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MOORED CURRENT METER AND CTD OBSERVATIONS FROM BARROW STRAIT, 2003-2004

by

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Abstract

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Ten instrumented moorings deployed in the eastern end of Barrow Strait from August 2003 to August 2004 provide yearlong records of current, temperature, salinity, and ice drift and thickness, extending a data time series started in August of 1998. Current data presented have been collected with Acoustic Doppler Current Profilers and specialised instrumentation for near-pole direction measurement. Temperature, salinity and density for fixed depths from moored CTDs, as well as daily CTD and fluorescence profiles (45 m to near-surface) collected by the prototype moored profiler "Icycler" are also presented. Ice draft data collected with an ASL ice profiling sonar, and bottom pressure and temperature from water level recorders moored at three locations complete the collection of moored records presented here. Data are presented as filtered and unfiltered time series, spectral and tidal analyses products, and statistical summaries.

Finally, two CTD sections across Barrow Strait and one across Wellington Channel, based on a 2004 ship-based survey, are presented.

Résumé

Hamilton, J., R. Pettipas and S. Prinsenberg. 2008. Moored current meter and CTD observations from Barrow Strait, 2003-2004. Can. Data Rep. Hydrogr. Ocean Sci. 173 : vii + 134 p.

Dix batteries d'instruments ancrées dans l'embouchure est du détroit de Barrows d'août 2003 à août 2004 ont fourni sur l'année des mesures des courants, de la température, de la salinité, de la pression au fond, de la dérive et de l'épaisseur de la glace, qui viennent prolonger une série chronologique de données commencée en août 1998. Les données sur les courants qui sont présentées ont été recueillies au moyen de profileurs de courant à effet Doppler et d'instruments spécialisés pour la mesure des directions près du pôle. Sont également présentées des données sur la température, la salinité et la densité à des profondeurs fixes mesurées avec des sondes CTP ancrées, ainsi que des profils quotidiens de la conductivité, de la température, de la profondeur et de la

fluorescence (de 45 m à la couche proche de la surface) recueillies par le prototype de profileur ancré « Icycler ». Des données sur la dérive de glace obtenues au moyen d'un sonar profileur de glace ASL et des données sur la température et la pression au fond recueillies à l'aide de limnigraphes ancrés à trois endroits complètent les données produites par les instruments ancrés contenues ici. Ces données sont présentées sous forme de séries chronologiques lissées et brutes, de produits issus d'analyses des marées et d'analyses spectrales, et de résumés statistiques.

Enfin, deux coupes transversales d'enregistrements des sondes CTP, l'une portant sur le détroit de Barrows et l'autre sur le chenal Wellington, provenant d'un relevé réalisé à partir d'un navire en 2004, sont aussi présentées.

Introduction

A field program to quantify and examine the inter-annual variability of the exchange through Barrow Strait (a principal pathway between the Arctic and North Atlantic Oceans), and more generally, to improve our understanding of the circulation within the Arctic Archipelago, was started by BIO investigators in August of 1998. Data from the first five years of this study, along with a description of the methods used, have previously been reported [Pettipas et al., 2006, 2005; Hamilton et al., 2004, 2003, 2002]. Described here are moored instrument data from the sixth year of the study.

Yearlong records of temperature, salinity and density information derived from moored microcat CTD data are presented as unfiltered and low-pass filtered time series, and also as power spectra. Current rate and direction are also presented as unfiltered and low-pass filtered contour plots, and as time series plots for depths corresponding to the moored CTDs. Seasonally averaged statistical summaries for both the CTD and current data are provided as graphs and/or in tabular form. Results of tidal analyses of the current data give tidal amplitudes, phase, and ellipse orientation as a function of depth for each of the five main tidal constituents (K1, M2, O1, S2, P1). Separate tidal analyses have been done for periods of solid ice cover and periods of open water.

Ice drift velocity, also obtained from the acoustic Doppler current profilers (ADCPs), are presented as yearlong time series. Ice draft data acquired with a moored ASL ice profiling sonar (IPS) are presented in statistical form showing monthly maxima and averages, and monthly thickness distributions. Water level and bottom temperature from water level recorders (WLRs) in three locations are also presented.

Also presented is a comprehensive data set from the Icycler profiler, which was moored on the South side of the strait. Detailed daily 45 m profiles of salinity, temperature, fluorescence and density to within 2 m of the ice cover, are presented as contour plots. Since lighter freshwater is concentrated in this near-surface zone where the use of conventional mooring technology is precluded due to the risk of loss due to ice, these Icycler data are being used to improve estimates of freshwater transport through the strait, which is the principle objective of this project.

Finally, hydrographic sections at the eastern and western ends of Barrow Strait, and across Wellington Channel are presented. These cross-sectional diagrams are created from a CTD survey conducted during the field study. These lines have been completed each summer since 1998, when ice conditions allow.

Mooring Locations and Description

A total of 10 instrumented moorings were distributed over four sites across the eastern end of Barrow Strait (see Figure 1) as in the previous two years. Four moorings were located at the 150 m contour on the south side, two moorings were halfway between this Southern site and the center of the strait (the "South Central" site), two moorings were in the middle of the Strait (the Central site), and two moorings were at the 200 m contour on the north side. An illustration of the moorings deployed is shown in Figure 2.

Acoustic Doppler Current Profilers (ADCPs) manufactured by RD Instruments (RDI), and precision heading references were mounted in streamlined buoyancy packages to provide current rate and direction information. The technique used to obtain reliable direction measurements here, where conventional compass technology is inadequate due to the proximity of the site to the magnetic pole, is described in detail by Hamilton [2004, 2001]. These upward looking ADCPs logged average speeds from 100 pings over a 5 minute on-period every 2 hours, and also provided a simultaneous ice drift speed over the yearlong deployment. 300 kHz Workhorse ADCPs were used at the Southern, South-Central and Northern sites. A "Long Ranger" (75 kHz) was used at the Central site. Concurrent direction measurements were logged separately with the precision heading reference systems, and have been merged with the ADCP speed data for presentation here. All five ADCP/compass systems were successfully recovered, and provided good quality data for the entire deployment period. The only exception was that the Long Ranger at the Central site did not provide ice drift data due to instrument setup issues.

An IPS was moored at the South-Central site, and provided good quality ice draft data for the duration of the yearlong deployment. Ice draft is the distance between the bottom of the ice and mean sea level.

SeaBird MicroCat CTDs were used to measure temperature, conductivity and pressure at targeted depths of 40, 80 and 160 m across the Strait, as well as the near-bottom at the Southern and South-Central sites. These CTDs recorded a single temperature, conductivity and pressure every 30 minutes.

The moored profiler "Icycler", equipped with an SBE-19plus CTD and a Wetlabs WS3S fluorometer, was once again used at the Southern site to obtain information in the upper water column. In the previous year, a set-up error limited data return, but this year the prototype instrument provided an excellent data set consisting of daily profiles of salinity, temperature and fluorescence from 45 m depth to just 2 m below the ice. Previously these near surface measurements were unattainable because of the risk of instrument loss due to ice ridges and icebergs when using conventional mooring technology. The new profiler, called Icycler, consists of a main float set at 50 m depth, which houses a winch that pays out and reels in a sensor float once a day. The sensor float is equipped with a sonar to detect the under-ice edge, and triggers the termination of the profile once the sensor float has ascended to within 2 meters of the ice. Icycler was developed at Bedford Institute of Oceanography, and is described in Fowler et al., 2004.

Water level recorders were attached to mooring anchors at the Southern, Central and Northern sites. An eleventh mooring to support a water level recorder was also deployed in the middle of the strait, 95 km to the west of the main mooring line. The instrument at the Southern site flooded and returned no data, while pressure data from the Central site instrument are unreliable after March. These malfunctions limit the value of the returned water level recorder data for computing the geostrophic flow.

A summary of the 2003-2004 moorings and instrumentation, including mooring positions, instrument depths and acquired data records, is presented in Table 1.

Data Processing

Current Speed and Direction Data

The Workhorse ADCPs were mounted in streamlined buoyancy packages (A2 "SUBs" manufactured by Open Seas Inc.) and set up to measure current relative to the instrument axes, ignoring their own compass information. These instruments were set up to average over a depth interval of 4 m. Typically, the highest useful depth average in the data sets from the three upper ADCP instruments (moored at a depth of about 80 m), was centered around 10 m. Current data above this level were rejected based on RDI's standard echo intensity quality criterion. The Long Ranger ADCP was also set up to ignore its own compass, and averaged over an 8 m interval. These acoustic Doppler current profilers also record ice drift velocity when there is solid or near-solid ice cover.

At the Southern site two Workhorse ADCPs, one at 74 m and one at 143 m depth, combine to provide currents for most of the water column. At the Central site where the bottom depth is 207 m, the Long Ranger moored near bottom provides the same coverage with a single instrument. At the South-Central and Northern sites currents for the upper water column only are provided by the WorkHorse ADCPs moored at ~80 m depth.

Direction was provided using an independent compass package mounted in the buoyancy package tail to give the orientation of the ADCP relative to magnetic north. Initiation of a compass sample cycle was triggered by the commencement of the bihourly ADCP measurement by making use of RDI's "RDS3 interface" to provide a turn-on pulse to the compass. The compass was programmed to take a 20 s sample in the middle of the 5 minute ADCP sampling interval. This conserved compass battery power, and took advantage of previous experience that current direction does not change significantly over 5 minutes at the study location [Hamilton et al., 2003].

Direction records were then adjusted for the variation in magnetic declination using magnetic observatory data from the NRCAN observatory in Resolute to get direction relative to true north.

Vertical excursions of the ADCPs caused by current drag forces acting on the mooring were similar to previous years, rarely exceeding three meters.

Moored CTD Data

SeaBird MicroCat CTDs were set up to measure temperature, conductivity and pressure every 30 minutes for the yearlong deployments. The mooring supporting the 40 m level CTD above the 80 m level ADCP m at the South-Central site was subjected to the greatest dip due to current drag forces acting on the mooring. The largest observed dip was 12 m, with a standard deviation in instrument depth over the yearlong deployment of just 0.8 m.

Low-Pass Filtering

Some of the data series presented have been filtered to remove the semidiurnal and diurnal tides using the technique described by Godin (1972). The technique uses three simple averaging filters applied in sequence. Godin, working with hourly observations, recommends two consecutive applications of a filter that averages over 24 samples, followed by one that averages over 25 samples. Here for the bi-hourly current data, we sequentially apply 12,12, and 13 sample averaging filters, while for the semi-hourly MicroCat CTD data we sequentially apply 48, 48 and 50 sample averaging filters.

Tidal Analysis

Harmonic tidal analyses of current data using Foreman's [1978] method is presented separately for periods of solid ice cover, and periods of broken or no ice, for each site where sufficient data for analysis are available. Only on the South side did ice become land-fast in 2003-2004, so it is just for this site that profiles of tidal ellipse constants for solid ice conditions are plotted. At the other three sites, ice remained mobile for all but a few days through the year. This was also the case in 2002-2003. In the four years previous to that (1998-2002) though, ice was land fast for at least four months each winter at all ADCP stations. Where sufficient data are available, tidal

ellipse axes amplitudes, orientations and phases for the main tidal constituents (K1, M2, O1, P1 and S2) are plotted as a function of depth.

The periodic vector function describing a particular constituent, traces an ellipse over a tidal cycle with major and minor amplitudes defined by the length of the semi-major and semi-minor axes. The major axis amplitude is always positive. The sign of the minor axis amplitude defines the rotation sense of the current ellipse. When positive the vector traces the ellipse in a counter-clockwise direction; when negative, the rotation sense is clockwise.

Ellipse orientation is the angle measured counter-clockwise from east to the semi-major axis.

The phase is a measure of the timing of high water referenced to astronomic positions over the Greenwich meridian. Phase is measured counter-clockwise from this chosen reference.

Data Presentation

Yearlong time series of half-hourly temperature, salinity and density from the moored CTDs are shown in Figures 3 - 6. At the Southern site, freshening of the upper level peaks earlier (mid-September) than in either of the preceding years, and the freshening is stronger and persists right through the winter and spring. Water at the ~40 m level at the South-Central site is also fresher than in the previous 2 winters and springs.

Power spectra of the moored CTD measurements are shown in Figures 7-10. Variance is higher than in the previous years on the South side, with principle peaks about 50% higher than the 02-03 results, and twice as high as the 01-02 results. At the Central and South-Central sites, results are similar to 02-03, and at the Northern site, variance in the diurnal band at the 40 m level is about twice that of the previous year.

Diurnal and weaker semi-diurnal signals are typically observed in the records, except at the Central site where, as in the previous years, the spectra show little in the way of distinguishing features.

Current data are shown as contour plots in Figures 11-18. Data from the deep and mid-water ADCPs at the Southern site have been combined. Data are presented in

along-strait and cross-strait components, where positive values are defined as flow towards 105° true and 15° true, respectively. Figures 11-14 display a month of unsmoothed data in which a strong tidal signal is apparent. Low-pass filtered data (tides removed) are shown in Figures 15-18. Mean flow is predominantly eastward at the South and South-central sites throughout the year. At the Central site mean flows are near zero throughout the year. In the previous year, Central site flows became eastward in late winter and early spring. At the Northern site, flow direction is westward in late summer and fall, and then near zero or weakly eastward for the rest of the year, repeating the pattern of the previous two years.

Missing data near the surface through the winter and spring (Figures 15, 16 and 18) are caused by a decrease in the effective range of the 300 kHz ADCPs when the water is at its clearest, and contains a minimum of acoustic reflectors. (The manufacturer's suggested data quality acceptance criteria have been applied.) The smoothing method used has smeared the impact of missing raw data over the filter length.

Shown in Figure 19, are yearlong data records of salinity, temperature, fluorescence and density from the moored profiler, Icycler. Through August to mid-October, water in the upper water column on the Southern site is 1-5 ppt (parts per thousand) fresher than at the 34 m level (the depth of the upper moored microcat ctd at the South site). Thirty meters is the shallowest we dared place instruments in previous years with more conventional mooring technology. The lack of data above 10 m from mid-March until mid-May is presumed to be due to ice avoidance by the profiler, where we hypothesize that an ice ridge formed and remained over the mooring until break-up commenced. Some other data gaps earlier in the record are also caused by ice avoidance, but others are a result of mooring knock-down in high currents.

Fluorescence was measured with a pumped WetLabs WS3S fluorometer integrated with the SBE-19plus CTD on the Icycler sensor float. The absolute fluorescence values in Figure 19 need to be taken with caution, as it is not possible to follow a typical protocol of regular calibration against chlorophyll extractions from water samples throughout the year. Regardless, the record provides very useful information on the timing and magnitude of phytoplankton blooms, and reliable information on varying

phytoplankton concentration throughout the year. The fluorescence record reveals an intense algal bloom from 10-30 m depth through June, and then a second period of activity in the last two weeks of July. This yearlong time series of daily fluorescence profiles is the first of its kind for this region.

Smoothed temperature, salinity and current data (where available) are shown for each moored CTD level in Figures 20-33. Tables 2 through 25 provide a summary of the CTD and ADCP data at the CTD depths, with statistics computed over each season, and for the entire year. Density has been included in these statistical summaries.

