of the 4 depths. The expected low-frequency annual signal is clear.

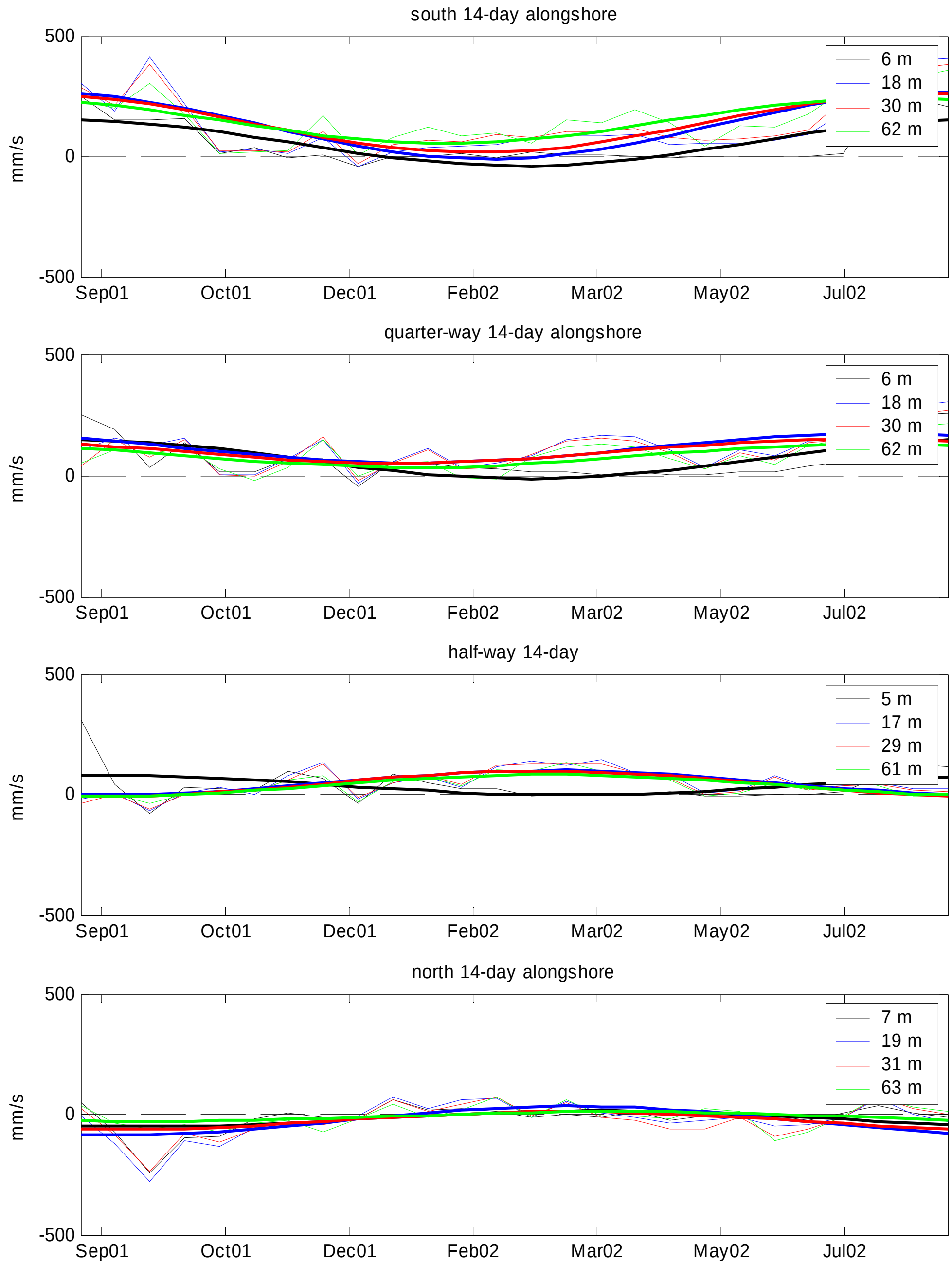

Figure 2-4 Time series of low-pass filtered data for 4 moorings at 4 representative depths with annual harmonic superimposed

2.2.2 Principal Component Analysis of alongshore current

Many analyses were performed on the ADCP data. The presentation of results starts from what was believed would be most important or most interesting reading and ends with what was thought to be least important or least interesting.

Before any PCA was performed, however, the 2-hrly data was examined for bins with good quality data. Time series plots for all 2-hrly velocity components are presented at the end of Part 2. Data were checked for principal axis of variance to check velocity direction. At one point, the 2-hourly alongshore data had tides removed and were decimated to 6-hourly and these are presented with the 30-day mean superimposed for interest. The power spectra were examined to see if there was anything significantly different from the 1998-2001 data. Nothing was found. These spectra are presented near the end of Part 2 where there are also a few coherence function estimates between 3 depths for the moorings. The last data to be presented are data that were lowpass filtered to 14-days as with the ADCP data from the previous year (with harmonics superimposed). The variances of the data are given for selected depths (for 2-hrly and 14-day data) and cross-correlation matrices are included for different data sets.

2.2.3 PCA, ADCP only, southern mooring for 4 years at 4 depths

Raw (2-hrly) data for the year, 2001-2002, were combined from instrument moorings 1398 and 1399 to make one data record for the southern mooring. These data were then appended to 2-hrly data from 1998-2001 to form a 4-year data set at that site. The 4-year, 2-hrly set was decimated to 14-days using the same Chebyshev low-pass filter as in van der Baaren et al (2003) and then PCA was performed for 4 representative depths.

Figure 2-5 shows yearly contours of the 14-day data for all depths. Figure 2-6 shows 4 years of 14-day data with an annual harmonic superimposed for the 4 depths used in the PCA.

2.2.3.1 Variance of 4 years of southern data (2-hrly and 14-day) at 4 depths

Table 2-1 Variance of original southern mooring data for 1998-2002 and low-pass filtered data.

south variance (mm^2s^{-2})		
Depth (m)	2-hrly	14-day
18	30761.42	15381.68
30	29341.90	12795.80
70	29636.71	11039.21
125	27361.99	7984.09

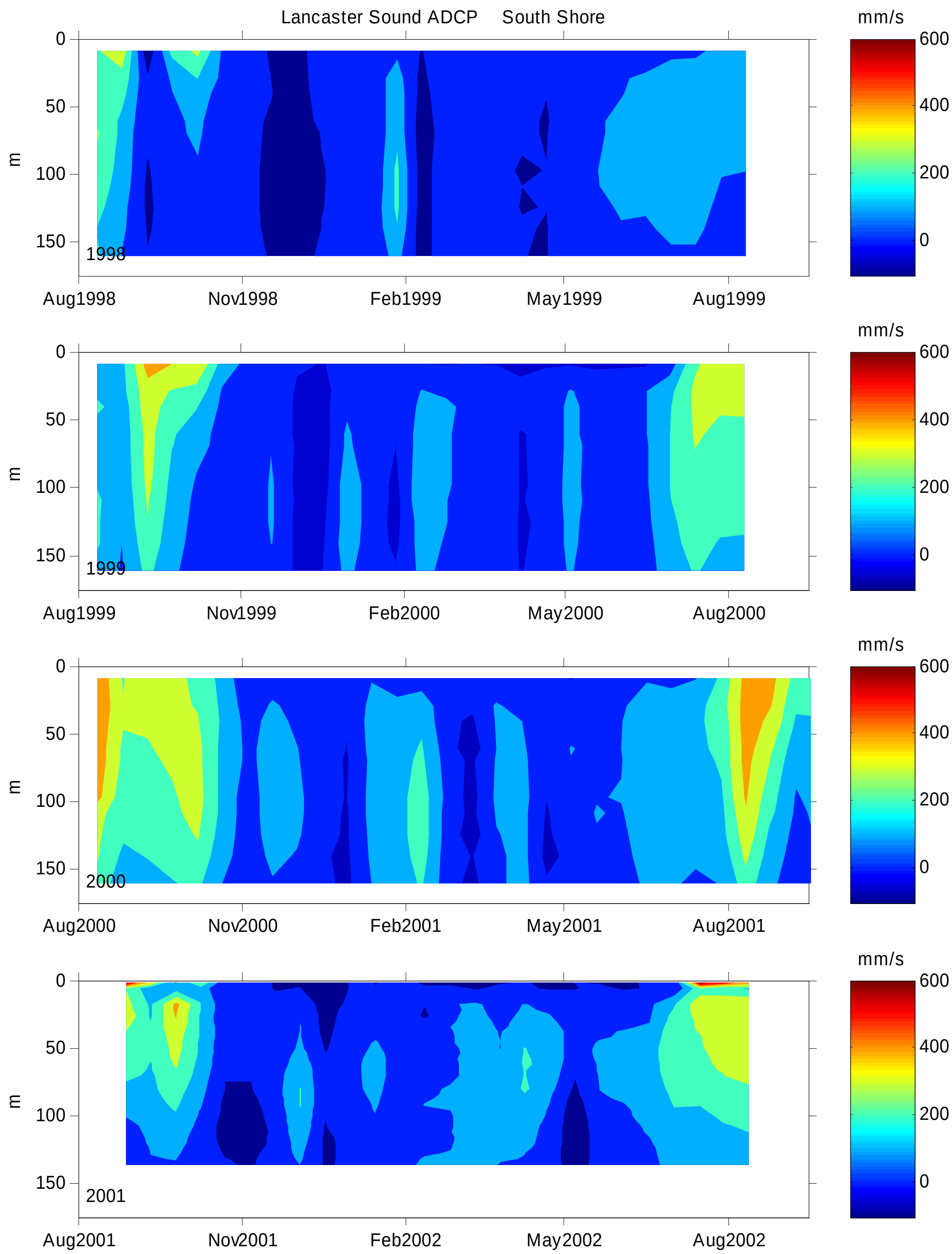

Figure 2-5 Time series of 4 years of data for southern ADCP mooring (1998-2002)

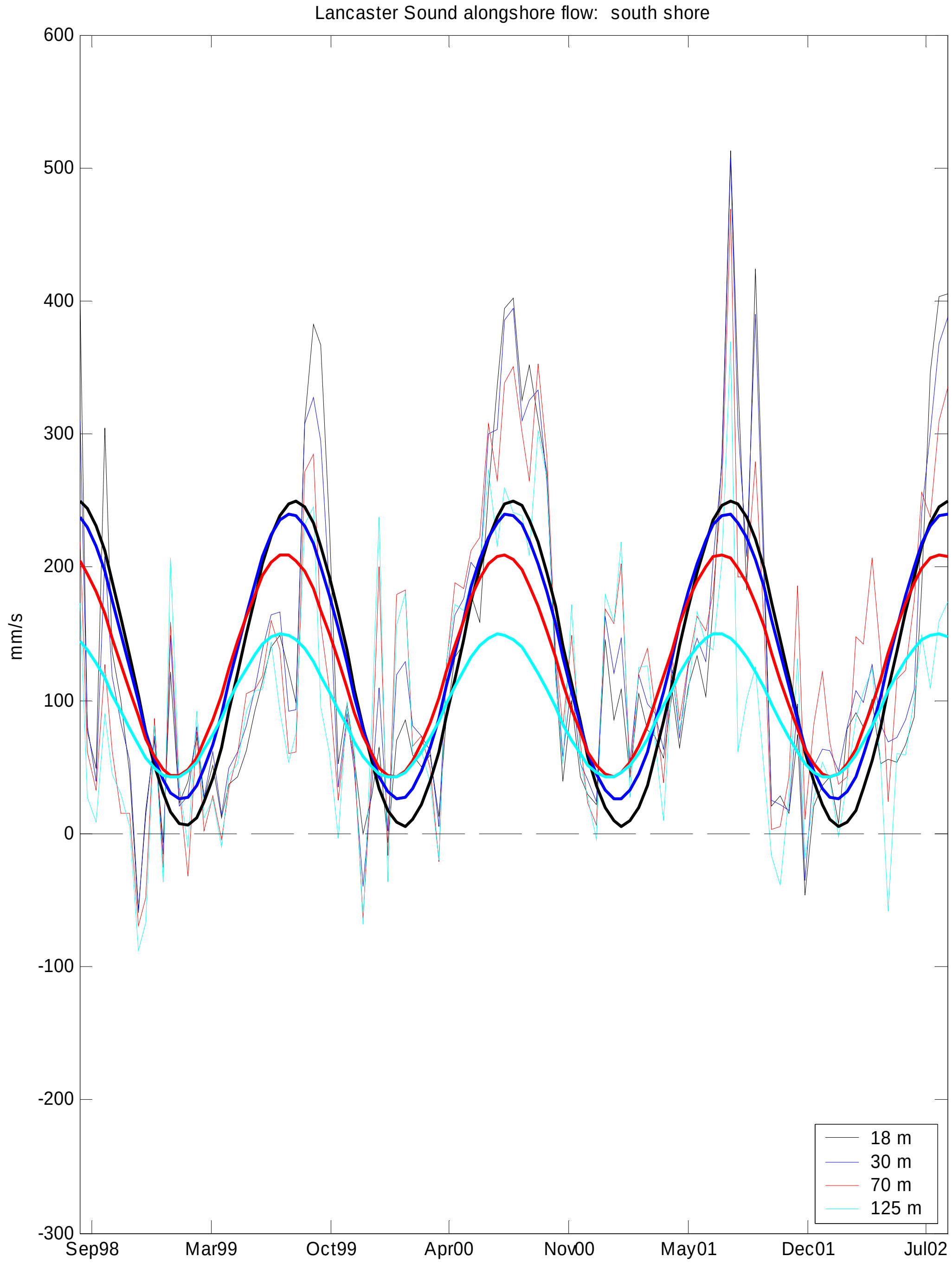

Figure 2-6 Time series of southern mooring's 4 years of low-pass filtered ADCP data with annual harmonic superimposed

2.2.3.2 Cross correlation matrix of 14-day data

Table 2-2 Cross-correlation matrix of low-pass filtered data (14-day) from southern mooring at 18, 30, 70, and 125 m

Cross correlation matrix of 14-day data				
	18 (m)	30 (m)	70 (m)	125 (m)
18 (m)	1.00			
30 (m)	0.98	1.00		
70 (m)	0.85	0.93	1.00	
125 (m)	0.72	0.81	0.92	1.00

2.2.3.3 Eigenvalues and % variance accounted for by each mode

Table 2-3 Eigenvalues and % explained variance for low-pass filtered data (14-day) from southern mooring at 18, 30, 70, and 125 m.

ADCP alongshore south				
	Eigenvectors			
	Mode 1	Mode 2	Mode 3	Mode 4
18 m	-0.57	0.57	0.32	0.49
30 m	-0.54	0.22	-0.14	-0.80
70 m	-0.49	-0.39	-0.70	0.34
125 m	-0.38	-0.69	0.62	-0.05

Mode	Eigenvalues	% Variance Explained
1	43043.80	91.19
2	3606.36	7.64
3	466.33	0.99
4	84.30	0.18

Table 2-4 Variance of original low-pass filtered (14-day) southern ADCP data and variance of first 4 modes.

Variance : south shore (mm^2s^{-2})							
		Mode 1		Mode 2		Mode 3	
Depth	Original	Residual	% var.	Residual	% var.	Residual	% var.
18	15381.6782	1249.7244	91.8752	68.1082	99.5572	20.3742	99.8675
30	12795.8049	243.2575	98.0989	62.8757	99.5086	53.8754	99.5790
70	11039.2091	788.9982	92.8528	239.4385	97.8310	9.8818	99.9105
125	7984.0938	1875.0108	76.5157	180.2109	97.7429	0.1728	99.9978

		Mode 4	
Depth	Original	Residual	% var.
18	15381.6782	0.0000	100.0000
30	12795.8049	0.0000	100.0000
70	11039.2091	0.0000	100.0000
125	7984.0938	0.0000	100.0000

2.2.3.4 Recreation of south mooring time series using first 4 modes

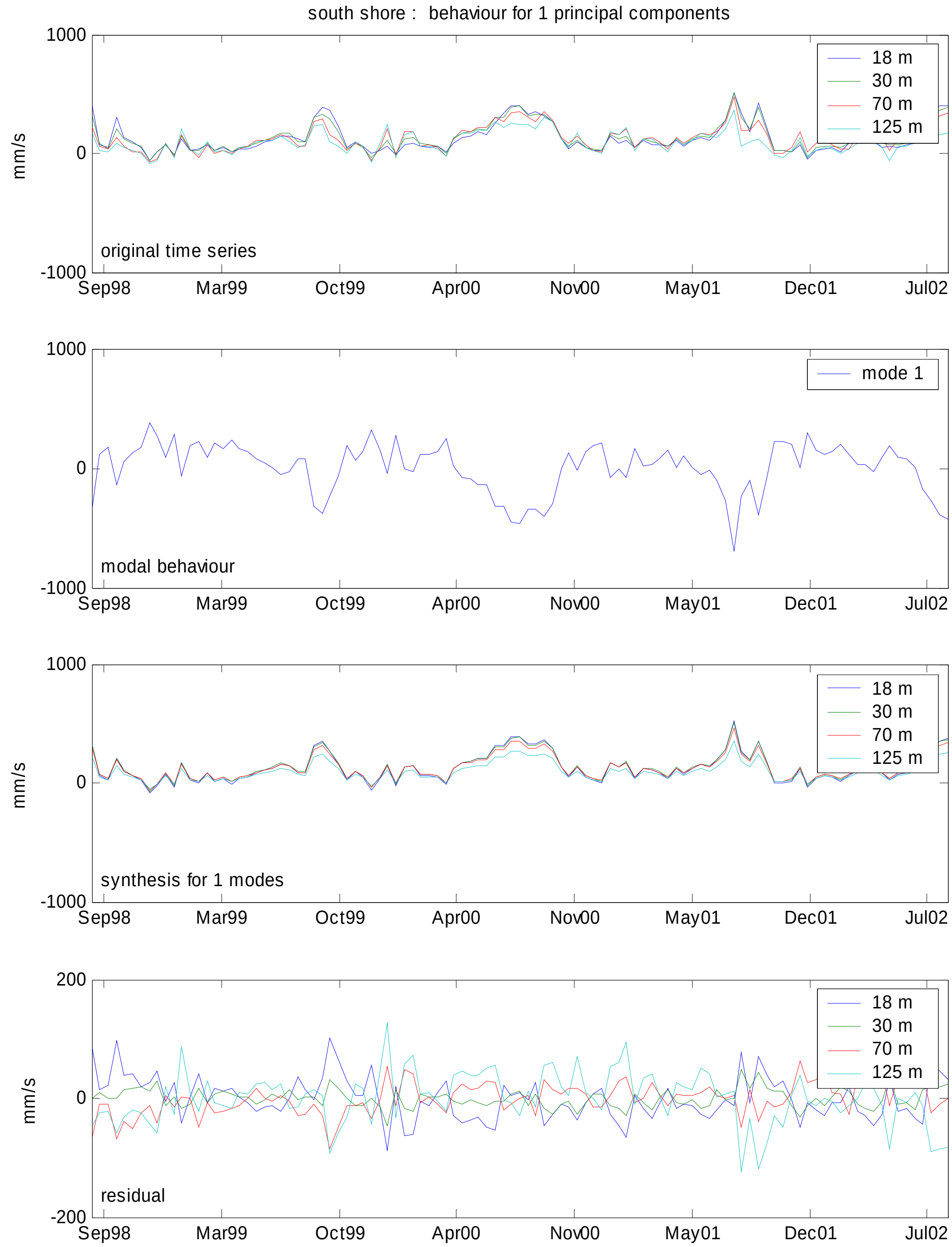

Figure 2-7 Recreation of southern mooring ADCP low-pass filtered time series using mode 1

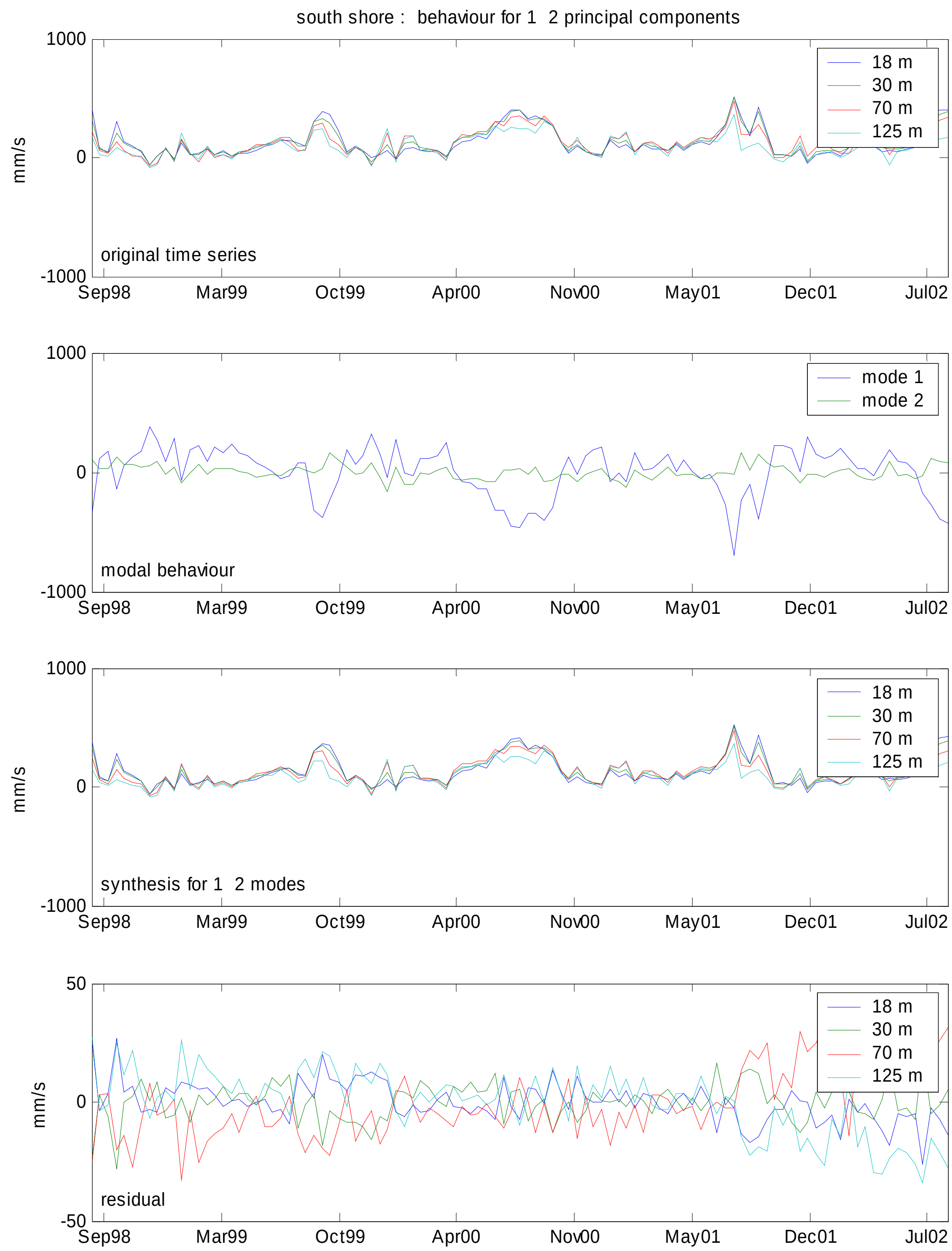

Figure 2-8 Recreation of southern mooring ADCP low-pass filtered time series using modes 1 and 2

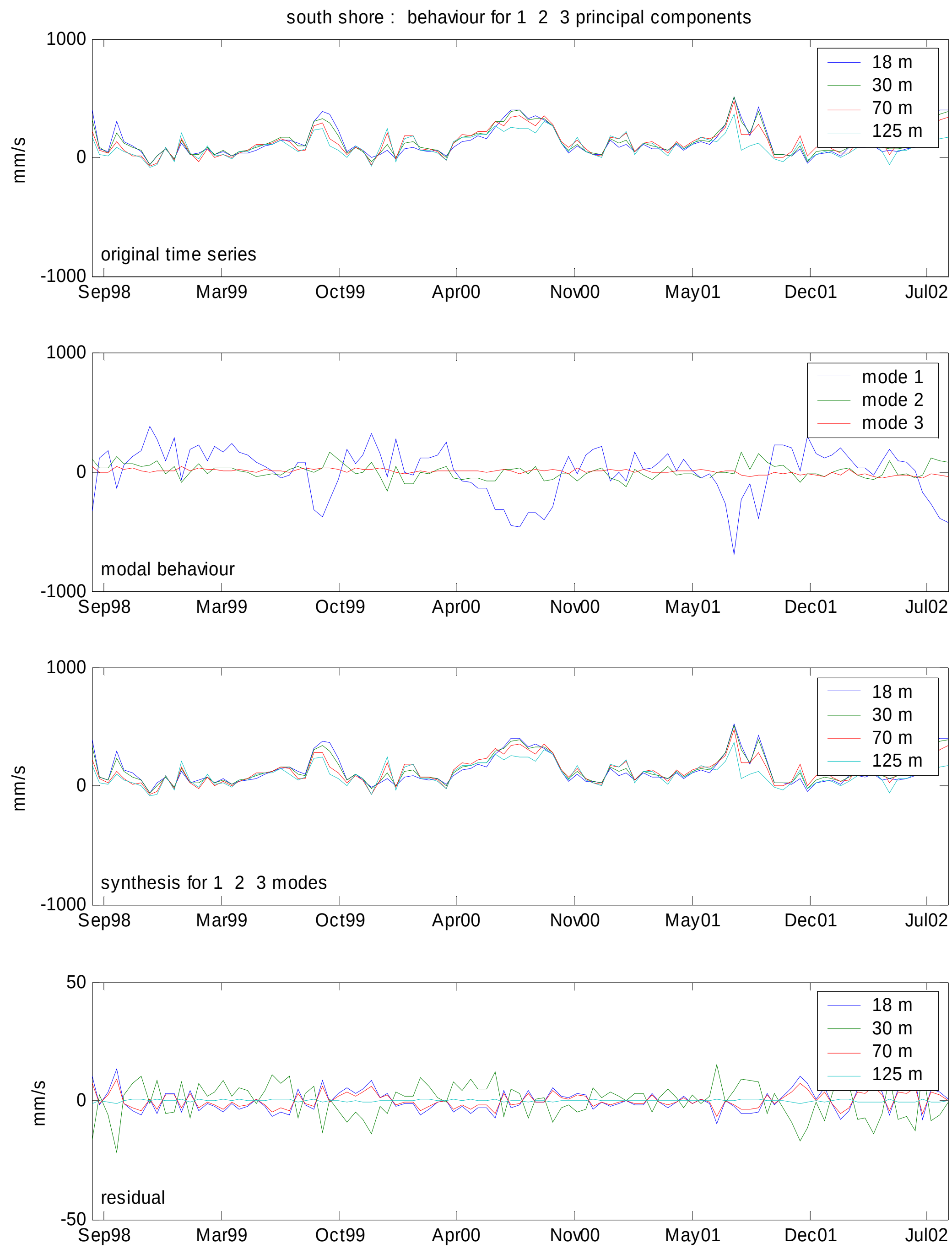

Figure 2-9 Recreation of southern mooring ADCP low-pass filtered time series using modes 1, 2, and 3

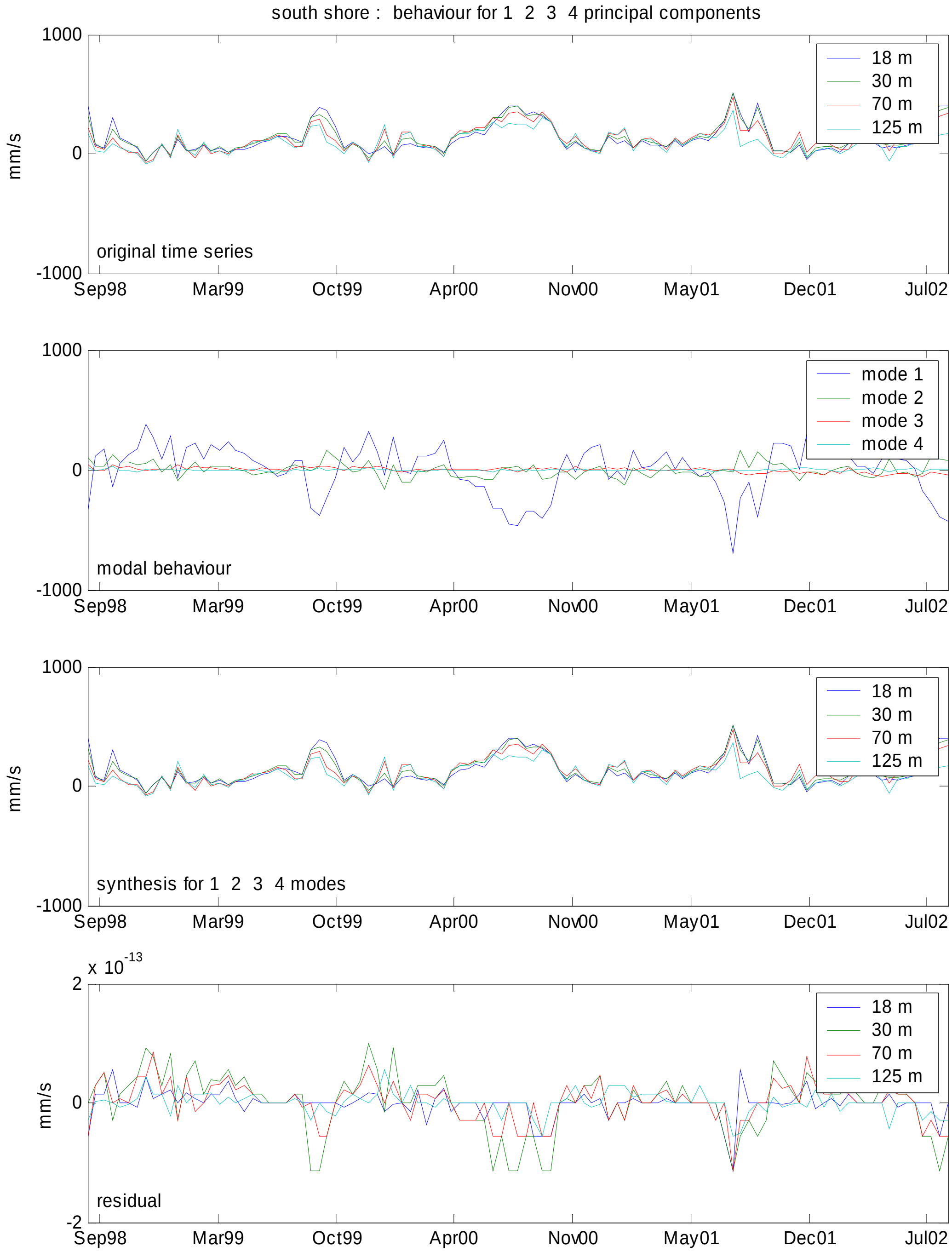

Figure 2-10 Recreation of southern mooring ADCP low-pass filtered time series using modes 1, 2, 3, and 4

2.2.4 PCA, ADCP only, 4 moorings, 14-day (South, Quarter-way, Half-way, and North)

The results in this section are from analyses performed on all 4 moorings where the data have been low-pass filtered. Data represent the year 2001-2002.

2.2.4.1 Variance of 14-day data at 4 depths for 4 moorings (mm^2s^{-2})

Table 2-5 Variance of original 2-hrly and low-pass filtered ADCP data (14-day) for four moorings (south, quarter-way, half-way, and north); one year only (2001-2002)

South mooring 1398/1399		
Depth (m)	2-hrly	Filtered 14-day
6	21785.97	8417.31
18	33393.36	18297.50
30	29724.28	14190.13
62	27559.91	9703.09
South mooring quarter-way 1401		
Depth(m)	2-hrly	Filtered 14-day
6	15022.87	7015.01
18	21919.38	6128.54
30	22376.39	5298.47
62	22999.25	3930.95
South mooring half-way 1403		
Depth (m)	2-hrly	Filtered 14-day
5	11860.12	5189.65
17	15481.79	2954.60
29	16136.82	2768.24
61	16308.27	2100.73
North mooring 1405		
Depth (m)	2-hrly	Filtered 14-day
7	11860.71	3451.87
19	18442.89	5579.54
31	16258.73	4488.56
63	14274.40	2194.50

2.2.4.2 PCA, using all 4 moorings at once for one year (2001-2002)

The following PCA was performed on shallow water bins only due to the limitations of the mooring depths at the quarter-way and half-way sites.

Table 2-6 PCA results (eigenvectors, eigenvalues, and % explained variance) for all four moorings at shallow depth

ADCP alongshore 4 moorings												
Eigenvectors												
	Mode	1	2	3	4	5	6	7	8	9	10	11
S	6 m	-0.33	0.01	-0.31	0.04	0.21	-0.46	-0.29	0.03	-0.48	0.25	-0.33
	18 m	-0.53	0.10	-0.06	-0.27	0.23	-0.07	-0.25	-0.24	0.23	-0.05	0.23
	30 m	-0.46	0.06	0.01	-0.27	0.15	0.22	0.03	0.08	0.27	-0.30	-0.08
	62 m	-0.37	-0.05	0.22	-0.14	-0.19	0.55	0.02	0.28	-0.39	0.23	0.01
Q	6 m	-0.28	-0.14	-0.27	0.43	-0.03	-0.16	0.29	0.50	0.24	-0.30	-0.04
	18 m	-0.26	-0.17	0.31	0.19	-0.16	-0.13	0.13	0.01	0.17	0.54	0.11
	30 m	-0.21	-0.19	0.36	0.19	-0.24	-0.27	0.02	0.02	0.05	0.01	-0.11
	62 m	-0.19	-0.11	0.31	0.19	-0.24	-0.08	0.01	-0.55	-0.23	-0.48	-0.07
H	5 m	-0.12	-0.24	-0.42	0.47	0.18	0.41	0.14	-0.39	-0.11	0.14	0.21
	19 m	0.07	-0.25	0.28	0.12	0.47	-0.08	-0.12	-0.04	0.09	0.04	0.19
	29 m	0.08	-0.24	0.28	0.04	0.44	-0.04	-0.09	0.15	0.05	0.01	0.18
	61 m	0.07	-0.21	0.21	-0.04	0.40	0.21	0.19	0.05	-0.17	-0.13	-0.58
N	7 m	0.05	-0.38	-0.16	0.03	-0.21	0.20	-0.46	-0.09	0.41	0.07	-0.46
	19 m	0.08	-0.50	-0.11	-0.26	-0.19	-0.02	-0.24	0.08	-0.01	0.01	0.19
	31 m	0.01	-0.46	-0.15	-0.25	-0.09	-0.12	0.08	0.15	-0.33	-0.29	0.27
	63 m	-0.03	-0.22	-0.14	-0.42	0.02	-0.18	0.64	-0.29	0.16	0.24	-0.16

ADCP alongshore 4 moorings						
Eigenvectors						
	Mode	12	13	14	15	16
S	6 m	0.17	-0.11	0.00	-0.01	0.11
	18 m	-0.34	0.31	-0.05	0.19	-0.33
	30 m	0.13	-0.38	0.06	-0.33	0.44
	62 m	0.30	0.17	-0.04	0.10	-0.20
Q	6 m	0.10	-0.00	-0.08	0.25	-0.23
	18 m	-0.31	-0.38	0.33	0.16	0.07
	30 m	-0.11	0.43	-0.32	-0.53	0.14
	62 m	0.20	-0.16	0.04	0.31	-0.01
H	5 m	-0.09	0.07	-0.10	-0.17	0.17
	19 m	0.39	-0.21	0.05	-0.33	-0.49
	29 m	0.17	0.32	0.00	0.42	0.53
	61 m	-0.50	-0.07	-0.08	0.06	-0.14
N	7 m	0.15	0.17	0.29	0.04	-0.04
	19 m	-0.11	-0.36	-0.61	0.13	0.02
	31 m	-0.19	0.13	0.54	-0.19	0.00
	63 m	0.31	0.14	-0.07	0.07	-0.04

Mode	Eigenvalues	% Variance Explained
1	63560.41	62.49
2	18360.74	18.05
3	10632.71	10.45
4	3852.86	3.79
5	2279.23	2.24
6	1352.09	1.33
7	541.89	0.53
8	425.06	0.42
9	233.85	0.23
10	184.23	0.18
11	154.80	0.15
12	77.46	0.08
13	20.97	0.02
14	18.02	0.02
15	10.18	0.01
16	4.20	0.00

2.2.5 PCA, ADCP only, southern 3 moorings, 14-day (South, Quarter-way, and Half-way)

The following analysis was performed on the three southern-most moorings only (south, quarter-way, and half-way).

Table 2-7 PCA results (eigenvectors, eigenvalues, and % explained variance) for all three southern-most moorings at shallow depth (south, quarter-way, and half-way)

ADCP alongshore south													
Eigenvectors													
	Mode	1	2	3	4	5	6	7	8	9	10	11	12
S	6 m	-0.32	0.22	0.30	-0.15	0.49	0.53	-0.39	0.11	-0.08	0.09	-0.15	-0.08
	18 m	-0.53	0.18	-0.17	-0.25	0.27	-0.32	0.04	-0.28	0.18	-0.14	0.43	0.32
	30 m	-0.47	0.11	-0.20	-0.27	-0.15	-0.29	0.19	0.23	-0.05	0.03	-0.50	-0.45
	62 m	-0.38	-0.13	-0.28	-0.01	-0.61	0.43	-0.20	-0.08	-0.32	-0.10	0.08	0.22
Q	6 m	-0.27	0.02	0.58	0.12	-0.14	-0.02	0.48	0.40	-0.21	0.15	0.25	0.18
	18 m	-0.27	-0.36	0.01	0.20	0.01	0.24	0.26	-0.35	0.50	0.47	-0.20	0.03
	30 m	-0.22	-0.44	0.00	0.35	0.20	0.10	0.07	0.16	0.13	-0.67	0.11	-0.30
	62 m	-0.18	-0.35	-0.09	0.37	0.17	-0.43	-0.47	0.16	-0.30	0.38	0.04	0.05
H	5 m	-0.09	-0.04	0.64	-0.05	-0.35	-0.29	-0.37	-0.38	0.13	-0.21	-0.14	-0.09
	19 m	0.08	-0.45	0.08	-0.34	0.25	-0.05	0.19	-0.12	-0.34	-0.19	-0.44	0.46
	29 m	0.07	-0.37	0.07	-0.46	0.04	0.07	0.08	-0.22	-0.27	0.21	0.44	-0.52
	61 m	0.06	-0.31	0.00	-0.44	-0.16	-0.01	-0.26	0.56	0.50	0.04	0.10	0.18

Mode	Eigenvalues	% Variance Explained
1	62198.55	74.06
2	11967.34	14.25
3	5012.20	5.97
4	2776.70	3.31
5	1194.24	1.42
6	255.18	0.30
7	216.94	0.26
8	166.12	0.20
9	116.04	0.14
10	53.18	0.06
11	22.15	0.03
12	8.99	0.01

2.2.6 PCA, ADCP only, southern-most mooring, 14-day, all levels

The following analyses were performed on ADCP data for all the bin depths for the southern-most mooring, 1398/1399.

Table 2-8 PCA results (eigenvectors, eigenvalues, and % explained variance) for southern-most mooring at all bin depths

ADCP alongshore south											
	Eigenvectors										
Mode	1	2	3	4	5	6	7	8	9	10	11
2 m	-0.30	-0.52	0.71	-0.28	-0.04	-0.04	0.06	-0.15	0.05	0.09	-0.07
6 m	-0.15	-0.22	0.13	0.11	0.14	0.15	-0.09	0.64	-0.09	-0.31	0.35
10 m	-0.26	-0.23	-0.12	0.38	0.08	-0.03	-0.37	-0.21	-0.41	-0.37	-0.07
14 m	-0.25	-0.16	-0.14	0.29	0.04	-0.30	-0.16	-0.06	-0.01	0.16	-0.37
18 m	-0.24	-0.12	-0.14	0.24	-0.01	-0.27	-0.10	-0.06	0.32	0.26	0.20
22 m	-0.23	-0.10	-0.14	0.19	0.02	-0.11	0.08	0.14	0.30	0.25	0.33
26 m	-0.23	-0.09	-0.15	0.11	-0.02	0.12	0.41	0.27	-0.07	0.14	-0.31
30 m	-0.22	-0.07	-0.16	0.05	-0.09	0.17	0.45	0.07	-0.02	-0.03	-0.28
34 m	-0.21	-0.05	-0.15	-0.00	-0.15	0.19	0.25	-0.11	0.11	-0.15	0.20
38 m	-0.20	-0.03	-0.15	-0.06	-0.17	0.24	0.08	-0.20	0.09	-0.27	0.20
42 m	-0.20	-0.01	-0.14	-0.15	-0.21	0.25	-0.08	-0.22	0.05	-0.14	0.07
46 m	-0.19	0.01	-0.14	-0.22	-0.15	0.15	-0.18	-0.17	-0.02	0.06	-0.04
50 m	-0.19	0.03	-0.14	-0.27	-0.06	0.06	-0.22	-0.01	-0.04	0.17	-0.05
54 m	-0.18	0.05	-0.13	-0.29	-0.02	0.01	-0.22	0.13	-0.01	0.13	-0.06
58 m	-0.18	0.07	-0.12	-0.30	0.02	0.03	-0.26	0.34	-0.02	0.12	-0.05
62 m	-0.17	0.09	-0.10	-0.28	0.15	-0.14	-0.07	0.18	-0.07	-0.07	-0.06
66 m	-0.17	0.11	-0.08	-0.24	0.24	-0.36	0.15	-0.11	-0.02	-0.17	0.13
70 m	-0.16	0.12	-0.05	-0.21	0.29	-0.42	0.32	-0.12	-0.11	-0.25	0.04
80 m	-0.15	0.16	0.08	0.06	0.16	0.16	0.08	-0.06	-0.37	0.25	0.09
84 m	-0.14	0.17	0.10	0.07	0.19	0.11	0.03	-0.11	-0.18	0.27	0.24
88 m	-0.14	0.18	0.11	0.09	0.20	0.12	0.03	-0.05	-0.14	0.17	0.22
92 m	-0.13	0.19	0.12	0.09	0.17	0.15	-0.00	-0.07	-0.06	0.13	-0.04
96 m	-0.13	0.20	0.12	0.09	0.13	0.17	-0.00	-0.10	0.06	-0.05	-0.11
100 m	-0.13	0.20	0.12	0.08	0.13	0.17	-0.04	0.00	0.09	-0.08	-0.19
104 m	-0.12	0.20	0.13	0.08	0.11	0.09	-0.09	-0.01	0.25	-0.08	-0.03
108 m	-0.12	0.21	0.13	0.07	0.05	0.01	-0.08	-0.05	0.32	-0.12	-0.02
112 m	-0.11	0.21	0.14	0.07	-0.02	-0.03	-0.08	0.01	0.27	-0.14	-0.09
116 m	-0.11	0.20	0.14	0.06	-0.10	-0.07	-0.05	0.09	0.15	-0.09	-0.11
120 m	-0.10	0.19	0.13	0.06	-0.17	-0.08	0.01	0.16	0.01	-0.08	-0.18
124 m	-0.09	0.18	0.12	0.05	-0.19	-0.09	0.01	0.18	-0.12	-0.09	-0.09
128 m	-0.08	0.17	0.11	0.06	-0.30	-0.15	0.04	0.05	-0.14	-0.12	0.09
132 m	-0.07	0.16	0.10	0.06	-0.40	-0.20	0.04	-0.01	-0.14	-0.01	0.20
136 m	-0.07	0.14	0.09	0.05	-0.41	-0.16	0.03	0.03	-0.24	0.20	0.09

ADCP alongshore south											
	Eigenvectors										
Mode	12	13	14	15	16	17	18	19	20	21	22
2 m	-0.09	0.04	0.03	0.02	0.00	0.01	-0.01	0.01	0.00	-0.00	-0.01
6 m	0.35	-0.20	-0.17	-0.07	-0.03	-0.06	0.02	-0.04	0.01	0.01	0.03
10 m	-0.16	0.17	0.29	-0.01	0.25	0.07	0.02	-0.08	-0.07	-0.05	-0.00
14 m	0.03	-0.20	-0.51	-0.01	-0.20	-0.16	0.09	0.22	0.04	0.12	-0.04
18 m	0.22	0.21	0.07	0.01	-0.18	-0.08	-0.25	-0.14	0.10	-0.02	0.10
22 m	-0.22	-0.12	0.27	0.07	0.03	0.30	0.16	-0.05	-0.06	-0.17	-0.13
26 m	0.07	0.03	0.19	0.14	0.07	0.21	-0.02	0.06	-0.01	0.21	0.06
30 m	0.03	-0.05	0.03	-0.08	0.23	-0.27	-0.08	-0.03	-0.14	-0.26	-0.07
34 m	-0.21	0.18	-0.15	-0.15	0.00	-0.34	0.07	-0.03	0.07	0.10	0.18
38 m	-0.30	-0.07	-0.39	-0.05	-0.10	0.34	-0.01	0.07	0.21	-0.03	-0.05
42 m	0.36	0.13	0.20	0.19	-0.33	-0.12	0.09	-0.04	-0.16	0.21	-0.34
46 m	0.27	-0.26	0.21	-0.01	-0.05	0.11	-0.06	0.18	0.10	-0.06	0.57
50 m	0.05	-0.48	0.04	-0.20	0.12	0.06	0.08	-0.11	-0.15	0.09	-0.24
54 m	-0.04	0.10	-0.18	-0.30	0.28	0.01	-0.27	-0.19	-0.08	-0.10	-0.04
58 m	-0.14	0.49	-0.10	0.22	0.06	0.14	0.14	0.37	-0.03	-0.05	0.01
62 m	-0.25	-0.06	0.16	0.35	-0.18	-0.46	-0.04	-0.20	0.23	-0.04	-0.01
66 m	0.03	-0.03	-0.00	-0.14	-0.02	-0.01	0.12	-0.18	0.09	-0.04	-0.08
70 m	0.21	0.00	-0.03	0.05	0.06	0.25	0.01	0.15	-0.15	0.09	0.08
80 m	0.13	0.28	-0.13	-0.16	-0.19	0.06	-0.26	-0.23	0.00	0.03	0.08
84 m	-0.13	-0.04	-0.02	-0.10	-0.14	-0.16	0.09	0.17	-0.52	-0.19	0.02
88 m	-0.14	-0.12	0.12	-0.04	0.15	-0.14	0.17	0.26	0.25	0.46	0.10
92 m	0.09	-0.11	0.07	0.04	0.13	0.03	-0.18	0.06	0.54	-0.19	-0.32
96 m	0.20	0.04	-0.12	0.17	-0.08	0.14	0.24	-0.04	0.10	-0.46	-0.08
100 m	0.02	-0.05	-0.14	0.25	-0.12	0.10	0.13	-0.20	-0.15	0.08	0.15
104 m	-0.14	-0.08	-0.06	0.21	0.13	0.02	-0.23	-0.05	-0.24	0.32	-0.22
108 m	0.06	0.02	-0.04	0.08	0.28	-0.06	-0.23	-0.00	-0.01	-0.02	0.28
112 m	0.04	0.05	0.05	-0.14	0.16	-0.07	0.14	-0.14	-0.12	0.05	0.10
116 m	0.07	0.12	0.17	-0.38	-0.04	-0.19	0.36	0.25	0.09	-0.14	-0.05
120 m	-0.04	0.15	0.14	-0.40	-0.26	0.23	-0.08	-0.05	0.09	0.26	-0.16
124 m	-0.30	-0.21	0.11	0.01	-0.35	0.10	-0.14	-0.10	-0.01	-0.09	0.24
128 m	-0.09	-0.13	0.04	0.12	-0.09	-0.04	-0.26	0.20	-0.13	-0.22	-0.09
132 m	0.19	0.02	-0.08	0.17	0.22	-0.08	-0.19	0.27	-0.00	0.04	-0.14
136 m	0.06	0.03	-0.17	0.19	0.24	0.05	0.41	-0.44	0.08	0.07	0.09

ADCP alongshore south											
	Eigenvectors										
Mode	23	24	25	26	27	28	29	30	31	32	33
2 m	0.01	0.00	-0.01	-0.02	0.01	0.00	-0.01	-0.00	-0.00	0.00	-0.00
6 m	-0.01	-0.02	0.03	0.06	-0.06	-0.03	0.04	0.01	0.01	-0.01	0.00
10 m	-0.01	-0.00	-0.06	-0.03	-0.03	0.00	-0.02	0.03	-0.01	-0.02	-0.01
14 m	-0.02	0.03	0.03	0.18	0.12	0.03	0.07	-0.04	-0.06	0.06	0.13
18 m	0.03	-0.13	0.08	-0.31	-0.19	-0.12	-0.05	0.06	0.17	-0.16	-0.29
22 m	0.19	0.18	-0.07	0.16	0.19	0.07	0.03	-0.08	-0.23	0.12	0.23
26 m	-0.37	-0.05	-0.11	-0.01	-0.04	0.19	-0.21	-0.08	0.31	0.16	-0.03
30 m	0.17	-0.05	0.22	-0.14	-0.03	-0.32	0.13	-0.04	-0.30	-0.22	0.03
34 m	0.16	0.00	-0.34	0.23	0.12	0.16	0.02	0.41	0.17	0.02	-0.07
38 m	-0.19	0.13	0.24	-0.20	-0.22	-0.02	-0.08	-0.22	-0.02	-0.00	-0.05
42 m	-0.02	-0.13	0.12	0.03	0.14	0.13	0.27	-0.15	-0.02	0.11	0.11
46 m	0.08	-0.01	0.03	0.28	-0.14	-0.20	-0.16	0.03	-0.10	0.04	0.11
50 m	-0.09	0.20	-0.14	-0.27	0.10	0.13	-0.04	0.30	0.10	-0.33	-0.13
54 m	0.22	-0.26	-0.08	0.06	0.05	0.14	0.02	-0.37	0.07	0.36	-0.12
58 m	-0.03	-0.03	0.09	-0.06	0.07	-0.17	0.13	0.24	0.01	-0.17	0.07
62 m	-0.06	0.32	-0.00	0.07	-0.17	0.09	-0.14	-0.19	-0.12	0.01	-0.13
66 m	-0.34	-0.33	-0.15	-0.03	0.13	-0.36	-0.13	0.04	0.05	0.04	0.35
70 m	0.31	0.13	0.13	0.03	-0.12	0.26	0.18	0.07	-0.00	-0.02	-0.20
80 m	0.03	0.27	0.16	-0.04	0.23	0.15	-0.24	0.05	-0.15	-0.12	0.28
84 m	-0.28	-0.00	-0.05	0.11	-0.36	-0.07	0.16	-0.03	0.05	0.14	-0.12
88 m	0.14	-0.19	0.07	-0.14	0.25	-0.11	0.05	-0.32	-0.01	-0.13	-0.17
92 m	0.04	0.02	0.08	0.08	-0.17	-0.02	0.30	0.31	0.18	0.25	0.08
96 m	-0.02	-0.18	-0.21	0.18	0.24	0.09	-0.22	-0.10	-0.09	-0.22	-0.41
100 m	0.34	0.14	-0.34	-0.43	-0.07	-0.26	0.03	-0.00	0.10	0.27	0.14
104 m	0.11	-0.30	0.17	0.26	-0.23	0.02	-0.37	0.20	-0.11	-0.13	0.10
108 m	-0.33	0.09	-0.19	-0.04	0.02	0.27	0.38	-0.19	-0.07	-0.28	0.26
112 m	-0.20	0.33	0.45	0.12	0.32	-0.21	-0.04	0.10	0.15	0.28	-0.23
116 m	0.12	-0.04	0.08	-0.24	-0.25	0.34	-0.29	-0.04	0.00	0.04	0.25
120 m	0.01	0.15	-0.29	0.26	-0.18	-0.27	0.17	-0.10	-0.15	-0.18	-0.15
124 m	-0.05	-0.40	0.17	-0.18	0.20	0.21	0.21	0.24	-0.17	0.11	-0.10
128 m	0.20	0.08	0.01	0.09	0.18	-0.12	-0.08	-0.20	0.58	-0.22	0.16
132 m	-0.14	0.10	-0.25	-0.17	0.07	-0.07	-0.20	0.10	-0.38	0.29	-0.14
136 m	0.03	-0.08	0.13	0.14	-0.25	0.03	0.12	-0.02	0.07	-0.12	0.07

Mode	Eigenvalues	% Variance Explained
1	315715.19	83.91
2	44354.04	11.79
3	11323.03	3.01
4	2856.37	0.76
5	968.96	0.26
6	370.09	0.10
7	222.26	0.06
8	158.25	0.04
9	108.47	0.03
10	69.38	0.02
11	37.63	0.01
12	22.57	0.01
13	13.22	0.00
14	9.62	0.00
15	6.09	0.00
16	3.48	0.00
17	2.63	0.00
18	0.91	0.00
19	0.71	0.00
20	0.47	0.00
21	0.44	0.00
22	0.29	0.00
23	0.15	0.00
24	0.08	0.00
25	0.01	0.00
26	0.00	0.00
27	0.00	0.00
28	0.00	0.00
29	0.00	0.00
30	0.00	0.00
31	0.00	0.00
32	0.00	0.00
33	0.00	0.00

Table 2-9 Eigenvalues and % variance accounted for by modes 1, 2, 3, and 4 for southern mooring ADCP data (14-day) at all bin depths

Variance : south shore (mm^2s^{-2})							
		Mode 1		Mode 2		Mode 3	
Depth	Original	Residual	% var.	Residual	% var.	Residual	%. var.
2	46803.1428	18079.6526	61.3709	5895.6479	87.4033	227.6684	99.5136
6	9228.8724	2570.8320	72.1436	331.4564	96.4085	146.3138	98.4146
10	24288.1896	2913.3703	88.0050	640.5844	97.3626	485.2187	98.0022
14	21296.6915	1661.5154	92.1982	518.5555	97.5651	298.4327	98.5987
18	19159.0849	1106.9412	94.2224	441.8275	97.6939	216.9954	98.8674
22	18087.8137	843.0683	95.3390	361.2678	98.0027	127.8525	99.2932
26	17014.4958	744.7938	95.6226	351.3329	97.9351	95.6913	99.4376
30	15388.8329	566.3862	96.3195	356.6818	97.6822	74.8825	99.5134
34	14271.8057	415.7167	97.0871	323.3016	97.7347	57.6948	99.5957
38	13502.6247	356.6824	97.3584	319.7679	97.6318	76.1032	99.4364
42	12704.9036	366.8621	97.1124	363.8682	97.1360	142.7482	98.8764
46	12182.2643	410.3332	96.6317	404.9310	96.6761	182.1986	98.5044
50	11744.1037	489.1453	95.8350	441.5468	96.2403	222.5290	98.1052
54	11337.3899	590.3122	94.7932	468.3704	95.8688	262.8521	97.6815
58	11089.6608	667.8402	93.9778	454.7447	95.8994	293.1967	97.3561
62	10353.1749	704.9992	93.1905	370.1878	96.4244	257.4113	97.5137
66	9498.0900	852.1848	91.0278	354.7767	96.2648	284.0390	97.0095
70	8833.7024	929.4562	89.4783	332.1733	96.2397	300.2246	96.6014
80	8168.7314	1295.3498	84.1426	149.9171	98.1647	69.2287	99.1525
84	7946.9955	1517.8603	80.9002	176.0645	97.7845	67.1594	99.1549
88	7803.4495	1698.0613	78.2396	207.0687	97.3464	72.7516	99.0677
92	7512.0223	1830.4545	75.6330	215.3662	97.1330	61.6816	99.1789
96	7133.0999	1914.4099	73.1616	220.6318	96.9069	52.5164	99.2638
100	6890.5832	1946.2475	71.7550	226.6013	96.7114	49.8871	99.2760
104	6612.4511	2029.2863	69.3111	232.5373	96.4833	45.3053	99.3148
108	6377.5063	2136.0965	66.5058	238.0372	96.2676	32.1212	99.4963
112	6107.6594	2112.1381	65.4182	245.0690	95.9875	26.9205	99.5592
116	5739.3141	2087.5909	63.6265	244.6943	95.7365	31.6511	99.4485
120	5180.9274	1910.7696	63.1192	232.9368	95.5040	45.4096	99.1235
124	4510.4773	1678.2062	62.7932	217.4412	95.1792	57.8692	98.7170
128	3740.4244	1514.2618	59.5163	251.9919	93.2630	108.3317	97.1038
132	3165.2075	1424.7602	54.9868	306.8524	90.3055	186.8018	94.0983
136	2570.6427	1163.5620	54.7365	278.8779	89.1514	192.3941	92.5157

Variance : south shore (mm^2s^{-2})			
		Mode 4	
Depth	Original	Residual	% var.
2	46803.1428	7.8799	99.9832
6	9228.8724	108.9483	98.8195
10	24288.1896	73.4324	99.6977
14	21296.6915	51.9097	99.7563
18	19159.0849	48.0820	99.7490
22	18087.8137	30.0782	99.8337
26	17014.4958	61.0978	99.6409
30	15388.8329	68.6707	99.5538
34	14271.8057	57.6945	99.5957
38	13502.6247	66.6843	99.5061
42	12704.9036	81.2478	99.3605
46	12182.2643	46.4380	99.6188
50	11744.1037	21.9291	99.8133
54	11337.3899	16.3743	99.8556
58	11089.6608	38.9947	99.6484
62	10353.1749	38.2411	99.6306
66	9498.0900	114.6194	98.7932
70	8833.7024	178.1659	97.9831
80	8168.7314	59.4942	99.2717
84	7946.9955	51.3602	99.3537
88	7803.4495	50.3086	99.3553
92	7512.0223	39.1362	99.4790
96	7133.0999	30.1998	99.5766
100	6890.5832	31.2779	99.5461
104	6612.4511	25.5186	99.6141
108	6377.5063	16.7490	99.7374
112	6107.6594	12.5117	99.7951
116	5739.3141	19.7403	99.6561
120	5180.9274	36.7213	99.2912
124	4510.4773	49.4057	98.9046
128	3740.4244	99.3576	97.3437
132	3165.2075	177.8506	94.3811
136	2570.6427	185.5931	92.7803

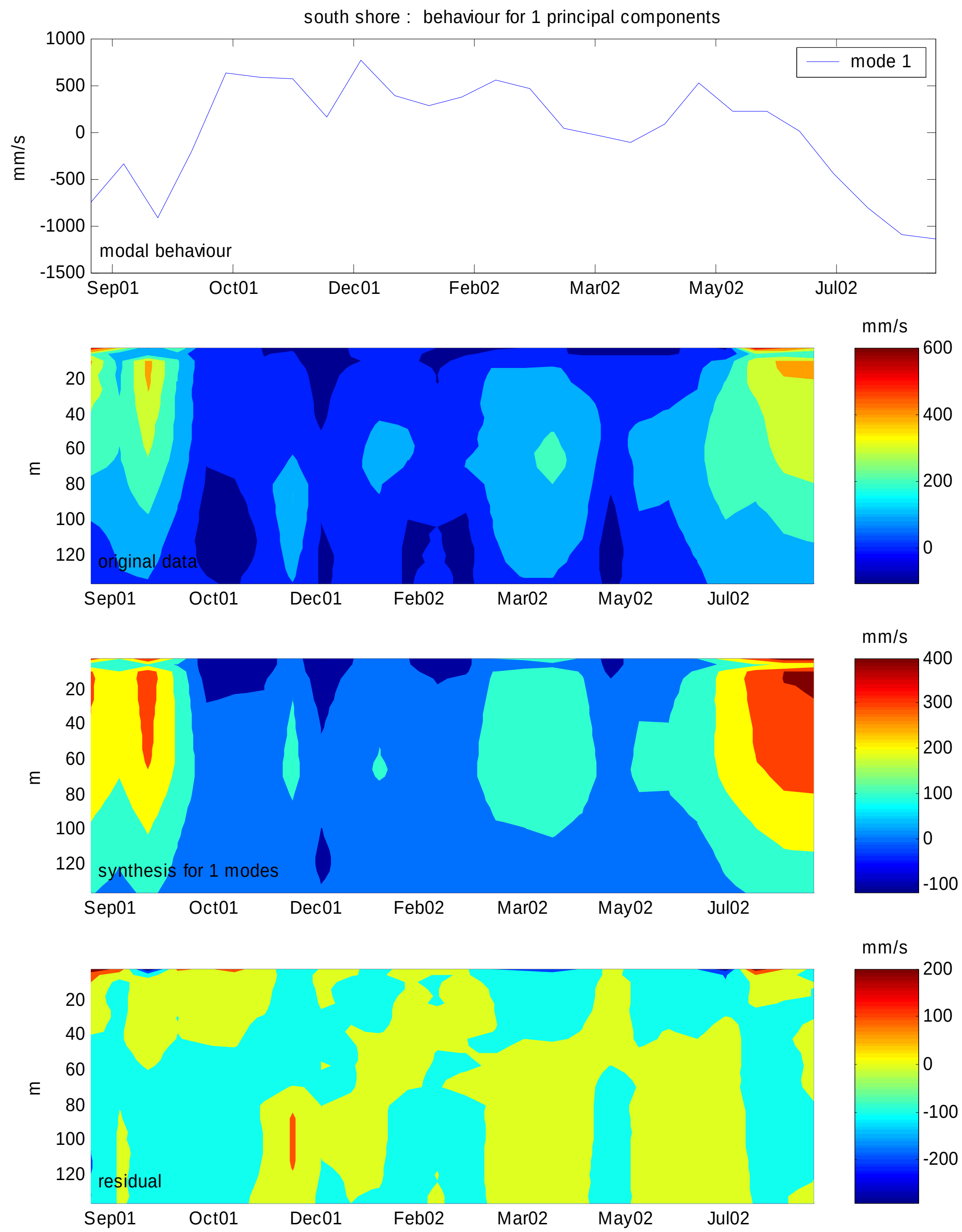

Figure 2-11 Recreation of time series using mode 1: south shore, 14-day data, 2001-2002

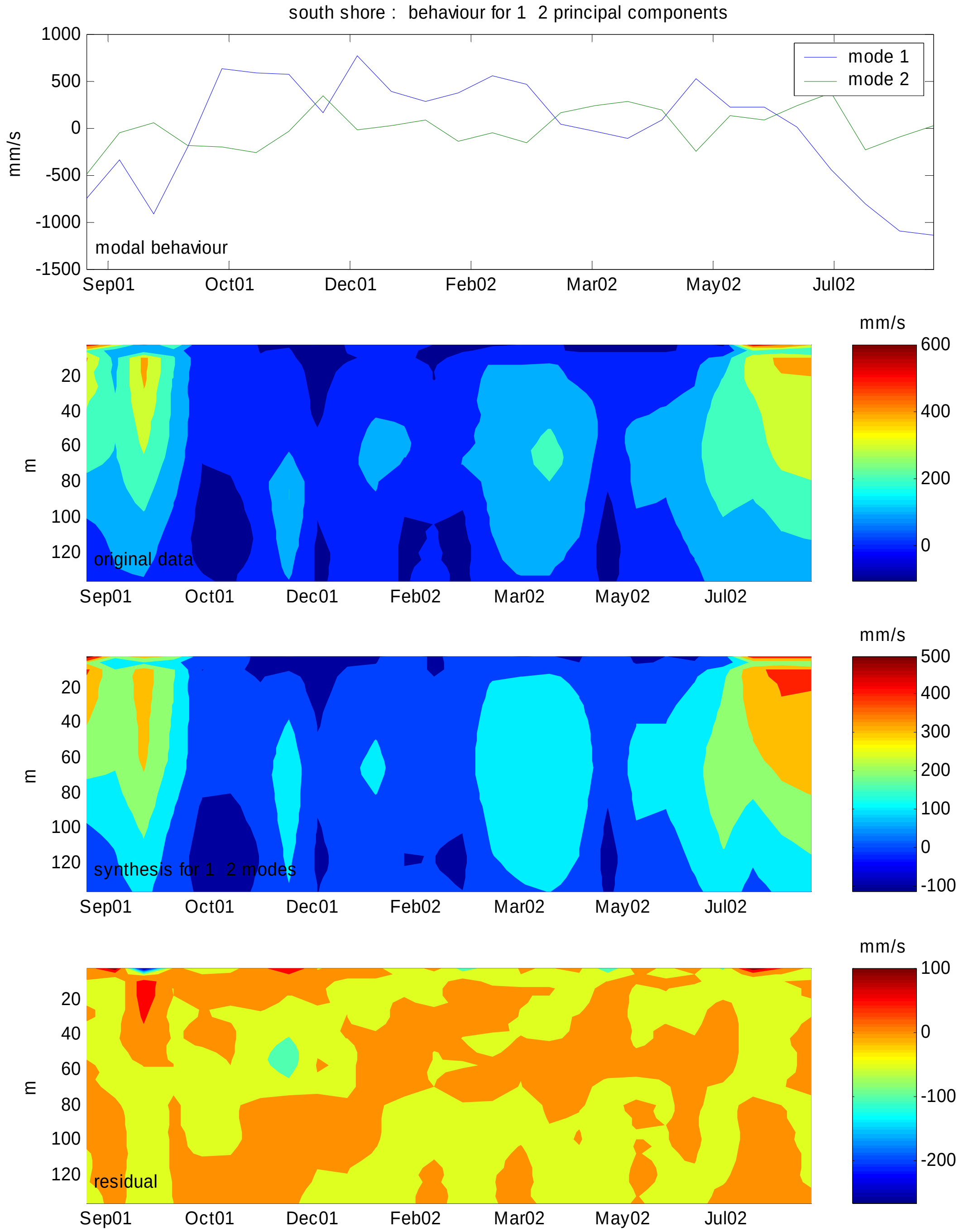

Figure 2-12 Recreation of time series using modes 1 and 2: south shore, 14-day data, 2001-2002

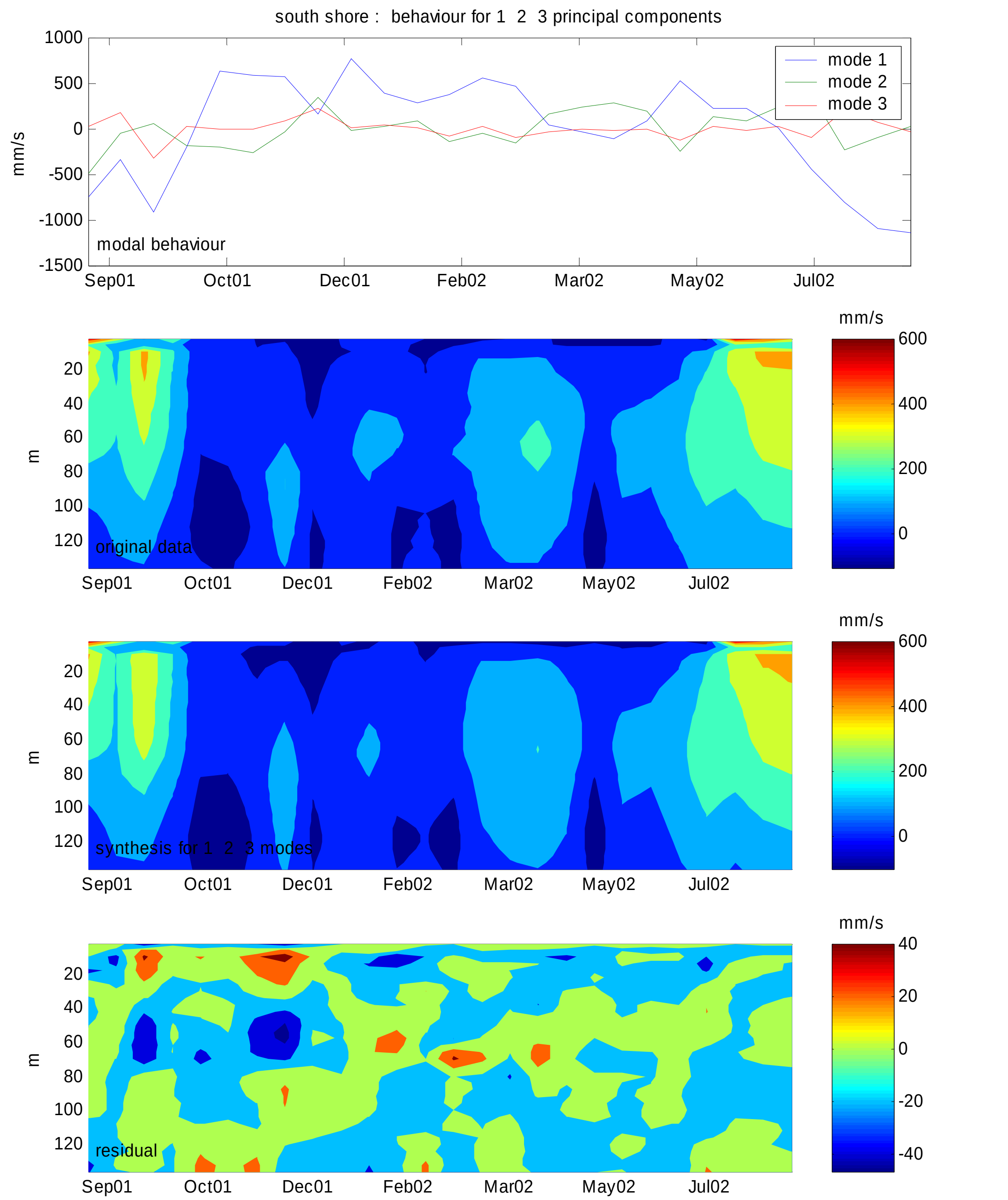

Figure 2-13 Recreation of time series using modes 1, 2, and 3: south shore, 14-day data, 2001-2002

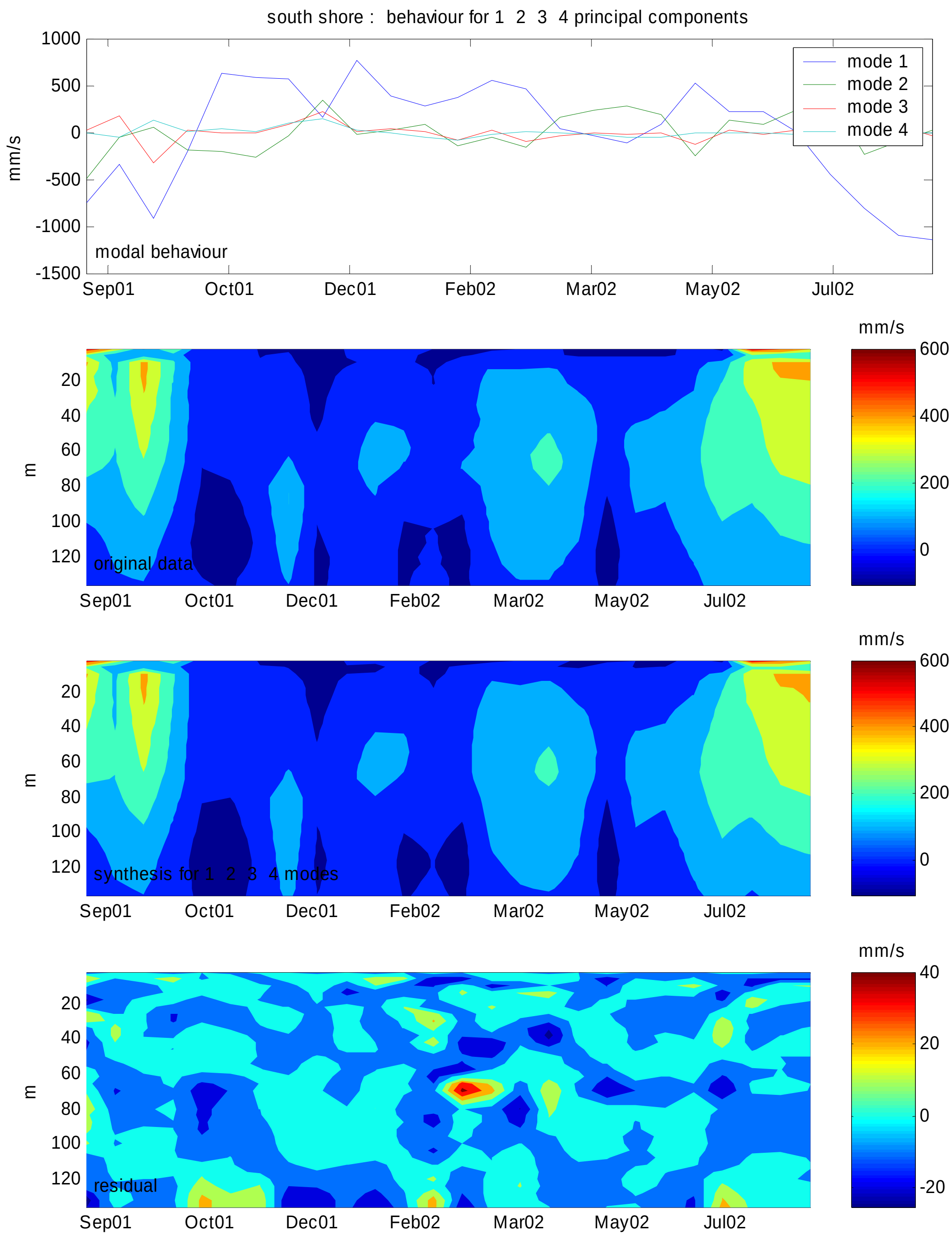

Figure 2-14 Recreation of time series using modes 1, 2, 3, and 4: south shore, 14-day data, 2001-2002

2.2.7 PCA, ADCP only quarter-way mooring, 14-day, all levels

The following analyses were performed on data from the mooring located quarter-way across the sound from the south shore. Data have been low-pass filtered and decimated to 14-day intervals. Analyses are for all bin depths.

Table 2-10 PCA results (eigenvectors, eigenvalues, and % explained variance) for quarter-way mooring at all bin depths

ADCP alongshore quarter-way										
	Eigenvectors									
Mode	1	2	3	4	5	6	7	8	9	10
2 m	-0.48	0.82	-0.14	0.24	0.13	0.02	-0.04	0.02	-0.01	0.01
6 m	-0.23	0.21	0.11	-0.86	-0.38	-0.02	0.06	-0.03	0.00	-0.02
10 m	-0.27	-0.10	0.50	-0.08	0.56	-0.21	0.45	-0.23	-0.13	-0.02
14 m	-0.26	-0.12	0.42	0.00	0.11	-0.12	-0.55	0.26	0.57	-0.10
18 m	-0.25	-0.13	0.31	0.08	-0.14	0.11	-0.10	0.08	-0.45	0.19
22 m	-0.24	-0.13	0.22	0.18	-0.24	0.26	-0.15	0.27	-0.41	-0.03
26 m	-0.24	-0.13	0.09	0.17	-0.24	0.49	0.11	-0.52	0.26	0.15
30 m	-0.23	-0.12	-0.02	0.20	-0.31	0.04	0.33	0.08	0.20	-0.33
34 m	-0.22	-0.13	-0.12	0.13	-0.22	-0.28	0.30	0.01	0.21	-0.20
38 m	-0.22	-0.14	-0.16	0.09	-0.17	-0.48	0.12	0.24	-0.11	0.06
42 m	-0.21	-0.15	-0.18	0.03	-0.09	-0.27	-0.08	-0.06	-0.00	0.45
46 m	-0.21	-0.16	-0.21	-0.03	0.06	-0.15	-0.24	-0.38	0.07	0.38
50 m	-0.20	-0.16	-0.24	-0.07	0.12	-0.08	-0.27	-0.21	-0.27	-0.28
54 m	-0.20	-0.17	-0.26	-0.11	0.17	0.07	-0.18	-0.08	-0.16	-0.43
58 m	-0.20	-0.17	-0.27	-0.14	0.24	0.28	-0.00	0.04	0.08	-0.19
62 m	-0.19	-0.17	-0.26	-0.17	0.29	0.35	0.26	0.52	0.13	0.36

ADCP alongshore quarter-way						
	Eigenvectors					
Mode	11	12	13	14	15	16
2 m	-0.00	-0.01	0.01	-0.02	0.00	0.00
6 m	0.00	0.01	-0.03	0.04	-0.00	-0.01
10 m	-0.04	0.05	-0.05	0.14	-0.03	-0.05
14 m	-0.02	0.03	-0.04	-0.06	0.03	-0.01
18 m	0.17	-0.08	0.39	-0.56	0.04	0.18
22 m	-0.00	-0.16	-0.22	0.60	-0.06	-0.13
26 m	-0.33	-0.01	-0.28	-0.16	0.08	0.03
30 m	0.30	0.59	0.25	0.09	-0.15	0.04
34 m	0.25	-0.69	-0.02	-0.11	0.07	-0.21
38 m	-0.46	0.11	-0.26	-0.06	0.09	0.49
42 m	-0.27	0.18	0.32	0.08	0.01	-0.62
46 m	0.44	-0.07	0.01	0.28	-0.28	0.40
50 m	0.27	0.25	-0.35	-0.15	0.52	-0.19
54 m	-0.26	-0.07	-0.01	-0.20	-0.67	-0.11
58 m	-0.24	-0.17	0.53	0.27	0.40	0.25
62 m	0.19	0.05	-0.28	-0.17	-0.07	-0.07

Mode	Eigenvalues	% Variance Explained
1	90866.71	78.59
2	22755.42	19.68
3	1296.99	1.12
4	417.59	0.36
5	215.17	0.19
6	31.95	0.03
7	17.17	0.01
8	11.35	0.01
9	5.04	0.00
10	2.73	0.00
11	1.54	0.00
12	1.34	0.00
13	0.92	0.00
14	0.44	0.00
15	0.08	0.00
16	0.04	0.00

Table 2-11 Eigenvalues and % variance accounted for by modes 1, 2, 3, and 4 for quarter-way mooring ADCP data (14-day) at all bin depths

Variance : quarter-way shore (mm^2s^{-2})							
		Mode 1		Mode 2		Mode 3	
Depth	Original	Residual	% var.	Residual	% var.	Residual	% var.
2	36115.0881	15326.0914	57.5632	54.6498	99.8487	28.2653	99.9217
6	6251.0267	1316.4794	78.9398	355.9346	94.3060	339.1736	94.5741
10	7281.6327	638.2653	91.2346	399.6831	94.5111	76.7329	98.9462
14	6643.1182	580.9756	91.2545	240.4270	96.3808	10.8328	99.8369
18	6280.3842	519.5195	91.7279	134.5671	97.8573	8.5032	99.8646
22	5854.6662	457.5450	92.1850	91.6876	98.4339	31.2775	99.4658
26	5705.0217	421.0690	92.6193	46.8110	99.1795	36.2249	99.3650
30	5359.1244	388.5814	92.7492	41.2077	99.2311	40.4592	99.2450
34	5011.2681	453.3246	90.9539	40.5909	99.1900	22.5643	99.5497
38	4771.7294	494.4028	89.6389	51.4916	98.9209	18.7553	99.6069
42	4672.7879	575.0049	87.6946	49.5098	98.9405	5.2716	99.8872
46	4603.0394	643.9720	86.0099	65.0014	98.5879	5.1154	99.8889
50	4410.5321	683.4153	84.5049	85.4266	98.0631	7.6328	99.8269
54	4307.4300	737.3664	82.8815	99.4220	97.6918	12.8244	99.7023
58	4221.5717	756.5054	82.0800	116.7677	97.2340	23.5776	99.4415
62	4136.0606	765.2543	81.4980	129.1748	96.8769	38.1490	99.0776

Variance : quarter-way shore (mm^2s^{-2})			
		Mode 4	
Depth	Original	Residual	% var.
2	36115.0881	3.9534	99.9891
6	6251.0267	31.2287	99.5004
10	7281.6327	74.0322	98.9833
14	6643.1182	10.8300	99.8370
18	6280.3842	6.0602	99.9035
22	5854.6662	17.0985	99.7080
26	5705.0217	24.4810	99.5709
30	5359.1244	23.8184	99.5556
34	5011.2681	15.2286	99.6961
38	4771.7294	15.3918	99.6774
42	4672.7879	4.9809	99.8934
46	4603.0394	4.7055	99.8978
50	4410.5321	5.8226	99.8680
54	4307.4300	8.1051	99.8118
58	4221.5717	15.3063	99.6374
62	4136.0606	26.7306	99.3537

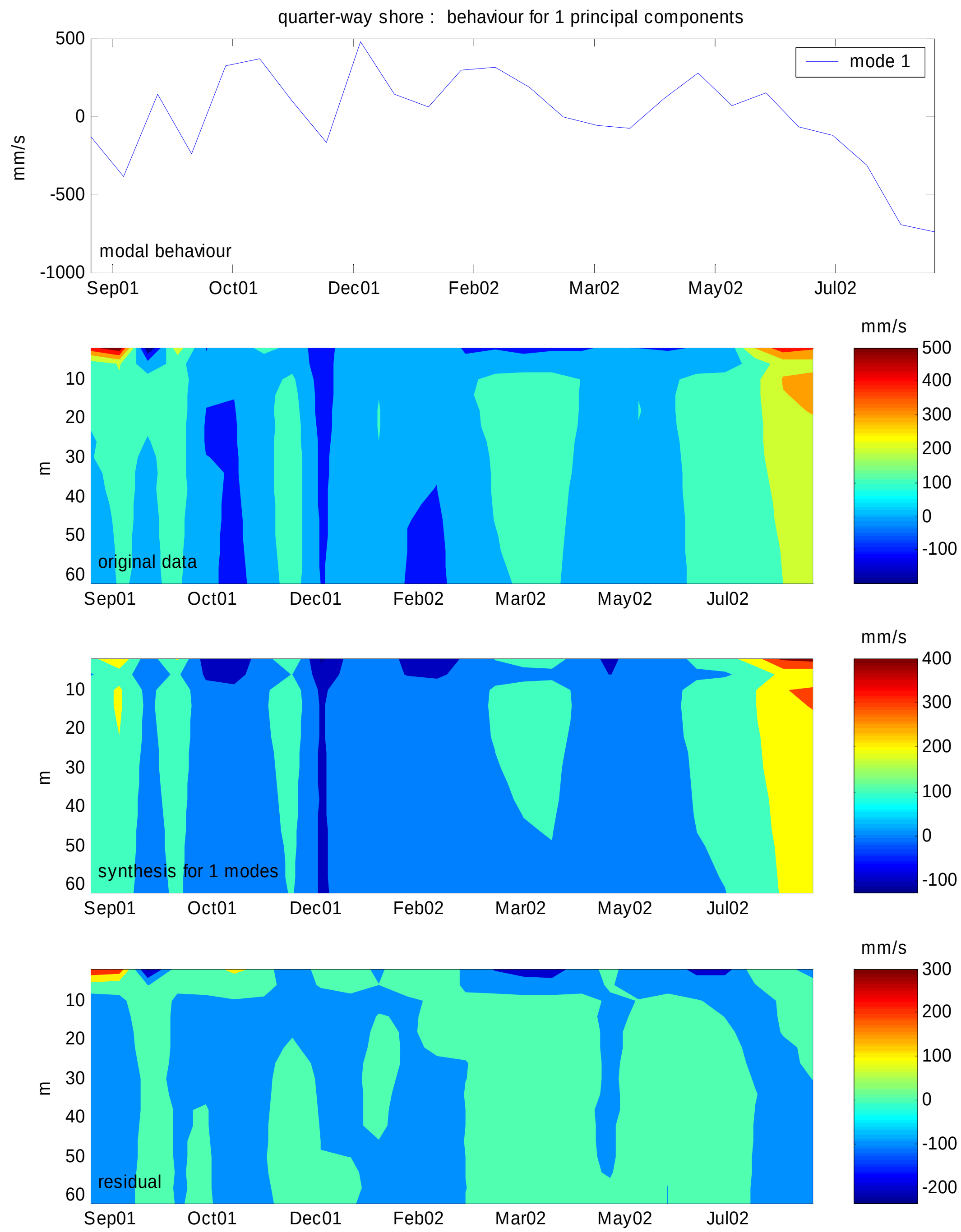

Figure 2-15 Recreation of time series using mode 1: quarter-way mooring shore, 14-day data, 2001-2002

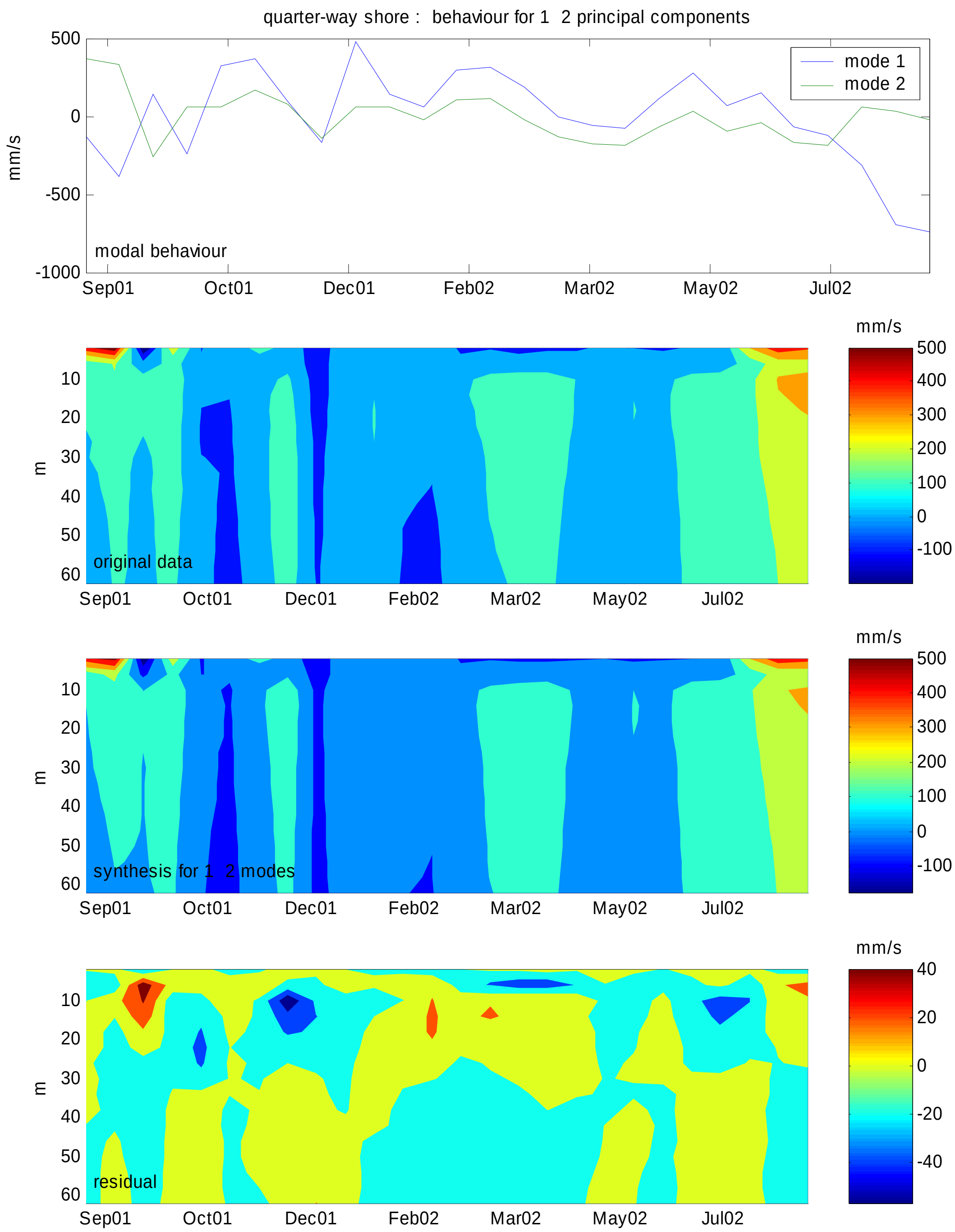

Figure 2-16 Recreation of time series using modes 1 and 2: quarter-way mooring shore, 14-day data, 2001-2002

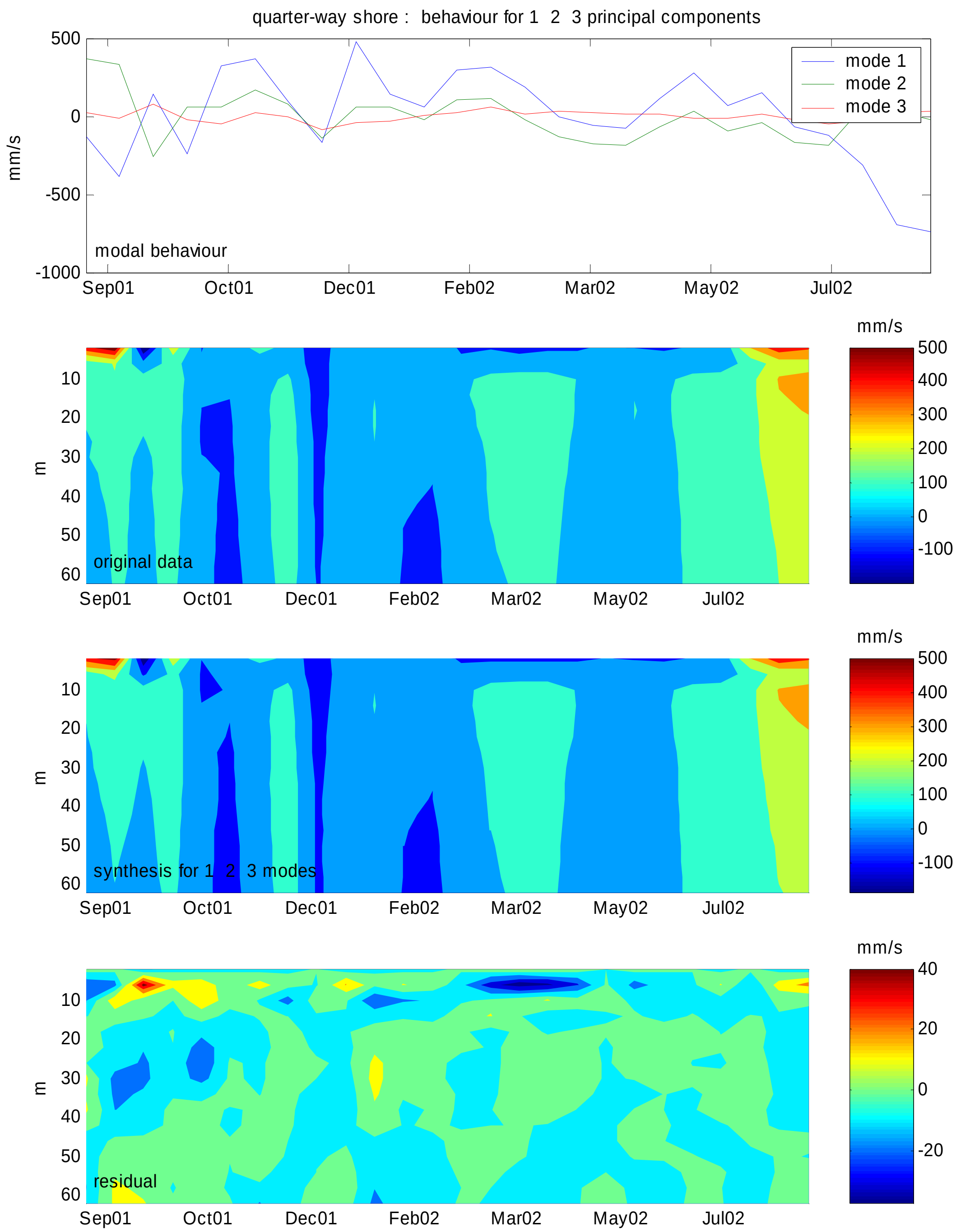

Figure 2-17 Recreation of time series using modes 1, 2, and 3: quarter-way mooring shore, 14-day data, 2001-2002

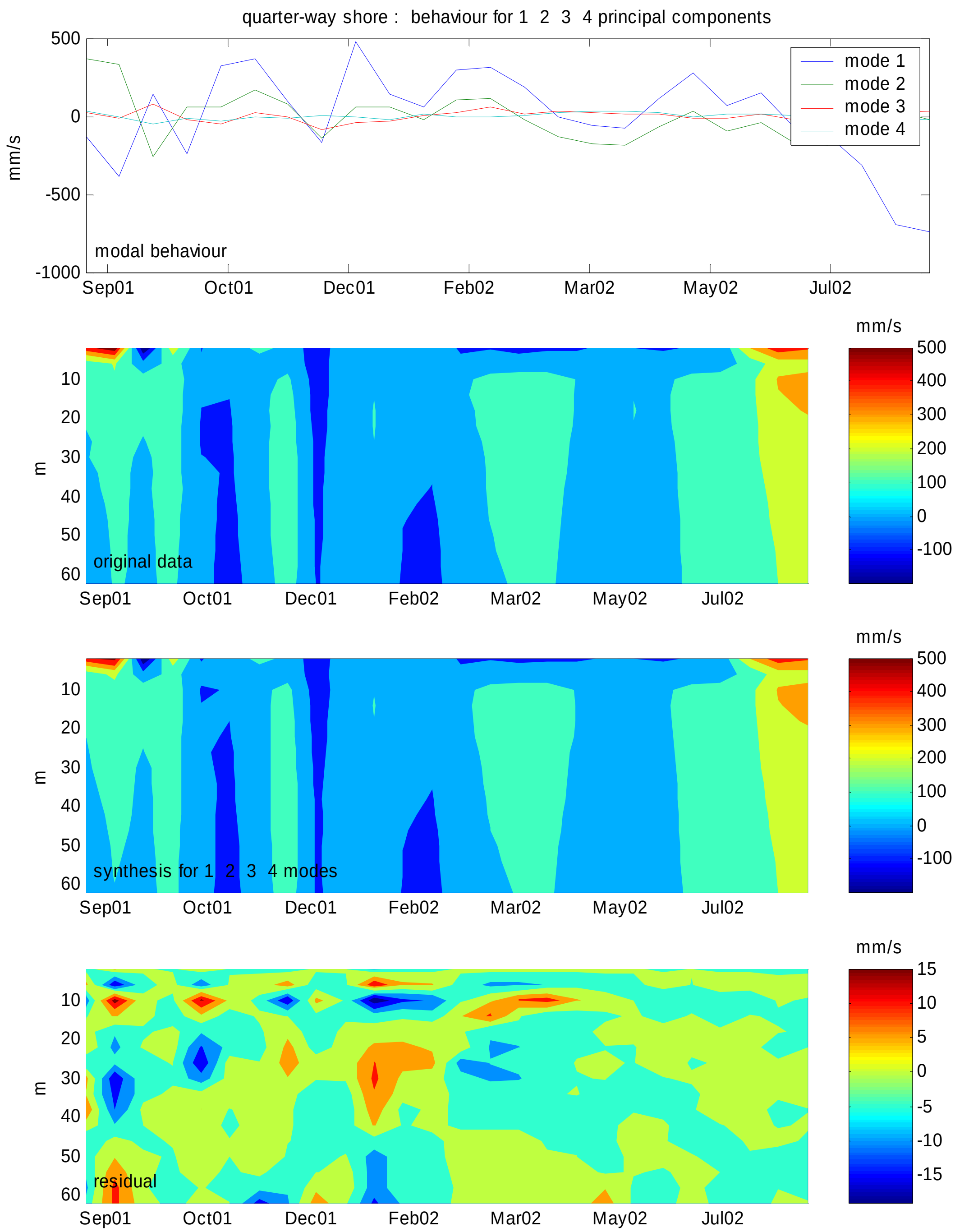

Figure 2-18 Recreation of time series using modes 1, 2, 3, and 4: quarter-way mooring shore, 14-day data, 2001-2002

Table 2-12 PCA results (eigenvectors, eigenvalues, and % explained variance) for half-way mooring at all bin depths

ADCP alongshore south											
	Eigenvectors										
Mode	1	2	3	4	5	6	7	8	9	10	11
1 m	-0.96	0.09	-0.01	-0.26	0.06	-0.03	0.04	-0.01	-0.01	0.01	-0.00
5 m	-0.27	0.06	0.11	0.93	-0.14	0.09	-0.11	0.04	0.03	-0.00	0.01
13 m	0.04	0.33	0.41	-0.03	0.57	0.63	-0.00	-0.00	0.01	-0.02	-0.02
17 m	0.04	0.32	0.42	-0.04	0.17	-0.61	-0.50	-0.10	0.17	-0.06	0.08
21 m	0.05	0.30	0.36	0.02	-0.10	-0.30	0.53	0.34	-0.35	0.20	-0.22
25 m	0.03	0.27	0.19	-0.05	-0.33	0.05	0.42	-0.13	0.23	-0.32	0.39
29 m	0.02	0.26	0.05	-0.09	-0.41	0.15	0.01	-0.28	0.41	-0.17	-0.53
33 m	0.02	0.26	0.01	-0.07	-0.33	0.16	-0.14	-0.24	-0.30	0.36	0.42
37 m	0.02	0.25	-0.07	-0.08	-0.23	0.15	-0.29	-0.13	-0.28	0.18	0.06
41 m	0.02	0.24	-0.13	-0.07	-0.16	0.12	-0.30	0.22	-0.13	-0.05	-0.35
45 m	0.02	0.24	-0.18	-0.02	-0.08	0.05	-0.12	0.48	-0.10	-0.07	-0.16
49 m	0.01	0.23	-0.24	-0.01	0.01	0.01	-0.06	0.40	0.12	-0.33	0.35
53 m	0.02	0.23	-0.27	-0.00	0.08	-0.03	0.00	0.22	0.27	-0.01	0.21
57 m	0.03	0.23	-0.26	0.07	0.14	-0.07	0.14	-0.01	0.28	0.55	-0.00
61 m	0.02	0.22	-0.27	0.08	0.18	-0.09	0.12	-0.18	0.21	0.22	-0.07
65 m	0.02	0.22	-0.27	0.10	0.21	-0.12	0.15	-0.27	-0.12	-0.06	-0.12
69 m	0.02	0.22	-0.28	0.11	0.20	-0.13	0.09	-0.34	-0.45	-0.45	-0.05

ADCP alongshore south						
	Eigenvectors					
Mode	12	13	14	15	16	17
1 m	0.00	-0.01	0.00	-0.00	0.00	0.00
5 m	0.00	0.02	-0.00	0.00	-0.00	-0.01
13 m	-0.03	0.00	0.01	0.01	-0.01	-0.00
17 m	0.01	-0.09	0.02	-0.00	0.01	-0.02
21 m	-0.11	0.25	-0.04	-0.01	-0.01	0.04
25 m	0.45	-0.26	-0.04	0.01	0.04	-0.03
29 m	-0.37	0.12	0.15	-0.01	-0.03	0.02
33 m	-0.45	-0.20	-0.23	0.17	-0.07	-0.01
37 m	0.42	0.44	0.34	-0.38	0.03	-0.09
41 m	0.37	-0.05	-0.46	0.40	0.21	0.22
45 m	-0.05	-0.58	0.22	-0.28	-0.27	-0.28
49 m	-0.32	0.22	0.00	-0.24	0.34	0.39
53 m	-0.01	0.42	-0.03	0.42	-0.35	-0.48
57 m	0.11	-0.20	0.45	0.25	0.22	0.29
61 m	0.10	0.03	-0.50	-0.46	-0.39	0.22
65 m	-0.08	-0.07	-0.17	-0.13	0.59	-0.53
69 m	-0.02	-0.03	0.25	0.24	-0.29	0.27

Mode	Eigenvalues	% Variance Explained
1	33241.33	54.11
2	25888.86	42.14
3	1537.02	2.50
4	363.48	0.59
5	237.35	0.39
6	126.31	0.21
7	20.94	0.03
8	12.82	0.02
9	3.93	0.01
10	2.62	0.00
11	1.24	0.00
12	0.97	0.00
13	0.58	0.00
14	0.30	0.00
15	0.14	0.00
16	0.07	0.00
17	0.03	0.00

Table 2-13 Eigenvalues and % variance accounted for by modes 1, 2, 3, and 4 for half-way mooring ADCP data (14-day) at all bin depths

Variance : half-way shore (mm^2s^{-2})							
		Mode 1		Mode 2		Mode 3	
Depth	Original	Residual	% var.	Residual	% var.	Residual	% var.
1	30746.2146	220.0912	99.2842	25.817	99.916	25.6794	99.9165
5	2796.7515	446.7787	84.0251	341.422	87.792	322.3607	88.4737
13	3236.4996	3169.5402	2.0689	385.722	88.082	127.3744	96.0644
17	3091.8234	3026.1086	2.1254	335.774	89.139	60.2571	98.0511
21	2597.8161	2529.2440	2.6396	216.120	91.680	21.6883	99.1651
25	2039.7974	2015.2022	1.2058	85.544	95.806	31.2222	98.4693
29	1809.0495	1800.8271	0.4545	52.639	97.090	48.5231	97.3178
33	1736.7136	1722.3228	0.8286	32.843	98.108	32.7826	98.1124
37	1603.8536	1592.4986	0.7080	27.726	98.271	20.9025	98.6967
41	1507.6138	1496.8480	0.7141	39.772	97.361	12.2017	99.1907
45	1503.4108	1490.3184	0.8708	55.668	96.297	5.5769	99.6291
49	1521.5328	1514.2195	0.4807	91.751	93.969	2.8639	99.8118
53	1503.7996	1492.9492	0.7215	111.761	92.568	2.6339	99.8249
57	1486.8707	1464.6977	1.4913	111.703	92.487	8.5753	99.4233
61	1447.2497	1430.9826	1.1240	127.000	91.224	12.1042	99.1636
65	1420.6969	1406.0060	1.0341	130.832	90.791	16.9799	98.8048
69	1388.2760	1378.0073	0.7397	135.681	90.226	19.0372	98.6287

Variance : half-way shore (mm^2s^{-2})			
		Mode 4	
Depth	Original	Residual	% var.
1	30746.2146	0.9038	99.9971
5	2796.7515	6.1429	99.7804
13	3236.4996	127.0920	96.0732
17	3091.8234	59.7853	98.0663
21	2597.8161	21.5491	99.1705
25	2039.7974	30.4422	98.5076
29	1809.0495	45.3897	97.4910
33	1736.7136	30.8665	98.2227
37	1603.8536	18.5739	98.8419
41	1507.6138	10.5547	99.2999
45	1503.4108	5.3751	99.6425
49	1521.5328	2.7943	99.8164
53	1503.7996	2.6339	99.8249
57	1486.8707	7.0203	99.5278
61	1447.2497	10.0171	99.3079
65	1420.6969	13.3059	99.0634
69	1388.2760	14.8342	98.9315

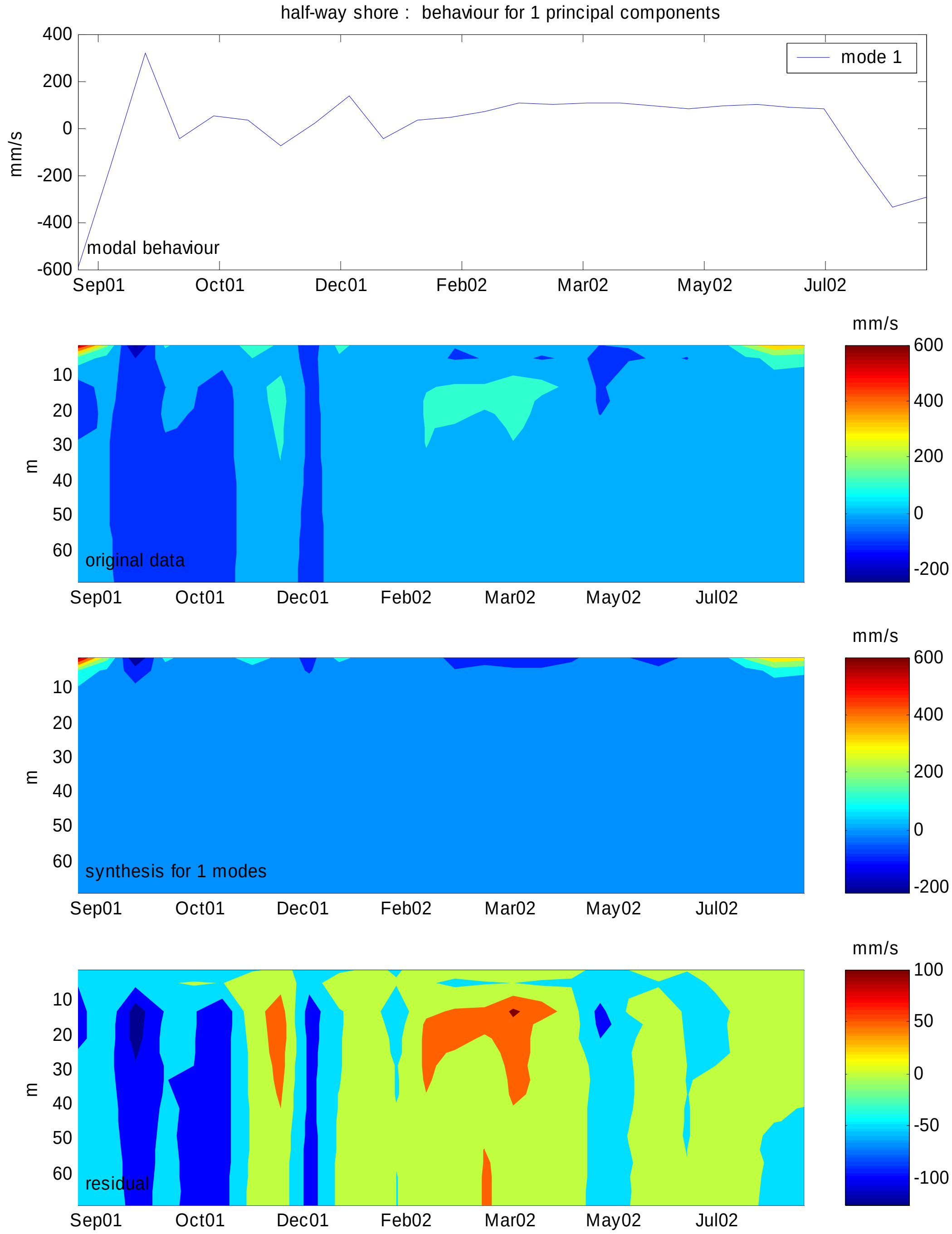

Figure 2-191 Recreation of time series using mode 1: half-way mooring shore, 14-day data, 2001-2002

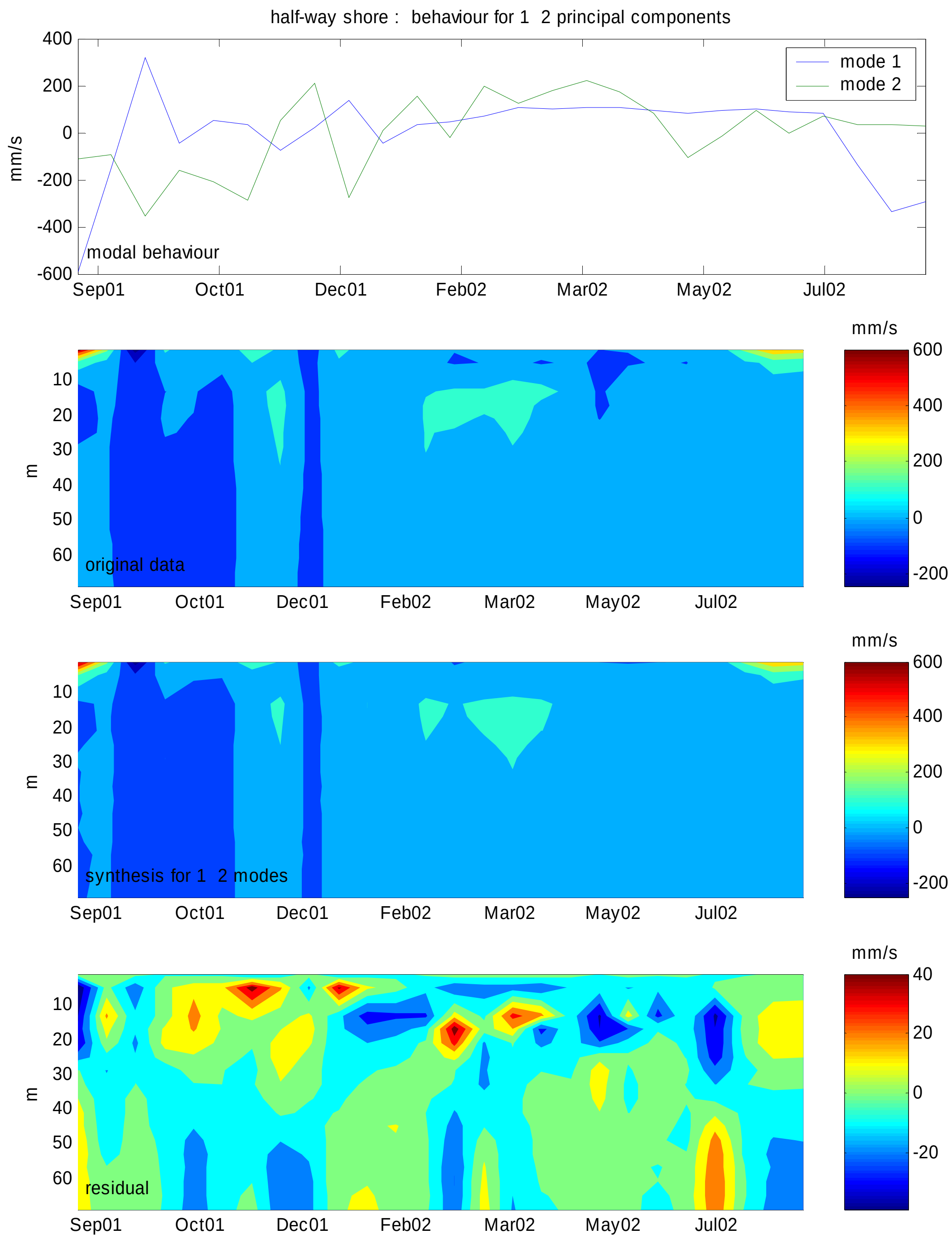

Figure 2-20 Recreation of time series using modes 1 and 2: half-way mooring shore, 14-day data, 2001-2002

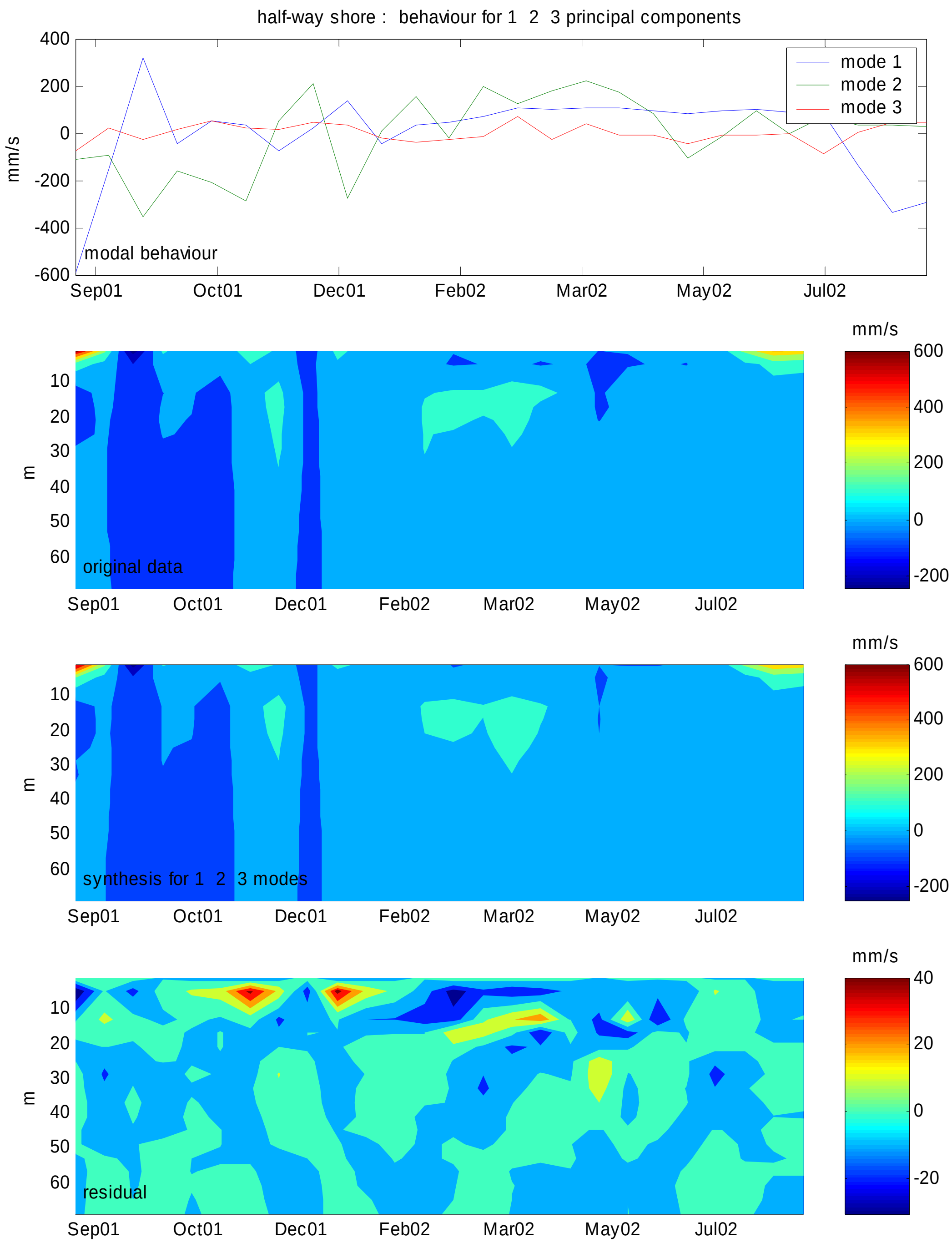

Figure 2-21 Recreation of time series using modes 1, 2, and 3: half-way mooring shore, 14-day data, 2001-2002

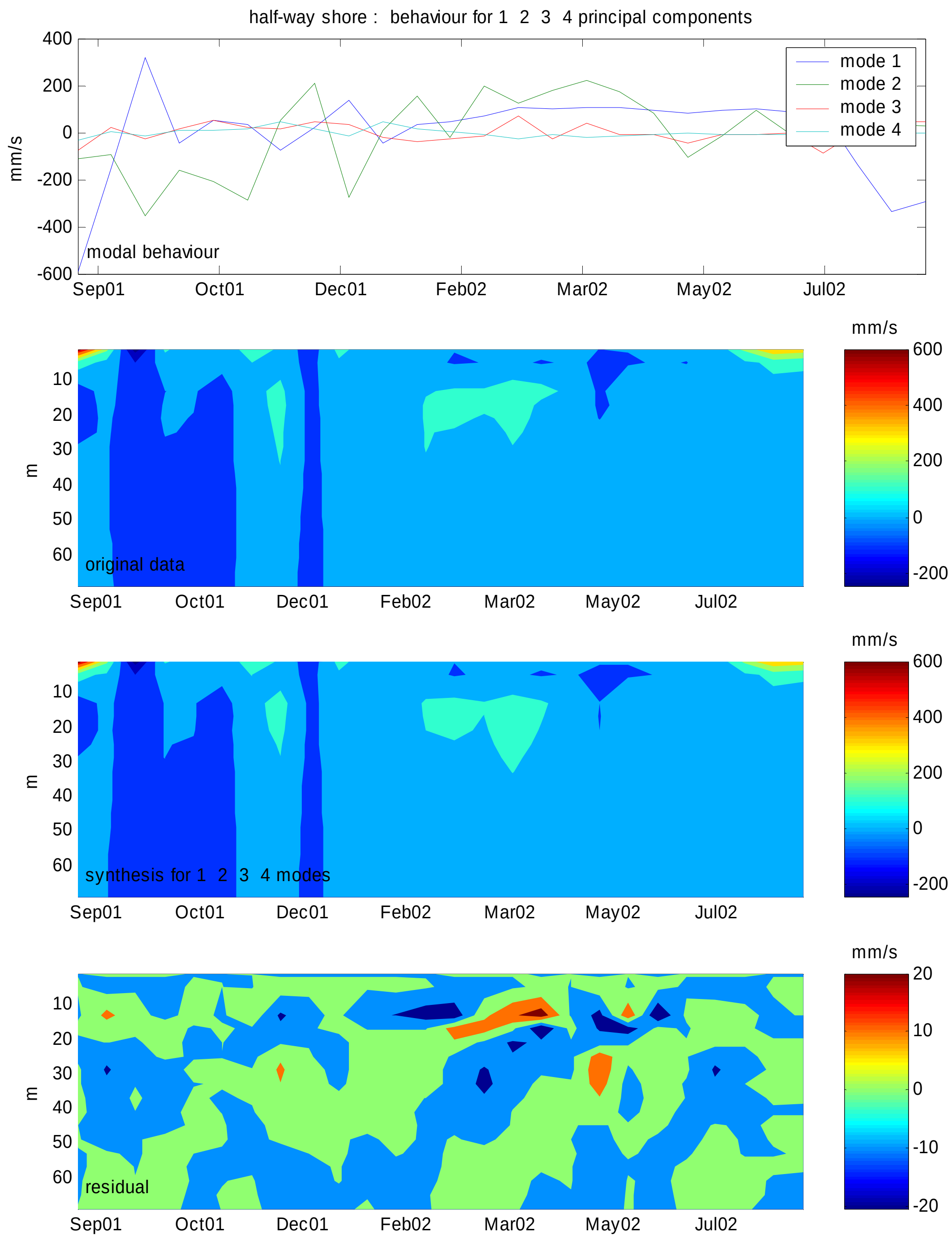

Figure 2-22 Recreation of time series using modes 1, 2, 3, and 4: half-way mooring shore, 14-day data, 2001-2002

2.2.8 PCA, ADCP only, north mooring, 14-day, all levels

The following analyses are for ADCP data from the northern mooring. Data have been low-pass filtered and decimated to 14-day intervals. Analyses are for all bin depths.

Table 2-14 PCA results (eigenvectors, eigenvalues, and % explained variance) for northern mooring at all bin depths

ADCP alongshore north												
	Eigenvectors											
Mode	1	2	3	4	5	6	7	8	9	10	11	12
3 m	-0.38	-0.81	-0.39	-0.08	-0.13	0.16	-0.02	-0.03	-0.02	-0.01	0.01	0.01
7 m	-0.21	-0.15	0.17	-0.35	0.75	-0.46	-0.00	-0.08	0.04	0.00	0.01	-0.02
11 m	-0.29	0.01	0.32	-0.36	-0.40	-0.21	-0.09	0.65	0.11	0.11	-0.05	-0.07
15 m	-0.29	0.06	0.33	-0.21	-0.32	-0.11	0.29	-0.45	-0.20	-0.13	-0.14	0.26
19 m	-0.28	0.07	0.30	-0.06	-0.13	0.16	-0.13	-0.45	0.07	-0.18	0.28	-0.27
23 m	-0.27	0.07	0.24	0.08	0.16	0.40	-0.44	0.01	0.07	0.32	0.14	-0.04
27 m	-0.26	0.05	0.17	0.18	0.26	0.38	-0.08	0.13	-0.08	0.05	-0.26	0.36
31 m	-0.25	0.05	0.09	0.24	0.17	0.20	0.37	0.23	-0.21	-0.40	-0.28	-0.09
35 m	-0.24	0.05	0.01	0.29	0.08	-0.02	0.37	0.18	0.11	-0.06	0.34	-0.47
39 m	-0.22	0.05	-0.05	0.31	-0.04	-0.21	0.36	0.01	0.13	0.39	0.29	0.43
43 m	-0.21	0.08	-0.09	0.29	-0.07	-0.22	-0.09	-0.14	0.23	0.12	-0.05	-0.02
47 m	-0.20	0.10	-0.14	0.24	-0.07	-0.25	-0.20	-0.17	0.03	0.12	-0.47	-0.31
51 m	-0.19	0.13	-0.17	0.15	-0.05	-0.23	-0.23	-0.01	0.11	-0.11	-0.19	-0.02
55 m	-0.17	0.16	-0.20	0.07	-0.01	-0.17	-0.28	0.09	-0.02	-0.34	0.22	0.42
59 m	-0.16	0.19	-0.23	-0.04	0.00	-0.05	-0.23	0.10	-0.31	-0.34	0.32	0.01
63 m	-0.14	0.20	-0.25	-0.15	-0.00	0.00	0.01	0.03	-0.40	0.09	-0.02	-0.16
67 m	-0.13	0.22	-0.26	-0.22	0.02	0.07	0.12	-0.02	-0.37	0.41	-0.13	-0.04
71 m	-0.12	0.24	-0.27	-0.27	0.05	0.18	0.14	-0.07	0.13	0.15	0.23	-0.08
75 m	-0.11	0.24	-0.28	-0.33	0.04	0.24	0.16	-0.02	0.62	-0.21	-0.23	0.08

ADCP alongshore north							
	Eigenvectors						
Mode	13	14	15	16	17	18	19
3 m	0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.01
7 m	-0.02	0.00	-0.01	0.01	0.00	0.02	0.02
11 m	-0.08	0.03	0.03	-0.08	0.07	0.03	0.05
15 m	0.06	-0.04	0.11	0.28	-0.18	-0.21	-0.21
19 m	0.04	0.07	-0.15	-0.41	0.25	0.28	0.20
23 m	0.06	-0.26	-0.09	0.38	-0.34	-0.05	0.07
27 m	0.04	0.41	0.17	-0.22	0.32	-0.12	-0.26
31 m	-0.24	-0.38	-0.06	0.04	-0.01	0.16	0.30
35 m	0.29	0.14	0.06	-0.05	-0.22	-0.24	-0.34
39 m	0.13	0.08	-0.05	0.12	0.11	0.28	0.33
43 m	-0.72	-0.00	-0.29	-0.06	-0.01	-0.12	-0.29
47 m	0.10	0.24	0.39	-0.01	-0.15	-0.08	0.39
51 m	0.40	-0.42	-0.03	0.16	0.40	0.23	-0.38
55 m	0.14	-0.19	-0.02	-0.40	-0.28	-0.35	0.16
59 m	-0.22	0.36	0.22	0.36	-0.07	0.38	-0.10
63 m	0.11	0.18	-0.56	0.19	0.29	-0.38	0.20
67 m	0.02	-0.13	-0.03	-0.41	-0.33	0.34	-0.23
71 m	-0.23	-0.30	0.52	0.02	0.35	-0.28	0.08
75 m	0.09	0.22	-0.22	0.10	-0.19	0.13	0.03

Mode	Eigenvalues	% Variance Explained
1	66924.18	80.88
2	10820.69	13.08
3	4294.01	5.19
4	511.77	0.62
5	89.87	0.11
6	58.12	0.07
7	23.16	0.03
8	9.56	0.01
9	3.57	0.00
10	2.49	0.00
11	1.23	0.00
12	0.68	0.00
13	0.36	0.00
14	0.26	0.00
15	0.16	0.00
16	0.08	0.00
17	0.07	0.00
18	0.03	0.00
19	0.02	0.00

Table 2-15 Eigenvalues and % variance accounted for by modes 1, 2, 3, and 4 for northern mooring ADCP data (14-day) at all bin depths

Variance : north shore (mm^2s^{-2})							
		Mode 1		Mode 2		Mode 3	
Depth	Original	Residual	% var.	Residual	% var.	Residual	%var.
3	17532.8924	7718.8316	55.9751	652.1080	96.2807	6.5764	99.9625
7	3467.0142	493.1618	85.7756	247.2575	92.8683	125.1605	96.3900
11	6327.0852	534.9358	91.5453	532.9164	91.5772	85.6465	98.6464
15	6280.1140	527.2693	91.6041	493.0846	92.1485	36.5500	99.4180
19	5837.9319	434.8226	92.5518	385.0259	93.4048	7.0965	99.8784
23	5306.5446	316.0484	94.0442	268.4370	94.9414	19.7833	99.6272
27	4844.3506	189.7041	96.0840	157.2511	96.7539	31.0613	99.3588
31	4320.4783	92.3762	97.8619	70.0693	98.3782	38.7420	99.1033
35	3821.8797	71.7366	98.1230	48.3135	98.7359	48.0414	98.7430
39	3467.1128	98.8530	97.1488	67.0350	98.0665	54.4604	98.4292
43	3204.6048	151.5134	95.2720	81.7860	97.4479	47.2892	98.5243
47	2955.4404	230.1366	92.2131	117.1313	96.0368	34.1958	98.8430
51	2678.8076	324.4968	87.8865	146.6614	94.5251	15.9208	99.4057
55	2419.5170	444.8745	81.6131	179.3007	92.5894	6.2027	99.7436
59	2240.0596	600.2713	73.2029	220.9741	90.1353	2.9435	99.8686
63	2110.1621	723.0353	65.7356	271.9827	87.1108	12.5045	99.4074
67	2052.8692	848.8091	58.6525	319.3526	84.4436	26.6854	98.7001
71	1975.1154	981.4872	50.3073	349.2229	82.3189	40.9666	97.9259
75	1898.3497	1033.7809	45.5432	387.5449	79.5852	61.6155	96.7543

Variance : north shore (mm^2s^{-2})			
		Mode 4	
Depth	Original	Residual	% var.
3	17532.8924	2.9171	99.9834
7	3467.0142	62.8395	98.1875
11	6327.0852	21.0022	99.6681
15	6280.1140	14.1534	99.7746
19	5837.9319	5.5053	99.9057
23	5306.5446	16.4988	99.6891
27	4844.3506	14.8942	99.6925
31	4320.4783	9.2106	99.7868
35	3821.8797	4.5051	99.8821
39	3467.1128	6.2247	99.8205
43	3204.6048	4.1430	99.8707
47	2955.4404	5.6913	99.8074
51	2678.8076	4.7174	99.8239
55	2419.5170	4.0399	99.8330
59	2240.0596	2.2823	99.8981
63	2110.1621	0.6893	99.9673
67	2052.8692	1.6513	99.9196
71	1975.1154	2.9451	99.8509
75	1898.3497	5.7634	99.6964

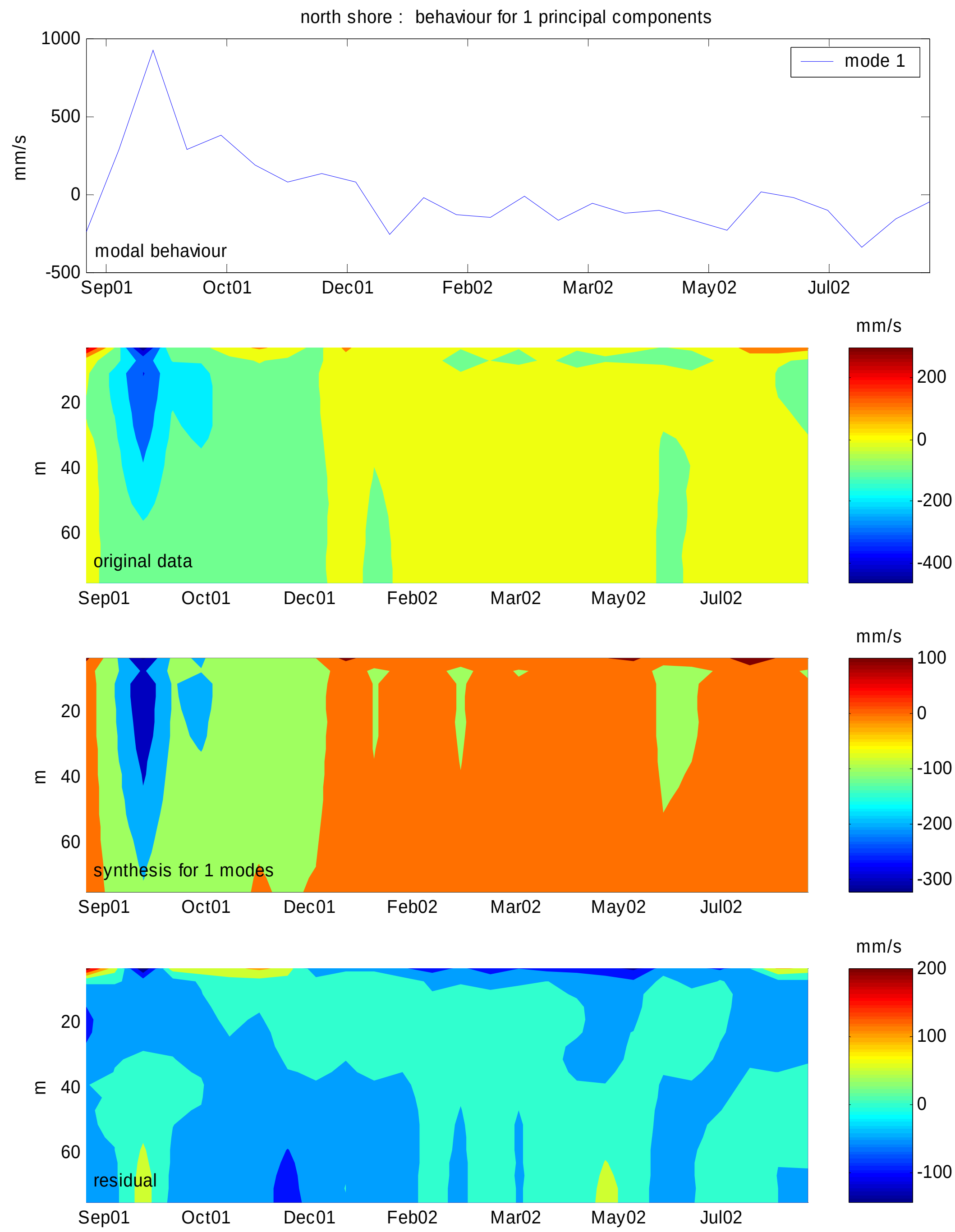

Figure 2-23 Recreation of time series using mode 1: north shore, 14-day data, 2001-2002

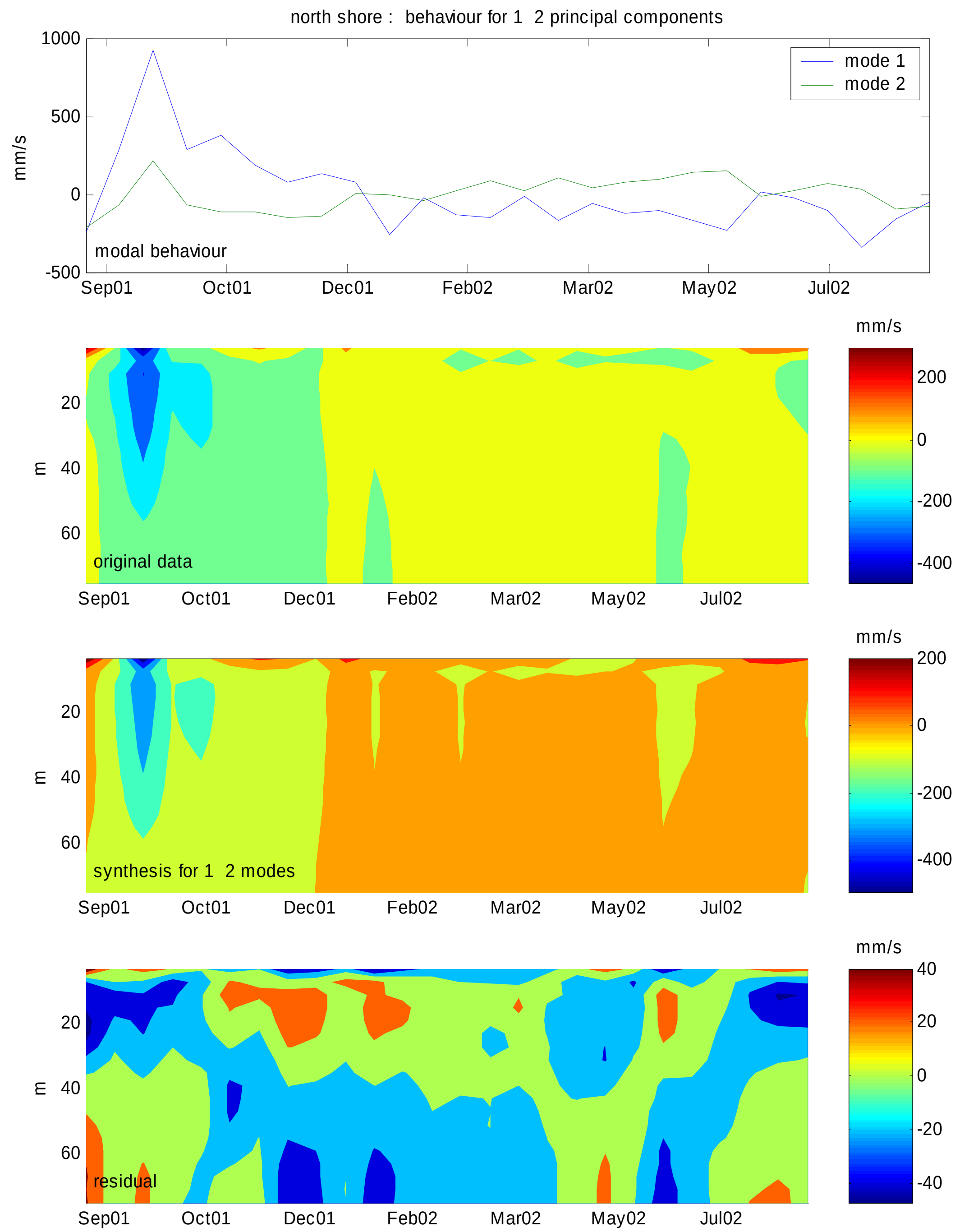

Figure 2-24 Recreation of time series using modes 1 and 2: north shore, 14-day data, 2001-2002

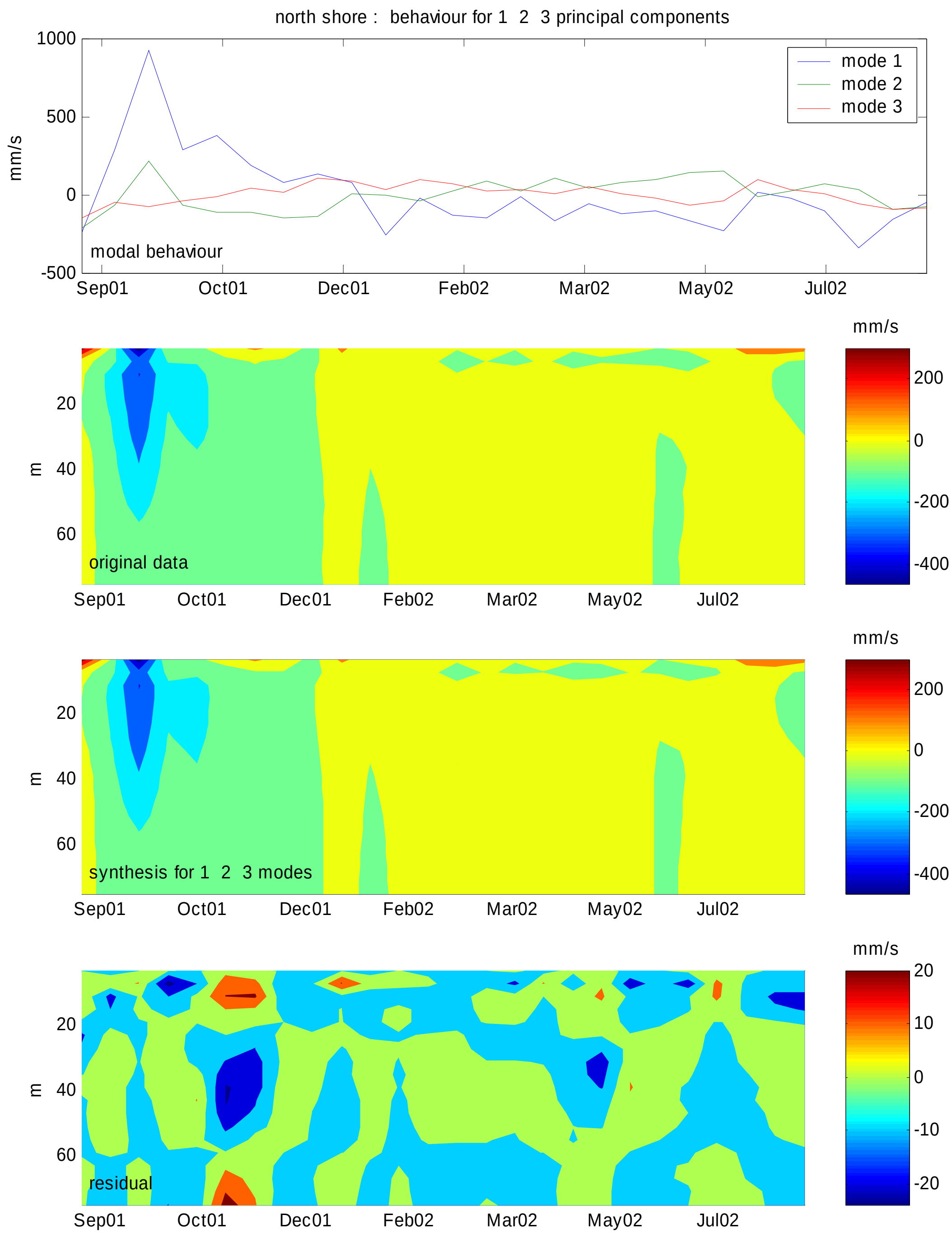

Figure 2-25 Recreation of time series using modes 1, 2, and 3: north shore, 14-day data, 2001-2002

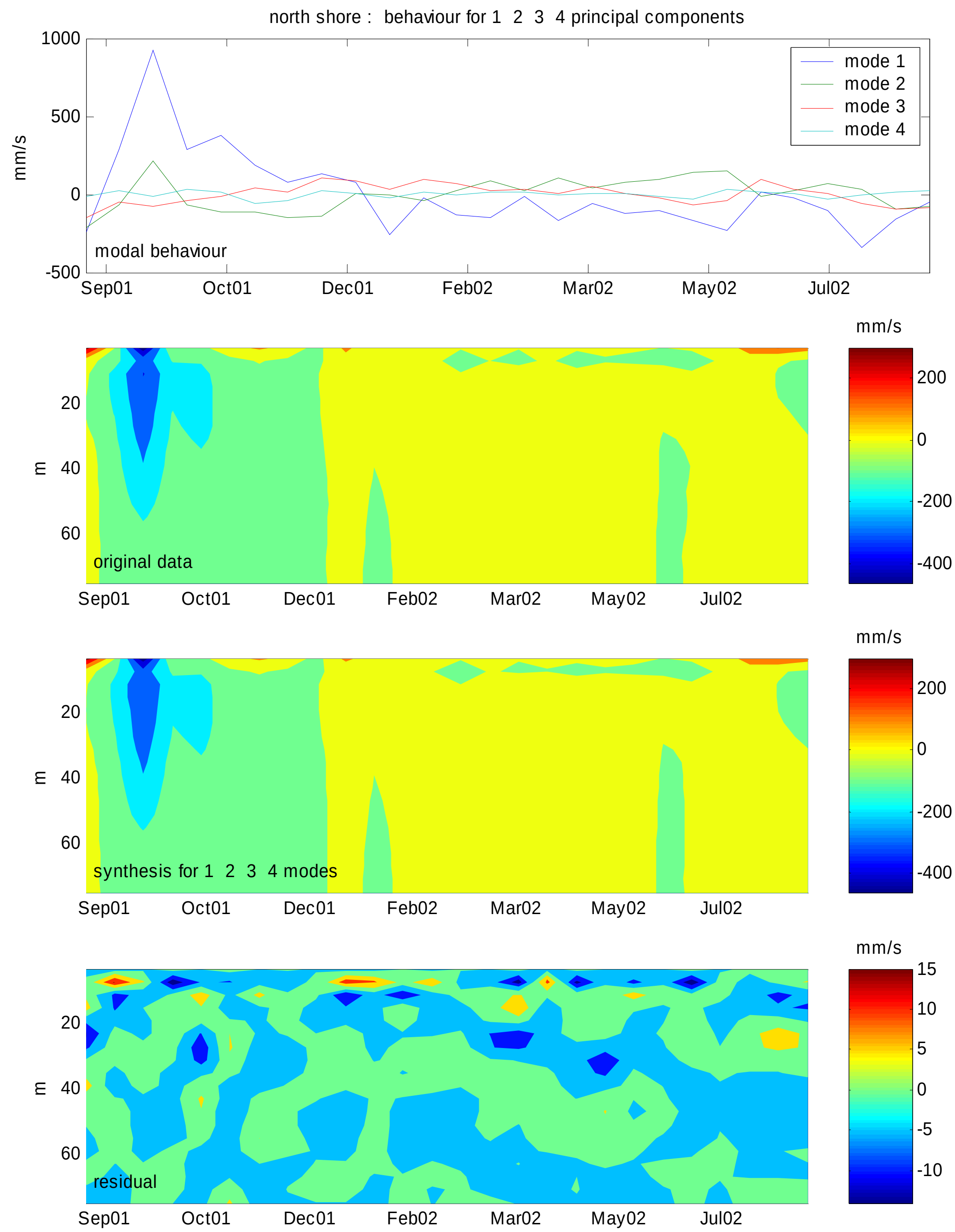

Figure 2-26 Recreation of time series using modes 1, 2, 3, and 4: north shore, 14-day data, 2001-2002

2.2.9 Cross-correlations of alongshore current

2.2.9.1 14-day data (low-pass filtered)

2.2.9.1.1 4 moorings at 4 depths

In the correlation matrix below the letters, S, Q, H, and N stand for South, Quarter-way, Half-way, and North. Values where the r^2 is ≥64% are highlighted by bold type. Looking at the surface, shallow, 30 m, and 60 m for the "southern" sites (south, quarter-way, and half-way) the correlation matrix below (14-day data) shows strong positive correlations for the surface and shallow water at the 3 locations and at 60 m. The 30 m depth is mid-depth for both the quarter-way and half-way mooring which may account for the poor correlation with the 30 m "shallow" water at the southern site. Correlation of the deeper water with the shallower water at the 3 locations is negative though weakly so. Except for water <19 m in depth, the north seems completely disconnected from the other 3 regions.

Table 2-16 Cross-correlation matrix of 14-day low-pass alongshore data at 4 depths for 4 moorings

	Surface at ~6 m				Shallow at ~18 m			
	S6	Q6	H5	N7	S18	Q18	H17	N19
S6								
Q6	**0.91**							
H5	**0.87**	**0.99**						
N7	0.72	**0.90**	**0.94**					
S18	**0.88**	0.77	0.76	0.69				
Q18	0.61	0.74	0.77	**0.88**	0.69			
H17	0.49	0.63	0.66	**0.80**	0.59	**0.97**		
N19	0.49	0.65	0.68	**0.81**	0.56	**0.94**	**0.96**	
S30	0.57	0.36	0.35	0.28	0.76	0.28	0.18	0.18
Q30	-0.44	-0.40	-0.37	-0.22	-0.29	0.10	0.20	0.12
H29	-0.49	-0.43	-0.39	-0.24	-0.35	0.06	0.16	0.07
N31	-0.49	-0.41	-0.35	-0.19	-0.35	0.01	0.09	0.03
S62	-0.14	-0.30	-0.28	-0.18	0.10	-0.02	0.02	-0.06
Q62	-0.21	-0.32	-0.30	-0.19	-0.04	-0.03	0.03	-0.07
H61	0.02	-0.11	-0.09	-0.02	0.18	0.11	0.15	0.04
N63	0.24	0.18	0.19	0.14	0.23	0.14	0.12	0.04

	Mid-depth at ~30 m				Deeper at ~62 m			
	S30	Q30	H29	N31	S62	Q62	H61	N63
S6								
Q6								
H5								
N7								
S18								
Q18								
H17								
N19								
S30								
Q30	-0.08							
H29	-0.15	**0.99**						
N31	-0.09	**0.91**	**0.93**					
S62	0.49	0.43	0.41	0.44				
Q62	0.29	0.51	0.53	0.55	**0.92**			
H61	0.43	0.43	0.44	0.47	**0.87**	**0.96**		
N63	0.33	0.12	0.14	0.24	0.54	0.69	0.79	

2.3 ADCP time series (contour and line plots) of UV components, all bins; 2-hourly, unfiltered

Note that surface values were interpolated when making the contour plots since top bins are known to be unreliable.

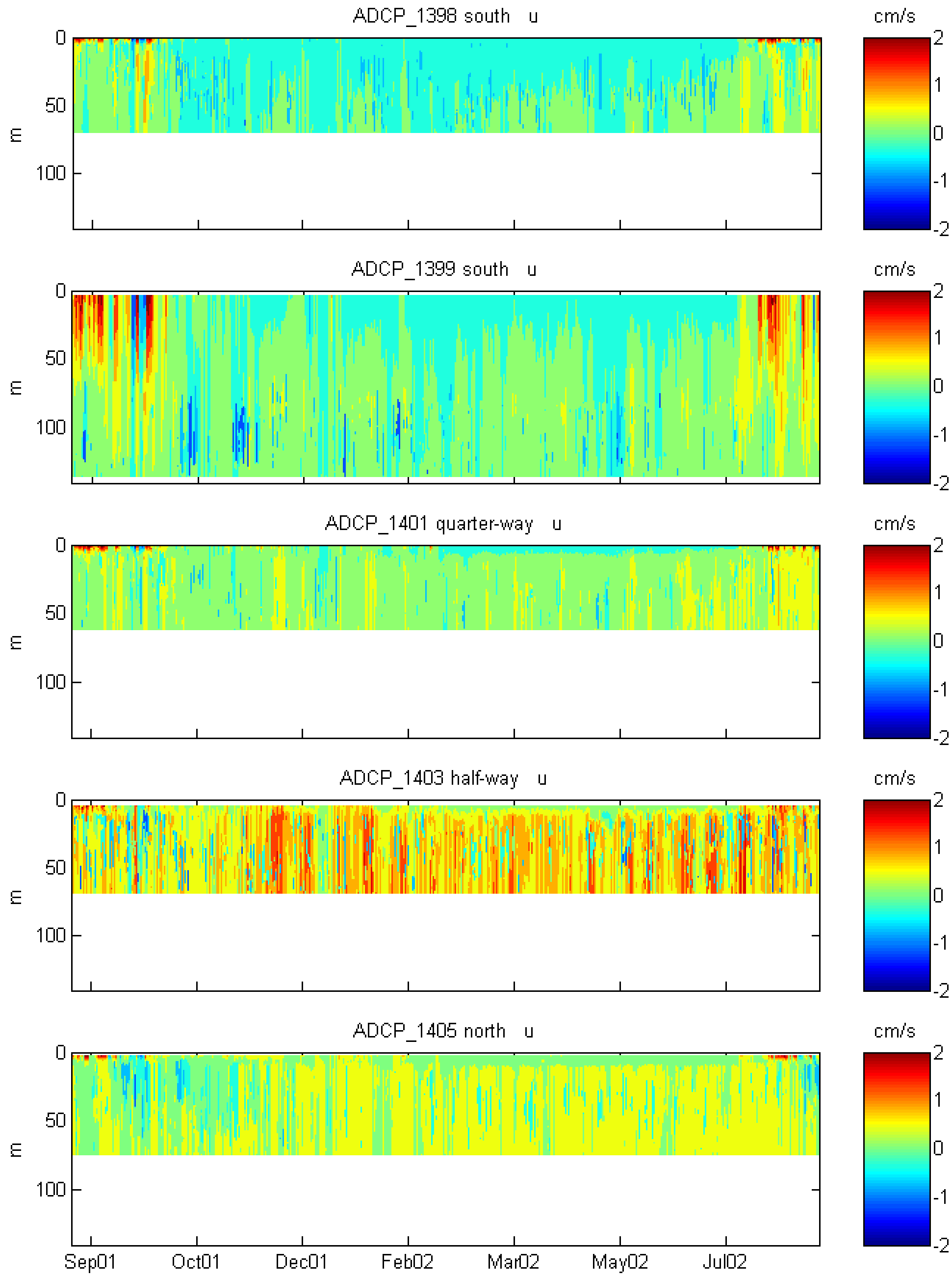

Figure 2-27 Contoured time series of 2-hourly alongshore data for ADCP data (2001-2002)

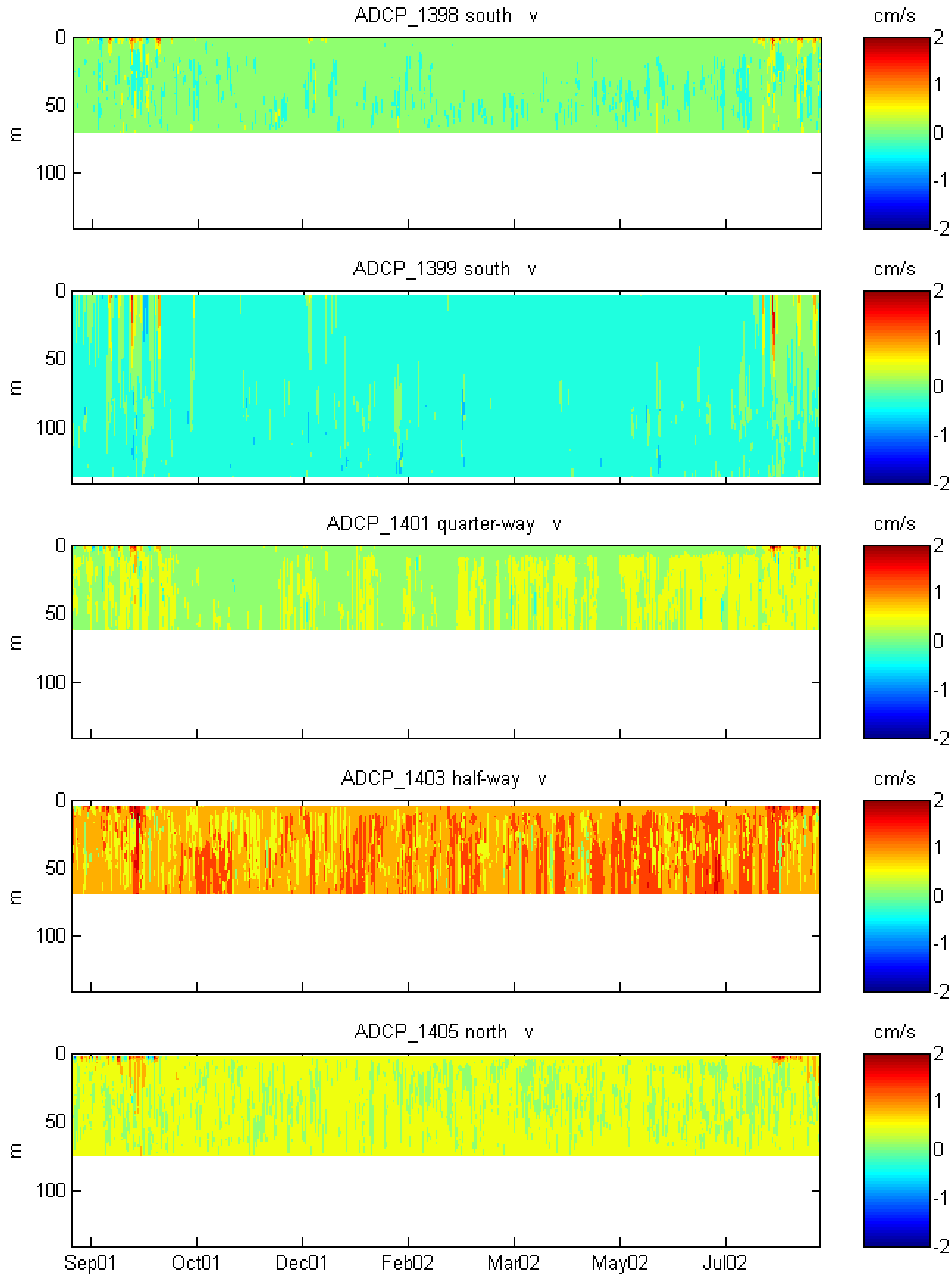

Figure 2-28 Contoured time series of 2-hourly cross channel data for ADCP data (2001-2002

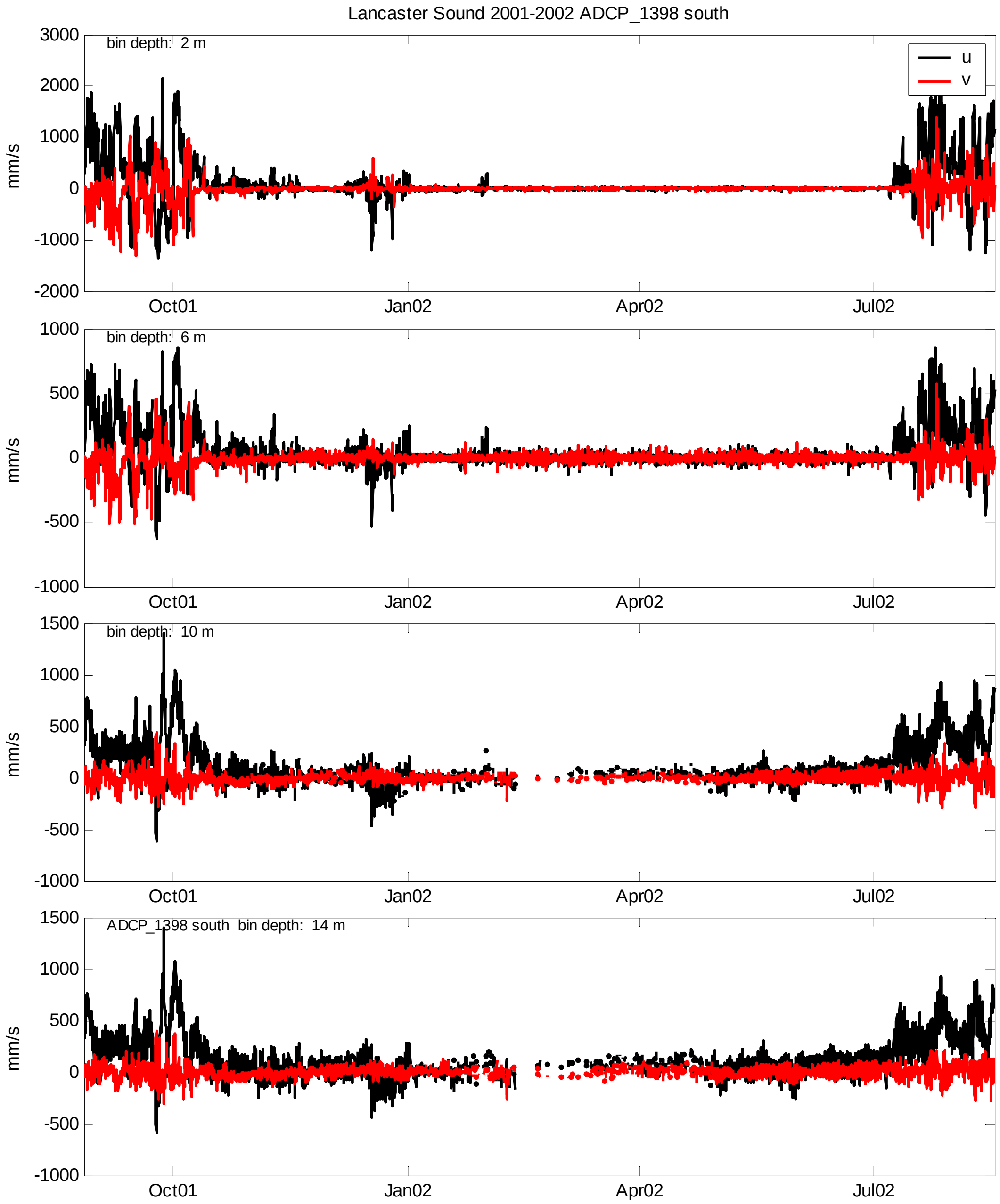

Figure 2-292 Line plot of ADCP 2-hourly velocity data for mooring 1398 at bins 2, 6, 10, and 14 m

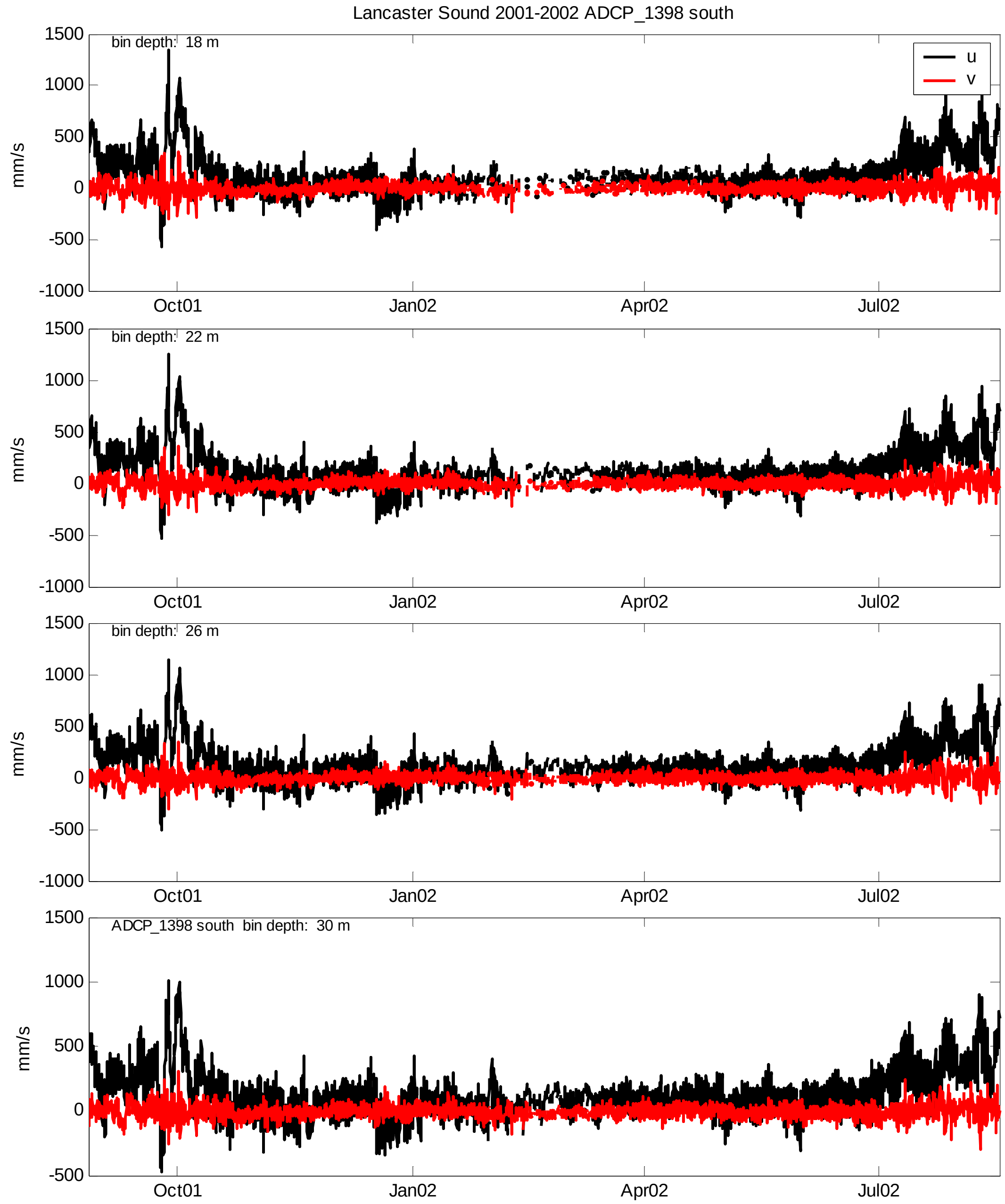

Figure 2-30 Line plot of ADCP 2-hourly velocity data for mooring 1398 at bins 18, 22, 26, and 30 m

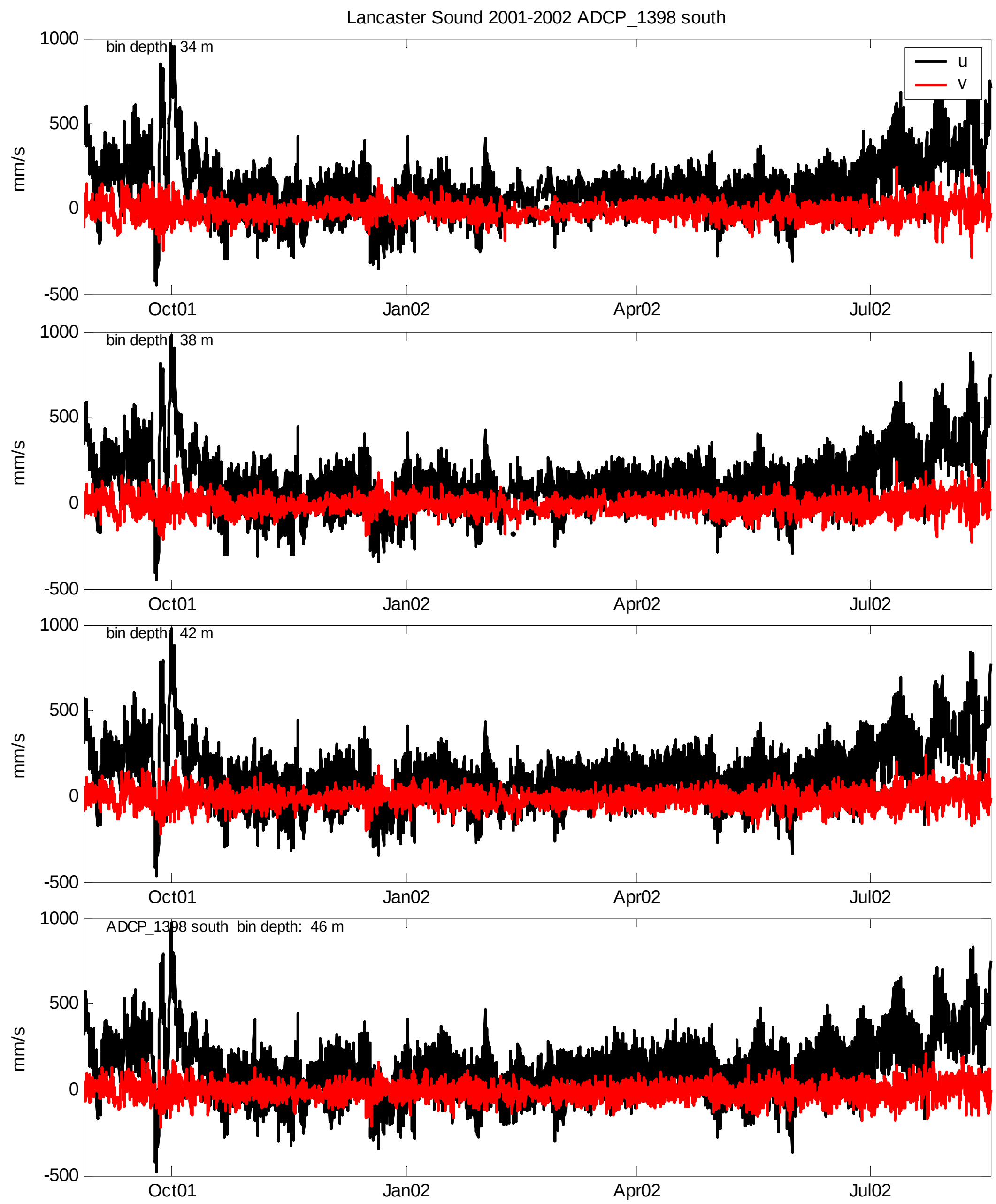

Figure 2-31 Line plot of ADCP 2-hourly velocity data for mooring 1398 at bins 34, 38, 42, and 46 m

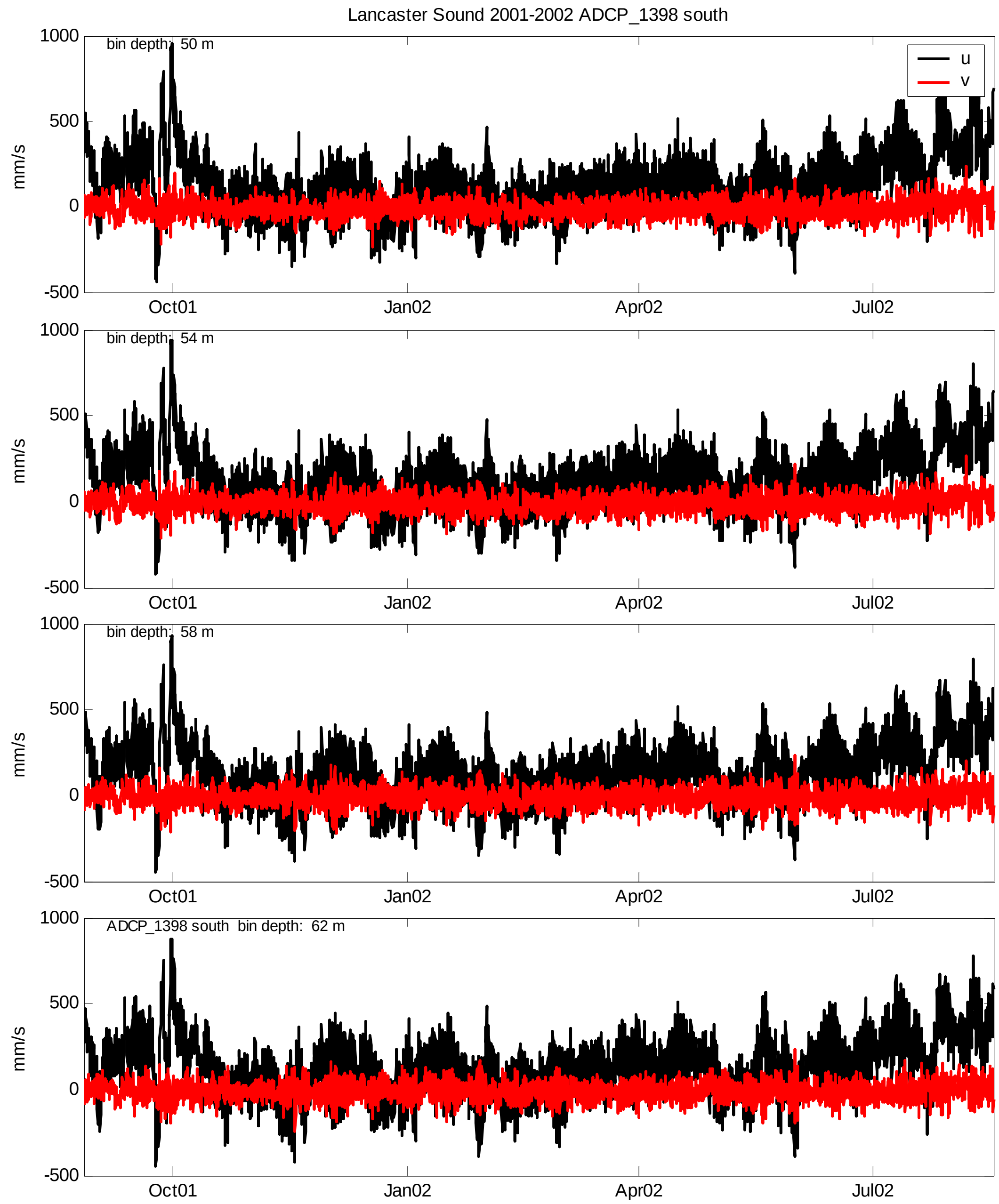

Figure 2-32 Line plot of ADCP 2-hourly velocity data for mooring 1398 at bins 50, 54, 58, and 62 m

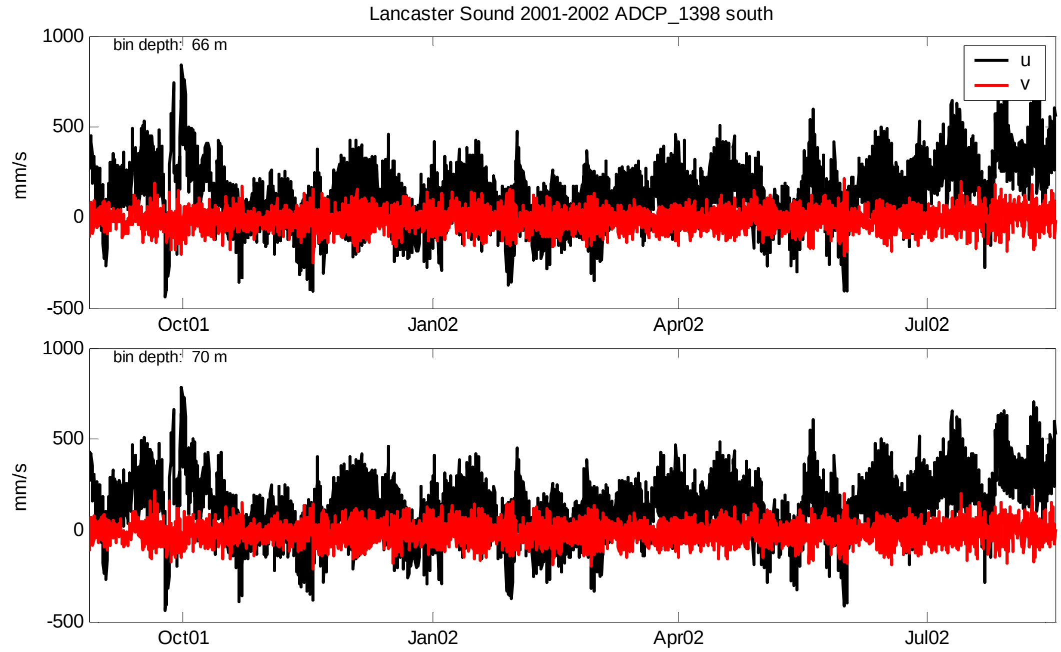

Figure 2-33 Line plot of ADCP 2-hourly velocity data for mooring 1398 at bins 66 and 70 m

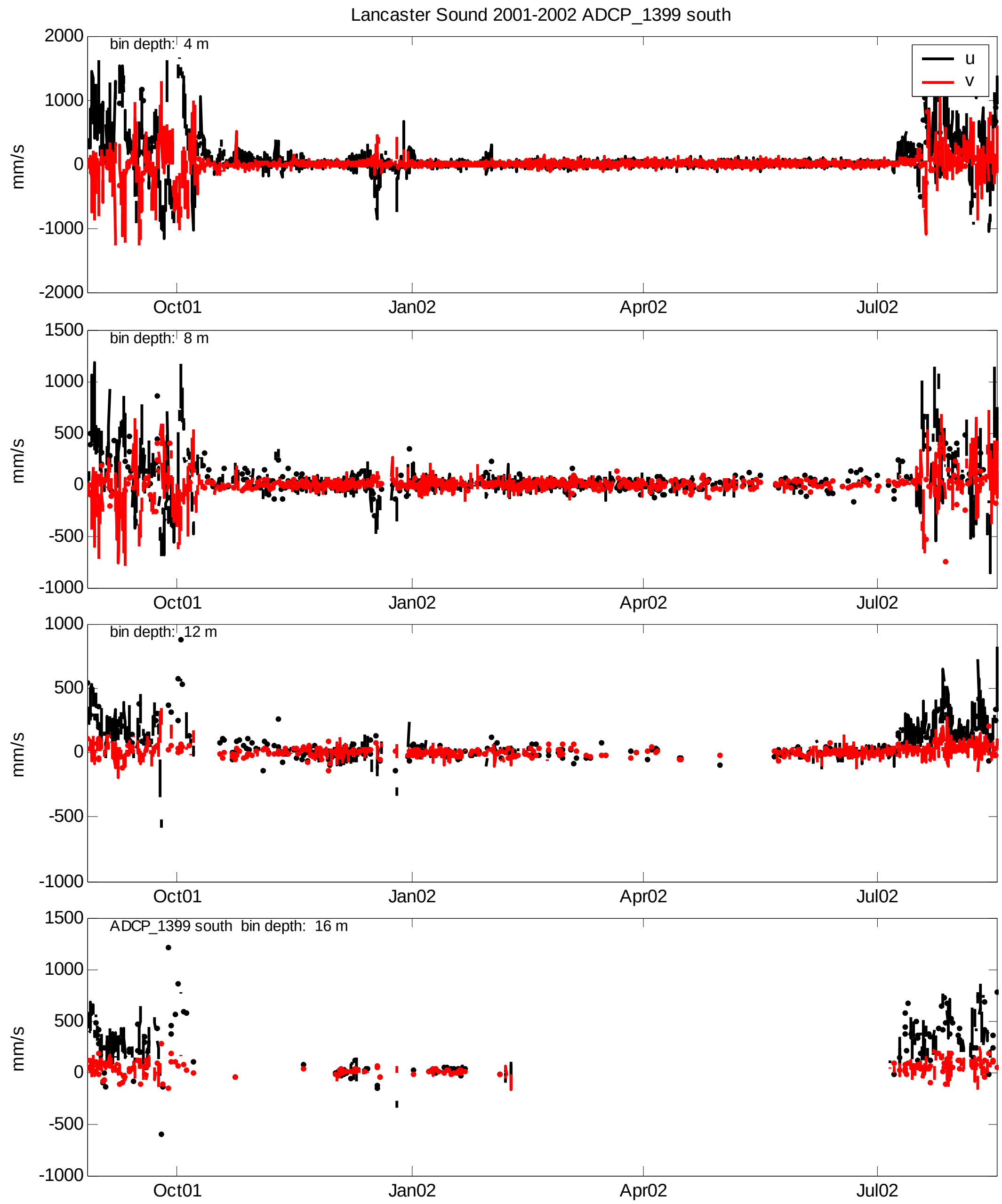

Figure 2-34 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 4, 8, 12, and 16 m

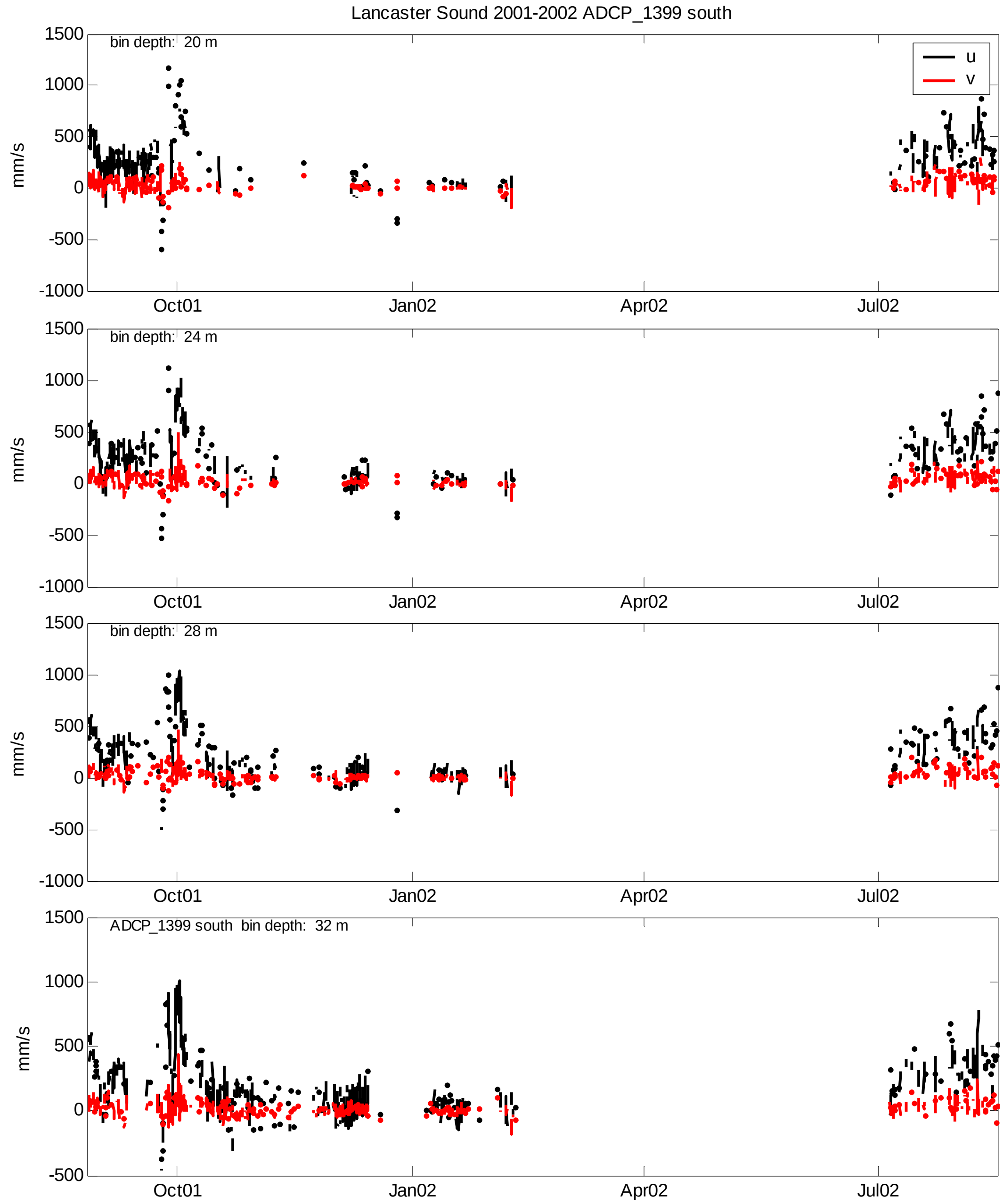

Figure 2-35 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 20, 24, 28, and 32 m

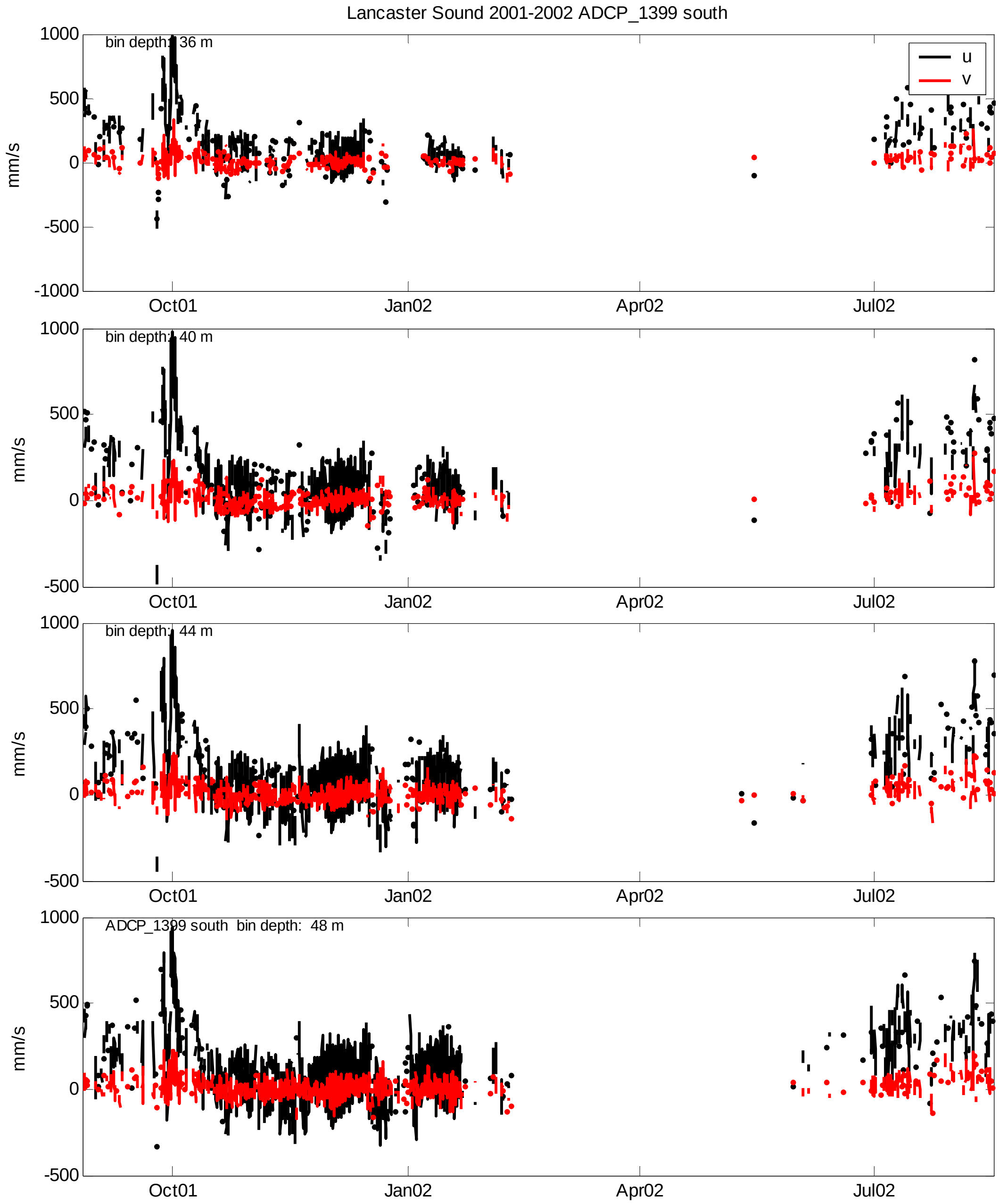

Figure 2-36 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 36, 40, 44, and 48 m

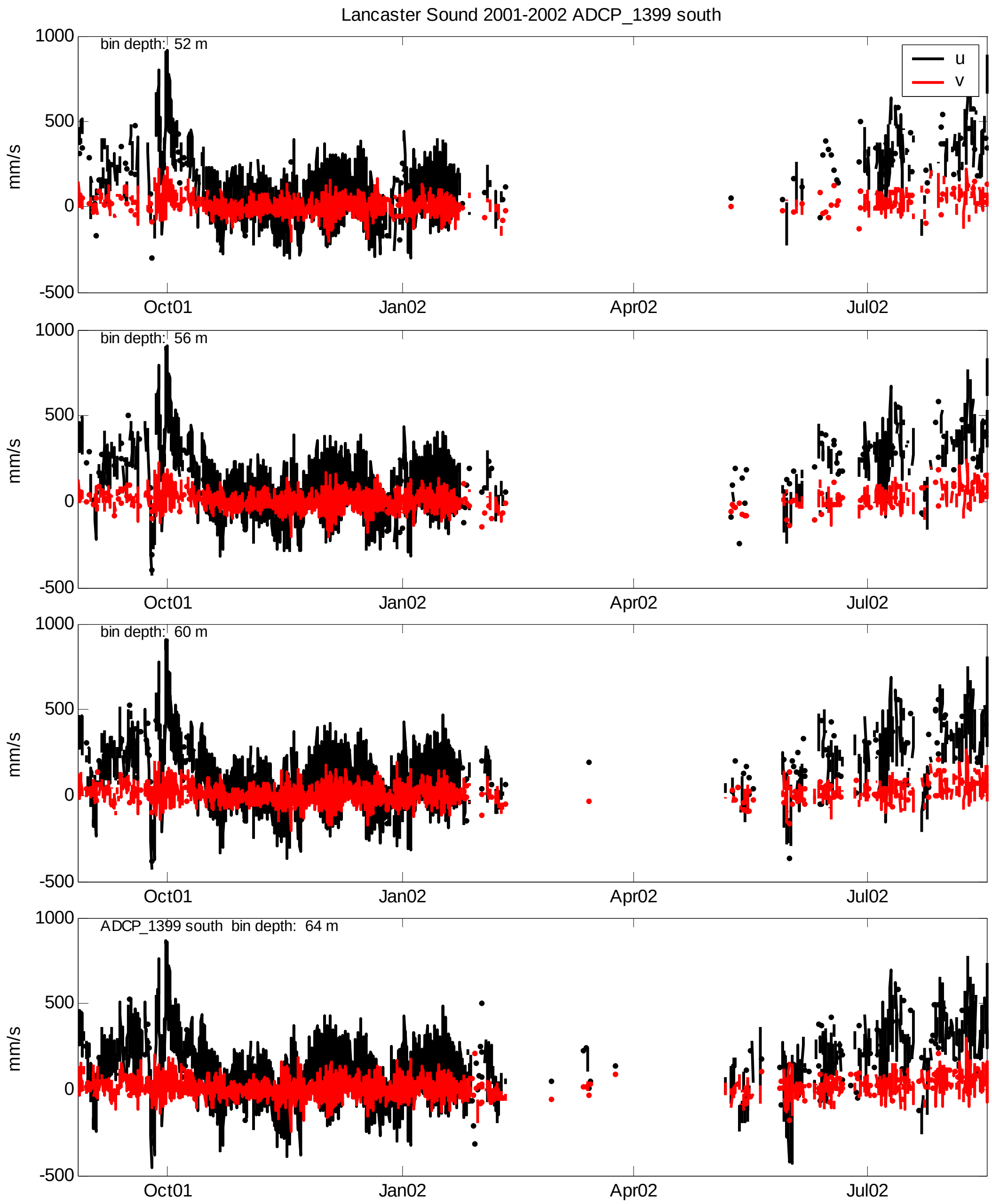

Figure 2-37 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 52, 56, 60, and 64 m

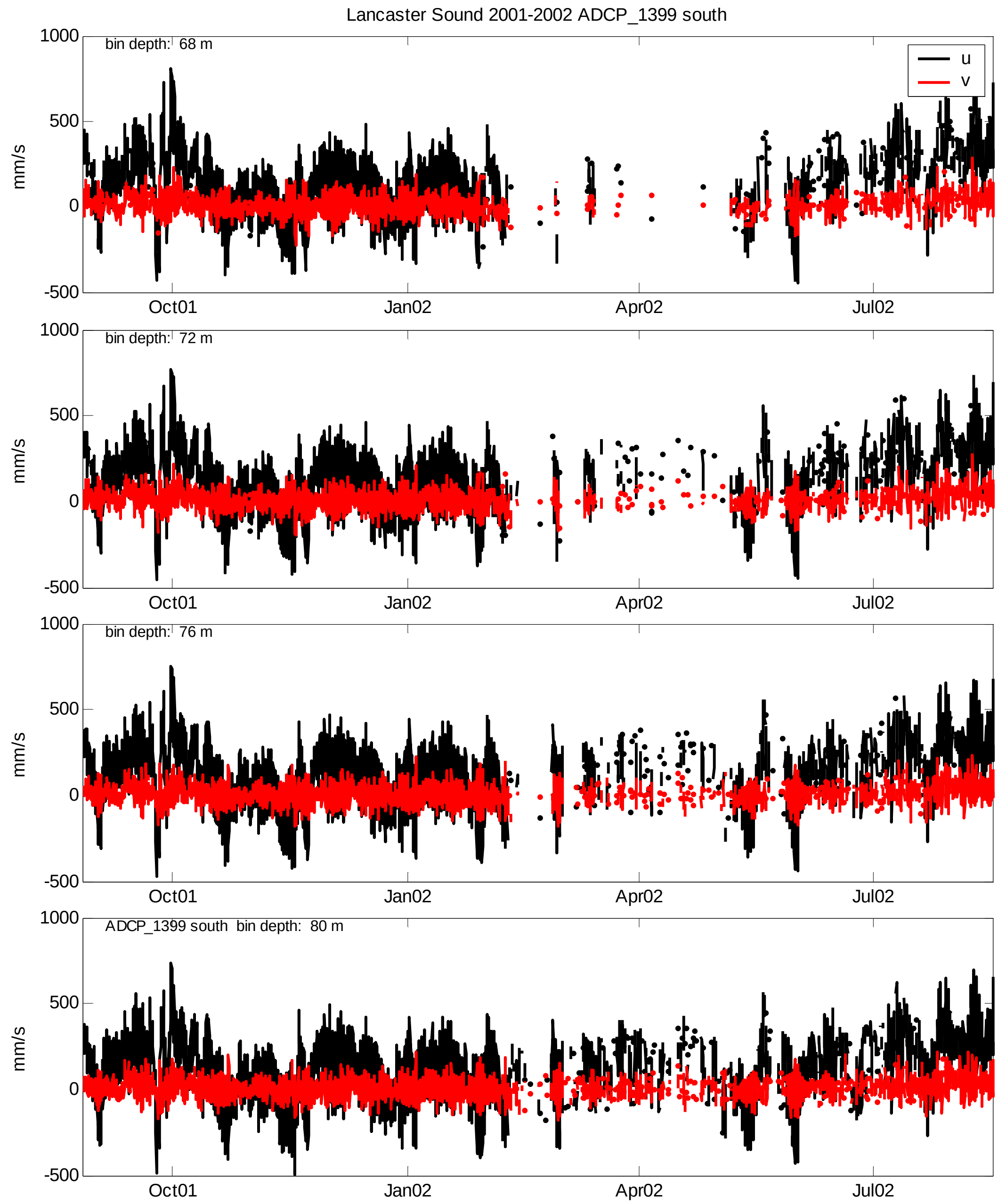

Figure 2-38 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 68, 72, 76, and 80 m

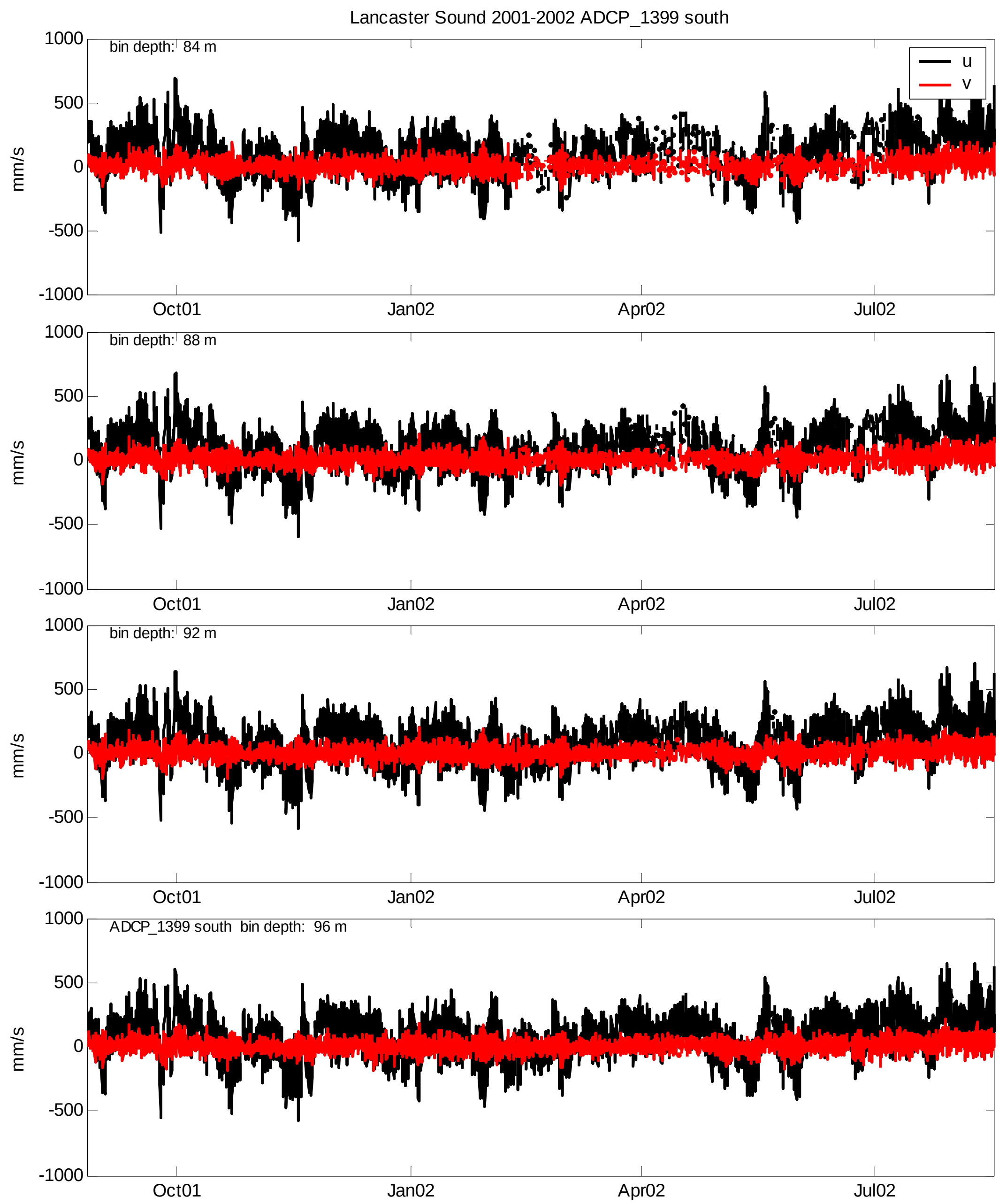

Figure 2-39 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 84, 88, 92, and 96 m