The annual average for salinity at the 40 m level at the South and South-Central sites is 0.3 ppt fresher than in each of the previous years.

Annual and seasonal mean flows are summarised in Figures 34-39. Each 4 m binned value for the WorkHorse ADCPs (8 m for the Long Ranger ADCP) is shown. The small discontinuity at the 75 m level in some of the Southern site records is a result of merging records from two ADCPs separated by ½ km on different moorings. Seasonal current patterns are similar to the previous year, but magnitudes on the Southern half of the strait are stronger in late summer, yet weaker in the fall and spring than in the previous year such that the yearly averages are similar.

As in the previous two years there is significant seasonal variation, but flows are predominately easterly in the upper water column, becoming progressively weaker moving north to the South Central and Central sites, and low or westward on the North side. Currents at the Central site are near zero throughout the year.

The variance in the bihourly, and low-pass filtered current data for the yearlong ADCP records are shown in Figure 40. On the south side, tides account for only half of the total variance in the along-strait current speeds, but at the Central site the portion due to tides is about 80%.

Tidal analysis results for the ADCP data collected at all four sites are presented as profiles for the five largest tidal constituents in figures 41 – 60. Separate analyses have been done for ice-free and solid ice periods, but only at the South site was the solid ice period long enough to provide reliable solid ice results. At the South-Central site, a single mooring supported the ADCP, and the upper level microcat CTD to reduce the total number of moorings. The top buoyancy of this mooring is large enough to be

detected by the ADCP and contaminated the current data in the 40 m bin, so these data are not used in producing the South-Central tidal profiles (Figures 46 – 50).

In 2003-2004, the longest ice-free period was at the end of the yearlong record rather than in the late summer/fall like in previous years, essentially indicating an abnormally early spring break-up. Ellipse orientations are generally along-strait as expected. Tidal constants are summarised in Tables 26 - 30.

Ice velocities through the year at the 4 sites were derived from the upper ADCPs, and are shown in Figures 61 - 64. No data were returned for the Long Ranger ADCP at the Central Site because of an instrument setup issue. Since the ice drift measurement quality is degraded by the presence of open water, there are periods in the time series at all of the other sites where no data are presented. The manufacturer's suggested data quality standards have been applied to the ice drift data. An additional criterion applied here is that where the magnitude of the "error velocity" for a particular ensemble is greater than 1 cm/s, the ice drift velocity estimate and the adjacent estimates are rejected.

Only at the Southern site did the ice become immobile for an extended period (almost six months). At the South-Central and Northern sites, ice provided full or at least near-full coverage from late September through to the first of June, but there were only a few periods of 10 days or less when the ice was immobile. The early spring break-up (June 1) is similar to 2001-2002 (mid-May), and two months earlier than what was observed in the first 4 years of the project when break-up was typically mid to late July.

Ice draft was measured in 2003-2004 for the first time in this project. An ASL Environmental Sciences ice profiling sonar (IPS) was moored at the South-Central site and provides ice draft for the entire year. Monthly mean, standard deviation, and maximum ice draft are shown in Figure 65 and Table 31, while histograms of draft distribution by month (based on the data presented in Table 32), are shown in Figure 66. Mean monthly ice drafts range from 1 to 2.3 m through the period when there is 100% ice cover. Monthly maxima are typically above 15 m, with the largest observed being 22 m, demonstrating the risk ice poses to moorings that extend to far up into the water column. Low standard deviation can mean that ice passing over the IPS is of very uniform thickness, which is not likely over an extended period, or that the ice was landfast, and

therefore stationary over the instrument. The latter occurred for brief periods only in 2003-2004 (Figure 65) so we have no months where standard deviation is near zero.

Water level recorders were included in the instrumentation of the 2003-2004 array for the first time in the program, with anchor-mounted instruments at the South, Central and North sites of the Barrow Strait mooring line (at approximately 91 °W). The instrument at the South site flooded and returned no data. Time series plots of pressure and temperature from these instruments are shown for the other two sites in Figures 67 and 68, with statistical summaries provided in Tables 33 and 34. Pressure data from the instrument at the Central site (Figure 67) after April are suspect, so are not included in the statistical summary of Table 33. A fourth water level recorder was deployed on a separate mooring in the center of the strait 95 km to the west of the Eastern Barrow Strait mooring line, at 74 ° 23.6" N, 93 º 49.7 " W. Those data (Figure 69 and Table 35) are to establish the along-strait surface slope.

A station map for the August 2003 ship-based CTD survey is shown in Figure 70. Results for the three lines appear as contoured sections in Figures 71, 72 and 73. These sections indicate an eastward geostrophic flow along the southern half of the Strait, and a shallow, westward flow near-shore on the North side. In Wellington Channel a southward flow on the western side is indicated.

Acknowledgements

We thank Kate Collins and Kumiko Azetsu-Scott for their reviews of this report, and Lorne McKee (NRCAN) for providing the Resolute Observatory magnetic declination data.

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Pettipas, R., J. Hamilton and S. Prinsenberg. 2005. Moored current meter and CTD observations from Barrow Strait, 2001--2002. Can. Data Rep. Hydrogr. Ocean Sci. 166 : v + 118 p.

Figure 1. **A map of the work area showing the location of the mooring sites (the open boxes), and the hydrographic survey lines (the dashed lines).**

<u>Figure 2</u>. Illustration of the Instrumented Mooring Array

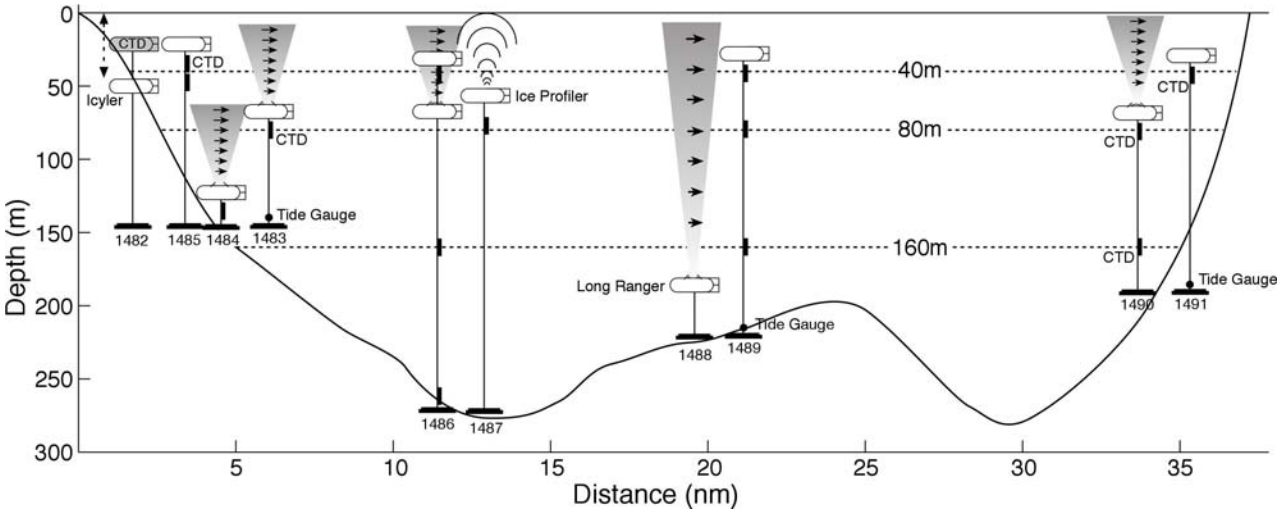


Figure 3 – Moored 30 min. CTD data, South Side Barrow Strait.
August 2003 - August 2004

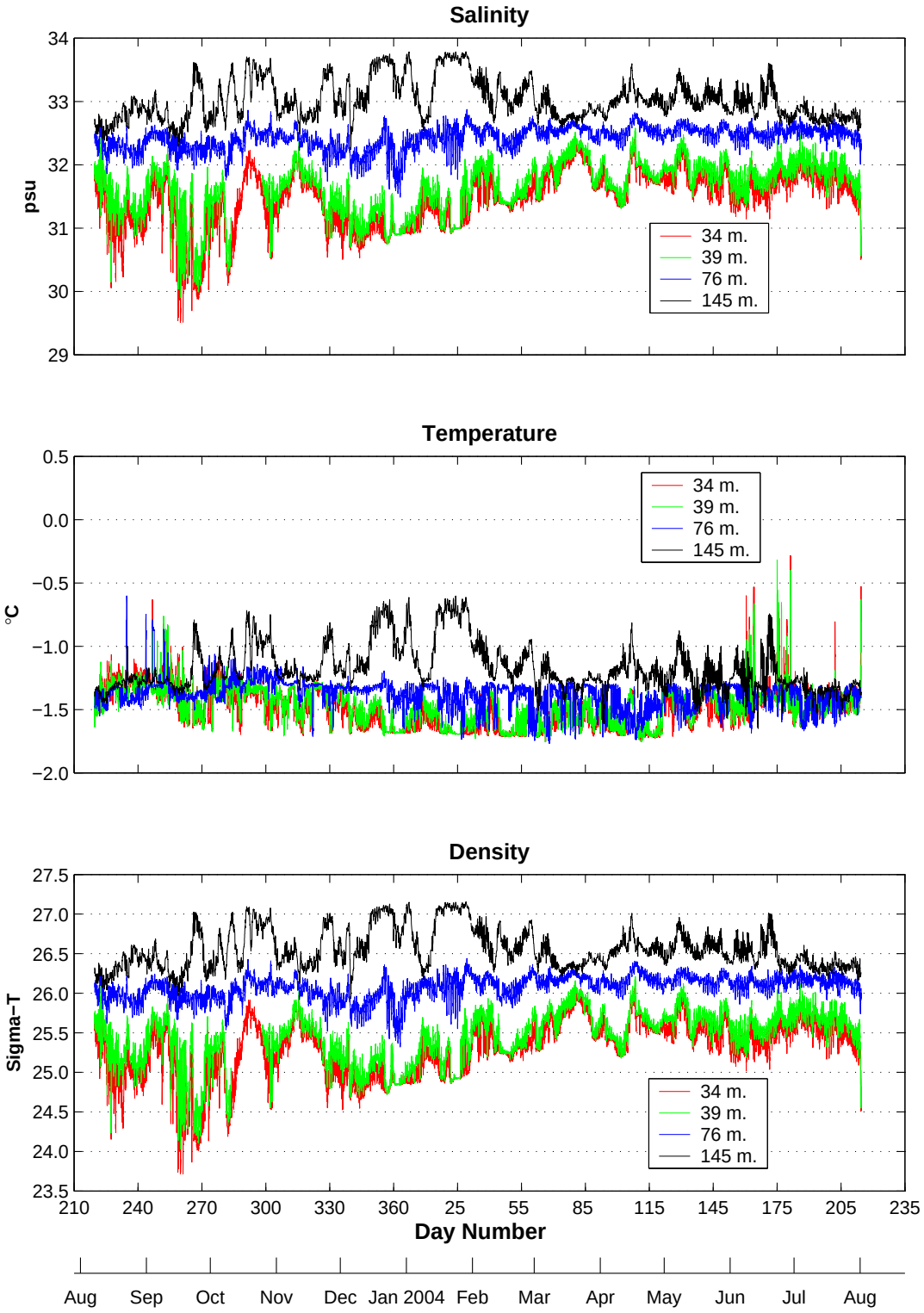


Figure 4 - Moored 30 min. CTD data, South-Central Barrow Strait. August 2003 - August 2004

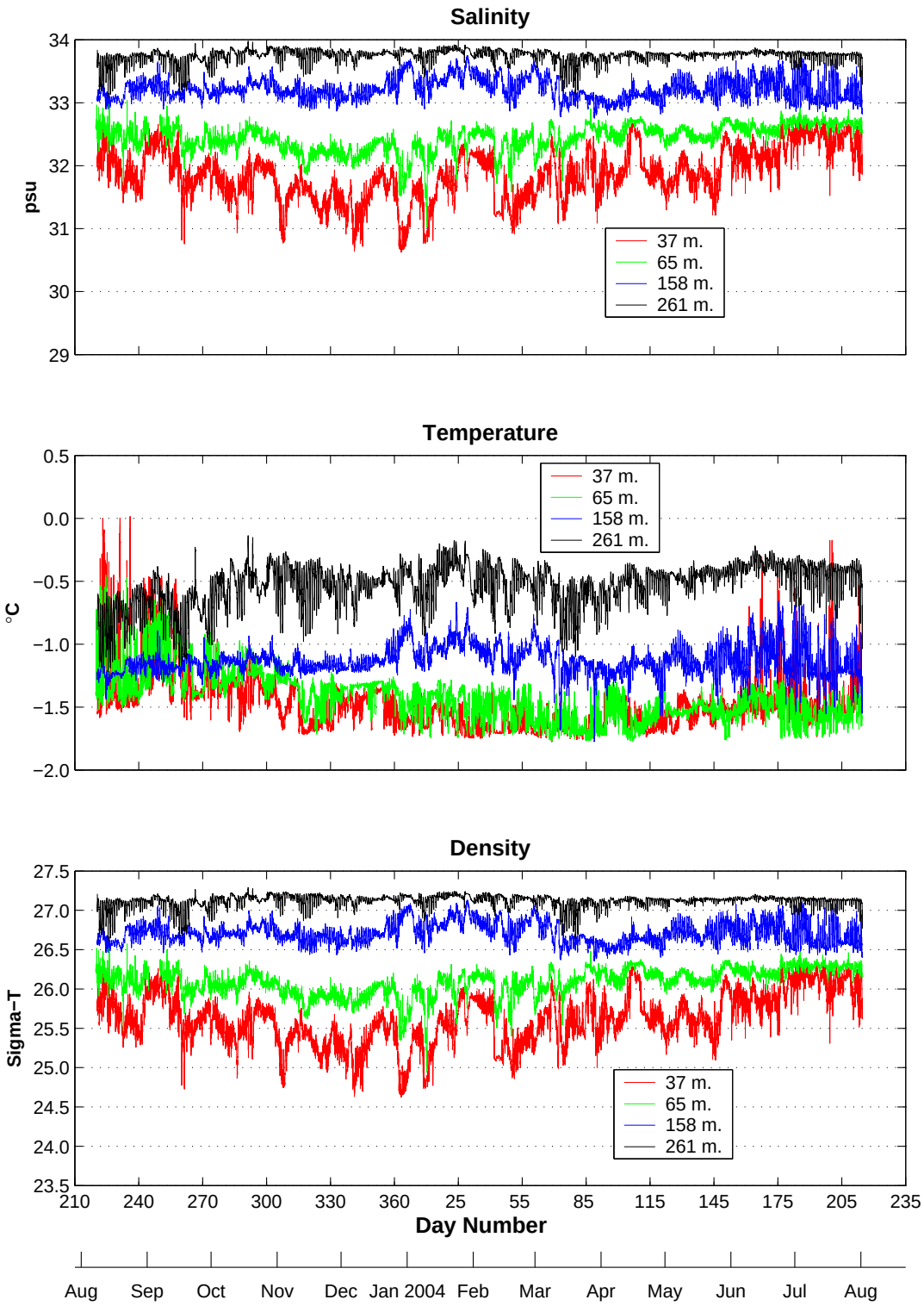


Figure 5 – Moored 30 min. CTD data, Central Barrow Strait.
August 2003 - August 2004