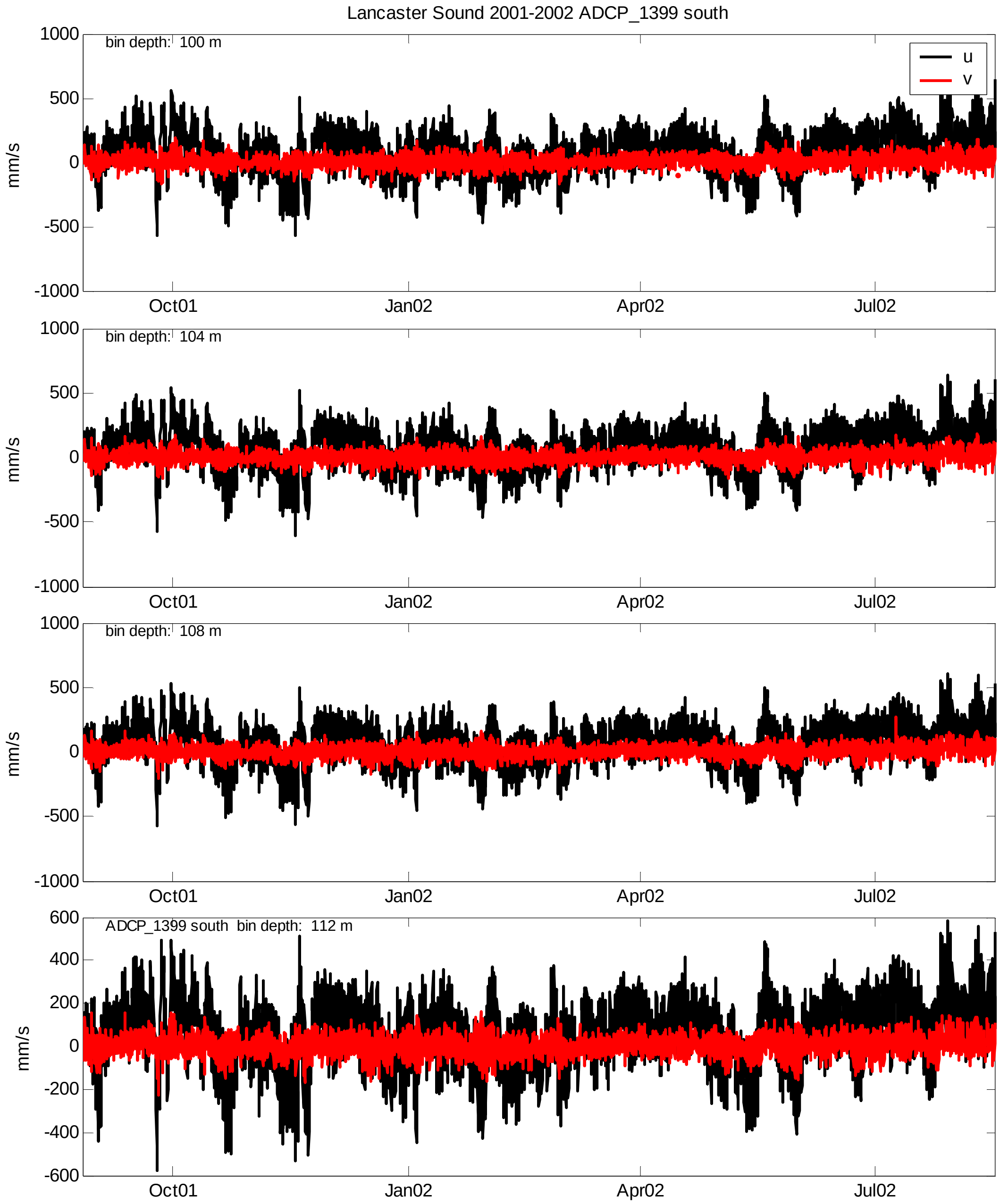

Figure 2-40 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 100, 104, 108, and 112 m

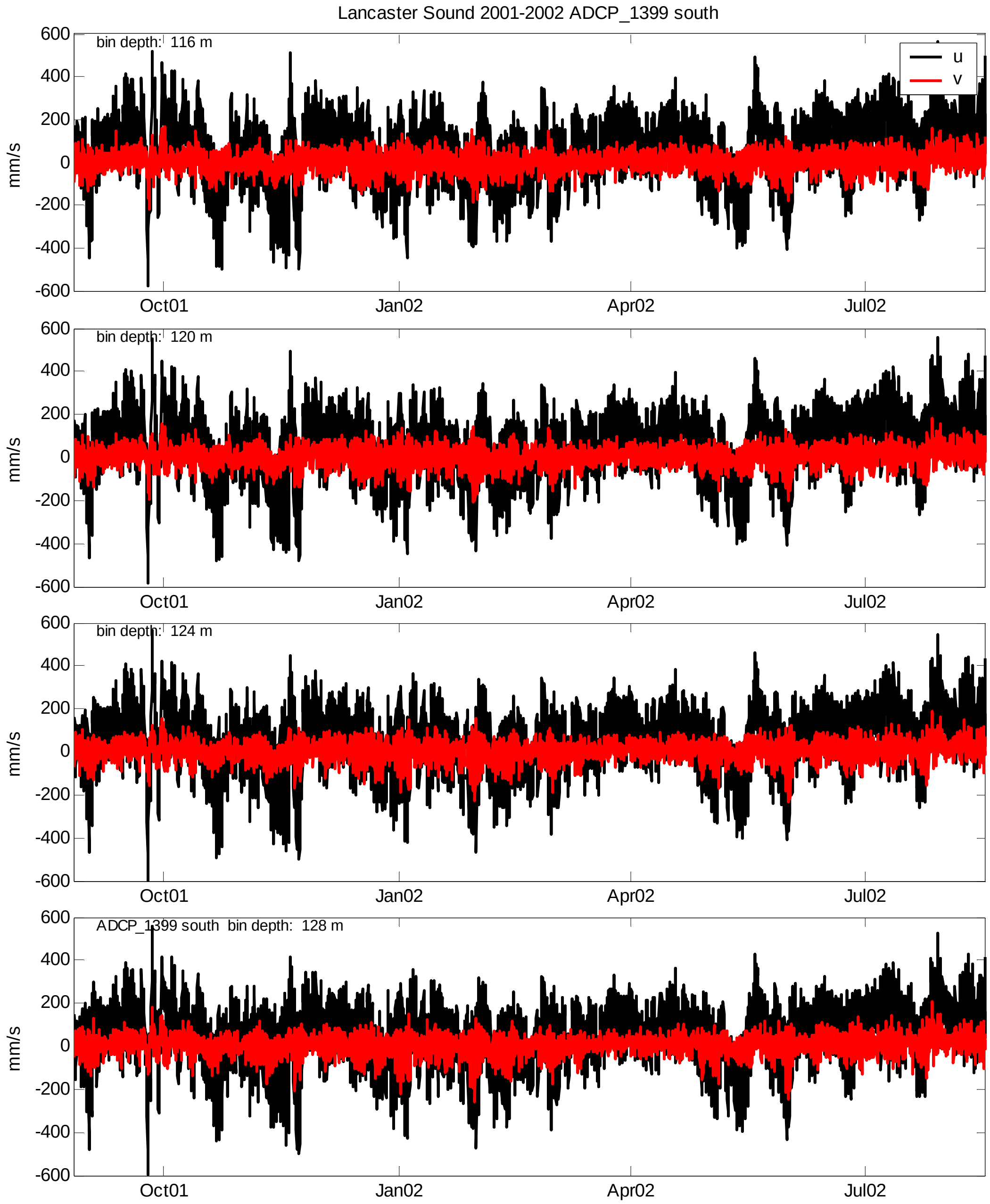

Figure 2-41 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 116, 120, 124, and 126 m

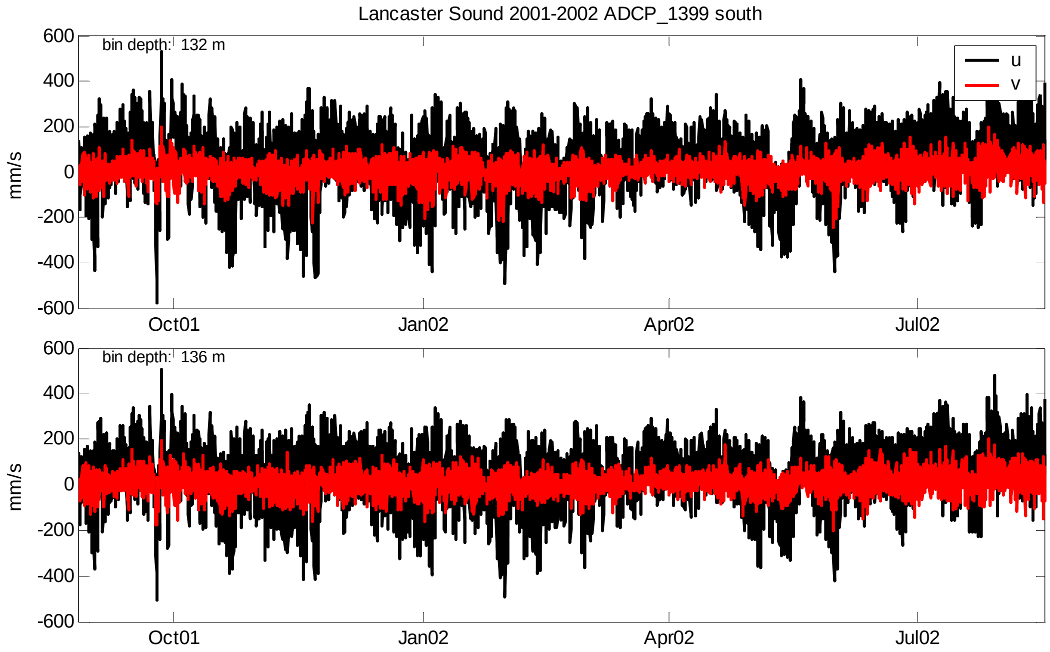

Figure 2-42 Line plot of ADCP 2-hourly velocity data for mooring 1399 at bins 132 and 136 m

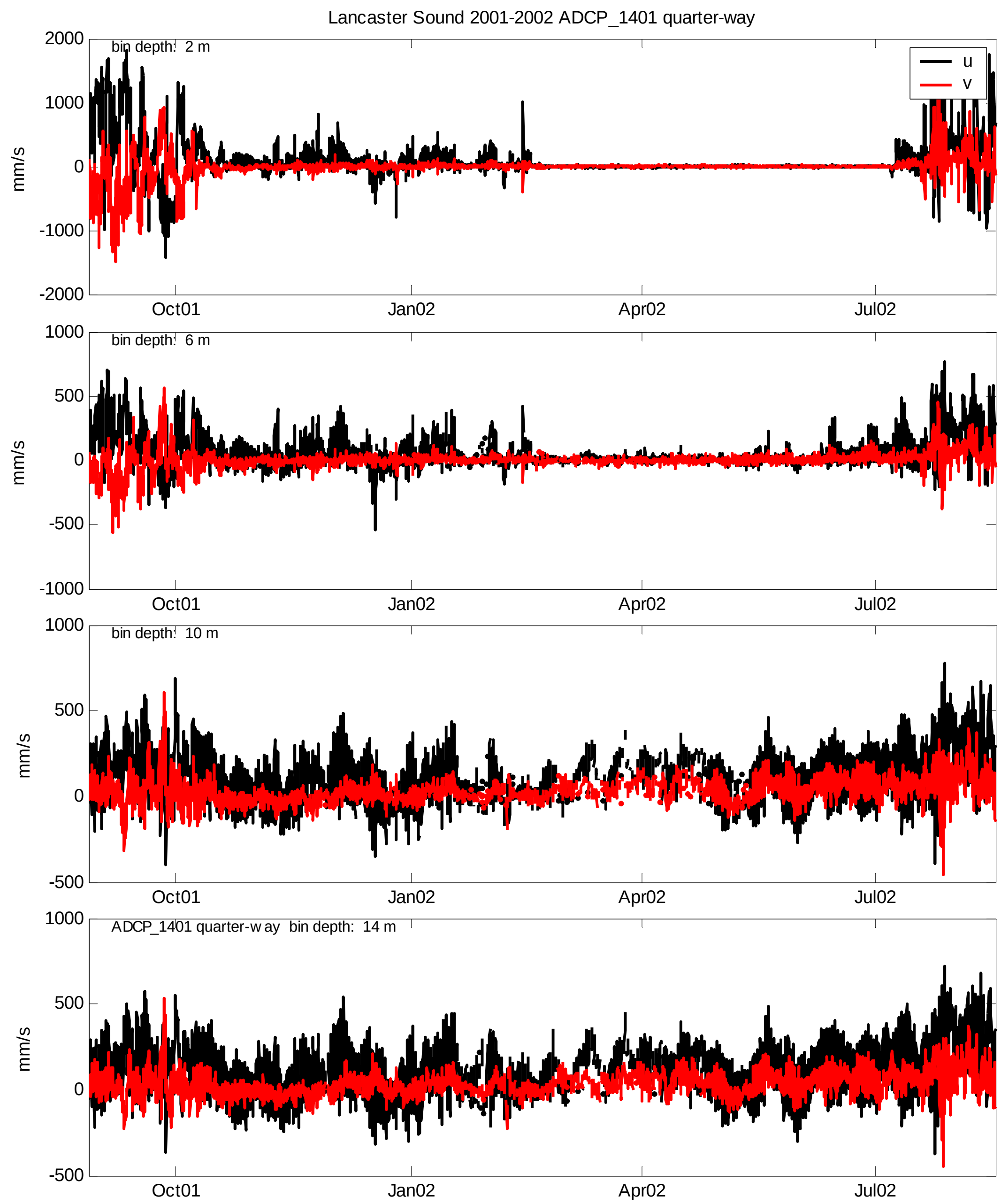

Figure 2-43 Line plot of ADCP 2-hourly velocity data for mooring 1401 at bins 2, 6, 10, and 14 m

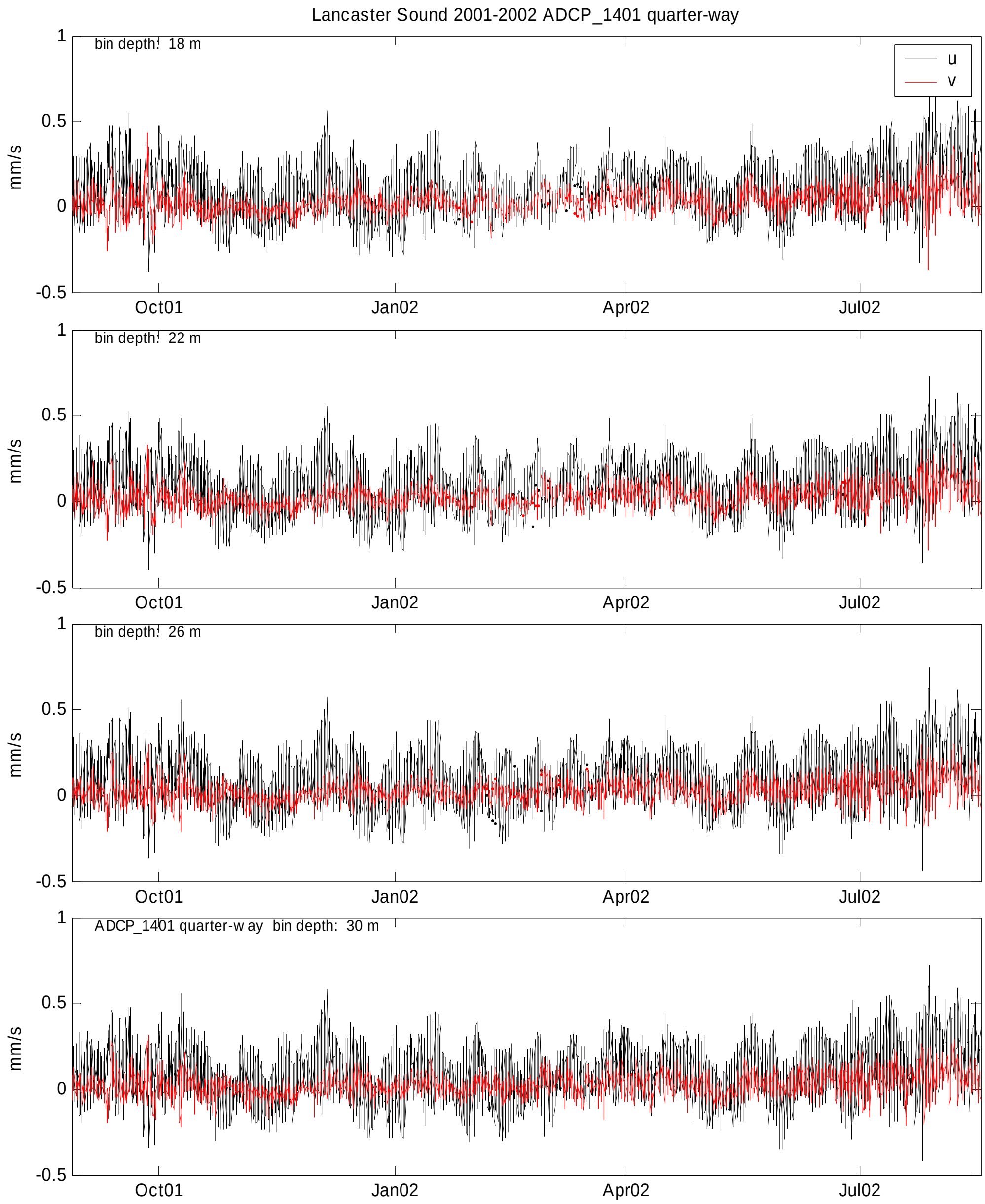

Figure 2-44 Line plot of ADCP 2-hourly velocity data for mooring 1401 at bins 18, 22, 26, and 30 m

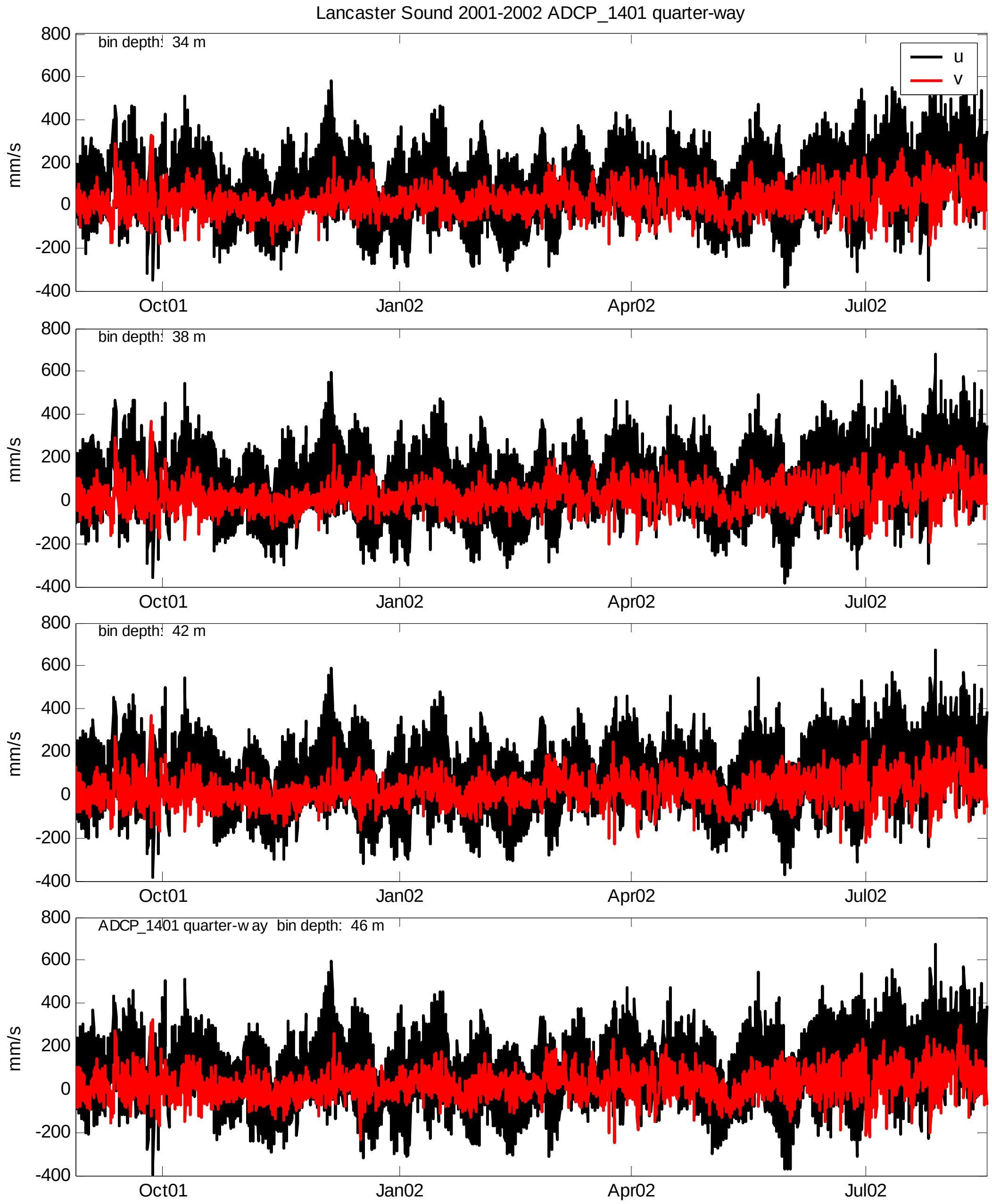

Figure 2-45 Line plot of ADCP 2-hourly velocity data for mooring 1401 at bins 34, 38, 42, and 46 m

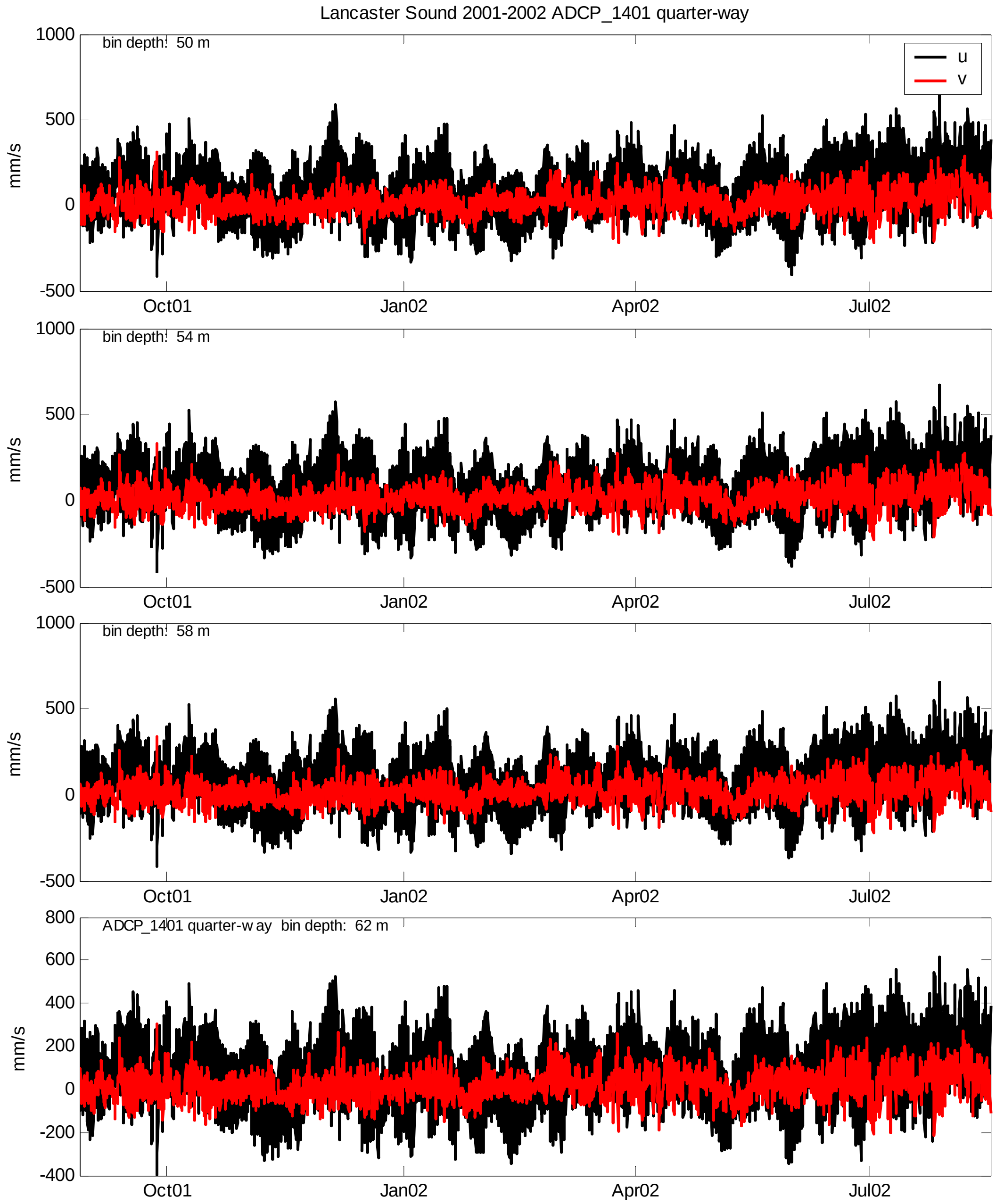

Figure 2-46 Line plot of ADCP 2-hourly velocity data for mooring 1401 at bins 50, 54, 58, and 62 m

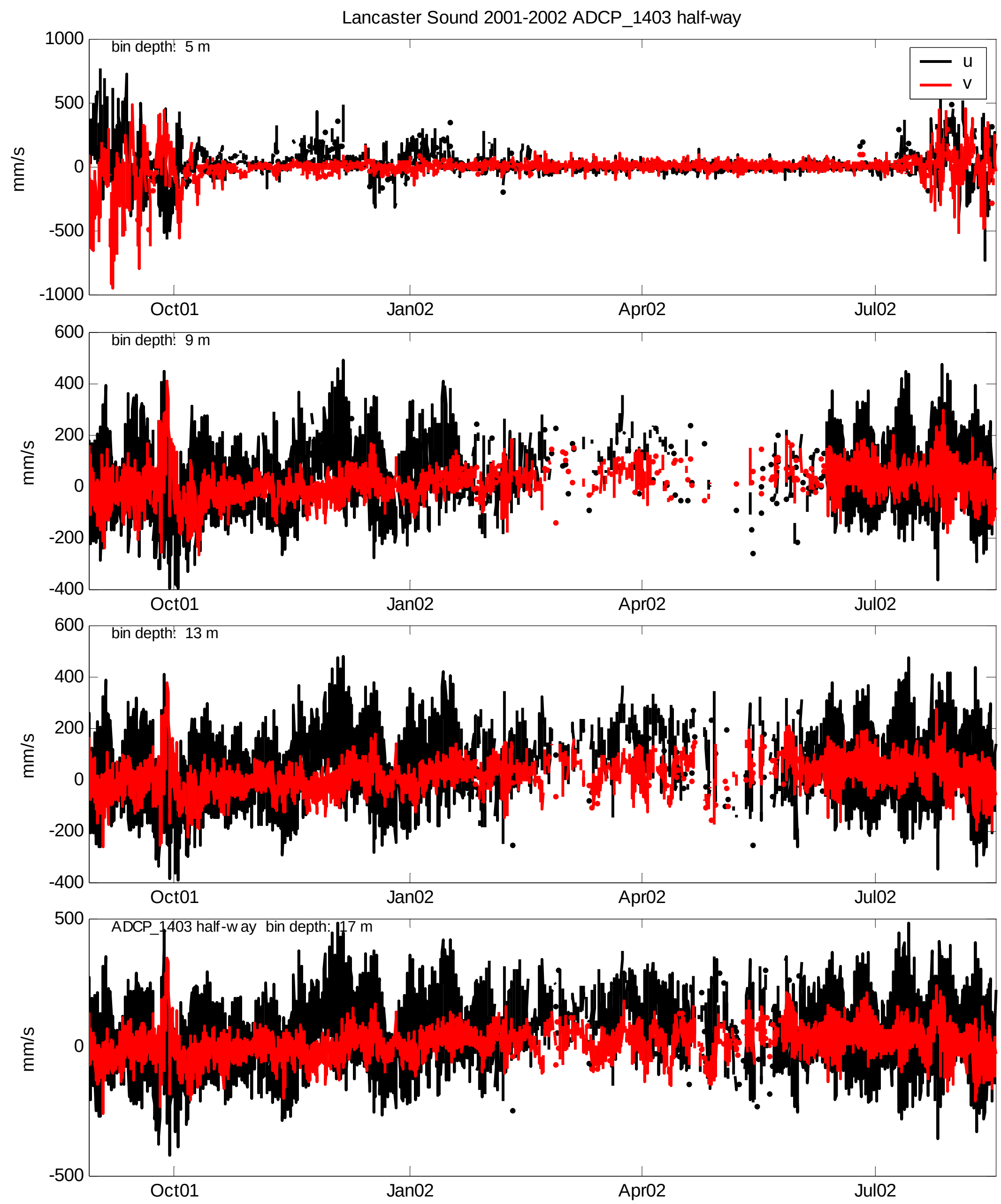

Figure 2-47 Line plot of ADCP 2-hourly velocity data for mooring 1403 at bins 5, 9, 13, and 17 m

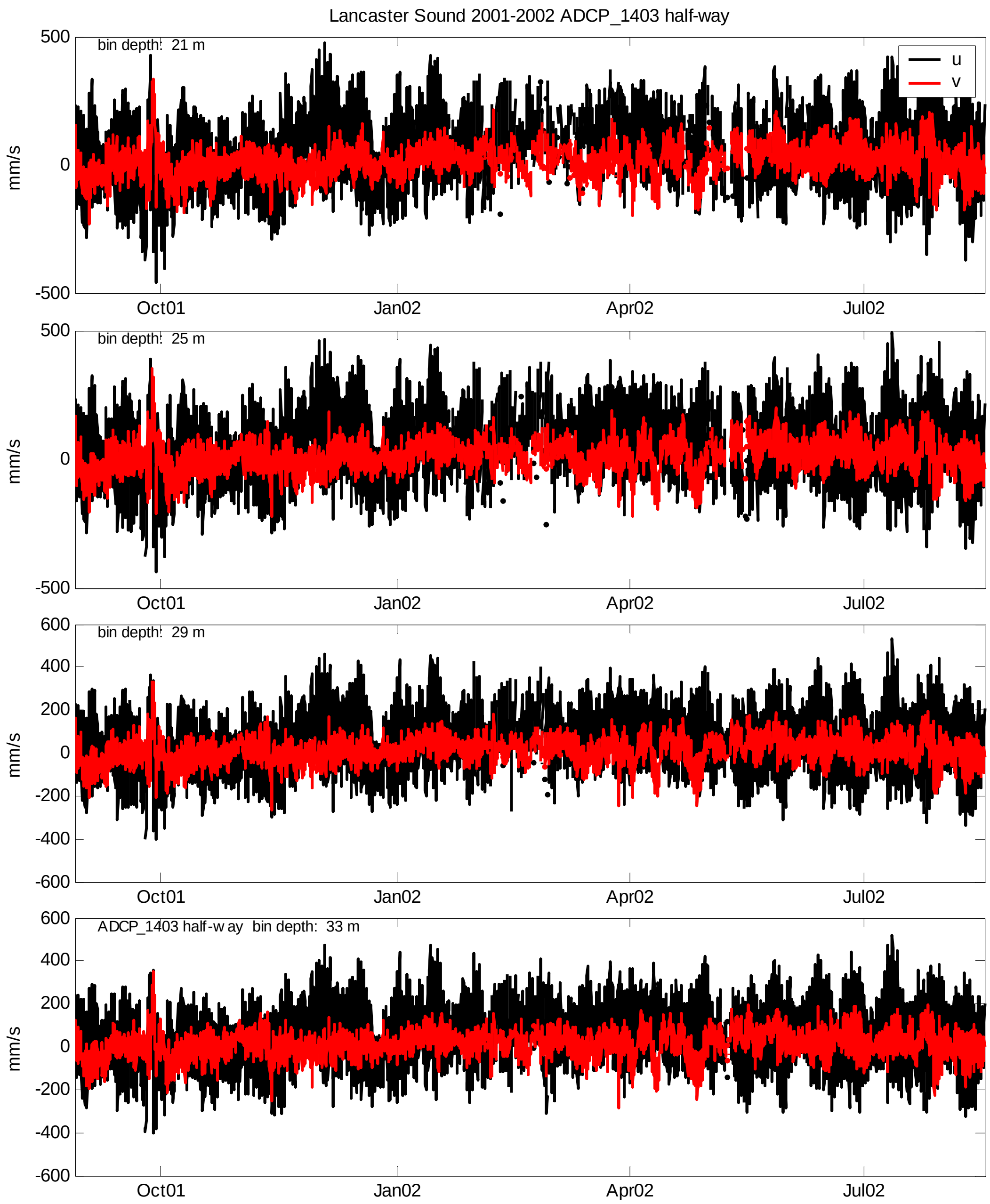

Figure 2-48 Line plot of ADCP 2-hourly velocity data for mooring 1403 at bins 21, 25, 29, and 33 m

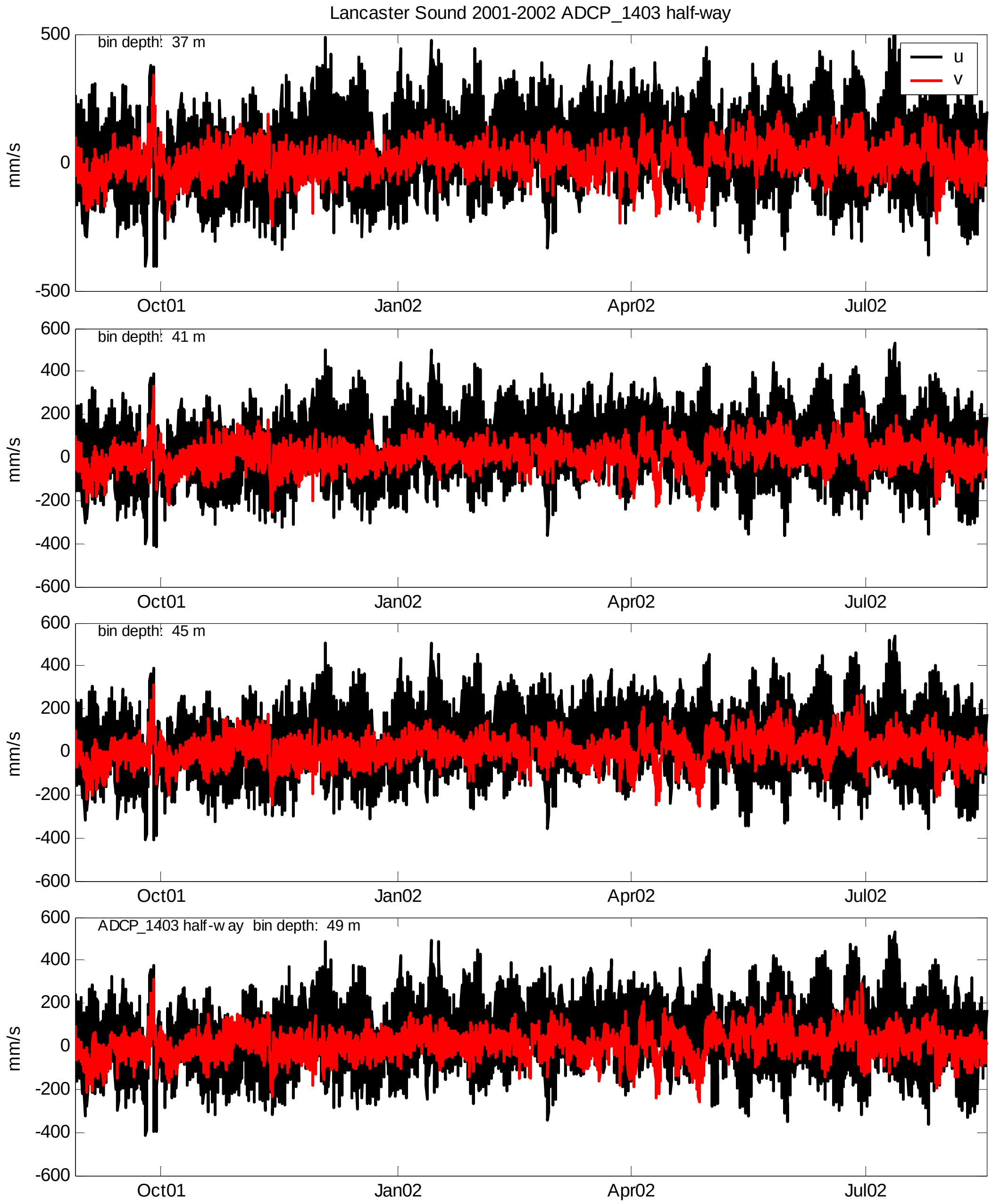

Figure 2-49 Line plot of ADCP 2-hourly velocity data for mooring 1403 at bins 37, 41, 45, and 49 m

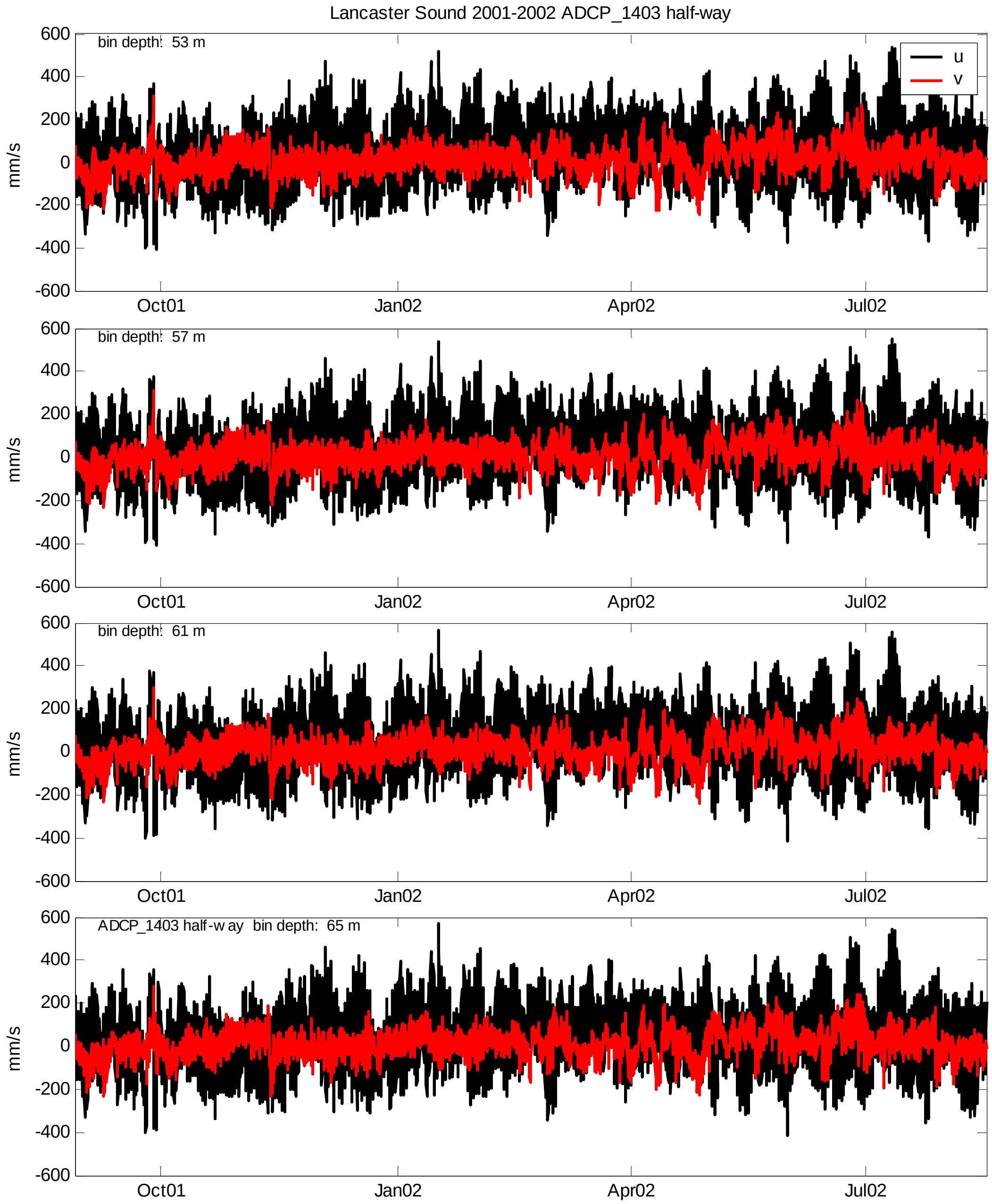

Figure 2-50 Line plot of ADCP 2-hourly velocity data for mooring 1403 at bins 53, 57, 61, and 65 m

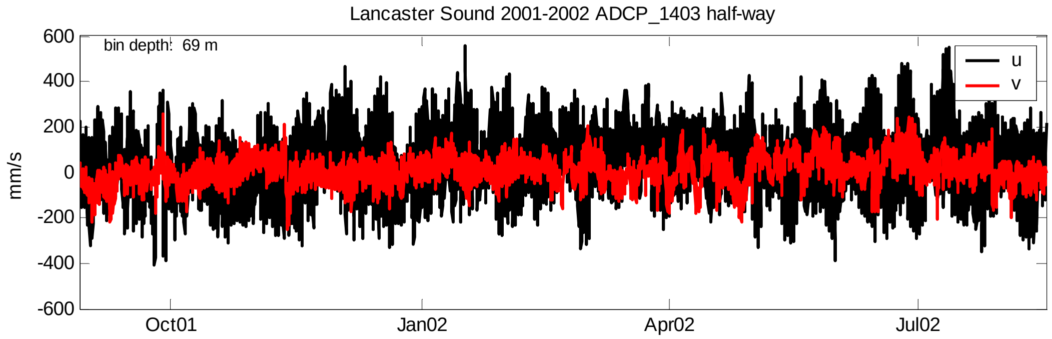

Figure 2-51 Line plot of ADCP 2-hourly velocity data for mooring 1403 at bins 69 m

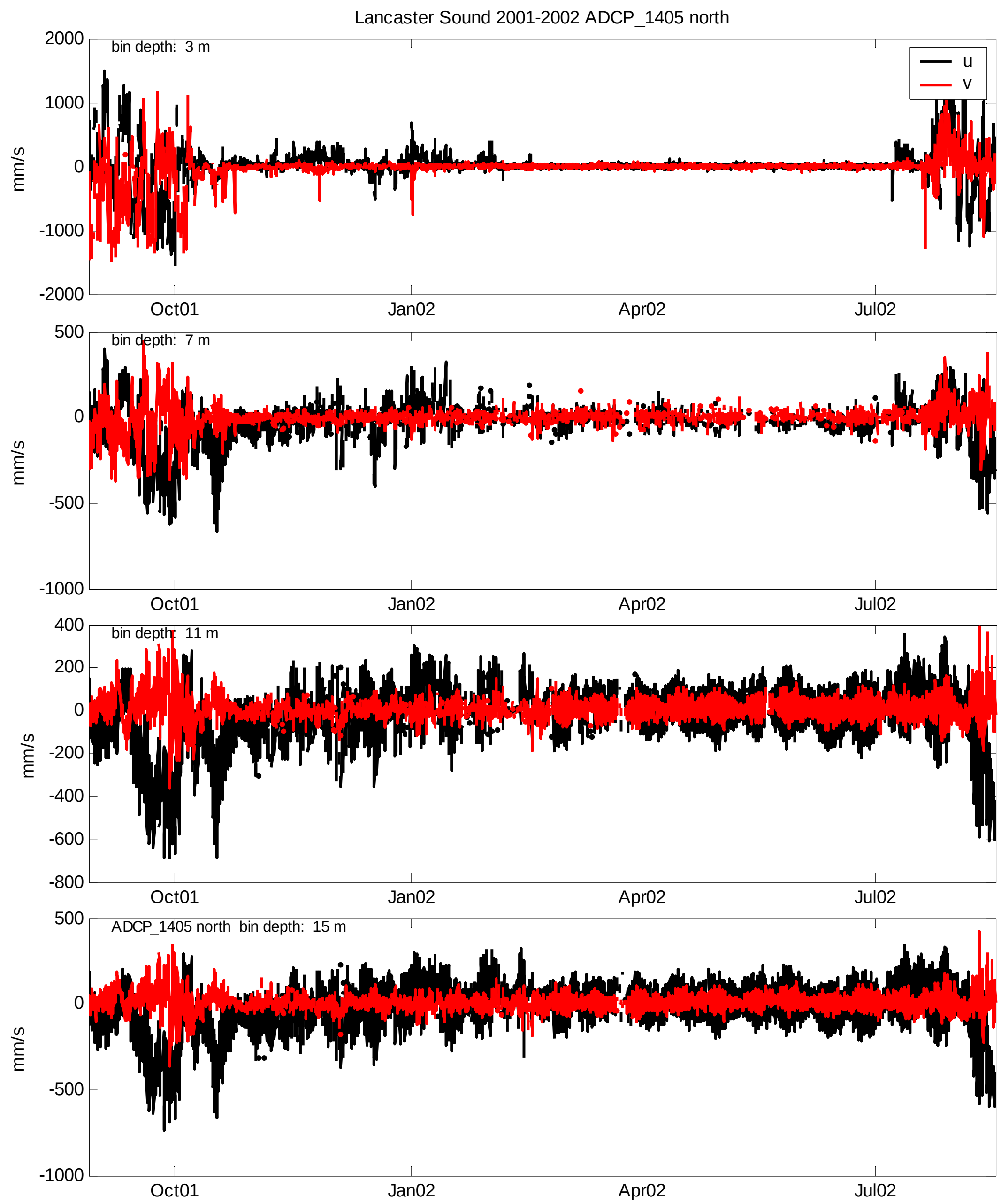

Figure 2-52 Line plot of ADCP 2-hourly velocity data for mooring 1405 at bins 3, 7, 11, and 15 m

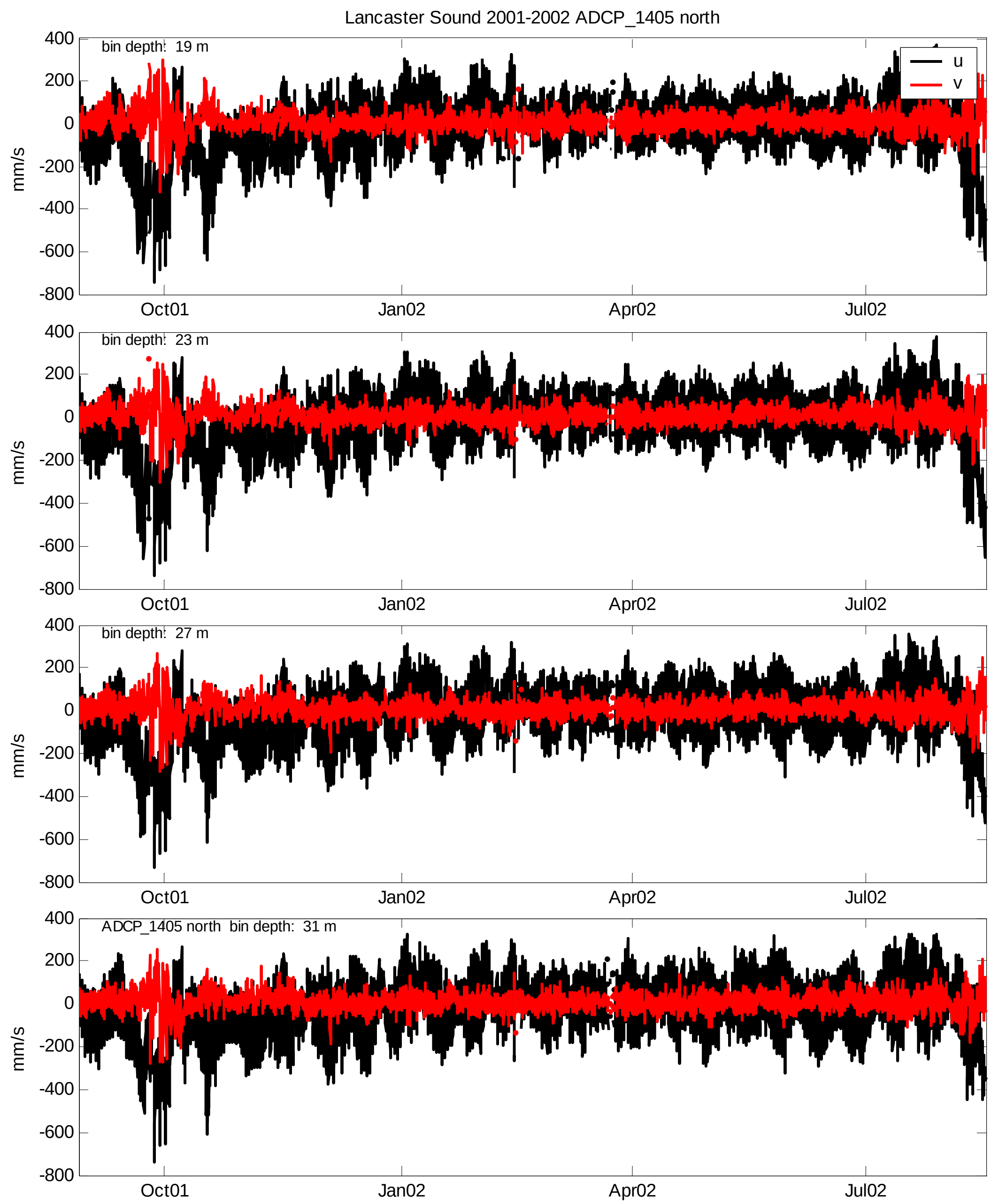

Figure 2-53 Line plot of ADCP 2-hourly velocity data for mooring 1405 at bins 19, 23, 27, and 31 m

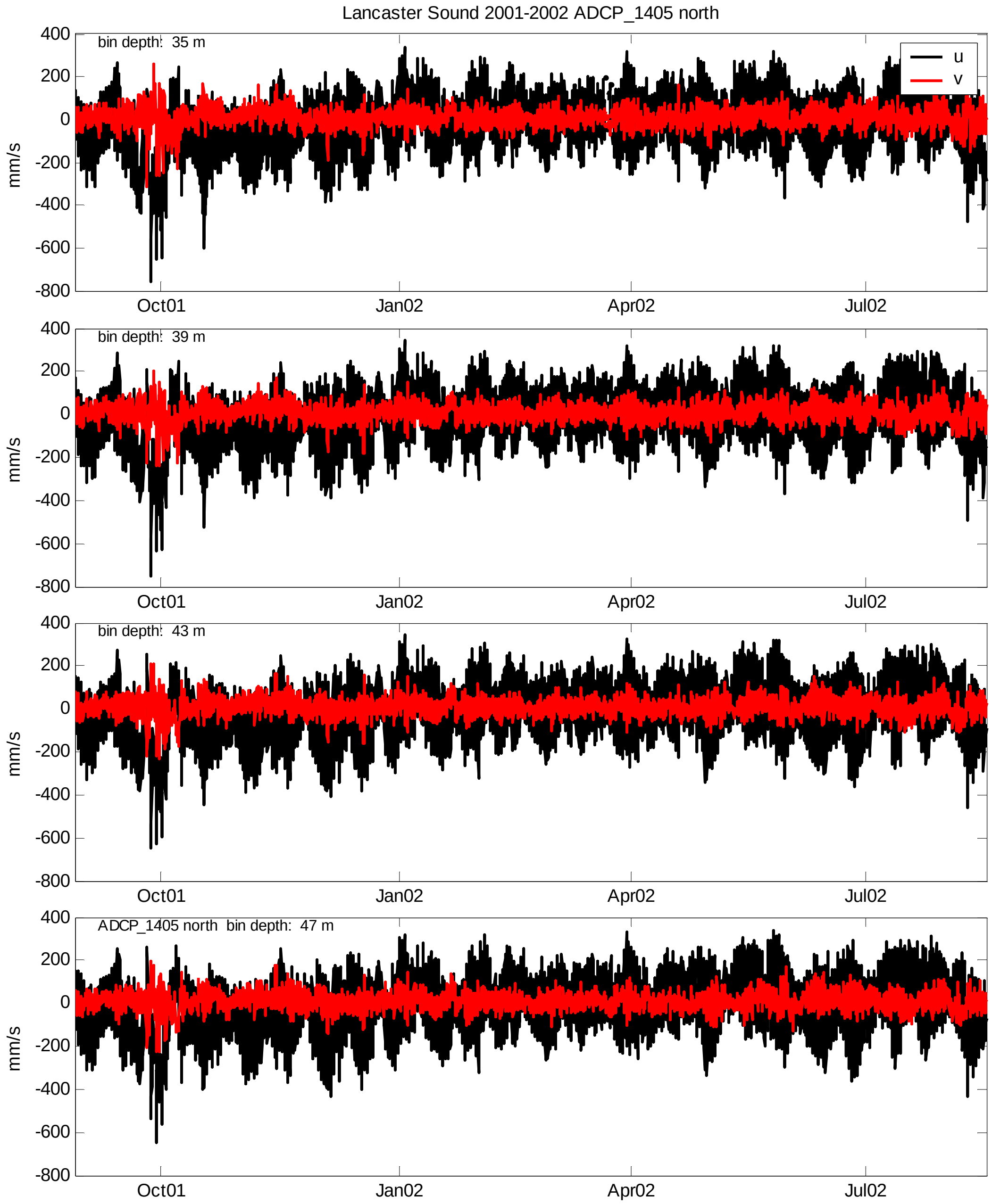

Figure 2-54 Line plot of ADCP 2-hourly velocity data for mooring 1405 at bins 35, 39, 43, and 47 m

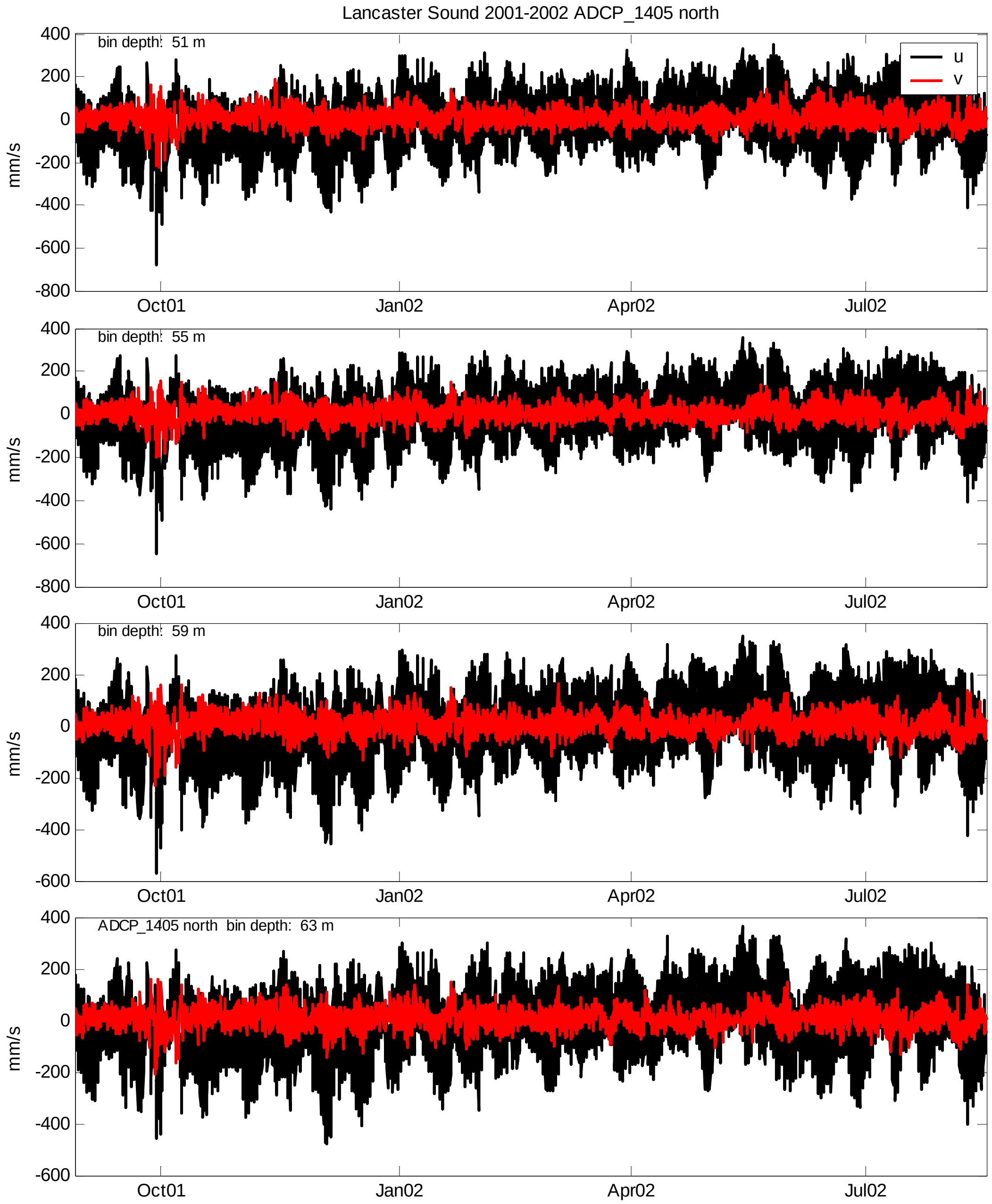

Figure 2-55 Line plot of ADCP 2-hourly velocity data for mooring 1405 at bins 51, 55, 59, and 63 m

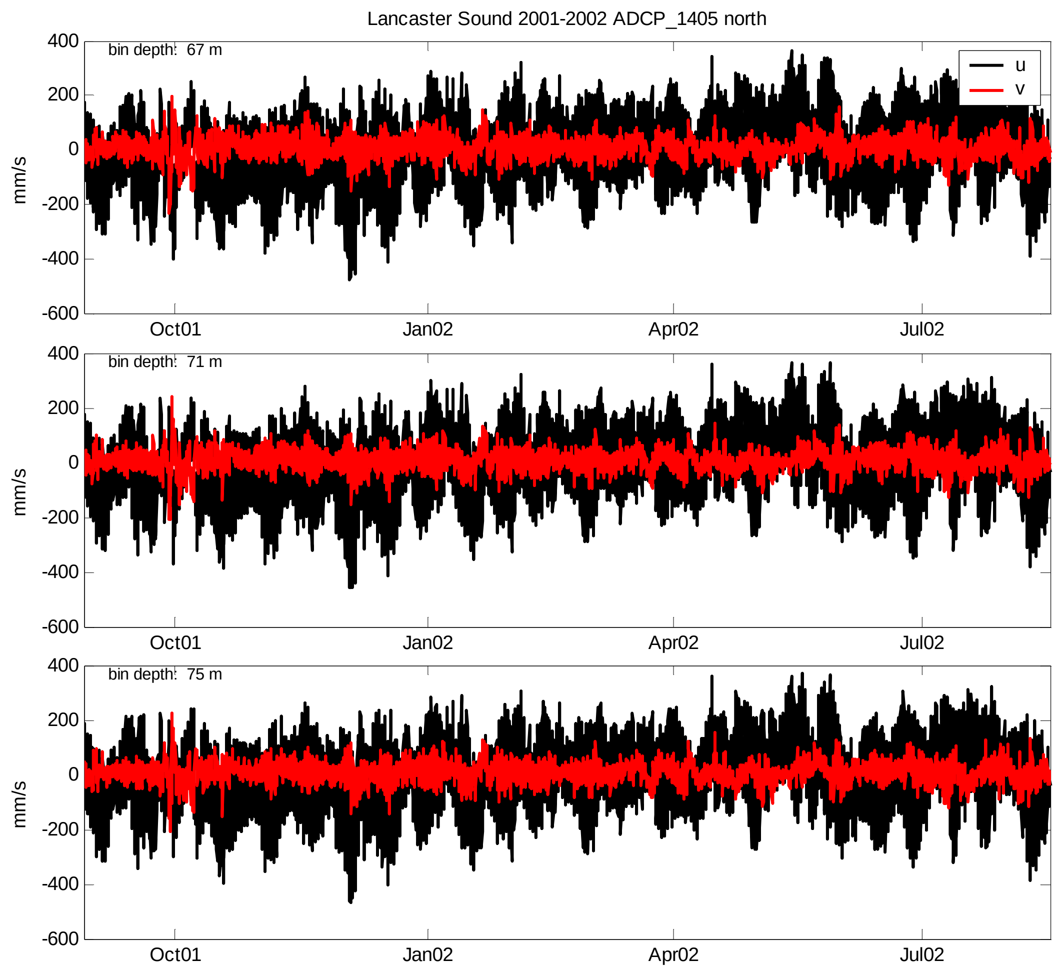

Figure 2-56 Line plot of ADCP 2-hourly velocity data for mooring 1405 at bins 67, 71, and 75 m

2.4 Principal axes of variance for ADCP data, all bins, 2-hourly

The following diagrams show that for the most part there was not greater than 7 ^{o} difference from 90 ^{o} in all records except for the top bins at all moorings. That is, the principal axes of variance were aligned with the co-ordinate system to which the original ADCP data were resolved (i.e. 105 ^{o} for eastward flow). The major axes were >3 ^{o} different from 90 ^{o} in the following cases: in the south from 50 – 80 m and at > 130 m; quarter-way from 6 - 30 m; halfway at > 10 m; and in the north from 7 - 30 m and > 60 m. The diagrams also show that the variance for the "alongshore" flow is about twice that of the cross-shore (ignoring the top bins since they are known to be unreliable at times).

ADCP_1398 south

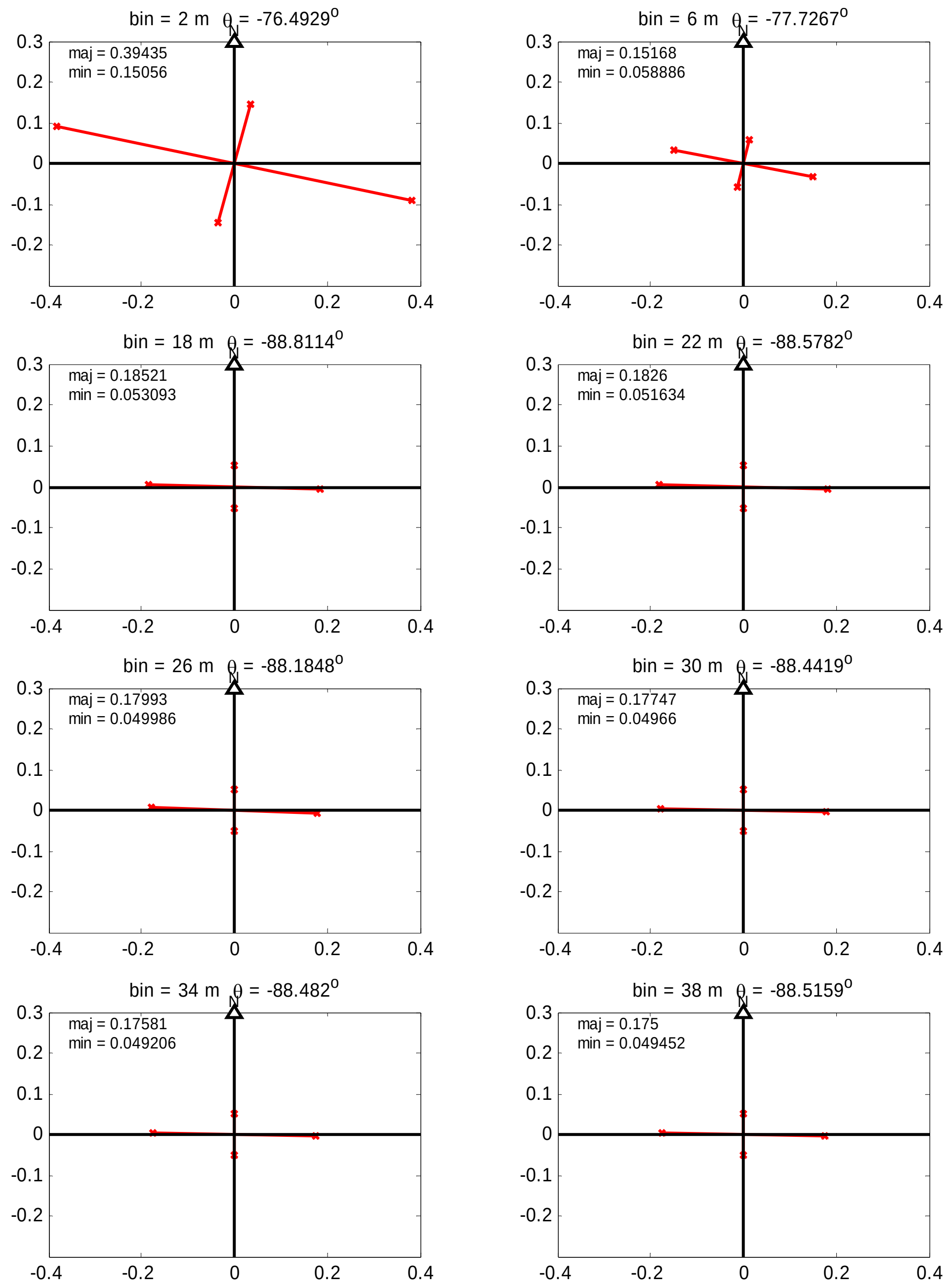

Figure 2-57 Principal axis of variance for mooring 1398 from 2 m to 38 m

ADCP_1398 south

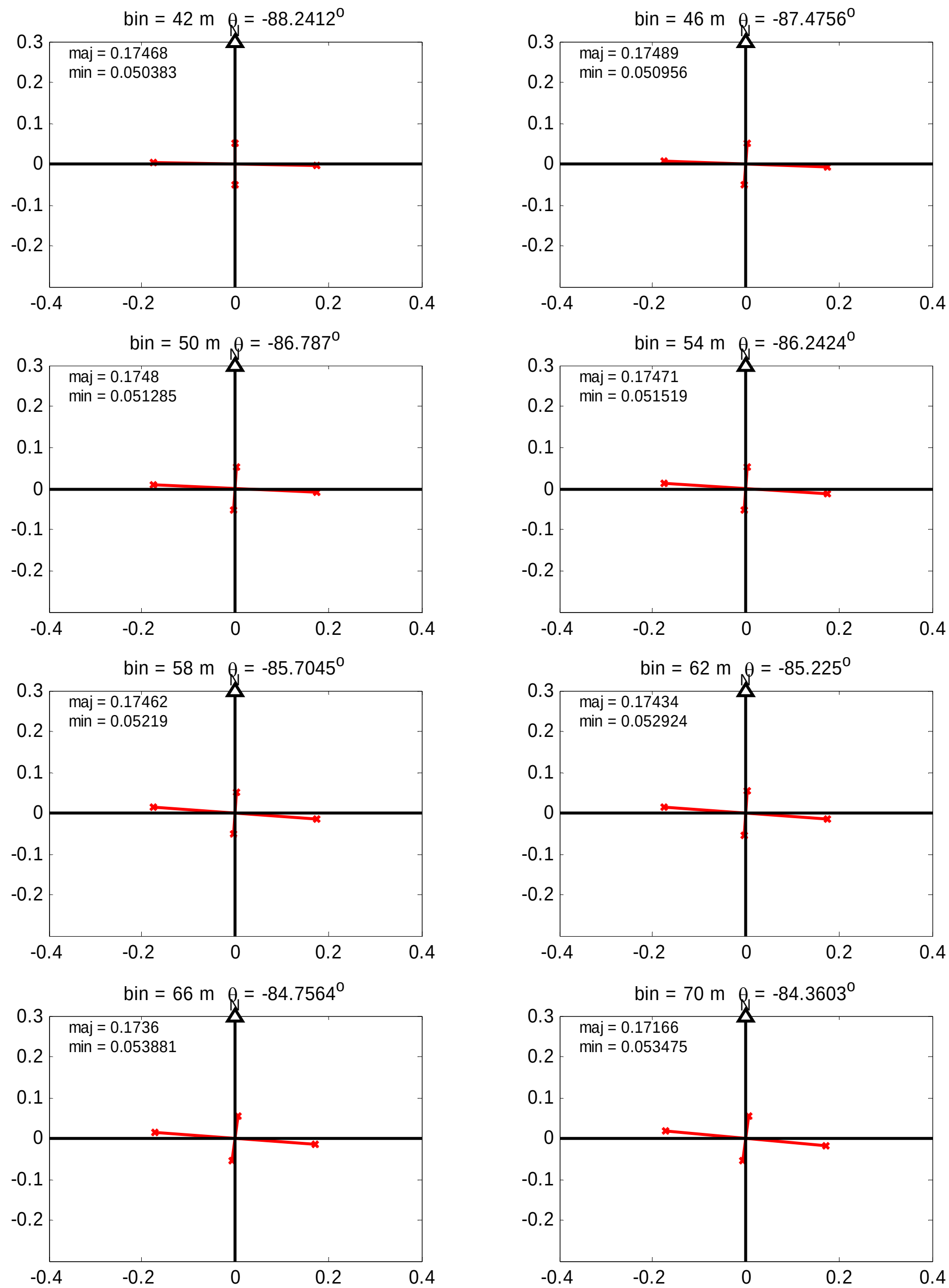

Figure 2-58 Principal axis of variance for mooring 1398 from 42 m to 70 m

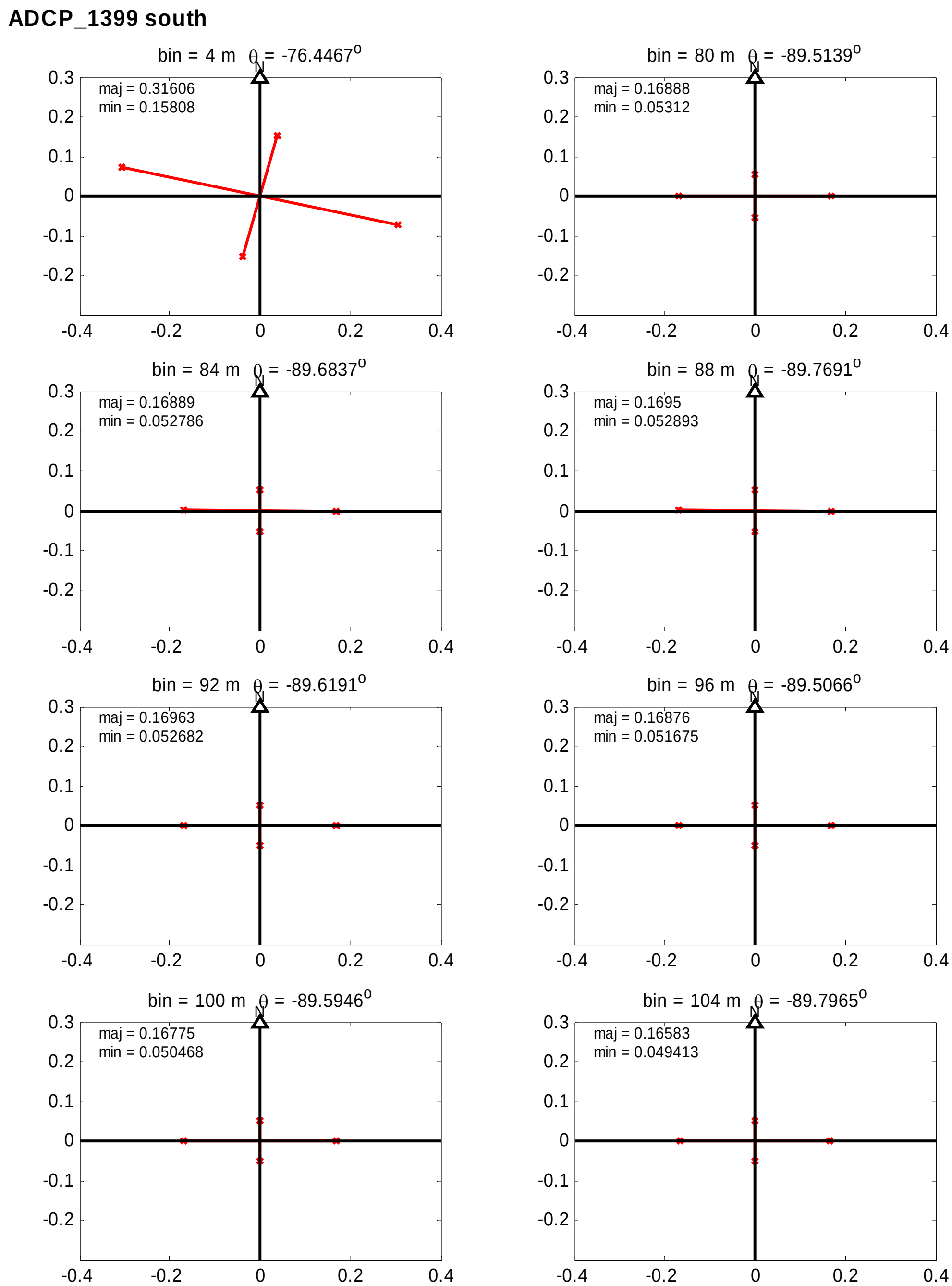

Figure 2-59 Principal axis of variance for mooring 1399 from 4 m to 104 m

ADCP_1399 south

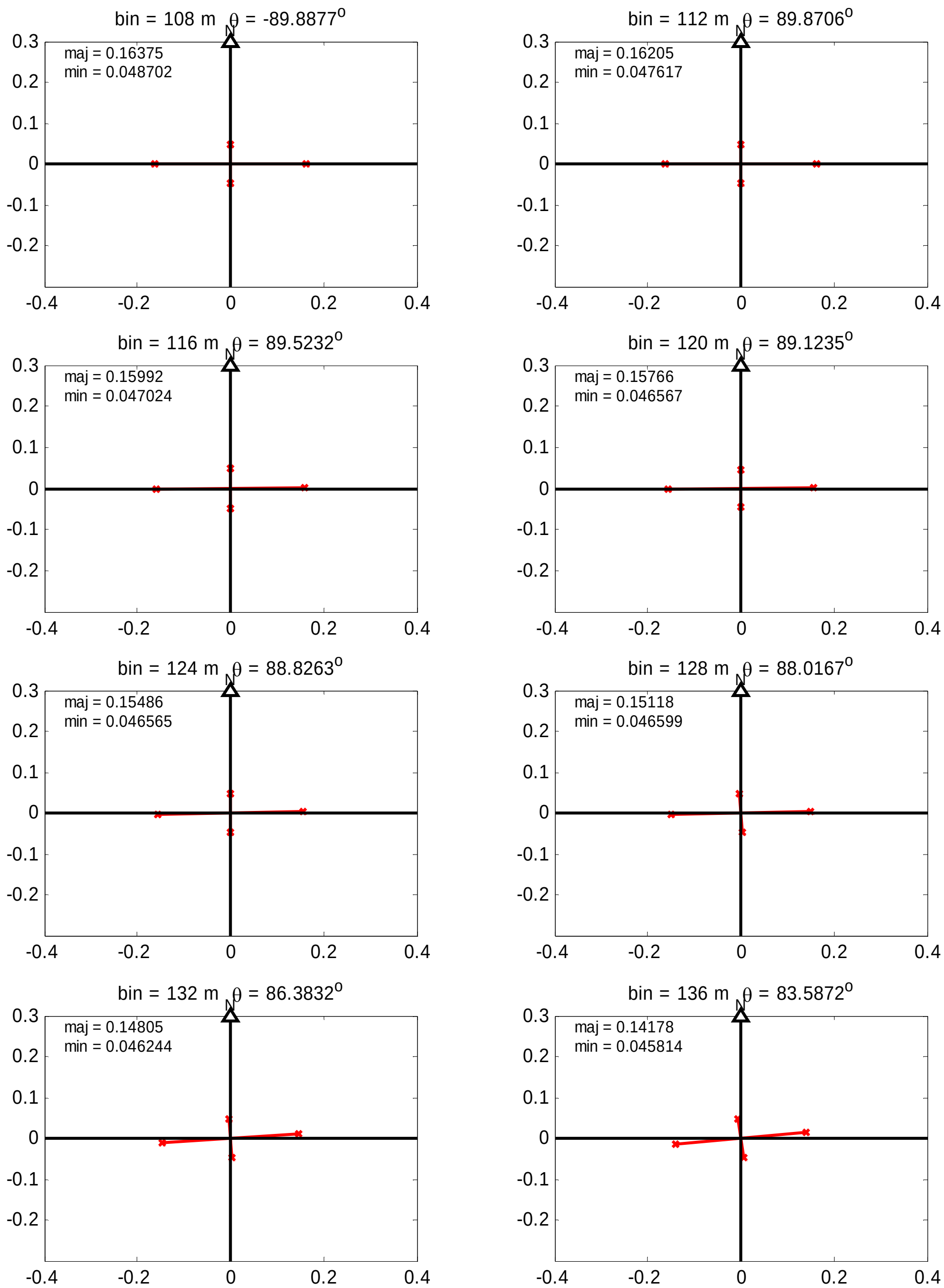

Figure 2-60 Principal axis of variance for mooring 1399 from 108 m to 136 m

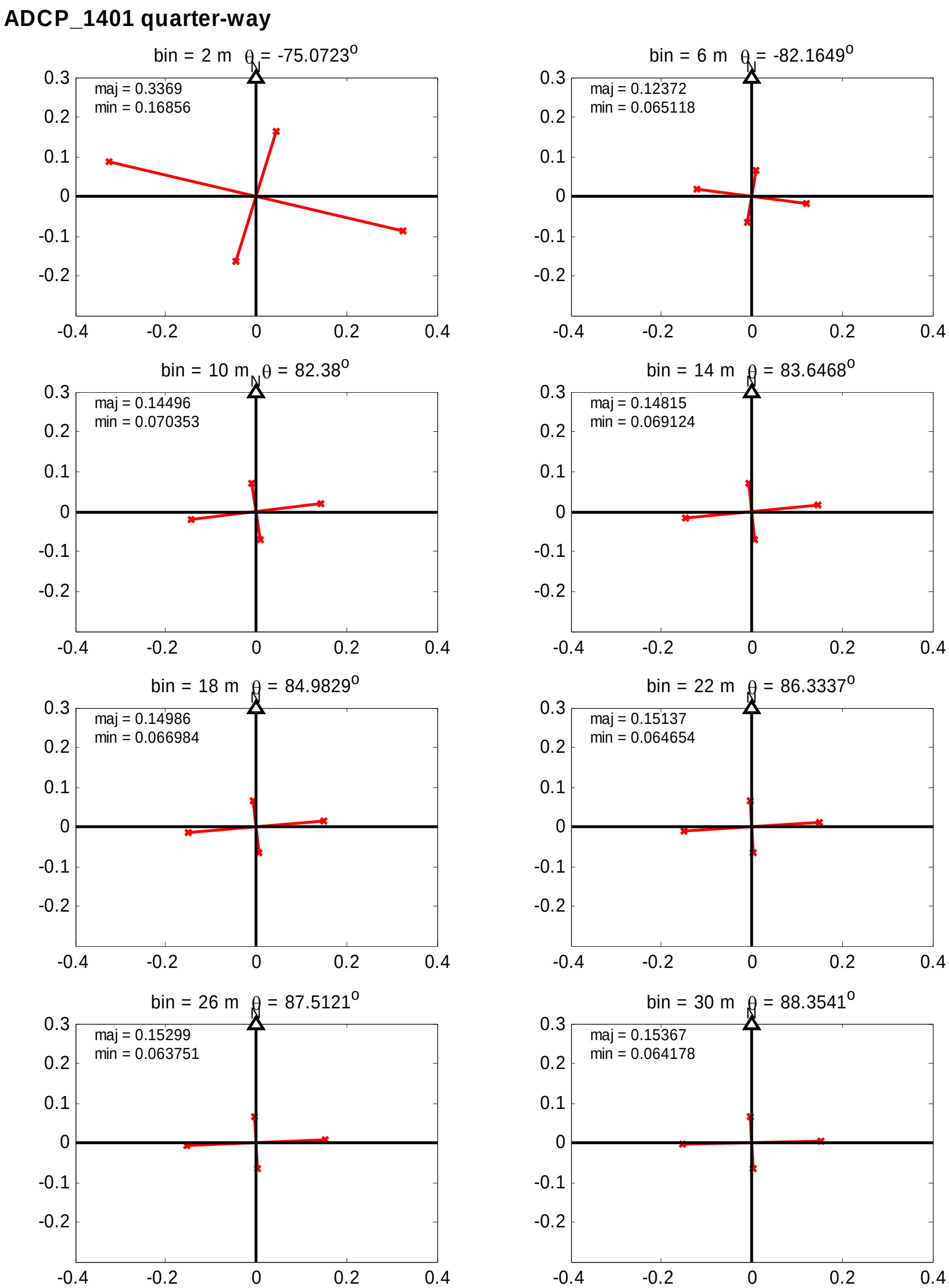

Figure 2-61 Principal axis of variance for mooring 1401 from 2 m to 30 m

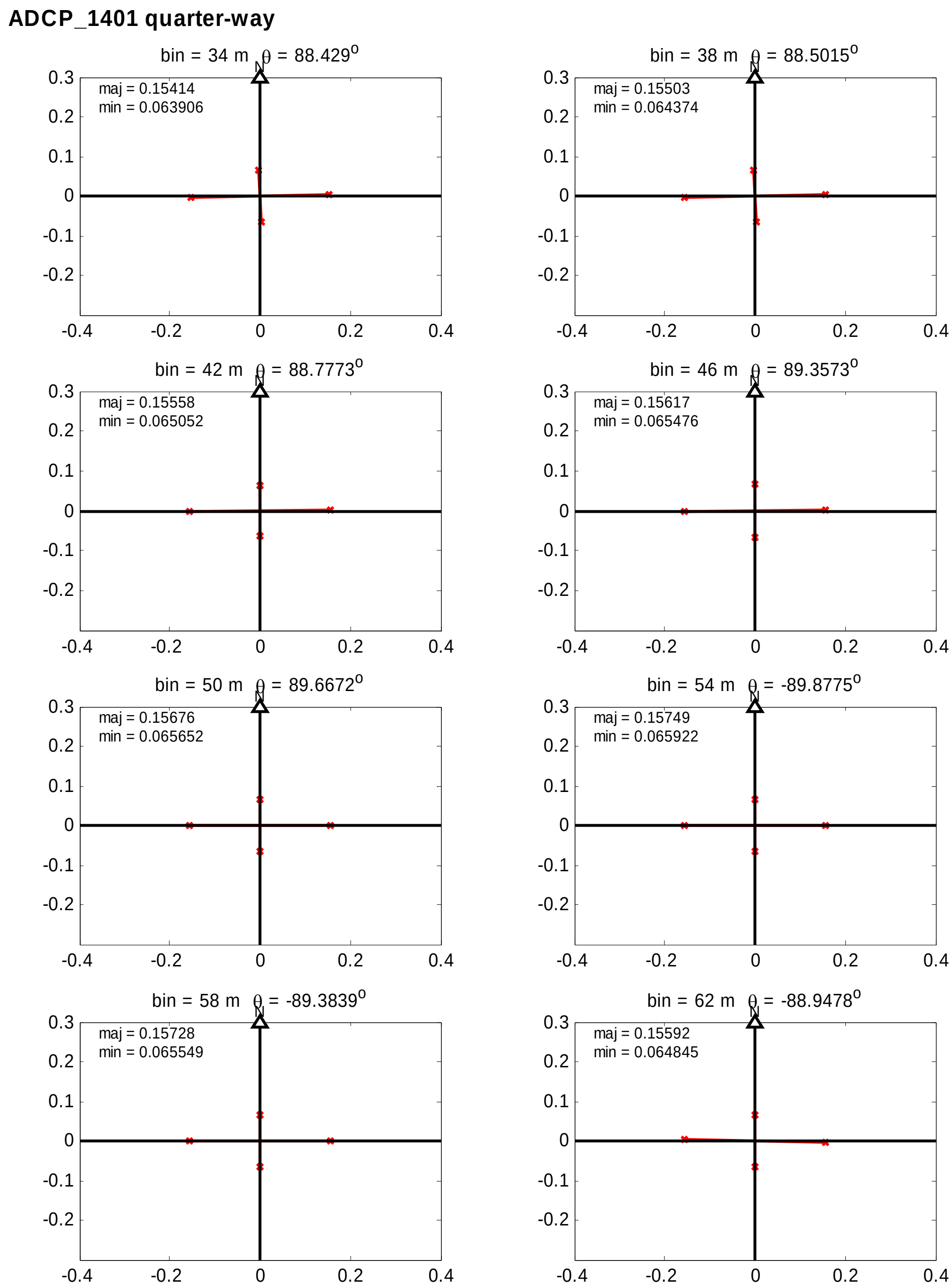

Figure 2-62 Principal axis of variance for mooring 1401 from 34 m to 62 m

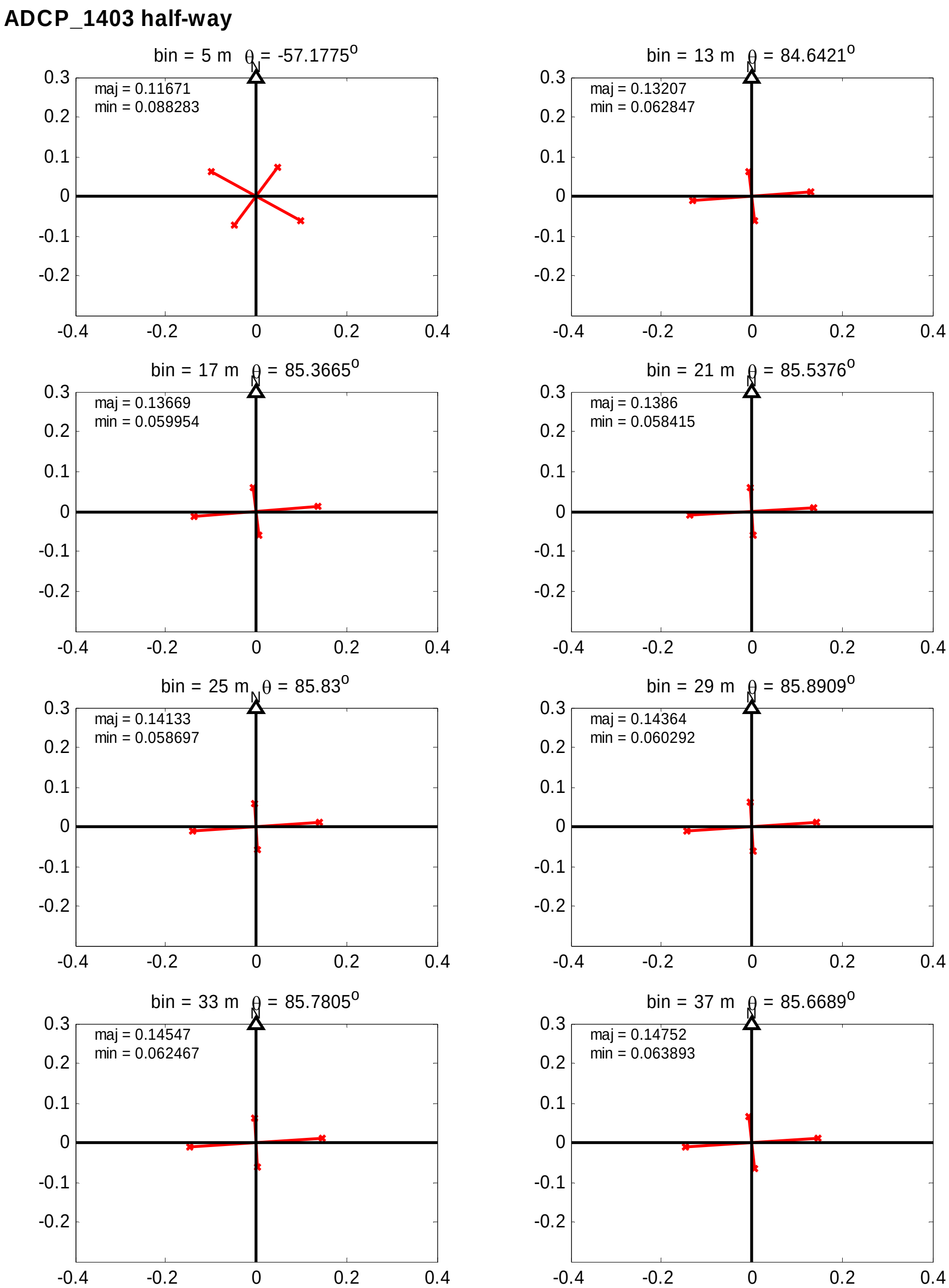

Figure 2-63 Principal axis of variance for mooring 1403 from 5 m to 37 m

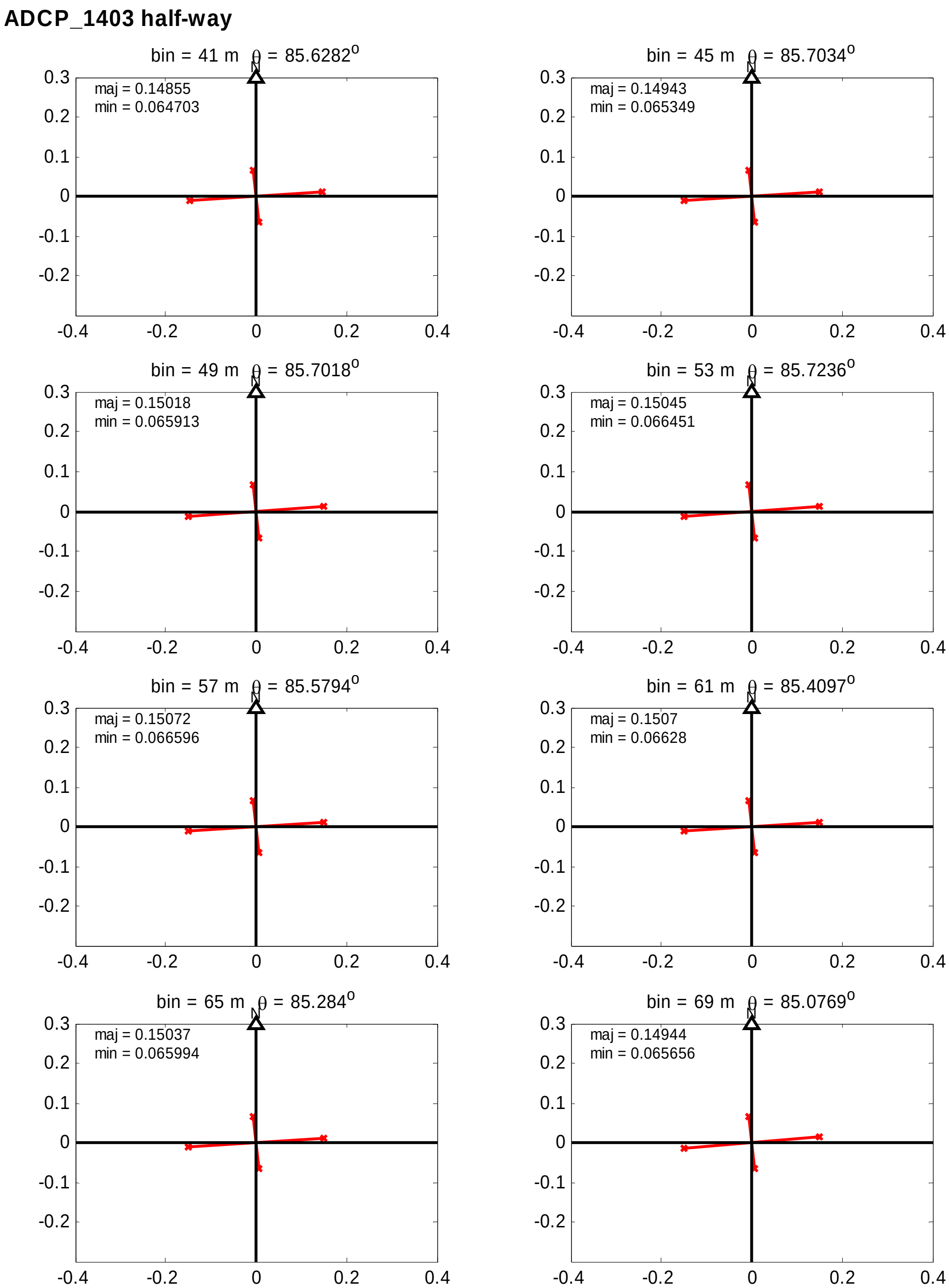

Figure 2-64 Principal axis of variance for mooring 1403 from 41 m to 69 m

ADCP_1405 north

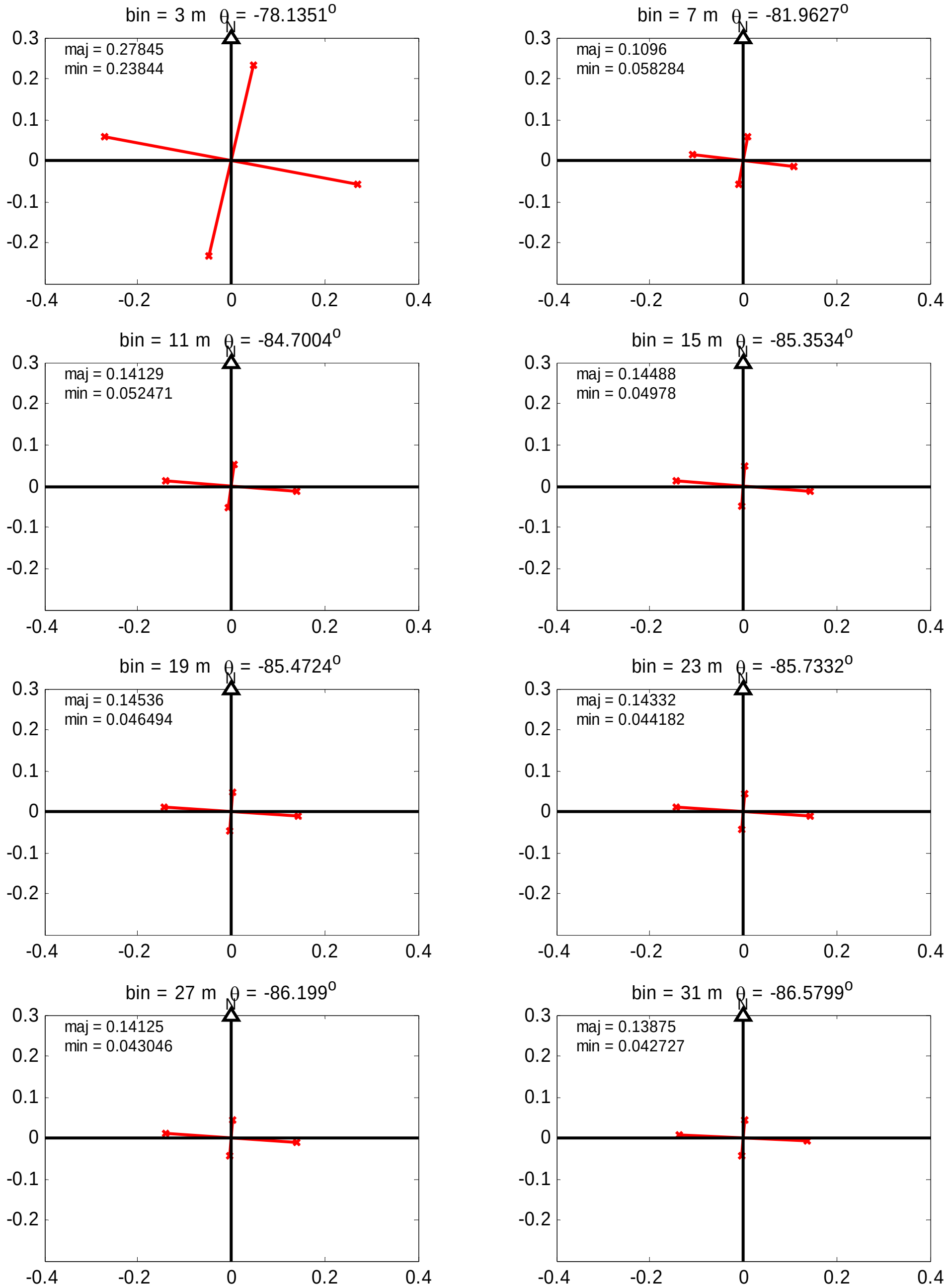

Figure 2-65 Principal axis of variance for mooring 1405 from 3 m to 31 m

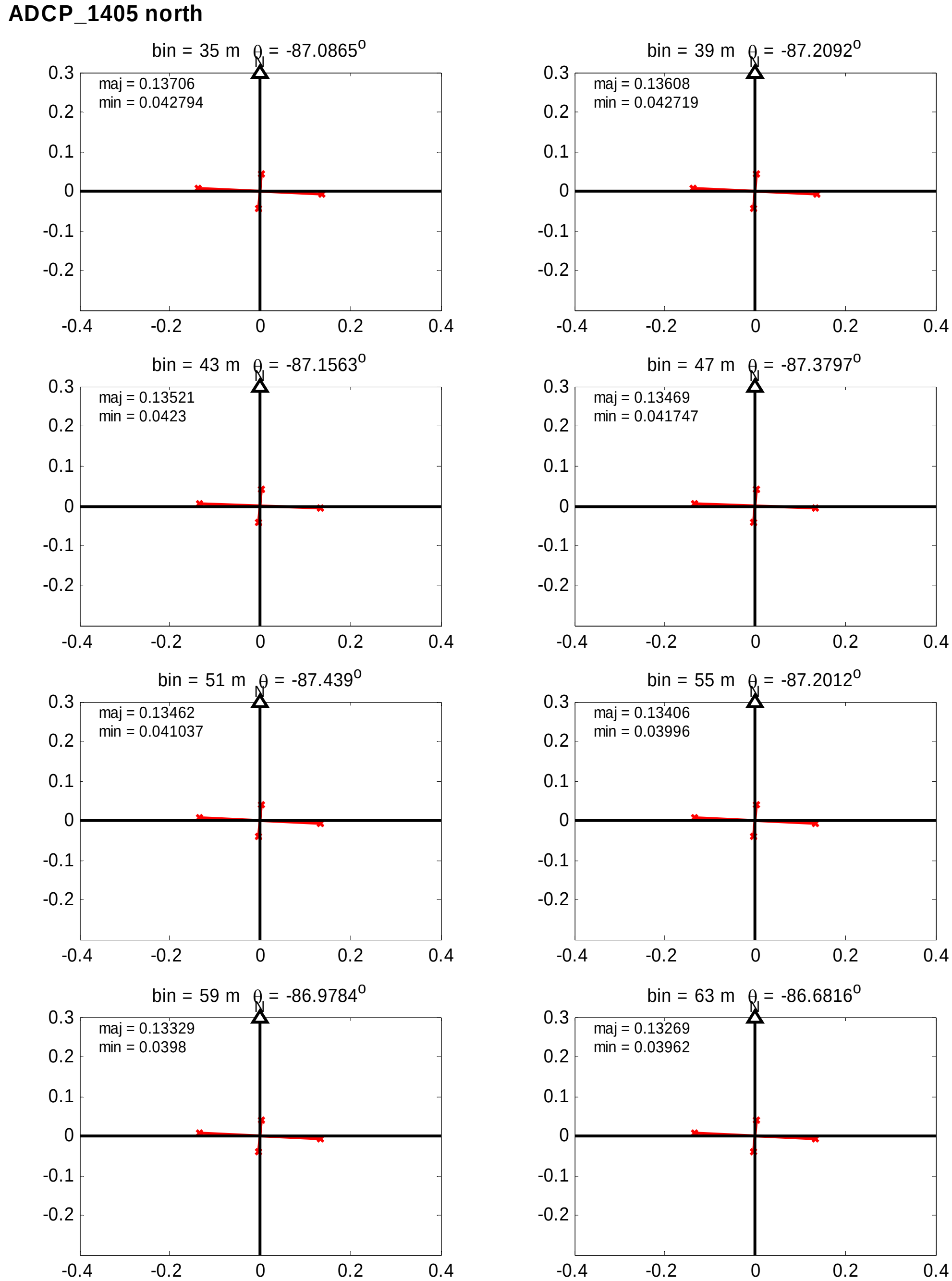

Figure 2-66 Principal axis of variance for mooring 1405 from 35 m to 63 m

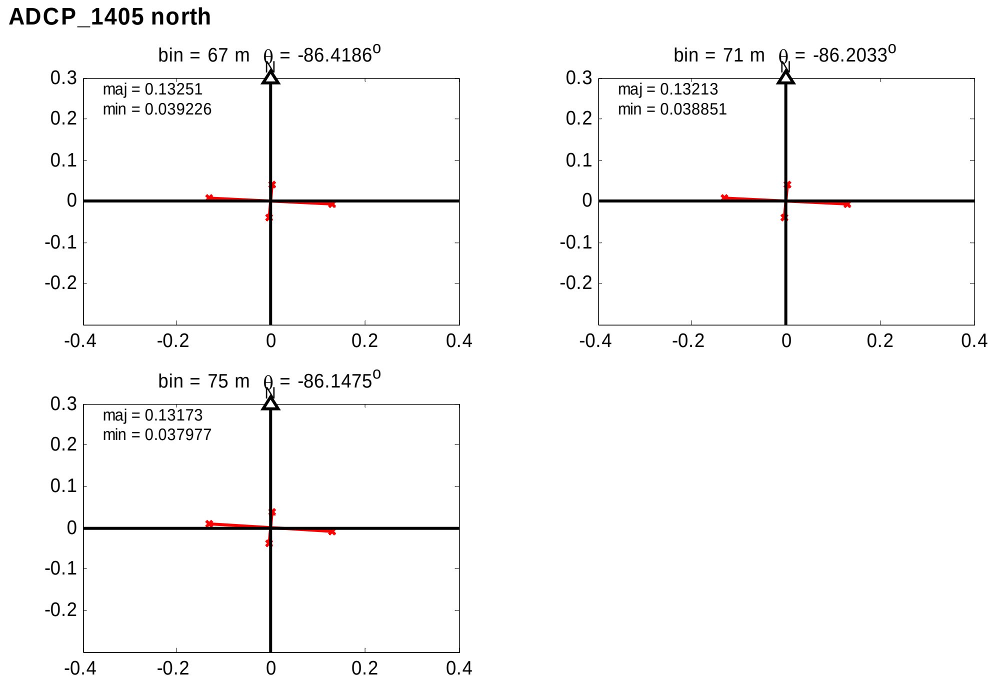

Figure 2-67 Principal axis of variance for mooring 1405 from 67 m to 75 m

2.5 ADCP alongshore time series, all bins, including 30-day mean, and data filtered for tides (6-hourly)

The following time series graphics are of 2-hourly data, 30-day mean, and fitted annual harmonic.

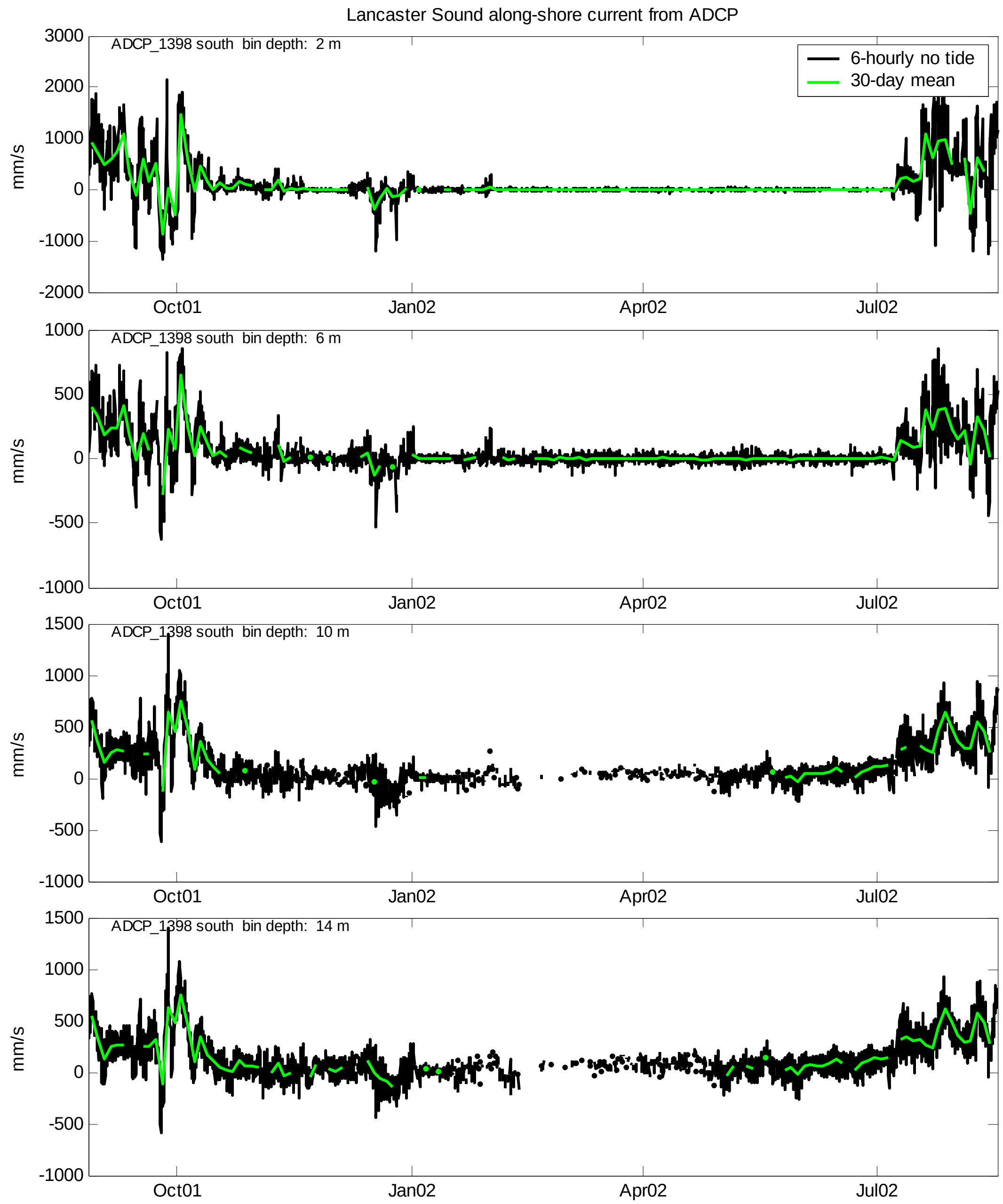

Figure 2-68 Time series of alongshore current for mooring 1398 from 2, 6, 10, and 14 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

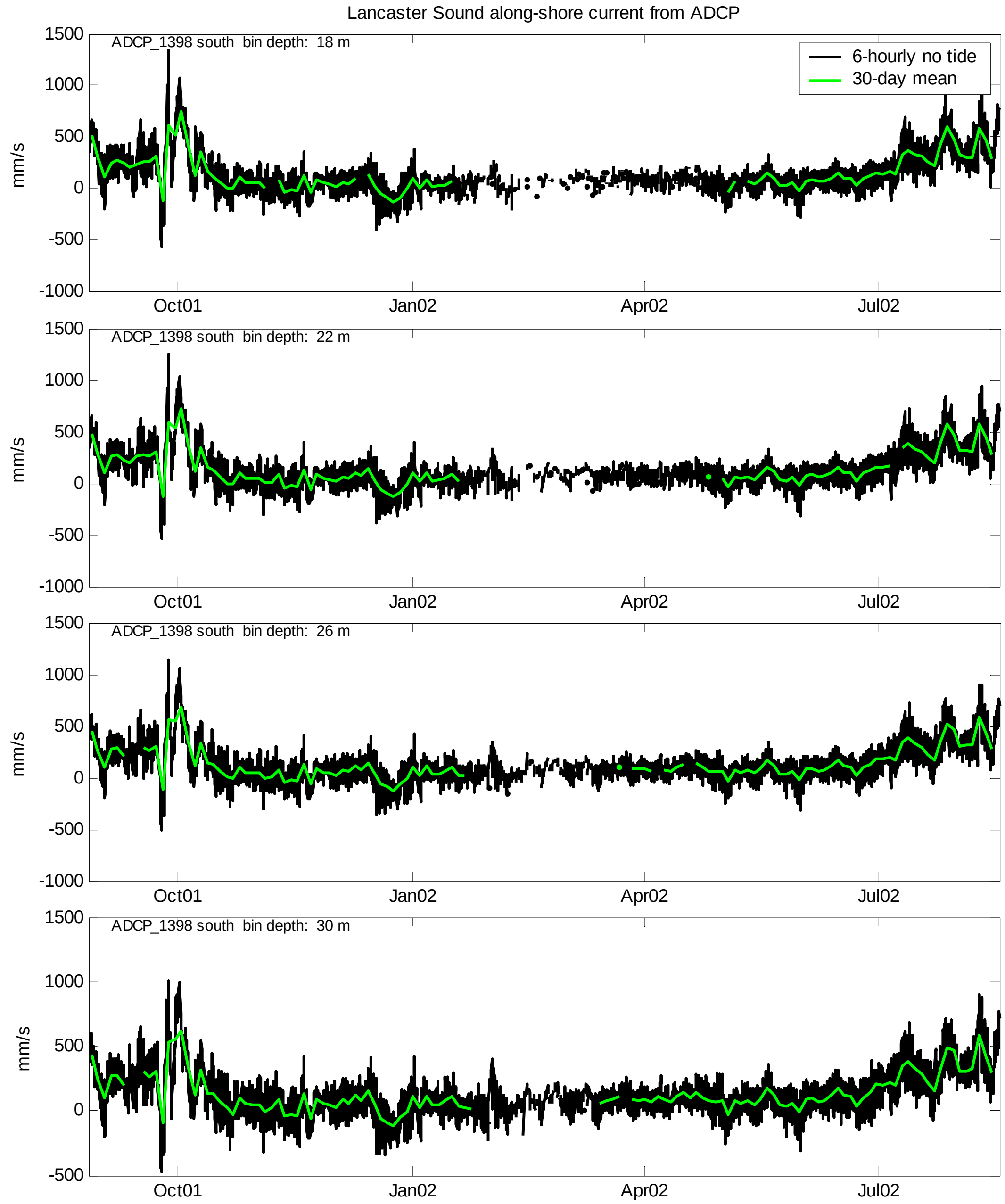

Figure 2-69 Time series of alongshore current for mooring 1398 from 18, 22, 26, and 30 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

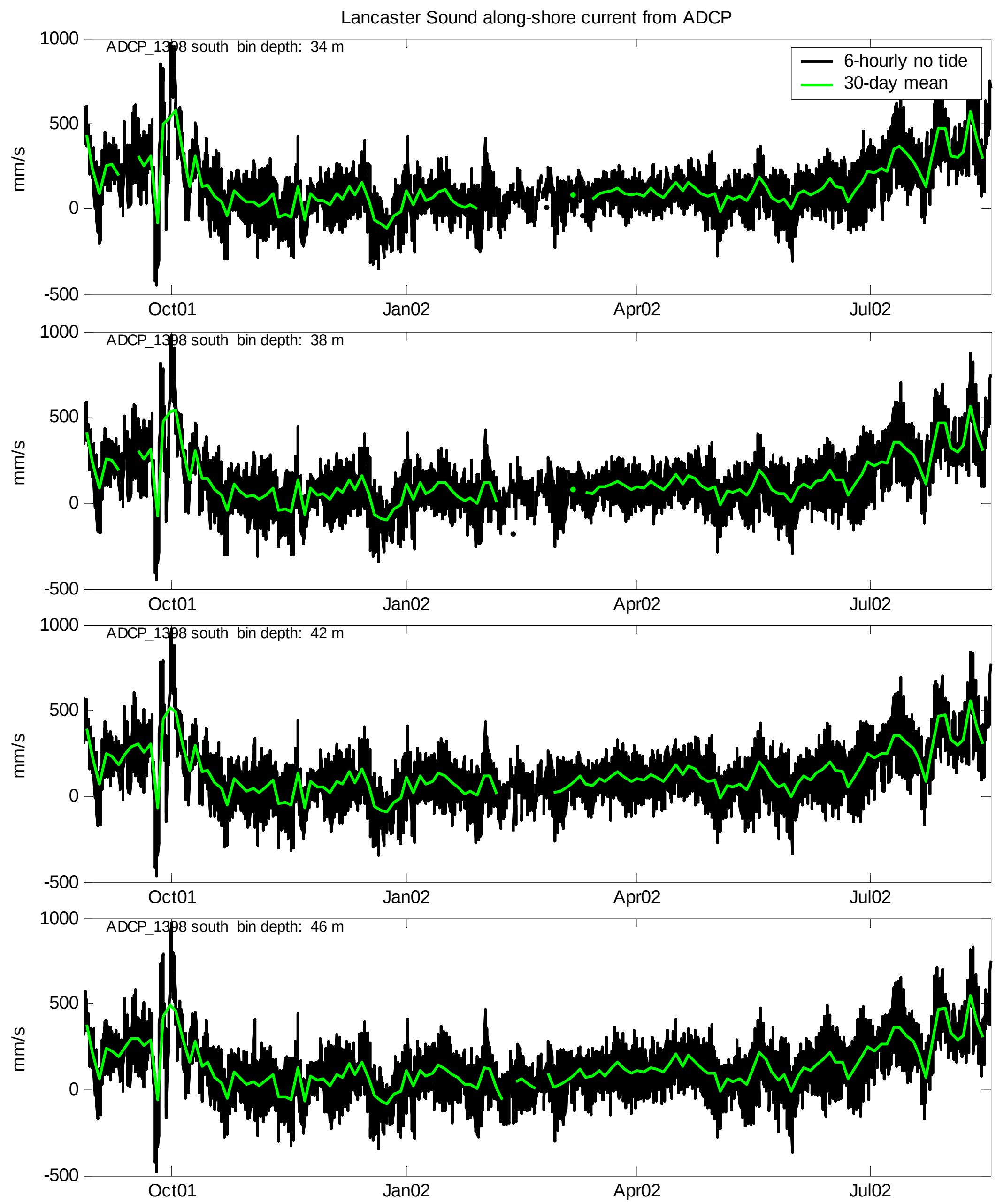

Figure 2-70 Time series of alongshore current for mooring 1398 from 34, 38, 42, and 46 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

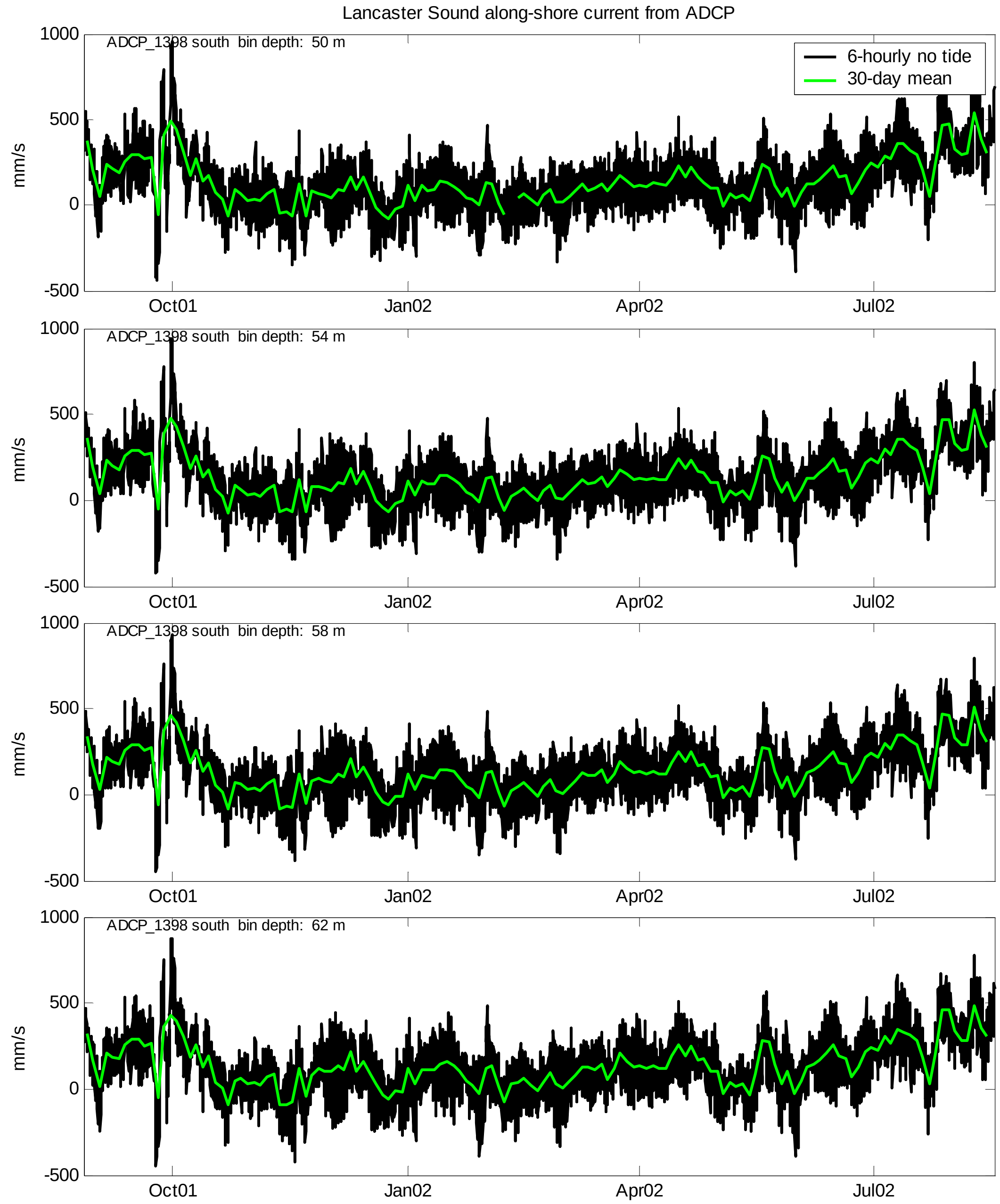

Figure 2-71 Time series of alongshore current for mooring 1398 from 50, 54, 58, and 62 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

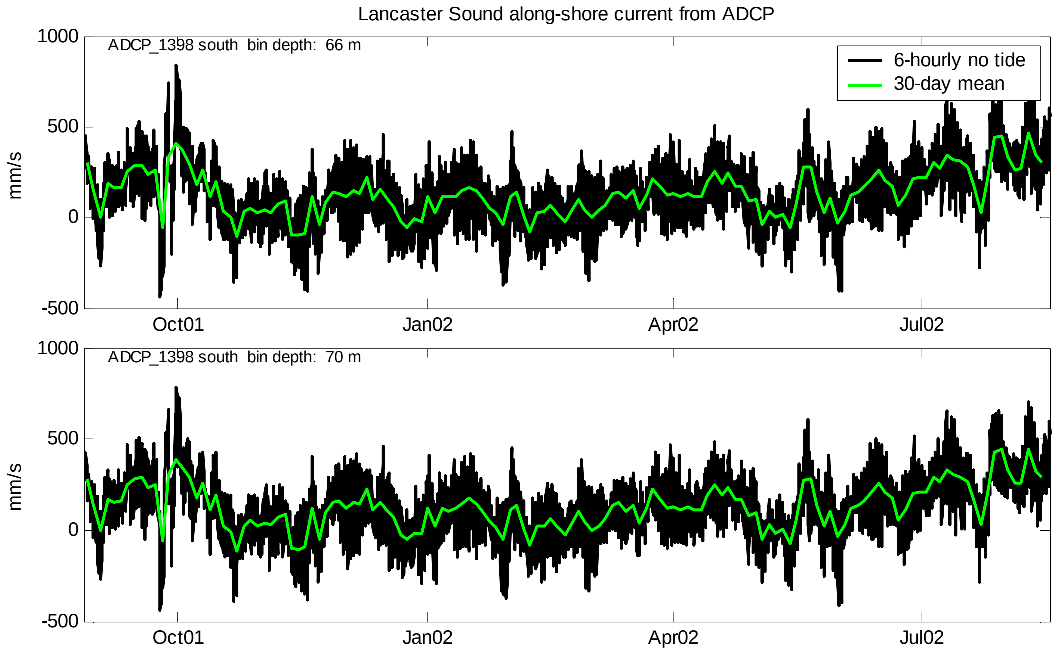

Figure 2-72 Time series of alongshore current for mooring 1398 from 66 and 70 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

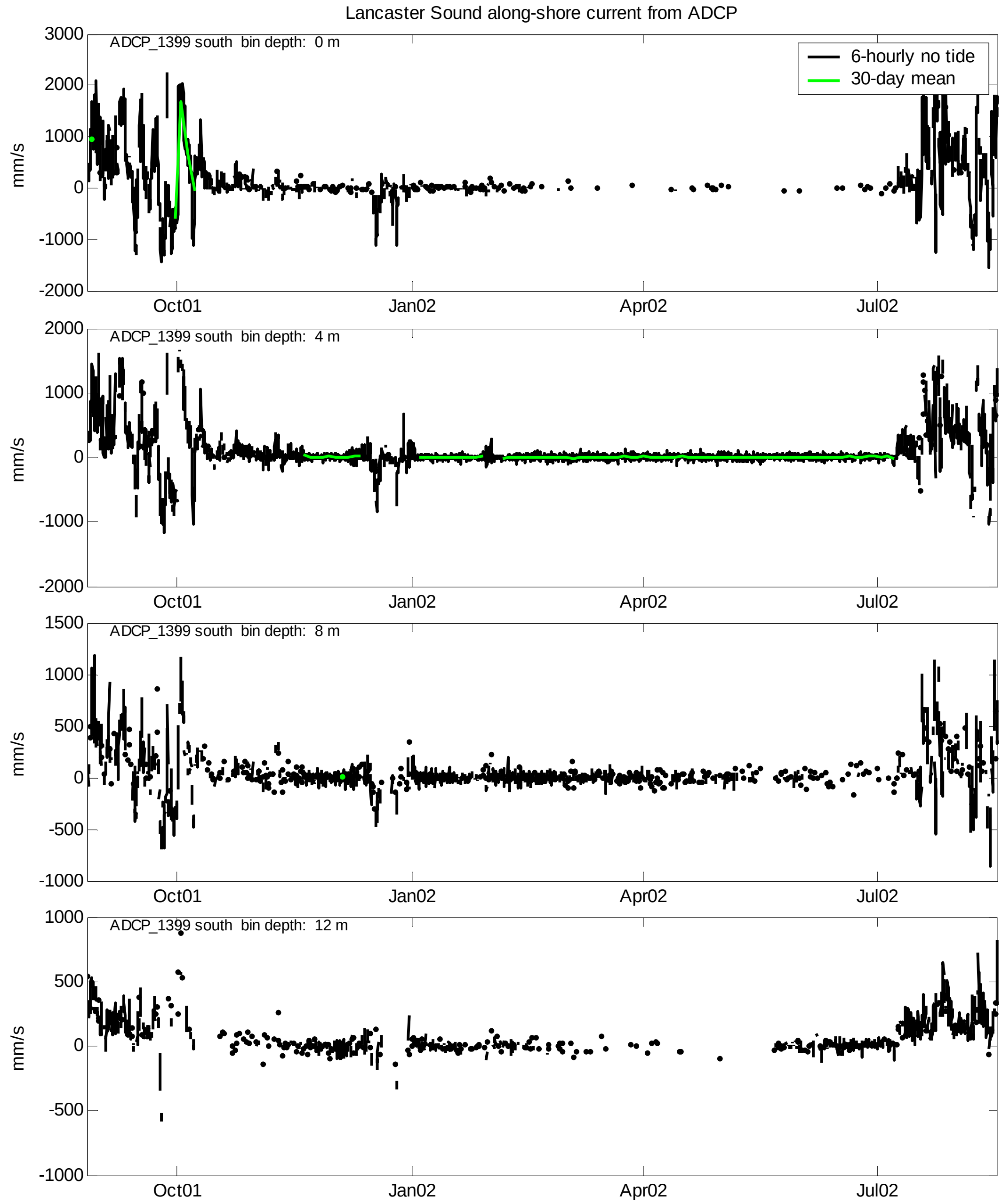

Figure 2-73 Time series of alongshore current for mooring 1399 from 0, 4, 8, and 12 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

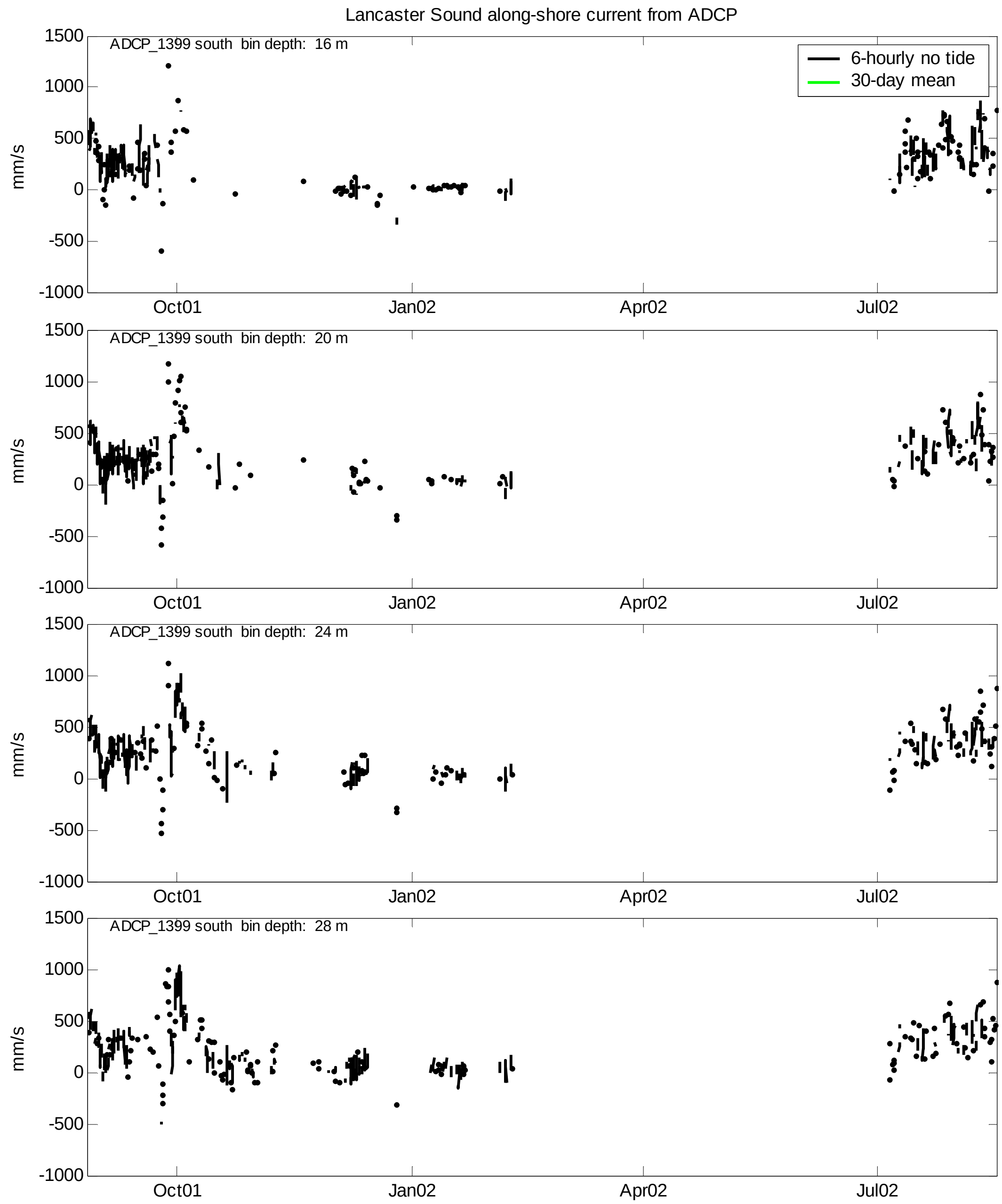

Figure 2-74 Time series of alongshore current for mooring 1399 from 16, 20, 24, and 28 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

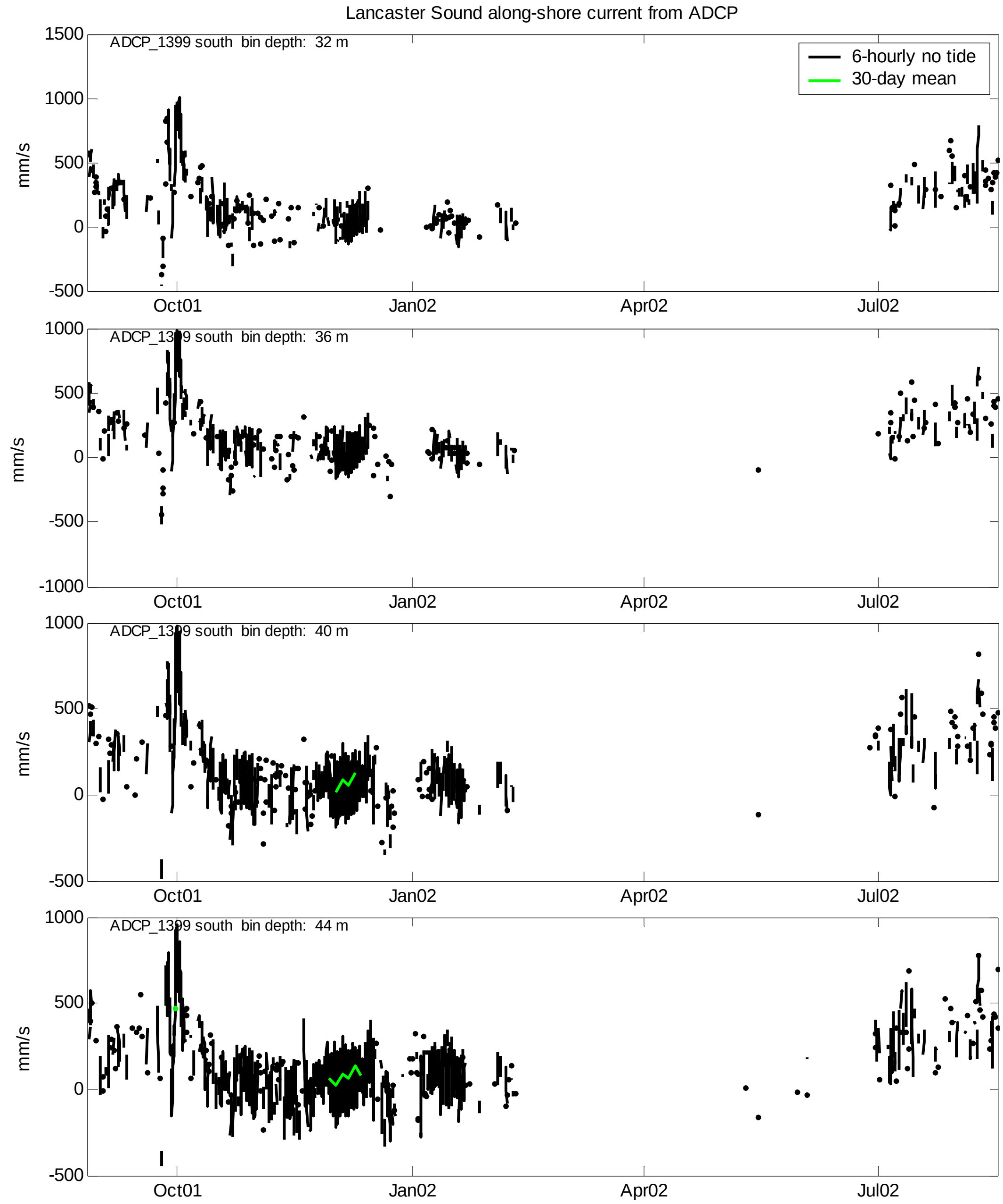

Figure 2-75 Time series of alongshore current for mooring 1399 from 32, 36, 40, and 44 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

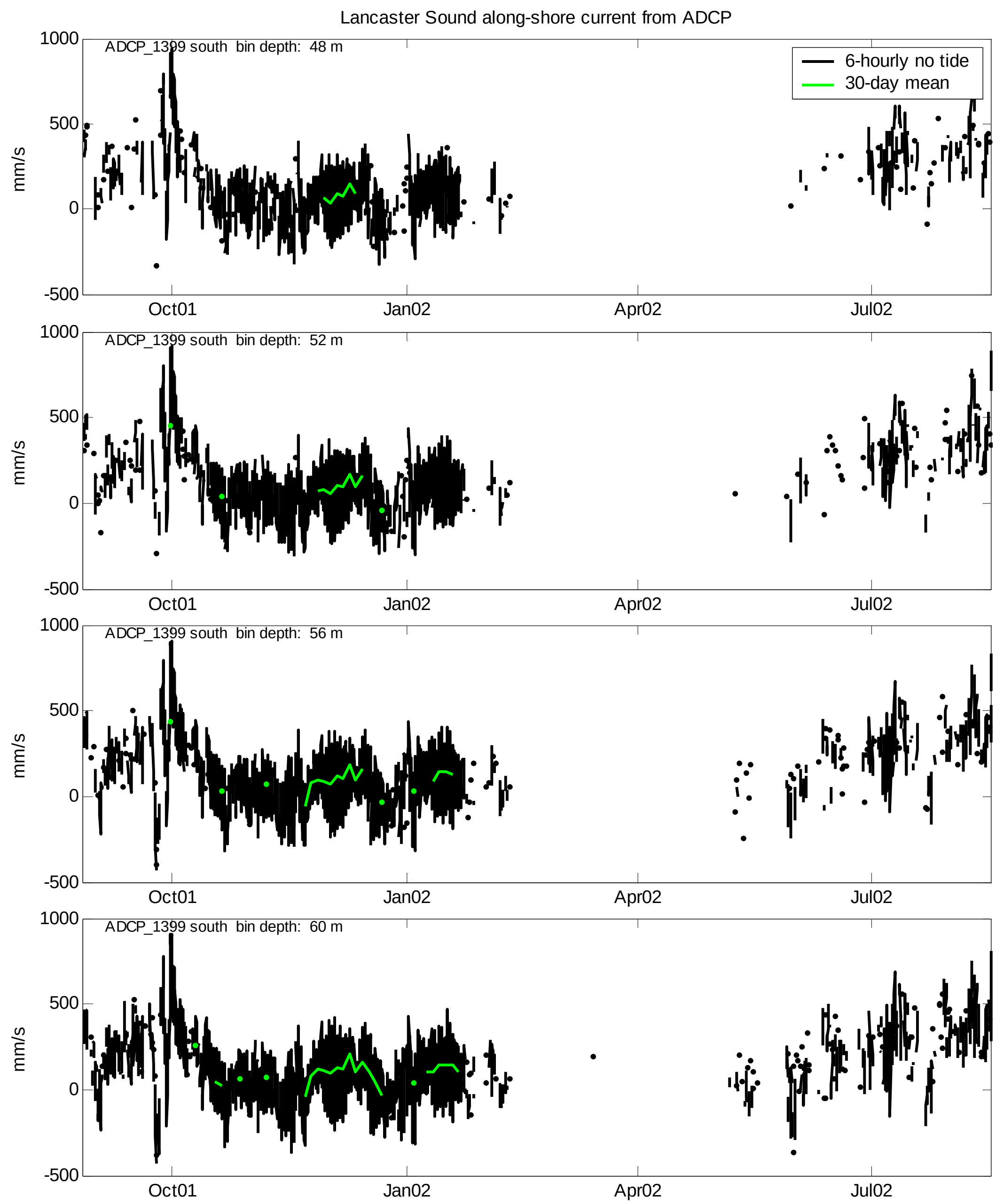

Figure 2-76 Time series of alongshore current for mooring 1399 from 48, 52, 56, and 60 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

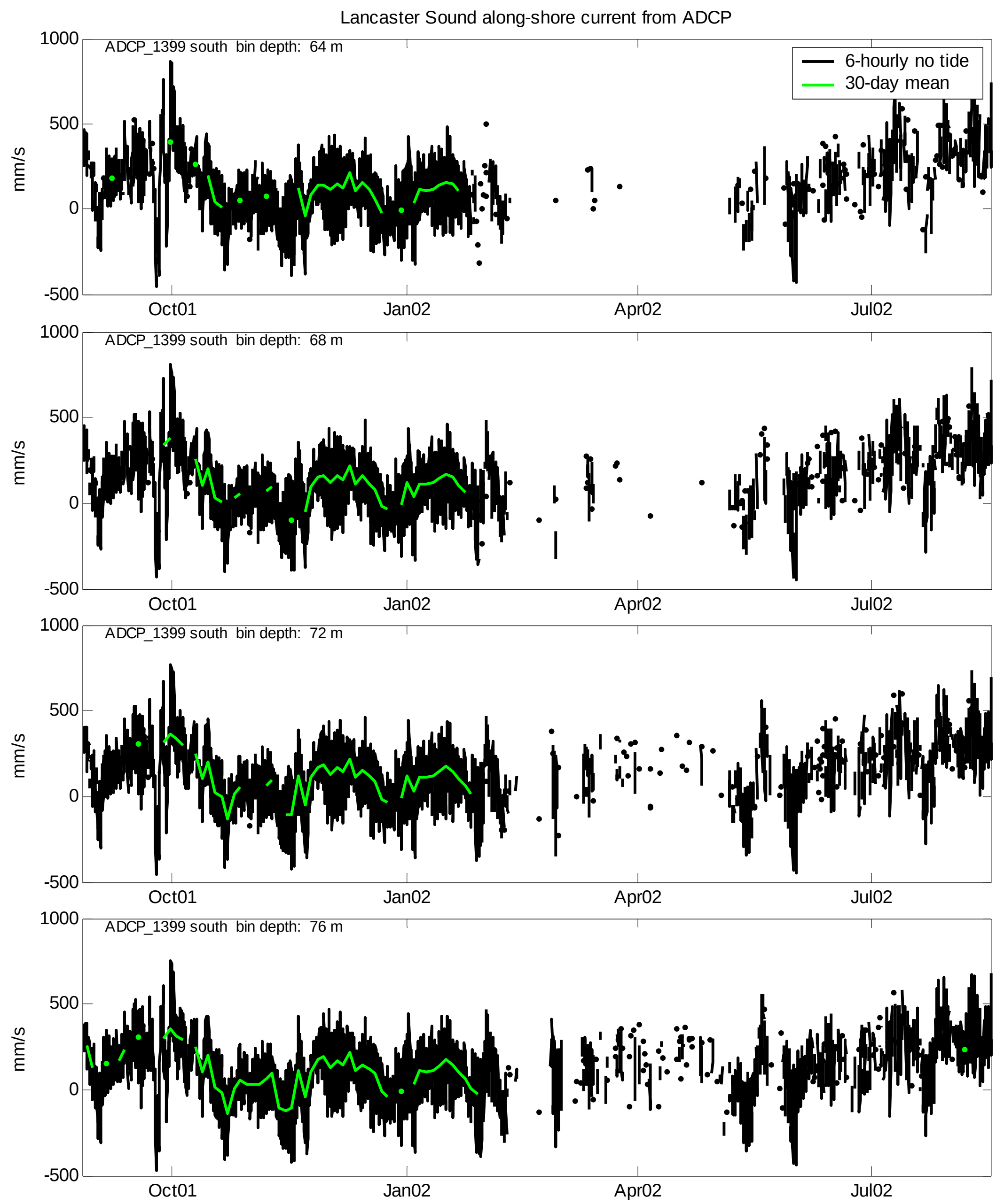

Figure 2-77 Time series of alongshore current for mooring 1399 from 64, 68, 72, and 76 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

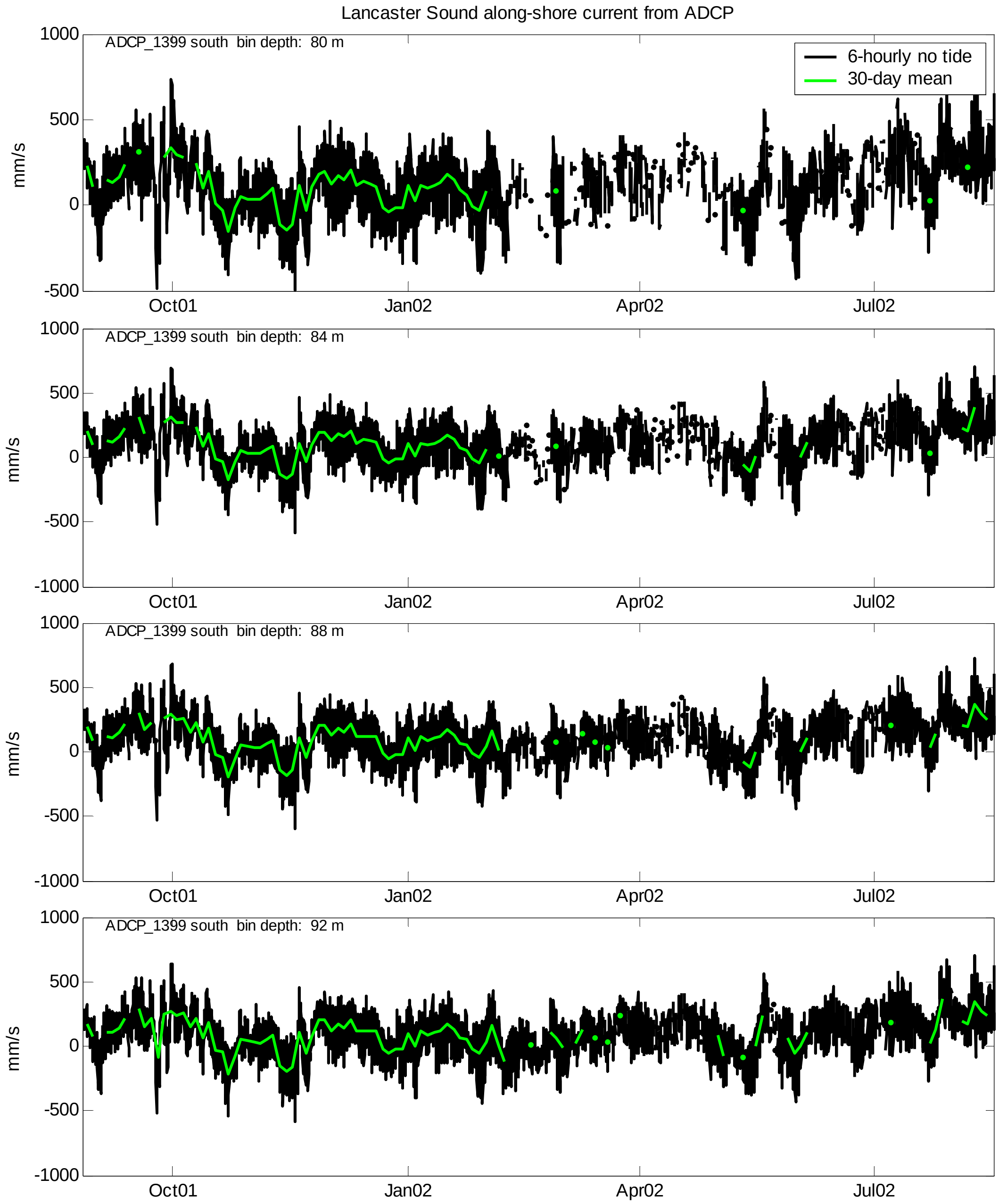

Figure 2-78 Time series of alongshore current for mooring 1399 from 80, 84, 88, and 92 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

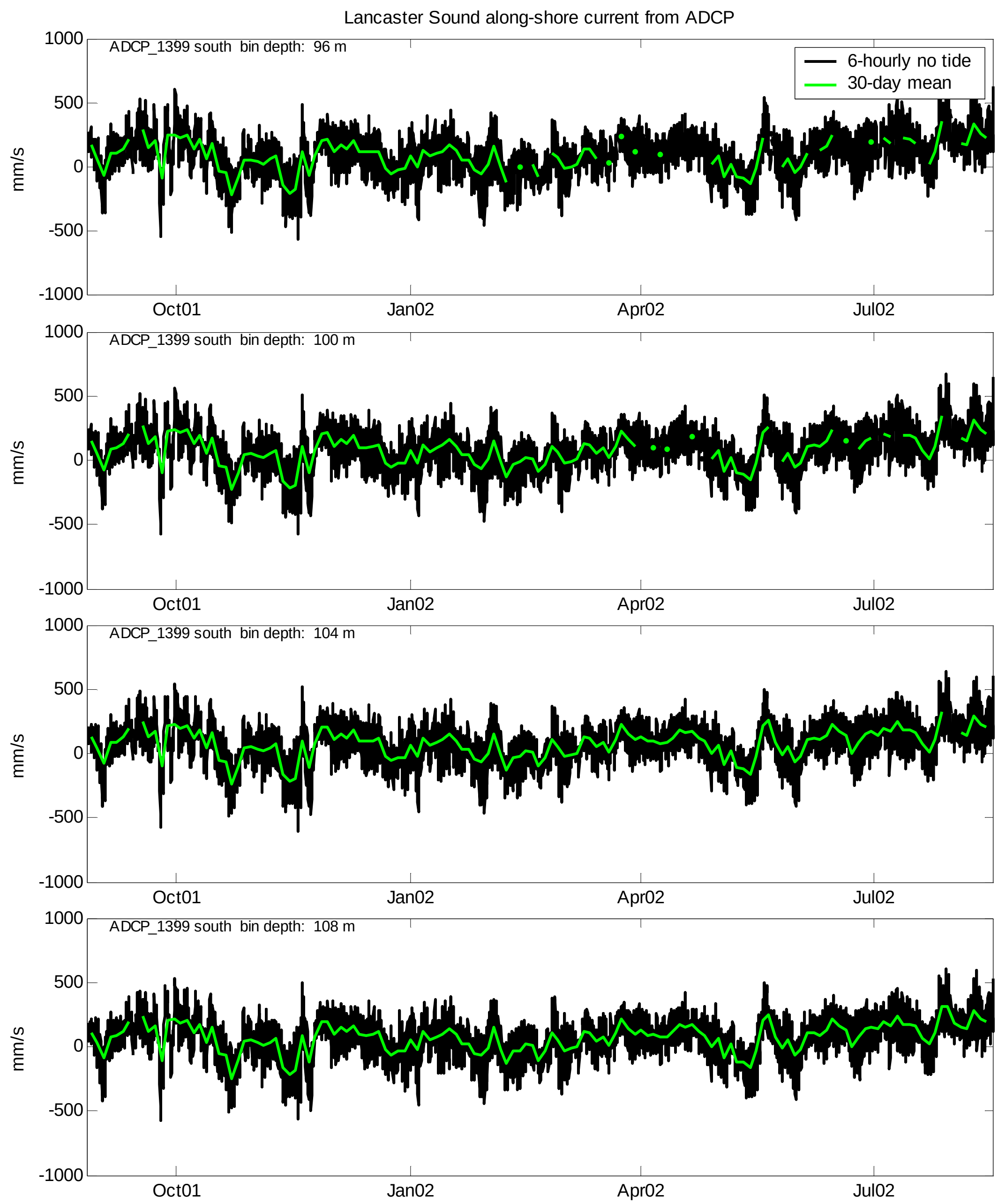

Figure 2-79 Time series of alongshore current for mooring 1399 from 96, 100, 104, and 108 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

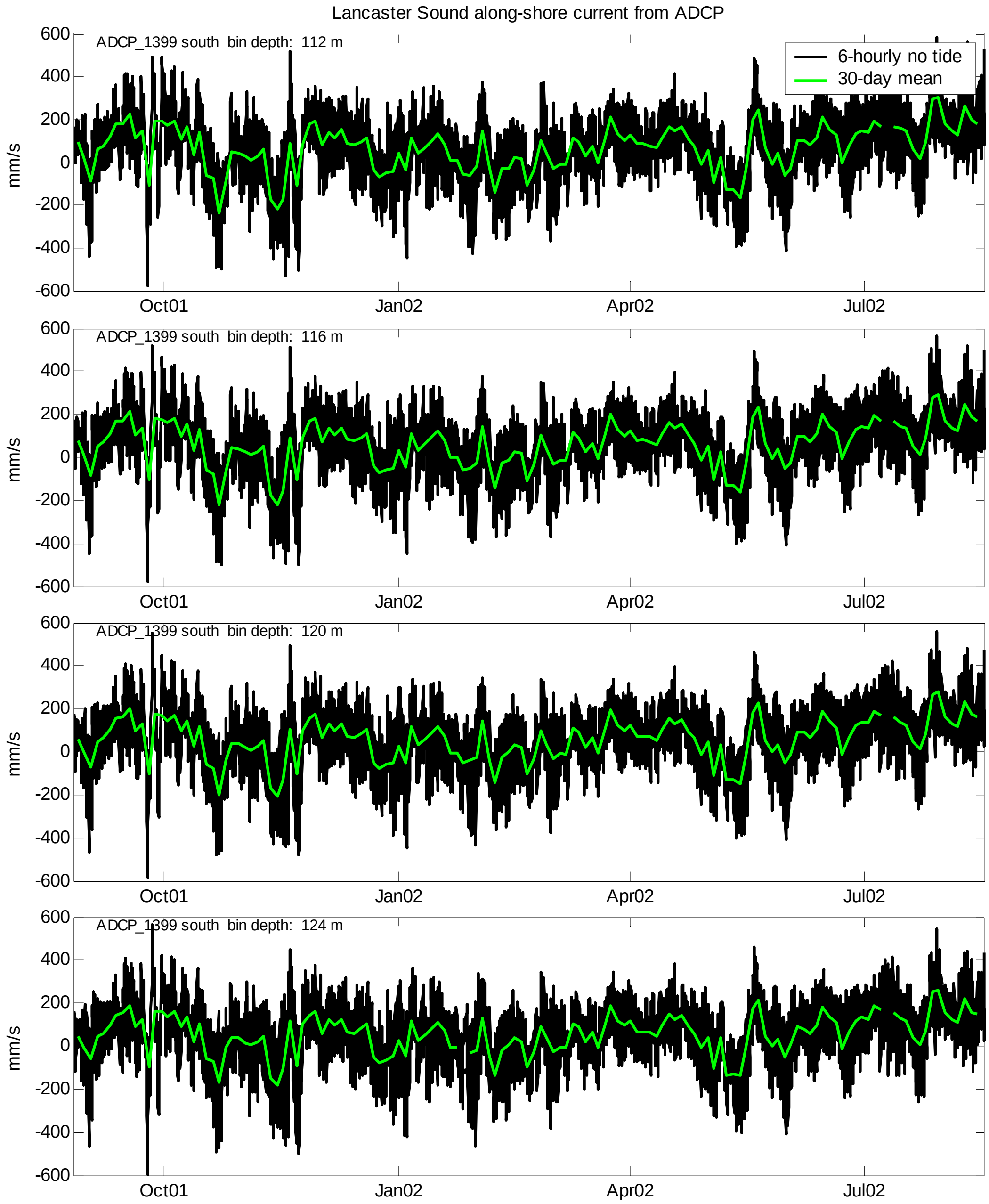

Figure 2-80 Time series of alongshore current for mooring 1399 from 112, 116, 120, and 124 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

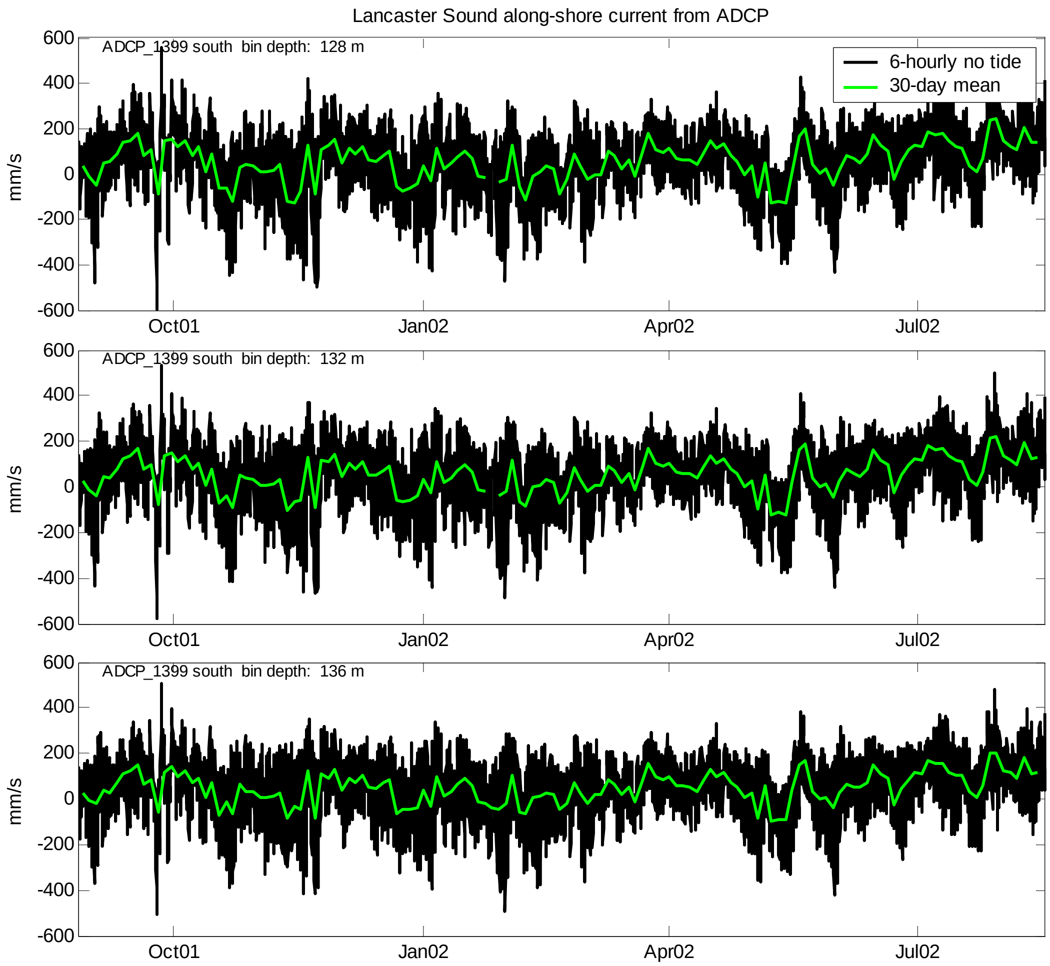

Figure 2-81 Time series of alongshore current for mooring 1399 from 128, 132, and 136 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

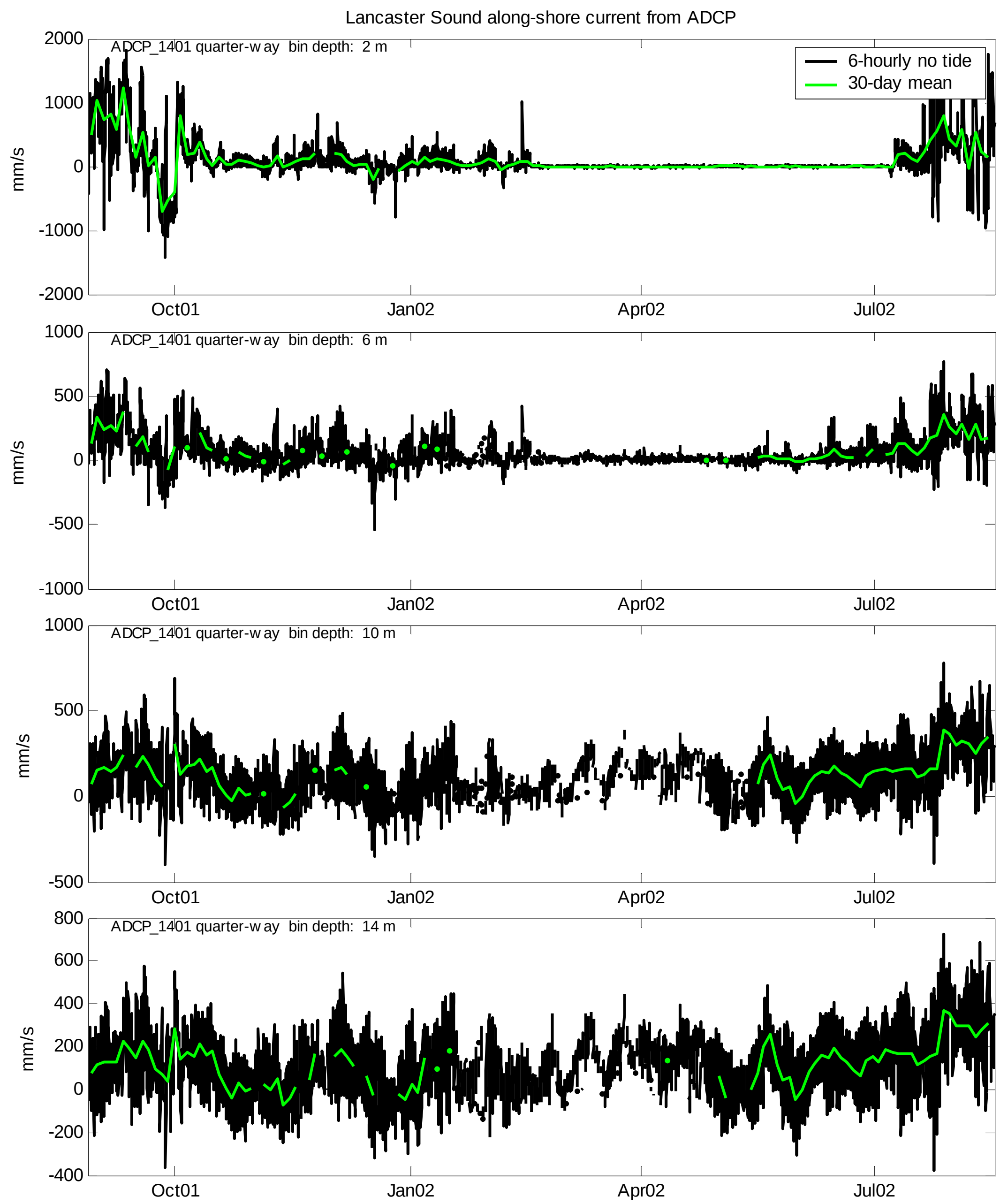

Figure 2-82 Time series of alongshore current for mooring 1401 from 2, 6, 10, and 14 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

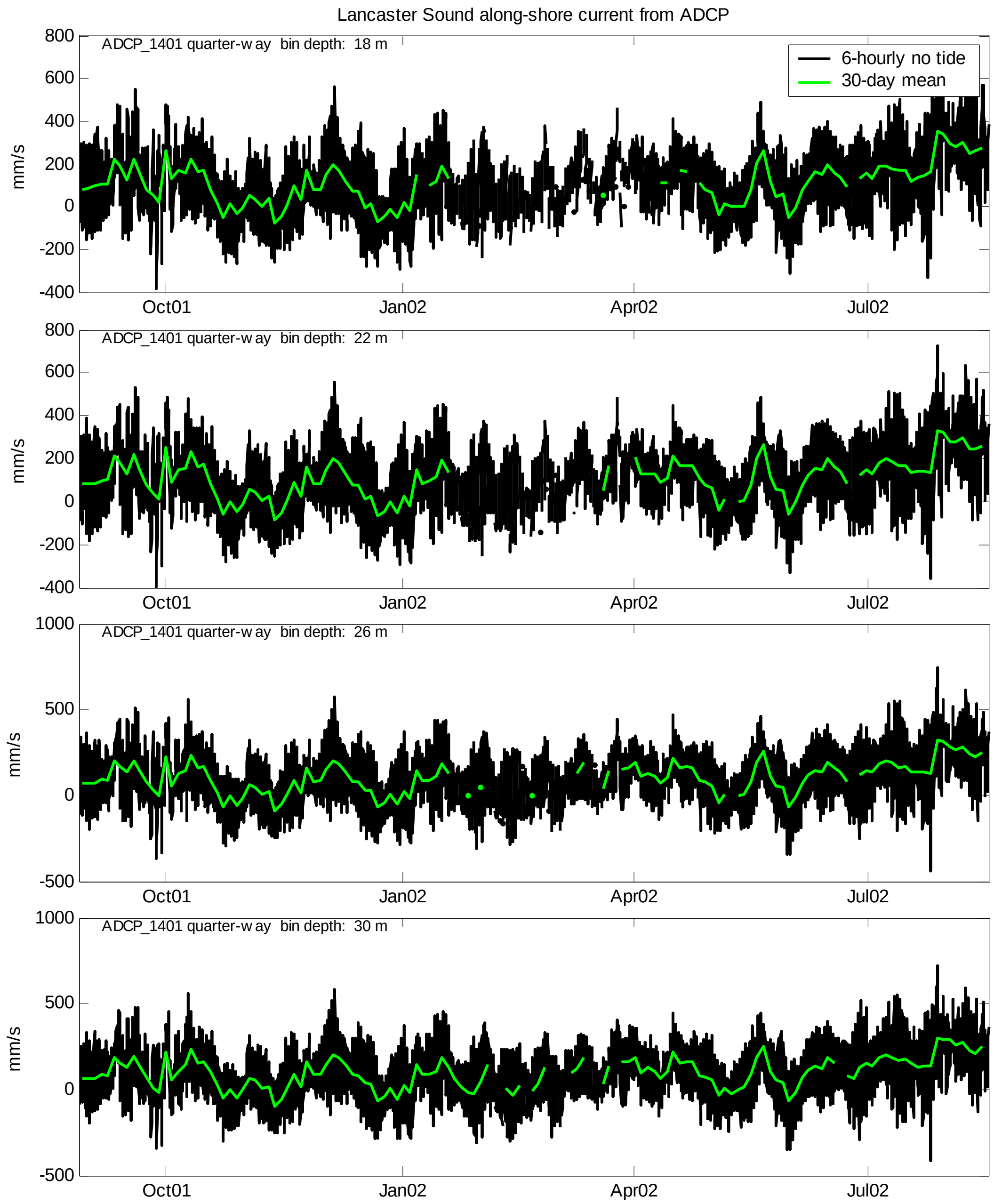

Figure 2-83 Time series of alongshore current for mooring 1401 from 18, 22, 26, and 30 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

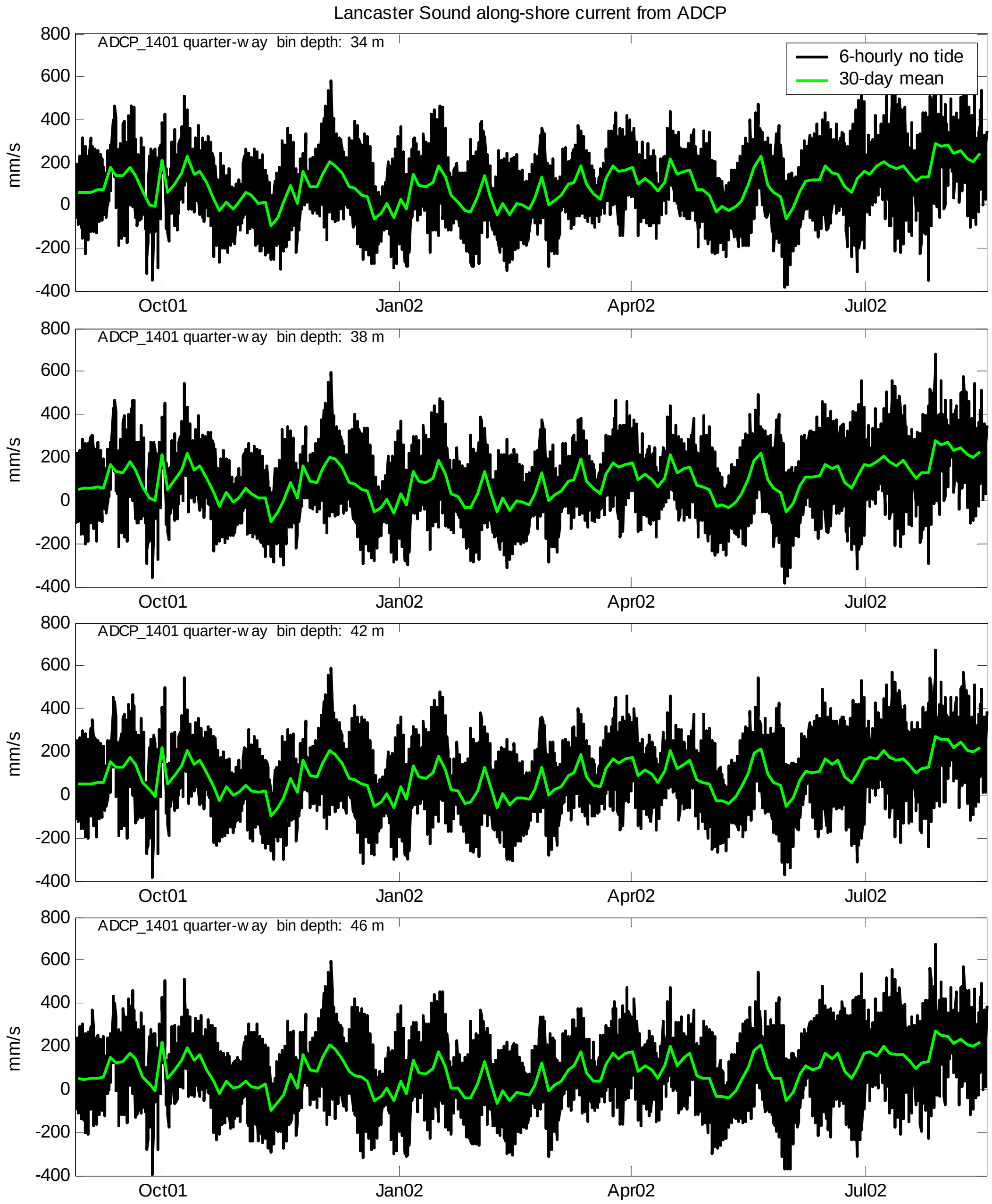

Figure 2-84 Time series of alongshore current for mooring 1401 from 34, 38, 42, and 46 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

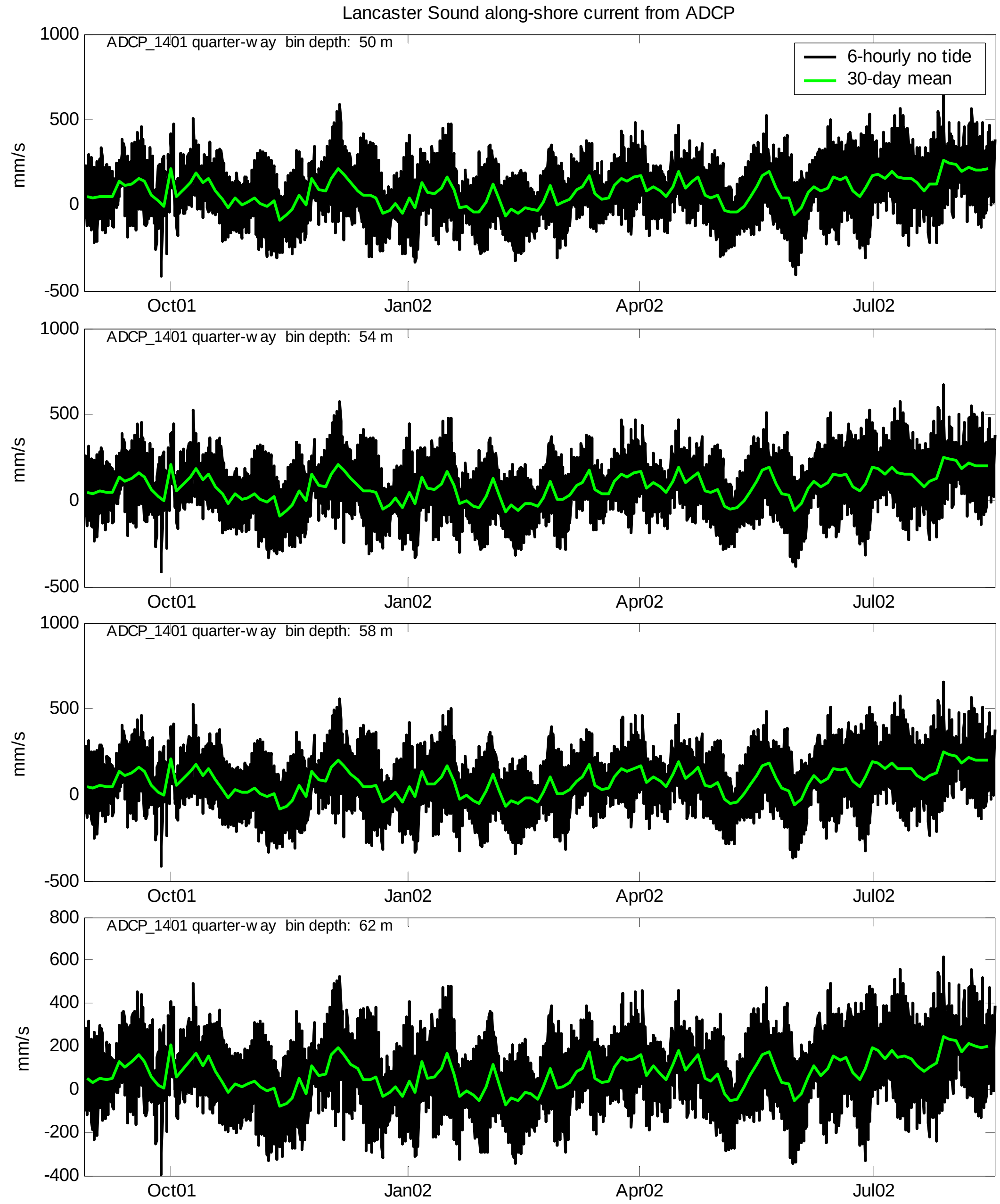

Figure 2-85 Time series of alongshore current for mooring 1401 from 50, 54, 58, and 62 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

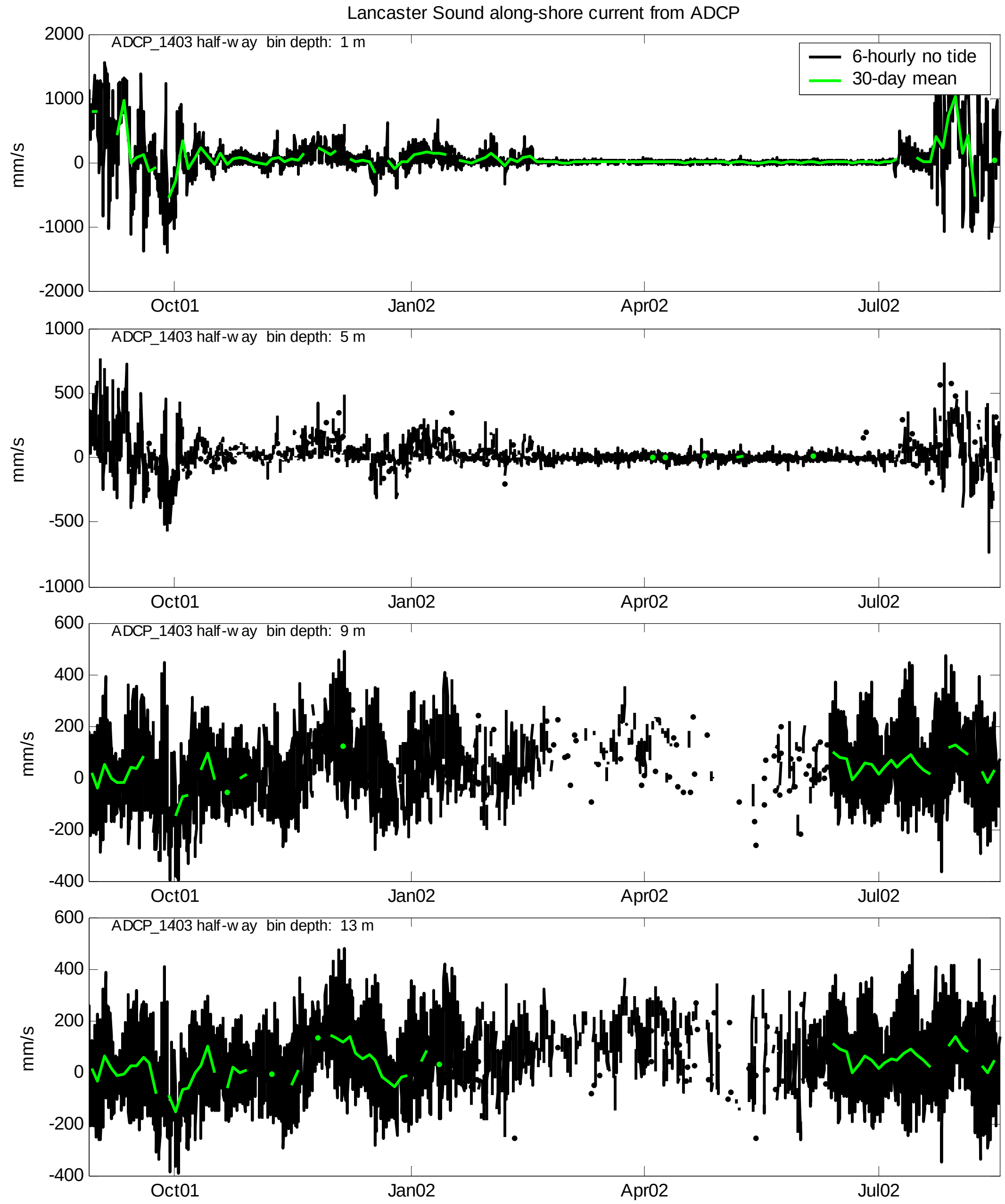

Figure 2-86 Time series of alongshore current for mooring 1403 from 1, 5, 9, and 13 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

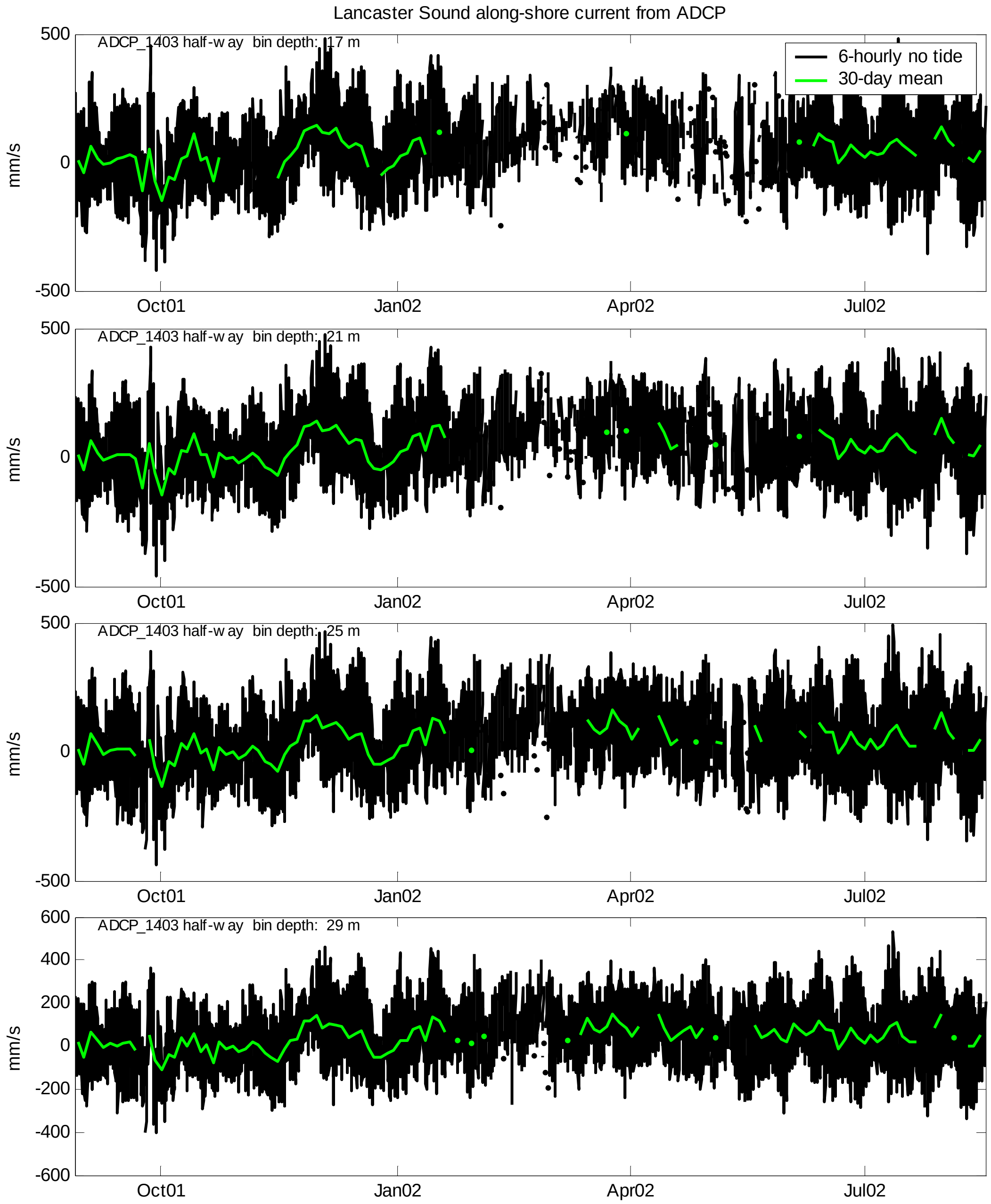

Figure 2-87 Time series of alongshore current for mooring 1403 from 17, 21, 25, and 29 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

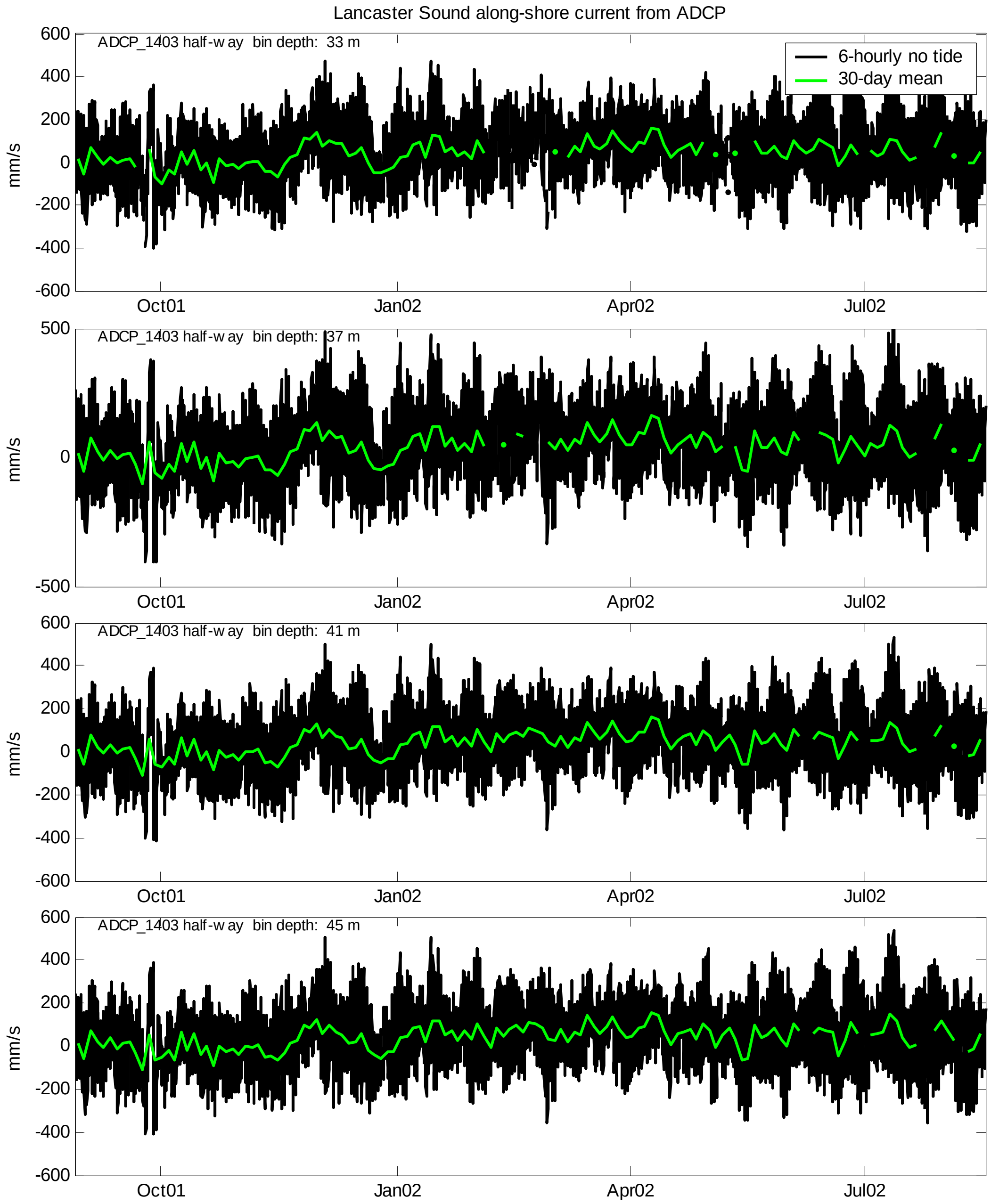

Figure 2-88 Time series of alongshore current for mooring 1403 from 33, 37, 41, and 45 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

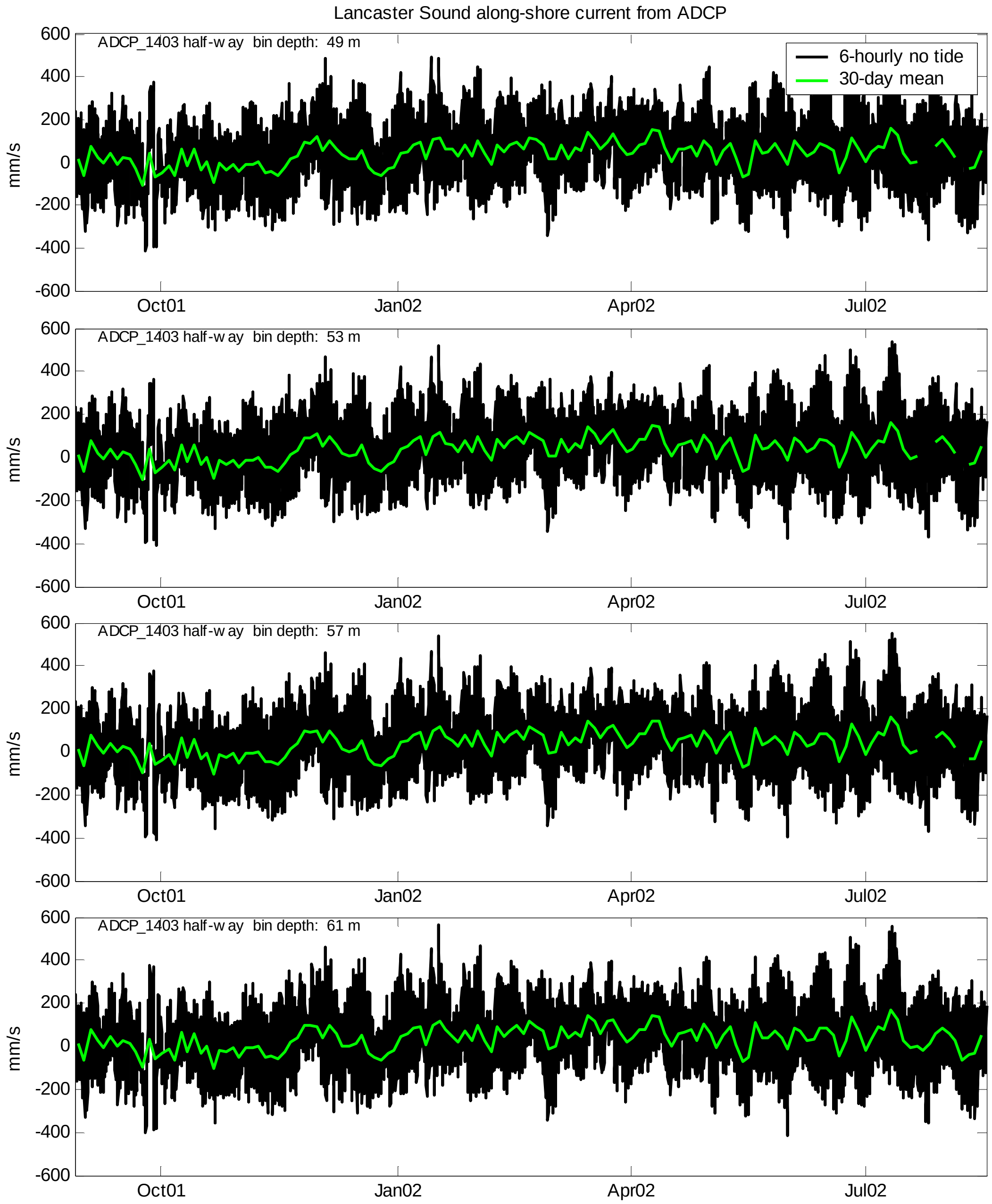

Figure 2-89 Time series of alongshore current for mooring 1403 from 49, 53, 57, and 61 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

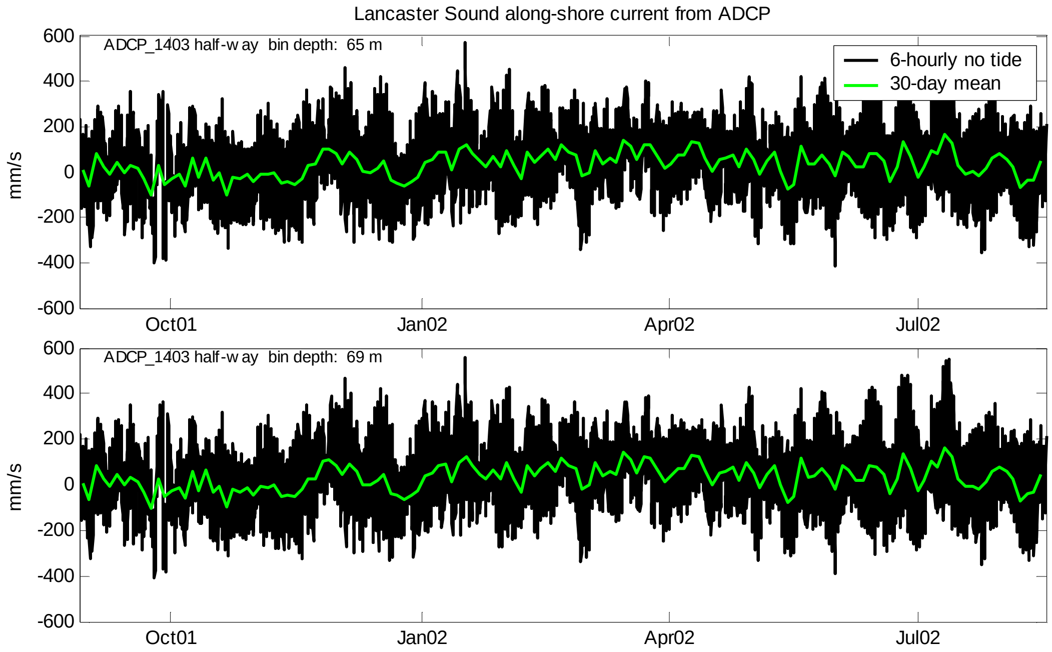

Figure 2-90 Time series of alongshore current for mooring 1403 from 65 and 69 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

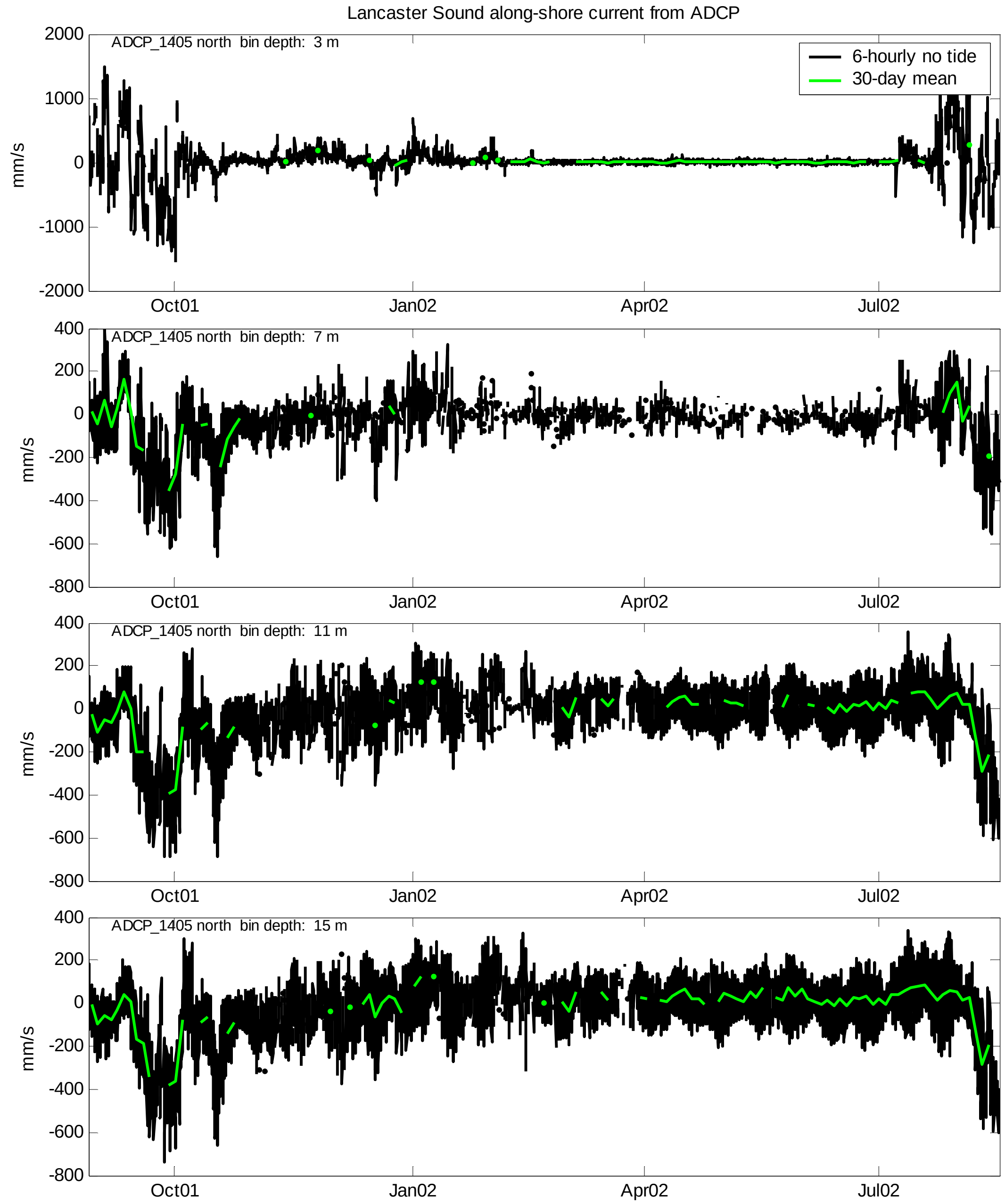

Figure 2-91 Time series of alongshore current for mooring 1405 from 3, 7, 11, and 15 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