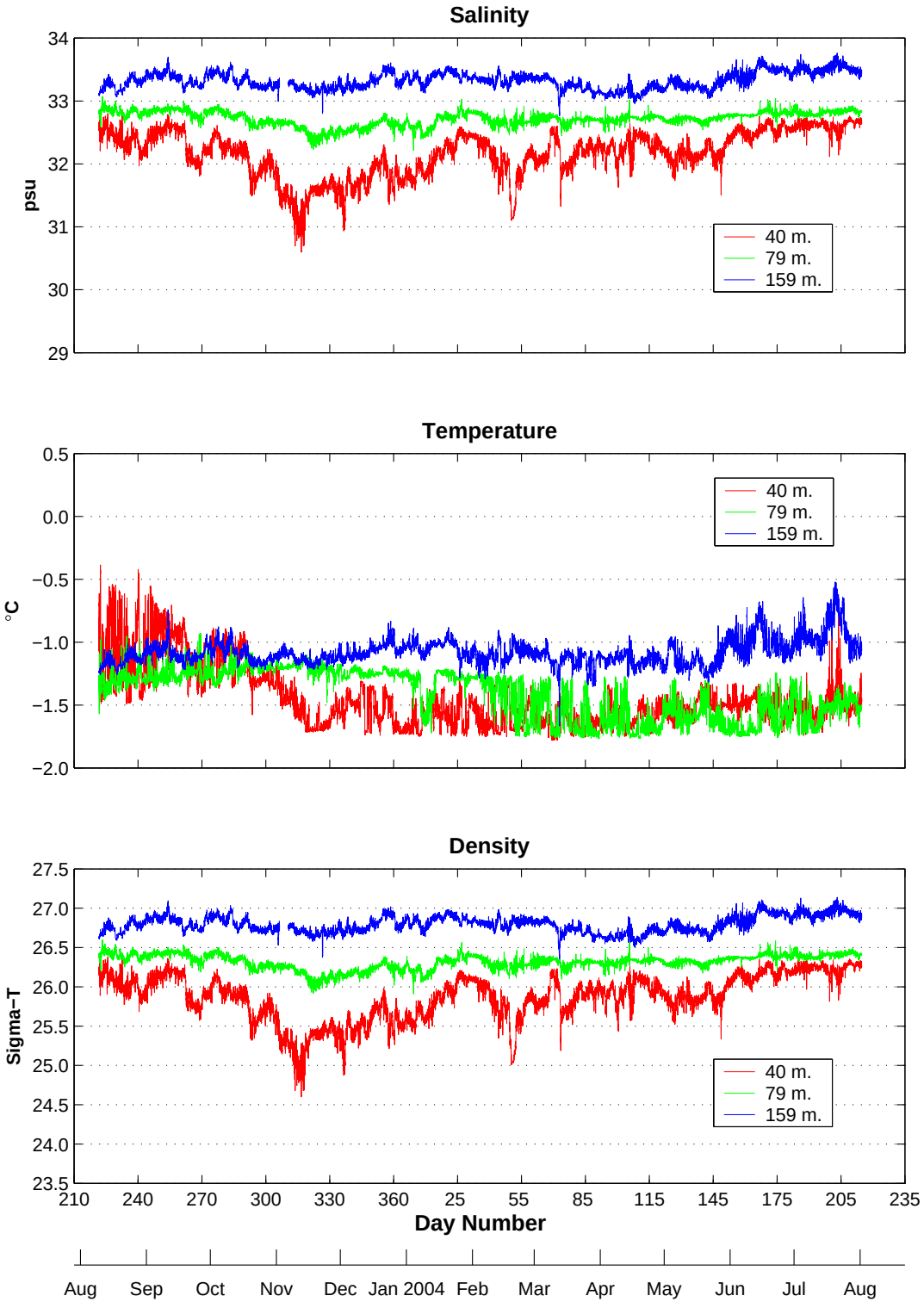


Figure 6 - Moored 30 min. CTD data, North Side Barrow Strait.
August 2003 – August 2004

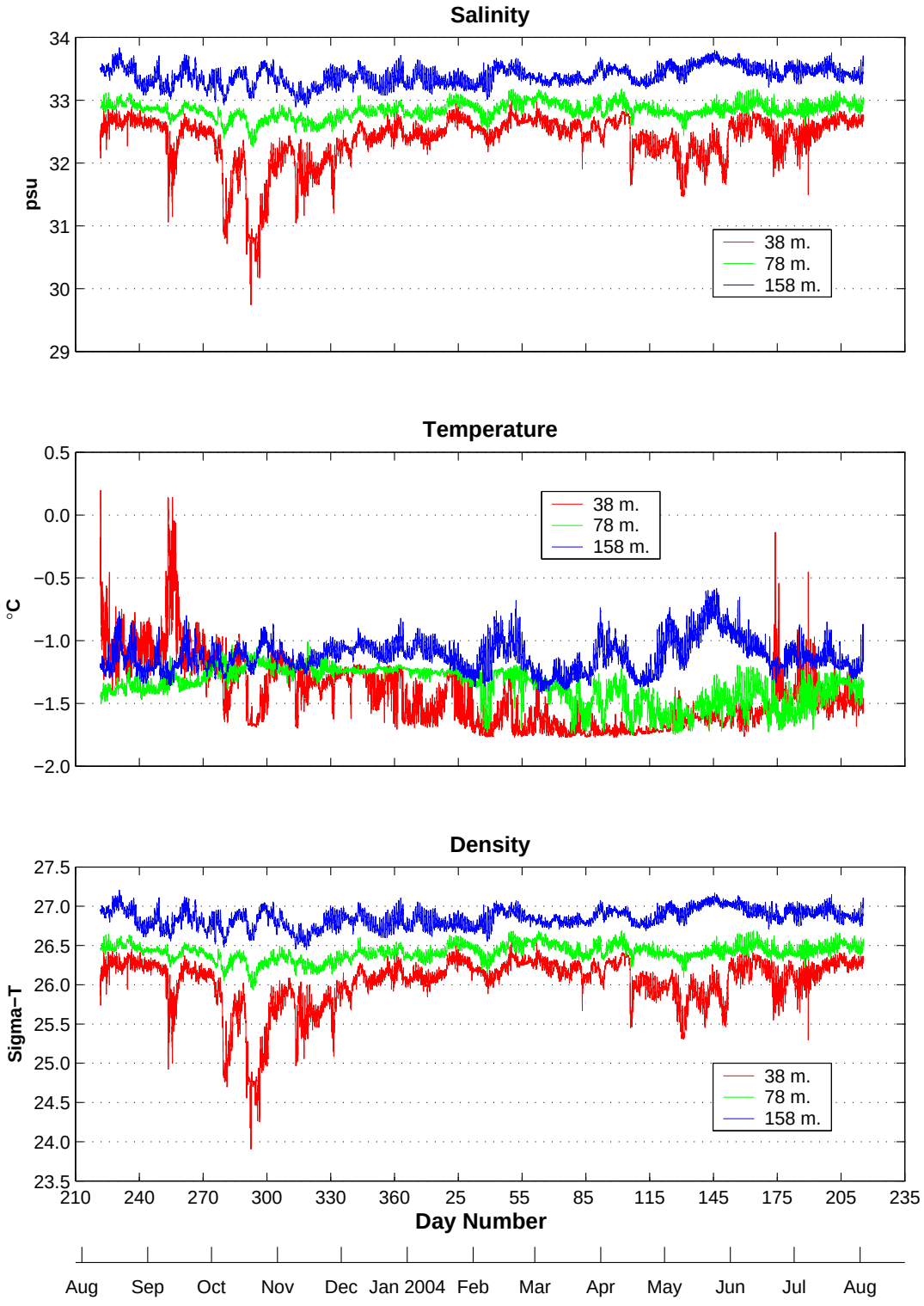


Figure 7 – Power Spectra of moored bi-hourly CTD data.
South Side Barrow Strait: Aug. 2003 – Aug. 2004.

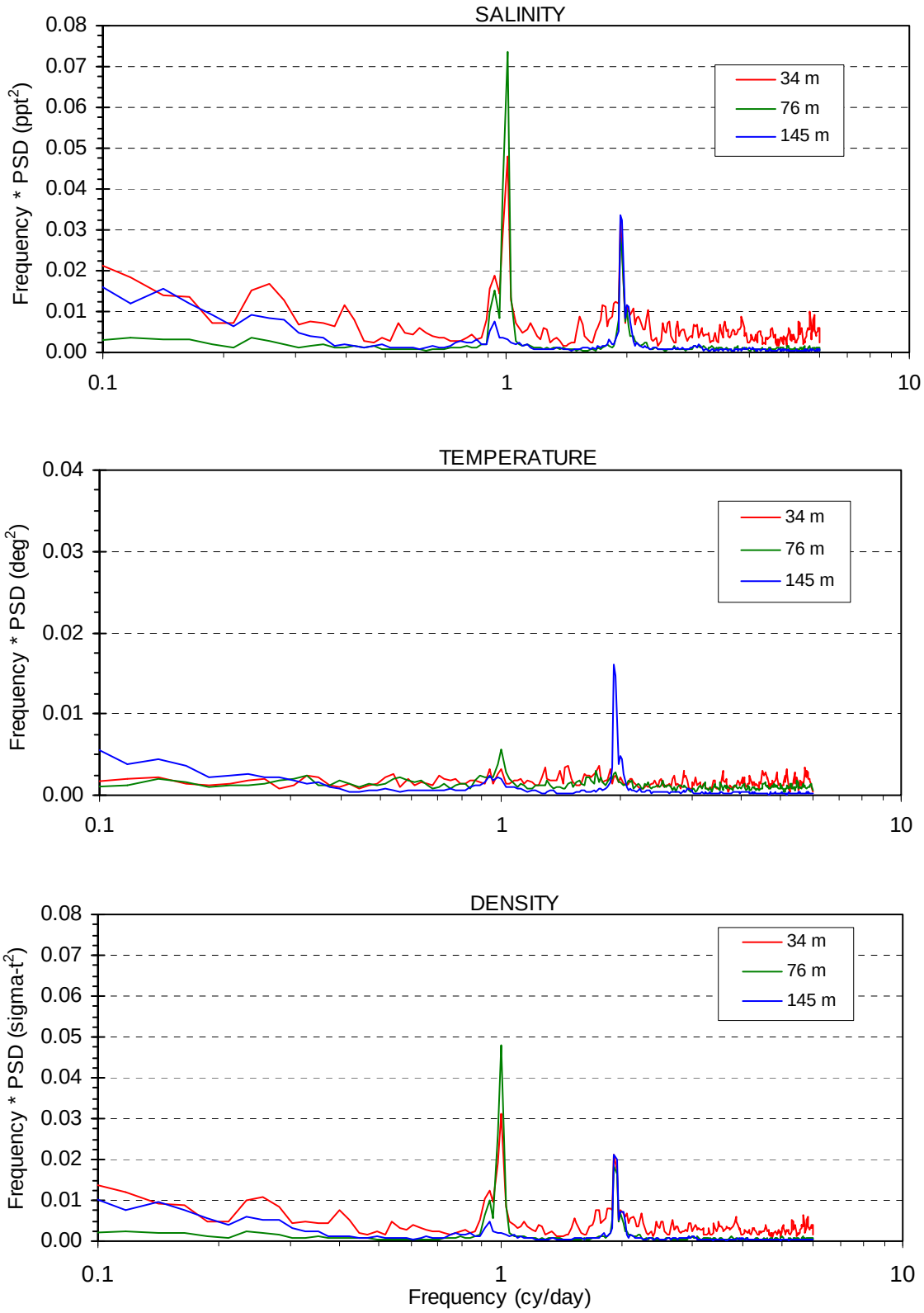


Figure 8 – **Power Spectra of moored bi-hourly CTD data. South-Central Barrow Strait: Aug. 2003 – Aug. 2004.**

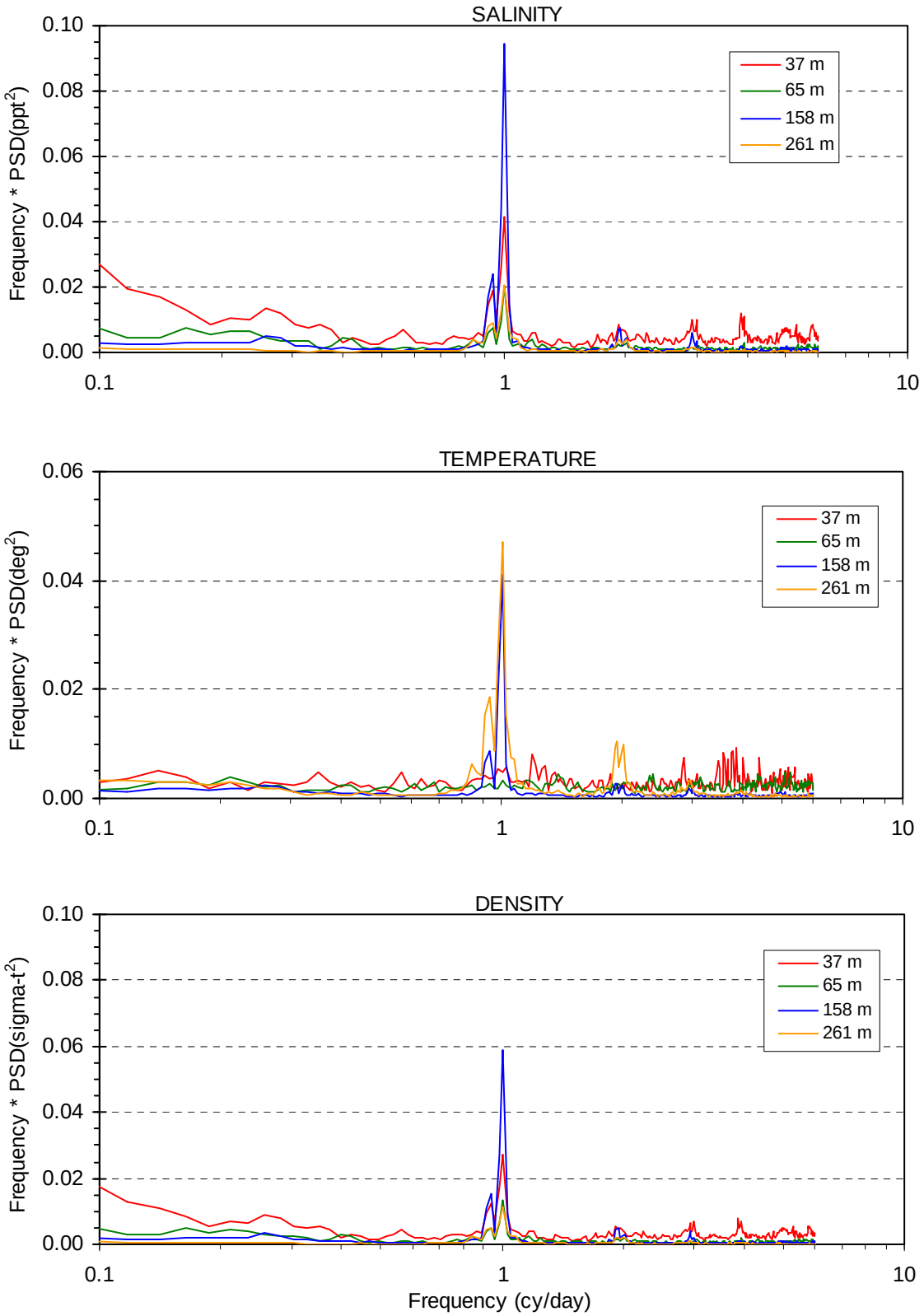


Figure 9 - Power Spectra of moored bi-hourly CTD data.
Central Barrow Strait: Aug. 2003 – Aug. 2004

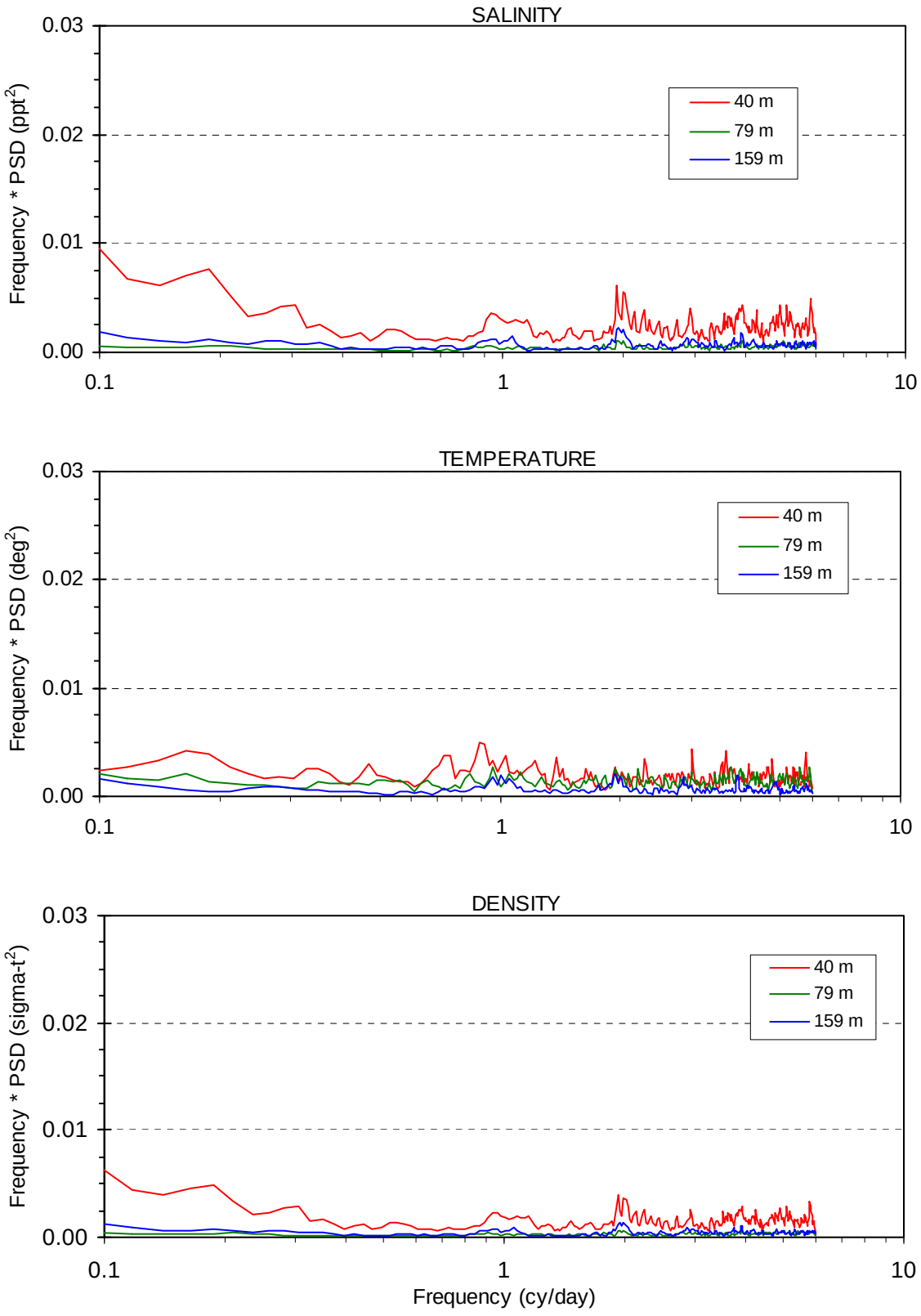
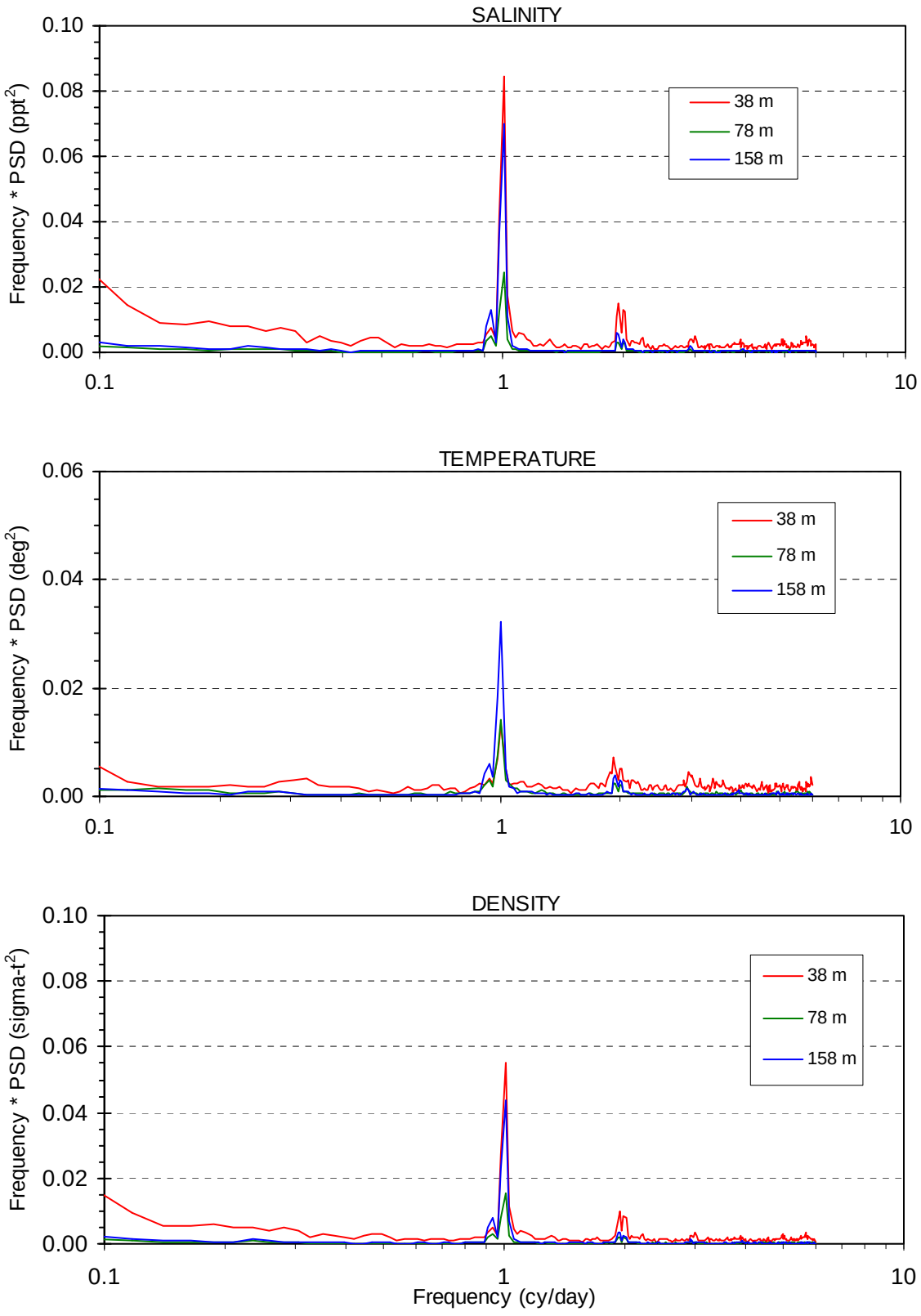
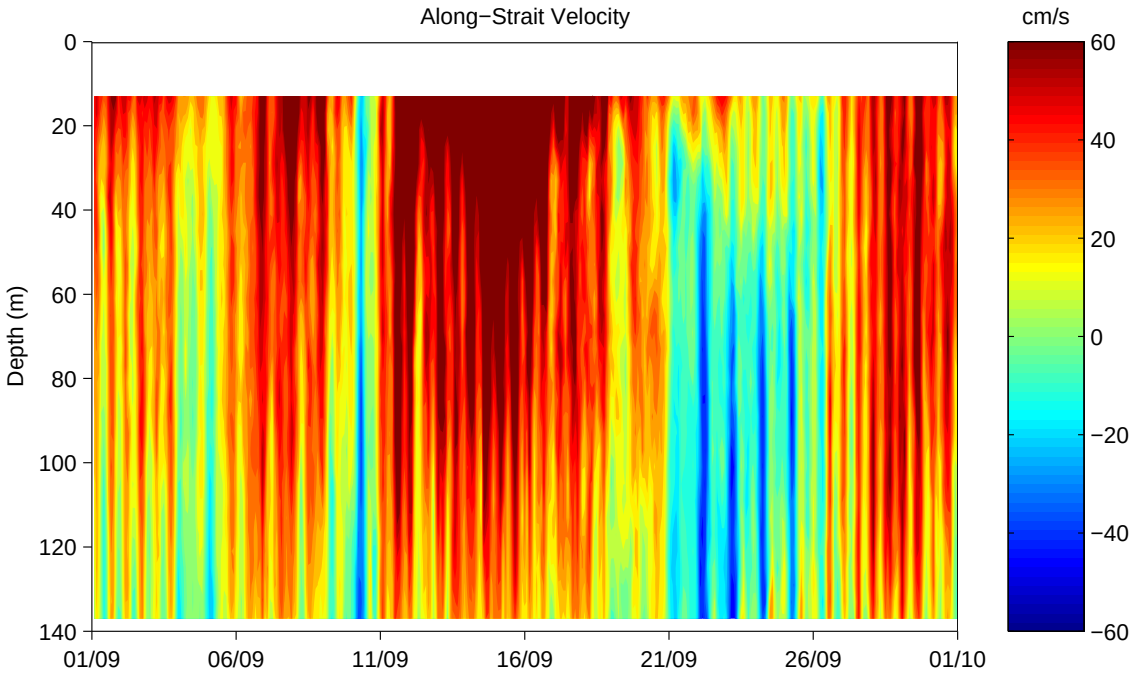
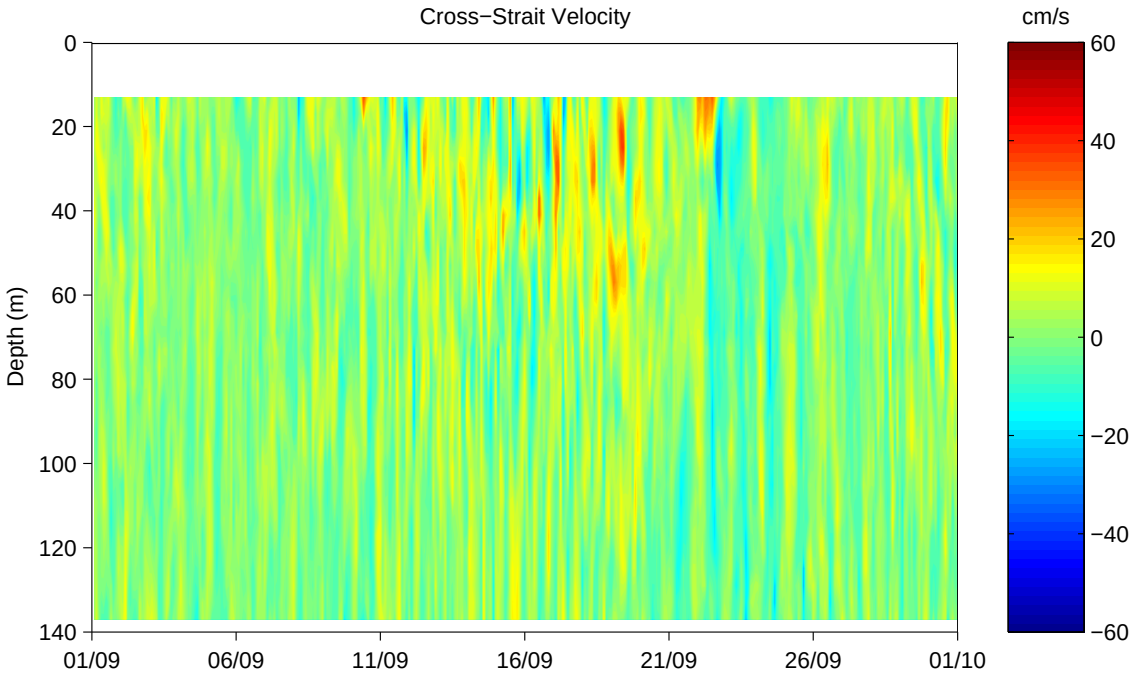


Figure 10 – Power Spectra of moored bi-hourly CTD data.
North Barrow Strait: Aug. 2003 – Aug 2004.