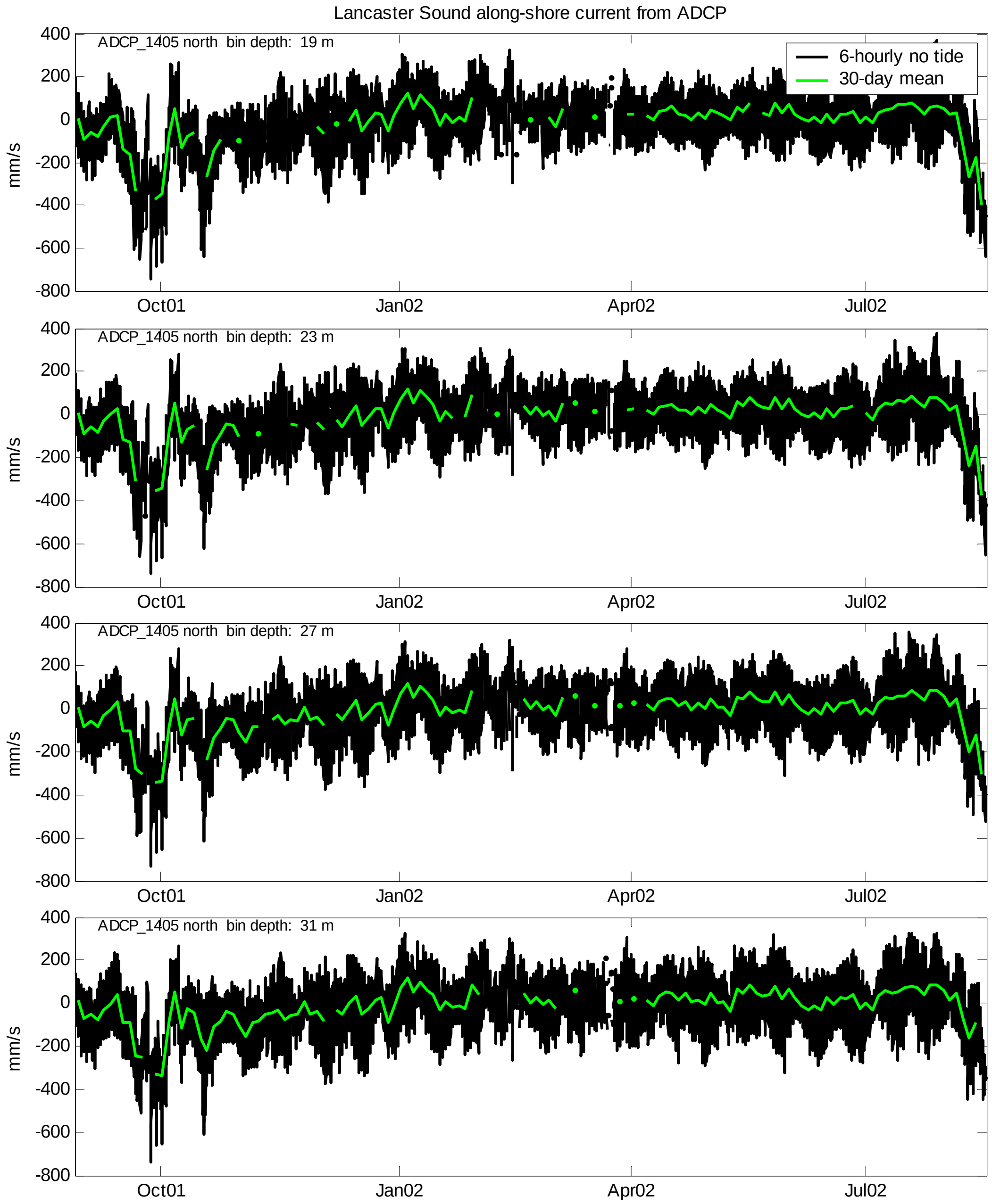

Figure 2-92 Time series of alongshore current for mooring 1405 from 19, 23, 27, and 31 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

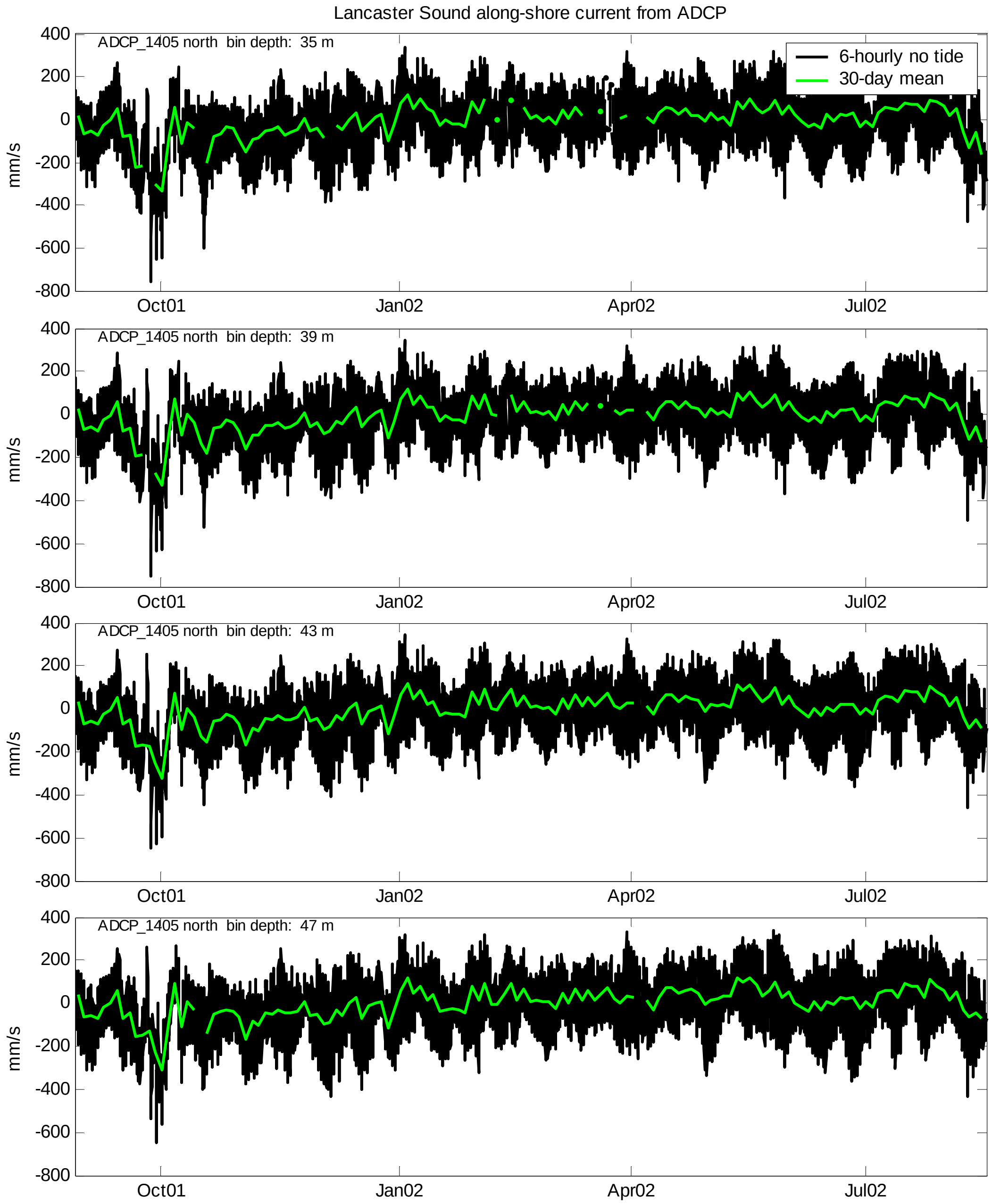

Figure 2-93 Time series of alongshore current for mooring 1405 from 35, 39, 43, and 47 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

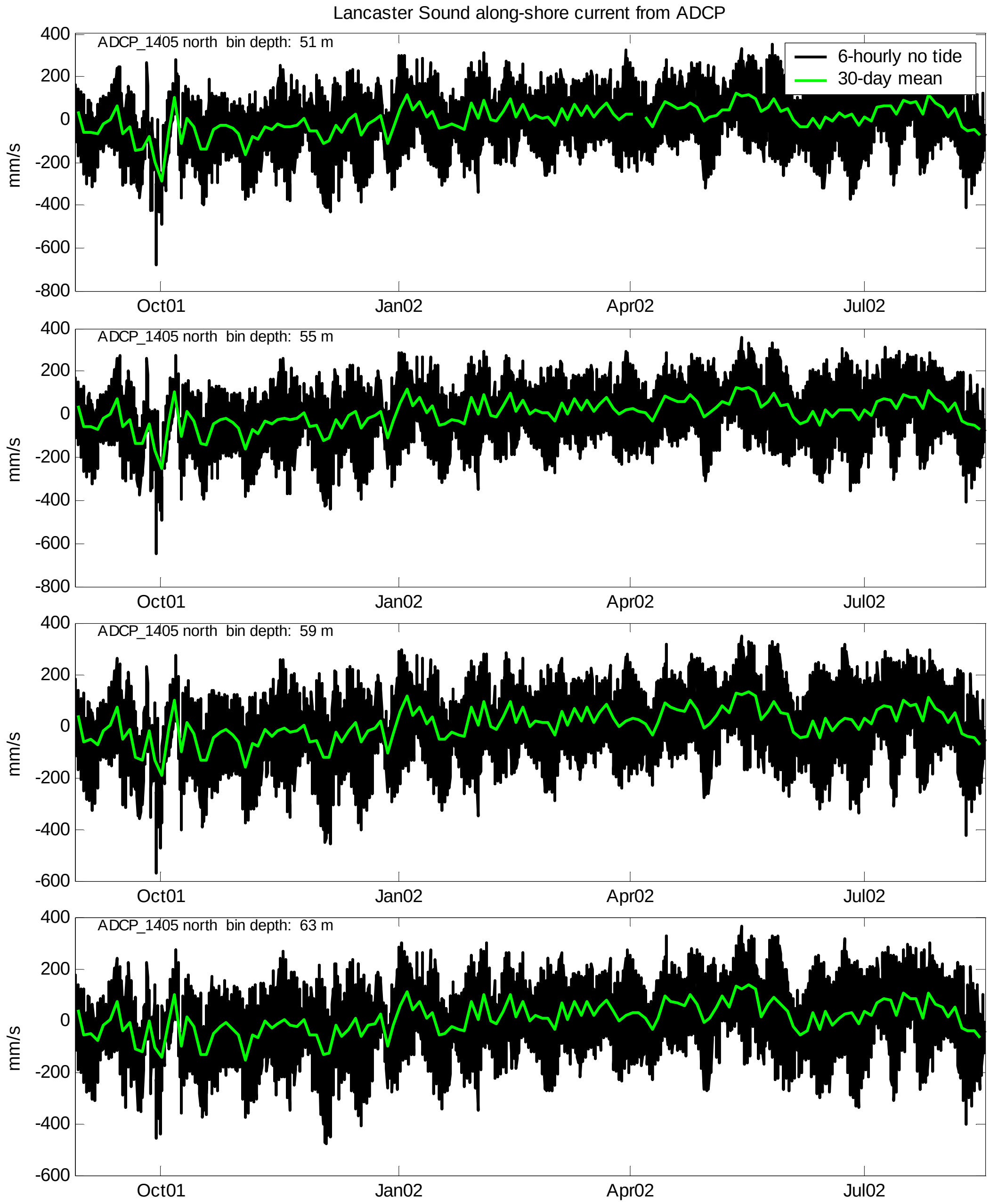

Figure 2-94 Time series of alongshore current for mooring 1405 from 51, 55, 59, and 63 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

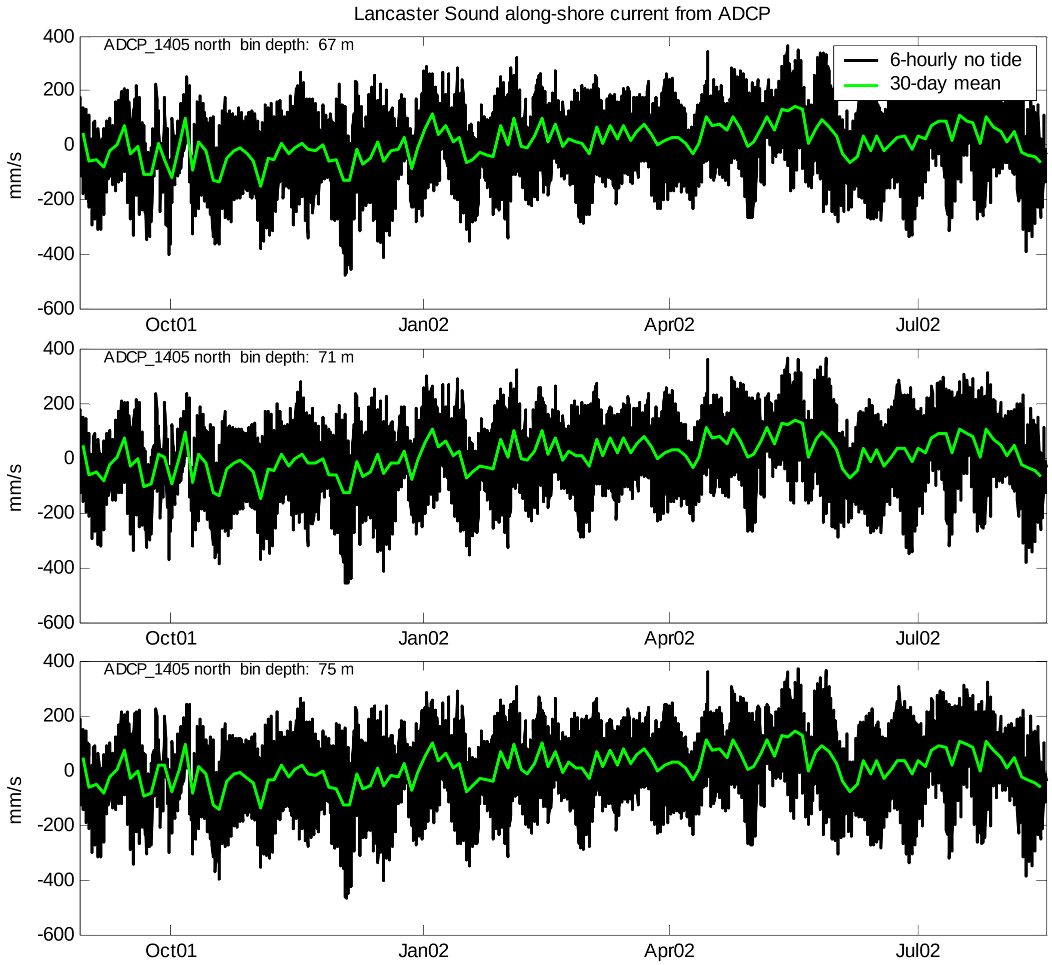

Figure 2-95 Time series of alongshore current for mooring 1405 from 67, 71, and 75 m (2001 – 2002): 30-day mean and tidally filtered (6-hourly)

2.6 Power spectra of 2-hourly data

Results are similar to what was seen in van der Baaren, et al. (2003) using the same window and data blocking.

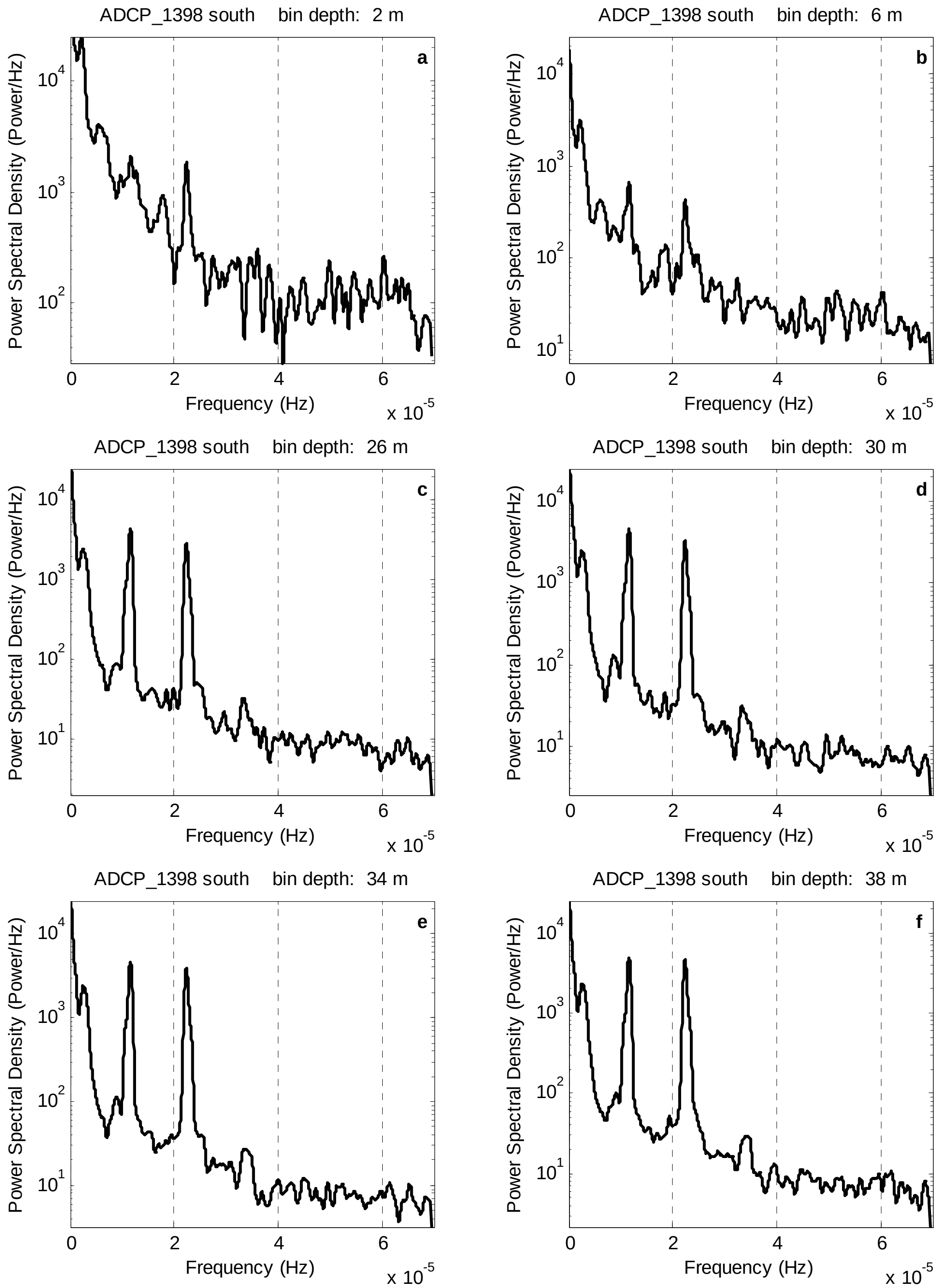

Figure 2-96 Power spectra for mooring 1398 from 2 to 38 m (2001 – 2002)

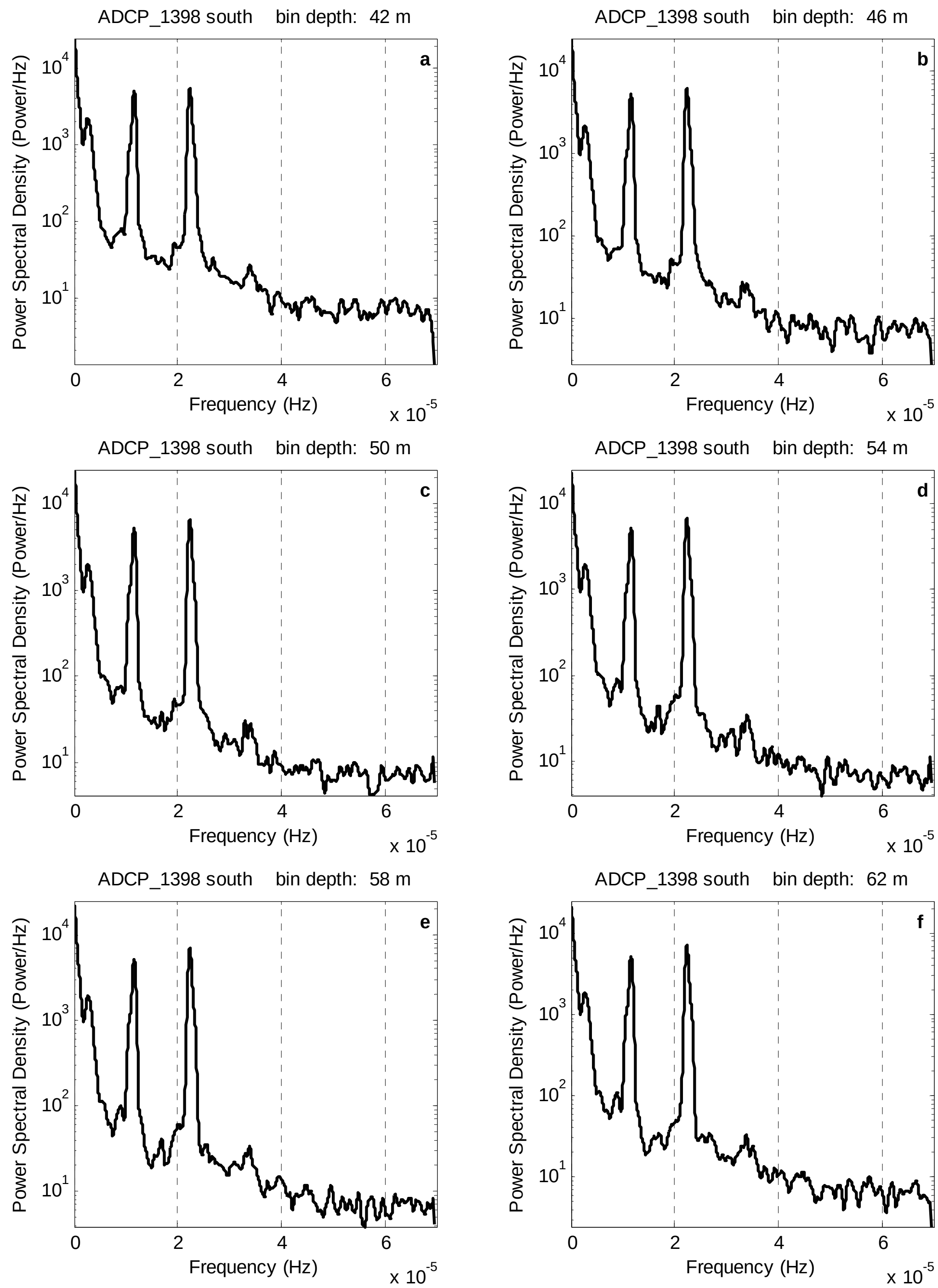

Figure 2-97 Power spectra for mooring 1398 from 42 to 62 m (2001 – 2002)

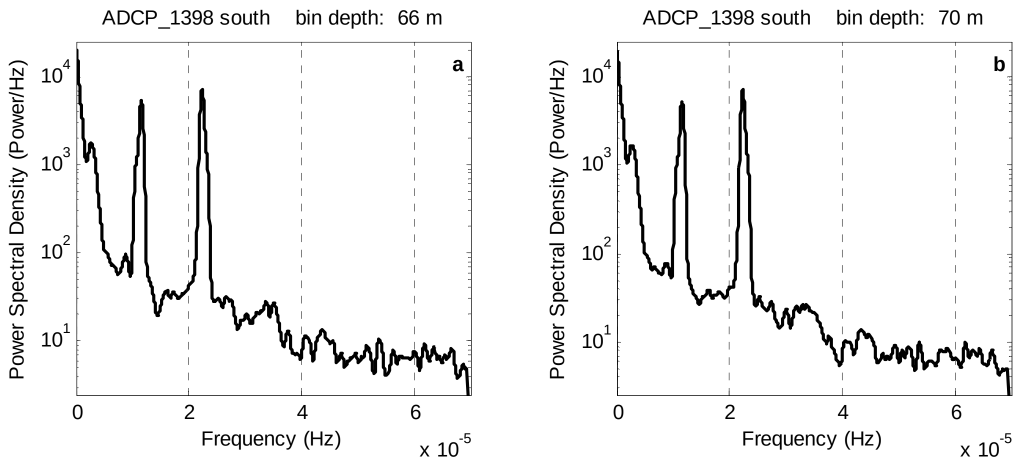

Figure 2-98 Power spectra for mooring 1398 from 66 to 70 m (2001 – 2002)

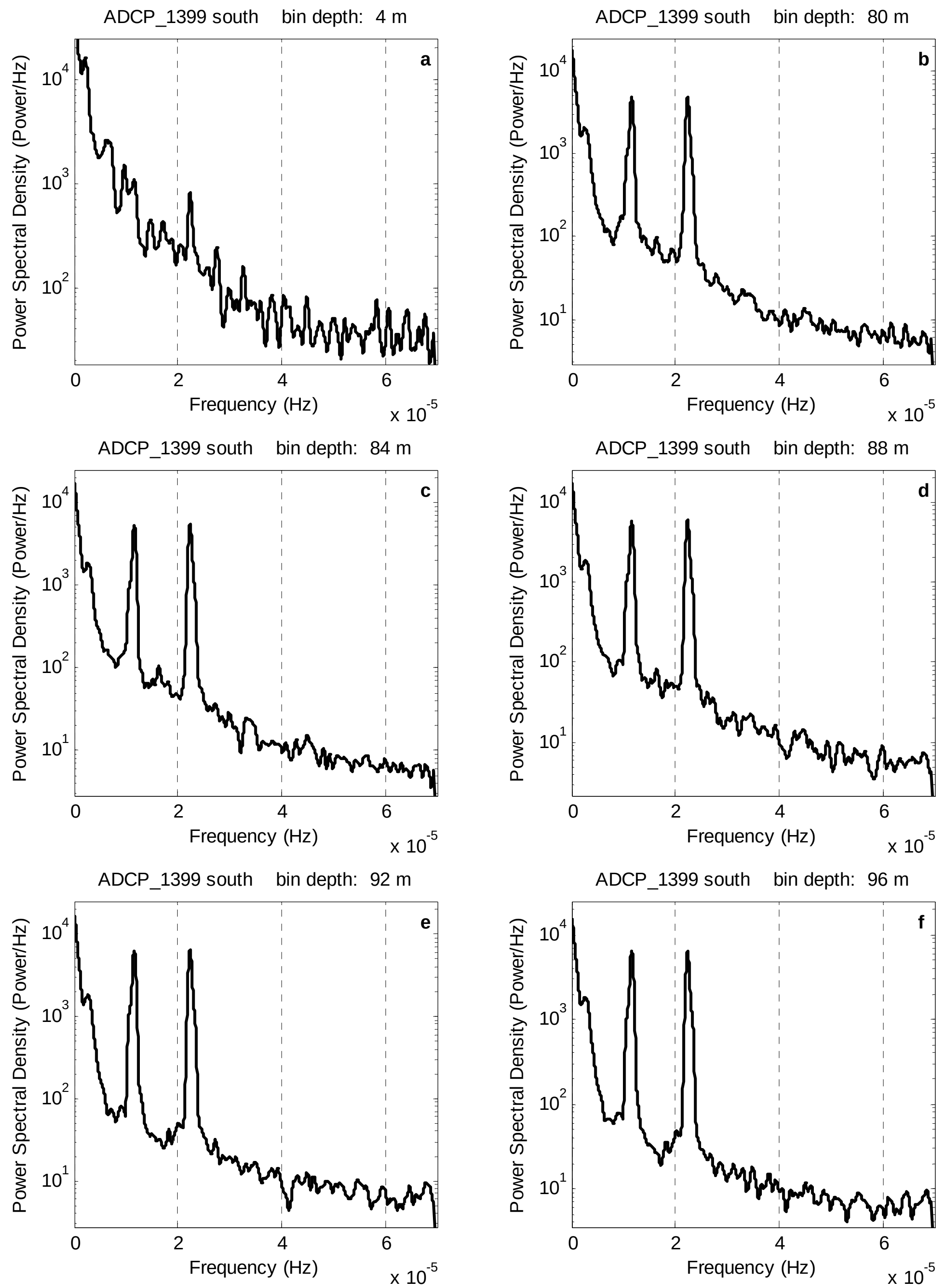

Figure 2-99 Power spectra for mooring 1399 from 4 to 96 m (2001 – 2002)

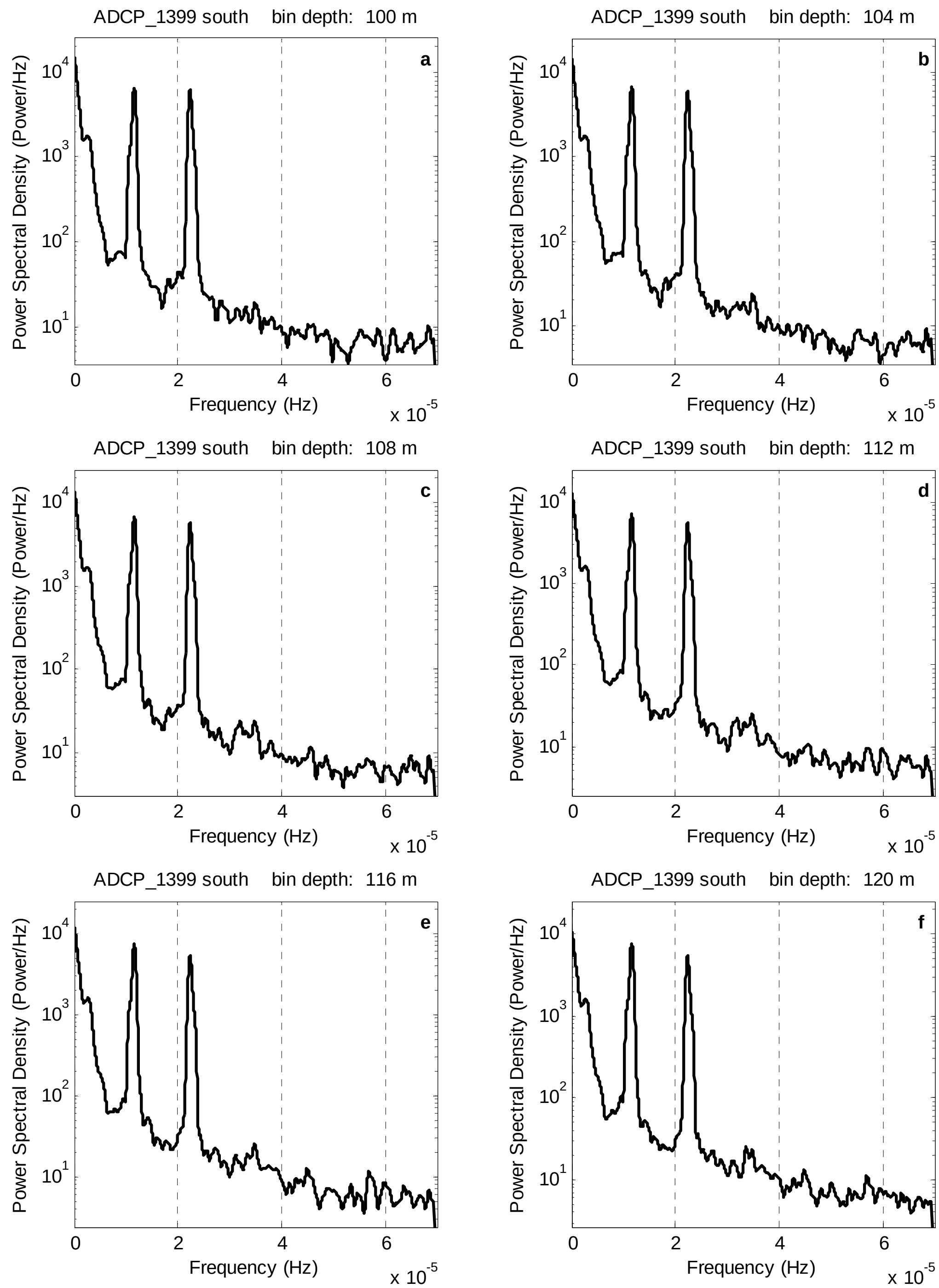

Figure 2-100 Power spectra for mooring 1399 from 100 to 120 m (2001 – 2002)

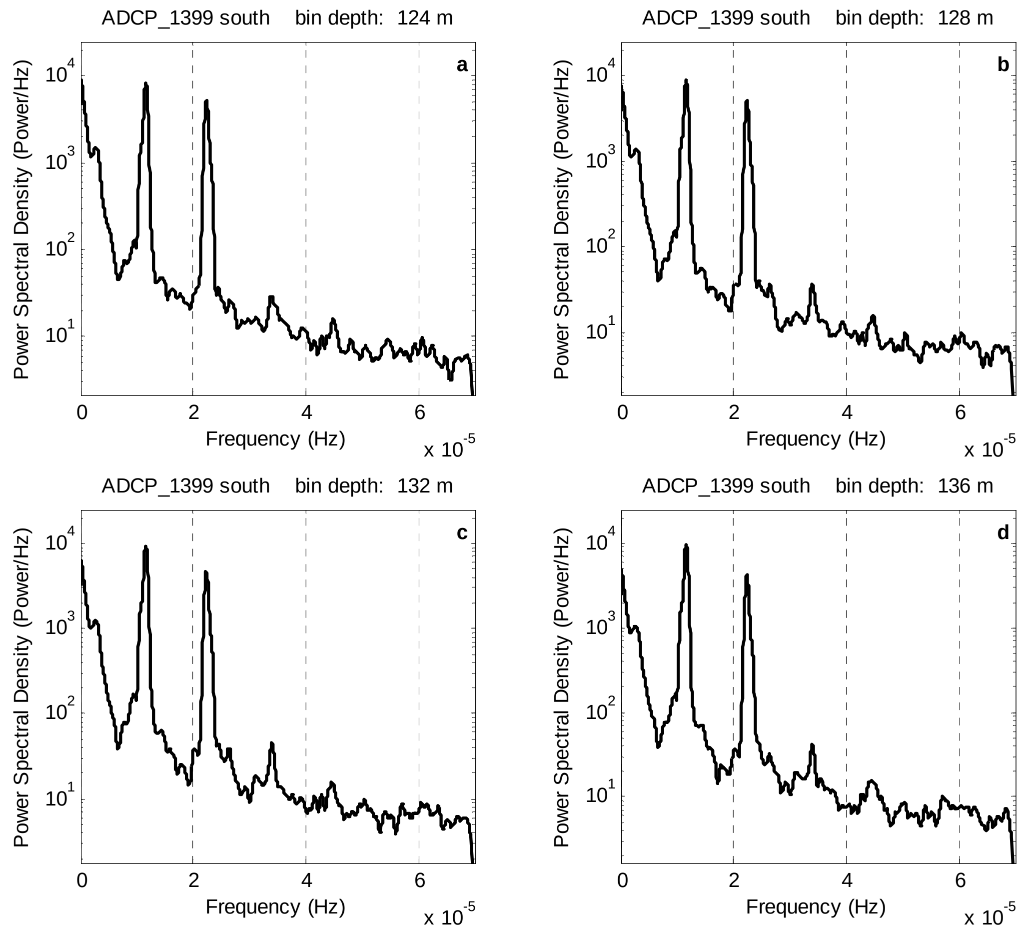

Figure 2-101 Power spectra for mooring 1399 from 124 to 136 m (2001 – 2002)

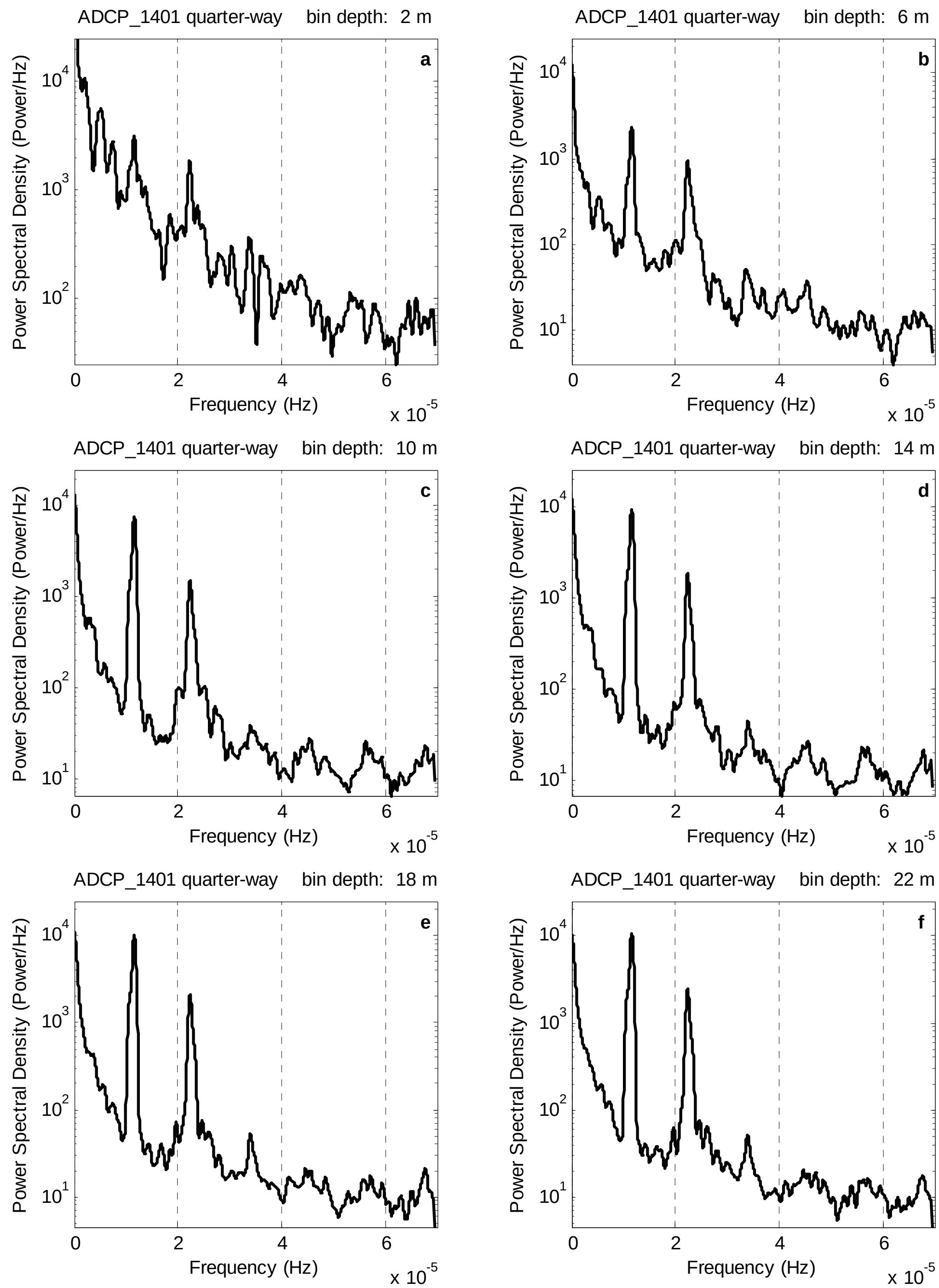

Figure 2-102 Power spectra for mooring 1401 from 2 to 22 m (2001 – 2002)

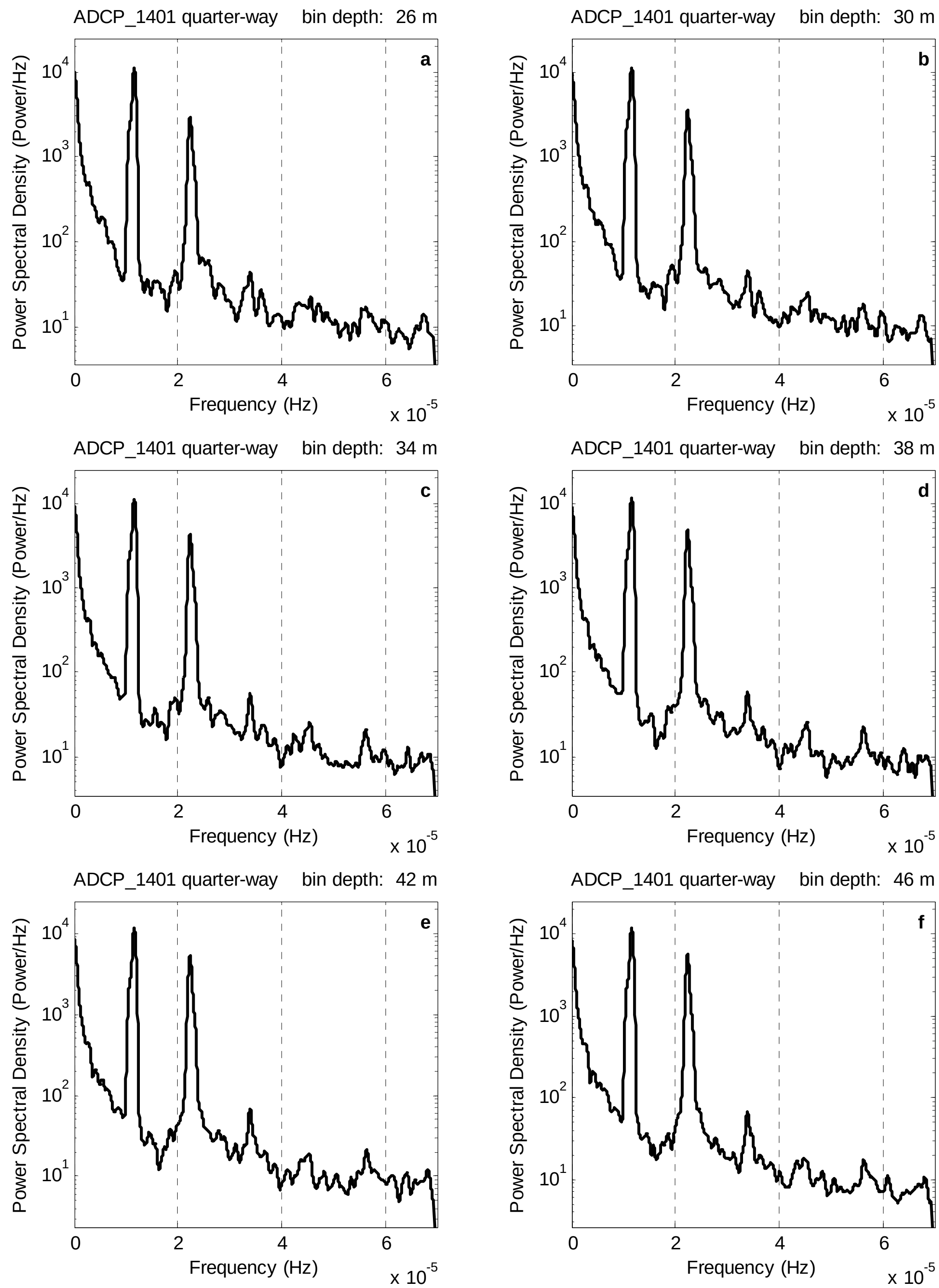

Figure 2-103 Power spectra for mooring 1401 from 26 to 46 m (2001 – 2002)

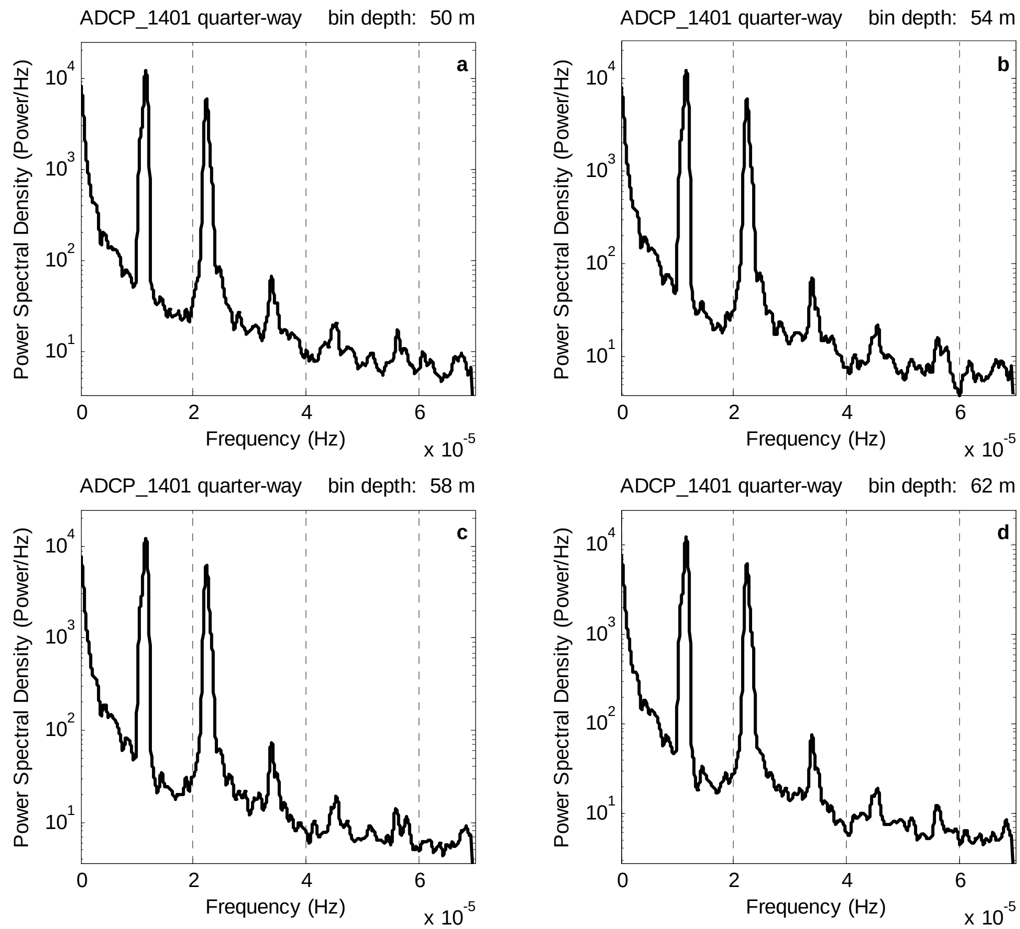

Figure 2-104 Power spectra for mooring 1401 from 50 to 62 m (2001 – 2002)

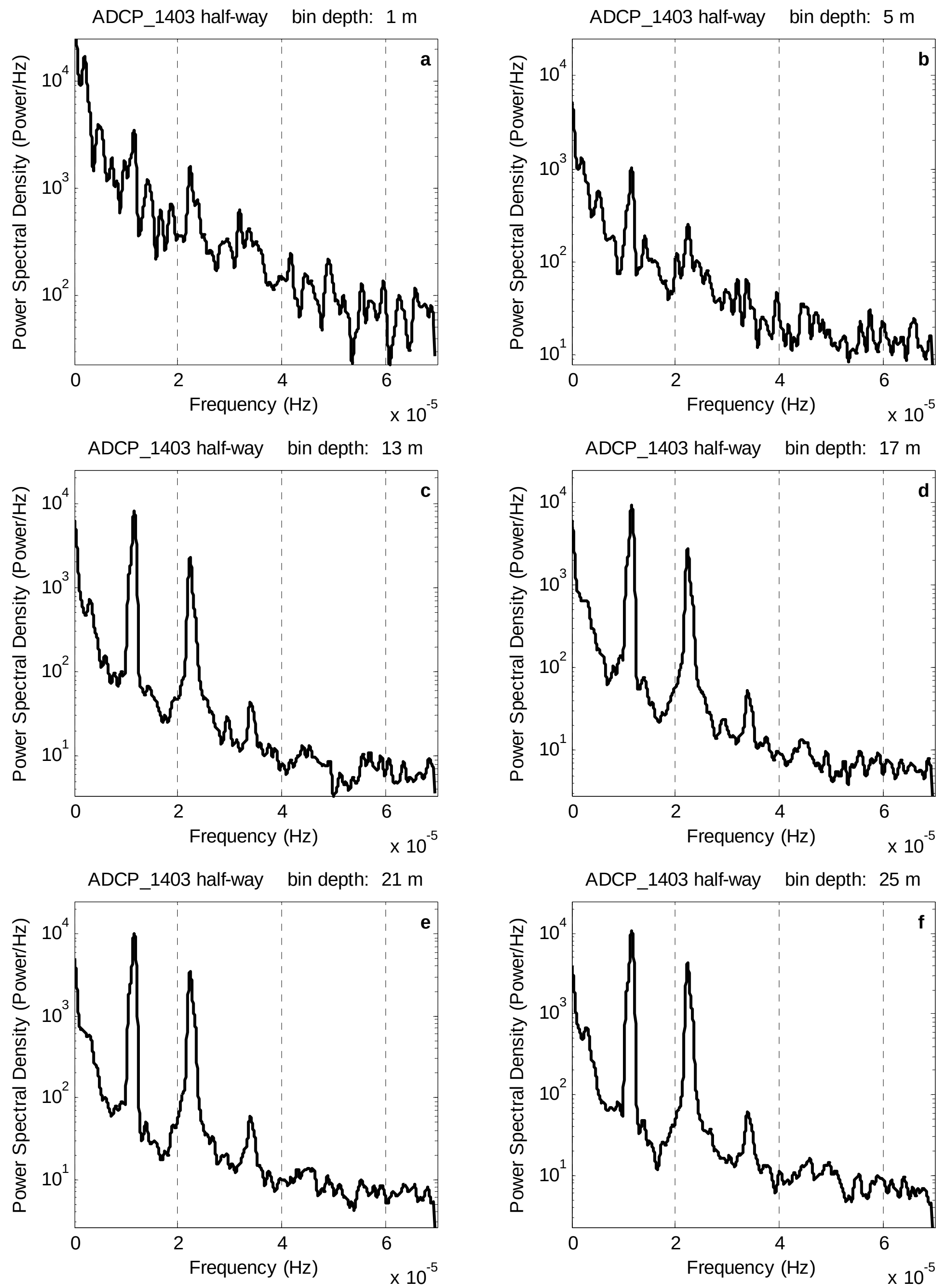

Figure 2-105 Power spectra for mooring 1403 from 1 to 25 m (2001 – 2002)

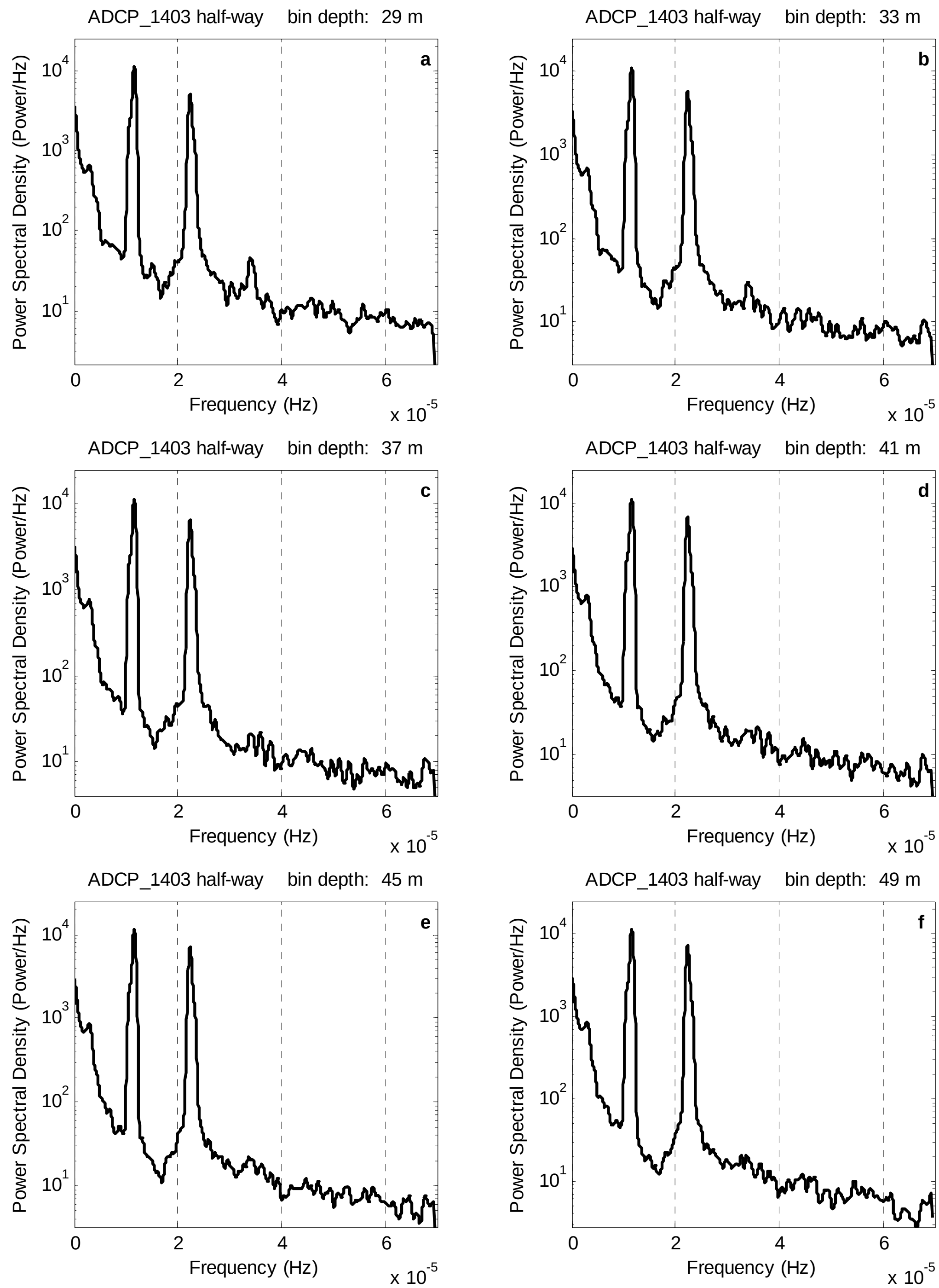

Figure 2-106 Power spectra for mooring 1403 from 29 to 49 m (2001 – 2002)

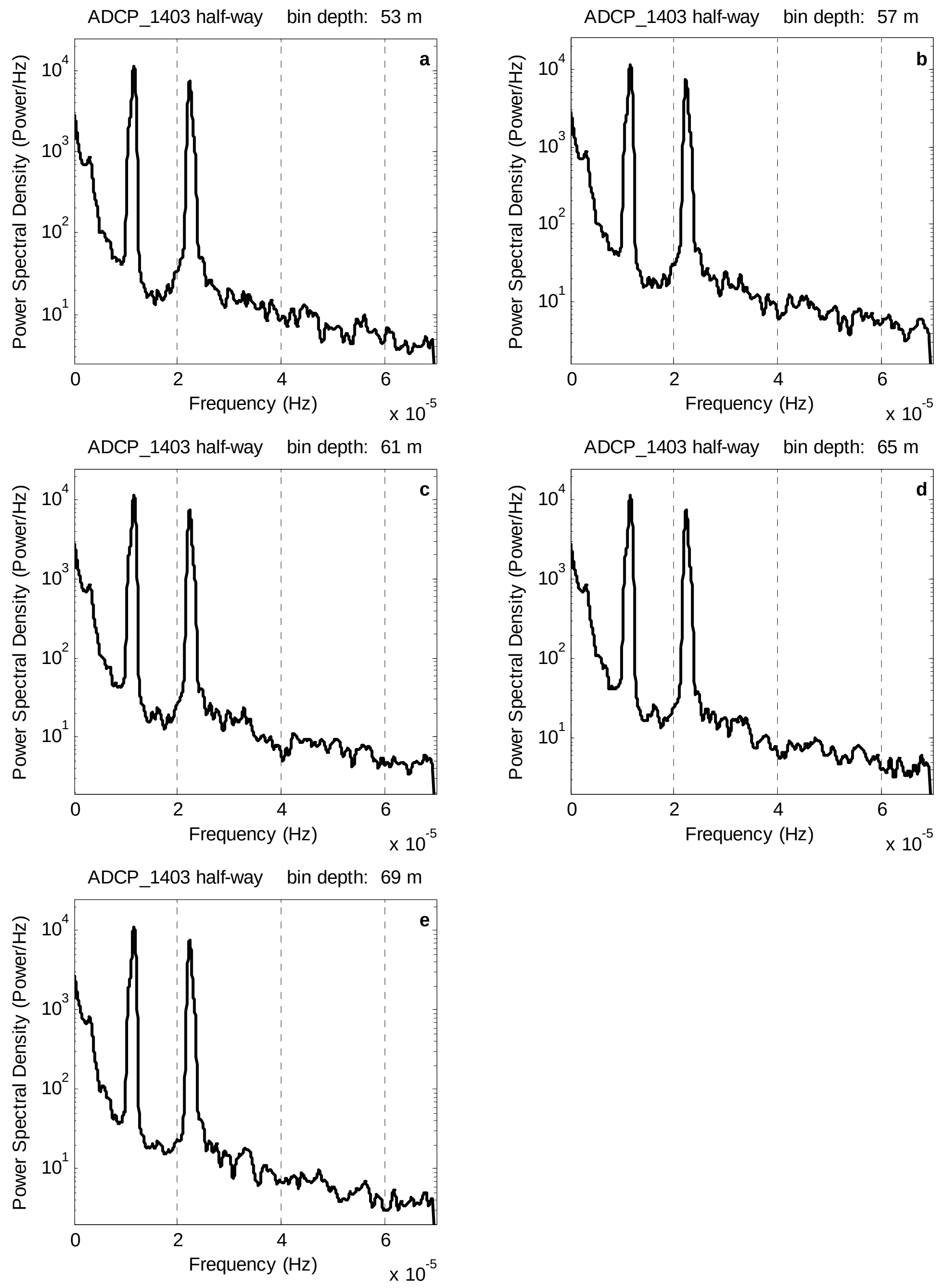

Figure 2-107 Power spectra for mooring 1403 from 53 to 69 m (2001 – 2002)

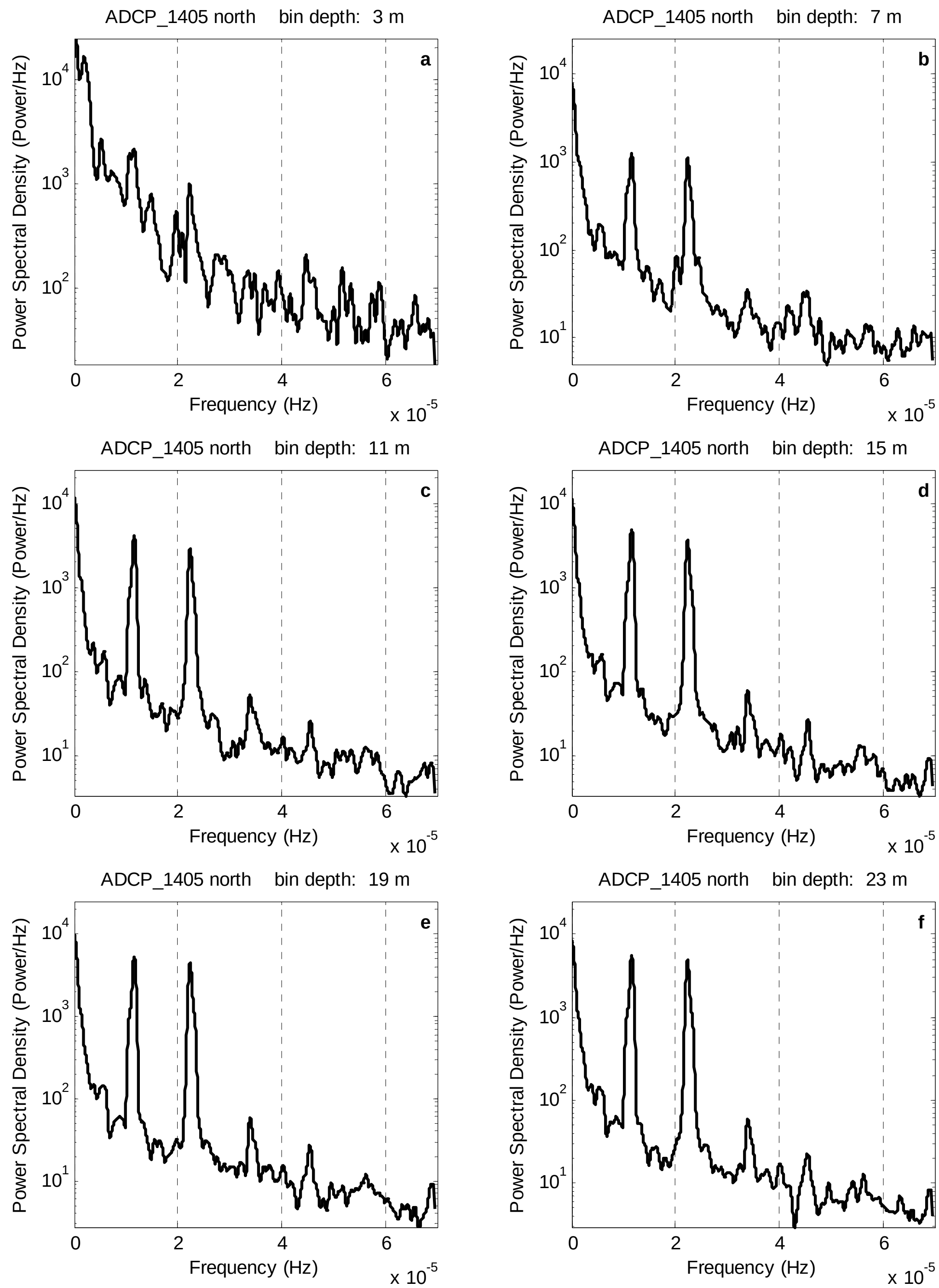

Figure 2-108 Power spectra for mooring 1405 from 3 to 23 m (2001 – 2002)

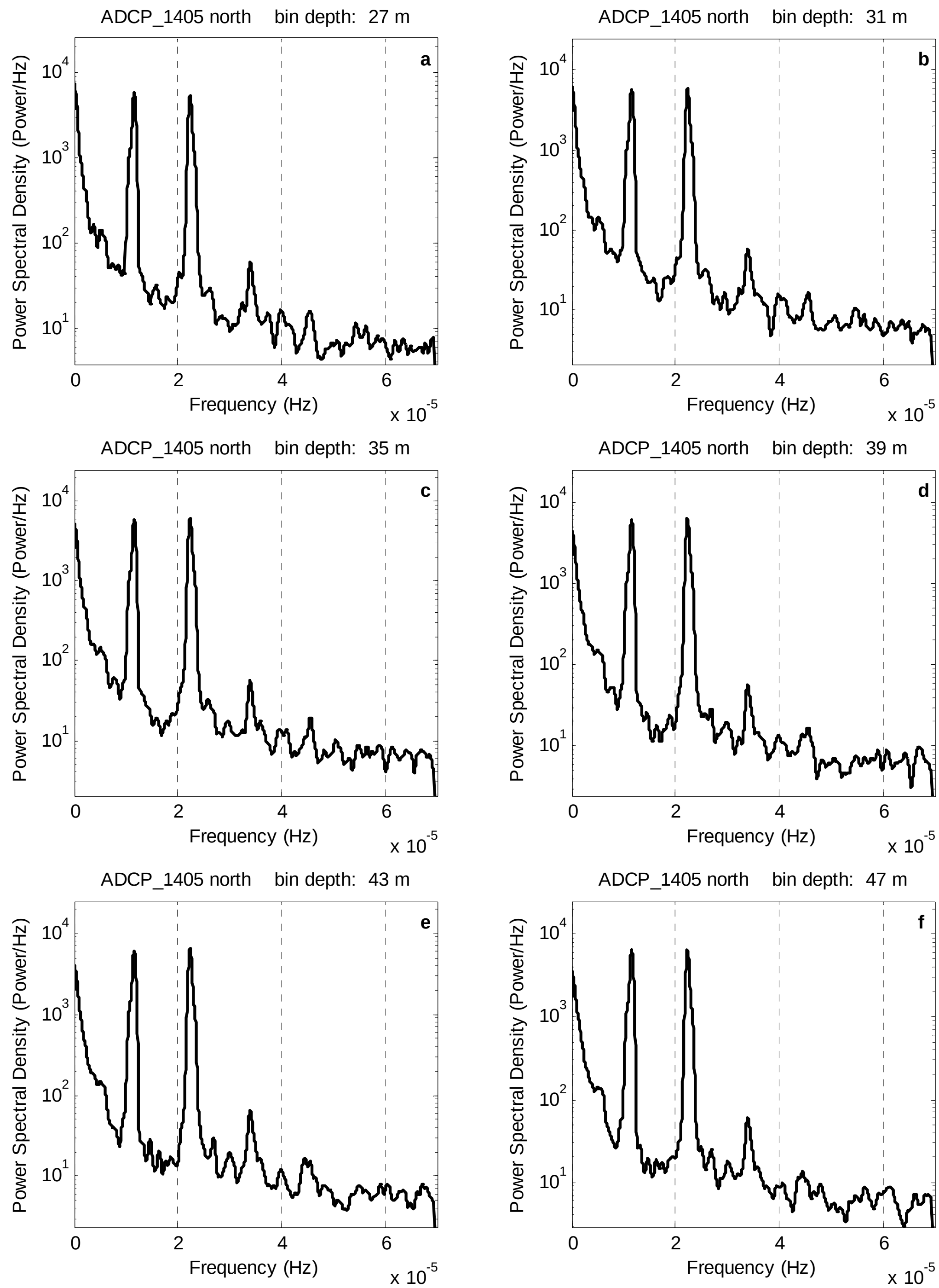

Figure 2-109 Power spectra for mooring 1405 from 27 to 47 m (2001 – 2002)

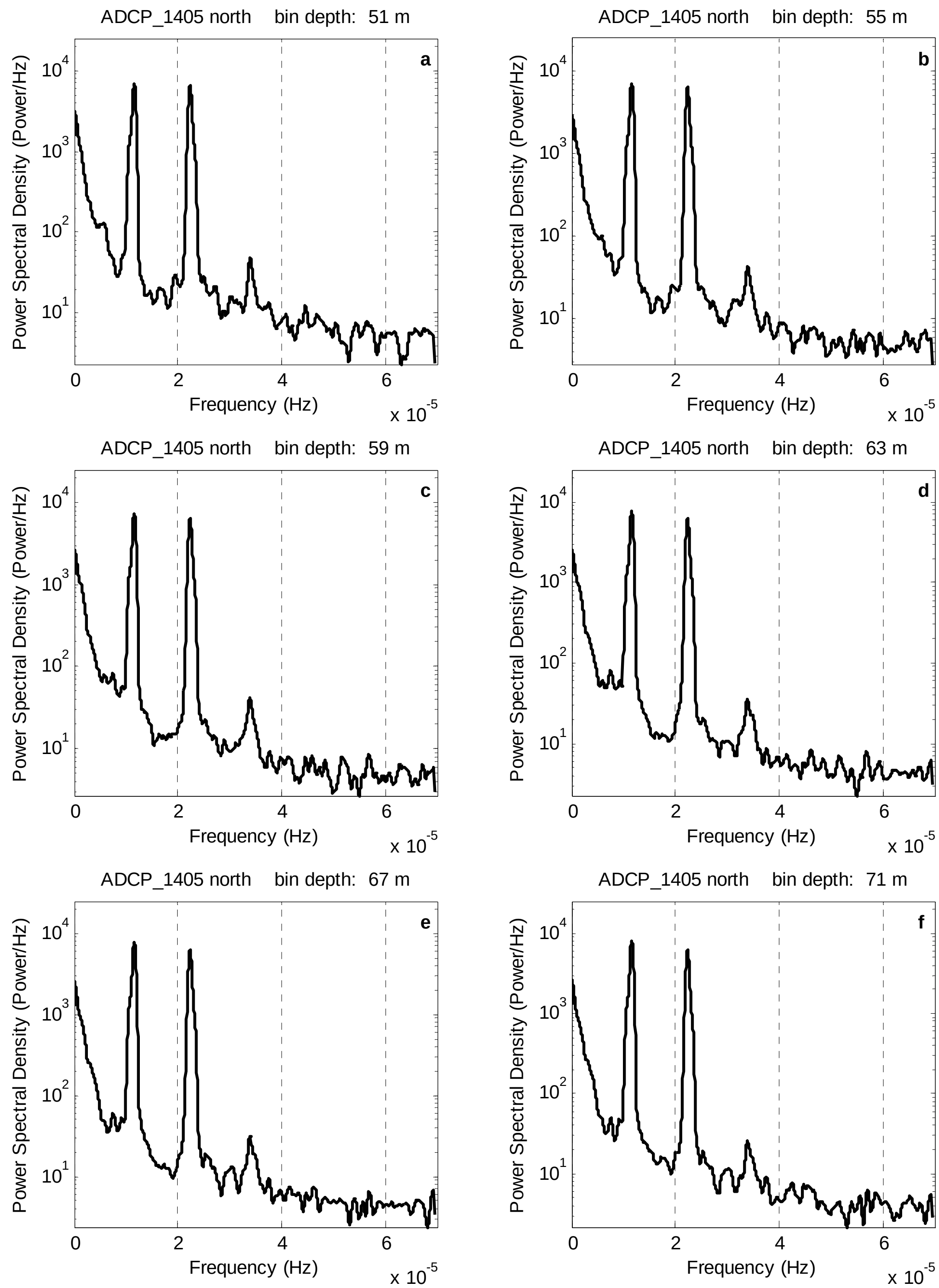

Figure 2-110 Power spectra for mooring 1405 from 51 to 71 m (2001 – 2002)

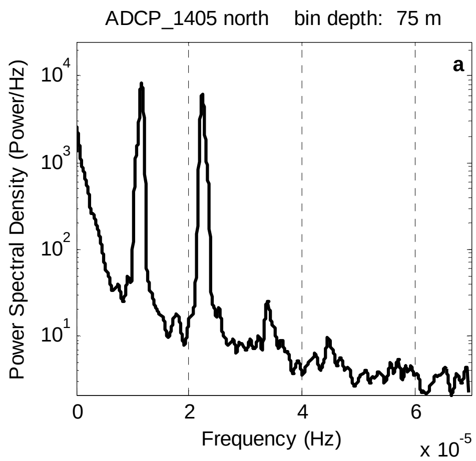

Figure 2-111 Power spectra for mooring 1405 at 75 m (2001 – 2002)

2.7 Coherence function estimates of 2-hrly alongshore data

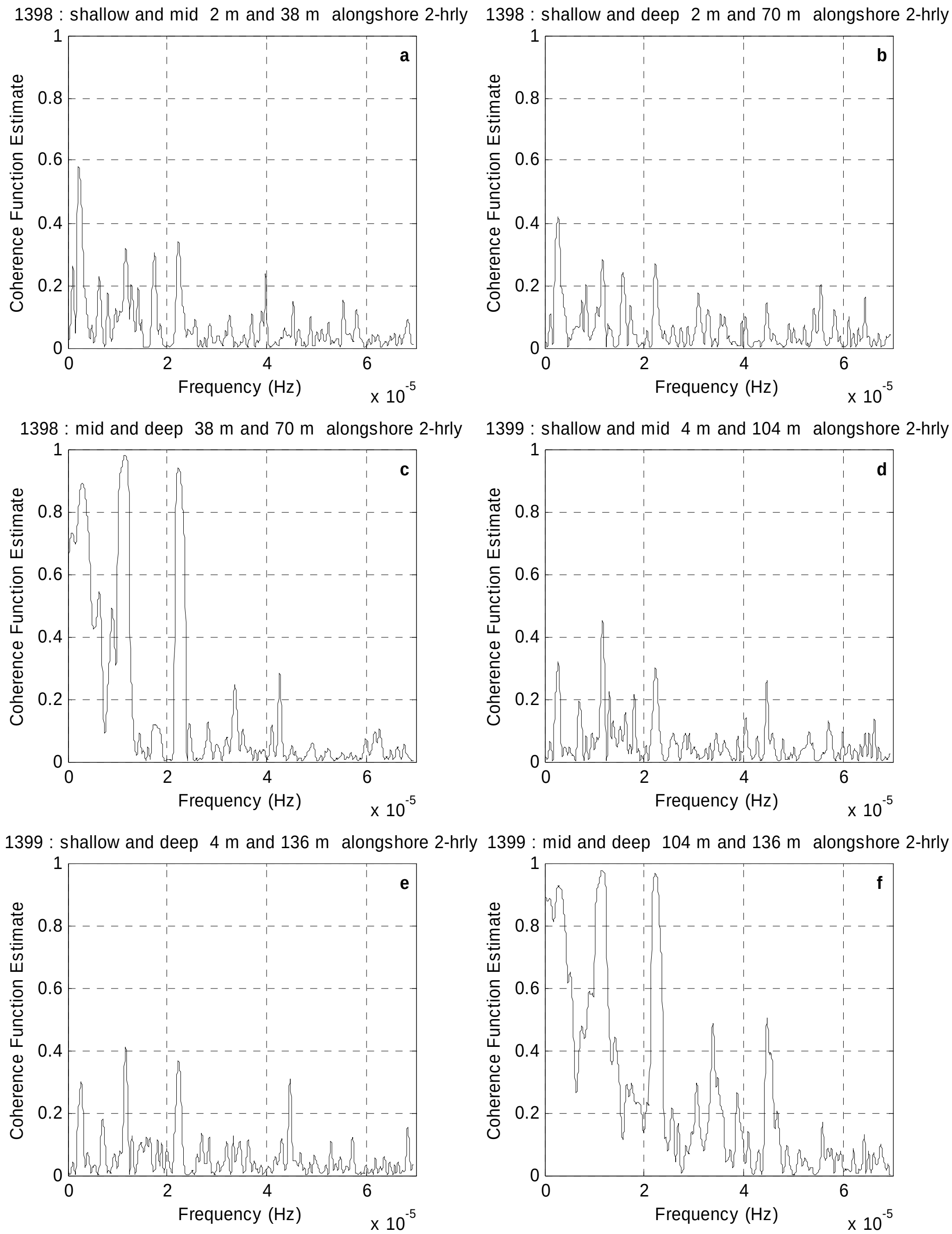

Figure 2-112 Coherence for moorings 1398 and 1399 for shallow and mid-depth; mid-depth and deep; and shallow and deep regions (2001 – 2002)

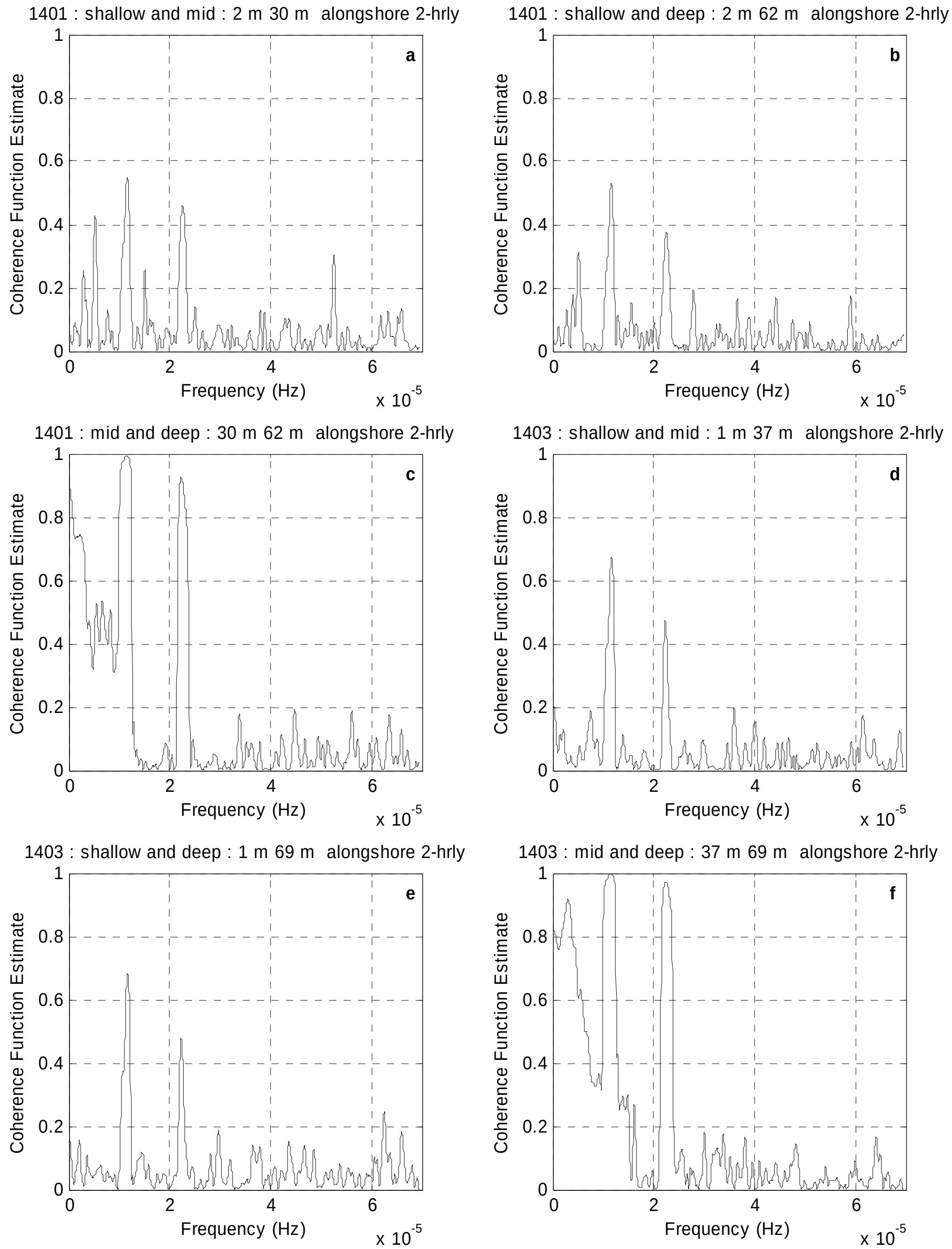

Figure 2-113 Coherence for moorings 1401 and 1403 for shallow and mid-depth; mid-depth and deep; and shallow and deep regions (2001 – 2002)

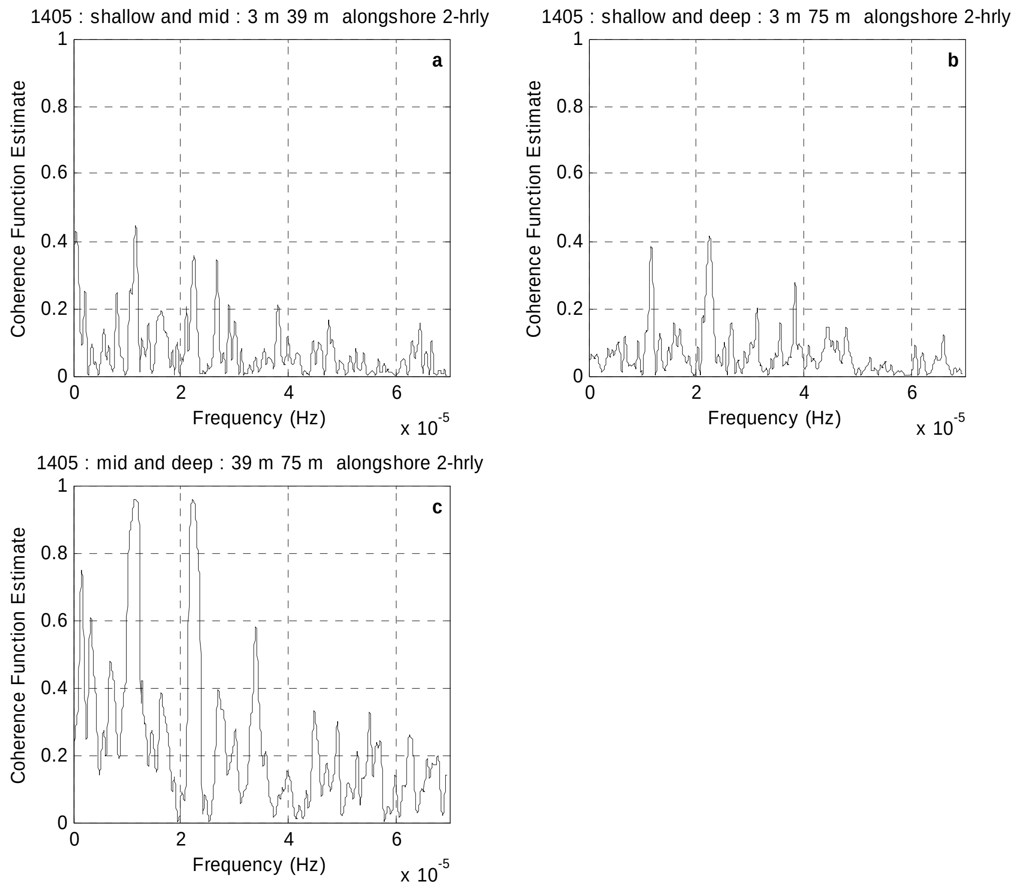

Figure 2-114 Coherence for mooring 1405 for shallow and mid-depth; mid-depth and deep; and shallow and deep regions (2001 – 2002)

2.8 Low-pass filtered data, decimated to 14-day intervals

2.8.1.1 Variance of 14-day data compared to 2-hourly at all depths

Table 2-17 Variances of low-pass filtered 14-day data compared to original 2-hourly data

Variance 1398 south shallow		
Depth (m)	2-hourly	14-day
2	148265.05	46894.86
6	22123.95	9191.04
26	32346.50	17362.09
30	31474.80	15979.52
34	30890.61	14781.39
38	30607.52	14005.89
42	30486.83	13216.31
46	30530.82	12651.56
50	30467.01	12142.24
54	30404.46	11691.27
58	30336.47	11365.12
62	30201.60	10875.78
66	29910.01	10218.45
70	29210.97	9614.59

Variance 1399 south deep		
Depth (m)	2-hourly	14-day
4	95780.23	31587.31
80	28520.24	7991.84
84	28523.40	7718.35
88	28730.33	7693.00
92	28773.56	7428.85
96	28478.74	7030.74
100	28139.84	6712.29
104	27500.02	6415.11
108	26814.58	6156.93
112	26258.93	5877.00
116	25572.08	5536.80
120	24852.12	4964.03
124	23972.72	4384.71
128	22829.23	3743.77
132	21840.87	3178.40
136	19875.64	2527.88

Variance 1401 quarter-way		
Depth (m)	2-hourly	14-day
2	107853.73	36115.09
6	15100.91	6251.03
10	20731.83	7281.63
14	21738.24	6643.12
18	22320.47	6280.38
22	22835.16	5854.67
26	23368.82	5705.02
30	23599.00	5359.12
34	23744.36	5011.27
38	24020.99	4771.73
42	24195.68	4672.79
46	24385.95	4603.04
50	24573.11	4410.53
54	24801.46	4307.43
58	24735.96	4221.57
62	24305.71	4136.06

Variance 1403 half-way		
Depth (m)	2-hourly	14-day
1	92272.40	30746.21
5	11908.68	2796.75
13	17325.46	3236.50
17	18584.51	3091.82
21	19112.97	2597.82
25	19887.68	2039.80
29	20546.30	1809.05
33	21066.85	1736.71
37	21661.52	1603.85
41	21961.96	1507.61
45	22228.36	1503.41
49	22451.05	1521.53
53	22532.58	1503.80
57	22607.03	1486.87
61	22592.74	1447.25
65	22486.46	1420.70
69	22200.93	1388.28

Variance 1405 North		
Depth (m)	2-hourly	14-day
3	76660.49	17532.89
7	11843.85	3467.01
11	19815.10	6327.09
15	20869.87	6280.11
19	21010.61	5837.93
23	20438.10	5306.54
27	19872.18	4844.35
31	19189.83	4320.48
35	18741.64	3821.88
39	18477.77	3467.11
43	18242.11	3204.60
47	18107.24	2955.44
51	18091.06	2678.81
55	17932.38	2419.52
59	17720.88	2240.06
63	17552.05	2110.16
67	17496.22	2052.87
71	17388.65	1975.12
75	17281.17	1898.35

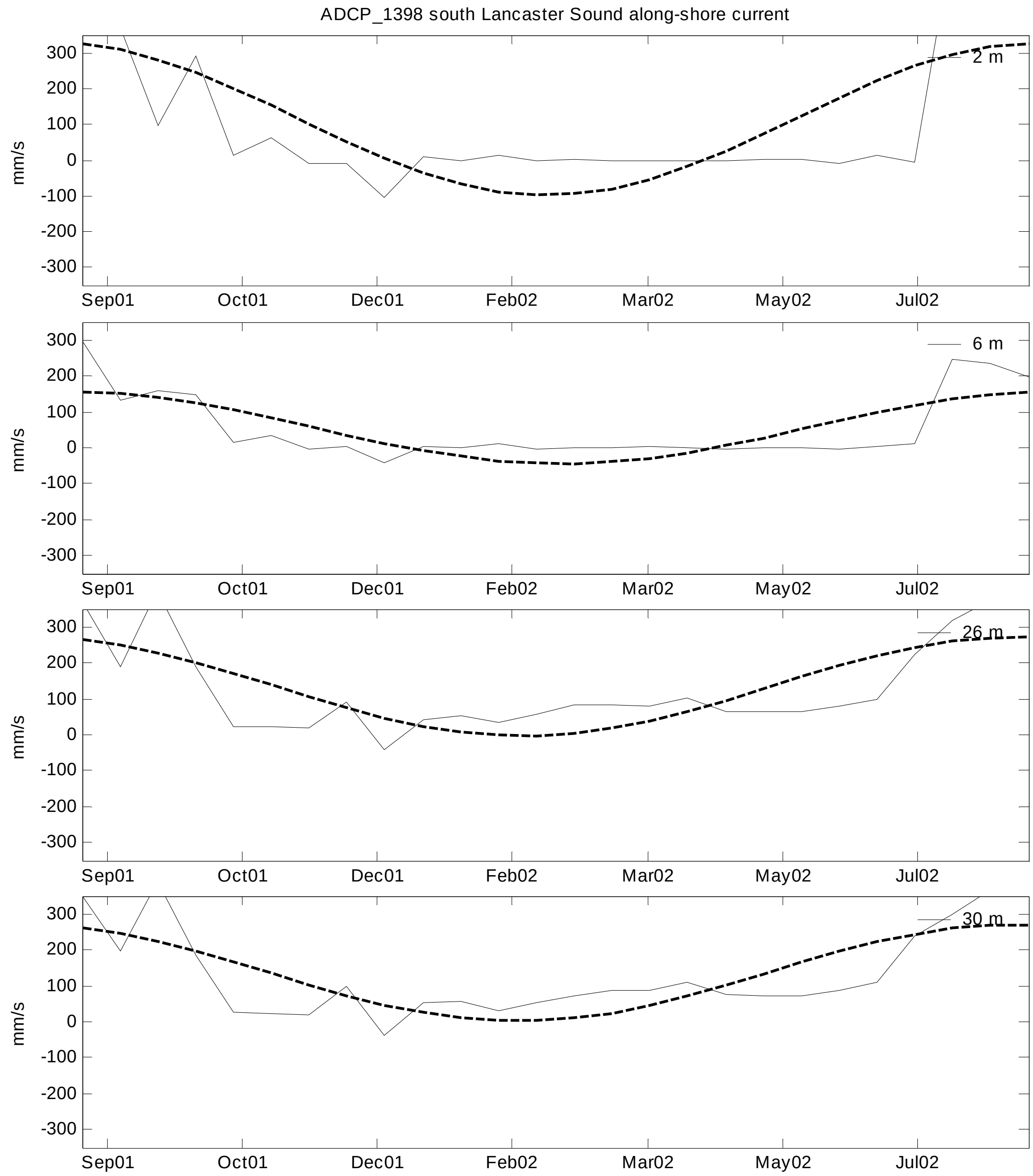

Figure 2-115 Time series of low-pass filtered ADCP data for mooring 1398 with annual harmonic superimposed: 2, 6, 26, and 30 m

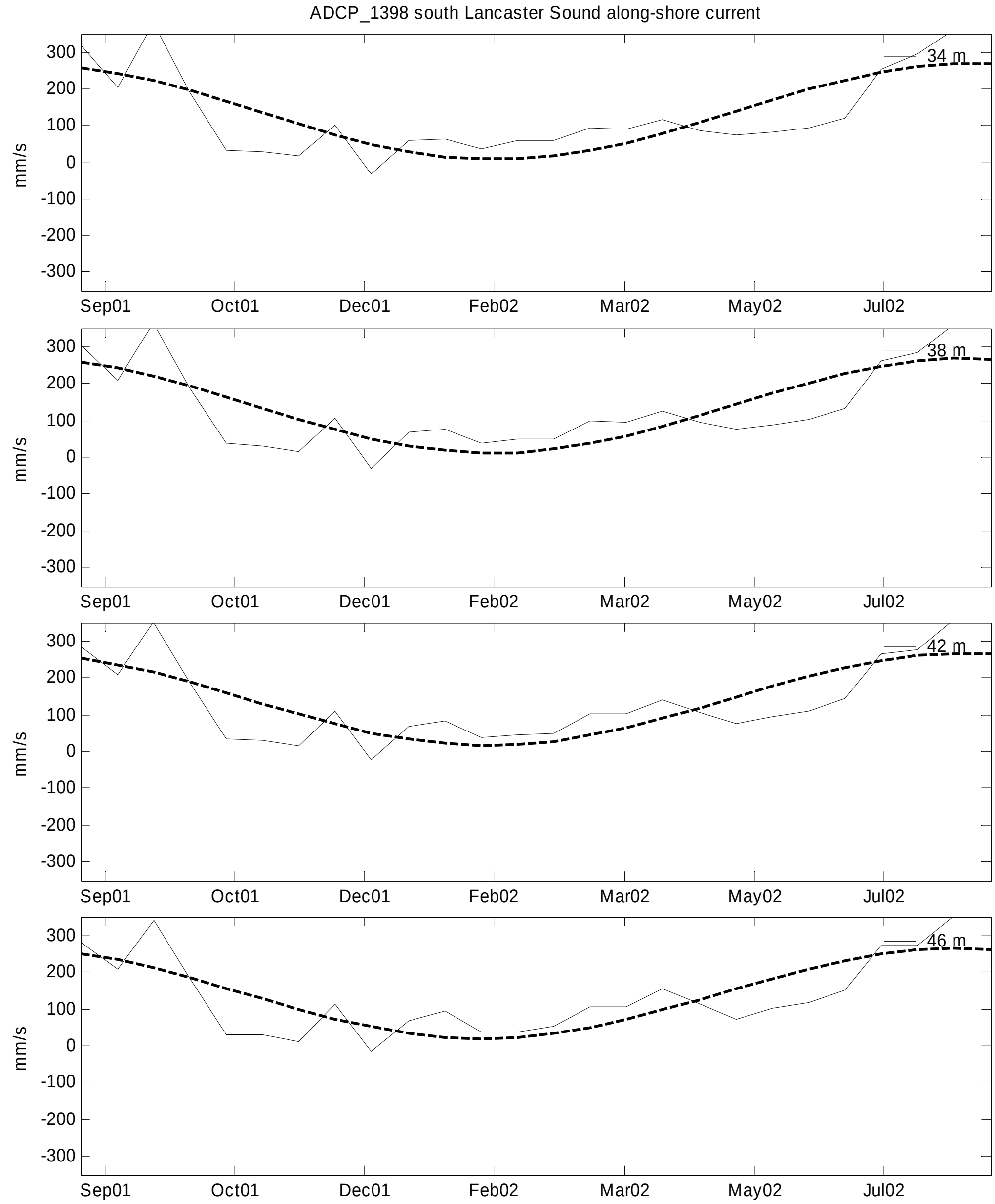

Figure 2-116 Time series of low-pass filtered ADCP data for mooring 1398 with annual harmonic superimposed: 34, 38, 42, and 46 m

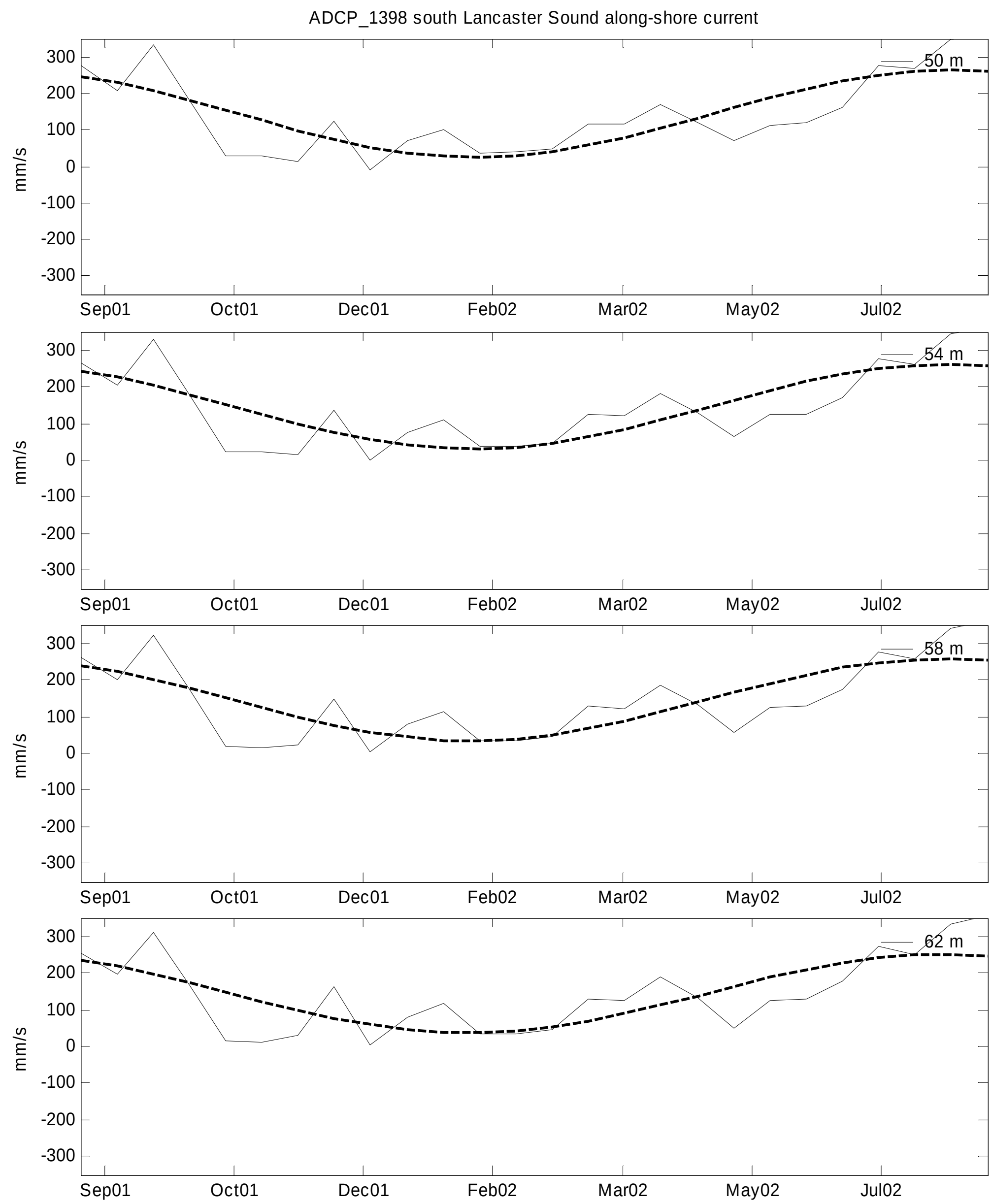

Figure 2-117 Time series of low-pass filtered ADCP data for mooring 1398 with annual harmonic superimposed: 50, 54, 58, and 62 m

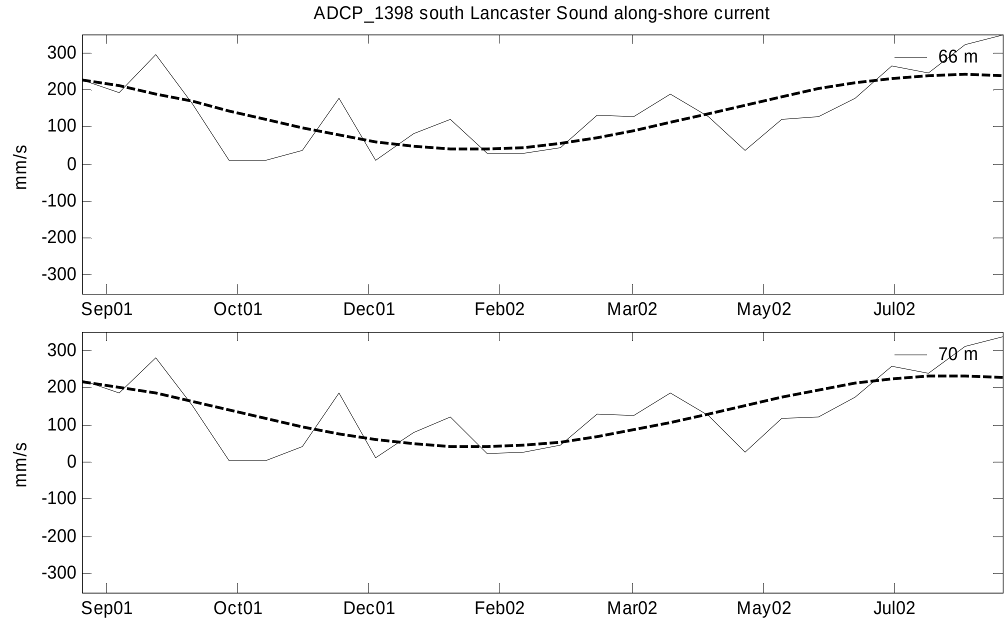

Figure 2-118 Time series of low-pass filtered ADCP data for mooring 1398 with annual harmonic superimposed: 68 and 70 m