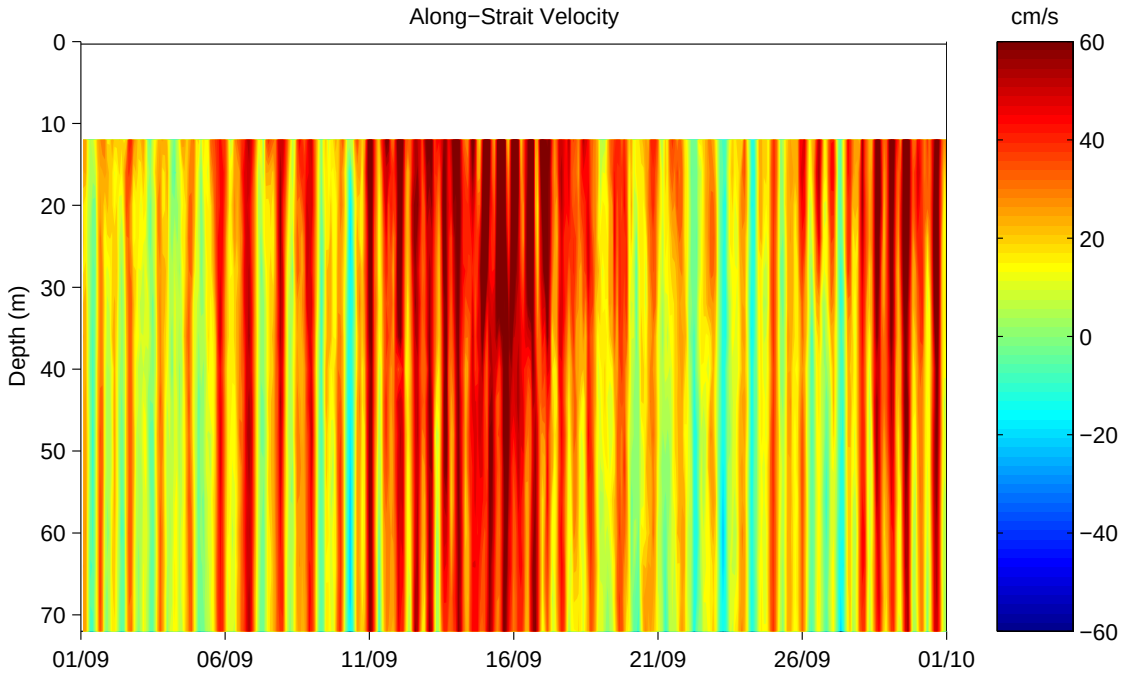


<u>Figure 11</u> – Bi-hourly current data, South Side Barrow Strait.
Sep. 1, 2003 – Sep. 30, 2003





<u>Figure 12</u> – Bi-hourly current data, South-Central Barrow Strait.
Sep. 1, 2003 – Sep. 30, 2003



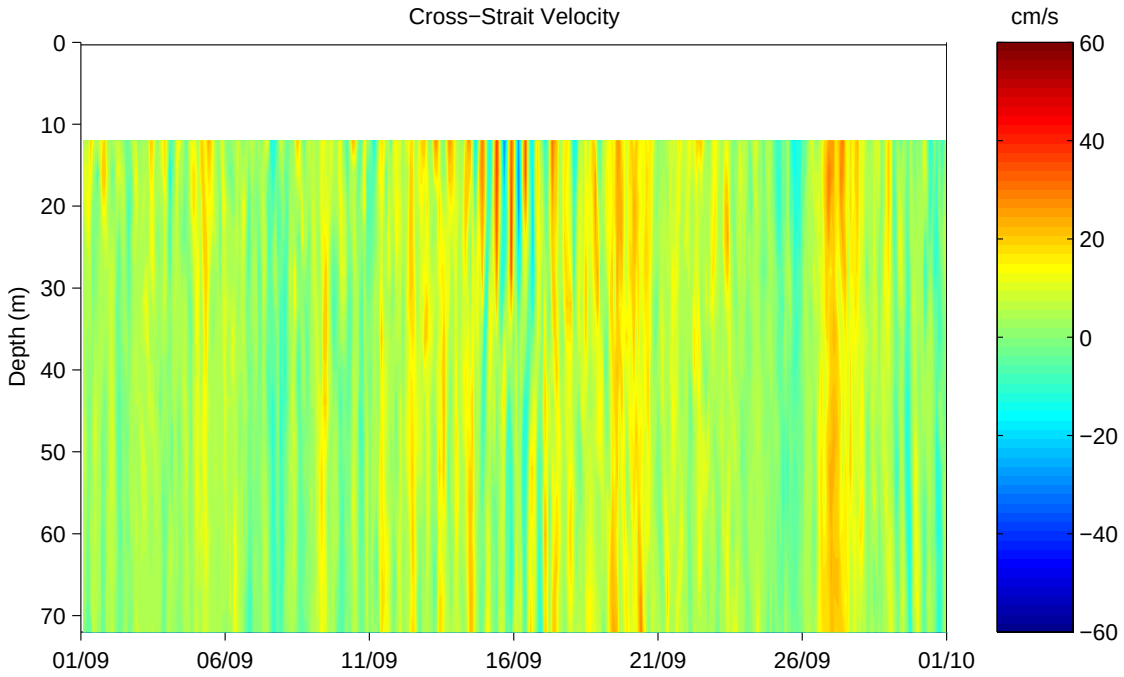
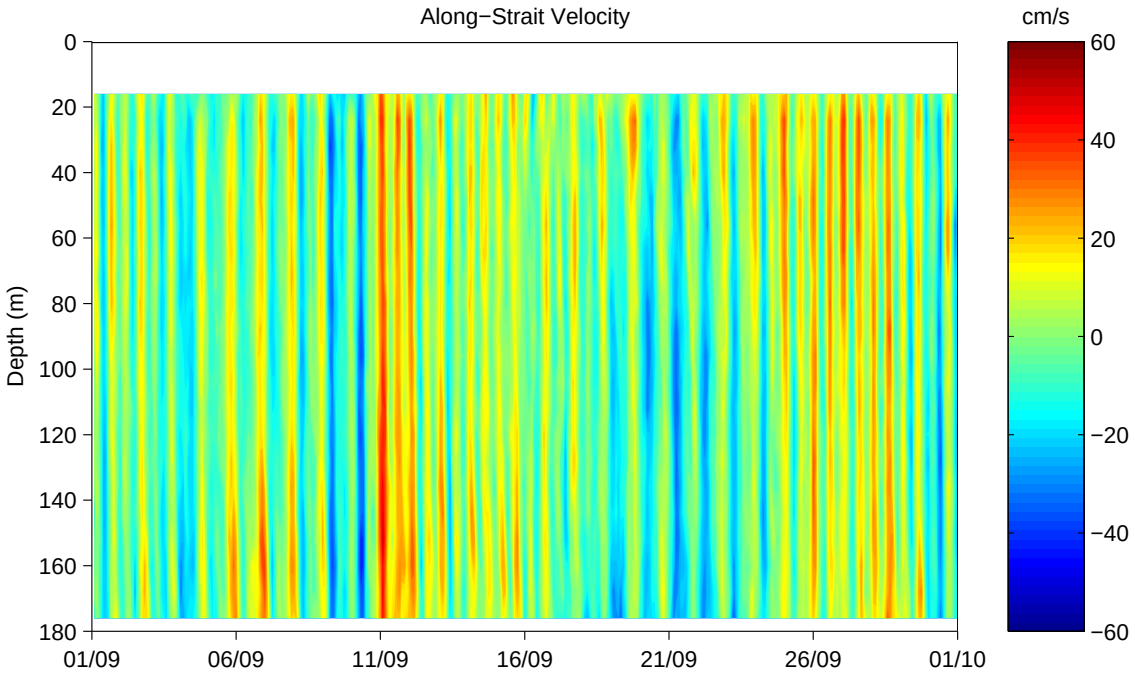
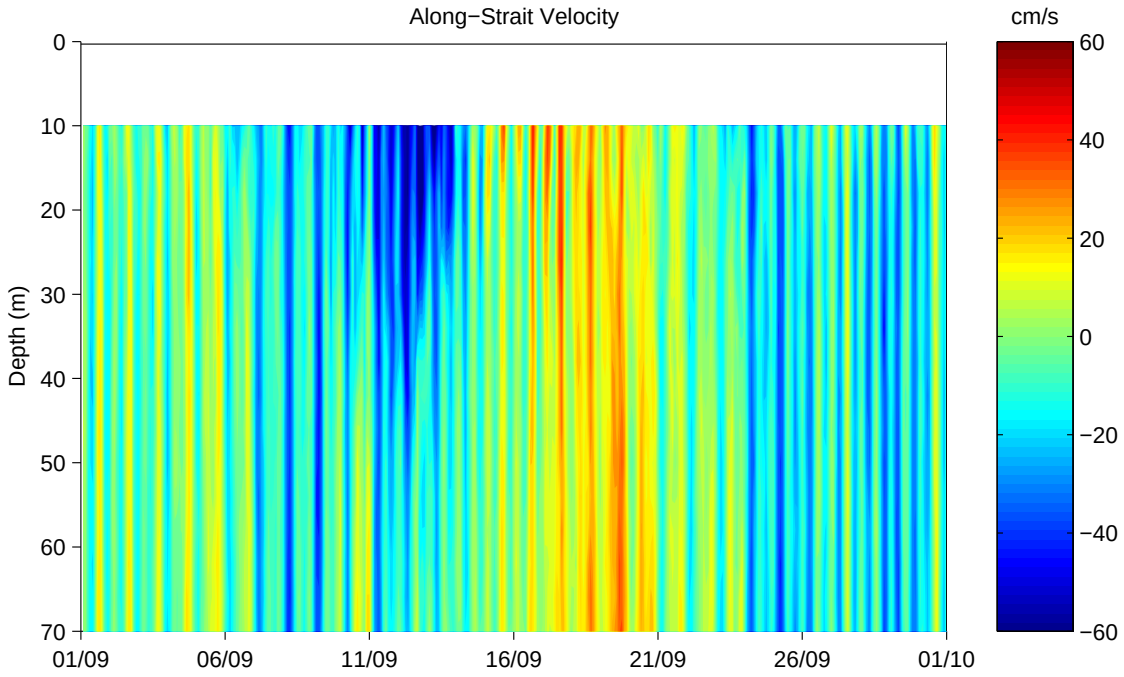
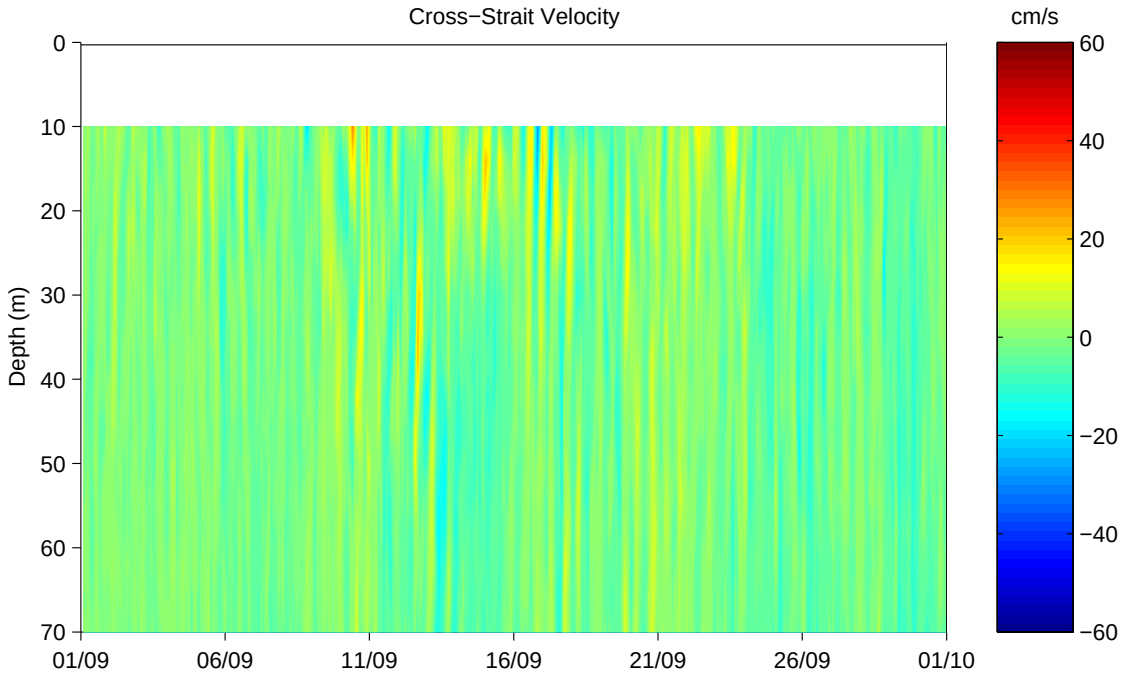


Figure 13 – Bi-hourly current data, Central Barrow Strait.
Sep. 1, 2003 – Sep. 30, 2003

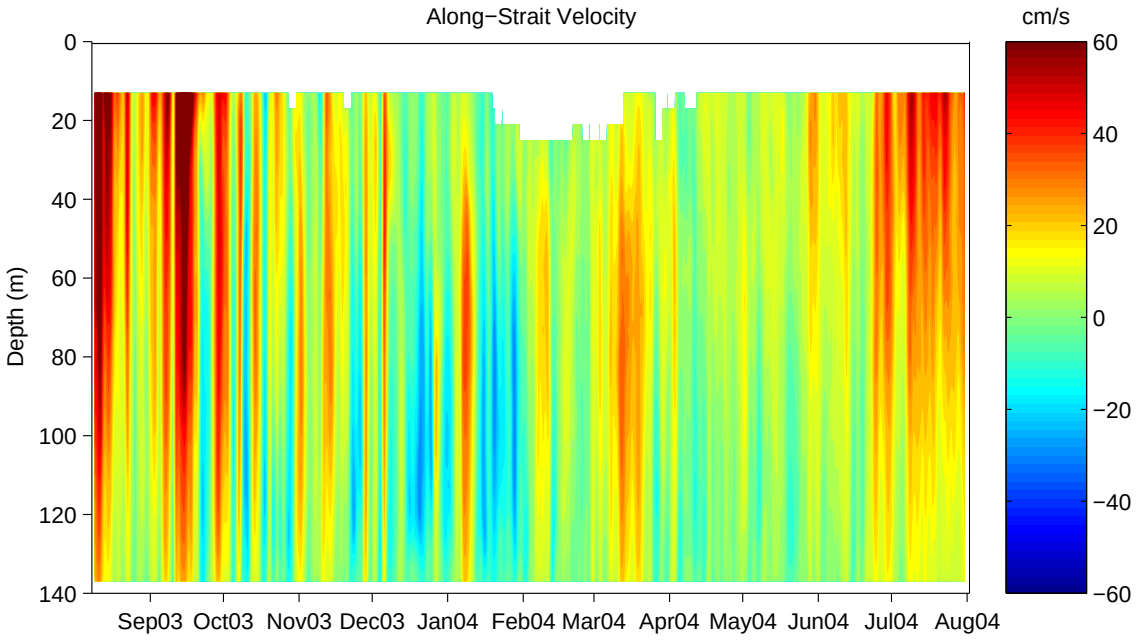


<u>Figure 14</u> – Bi-hourly current data, North Side Barrow Strait.
Sep. 1, 2003 – Sep. 30, 2003





<u>Figure 15</u> - Low-pass filtered currents, South Side Barrow Strait. August 2003 - August 2004