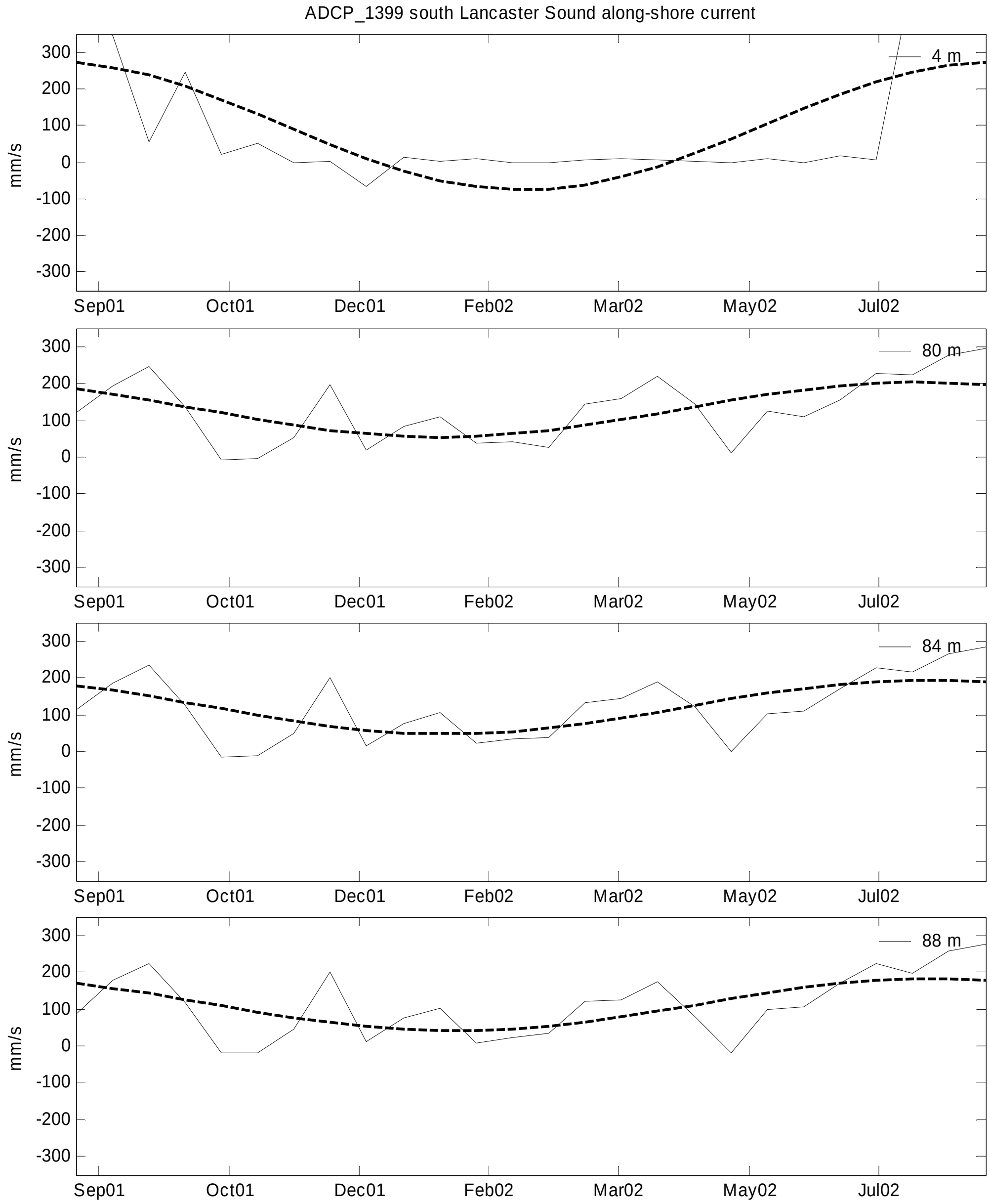

Figure 2-119 Time series of low-pass filtered ADCP data for mooring 1399 with annual harmonic superimposed: 4, 80, 84, and 88 m

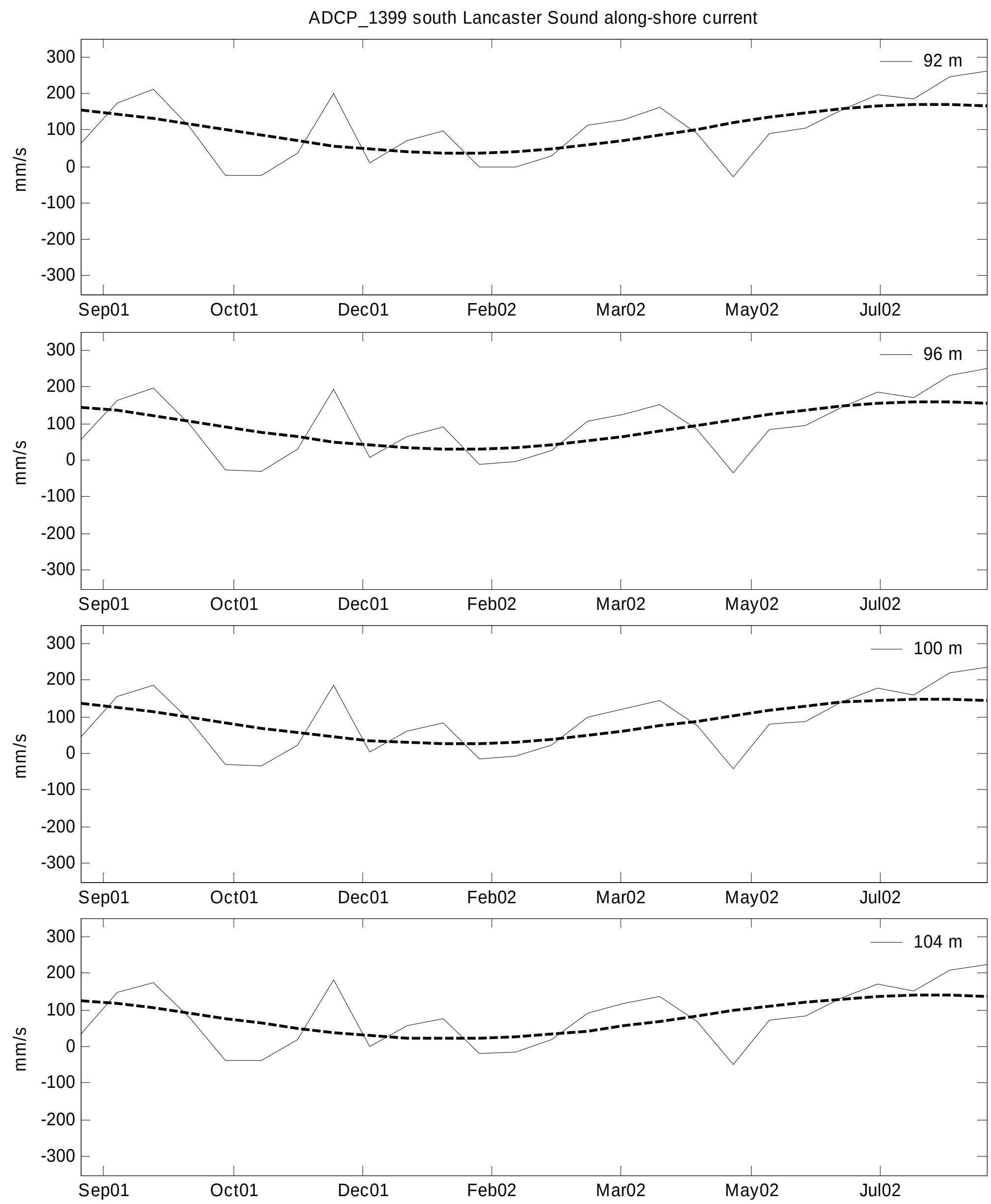

Figure 2-120 Time series of low-pass filtered ADCP data for mooring 1399 with annual harmonic superimposed: 92, 96, 100, and 104 m

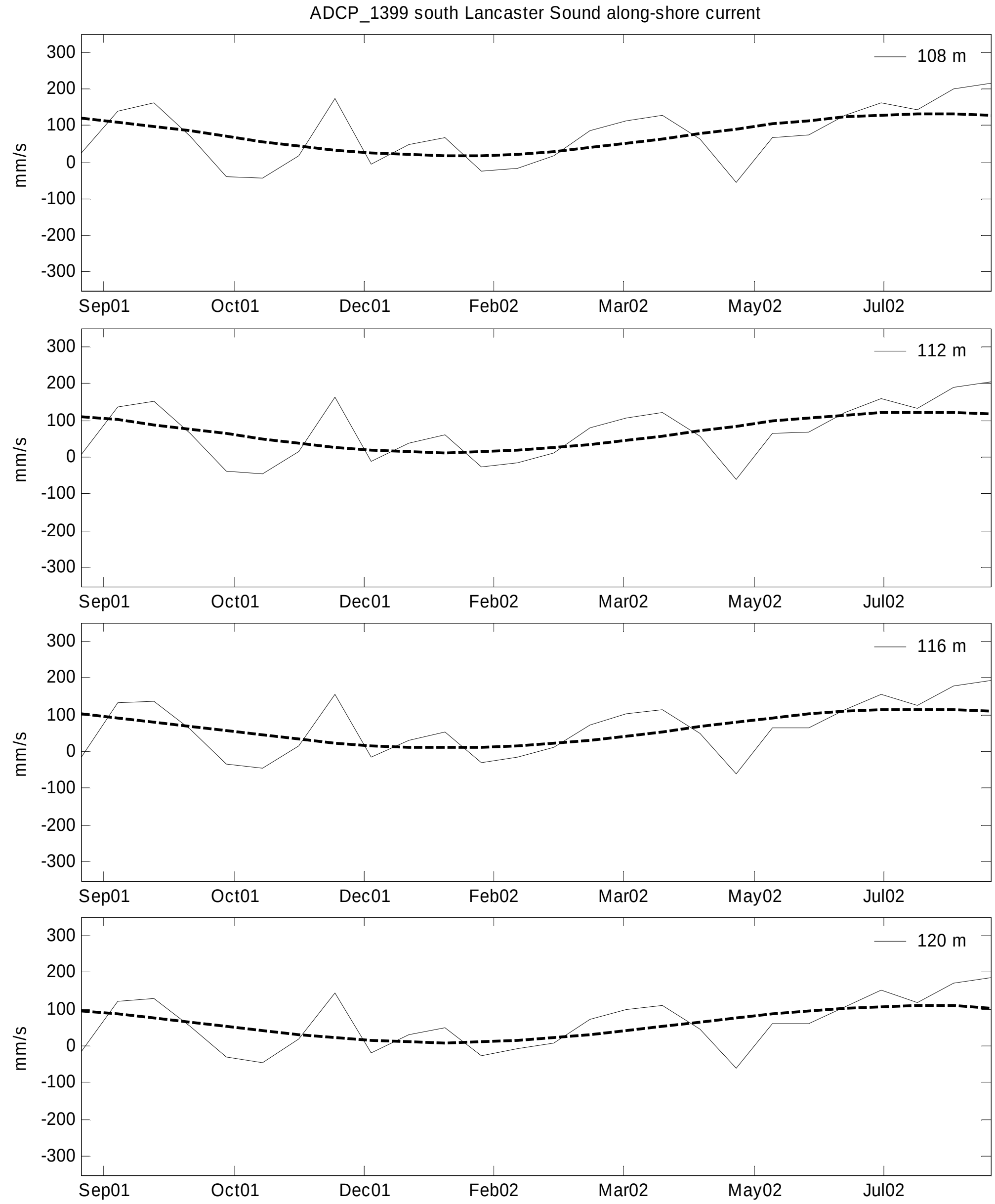

Figure 2-121 Time series of low-pass filtered ADCP data for mooring 1399 with annual harmonic superimposed: 108, 112, 116, and 120 m

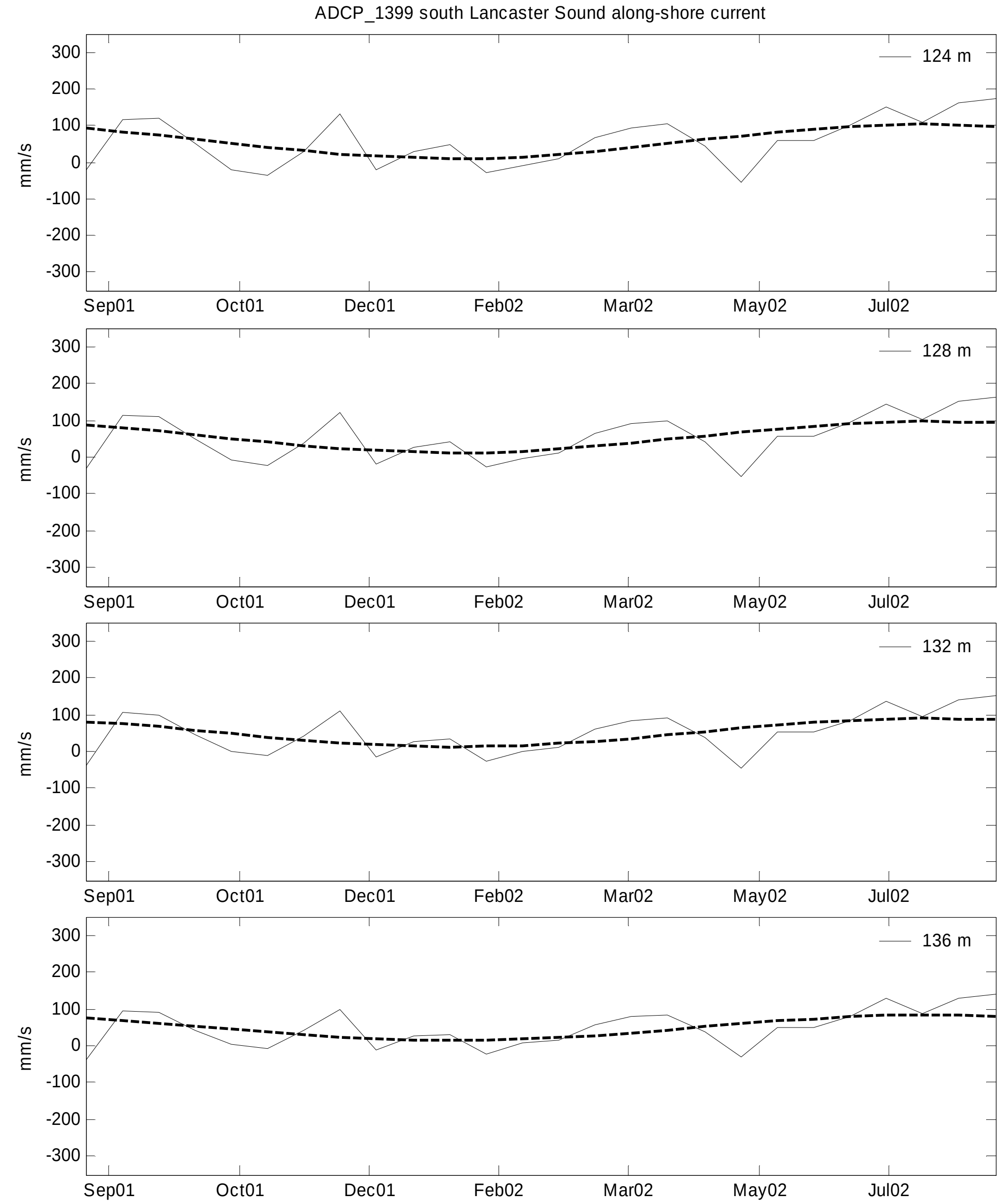

Figure 2-122 Time series of low-pass filtered ADCP data for mooring 1399 with annual harmonic superimposed: 124, 128, 132, and 136 m

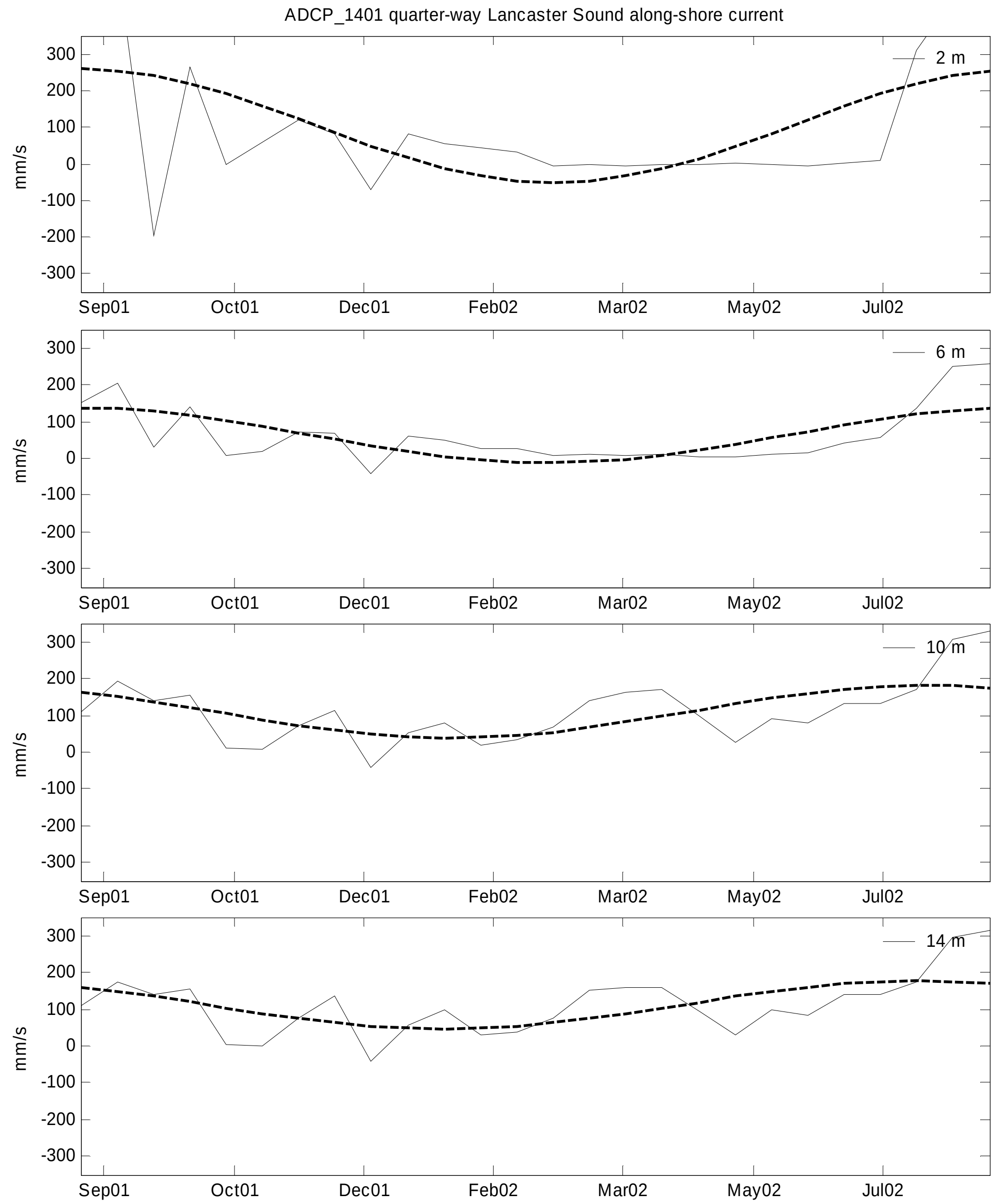

Figure 2-123 Time series of low-pass filtered ADCP data for mooring 1401 with annual harmonic superimposed: 2, 6, 10, and 14 m

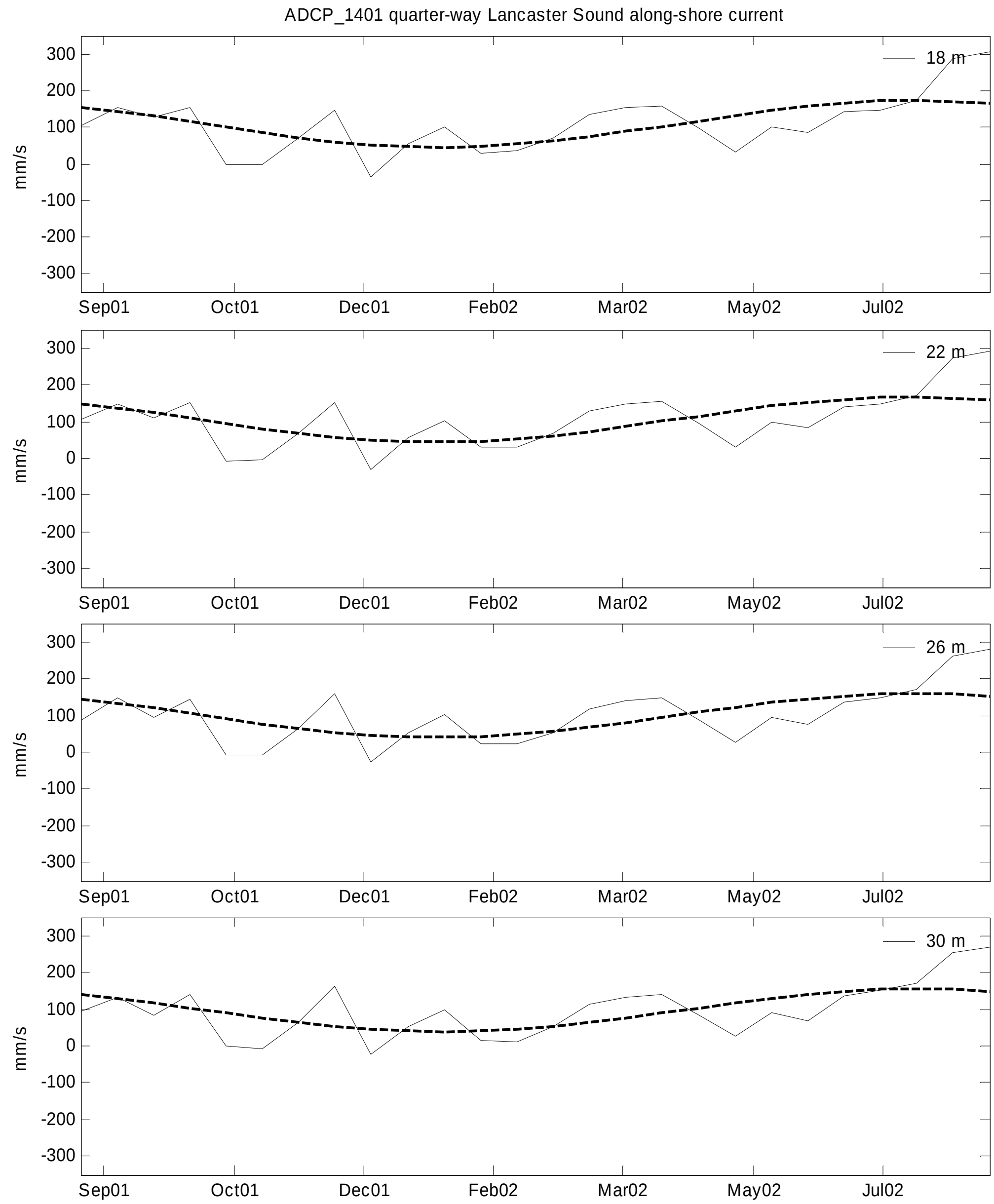

Figure 2-124 Time series of low-pass filtered ADCP data for mooring 1401 with annual harmonic superimposed: 18, 22, 26, and 30 m

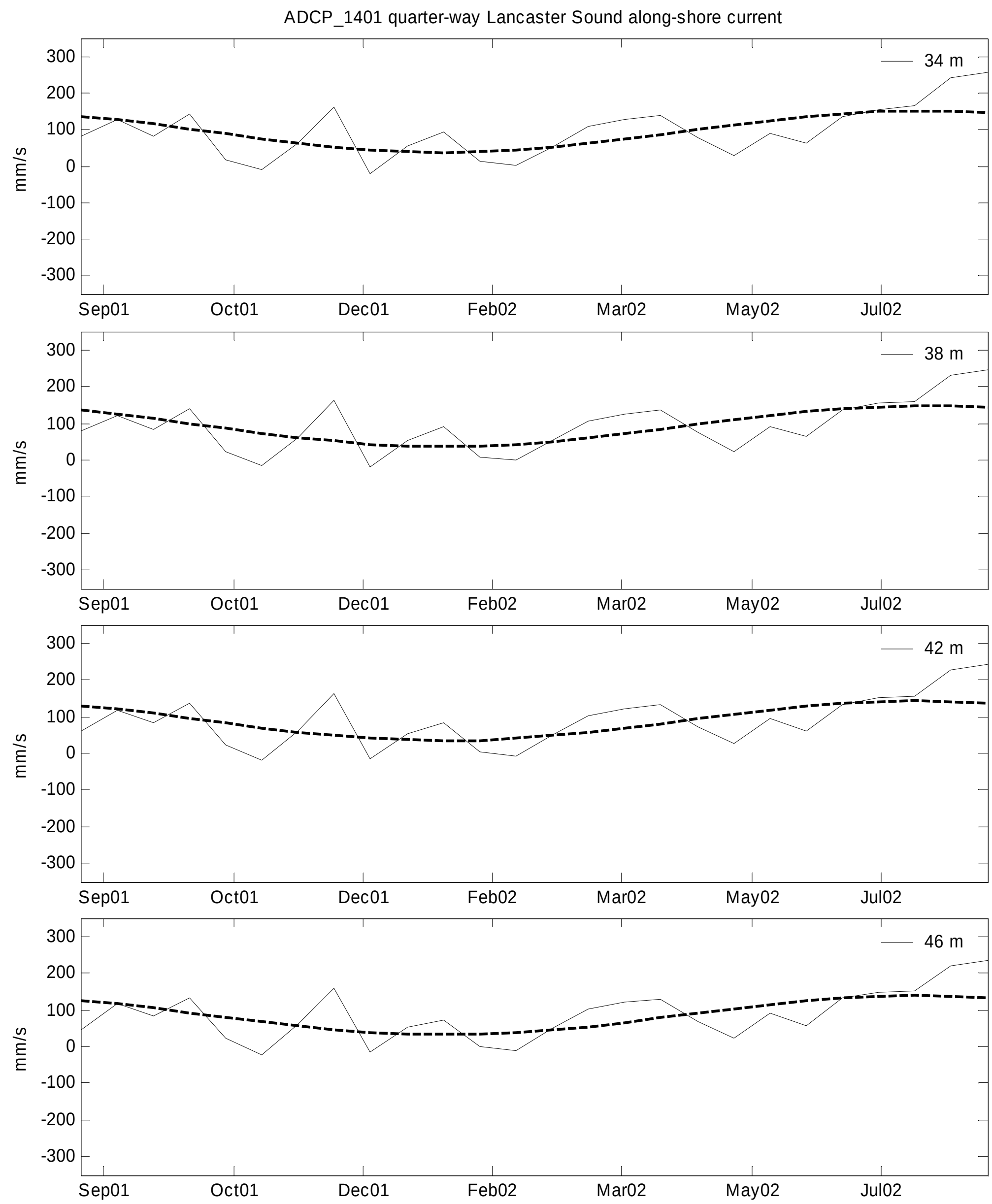

Figure 2-125 Time series of low-pass filtered ADCP data for mooring 1401 with annual harmonic superimposed: 34, 38, 42, and 46 m

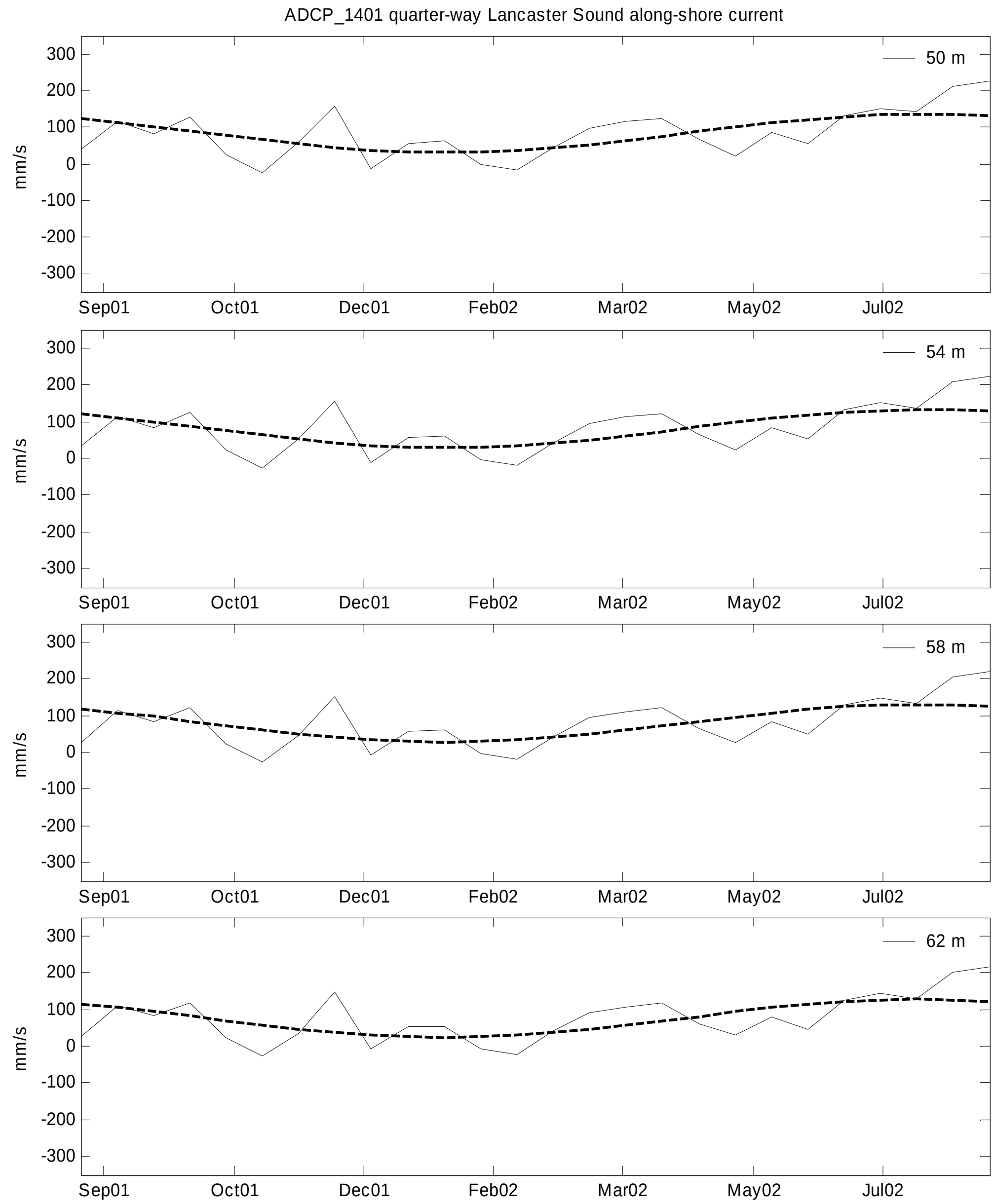

Figure 2-126 Time series of low-pass filtered ADCP data for mooring 1401 with annual harmonic superimposed: 50, 54, 58, and 62 m

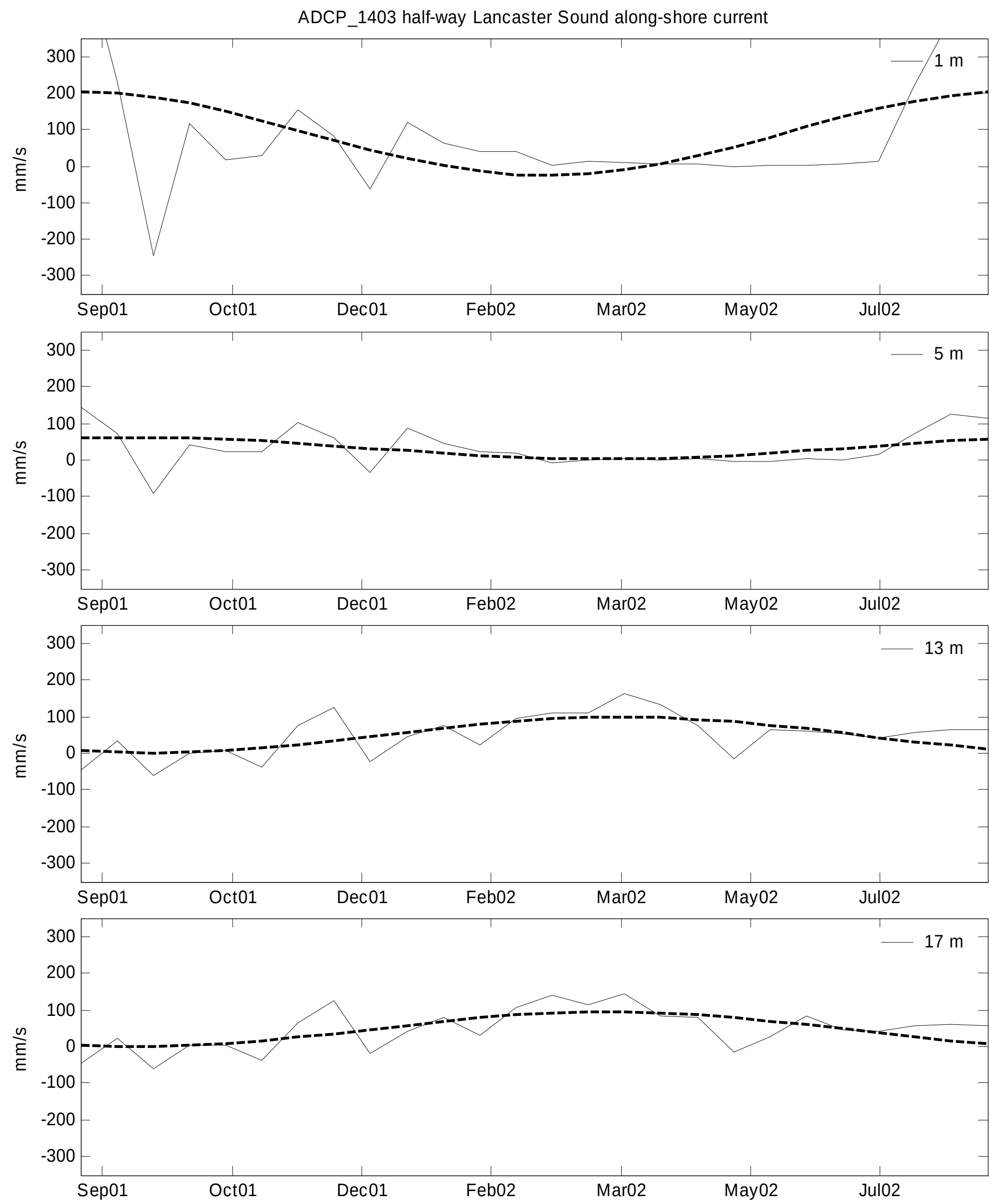

Figure 2-127 Time series of low-pass filtered ADCP data for mooring 1403 with annual harmonic superimposed: 1, 5, 13, and 17 m

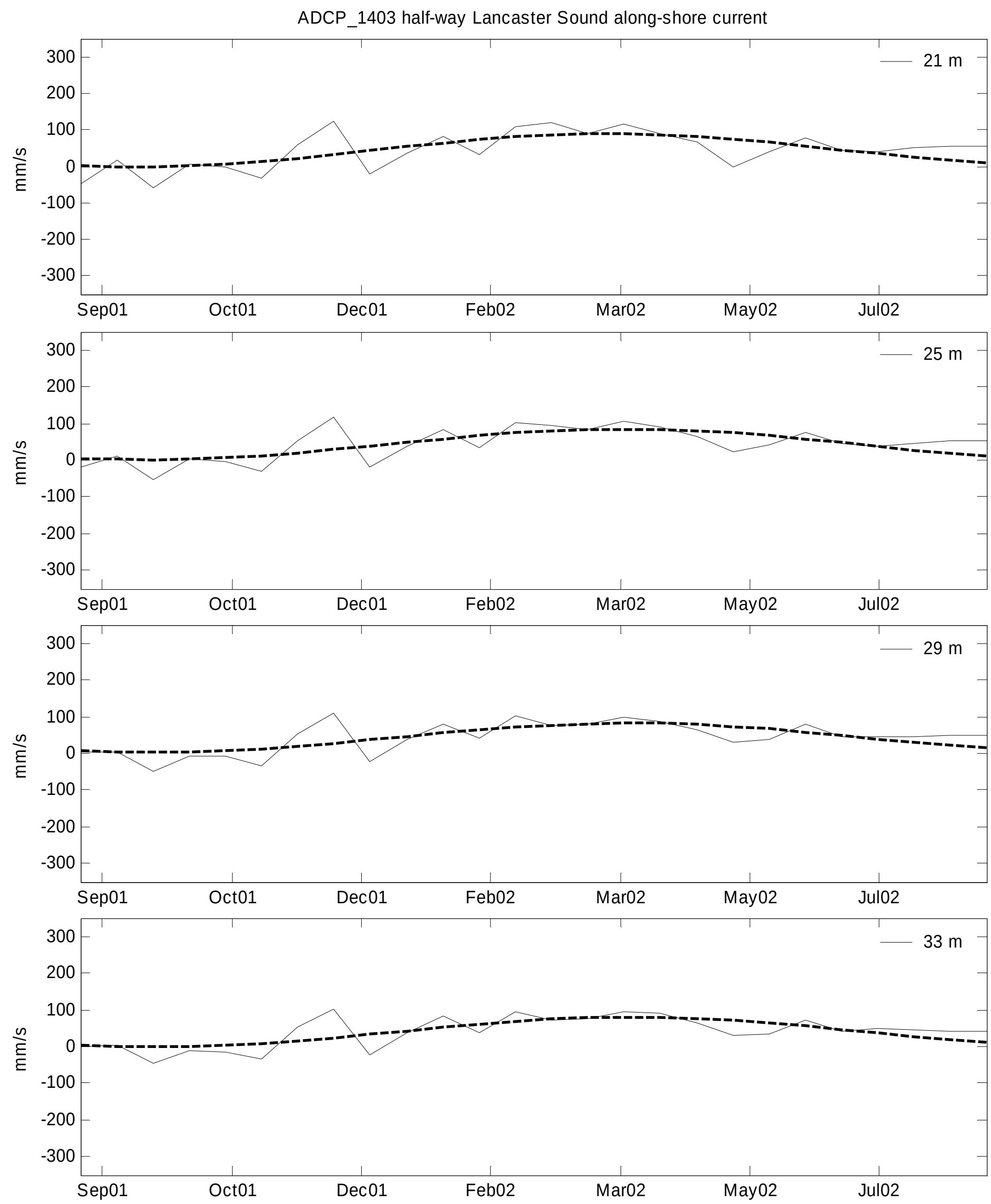

Figure 2-128 Time series of low-pass filtered ADCP data for mooring 1403 with annual harmonic superimposed: 21, 25, 29, and 33 m

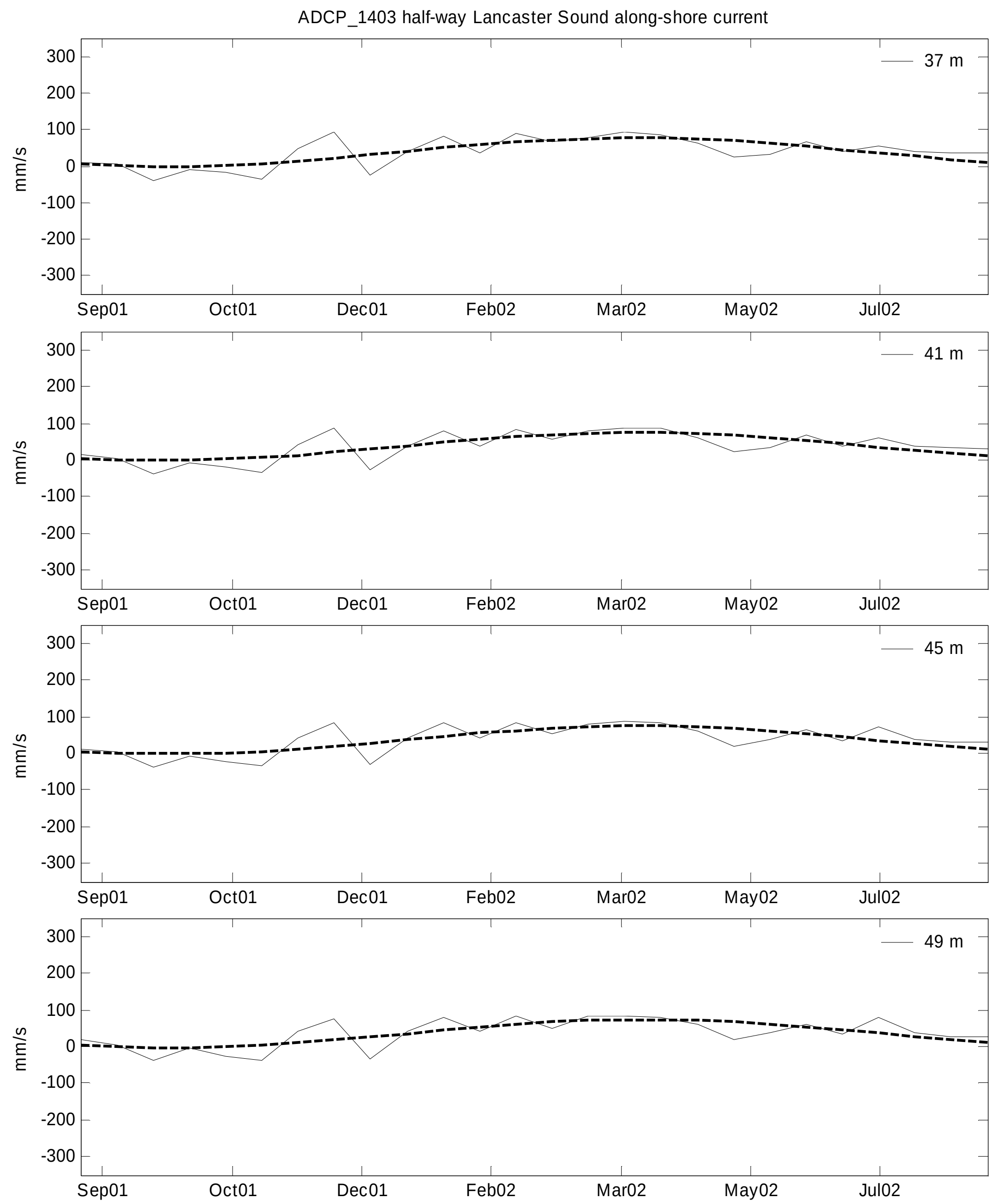

Figure 2-129 Time series of low-pass filtered ADCP data for mooring 1403 with annual harmonic superimposed: 37, 41, 45, and 49 m

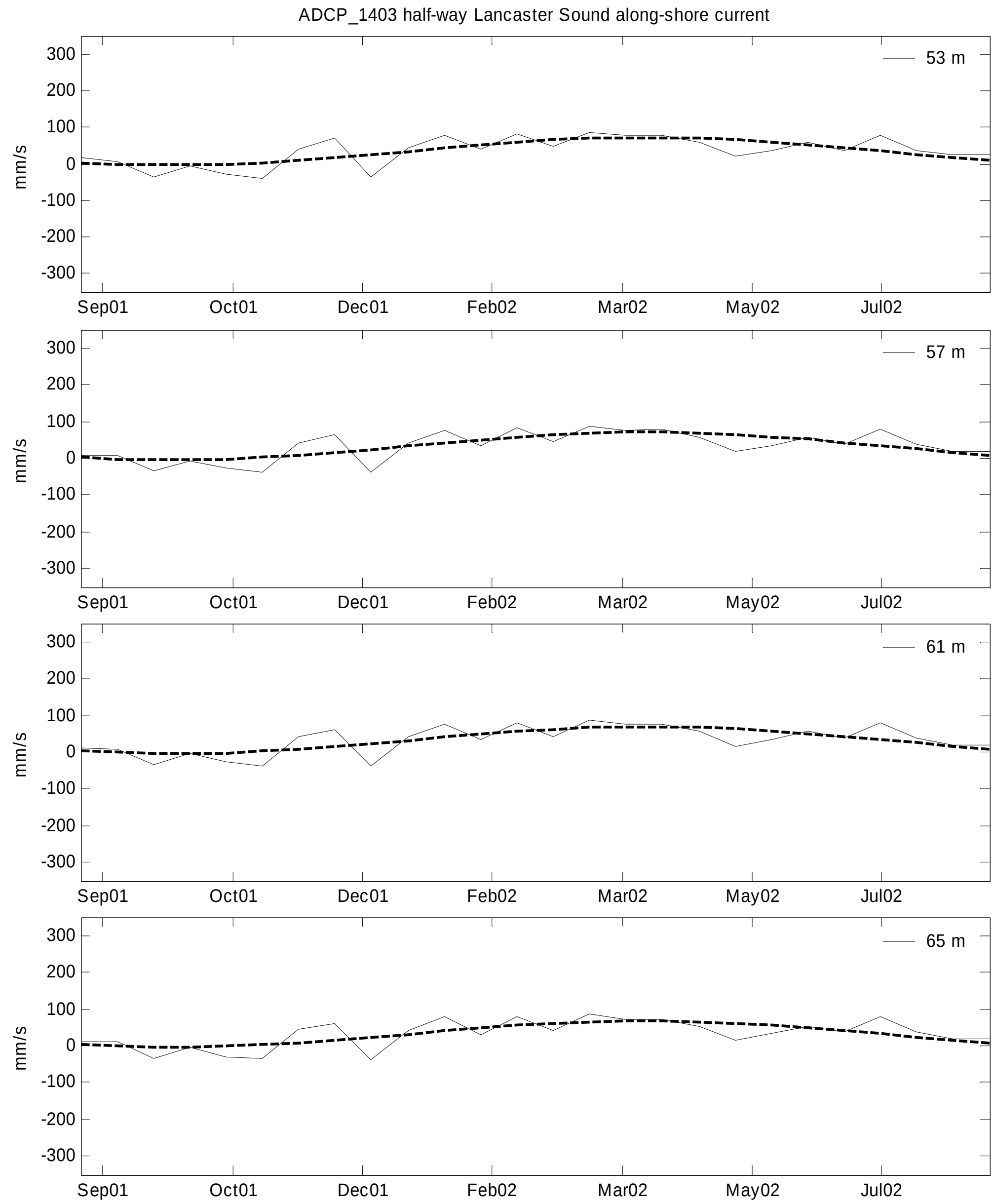

Figure 2-130 Time series of low-pass filtered ADCP data for mooring 1403 with annual harmonic superimposed: 53, 57, 61, and 65 m

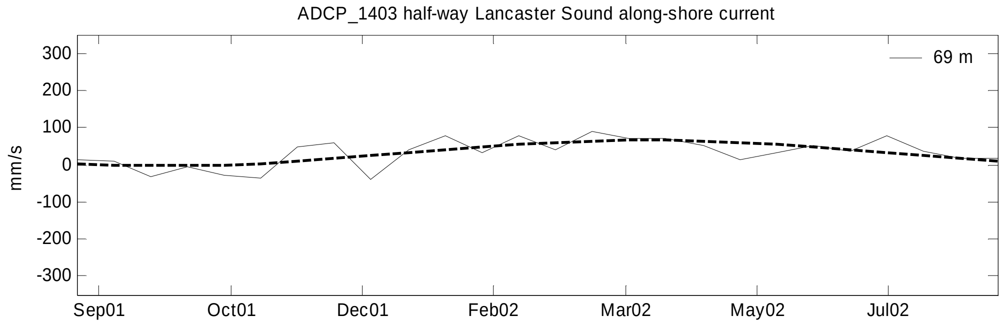

Figure 2-131 Time series of low-pass filtered ADCP data for mooring 1403 with annual harmonic superimposed: 69 m

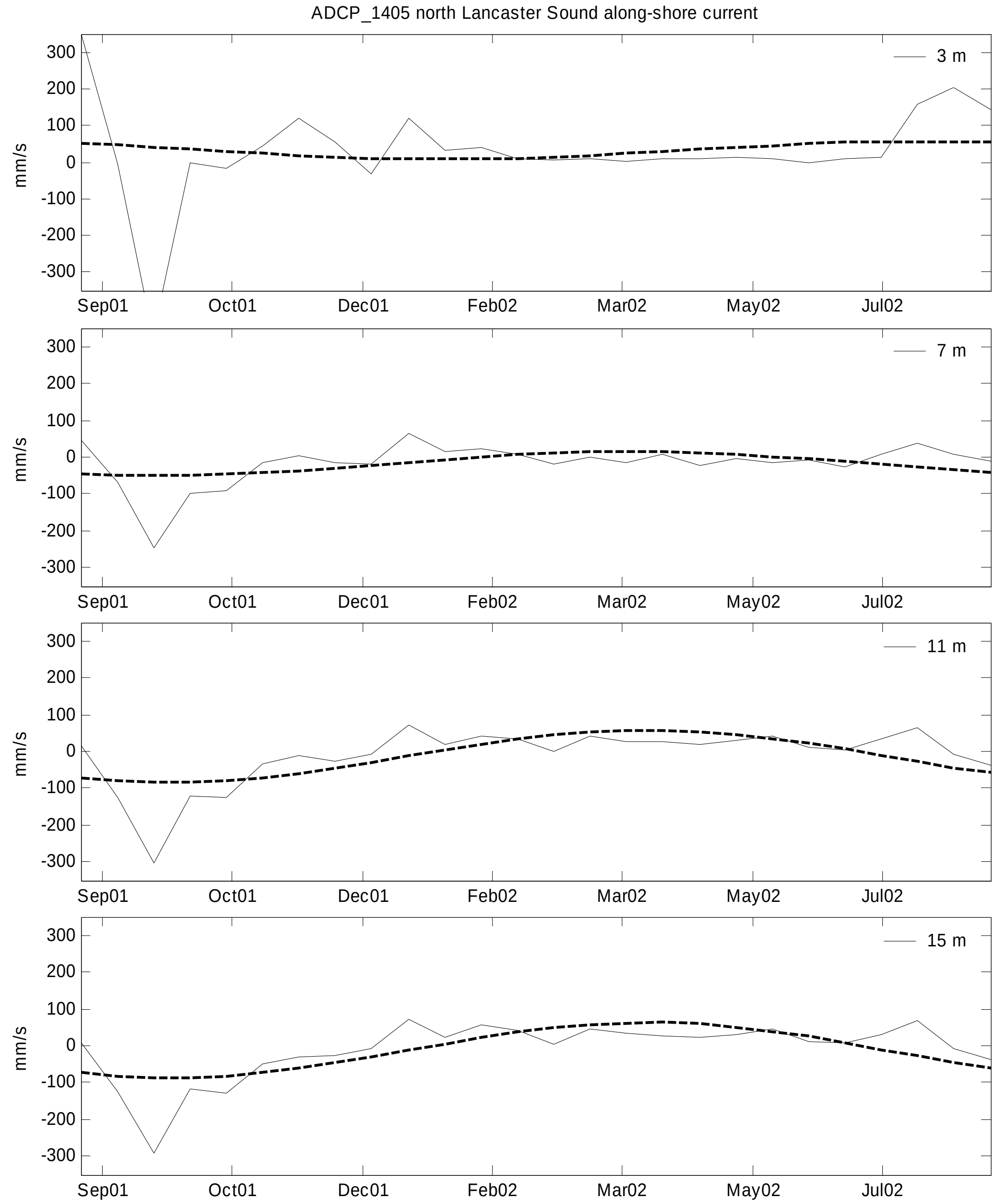

Figure 2-132 Time series of low-pass filtered ADCP data for mooring 1405 with annual harmonic superimposed: 3, 7, 11, and 15 m

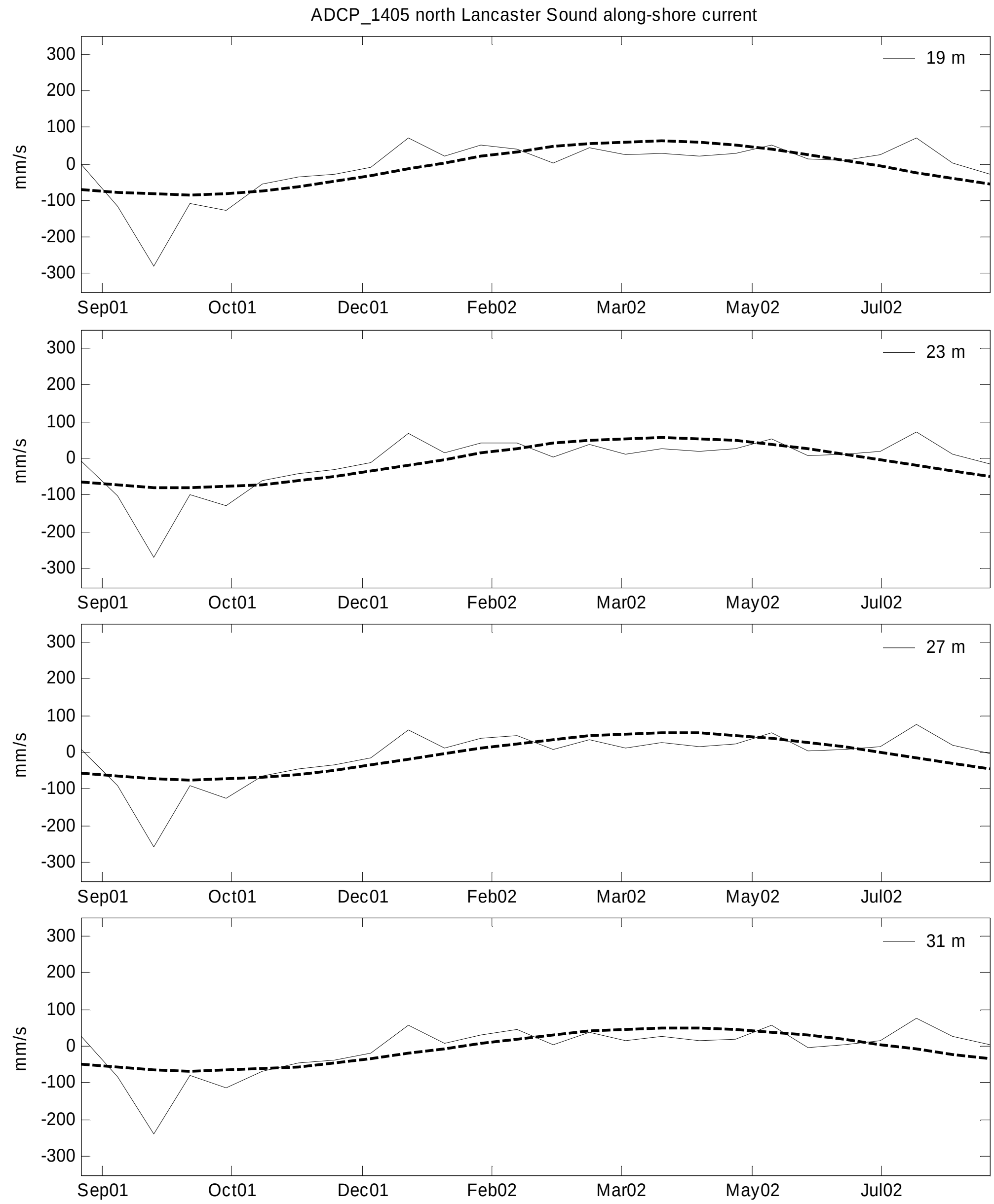

Figure 2-133 Time series of low-pass filtered ADCP data for mooring 1405 with annual harmonic superimposed: 19, 23, 27, and 31 m

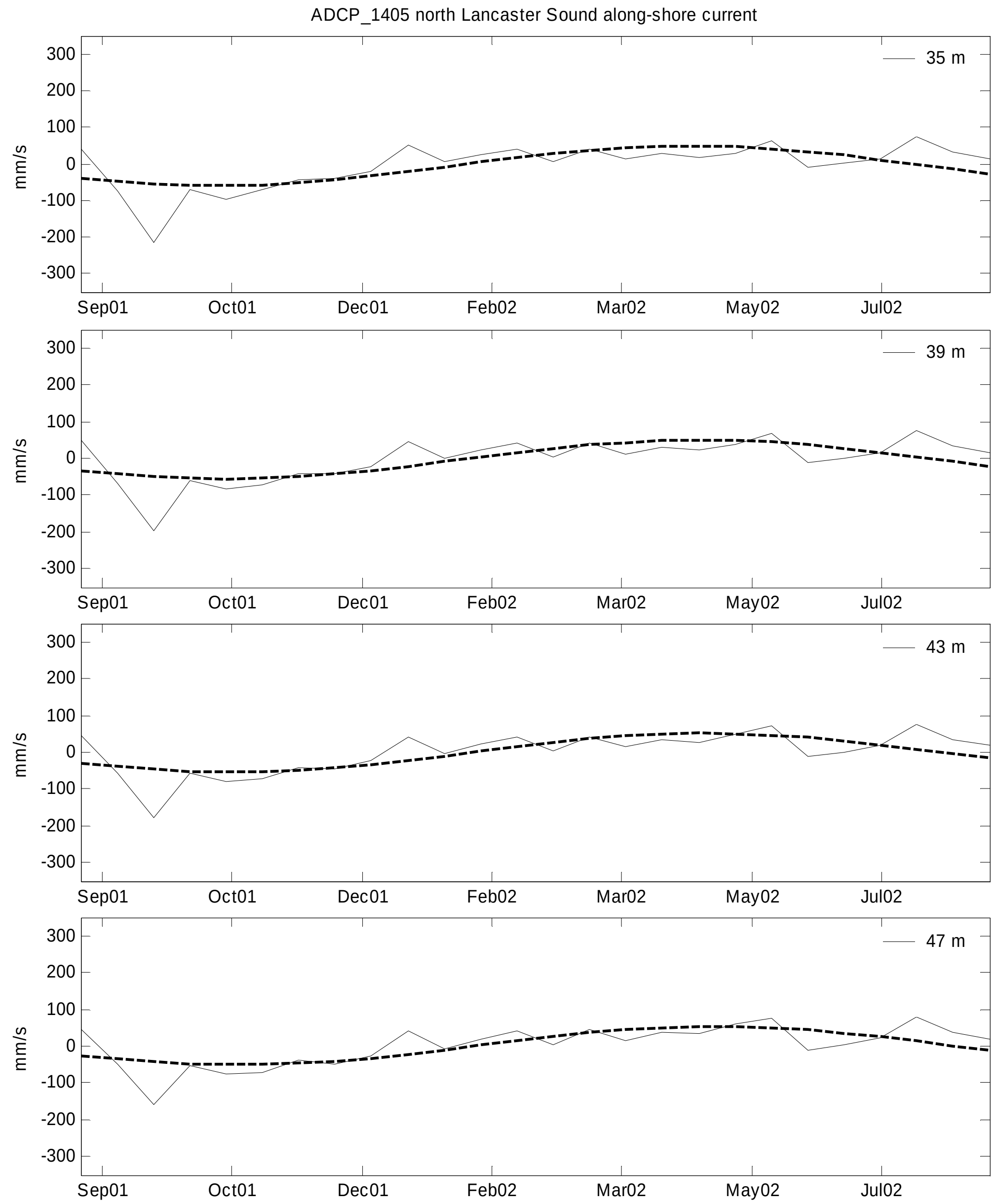

Figure 2-134 Time series of low-pass filtered ADCP data for mooring 1405 with annual harmonic superimposed: 35, 39, 43, and 47 m

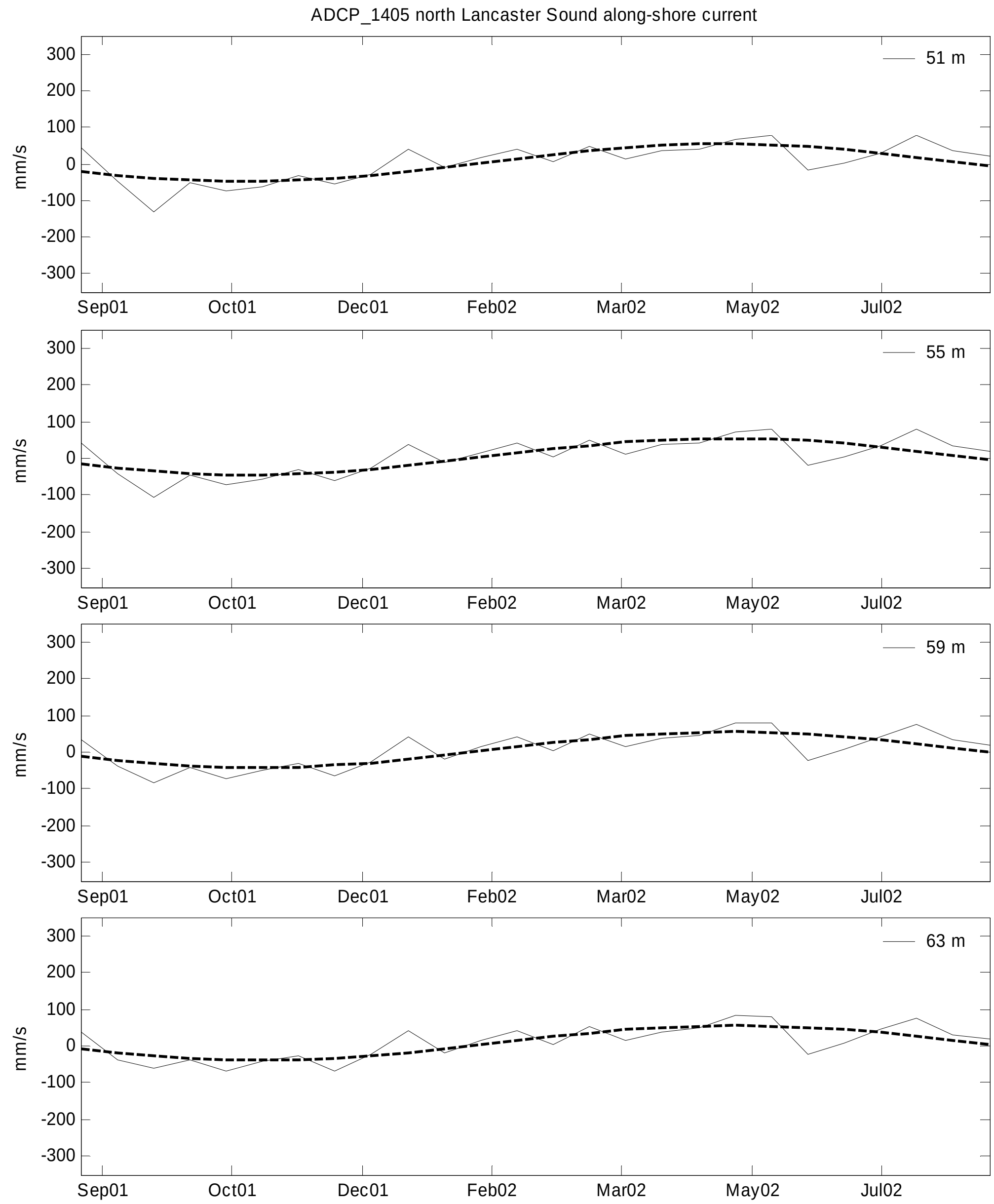

Figure 2-135 Time series of low-pass filtered ADCP data for mooring 1405 with annual harmonic superimposed: 51, 55, 59, and 63 m

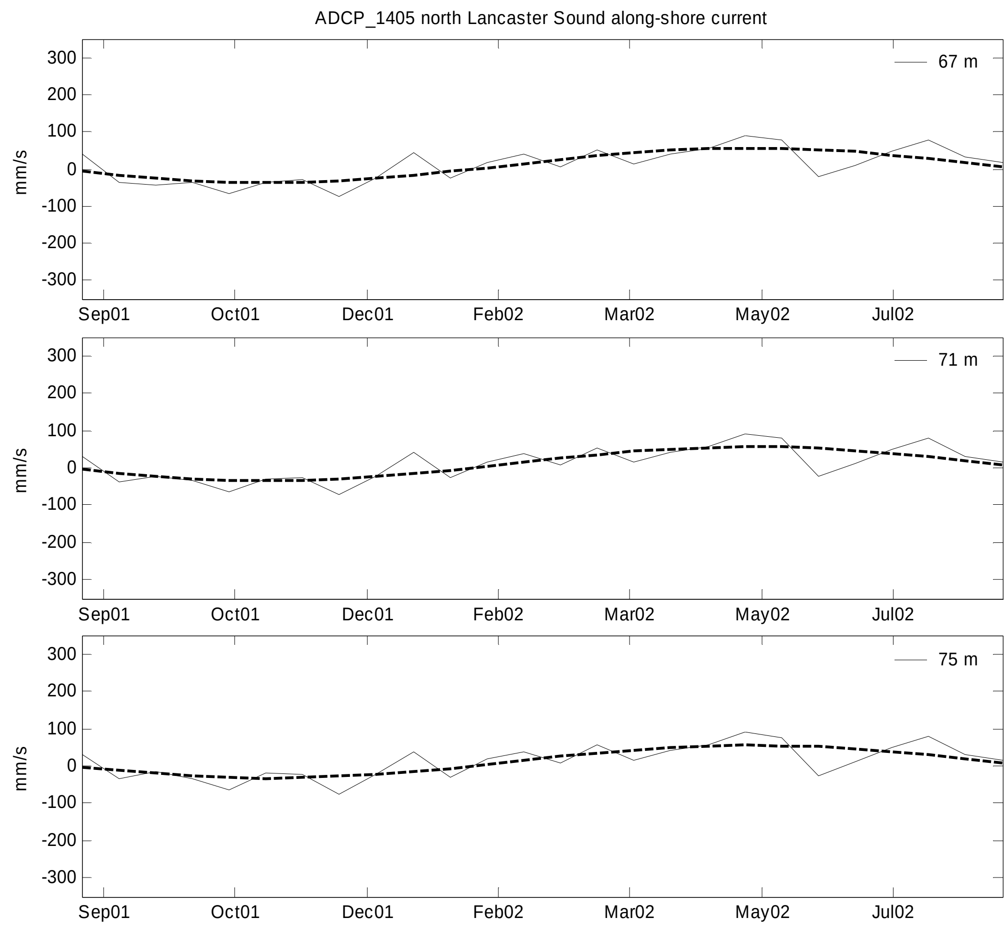

Figure 2-136 Time series of low-pass filtered ADCP data for mooring 1405 with annual harmonic superimposed: 67, 71, and 75 m

Part 3 Principal Component Analysis of ADCP and Moored CTD (Microcat) Data from Lancaster Sound; 2001 – 2002 for Selected Depths and 4 years (1998-2002) at 2 levels in South

3.1 Data

Moored CTD instruments were mounted on moorings 1400, 1402, 1404, and 1406 as shown in Figure 3-1.

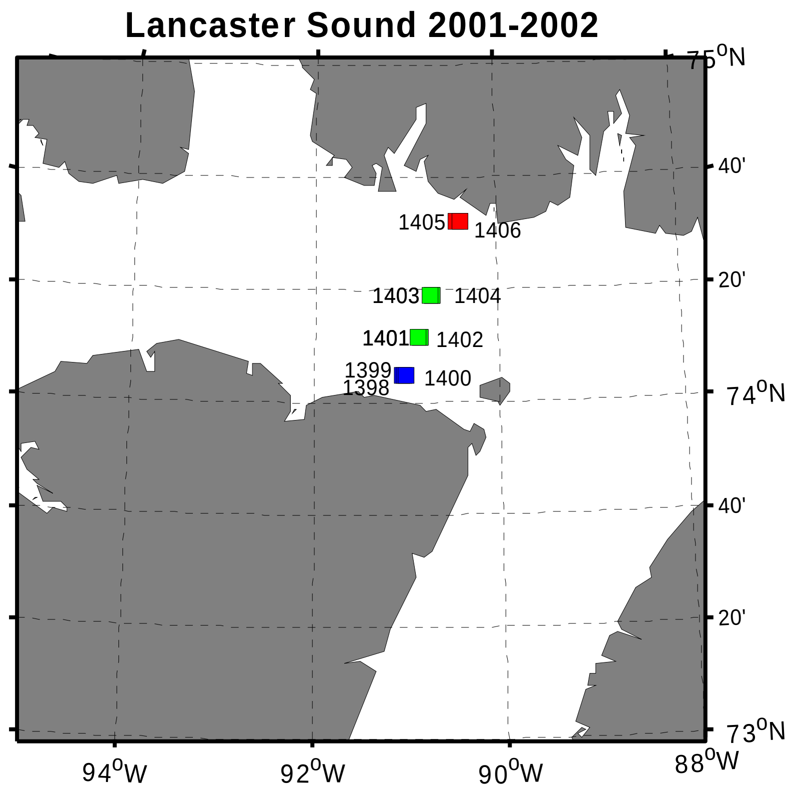

Figure 3-1 Map of Lancaster Sound showing locations of ADCPs and moored CTDs.

3.2 Analysis and Results

3.2.1 Summary

Briefly, the PCA of the 1-year ADCP and Microcat data records showed that the first mode is a shallow velocity mode in the south and similar in the north. The first mode in the south in the 4-year analysis shows similar response as in the 3-year analysis of van der Baaren et al (2003): **U** and σ were not in phase. The magnitudes of **U** are much greater than σ.

More specifically . . .

The four-year data record (14-day low-pass filtered) for the southern mooring <80 m shows that alongshore velocity at 80 m is well-correlated with that measured at 30 m ($r^2 \sim 0.80$). However, density records for the same depths are not well-correlated to the alongshore velocity records ($r^2 < 0.01$) nor are these 2 density records well-correlated with each other. The PCA results for southern mooring data indicate that the first mode is a velocity mode at <80 m with ~95% of the variance accounted for by the alongshore velocity. Four-year results are consistent with 3-year record PCA results of van der Baaren et al (2003). Data for deeper waters do not exist at equivalent depths for the 3-year record and 1-year record to make definitive conclusions about water >80 m.

Curiously, for the one-year 14-day low-pass record, 2001-2002, the southern data shows > 0.60 for the r^2 between density measured at 78 m and alongshore velocity at 80 m. r^2 for density at 78 m and alongshore velocity at 136 m is ~ 0.50. Also, the first mode, aside from >70% explained variance from the alongshore velocities at 30, 80, and 136 m, received significant contribution from density at 78 m with as much as 66% of variance explained.

One-year 14-day low-pass records for moorings located ¼ and ½ -way across the channel show no indication of a good correlation between density and alongshore velocity. The same is true for the 1-year 14-day low-pass data from the northern-most mooring. Alongshore velocities measured at ~ 60-70 m for the 3 moorings are well-correlated with their shallower counterparts at 30-40 m with $r^2 > 0.64$. Alongshore velocities at the ¼ and ½-way marks contribute significantly to the first mode with ≥75% variance accounted for at the ¼ way mark and >85% accounted for at the ½-way mark for data recorded at <70 m. The density at 34 m at the ¼ -way mooring, however, also contributed to the first mode with 57% of the variance accounted for by this mode.

North shore 1-year data records show slightly different PCA results from other 2 moorings (quarter-way and half-way) with the first mode removing 66% and 64% variance from the velocity records at 39 m and 75 m but also removing 53% and 78 % of the variance from the density records at 38 m and 161 m. The correlation of the density records at those depths with the 2 velocity records was low with r^2 values of <3%.

Microcat data

Microcat hourly data were plotted into time series and then low-pass filtered and decimated to 14-day intervals. Cross-correlations of the 14-day data were performed for each mooring before doing the PCA to see what could be expected. Time series data were plotted as single lines per depth record or as contours for both hourly and 14-day records. Transect contours were also plotted for 14-day and monthly mean records. Data were interpolated to a 50 m depth x 0.5^o latitude grid in order to draw them. Variances for hourly and 14-day records were computed for the 2001-2002 records.

Microcat data for 2001-2002 data did not match in depth with 1998-2001 data so only 30 m and 80 m depths were used to construct the 4-year record. From the 4-year density time series of all sensors it was seen that the records from the two deepest sensors differed enough that it would likely skew results.

Principal Component Analysis of alongshore current and density

PCA results for southern mooring data for the years 1998-2002, (4 years) are presented first. There were only 2 depths for which there were enough data to analyze. In addition, an analysis was performed for the 1-year record for all four moorings (south, quarter-way, half-way, and north) since these are the first data from deployment sites quarter-way and half-way across the channel.

A brief analysis of data for “winter/summer” months only was performed to see if there was a difference from the full year record. It seemed, from looking at the 4-year time series, that the times of warmer, saltier water were from December to August. The PCA was performed for a 4-year winter/summer record and then for a 1-year winter/summer record at the southern and northern moorings. Since there was neither a quarter-way nor a half-way mooring from 1998-2001, those records were ignored for this particular analysis. The results for the PCA of the winter/summer records are presented for mode 1 only.

3.2.2 PCA: ADCP and density, southern mooring for 4 years, 14-day data

The following diagram shows the original data for the southern mooring for 4 years at 2 depths. The 14-day low-pass filtered data are superimposed. Original ADCP data were 2-hourly while CTD original data were 6-hourly. The PCA results for the 14-day data follow tables of variance and the cross-correlation matrix.

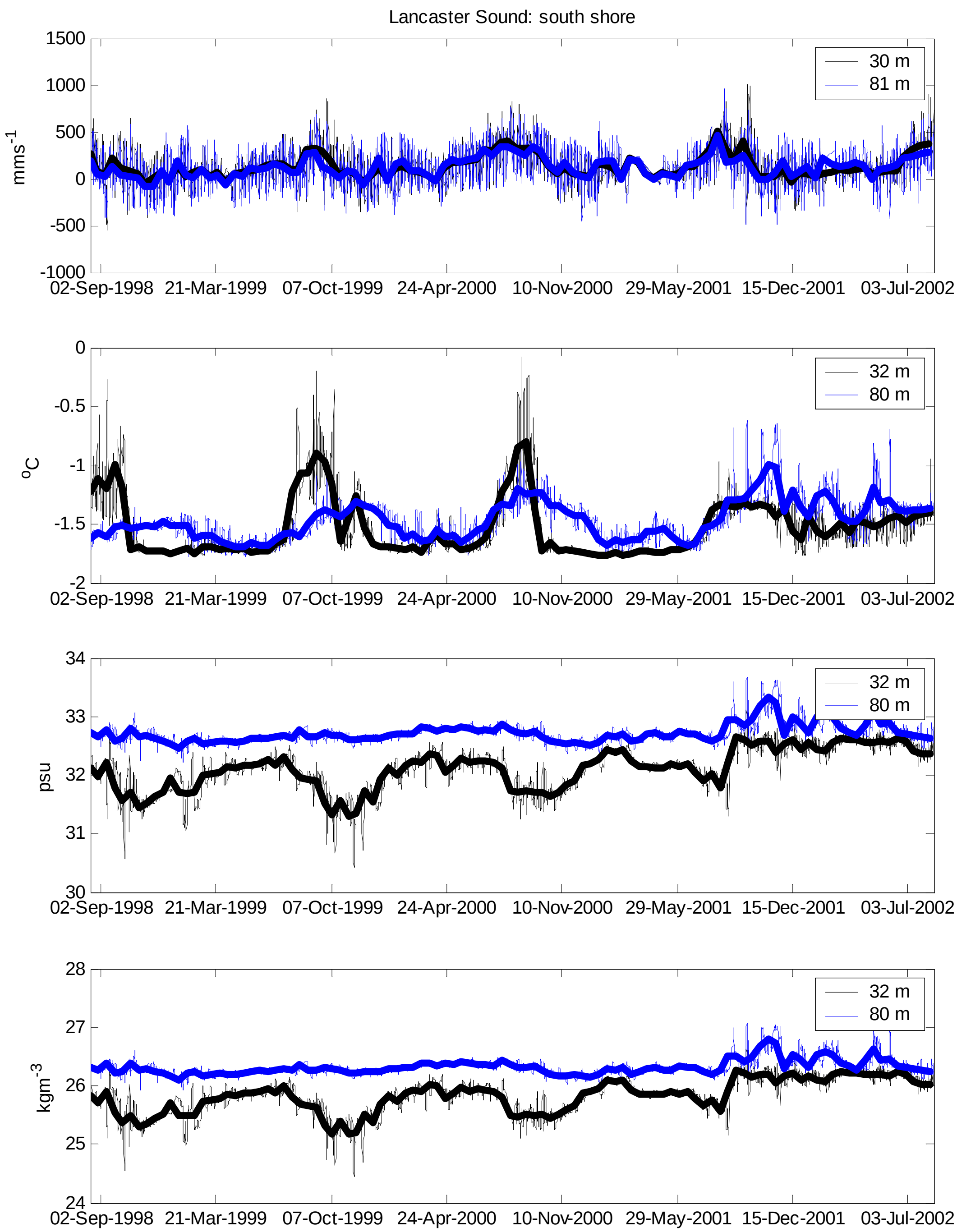

Figure 3-2 Time series of ADCP and Microcat data 2-hourly data for 1998-2002; south shore

3.2.2.1 Variance of 4 years of southern data (6-hrly and 14-day) at 2 depths

ADCP data were interpolated to 6 hours to match CTD sampling.

Table 3-1 Variances of 4-year ADCP and Microcat record at 30 and 80 m for southern mooring: 6-hrly (no tide) and 14-day (low-pass)

south variance (mm^2s^{-2})		
Depth	6-hrly	14-day
ADCP 30 m	29060.27	13470.59
ADCP 81 m	28852.59	11268.91
CTD 32 m	0.09	0.08
CTD 80 m	0.02	0.01

3.2.2.2 Cross correlation matrix of 14-day data, ADCP and CTD, 4 years

Values of r^2>50% are highlighted.

Table 3-2 Cross-correlation matrix for low-pass (14-day) 4-year ADCP and Microcat data at 30 and 80 m

Cross correlation matrix of 14-day data				
	ADCP 30 m	ADCP 81 m	CTD 32 m	CTD 80 m
ADCP 30 m	1.00			
ADCP 81 m	**0.90**	1.00		
CTD 32 m	-0.04	0.08	1.00	
CTD 80 m	-0.04	-0.00	0.55	1.00

3.2.2.3 Eigenvectors and eigenvalues

The numeric signs of first mode eigenvectors are all negative except for density at 80 m. For 1998-2001 (van der Baaren et al, 2003), the signs were all negative for this mode except at the deepest point. Alongshore flow and density should show opposite signs for this mode (increasing U eastward and decreasing σ downwards). U is still dominant here: |U| >> |σ| for Mode 1. Mode 2 is the opposite Mode 1.

Table 3-3 Eigenvectors and eigenvalues for first 4 modes of 4-year data record: ADCP and Microcat, southern mooring

ALONGSHORE FLOW AND DENSITY								
South	Eigenvectors					Eigenvalues		% Expl. Var.
		Mode 1	Mode 2	Mode 3	Mode 4			
ADCP	30 m	-0.71	0.04	-0.10	0.70	Mode 1	1.90	47.40
	81 m	-0.71	-0.04	0.07	-0.70	Mode 2	1.55	38.81
CTD	32 m	-0.01	-0.71	0.70	0.12	Mode 3	0.46	11.41
	80 m	0.02	-0.70	-0.71	-0.05	Mode 4	0.10	2.38

3.2.2.4 % variance accounted for by each mode

Note that first mode removes a great deal of variance from the ADCP record and hardly anything from the density record. For 1998-2001 (van der Baaren, et al, 2003) it was approximately 75% removed from alongshore flow and 20% from density for mode 1.

Table 3-4 Variance of first 4 modes for PCA of south shore alongshore flow and density), 1998-2002, 30 m and 80 m

Variance : south shore (mm^2s^{-2} and kg^2m^{-6})								
			Mode 1		Mode 2		Mode 3	
Depth		Original	Residual	% var.	Residual	% var.	Residual	% var.
ADCP	30 m	13470.59	718.70	94.66	692.10	94.86	625.81	95.35
	81 m	11268.91	583.85	94.82	552.36	95.10	528.72	95.31
CTD	32 m	0.08	0.08	0.04	0.02	77.79	0.00	99.85
	80 m	0.01	0.01	0.09	0.00	77.11	0.00	99.98

			Mode 4	
Depth		Original	Residual	% var.
ADCP	30 m	13470.59	0.00	100.00
	81 m	11268.91	0.00	100.00
CTD	32 m	0.08	0.00	100.00
	80 m	0.01	0.00	100.00

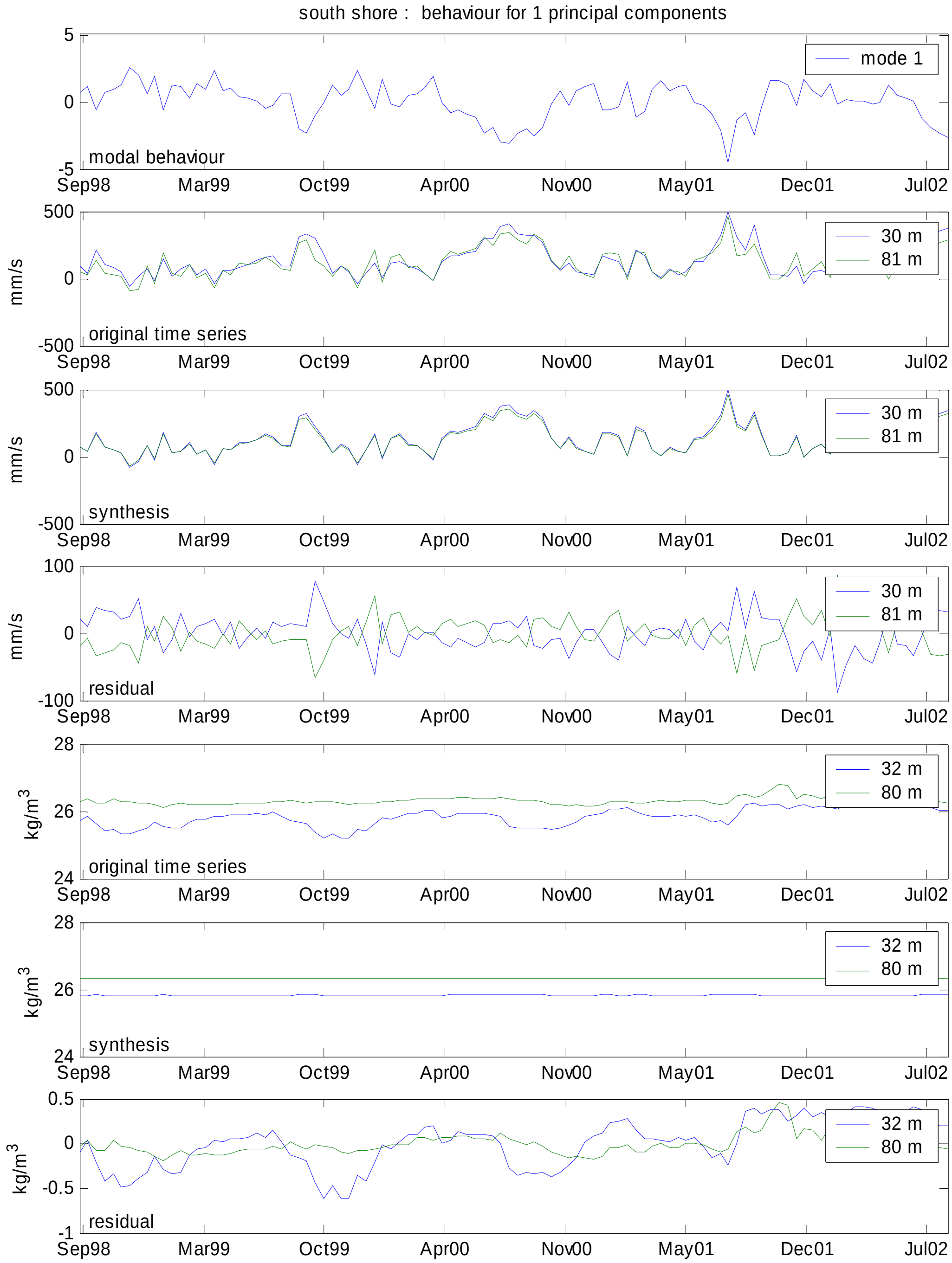

Figure 3-3 Recreation of time series using mode 1: South shore, 4 years of 14-day data

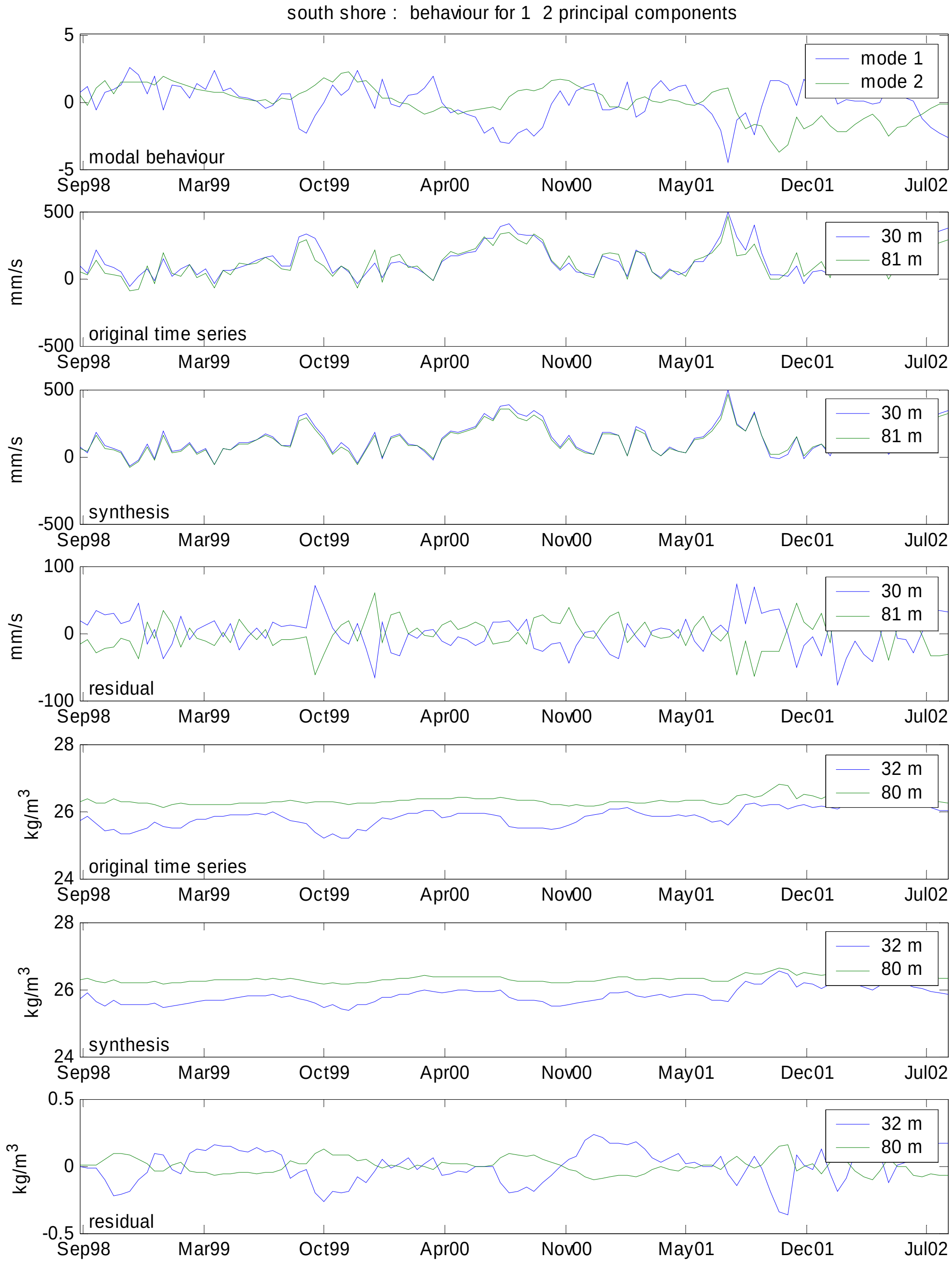

Figure 3-4 Recreation of time series using modes 1 and 2: South shore, 4 years of 14-day data

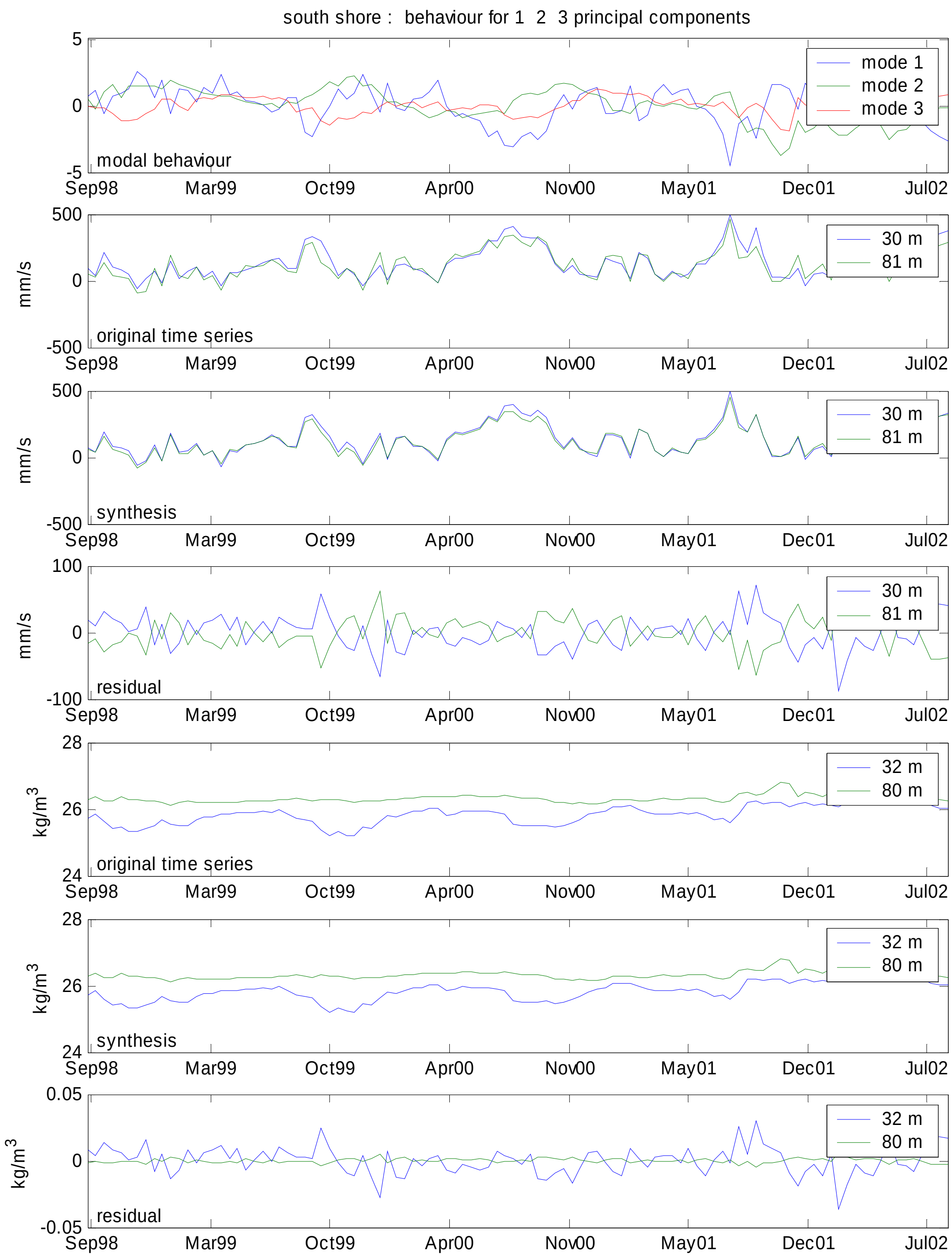

Figure 3-5 Recreation of time series using modes 1, 2, and 3: South shore, 4 years of 14-day data

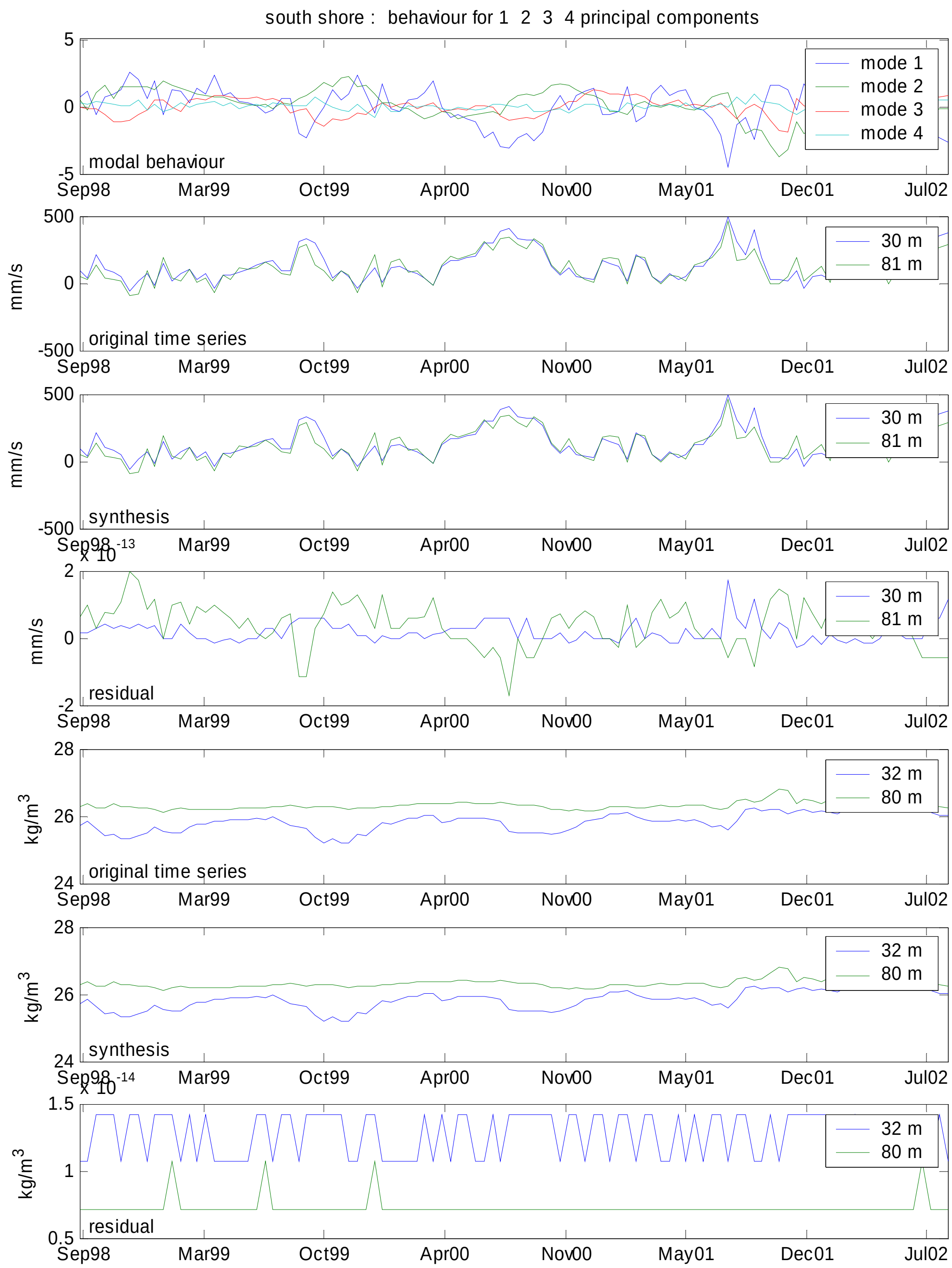

Figure 3-6 Recreation of time series using modes 1, 2, 3, and 4: South shore, 4 years of 14-day data

3.2.3 PCA, alongshore flow and density, southern mooring for 4 years, 14-day data, >December and <August, 4 years

The cross-correlation matrix for the southern 4-year low-pass data (1998-2002) was quite different at CTD 80 m from that of 1998-2001 (van der Baaren, et al., 2003, p.26) but almost the same for the ADCP data.

3.2.3.1 Cross correlation matrix of 14-day data, ADCP and CTD, 4 years

Table 3-5 Cross-correlation matrix of ADCP and CTD, 14-day, data between Dec. to Aug. over 4 years

	ADCP 30 m	ADCP 81 m	CTD 32 m	CTD 80 m
ADCP 30 m	1.00			
ADCP 81 m	0.88	1.00		
CTD 32 m	0.07	0.19	1.00	
CTD 80 m	-0.01	0.14	0.62	1.00

3.2.3.2 Eigenvectors and eigenvalues

Note that the sign of the first mode eigenvectors are all positive whereas they were all negative for 1998-2001. Response of U and σ is still not synchronous. The magnitude of U >> magnitude of σ for mode 1. Mode 2 looks like a normal response for the phase.

Table 3-6 Eigenvectors and eigenvalues for PCA of alongshore flow and density for south shore between Dec. and Aug. over 4 years

ALONGSHORE FLOW AND DENSITY : south shore winters								
eigenvectors		mode 1	mode 2	mode 3	mode 4		eigenvalues	%. expl. var.
ADCP	30 m	0.60	-0.40	0.00	-0.70	mode 1	1.99	49.73
	81 m	0.64	-0.28	-0.06	0.71	mode 2	1.53	38.20
CTD	32 m	0.36	0.60	0.71	-0.03	mode 3	0.38	9.38
	80 m	0.31	0.64	-0.70	-0.10	mode 4	0.11	2.69

3.2.3.3 % variance accounted for by mode 1

Note that values are more in line with what was published for 1998-2001 data (refresher: 70 and 80 % variance removed in U and 17 and 30% variance removed in $\sigma_{t)}$.

Table 3-7 Variance of original data and accounted for by first mode in PCA of southern alongshore flow and density; 30 and 80 m; between Dec. and Aug. over 4 years

Variance : south shore winters			
	Original	Residual	%. expl. var.
ADCP 30 m	8507.40	2486.69	70.77
ADCP 81 m	8551.14	1505.55	82.39
CTD 32 m	0.04	0.03	26.06
CTD 80 m	0.01	0.01	19.69

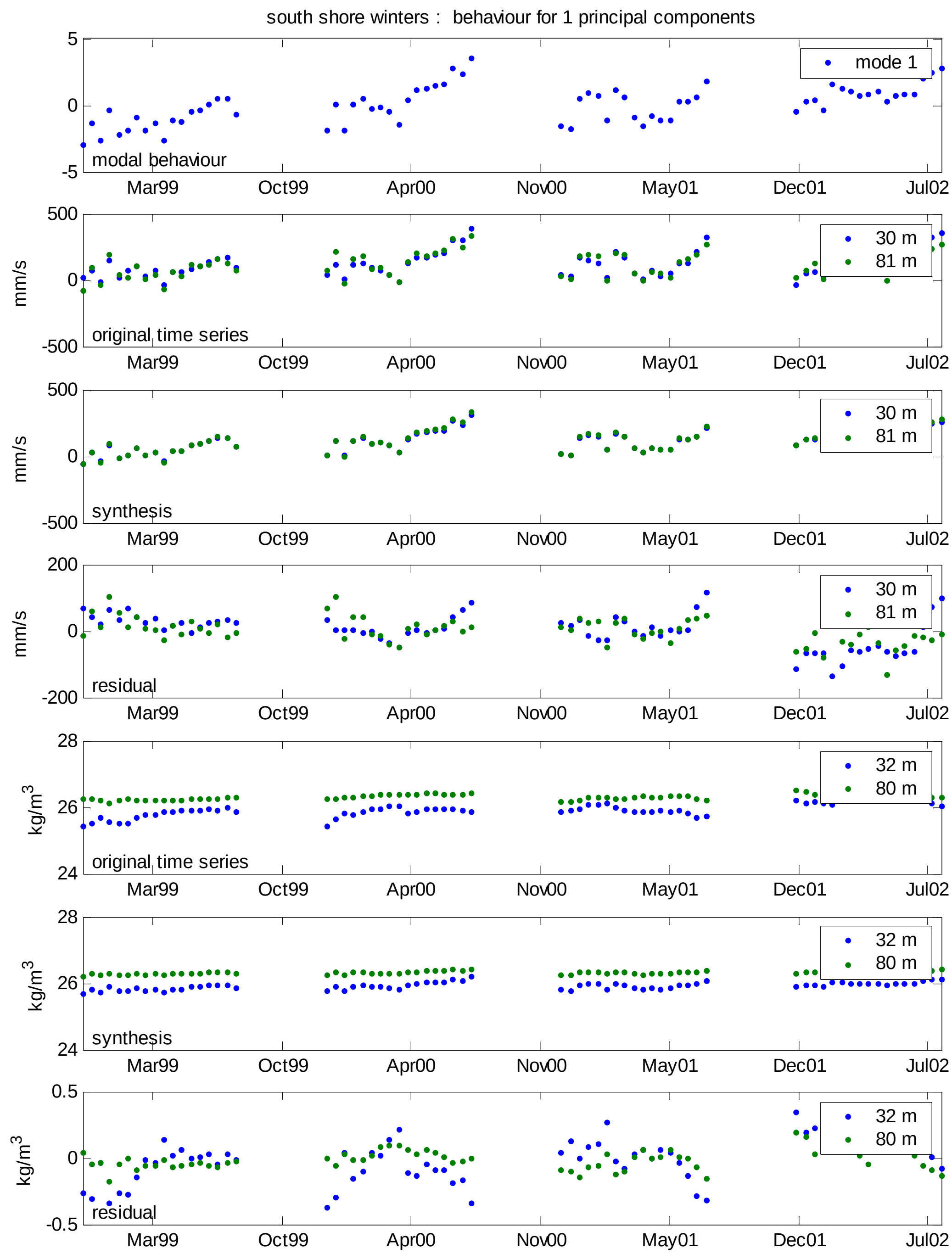

Figure 3-7 Recreation of time series using mode 1: southern mooring, 14-day data, 1 year, >December and <August over 4 years

3.2.4 PCA, ADCP and density, southern mooring, 14-day data for 1 year

3.2.4.1 Eigenvectors and eigenvalues

The signs of the eigenvectors for mode 1 are different from the previous 1998-2001 analysis. In the 1998-2001 PCA, they were all negative except for the deepest density (van der Baaren et al., 2003). The response of U and σ looks normal: that is, an increase in U shows a decrease in σ. The magnitudes for mode 1 are of the same order for all but density at 32 m and at 144 m.

Table 3-8 Eigenvectors and eigenvalues for PCA of alongshore flow and density for south shore for 2001-2002

Alongshore flow and density: south										
Eigenvectors		1	2	3	4	5	6	Mode	Eigenvals	
ADCP	30 m	-0.47	-0.14	-0.03	0.75	-0.20	-0.40	1	3.34	55.59
	80 m	-0.54	0.05	-0.07	0.09	-0.08	0.83	2	1.51	25.22
	136 m	-0.51	0.11	-0.19	-0.24	0.76	-0.26	3	0.58	9.71
CTD	32 m	0.15	0.63	-0.74	0.13	-0.15	-0.03	4	0.40	6.72
	78 m	0.44	-0.33	-0.22	0.51	0.55	0.29	5	0.15	2.42
	144 m	0.10	0.68	0.60	0.31	0.24	0.06	6	0.02	0.34

3.2.4.2 % variance accounted for by each mode

There seems to be a great deal of variance removed from not only the ADCP record but also from the density record at 78 m.

Table 3-9 Variance of original ADCP and density data and percentage accounted for by first 4 modes, 2001-2002, southern mooring

Variance (mm^2s^{-2} and kgm^{-3})								
			Mode 1		Mode 2		Mode 3	
	Depth	Original	Residual	% var.	Residual	% var.	Residual	%. var.
ADCP	30 m	15945.12	4210.44	73.59	3748.19	76.49	3739.65	76.55
	80 m	7462.00	189.92	97.45	156.83	97.90	136.92	98.17
	136 m	2248.40	334.99	85.10	290.53	87.08	242.23	89.23
CTD	32 m	0.00	0.00	7.89	0.00	67.29	0.00	99.02
	78 m	0.02	0.01	65.86	0.00	82.15	0.00	84.97
	144 m	0.09	0.09	3.66	0.02	73.95	0.00	95.21

			Mode 4	
	Depth	Original	Residual	% var.
ADCP	30 m	15945.12	142.78	99.10
	80 m	7462.00	111.86	98.50
	136 m	2248.40	189.36	91.58
CTD	32 m	0.00	0.00	99.68
	78 m	0.02	0.00	95.42
	144 m	0.09	0.00	99.15

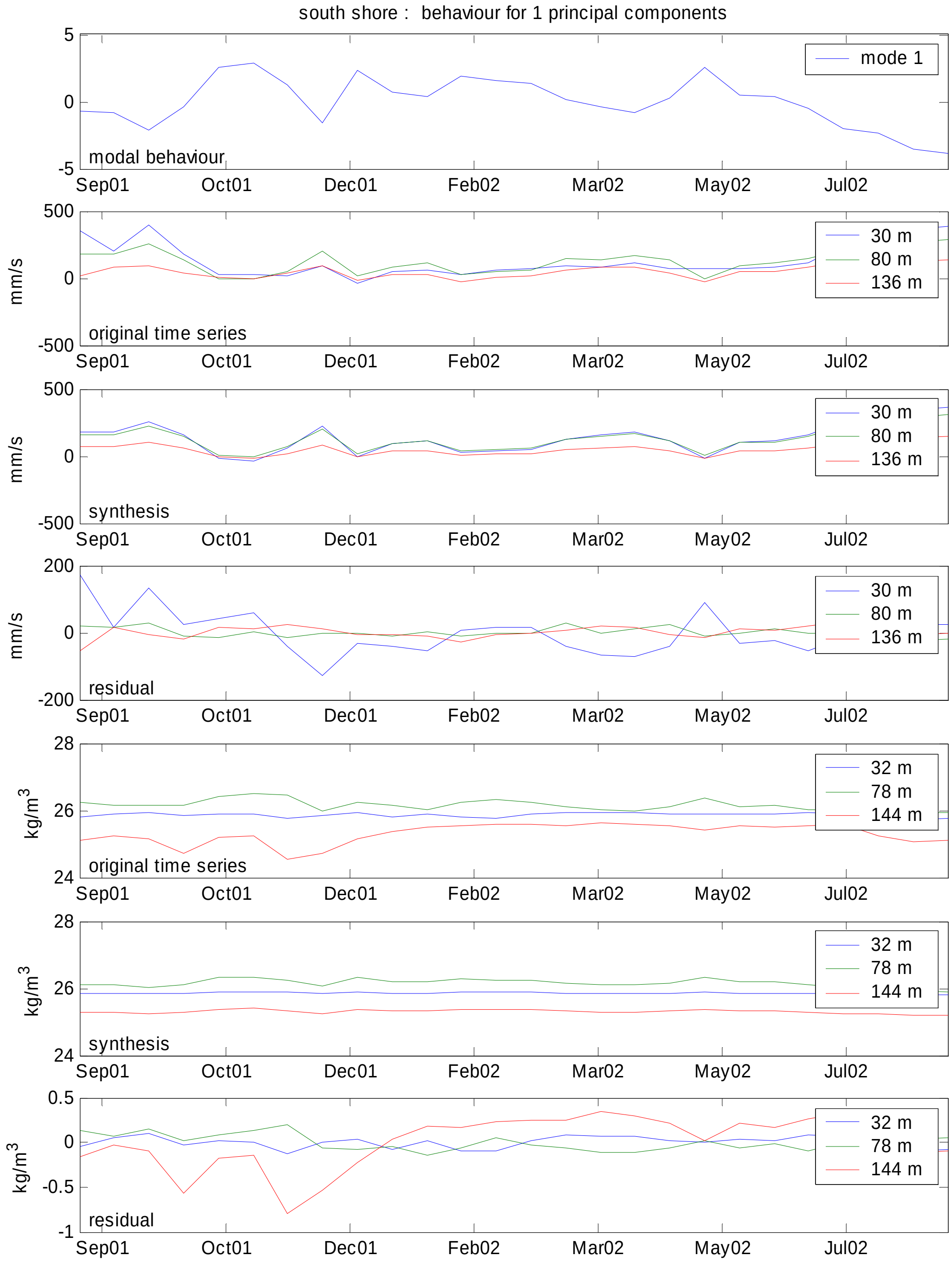

Figure 3-8 Recreation of time series using mode 1 at 3 depths: southern mooring, 14-day data, 1 year (2001-2002)

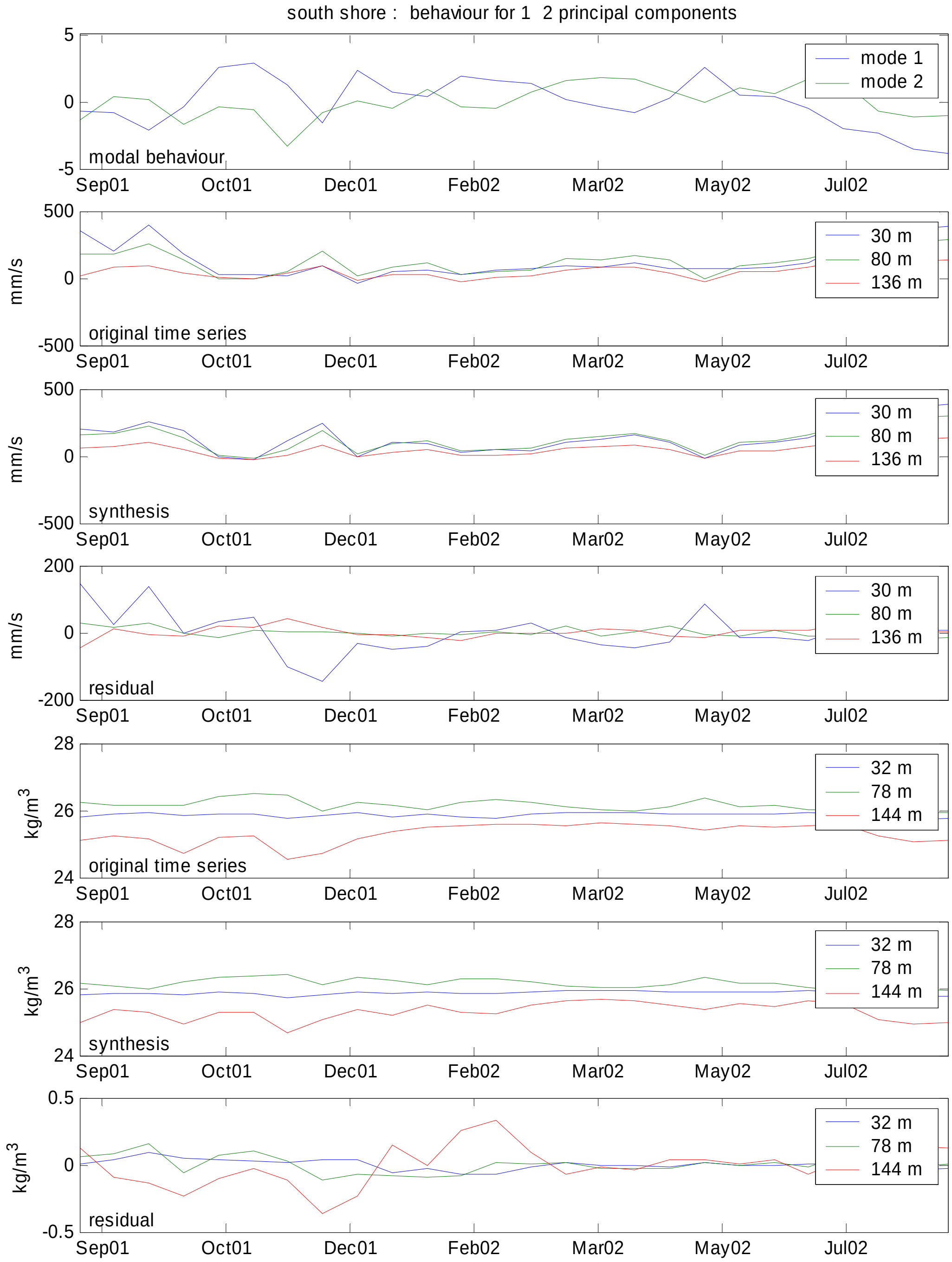

Figure 3-9 Recreation of time series using modes 1 and 2 at 3 depths: southern mooring, 14-day data, 1 year (2001-2002)

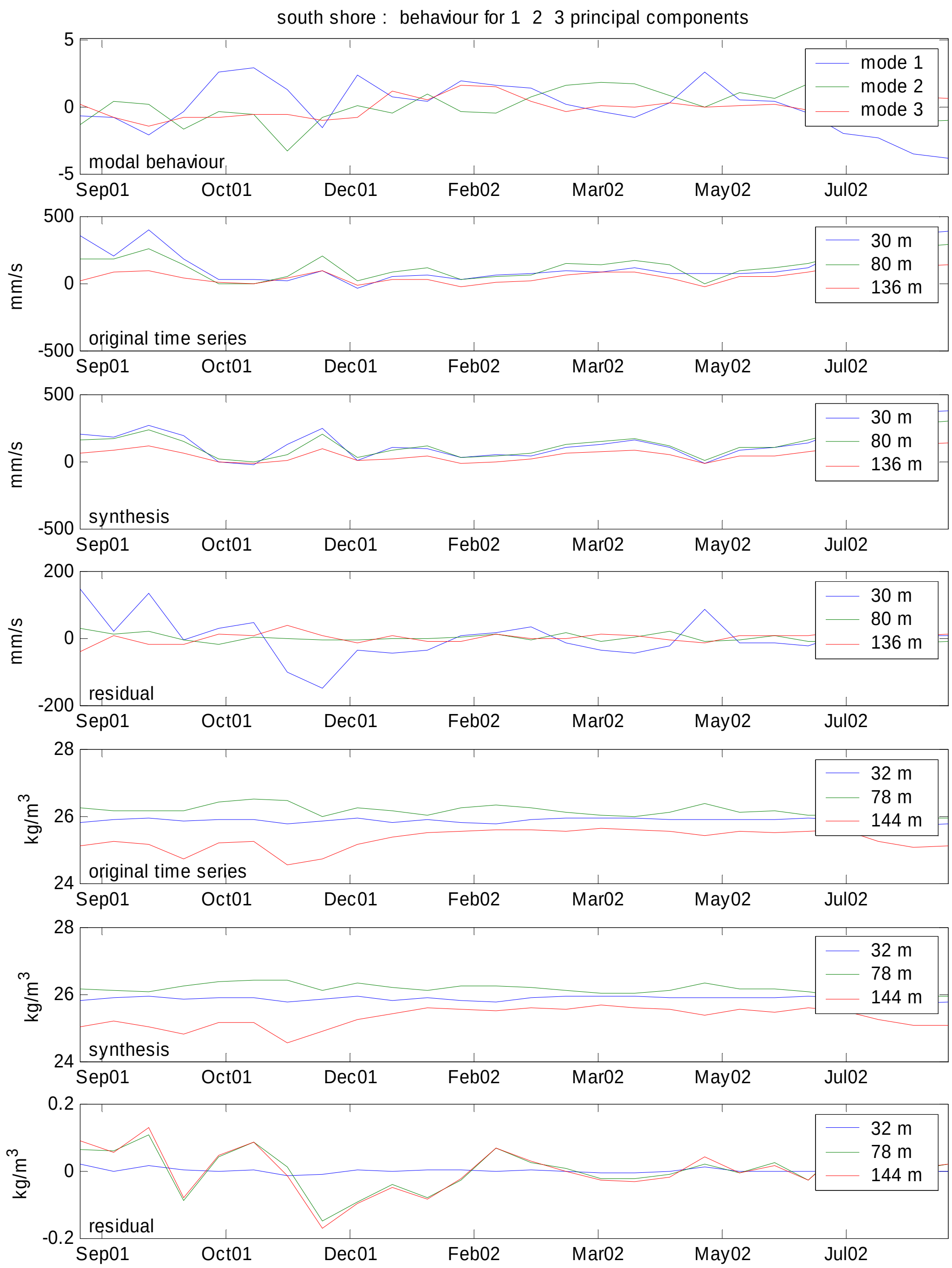

Figure 3-10 Recreation of time series using modes 1, 2, and 3 at 3 depths: southern mooring, 14-day data, 1 year (2001-2002)

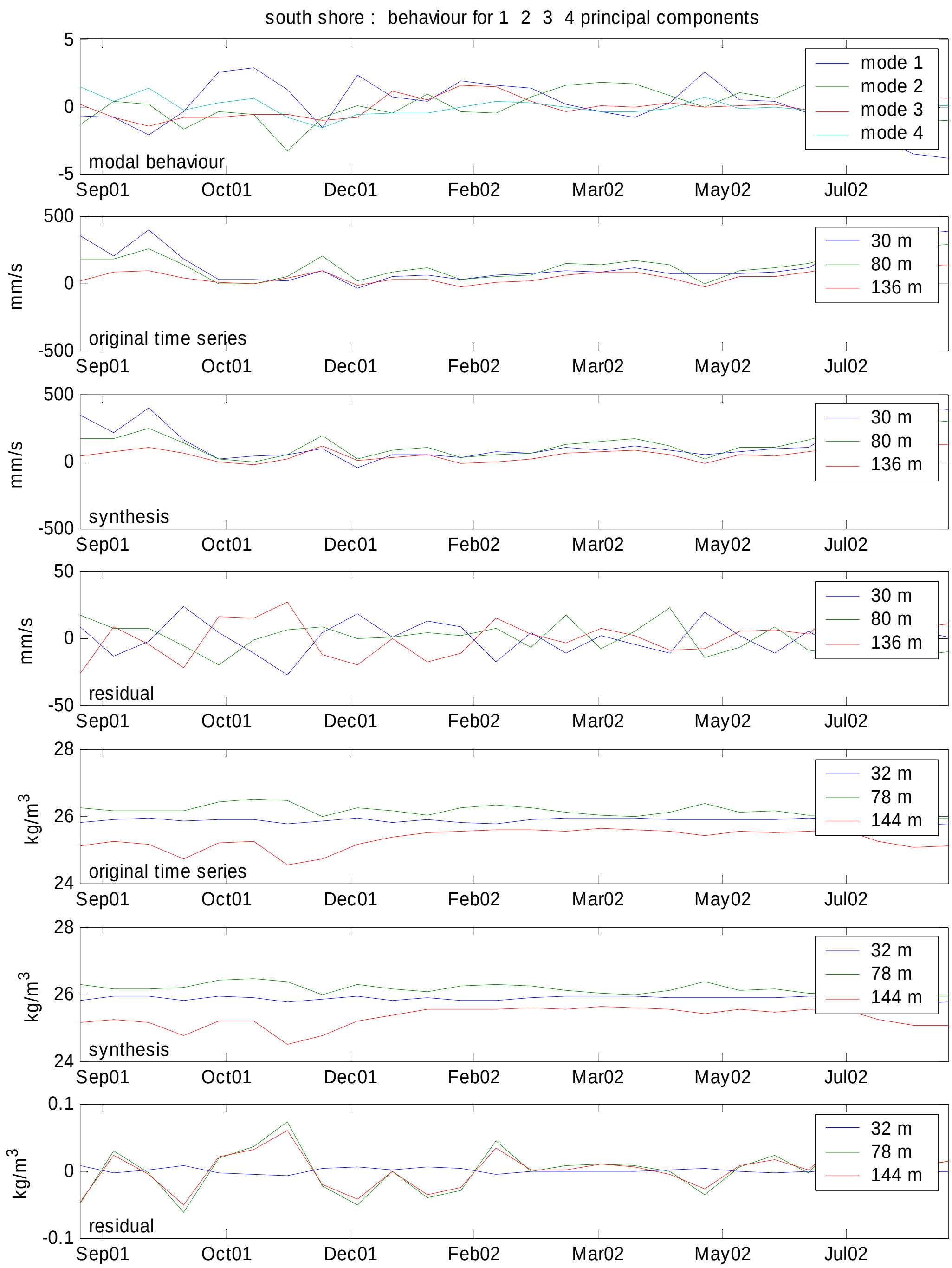

Figure 3-11 Recreation of time series using modes 1, 2, 3, and 4 at 3 depths: southern mooring, 14-day data, 1 year (2001-2002)

3.2.5 PCA, ADCP and density, southern mooring, 14-day data for >December 2001 and <August 2002

3.2.5.1 Eigenvectors and eigenvalues

The signs of the eigenvectors are different for first mode for Dec. 2002 to Aug. 2002 than for the entire year's record. The magnitudes of mode 1, however, are the same as for the entire year.

Table 3-10 Eigenvectors and eigenvalues for PCA of alongshore flow and density for south shore between Dec. 2002 and Aug. 2002

ADCP AND CTD									
south	eigenvectors						eigenvalues		% expl. var.
winter	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6			
ADCP 30 m	0.46	0.10	-0.37	0.60	0.49	-0.22	mode 1	3.92	65.28
ADCP 80 m	0.49	-0.16	-0.04	0.01	-0.09	0.85	mode 2	1.20	19.99
ADCP 136 m	0.47	-0.28	0.01	0.13	-0.72	-0.41	mode 3	0.63	10.56
CTD 32 m	-0.24	-0.72	0.44	0.44	0.19	0.04	mode 4	0.18	3.03
CTD 78 m	-0.44	0.32	-0.17	0.64	-0.45	0.25	mode 5	0.05	0.85
CTD 144 m	-0.27	-0.51	-0.80	-0.17	-0.03	0.02	mode 6	0.02	0.29

3.2.5.2 % variance accounted for by mode 1

More variance is removed here by mode 1 than for all records.

Table 3-11 Variance of original data and accounted for by first mode in PCA of southern alongshore flow and density; 30 and 80 m; between Dec. 2002 and Aug. 2002

Variance (mm^2s^{-2} and kgm^{-3})			
	Original	Residual	pct. var.
ADCP 30 m	13252.78	2361.65	82.18
ADCP 80 m	6888.63	296.92	95.69
ADCP 136 m	2562.86	324.99	87.32
CTD 32 m	0.00	0.00	21.79
CTD 78 m	0.02	0.00	77.15
CTD 144 m	0.06	0.04	27.56

3.2.6 PCA, ADCP and density, quarter-way mooring, 14-day data for 1 year

3.2.6.1 Eigenvectors and eigenvalues

The ADCP and CTD results are exhibiting the expected response for mode 1 (an increase in U shows a decrease in σ). The magnitude of ADCP response is larger than the CTD response for mode 1.

Table 3-12 Eigenvectors and eigenvalues for PCA of alongshore flow and density for mooring a quarter way across from the south shore, 2001-2002

ADCP alongshore flow and density: quarter-way										
Eigenvectors		1	2	3	4	5	6	Mode	Eigenvals	% Expl. Var.
ADCP	34 m	0.57	0.36	-0.07	0.12	0.05	-0.72	1	2.36	39.28
	62 m	0.56	0.38	-0.08	0.14	0.20	0.69	2	1.51	25.25
CTD	34 m	-0.49	0.34	-0.10	0.56	0.56	-0.08	3	1.33	22.21
	70 m	-0.26	0.57	-0.29	-0.72	0.09	-0.01	4	0.45	7.47
	149 m	-0.20	0.53	0.50	0.22	-0.61	0.06	5	0.45	5.57
	268 m	0.07	-0.01	0.80	-0.30	0.51	-0.04	6	0.45	0.22

3.2.6.2 % variance accounted for by each mode

Table 3-13 Variance of original data and accounted for by first 4 modes in PCA of quarter-way alongshore flow and density at selected depths; 2001-2002

Variance (mm^2s^{-2} and kgm^{-3})								
			Mode 1		Mode 2		Mode 3	
	Depth	Original	Residual	% var.	Residual	% var.	Residual	%. var.
ADCP	34 m	5171.69	1147.20	77.82	107.76	97.92	74.91	98.55
	62 m	4224.70	1067.49	74.73	160.71	96.20	121.31	97.13
CTD	34 m	0.00	0.00	56.61	0.00	73.98	0.00	75.43
	70 m	0.01	0.00	16.07	0.00	65.50	0.00	76.70
	149 m	0.01	0.01	9.21	0.01	52.35	0.00	85.21
	268 m	0.02	0.02	1.23	0.02	1.24	0.00	87.42

			Mode 4	
	Depth	Original	Residual	% var.
ADCP	34 m	5171.69	38.96	99.25
	62 m	4224.70	82.71	98.04
CTD	34 m	0.00	0.00	89.42
	70 m	0.01	0.00	99.76
	149 m	0.01	0.00	87.43
	268 m	0.02	0.00	91.39

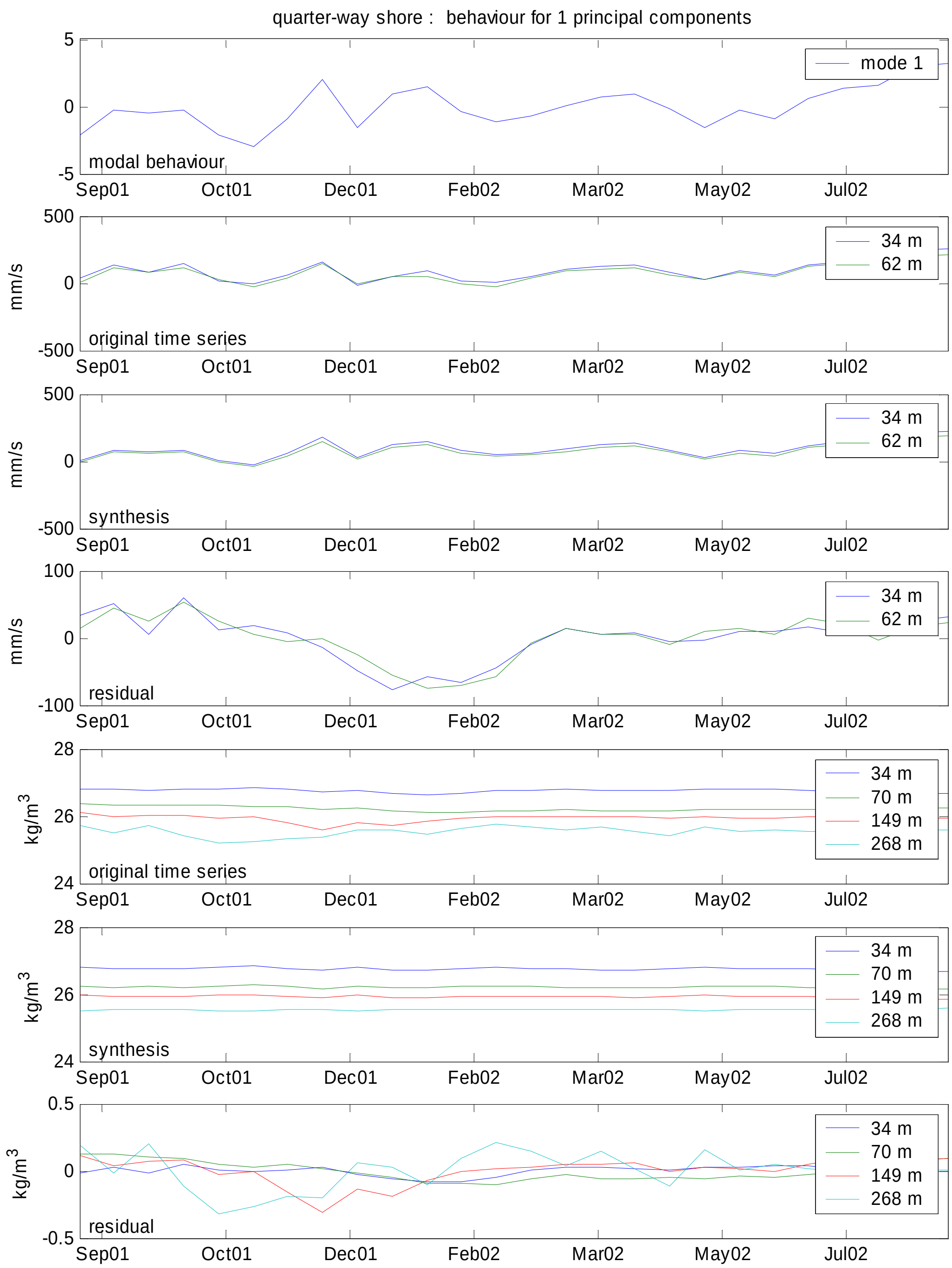

Figure 3-12 Recreation of time series using mode 1: quarter-way, 14-day data, 1 year

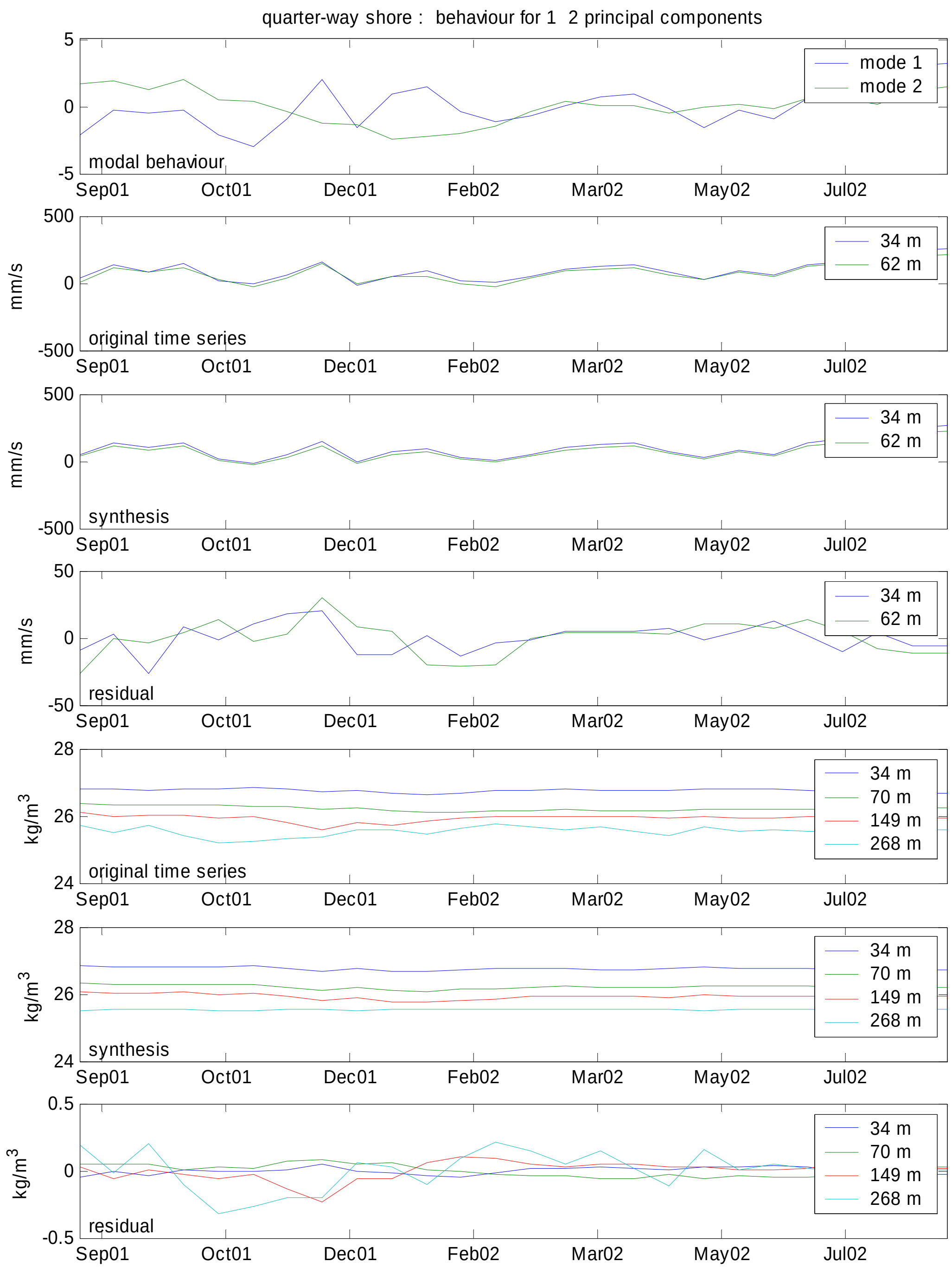

Figure 3-13 Recreation of time series using modes 1 and 2: quarter-way, 14-day data, 1 year

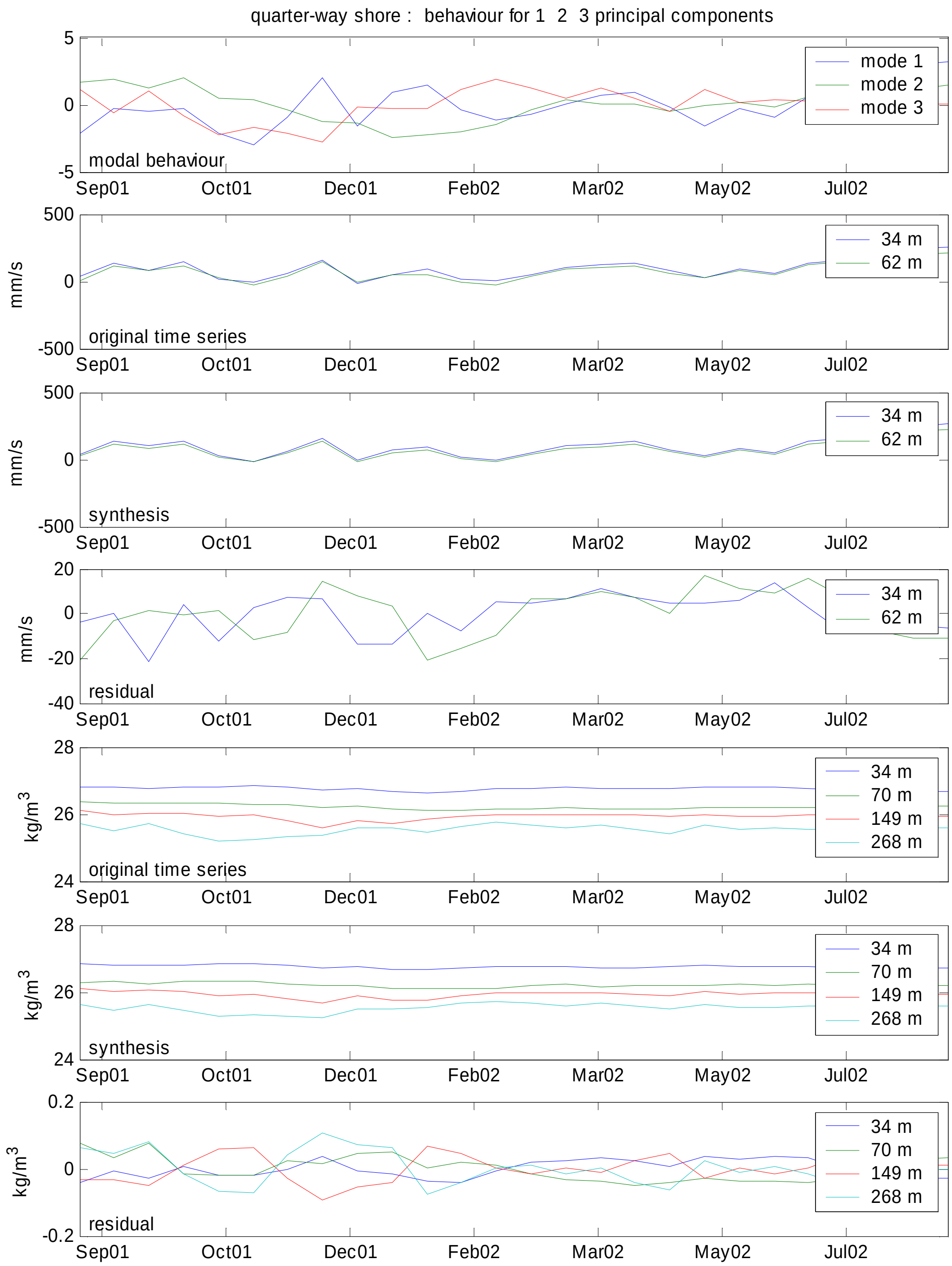

Figure 3-14 Recreation of time series using modes 1, 2, and 3: quarter-way, 14-day data, 1 year

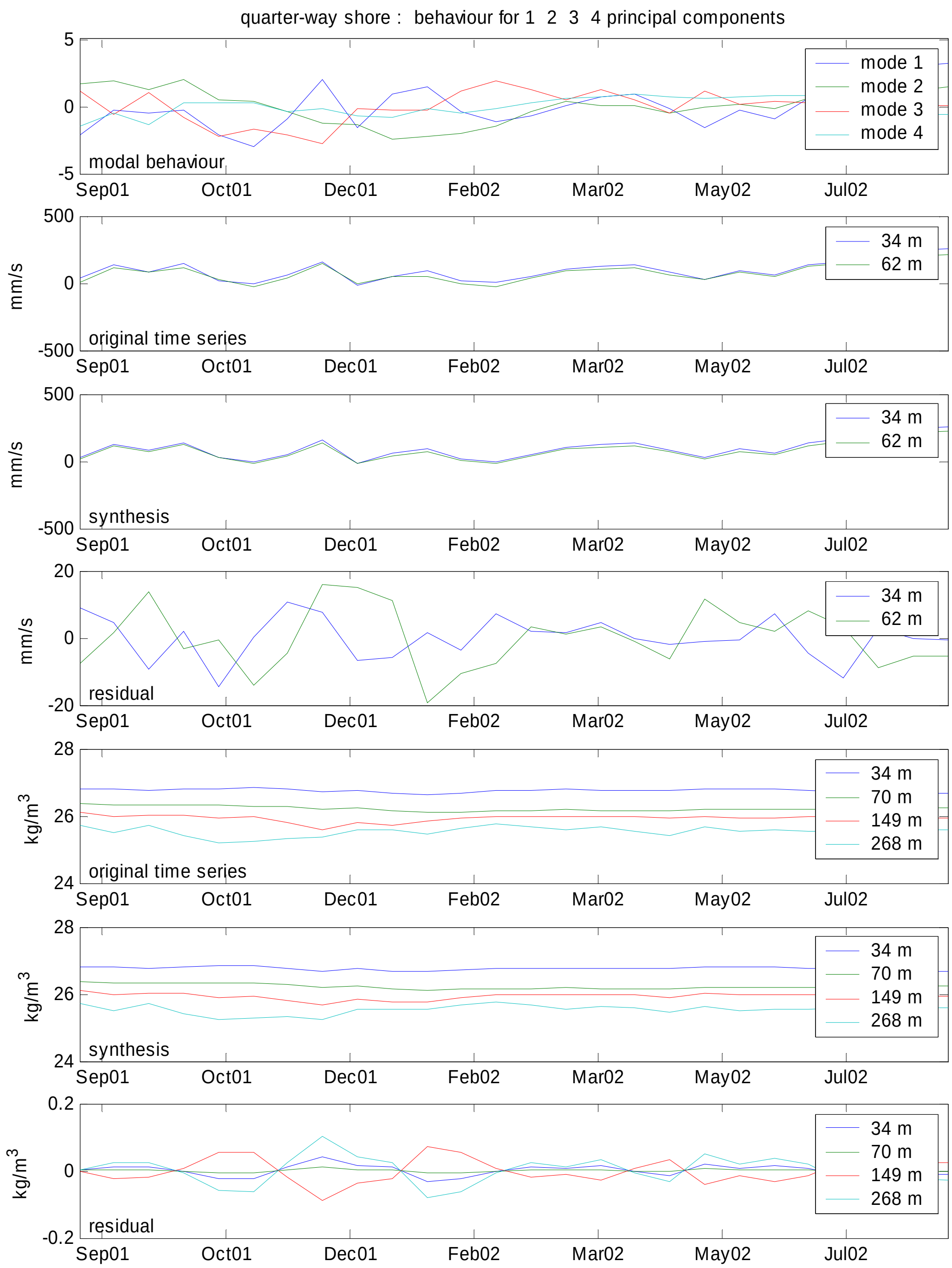

Figure 3-15 Recreation of time series using modes 1, 2, 3, and 4: quarter-way, 14-day data, 1 year

3.2.7 PCA, ADCP and density, half-way mooring, 14-day data for 1 year

3.2.7.1 Eigenvectors and eigenvalues

At the half-way mark, the response is as expected for the first mode; that is, U and σ increasing and decreasing in opposition.

Table 3-14 Eigenvectors and eigenvalues for PCA of alongshore flow and density for half-way mooring, 2001-2002

ADCP alongshore flow and density: half-way									
Eigenvectors		1	2	3	4	5	Mode	Eigenvals	% Expl. Var.
ADCP	33 m	0.63	0.05	-0.27	0.07	-0.73	1	2.34	46.70
	69 m	0.61	0.09	-0.40	0.01	0.68	2	1.69	33.73
CTD	34 m	-0.08	0.69	-0.09	-0.71	-0.06	3	0.55	10.97
	78 m	-0.41	0.43	-0.61	0.53	-0.05	4	0.36	7.24
	158 m	0.25	0.58	0.63	0.45	0.07	5	0.07	1.35

3.2.7.2 % variance accounted for by each mode

At the half-way point the first mode still removes a great deal of variance from ADCP.

Table 3-15 Variance of original data and accounted for by first 4 modes in PCA of half-way alongshore flow and density at selected depths; 2001-2002

Variance (mm^{2}s^{-2} and kgm^{-3})								
			Mode 1		Mode 2		Mode 3	
	Depth	Original	Residual	% var.	Residual	% var.	Residual	%. var.
ADCP	33 m	1596.71	140.01	91.94	133.33	92.32	65.33	96.24
	69 m	1207.31	180.97	86.96	163.72	88.21	43.48	96.87
CTD	34 m	0.00	0.01	1.33	0.00	81.11	0.00	81.51
	78 m	0.00	0.00	38.82	0.00	69.67	0.00	89.78
	158 m	0.00	0.02	14.46	0.01	70.87	0.00	92.65

			Mode 4	
	Depth	Original	Residual	% var.
ADCP	33 m	1596.71	62.00	96.43
	69 m	1207.31	43.45	96.87
CTD	34 m	0.00	0.00	99.98
	78 m	0.00	0.00	99.98
	158 m	0.00	0.00	99.97

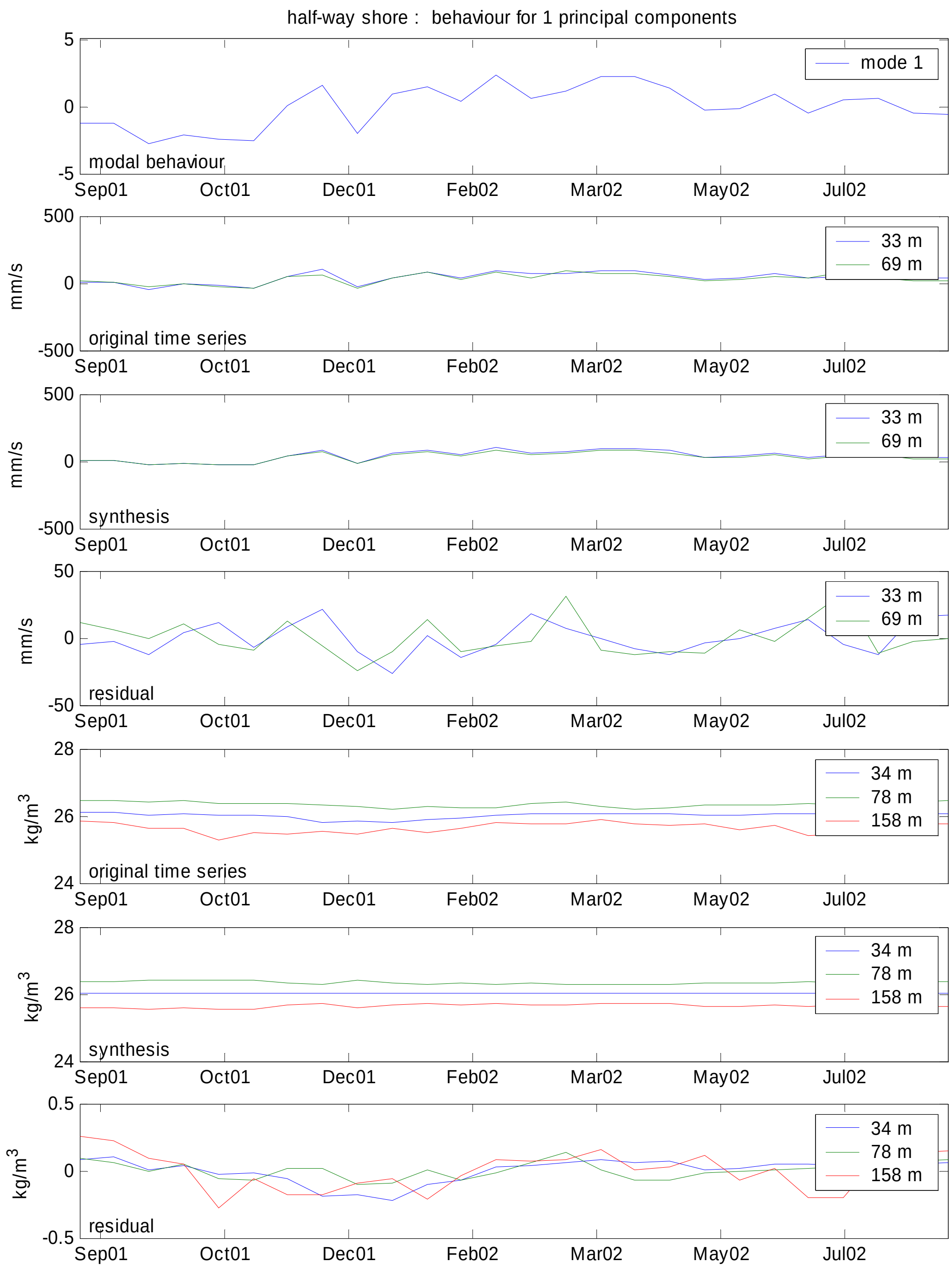

Figure 3-16 Recreation of time series using mode 1: half-way mooring, 14-day data, 1 year

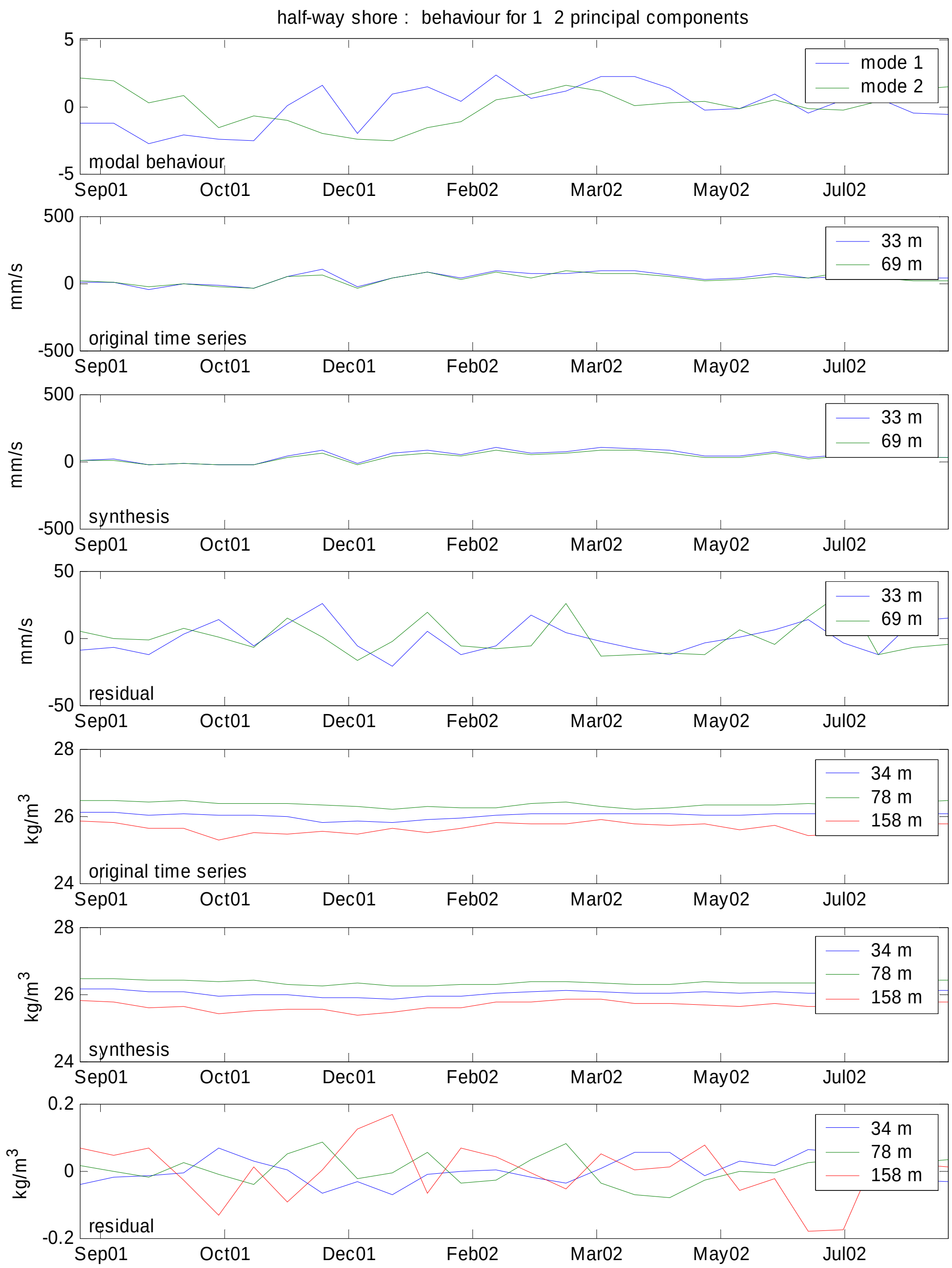

Figure 3-17 Recreation of time series using modes 1 and 2: half-way mooring, 14-day data, 1 year

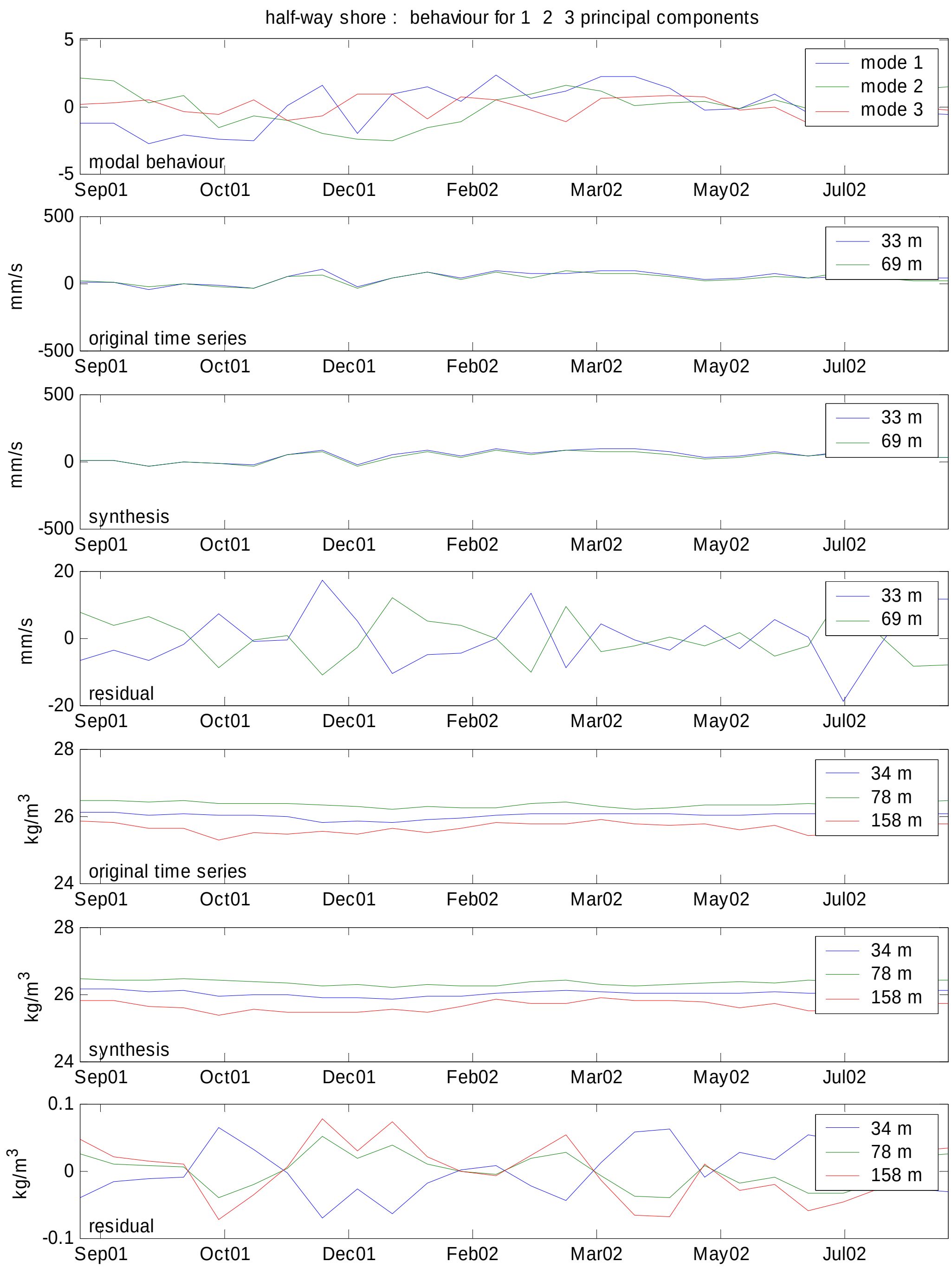

Figure 3-18 Recreation of time series using modes 1, 2, and 3: half-way mooring, 14-day data, 1 year

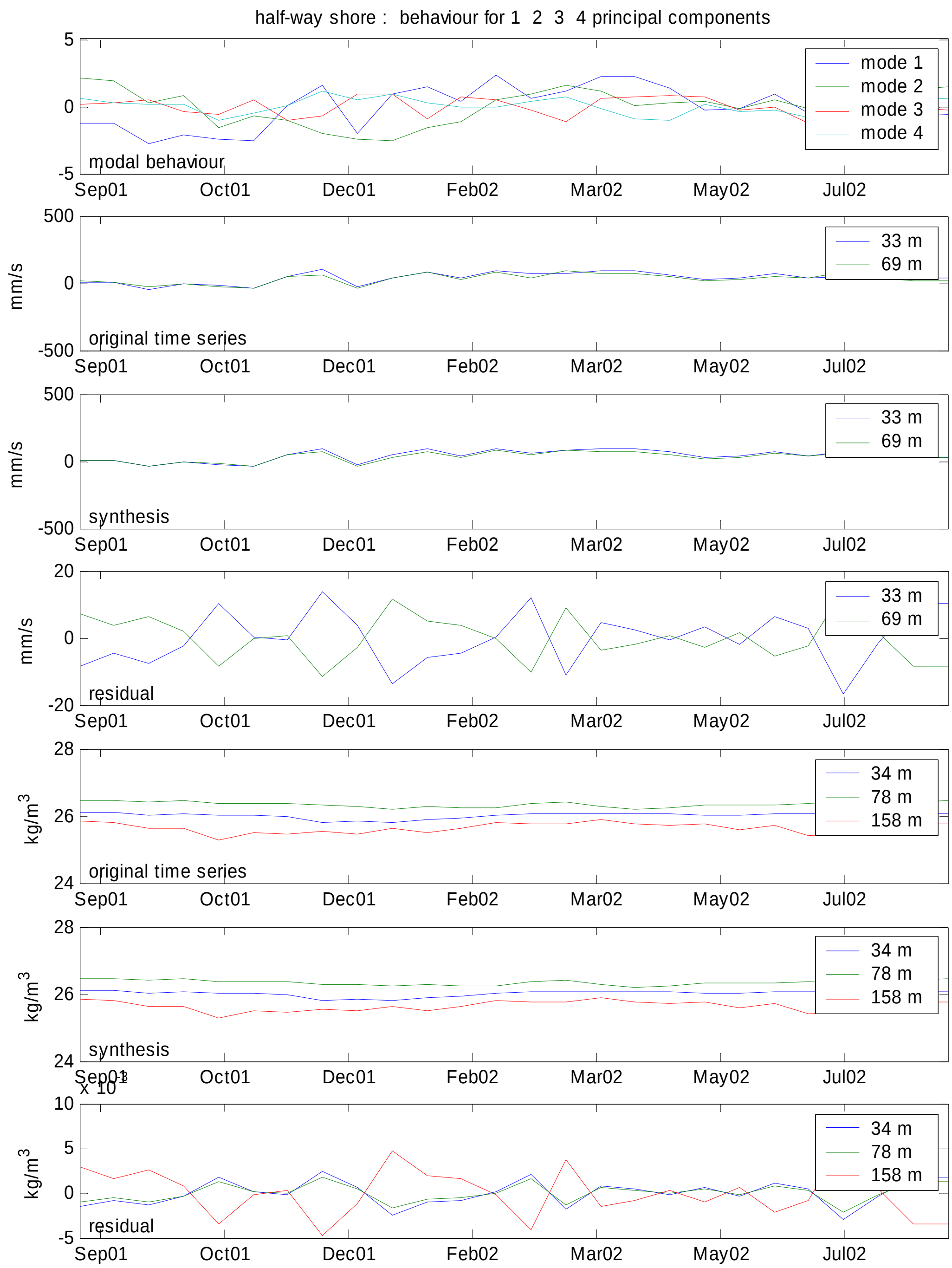

Figure 3-19 Recreation of time series using modes 1, 2, 3, and 4: half-way mooring, 14-day data, 1 year

3.2.8 PCA, ADCP and density, northern mooring, 14-day data for 1 year

3.2.8.1 Eigenvectors and eigenvalues

1998-2001 analysis (van der Baaren, et al., 2003) showed all positive eigenvectors for Mode 1. That is, the response of velocity is in phase with the density response: increasing westward U (negative velocity) accompanies decreasing density with depth (negative density) (Figure 3-20).

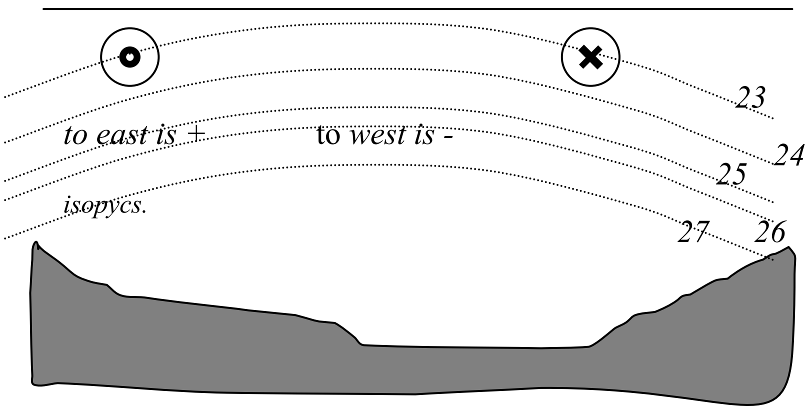

Figure 3-20 Schematic of what is expected (this is only an example; not real data or to scale)

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In the south, we expect positive U (eastward flow) to be accompanied by decreasing density (negative σ).

For the northern mooring the eigenvectors all had negative signs for the first mode so flow is in phase as expected. The eigenvectors are of the same order of magnitude except for density at 38 and 83 m. 1998-2001 saw U at 146 m and density at 38 m of lower magnitude.

Table 3-16 Eigenvectors and eigenvalues for PCA of alongshore flow and density for northern mooring, 2001-2002

ADCP alongshore flow and density: north									
Eigenvectors		1	2	3	4	5	Mode	Eigenvals	% Expl. Var.
ADCP	39 m	-0.49	-0.36	0.41	-0.41	0.54	1	2.71	54.24
	75 m	-0.49	-0.49	0.09	0.19	-0.69	2	1.29	25.90
CTD	38 m	-0.44	0.49	-0.37	-0.60	-0.26	3	0.80	15.96
	83 m	-0.20	0.60	0.71	0.26	-0.13	5	0.12	2.47
	161 m	-0.53	0.14	-0.42	0.60	0.39	6	0.07	1.43

3.2.8.2 % variance accounted for by each mode

The same amount of variance is removed for 2001-2002 PCA of northern mooring data as in 1998-2001 except for 38 and 83 m in the density records. Comparing values from 1998-2001 for mode 1: **63** and **62**% variance removed from 38 and 74 m ADCP records and **38**, **54**, and **63**% variance removed from 38, 83, and 178 m density records.

Table 3-17 Variance of original data and accounted for by first 4 modes in PCA of northern alongshore flow and density at selected depths; 2001-2002

Variance (mm^2s^{-2} and kgm^{-3})								
			Mode 1		Mode 2		Mode 3	
	Depth	Original	Residual	% var.	Residual	% var.	Residual	%. var.
ADCP	39 m	2257.46	774.55	**65.69**	397.44	82.39	94.38	95.82
	75 m	2309.66	830.60	**64.04**	102.76	95.55	89.28	96.13
CTD	38 m	0.01	0.00	**52.84**	0.00	84.28	0.00	95.07
	83 m	0.09	0.08	**11.11**	0.04	58.27	0.00	99.05
	161 m	0.02	0.00	**77.54**	0.00	80.21	0.00	94.44
			Mode 4					
	Depth	Original	Residual	% var.				
ADCP	39 m	2257.46	46.70	97.93				
	75 m	2309.66	78.49	96.60				
CTD	38 m	0.01	0.00	99.53				
	83 m	0.09	0.00	99.88				
	161 m	0.02	0.00	98.90				

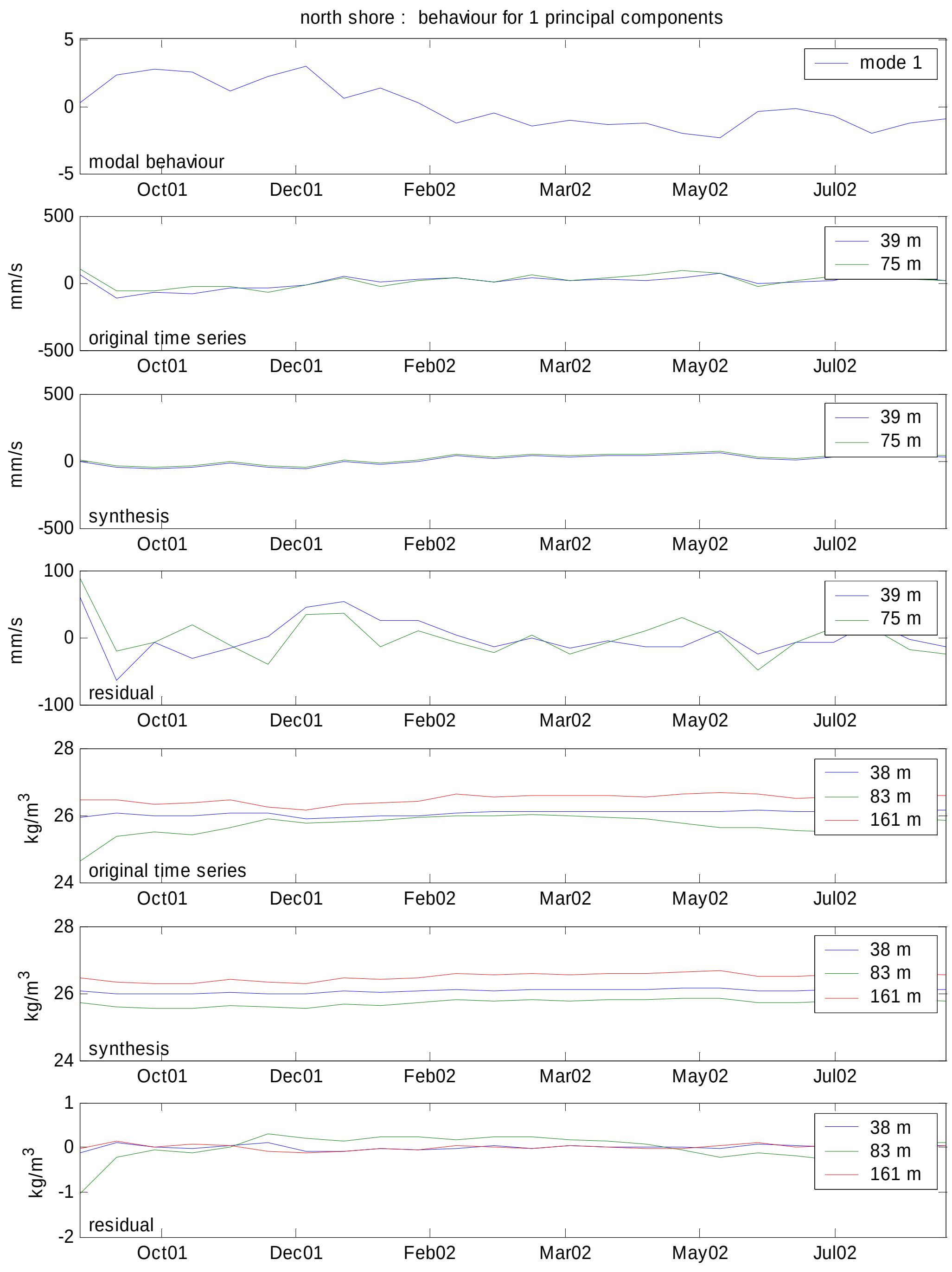

Figure 3-21 Recreation of time series using mode 1: north, 14-day data, 1 year

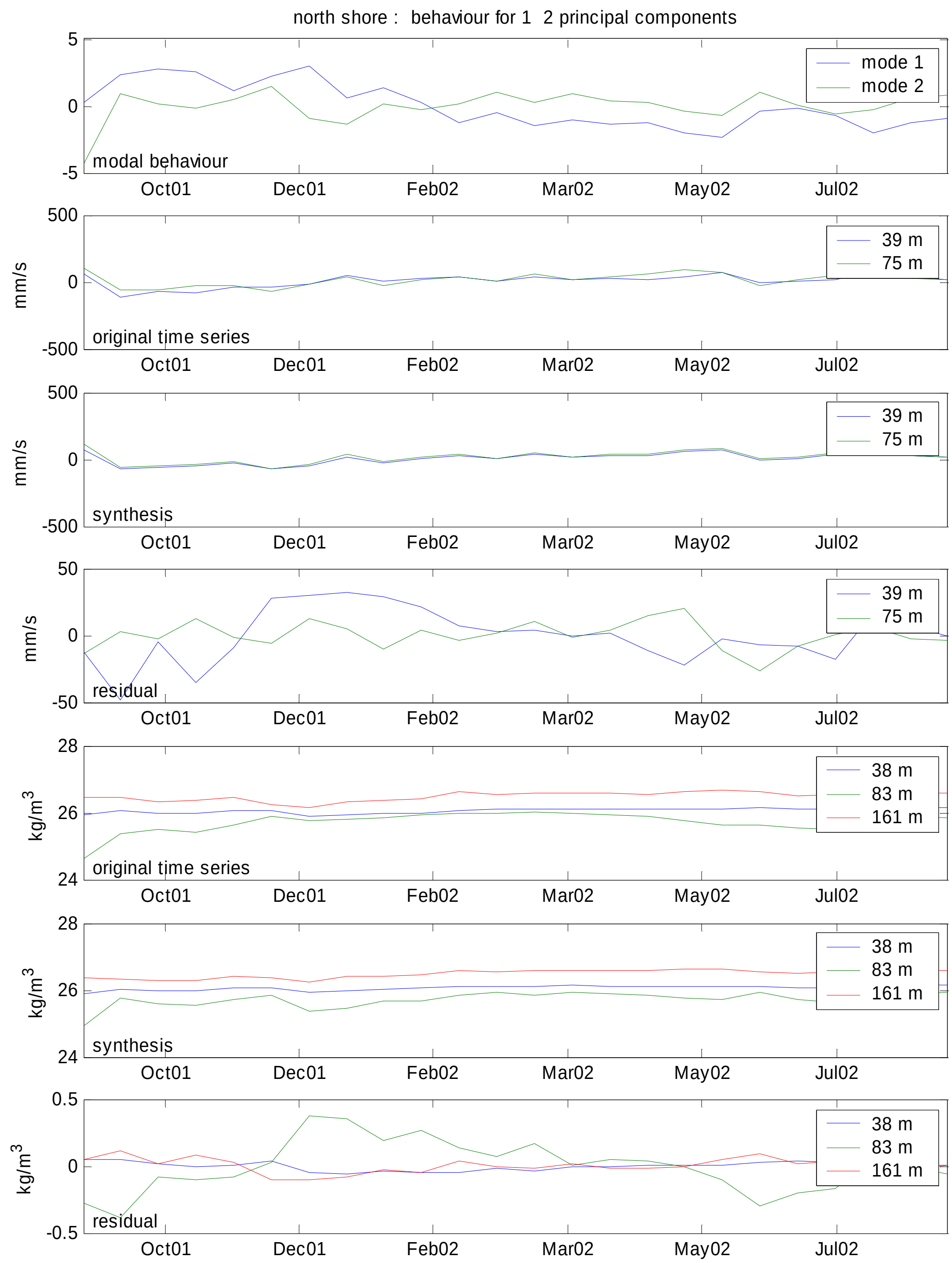

Figure 3-22 2 Recreation of time series using modes 1 and 2: north, 14-day data, 1 year

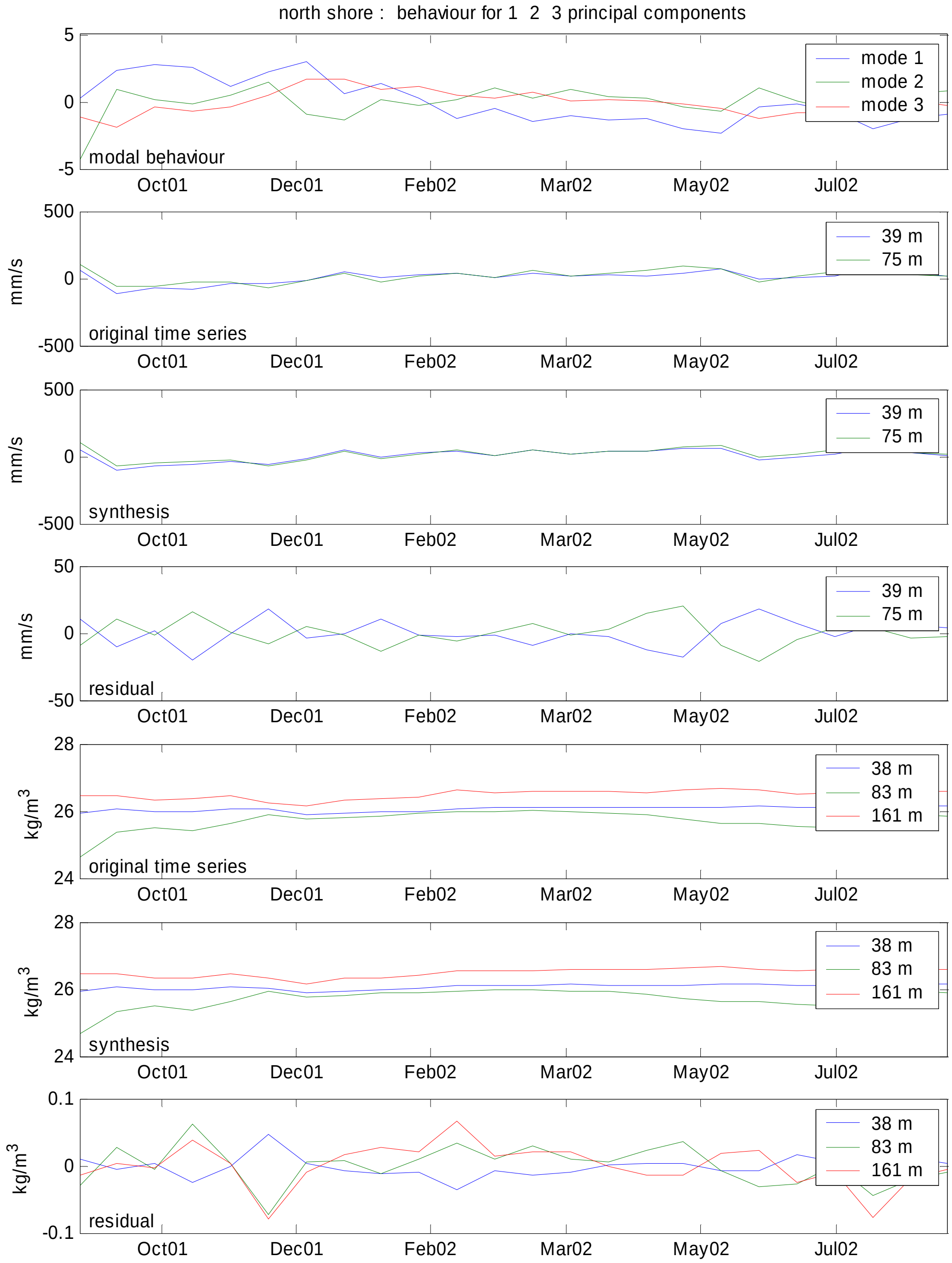

Figure 3-23 Recreation of time series using modes 1, 2, and 3: north, 14-day data, 1 year

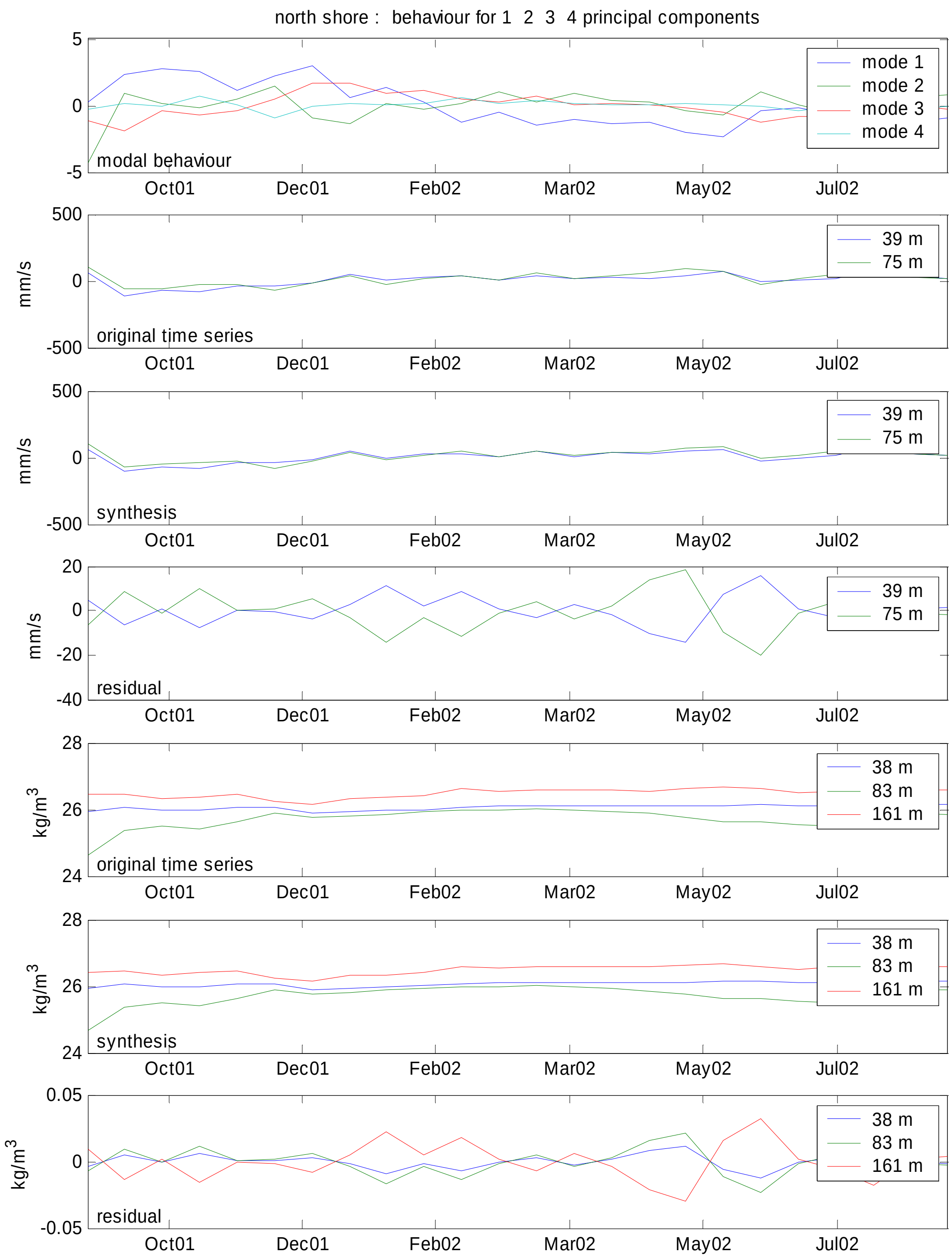

Figure 3-24 Recreation of time series using modes 1, 2, 3, and 4: north, 14-day data, 1 year

3.2.9 PCA, ADCP and density, northern mooring, 14-day data for >December 2001 and <August 2002

3.2.9.1 Eigenvectors and eigenvalues

The values of 38 m and 83 m density are even less now than for the entire year. However, the first mode eigenvector shows velocity and density responses are still in phase.

Table 3-18 Eigenvectors and eigenvalues for PCA of alongshore flow and density for north shore between Dec. 2001 and Aug. 2002

ADCP AND CTD								
north winter	eigenvectors					eigenvalues		% expl. var.
	mode 1	mode 2	mode 3	mode 4	mode 5			
ADCP 39 m	0.50	-0.42	0.28	-0.21	0.67	mode 1	2.75	54.92
ADCP 75 m	0.53	-0.26	0.34	-0.08	-0.73	mode 2	1.09	21.70
CTD 38 m	0.43	0.47	-0.47	-0.61	-0.01	mode 3	0.95	18.99
CTD 83 m	0.00	-0.67	-0.73	0.05	-0.10	mode 4	0.12	2.49
CTD 161 m	0.54	0.28	-0.22	0.76	0.11	mode 5	0.10	1.90

3.2.9.2 Variance accounted for by mode 1

Table 3-19 Variance of original data and accounted for by first mode in PCA of northern alongshore flow and density; between Dec. 2001 and Aug. 2002

Variance (mm^{2}s^{-2} and kgm^{-3})			
	Original	Residual	pct. var.
ADCP 39 m	853.22	272.91	68.01
ADCP 75 m	1740.45	413.46	76.24
CTD 38 m	0.01	0.00	50.64
CTD 83 m	0.02	0.02	0.00
CTD 161 m	0.02	0.00	79.69

3.2.10 Variance of Microcat and ADCP data, 4 moorings, 2-hourly and 14-day, 1 year

CTD data were interpolated to 2-hourly intervals to match ADCP data.

Table 3-20 Variance of 2-hourly and low-pass filtered ADCP and moored CTD data

South			
	Depth (m)	2-Hourly	Filtered 14-day
ADCP (mm^2s^2)	30	31409.02	15945.12
	80	27110.88	7462.00
	136	19864.37	2248.40
CTD (σ_t kg^2m^{-6})	32	0.01	0.00
	78	0.04	0.02
	144	0.11	0.09
Quarter-way			
	Depth (m)	2-Hourly	Filtered 14-day
ADCP (mm^2s^2)	34	23749.65	5171.69
	62	24311.25	4224.70
CTD (σ_t kg^2m^{-6})	34	0.01	0.00
	70	0.01	0.01
	149	0.02	0.01
	268	0.04	0.02
Half-way			
	Depth (m)	2-Hourly	Filtered 14-day
ADCP (mm^2s^2)	33	21066.85	1736.71
	69	22200.93	1388.28
CTD (σ_t kg^2m^{-6})	34	0.01	0.01
	78	0.01	0.01
	158	0.04	0.02
North			
	Depth (m)	2-Hourly	Filtered 14-day
ADCP (mm^2s^2)	39	18454.44	2257.46
	75	17408.70	2309.66
CTD (σ_t kg^2m^{-6})	38	0.01	0.01
	83	0.10	0.09
	161	0.03	0.02

3.2.11 Cross-correlations of ADCP and CTD Data

3.2.11.1 14-day data (low-pass filtered), 1 year

Values where the r^2 is ≥ 0.50 are highlighted in bold type. The southern mooring shows the most connection between velocity and density at >80 m with negative $r^2 = 0.64$ at ~ 80 m and $r^2 \sim 0.60$ between CTD 78 m and ADCP 136 m.

Table 3-21 Cross-correlation matrices of ADCP and moored CTD low-pass filtered data (14-day) for 2001-2002 at all moorings

South

		30 m	80 m	136 m	32 m	78 m	144 m
ADCP	30 m	1.00					
	80 m	**0.86**	1.00				
	136 m	**0.68**	**0.91**	1.00			
CTD	32 m	-0.32	-0.19	-0.10	1.00		
	78 m	-0.49	**-0.80**	**-0.77**	0.03	1.00	
	144 m	-0.23	-0.15	-0.13	0.45	-0.18	1.00

Quarter-way

		ADCP 34 m	ADCP 62 m	CTD 34 m	CTD 70 m	CTD 149 m	CTD 268 m
ADCP	34 m	1.00					
	62 m	**0.98**	1.00				
CTD	34 m	-0.43	-0.37	1.00			
	70 m	-0.05	-0.03	0.47	1.00		
	149 m	-0.02	-0.04	0.37	0.30	1.00	
	268 m	0.01	0.02	-0.18	-0.25	0.36	1.00

Half-way

		ADCP 33 m	ADCP 69 m	CTD 34 m	CTD 78 m	CTD 158 m
ADCP	33 m	1.00				
	69 m	**0.93**	1.00			
CTD	34 m	-0.06	0.01	1.00		
	78 m	-0.46	-0.39	0.46	1.00	
	158 m	0.33	0.31	0.48	0.06	1.00

North

		ADCP 39 m	ADCP 75 m	CTD 38 m	CTD 83 m	CTD 161 m
ADCP	39 m	1.00				
	75 m	**0.87**	1.00			
CTD	38 m	0.26	0.24	1.00		
	83 m	0.21	-0.06	0.40	1.00	
	161 m	0.49	0.58	**0.80**	0.18	1.00

Correlations improve for data if we only look at data record from December 1 onward (estimated time of maximum ice cover) and also time of significant presence of North Atlantic Water in the bottom layer. See the following cross-correlation matrices for 14-day data for southern and northern mooring for records after December 1, 2001.

Table 3-22 Cross-correlation matrices of ADCP and moored CTD low-pass filtered data (14-day) for Dec. 2002 to Aug. 2002 at southern and northern moorings only

South

		30 m	80 m	136 m	32 m	78 m	144 m
ADCP	30 m	1.00					
	80 m	0.87	1.00				
	136 m	0.81	0.96	1.00			
CTD	32 m	-0.56	-0.33	-0.19	1.00		
	78 m	-0.66	-0.91	-0.90	0.13	1.00	
	144 m	-0.37	-0.40	-0.33	0.45	0.33	1.00

North

		ADCP 39 m	ADCP 75 m	CTD 38 m	CTD 83 m	CTD 161 m
ADCP	39 m	1.00				
	75 m	**0.89**	1.00			
CTD	38 m	0.26	0.34	1.00		
	83 m	0.11	-0.03	-0.02	1.00	
	161 m	0.54	0.61	**0.82**	-0.04	1.00

3.3 Microcat time series and transects, 14-day data, 1 year

Presented in this section are the time series and transects of the moored CTD data. Data have been low-pass filtered and decimated to 14-day intervals. Note the warm salty Atlantic Water on the bottom.