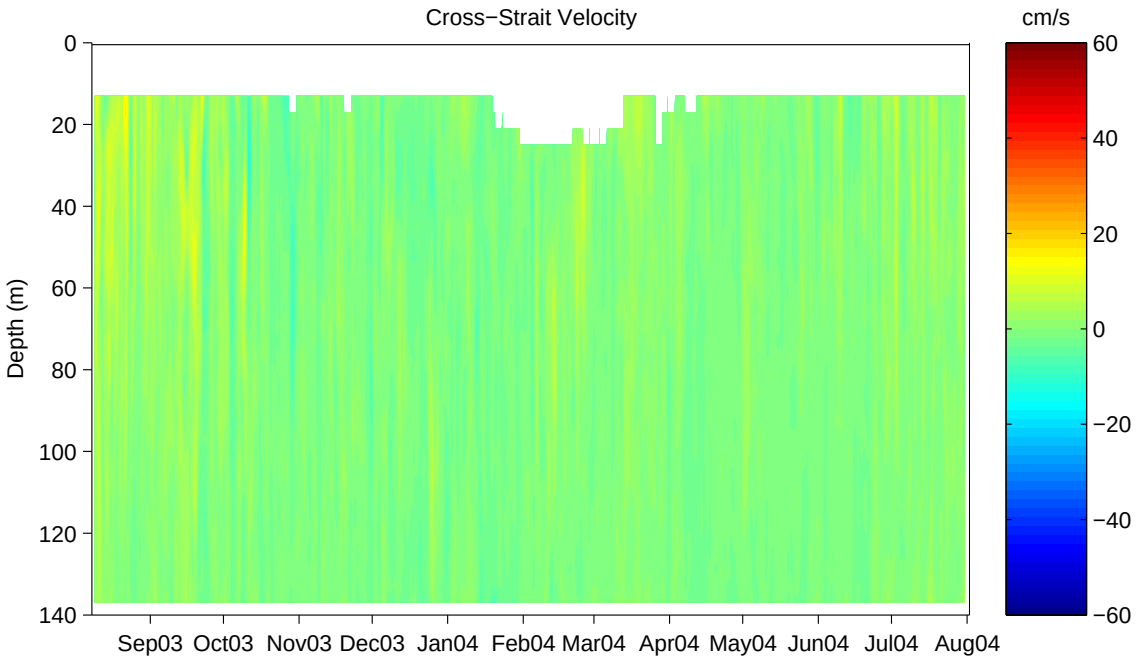


Figure 16 - Low-pass filtered currents, South-Central Barrow Strait. August 2003 - August 2004

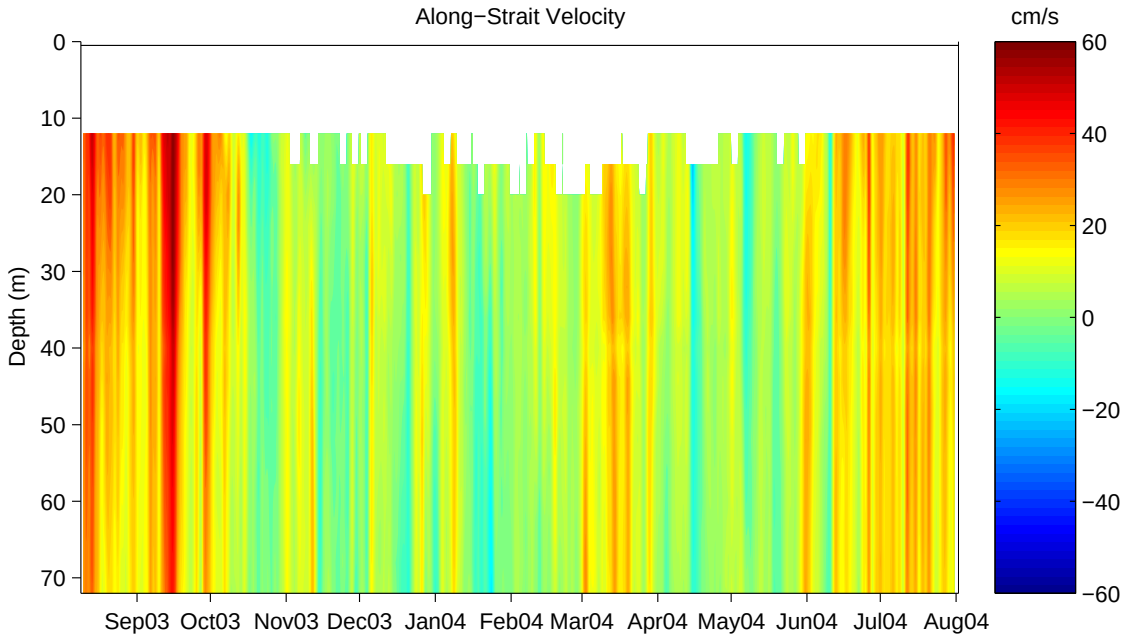
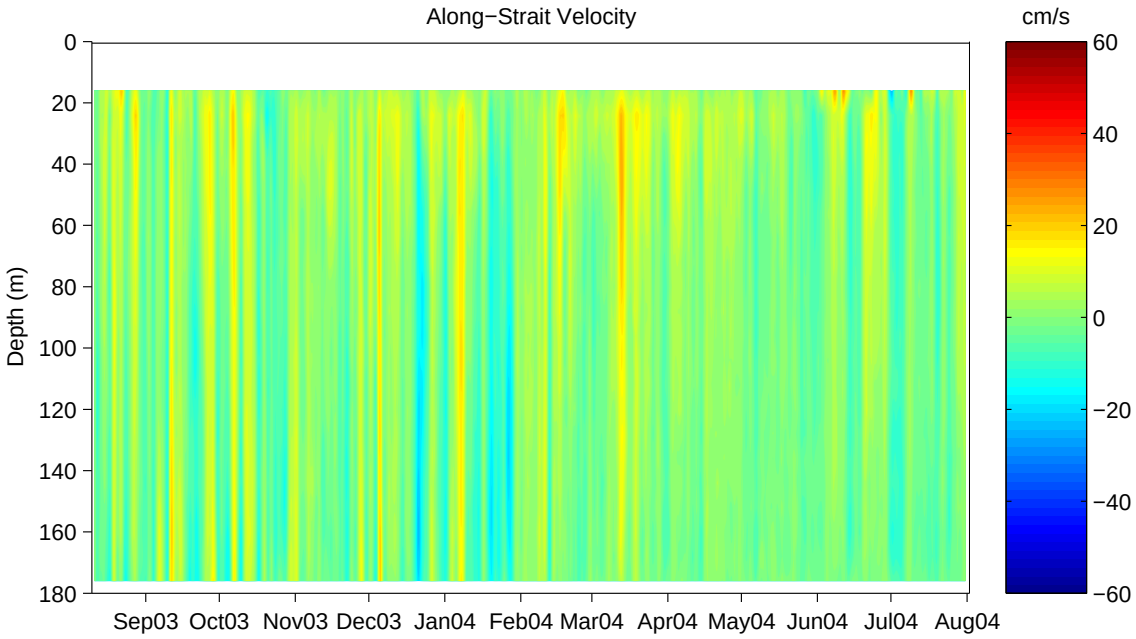


Figure 17 - Low-pass filtered currents, Central Barrow Strait. August 2003 - August 2004



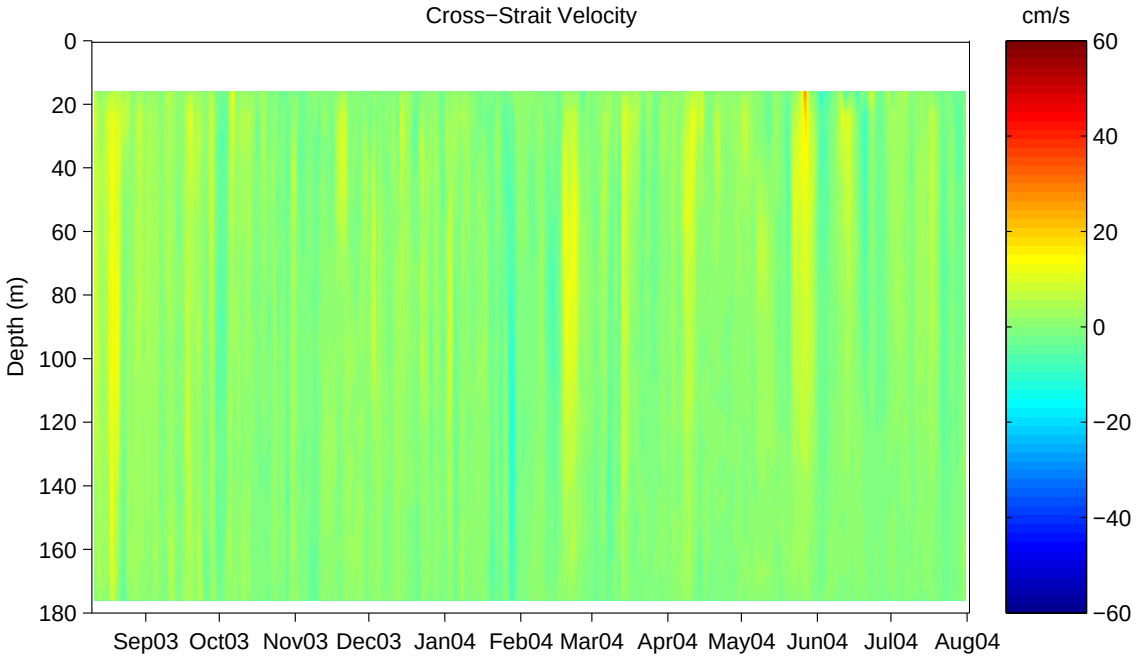
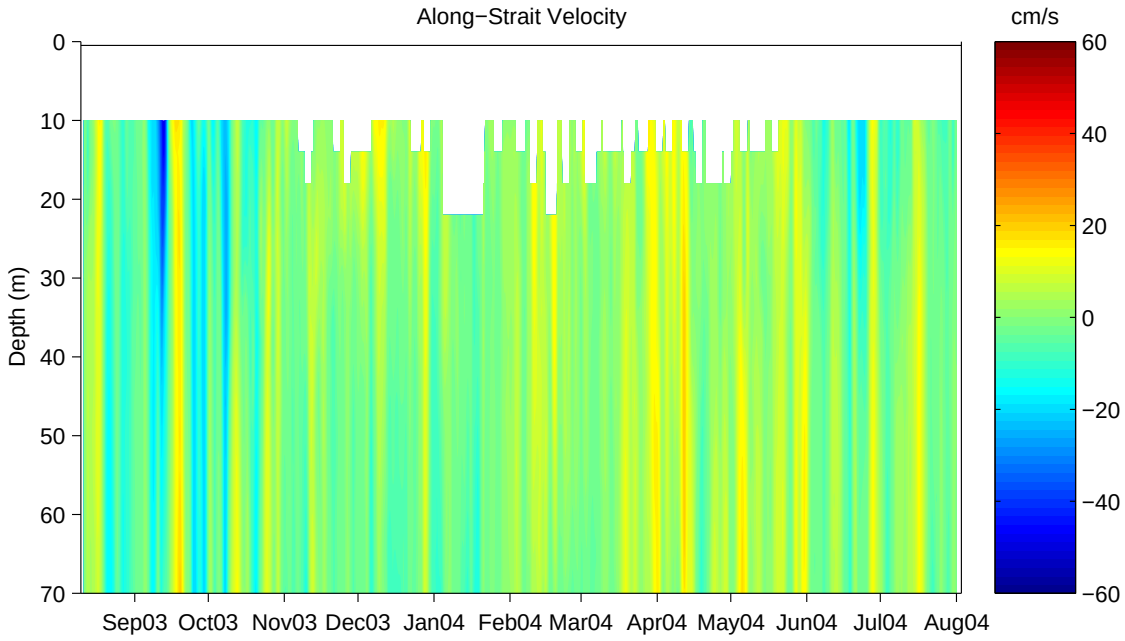
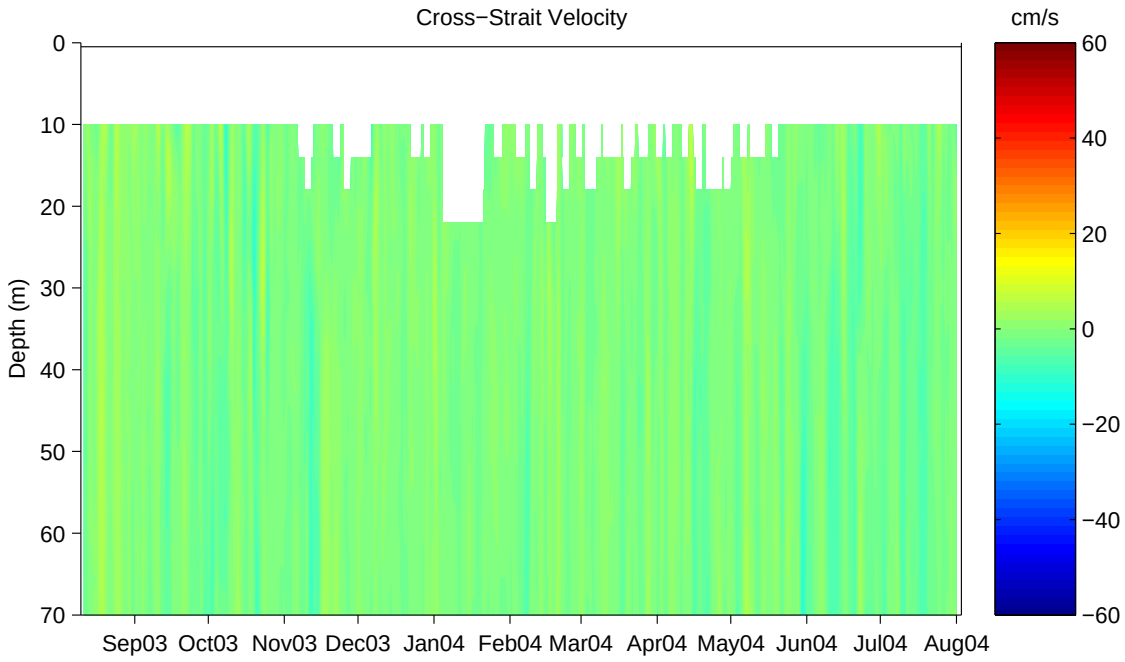
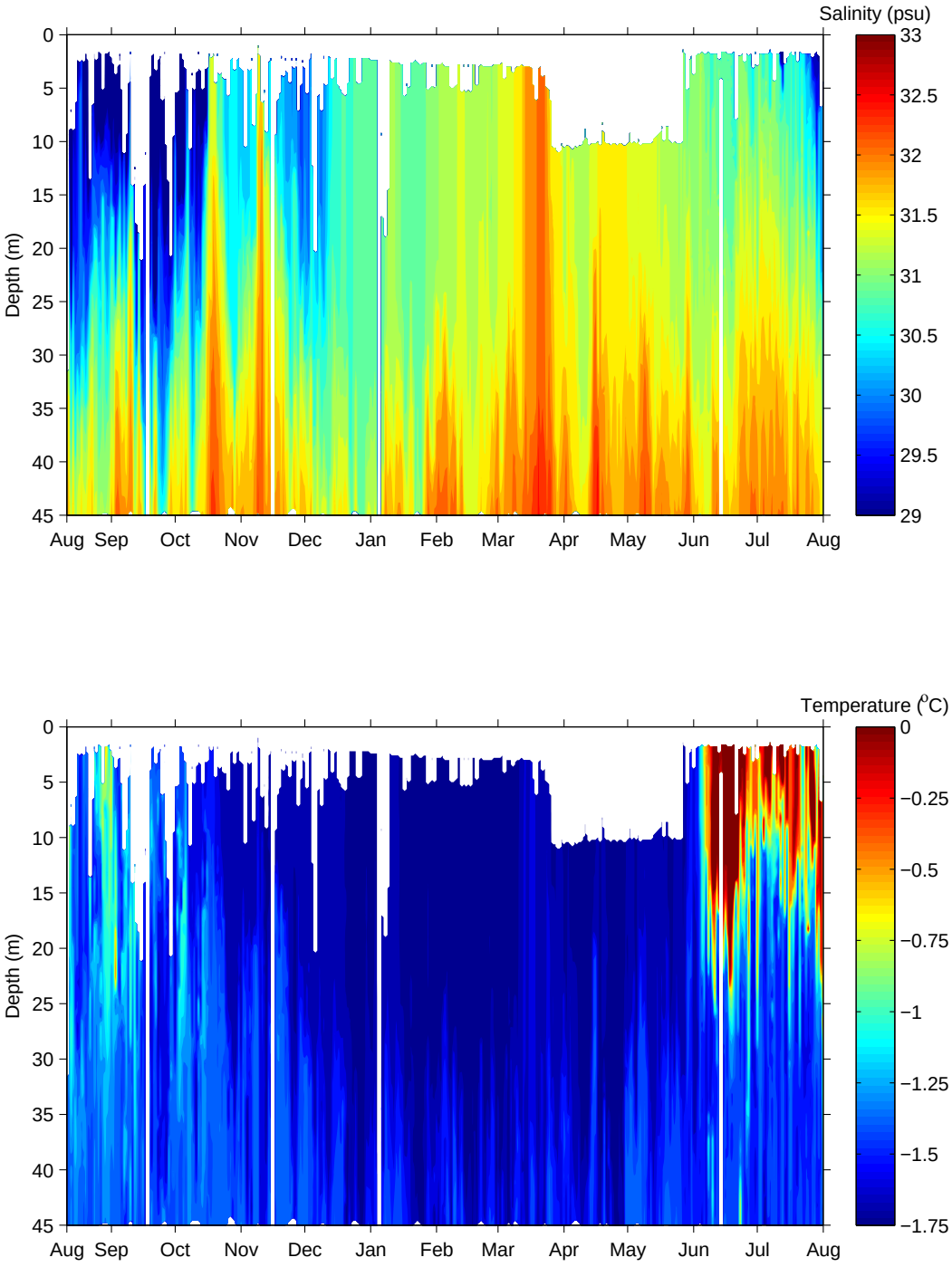