3.3.1 Microcat low-pass filtered time series, 2001-2002

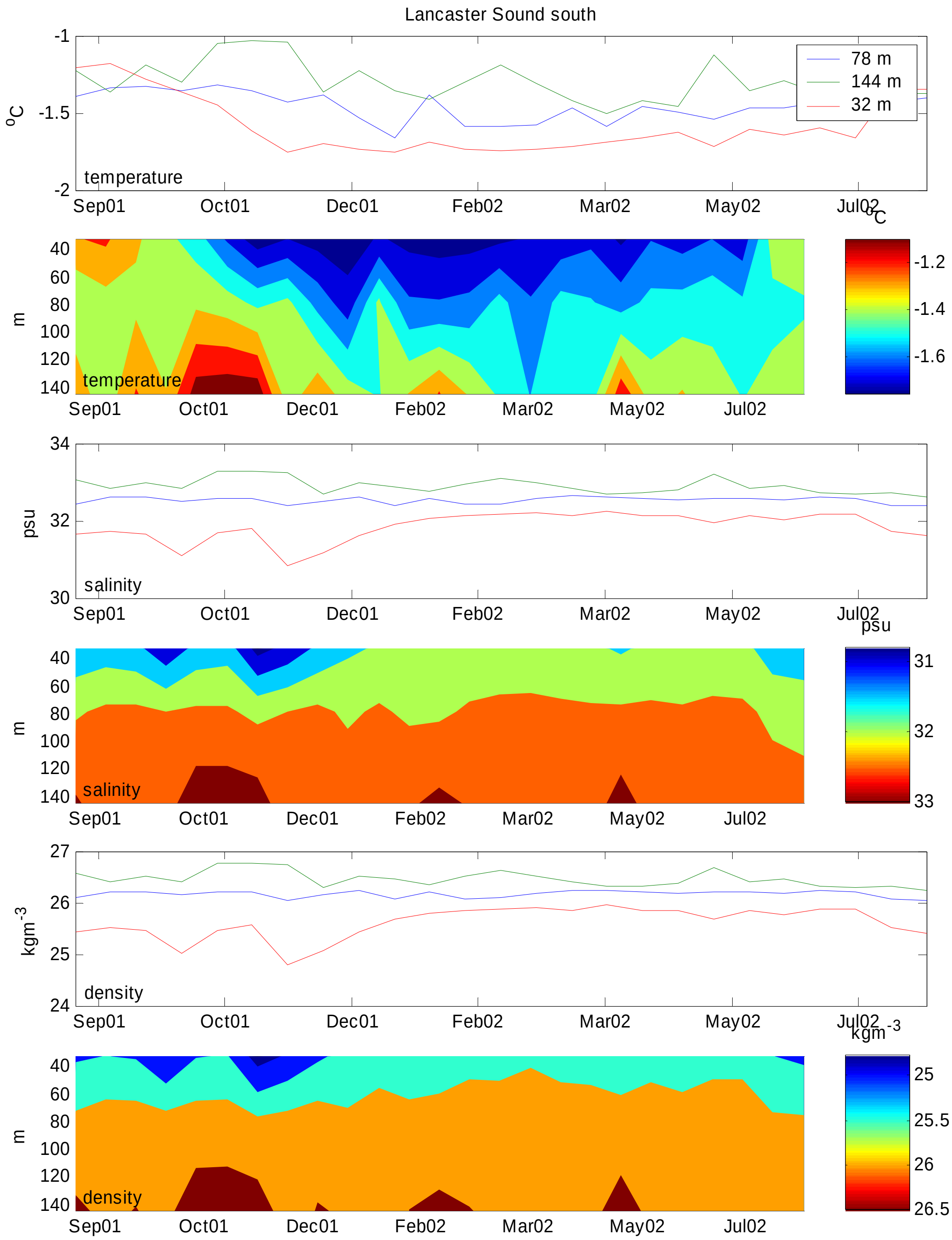

Figure 3-25 Moored CTD data 2001-2002 at southern mooring

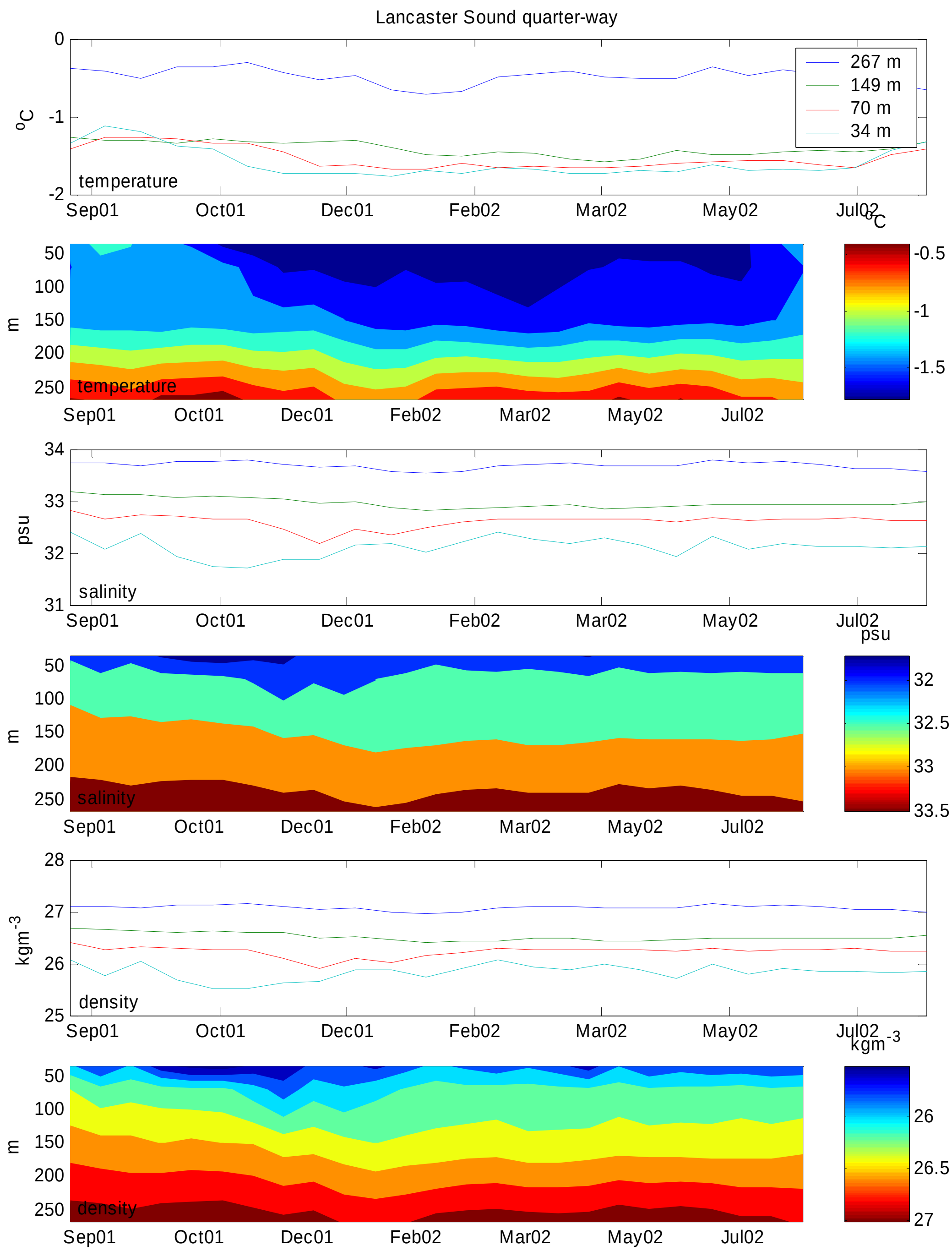

Figure 3-26 Moored CTD data 2001-2002 at quarter-way mooring

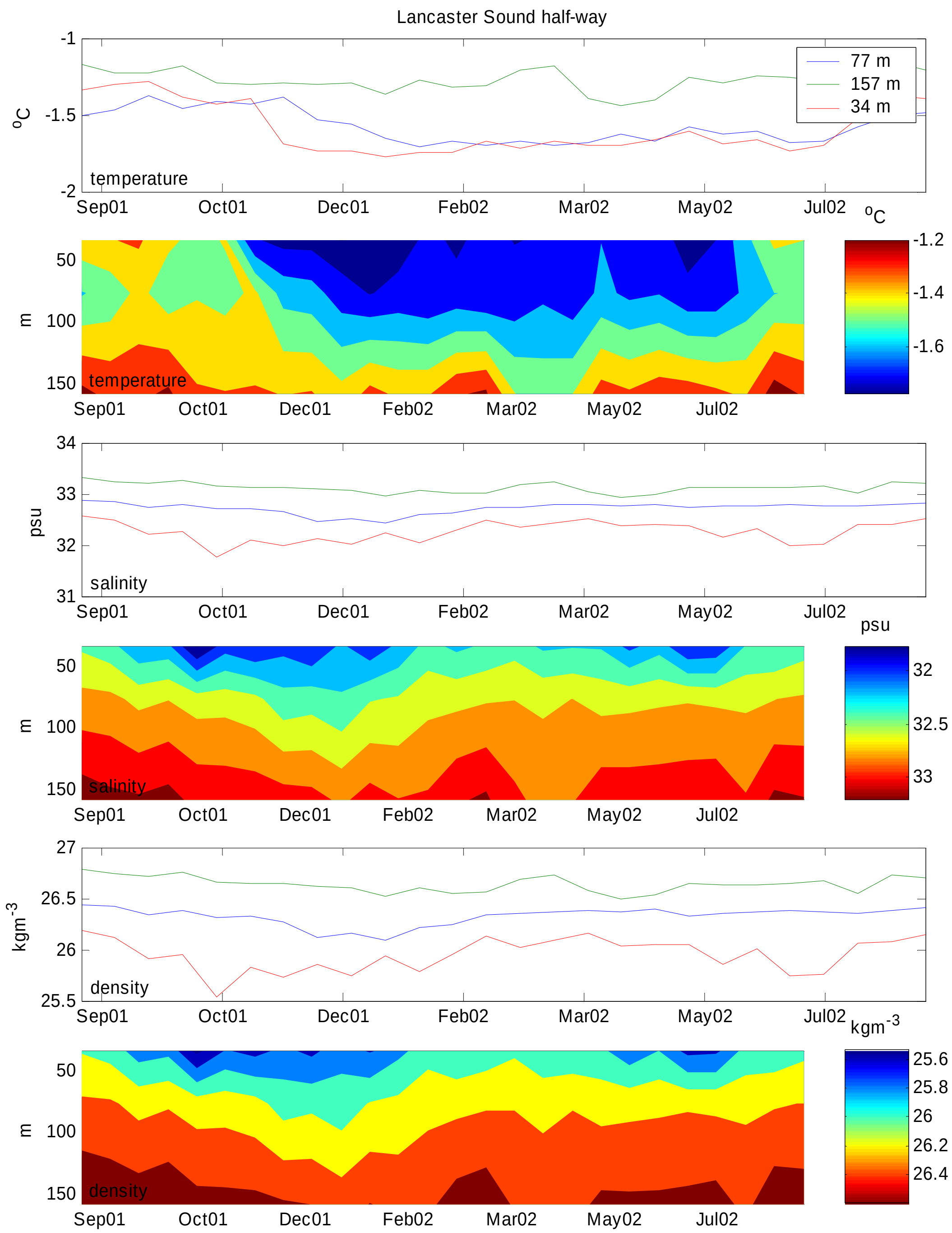

Figure 3-27 Moored CTD data 2001-2002 at half-way mooring

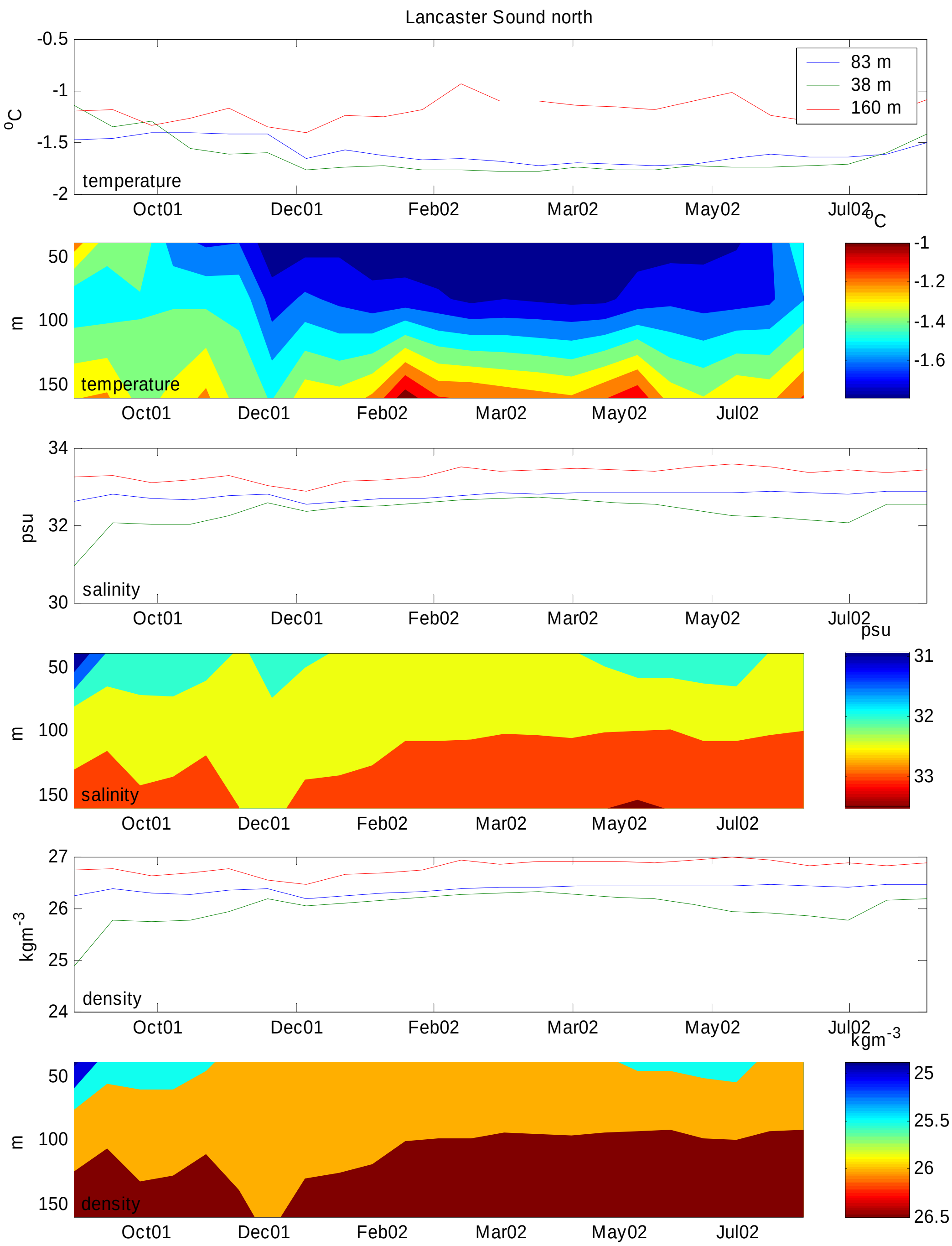

Figure 3-28 Moored CTD data 2001-2002 at northern mooring

3.3.2 Microcat transect series, 14-day data, 1 year

To draw the transects, data were interpolated to 50 m depth intervals and 0.5 degree latitude intervals.

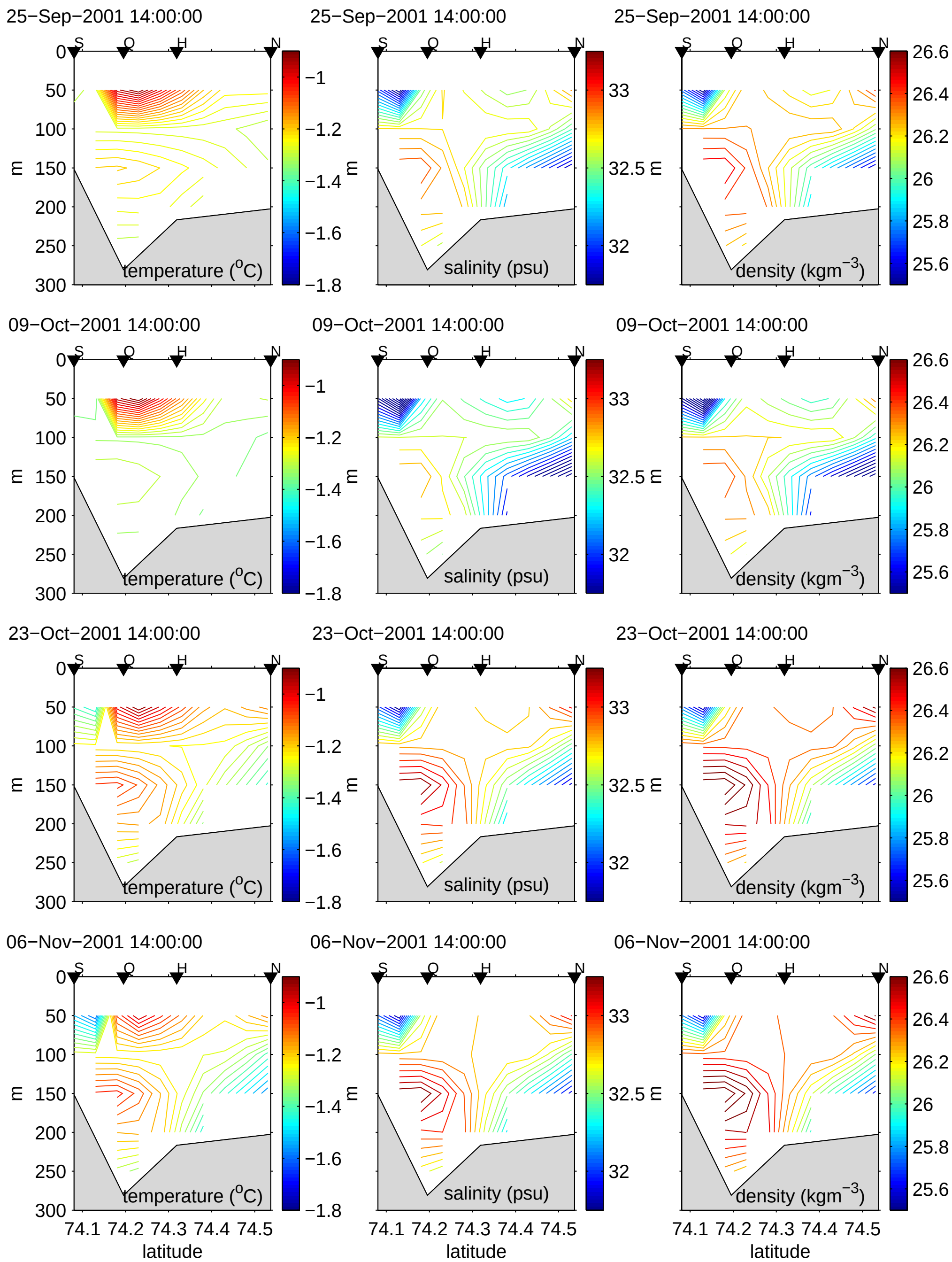

Figure 3-29 Transects of low-pass filtered Microcat data using all 4 moorings Sept. 2001 to Nov. 2001

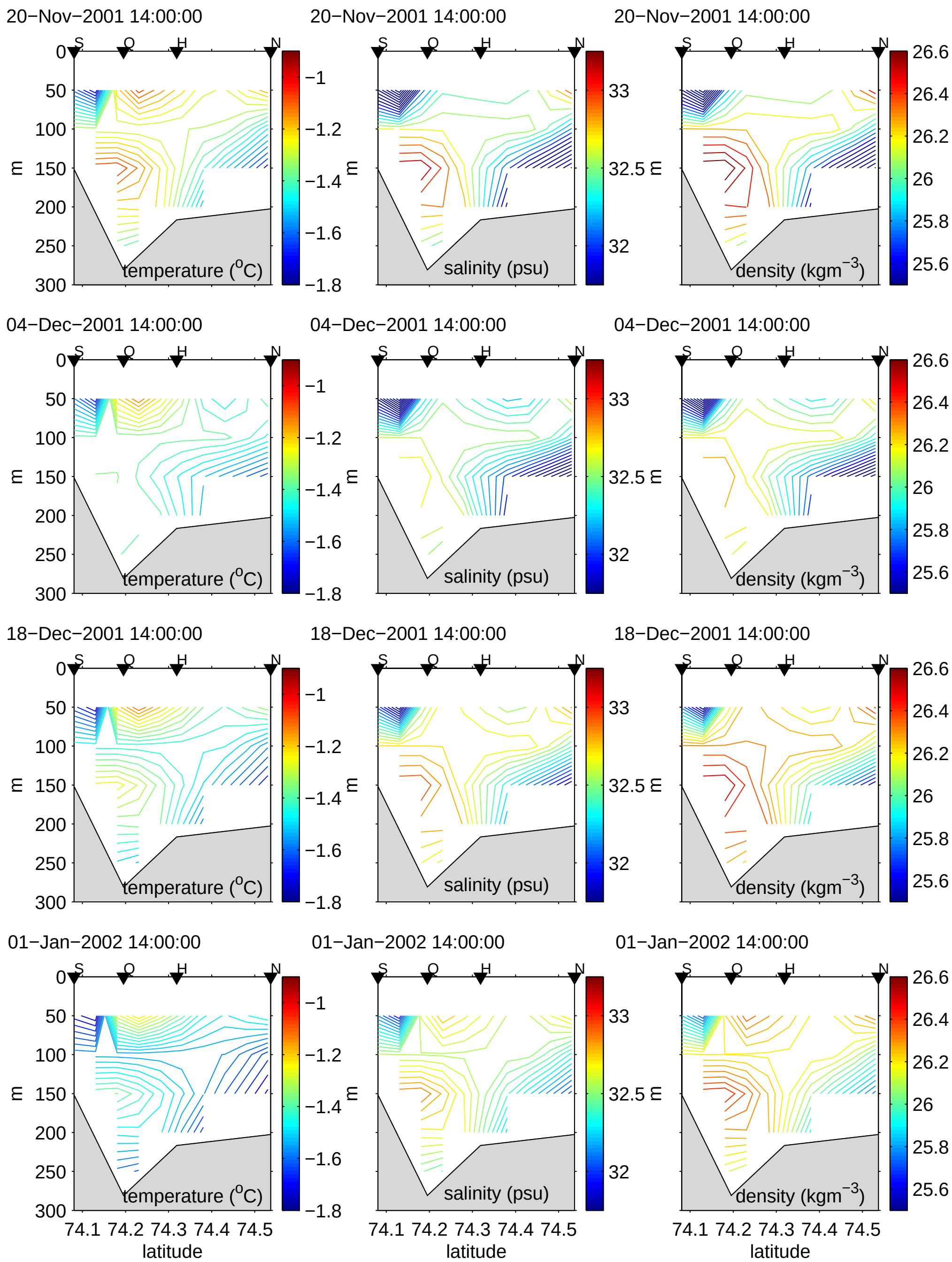

Figure 3-30 Transects of low-pass filtered Microcat data using all 4 moorings Nov. 2001 to Jan. 2002

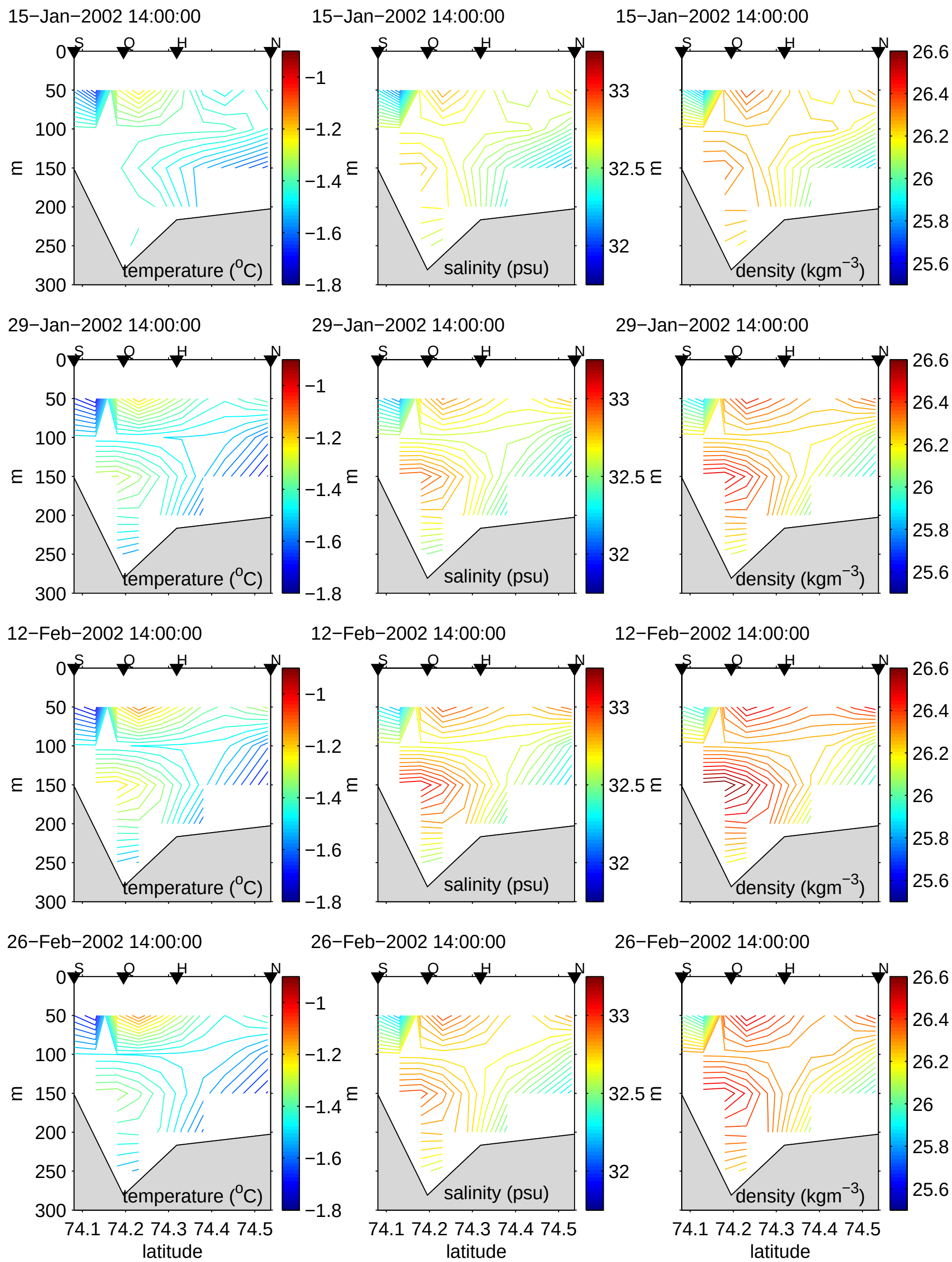

Figure 3-31 Transects of low-pass filtered Microcat data using all 4 moorings Jan. 2002 to Feb. 2002

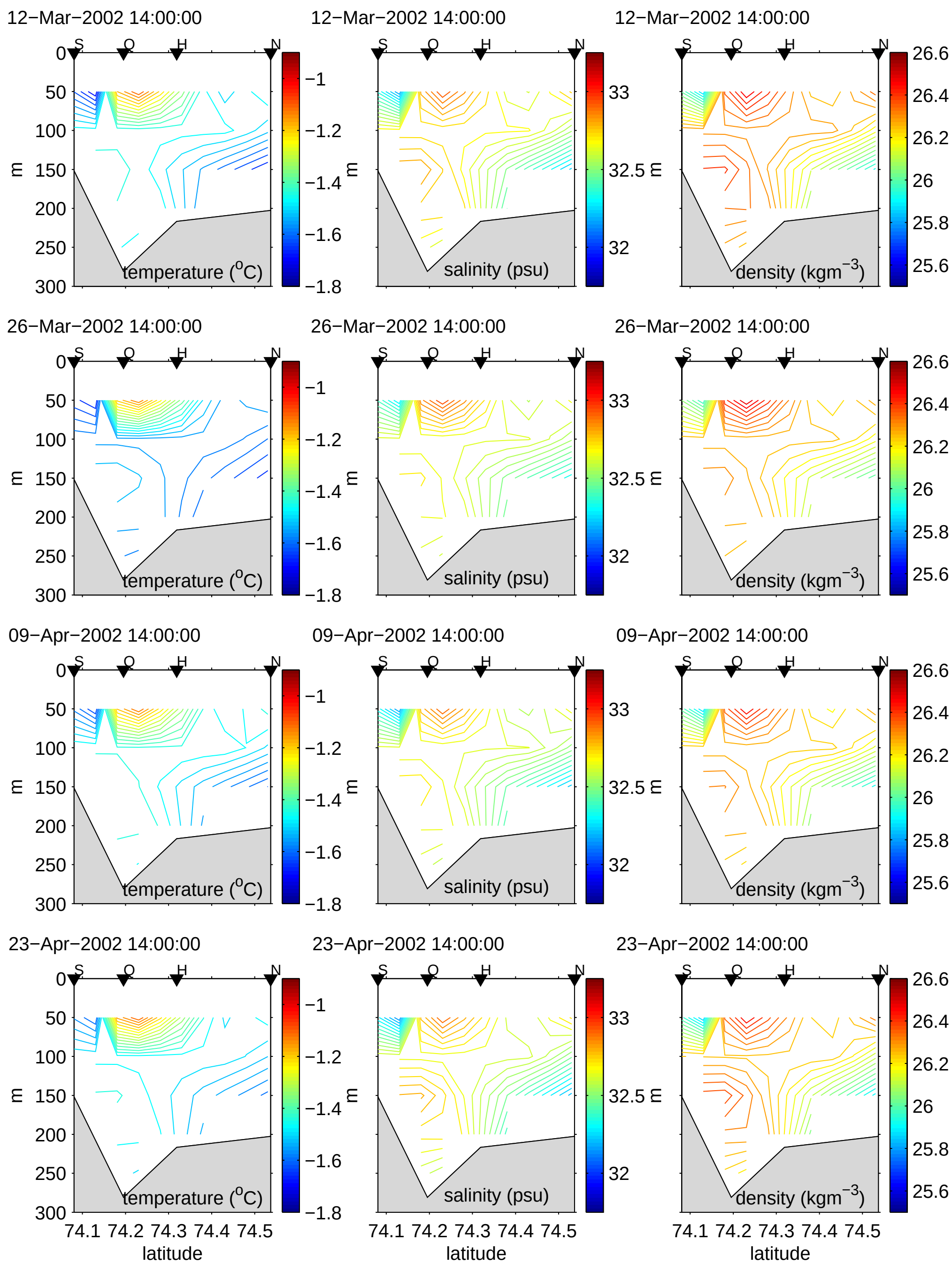

Figure 3-32 Transects of low-pass filtered Microcat data using all 4 moorings Mar. 2002 to Apr. 2002

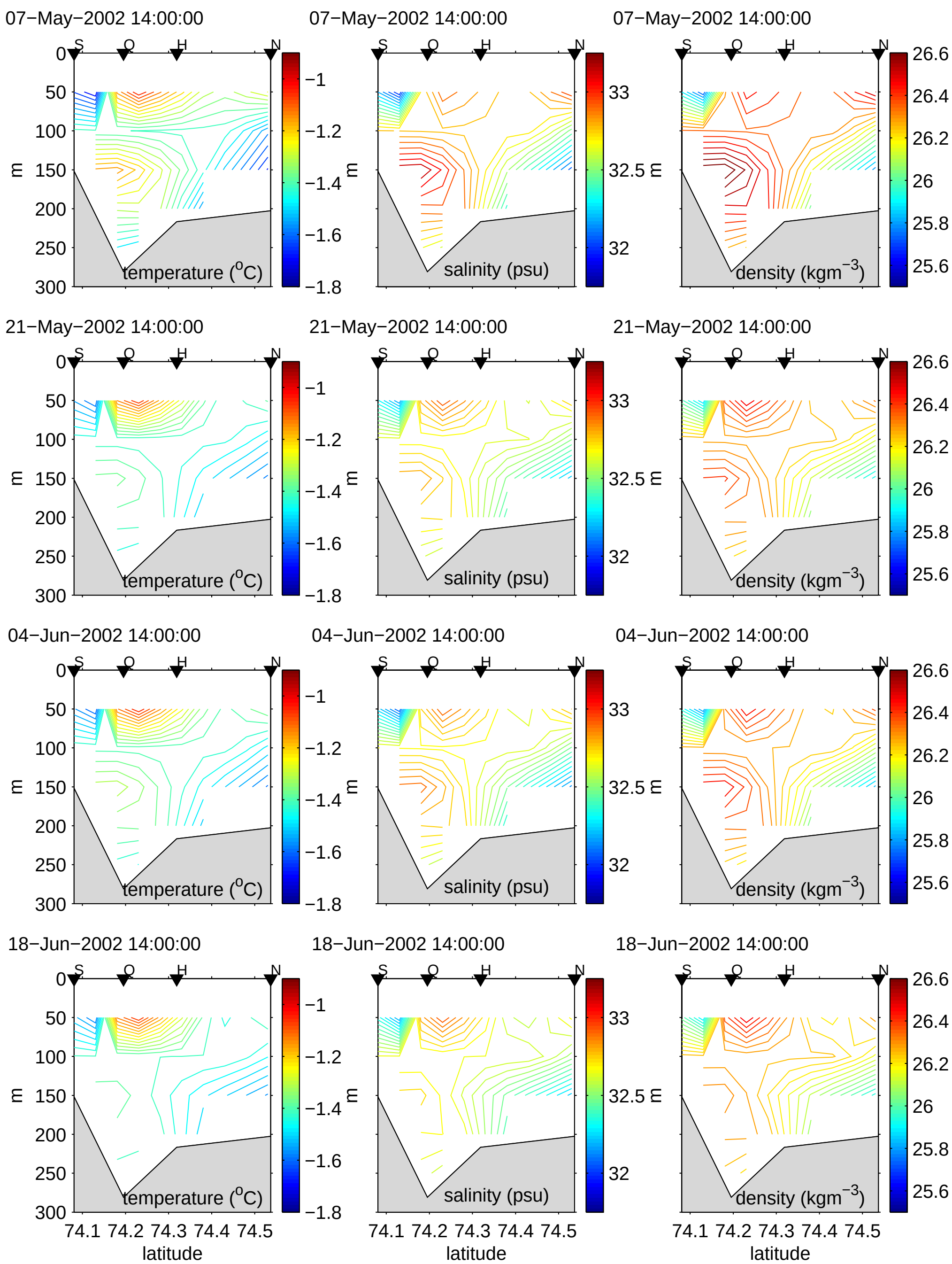

Figure 3-33 Transects of low-pass filtered Microcat data using all 4 moorings May 2002 to Jun. 2002

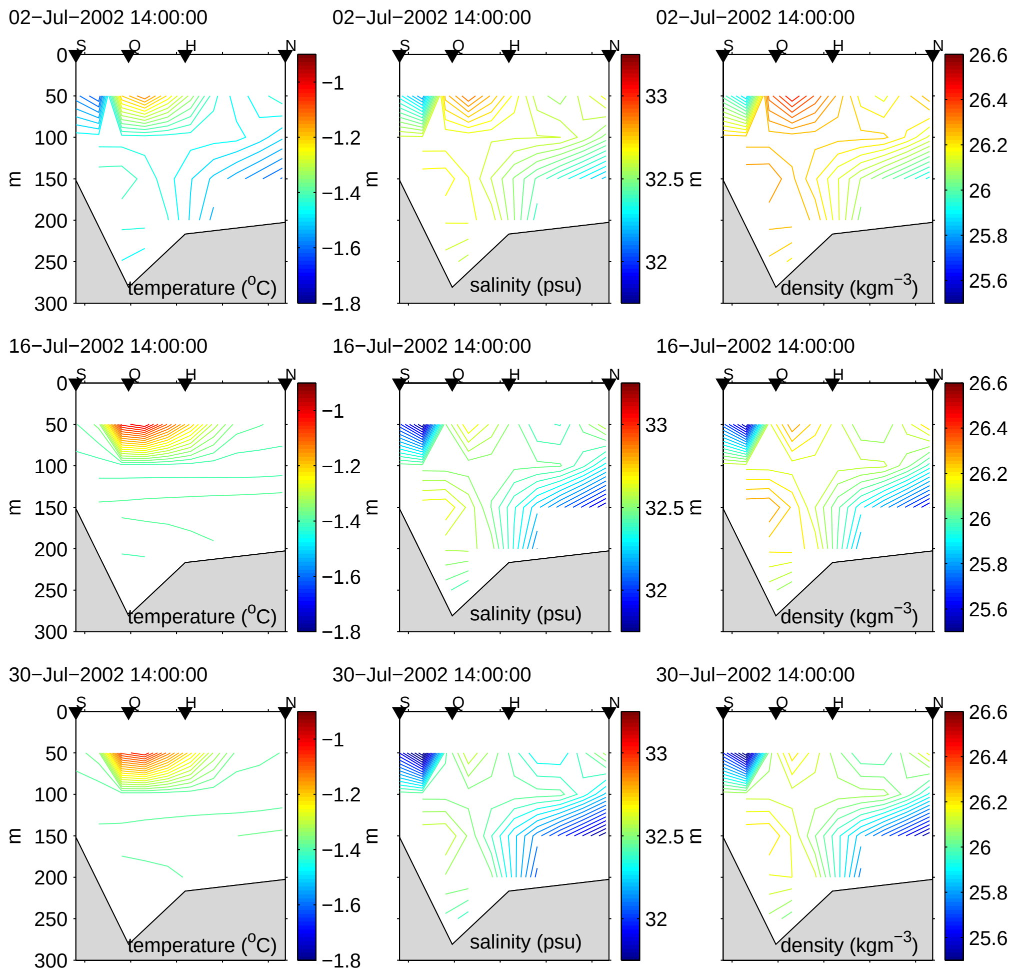

Figure 3-34 Transects of low-pass filtered Microcat data using all 4 moorings Jul. 2002

3.3.3 Microcat time series, hourly data, 1 year

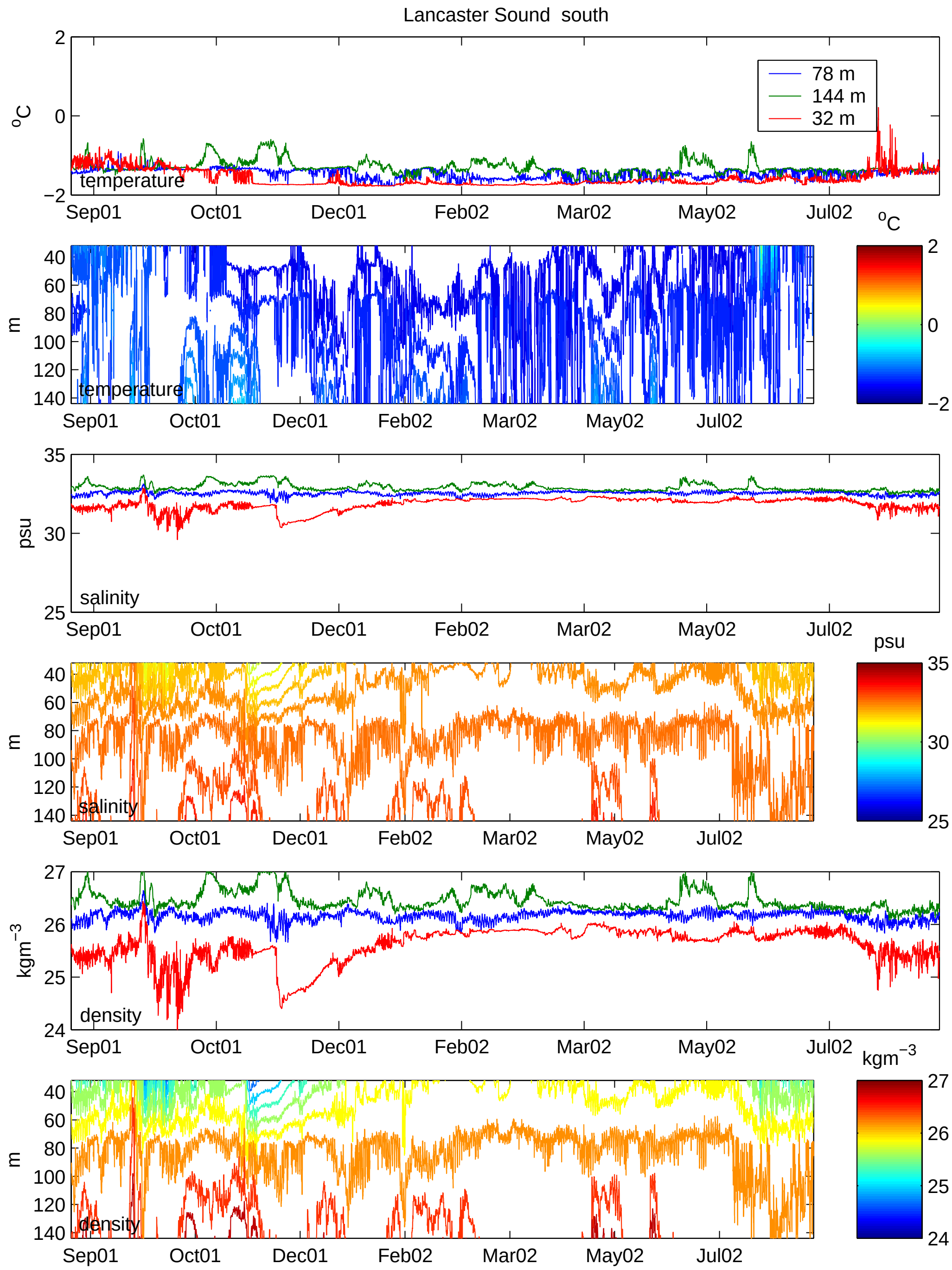

Figure 3-35 Hourly Microcat data 2001-2002 for southern mooring

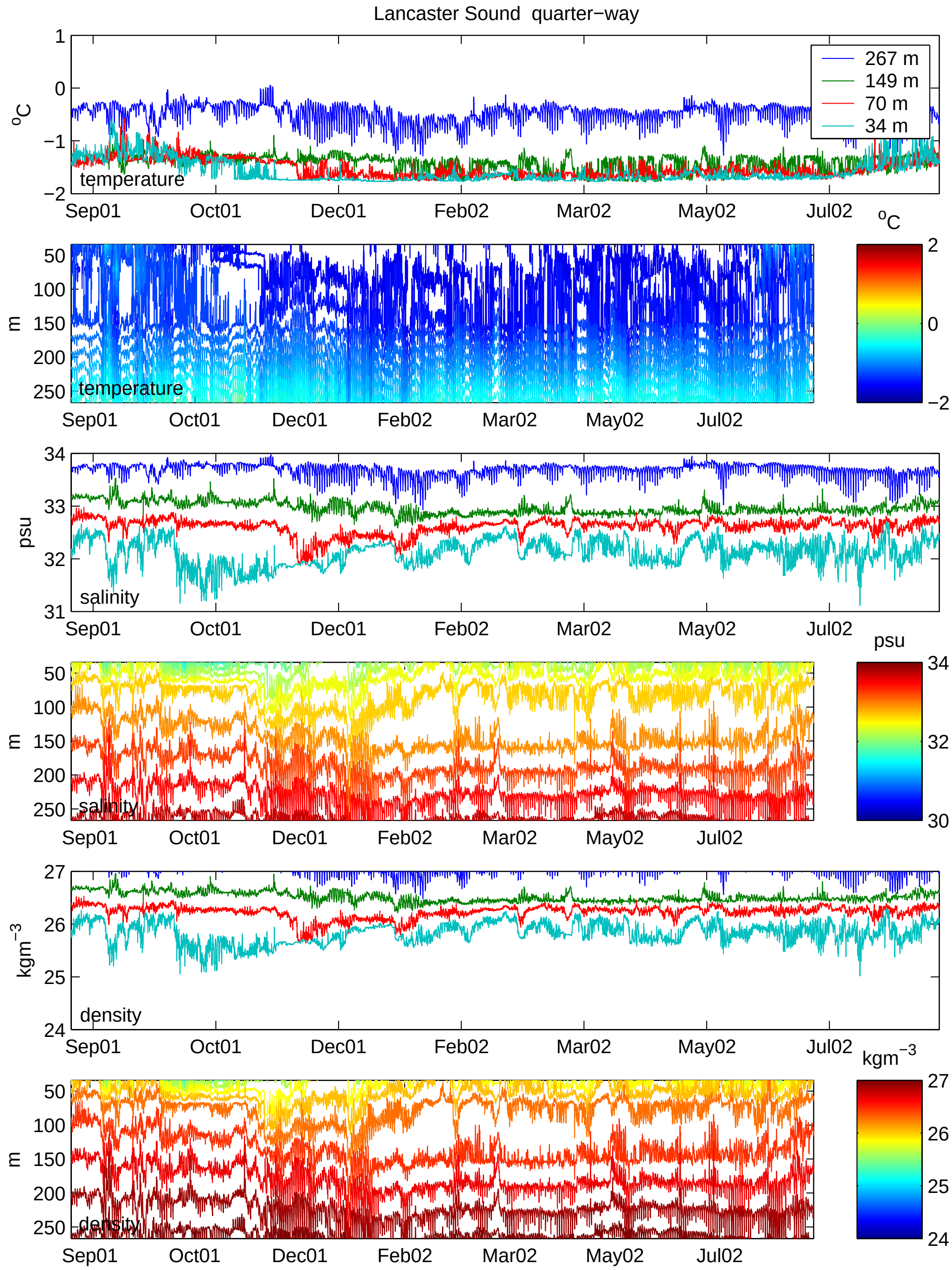

Figure 3-36 Hourly Microcat data 2001-2002 for quarter-way mooring

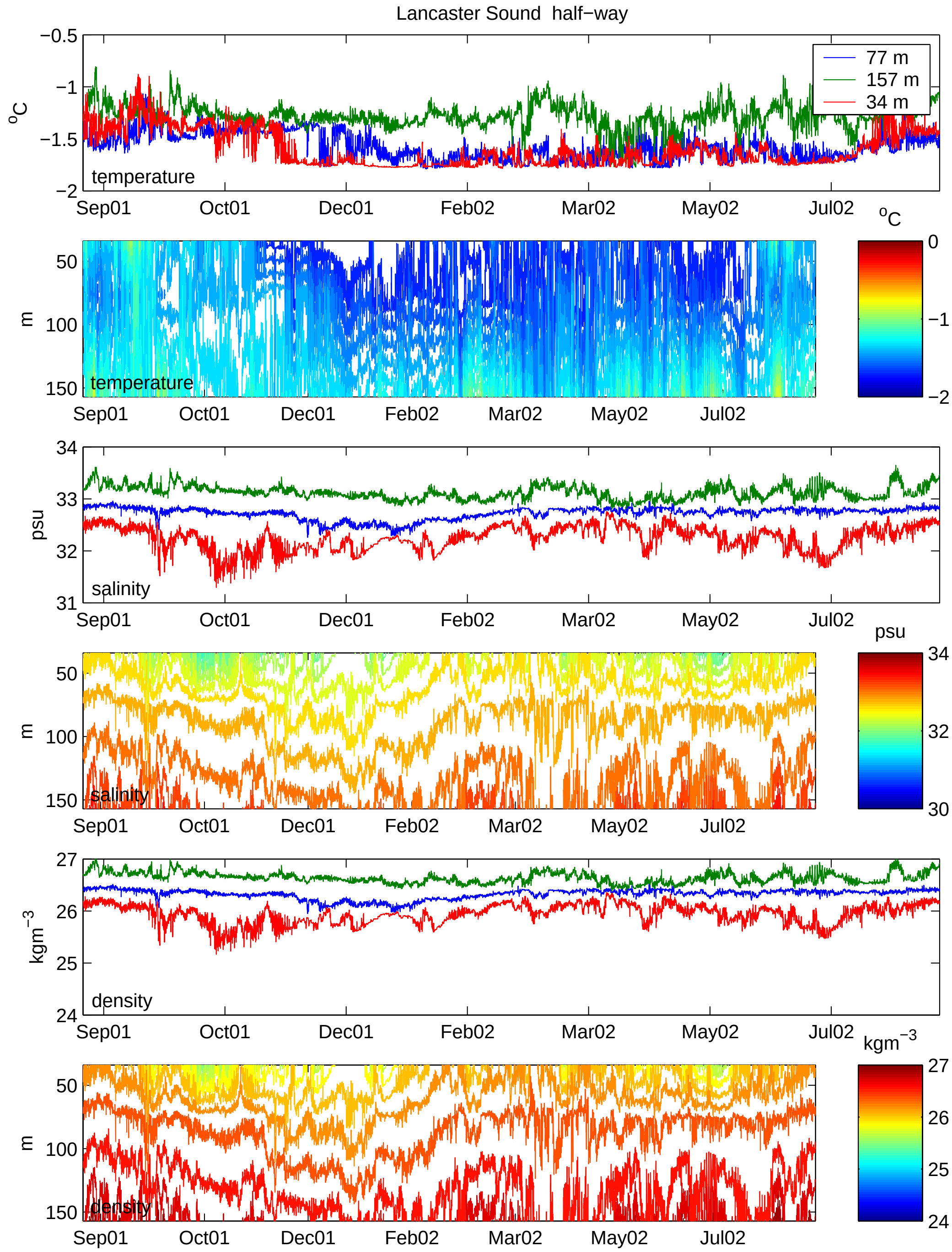

Figure 3-37 Microcat data 2001-2002 for half-way mooring

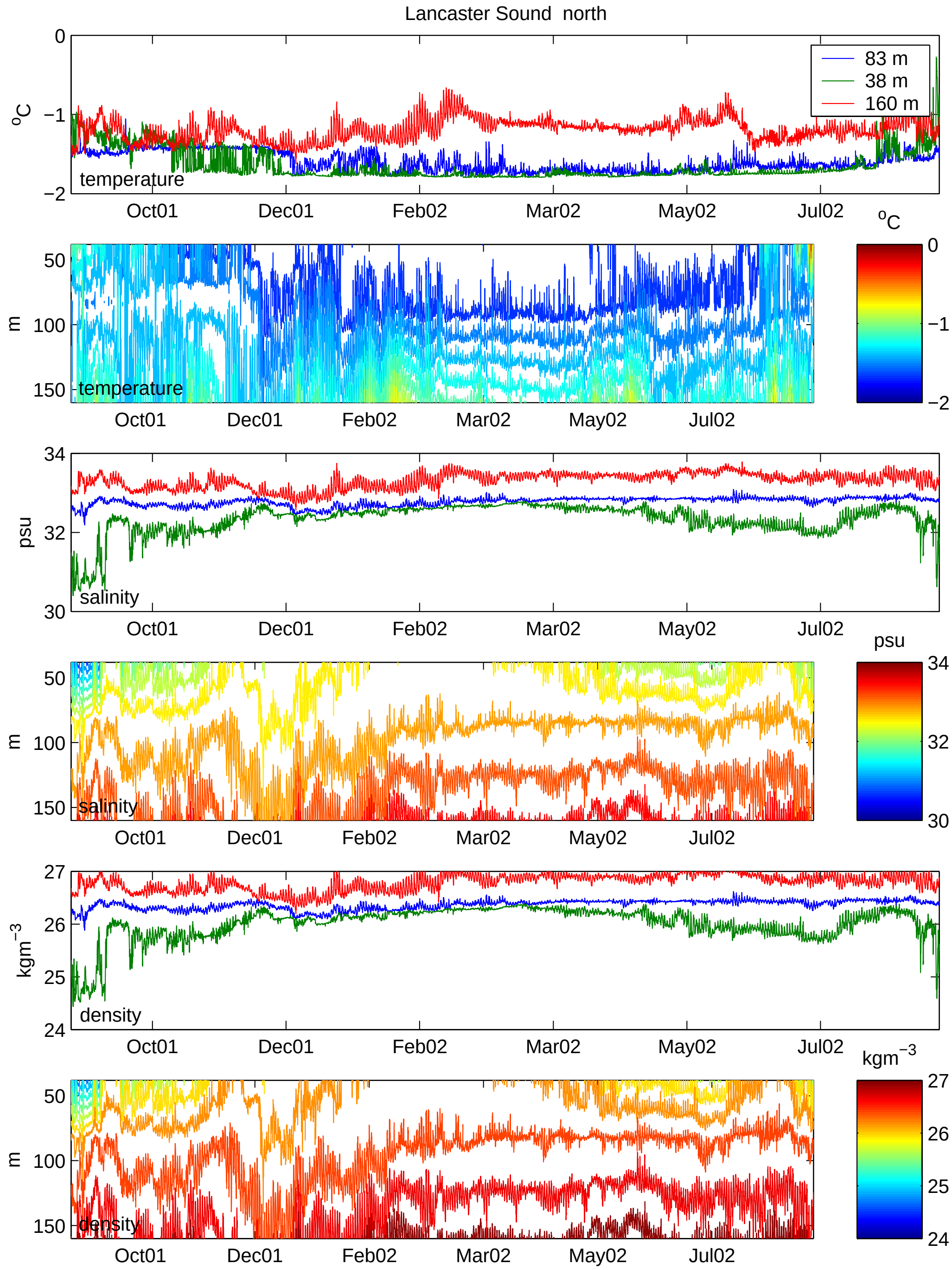

Figure 3-38 Microcat data 2001-2002 for northern mooring

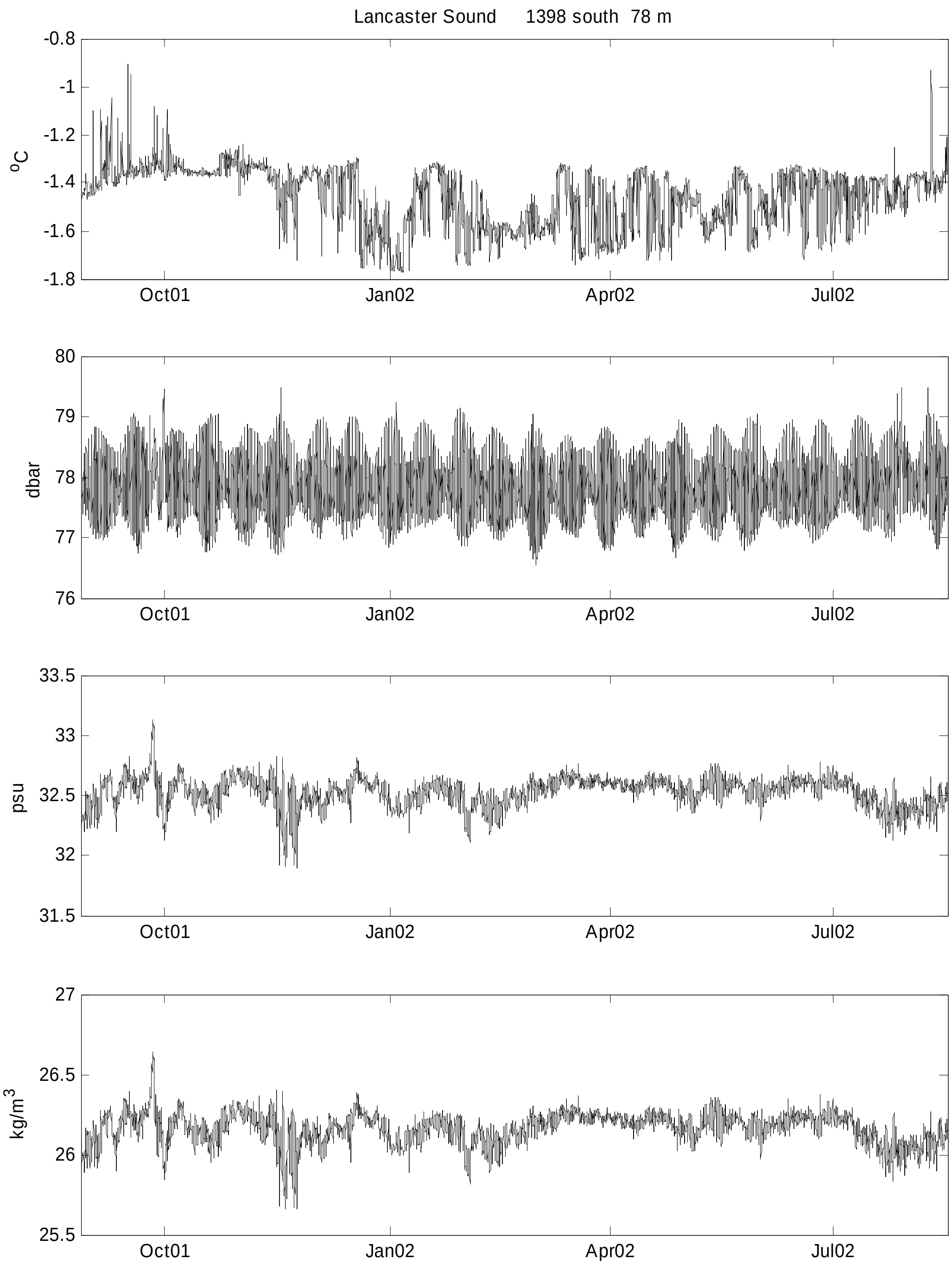

Figure 3-39 Microcat data 2001-2002 for southern mooring #1399 @ 78 m

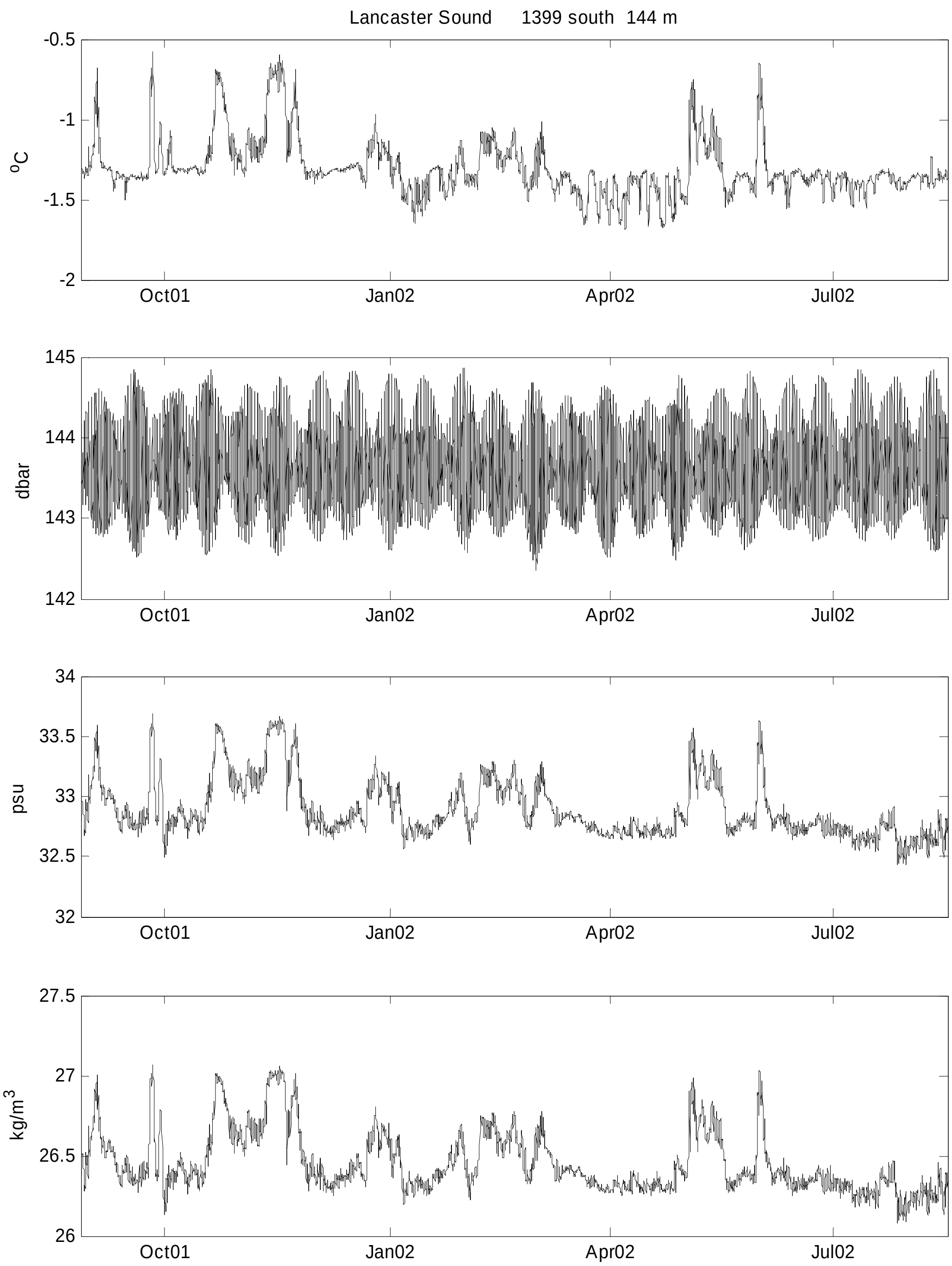

Figure 3-40 Microcat data 2001-2002 for southern mooring #1399 @ 144 m

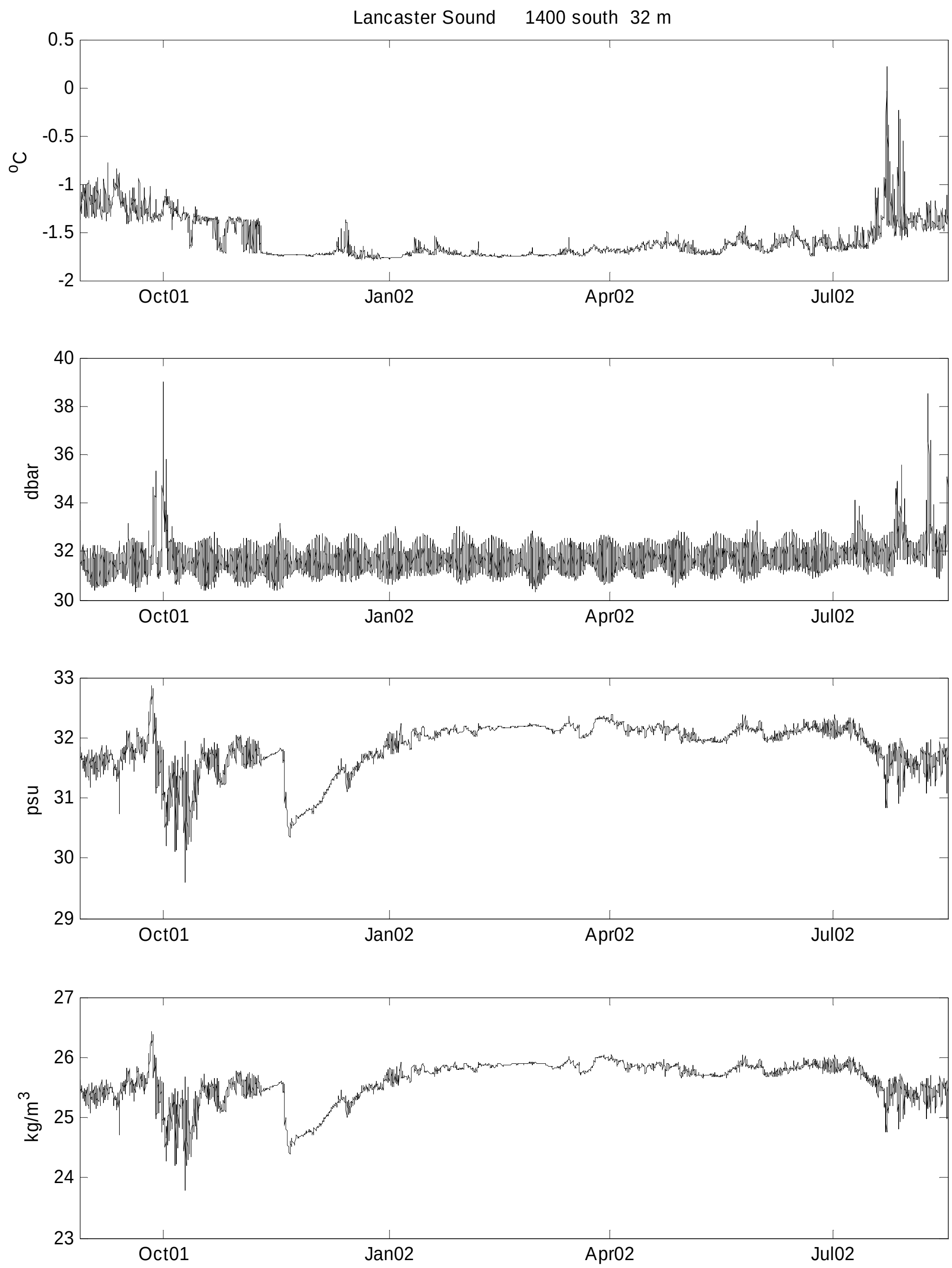

Figure 3-41 Microcat data 2001-2002 for southern mooring #1400 @ 32 m

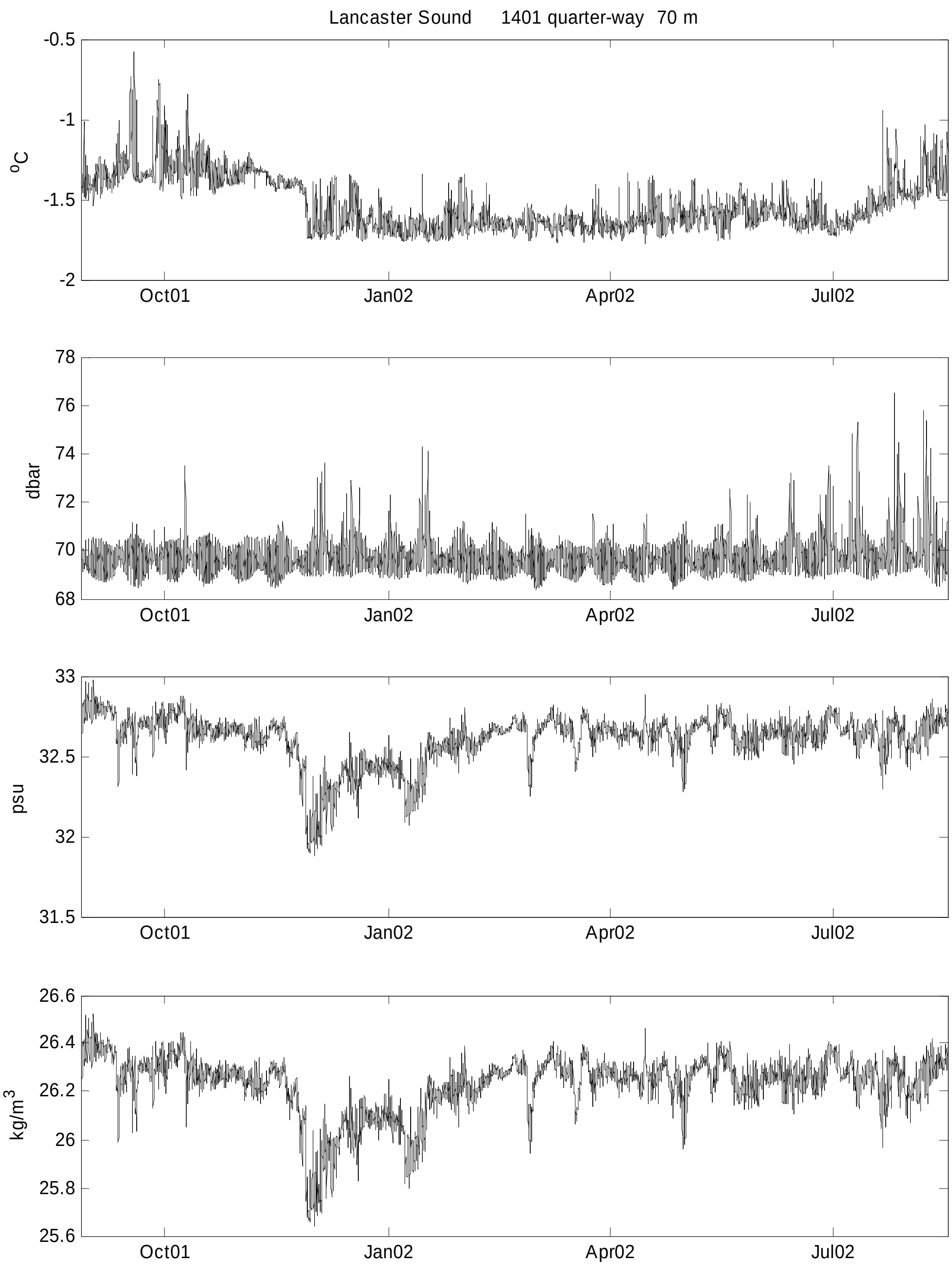

Figure 3-42 Microcat data 2001-2002 for quarter-way mooring #1401 @ 70 m

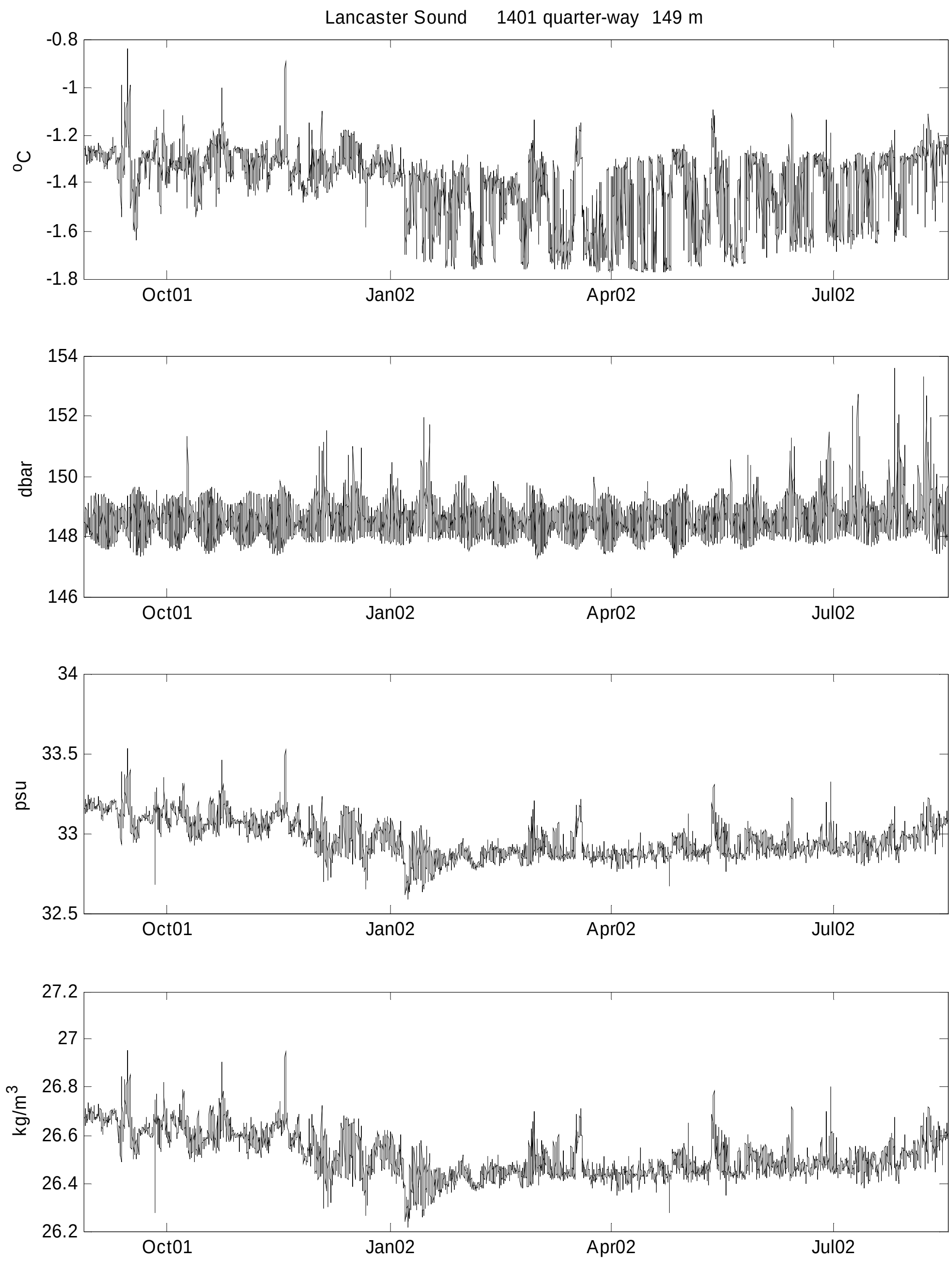

Figure 3-43 Microcat data 2001-2002 for quarter-way mooring #1401 @ 149 m

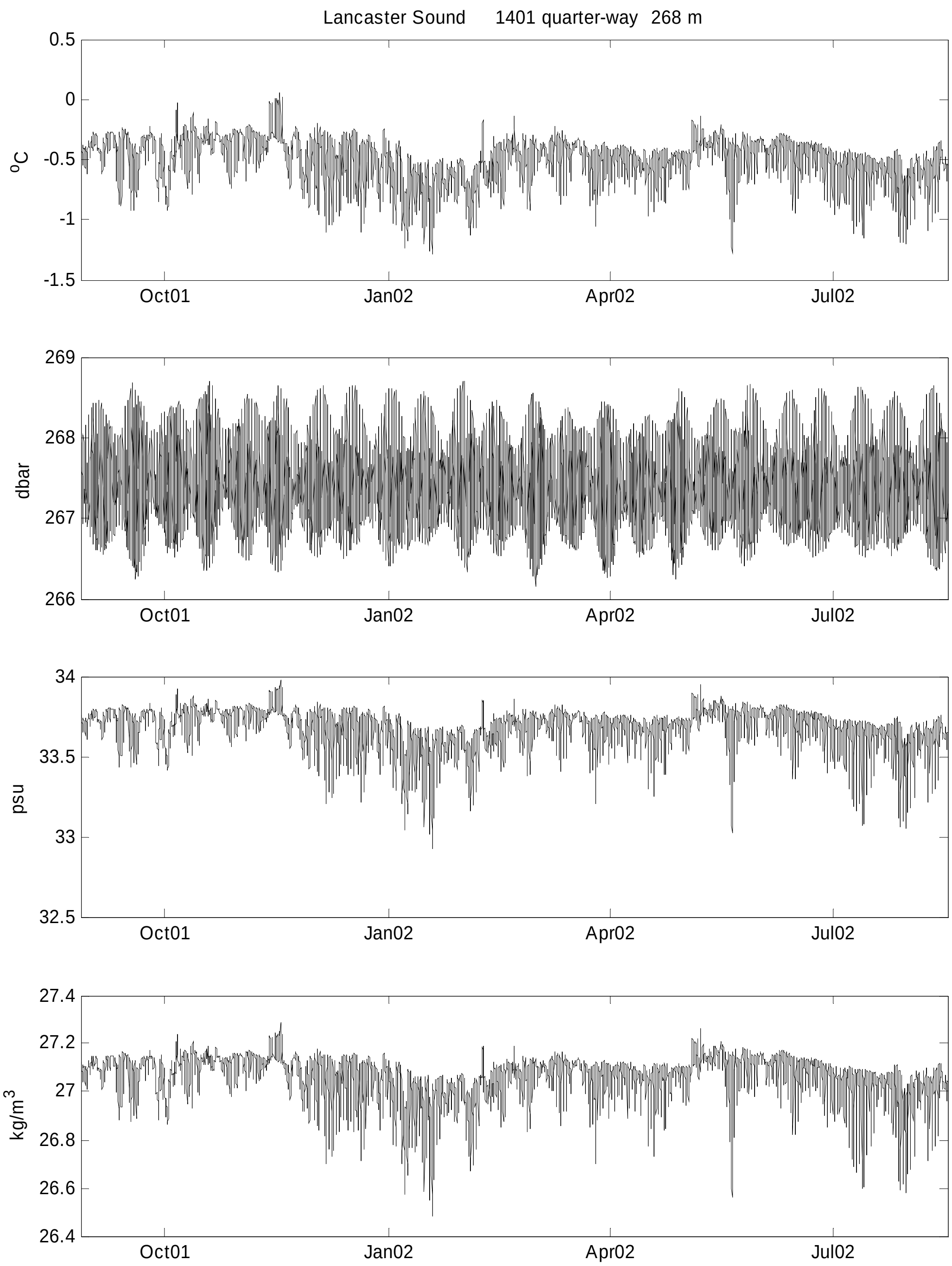

Figure 3-44 Microcat data 2001-2002 for quarter-way mooring #1401 @ 268 m

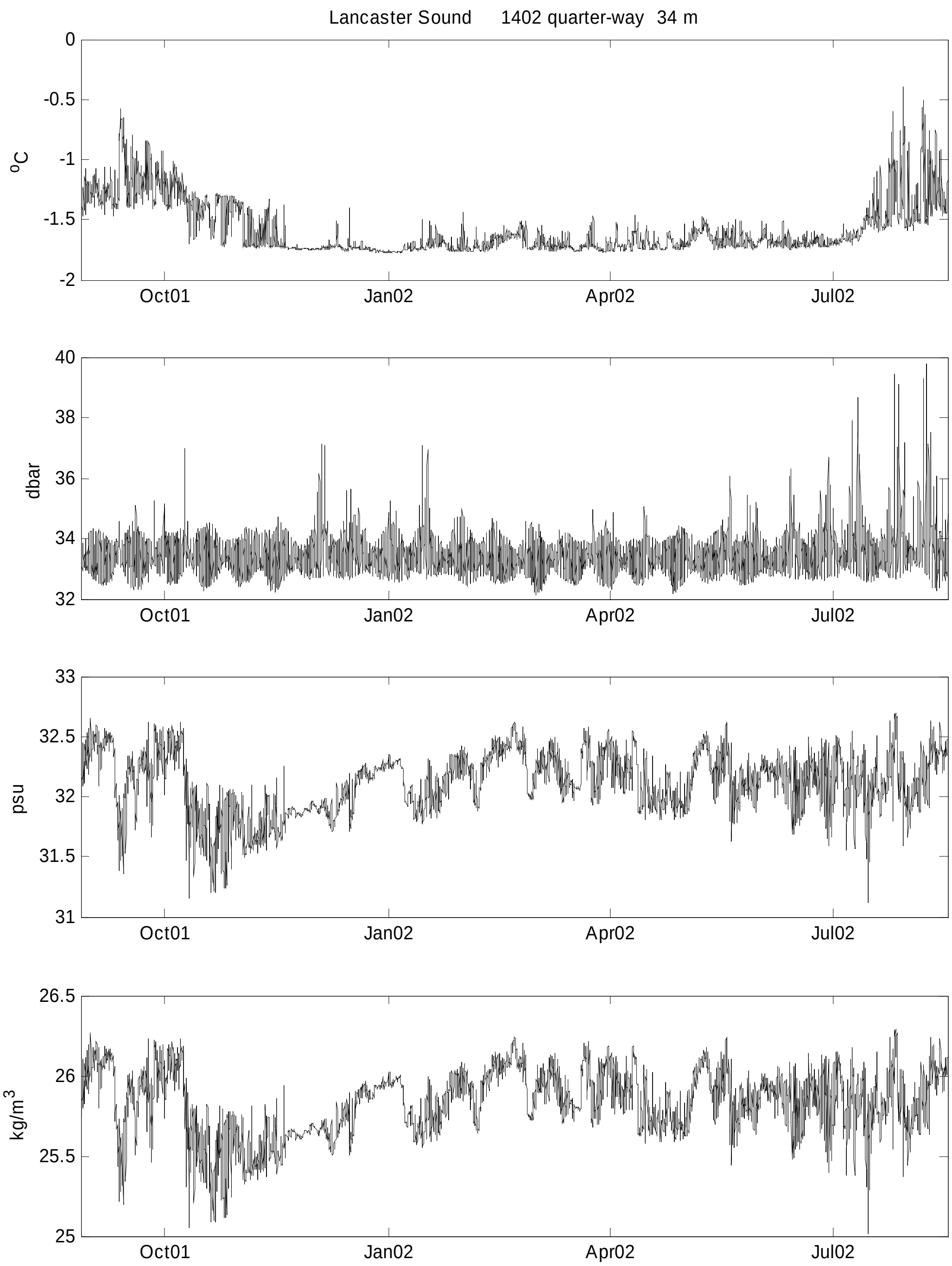

Figure 3-45 Microcat data 2001-2002 for quarter-way mooring #1402 @ 34 m

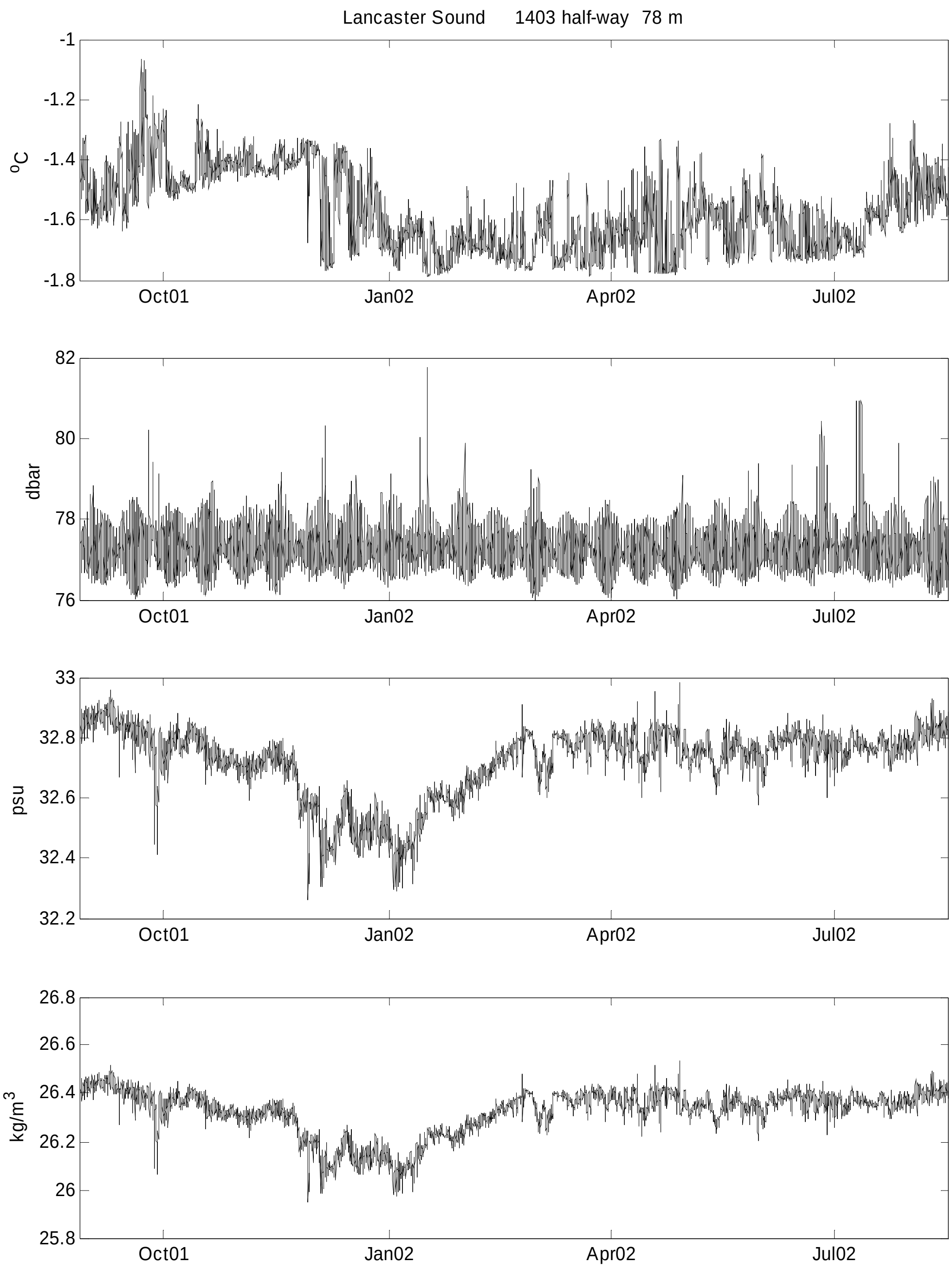

Figure 3-46 Microcat data 2001-2002 for half-way mooring #1403 @ 78 m

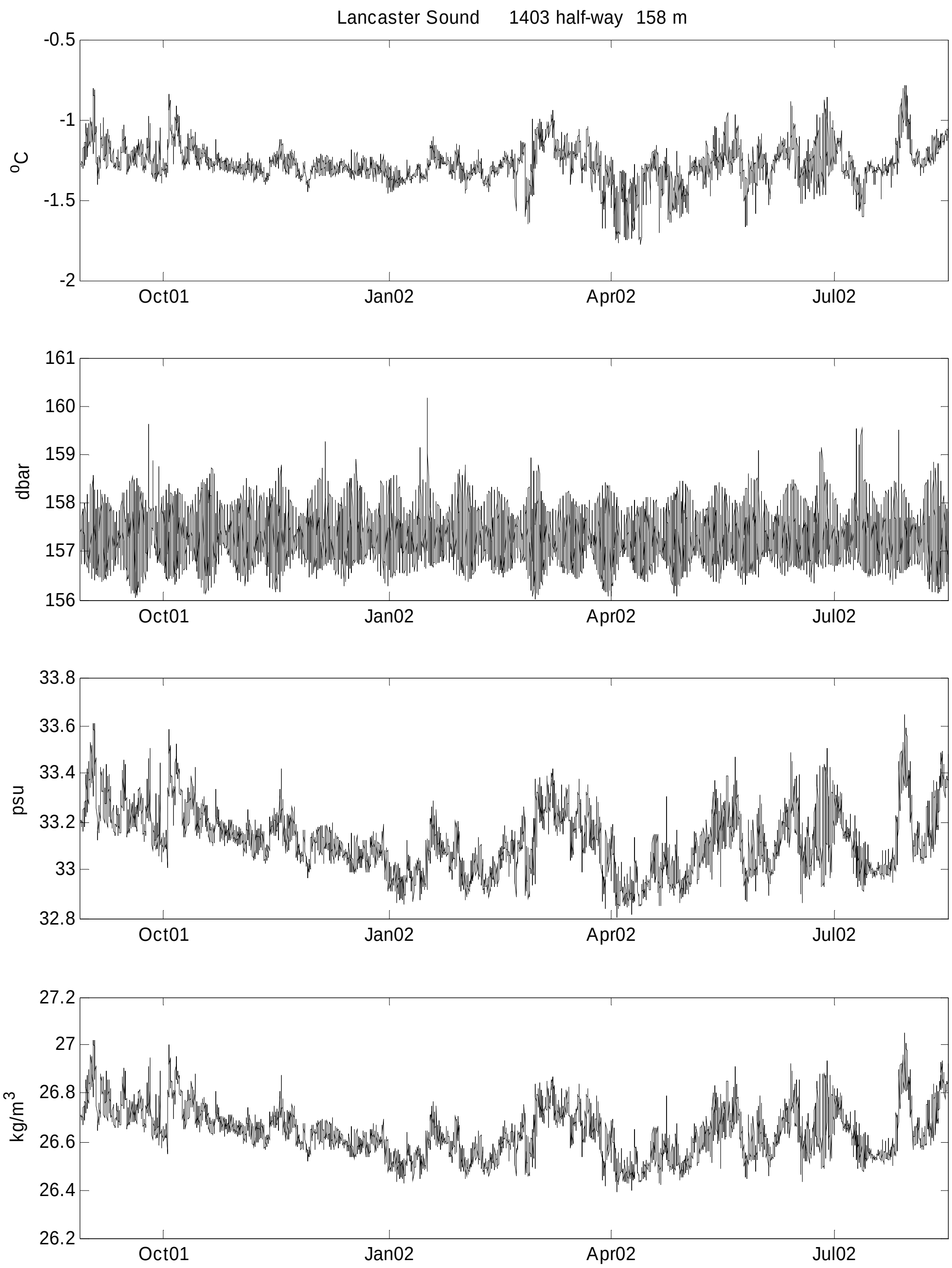

Figure 3-47 Microcat data 2001-2002 for half-way mooring #1403 @ 158 m

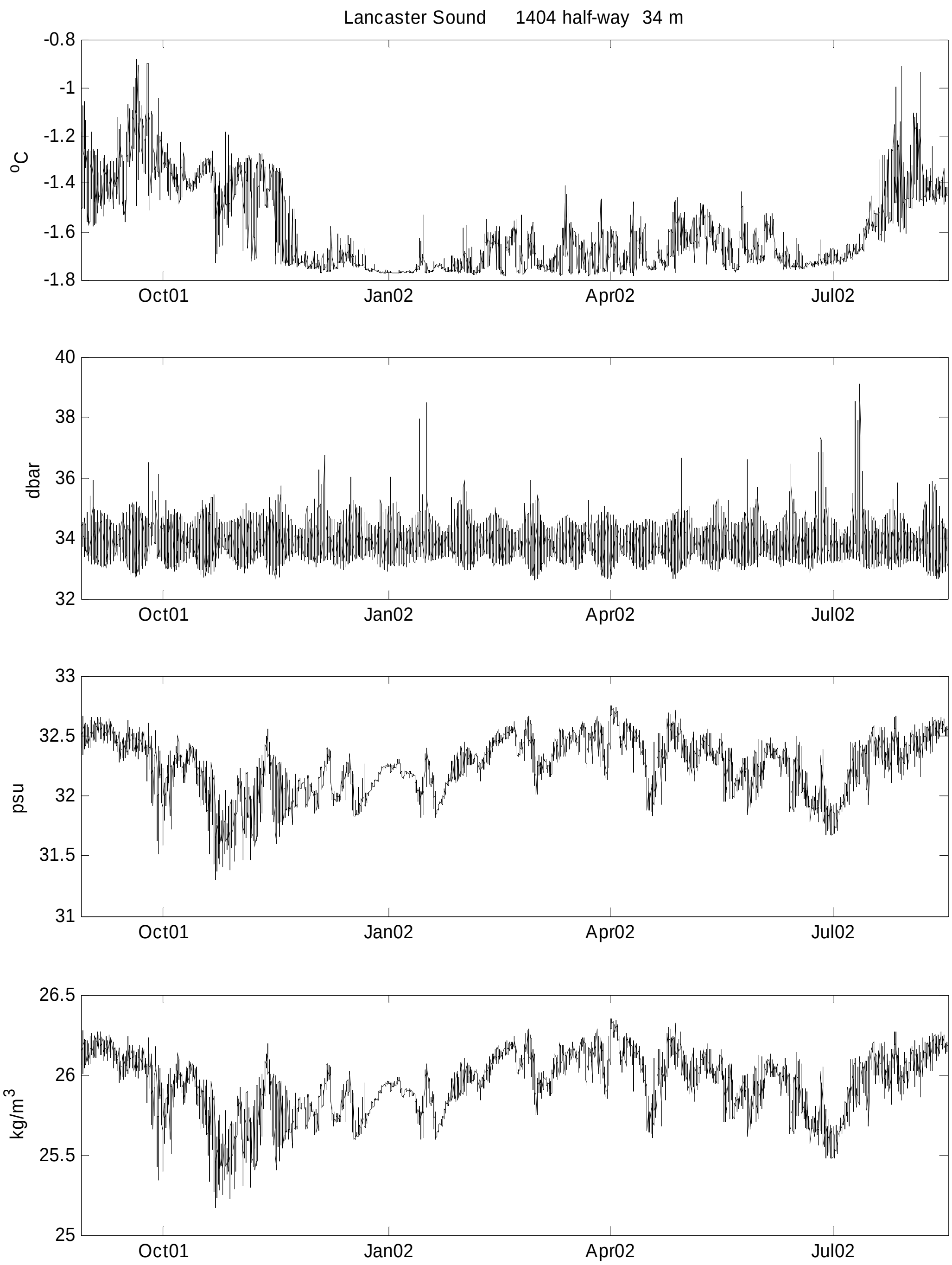

Figure 3-48 Microcat data 2001-2002 for half-way mooring #1404 @ 34 m

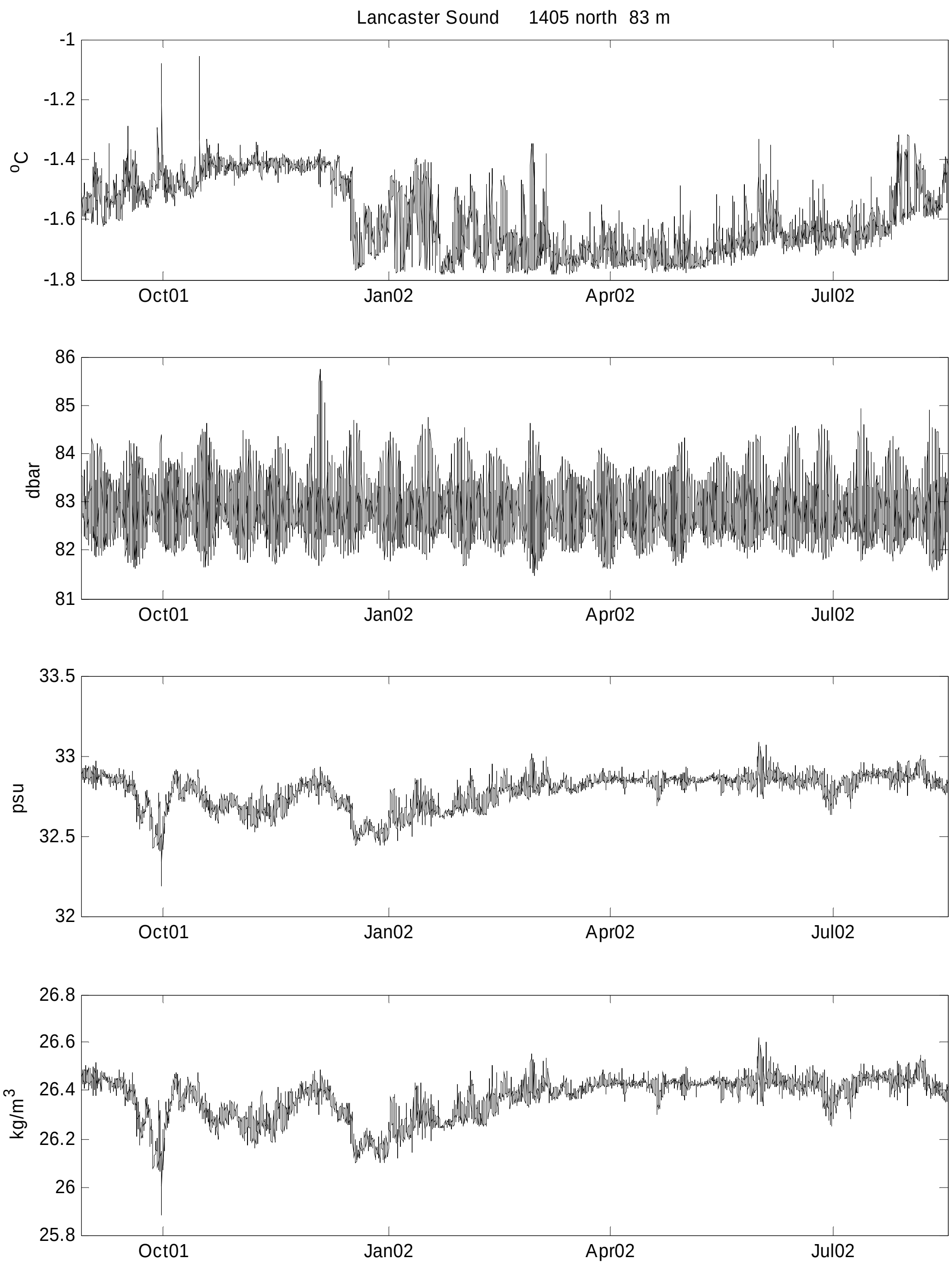

Figure 3-49 Microcat data 2001-2002 for northern mooring #1405 @ 83 m

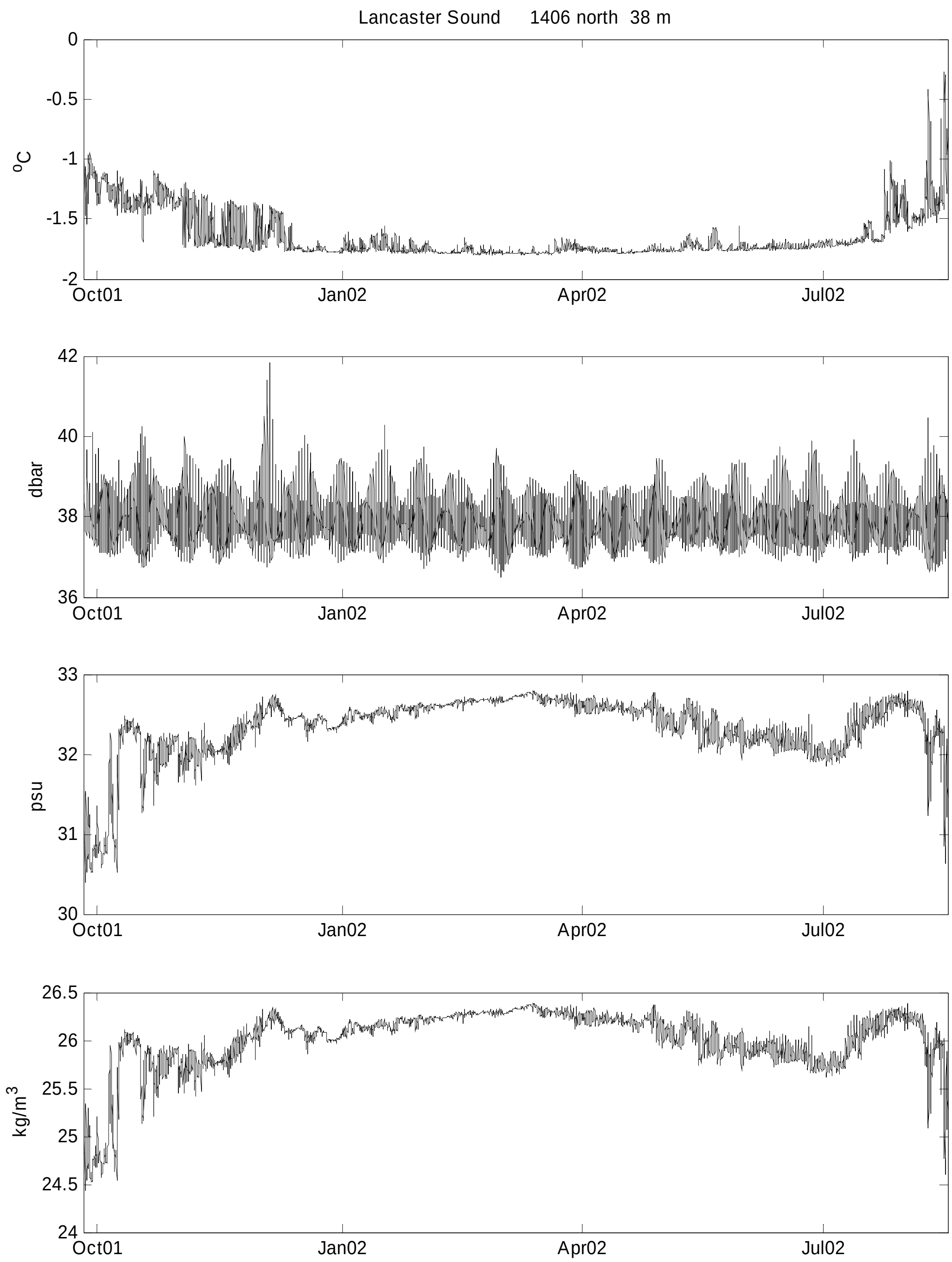

Figure 3-50 Microcat data 2001-2002 for half-way mooring #1406 @ 38 m

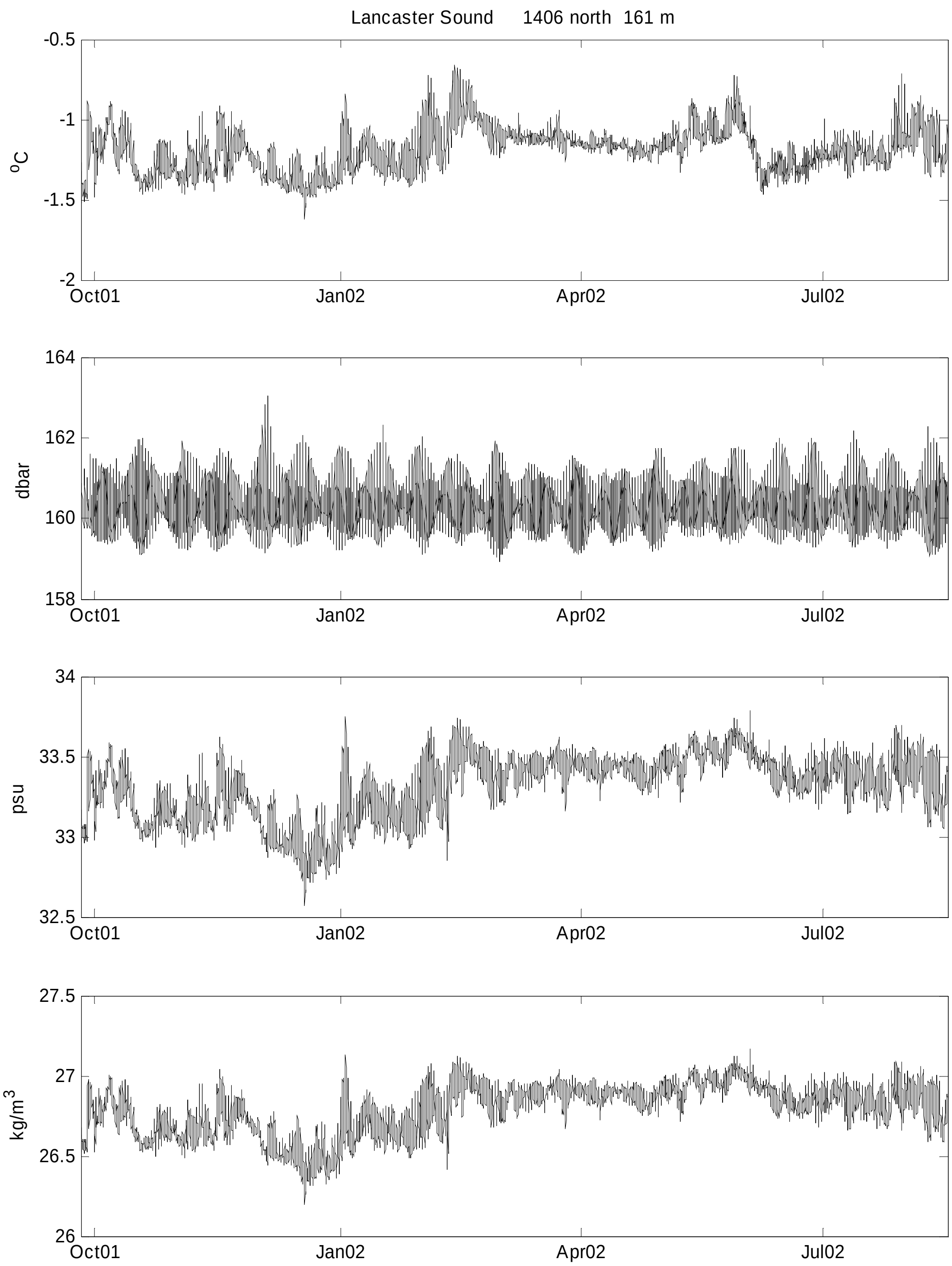

Figure 3-51 Microcat data 2001-2002 for half-way mooring #1406 @ 161 m