Figure 18 - Low-pass filtered currents, North Side Barrow Strait. August 2003 - August 2004

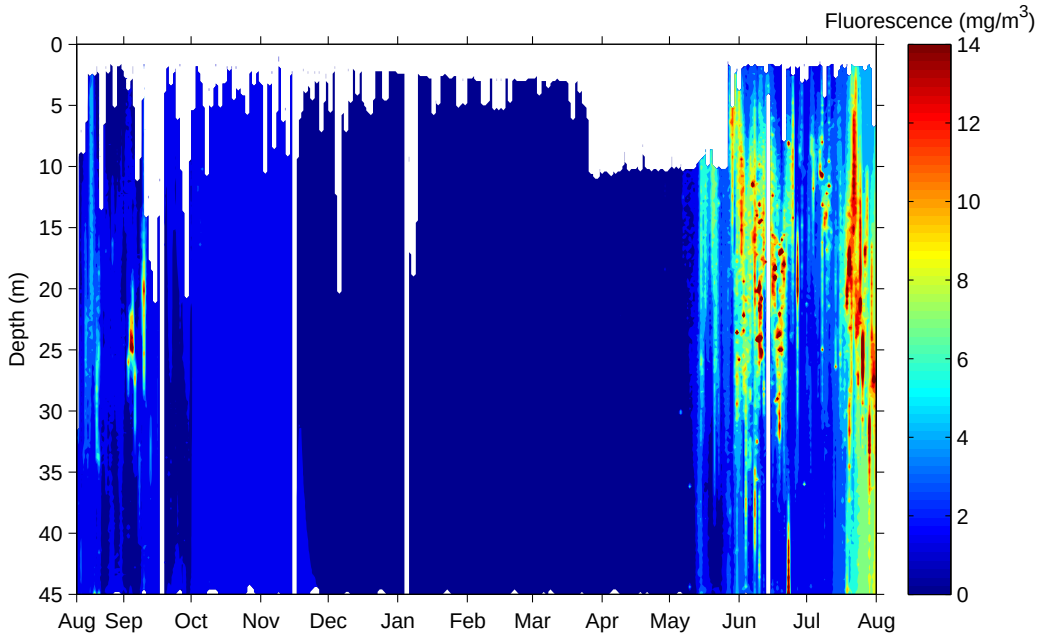




<u>Figure 19</u> – Daily Icycler Measurements:
South Side Barrow Strait, August 11, 2003 – August 1, 2004



<u>Figure 19</u> (continued) – Daily Icycler Measurements:
South Side Barrow Strait, August 11, 2003 – August 1, 2004



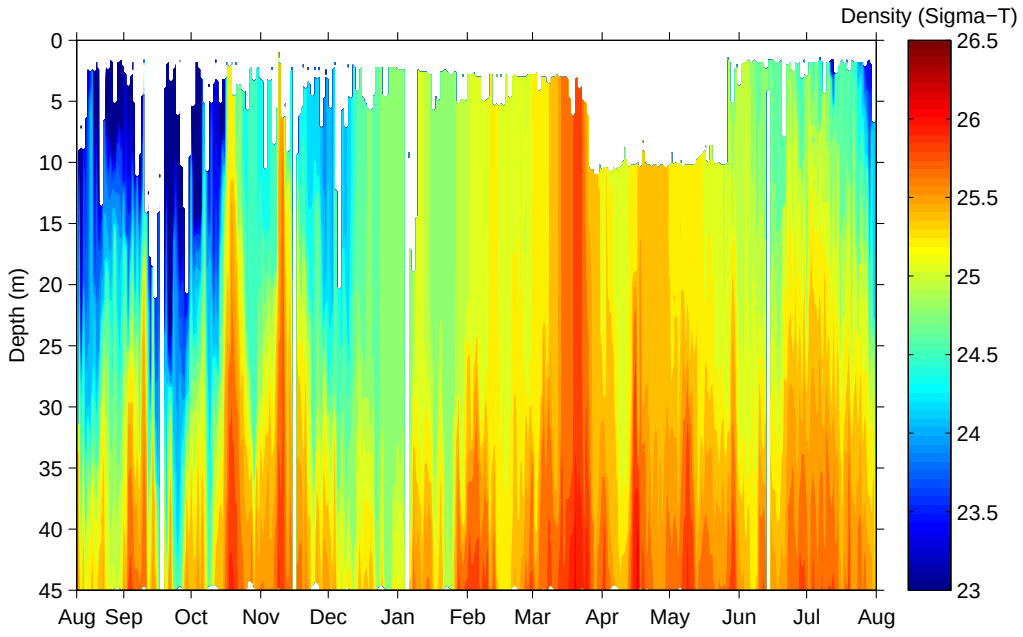


Figure 20 - Low-pass filtered T,S (34 m.) and current data (32 m.). South Side Barrow Strait: August 2003 - August 2004.

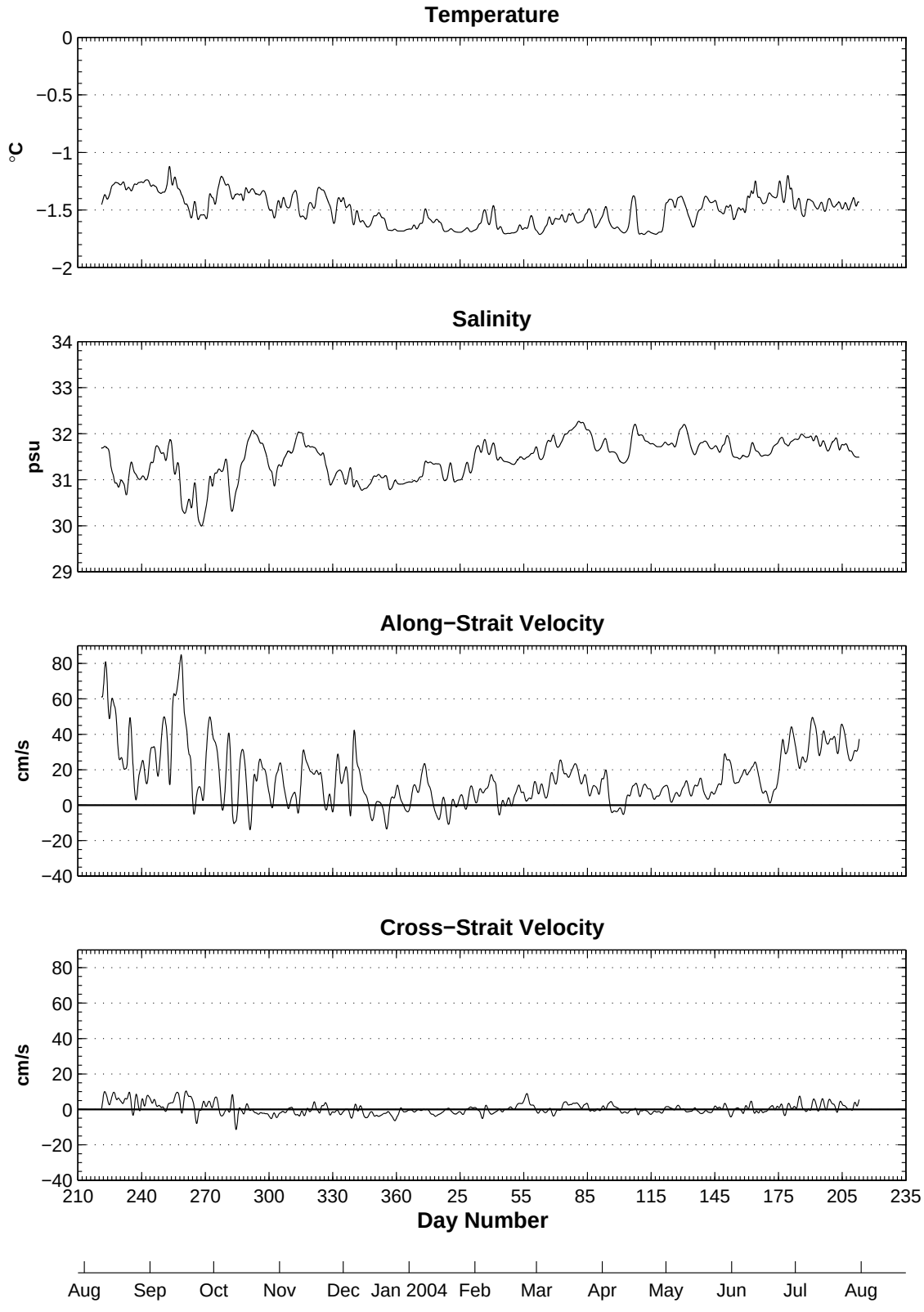


Figure 21 - Low-pass filtered T,S (39 m.) and current data (40 m.). South Side Barrow Strait: August 2003 - August 2004.

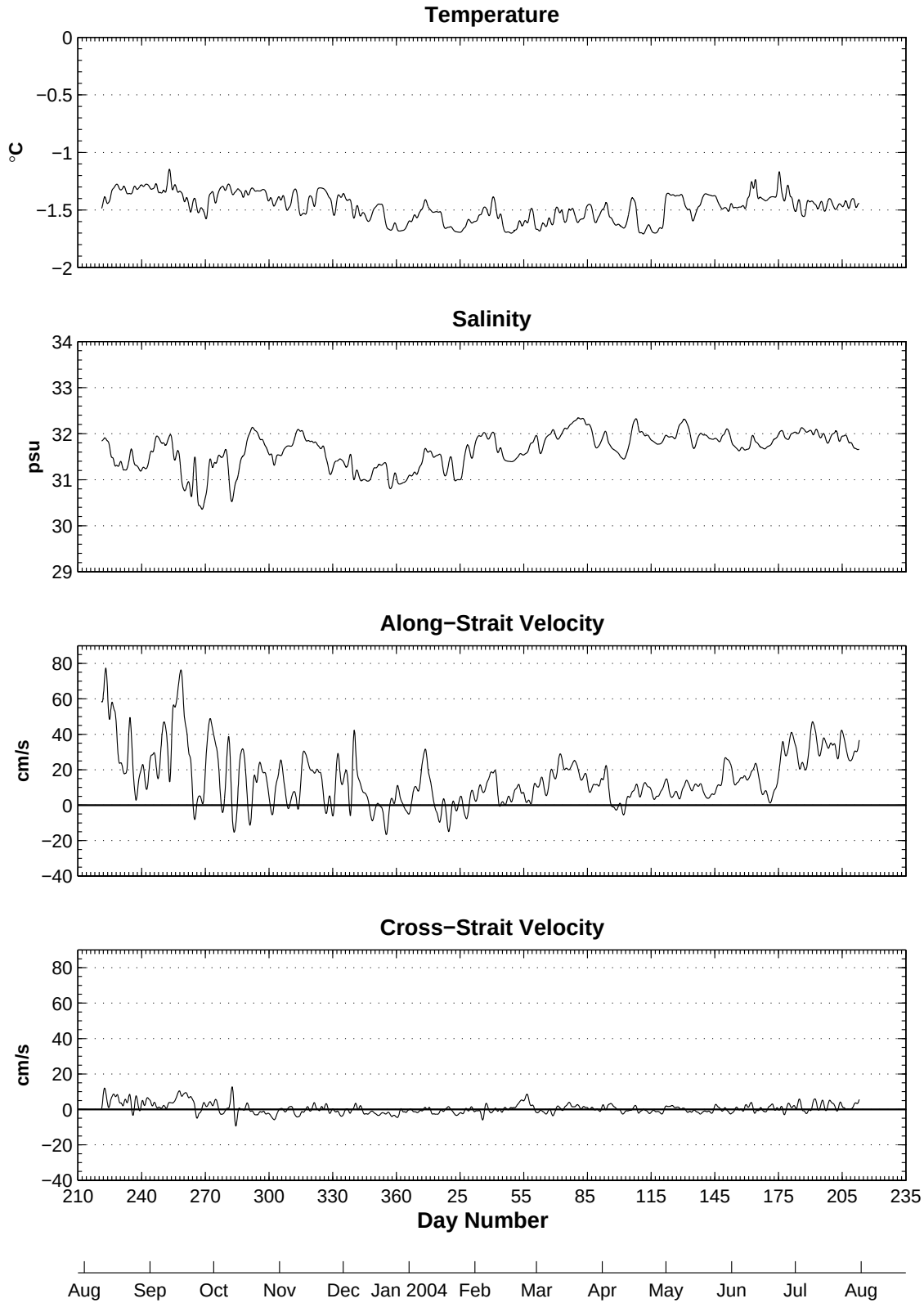


Figure 22 - Low-pass filtered T,S (76 m.) and current data (77 m.). South Side Barrow Strait: August 2003 - August 2004.

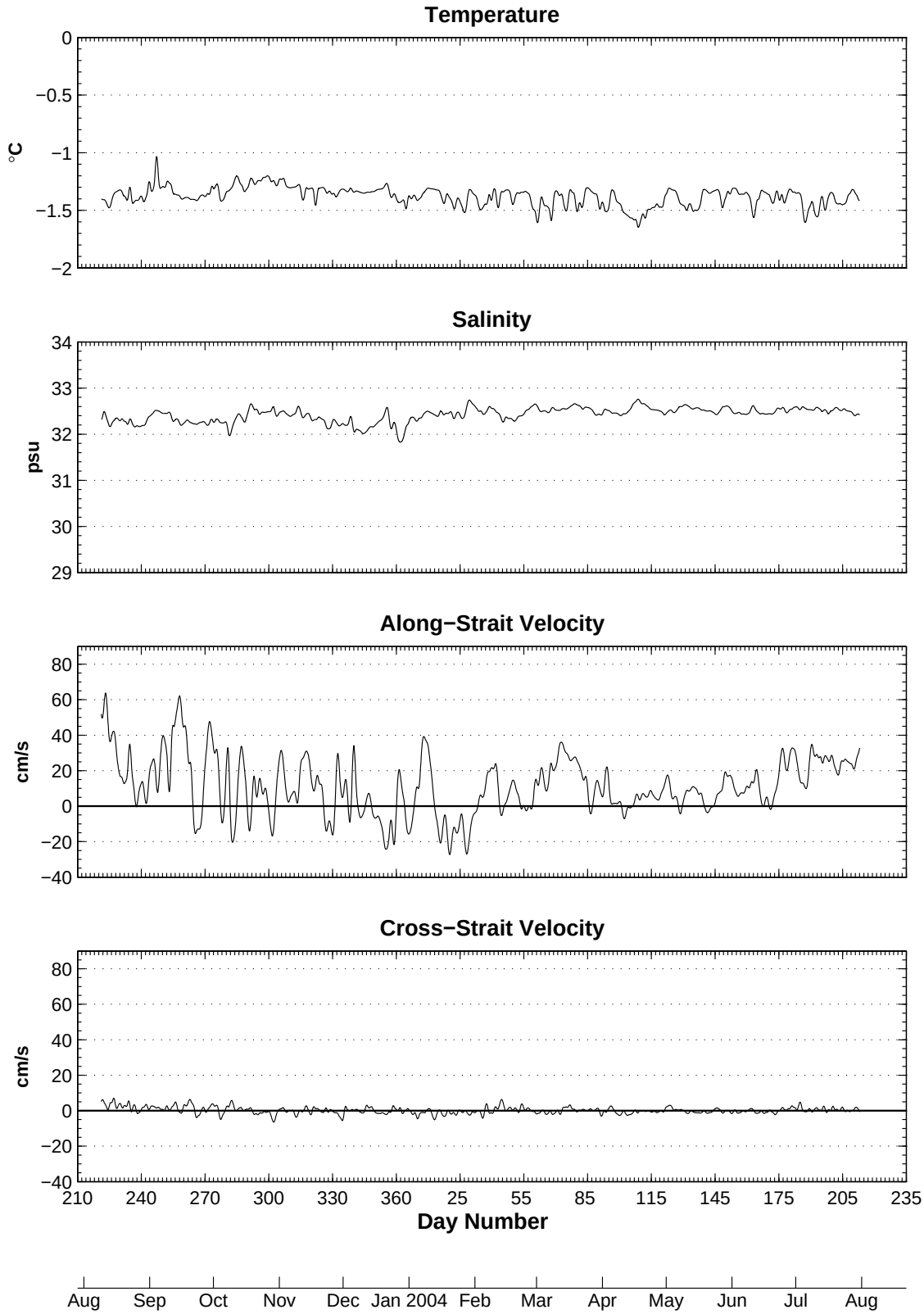


Figure 23 - Low-pass filtered T,S (145 m.) and current data (137 m.). South Side Barrow Strait: August 2003 - August 2004.

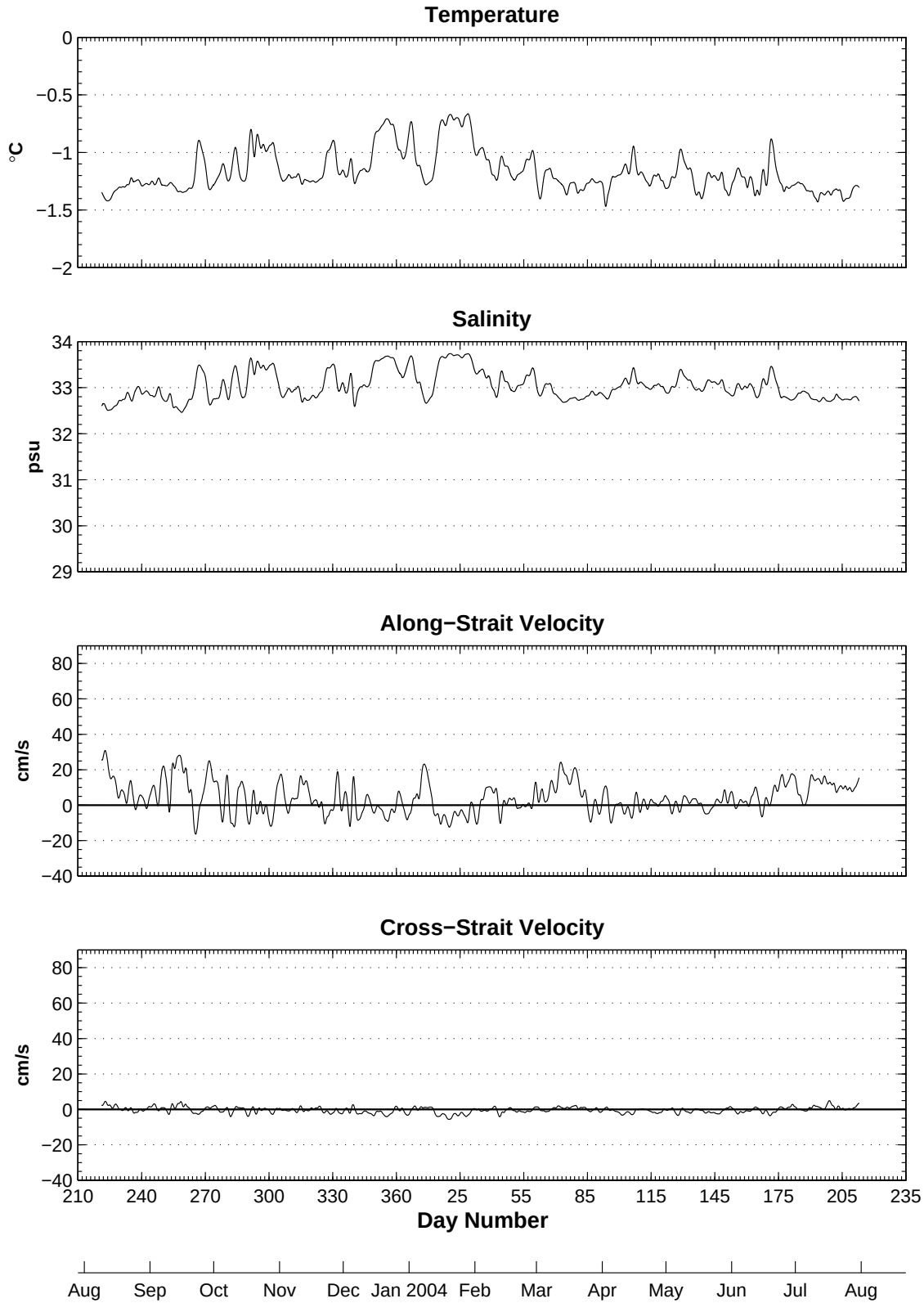


Figure 24 - Low-pass filtered T,S (37 m.) and current data (36 m.). South-Central Barrow Strait: August 2003 - August 2004.

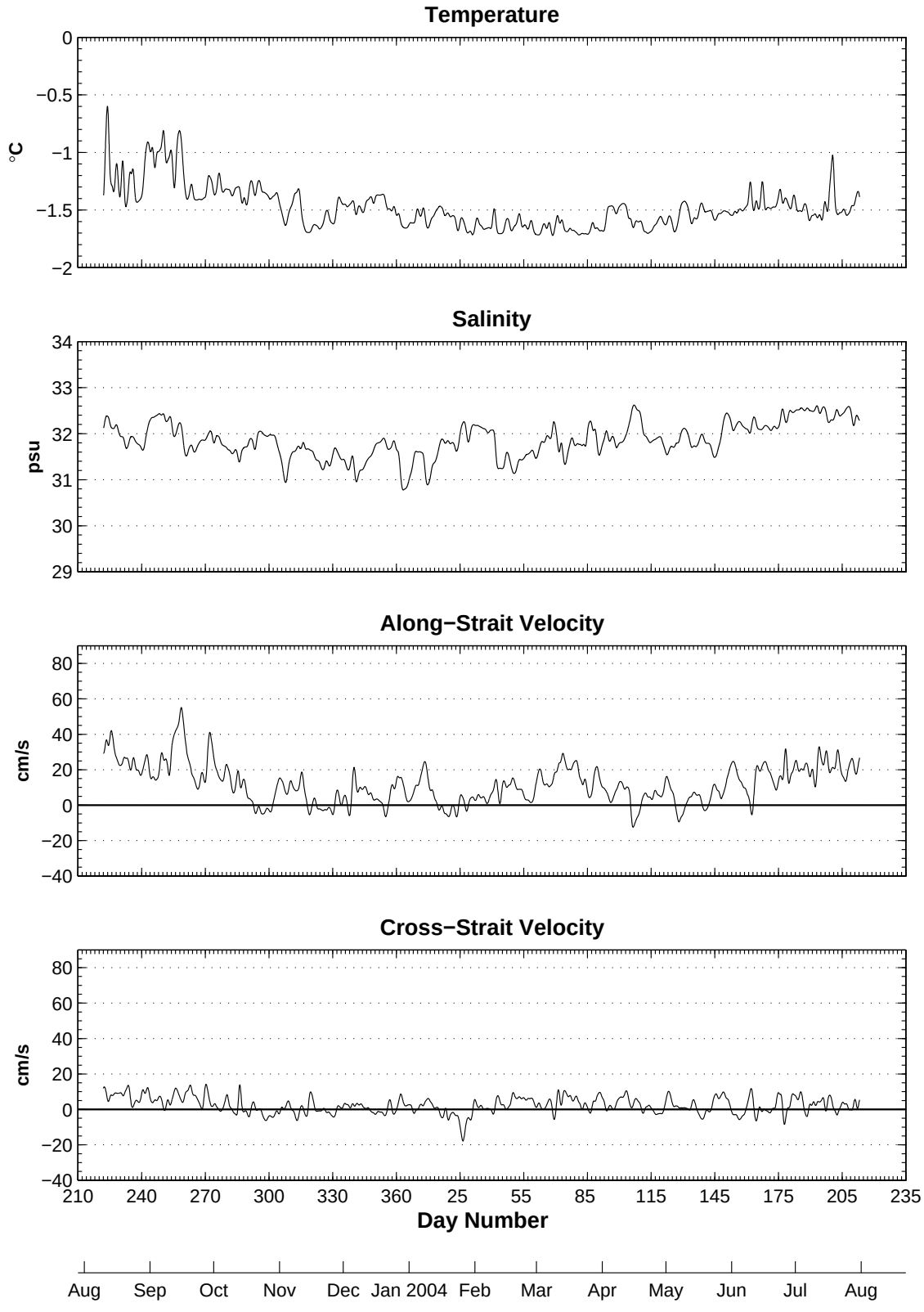


Figure 25 - Low-pass filtered T,S (65 m.) and current data (64 m.). South-Central Barrow Strait: August 2003 - August 2004.

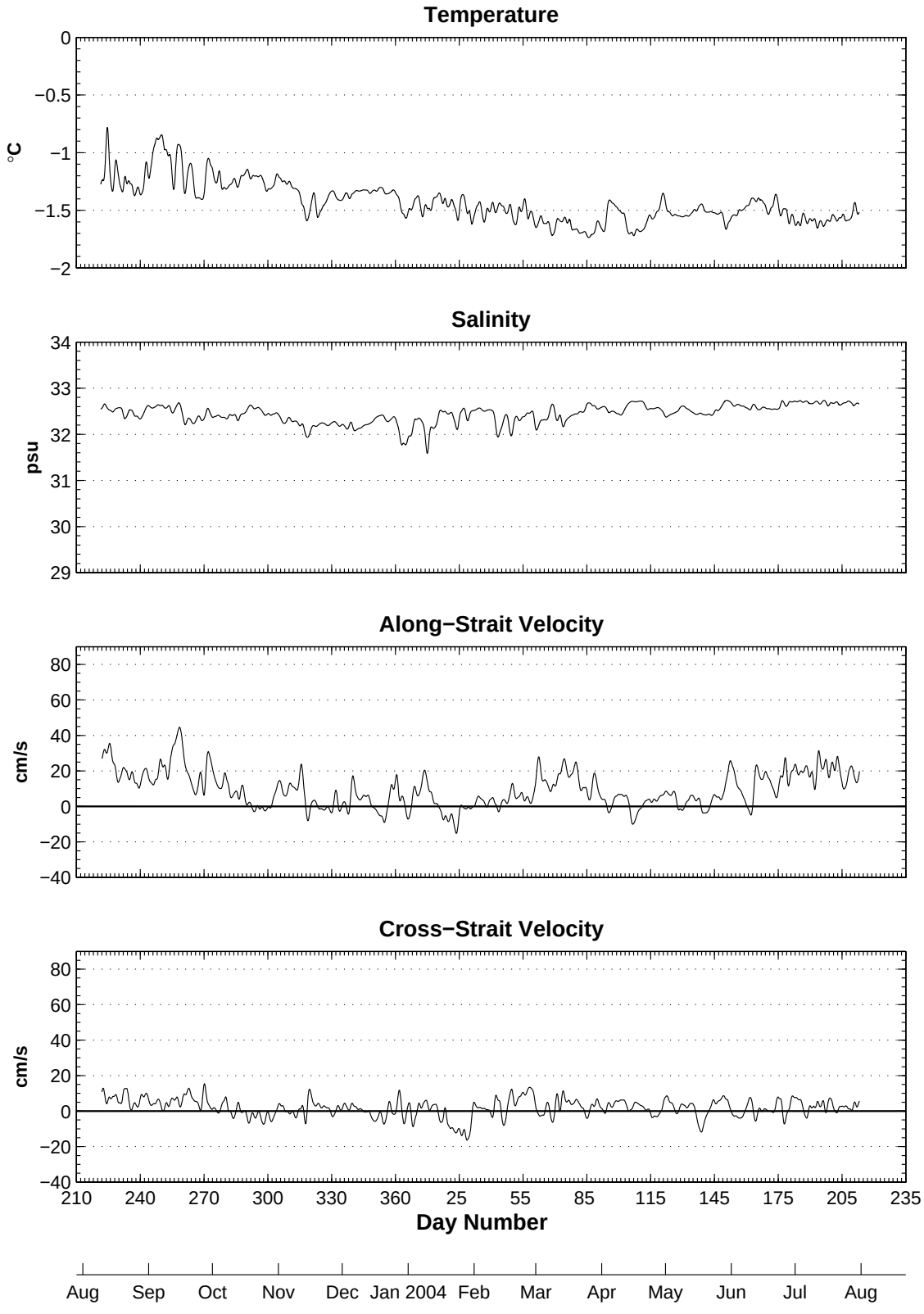


Figure 26 - Low-pass filtered T,S (158 m.).
South-Central Barrow Strait: August 2003 - August 2004.

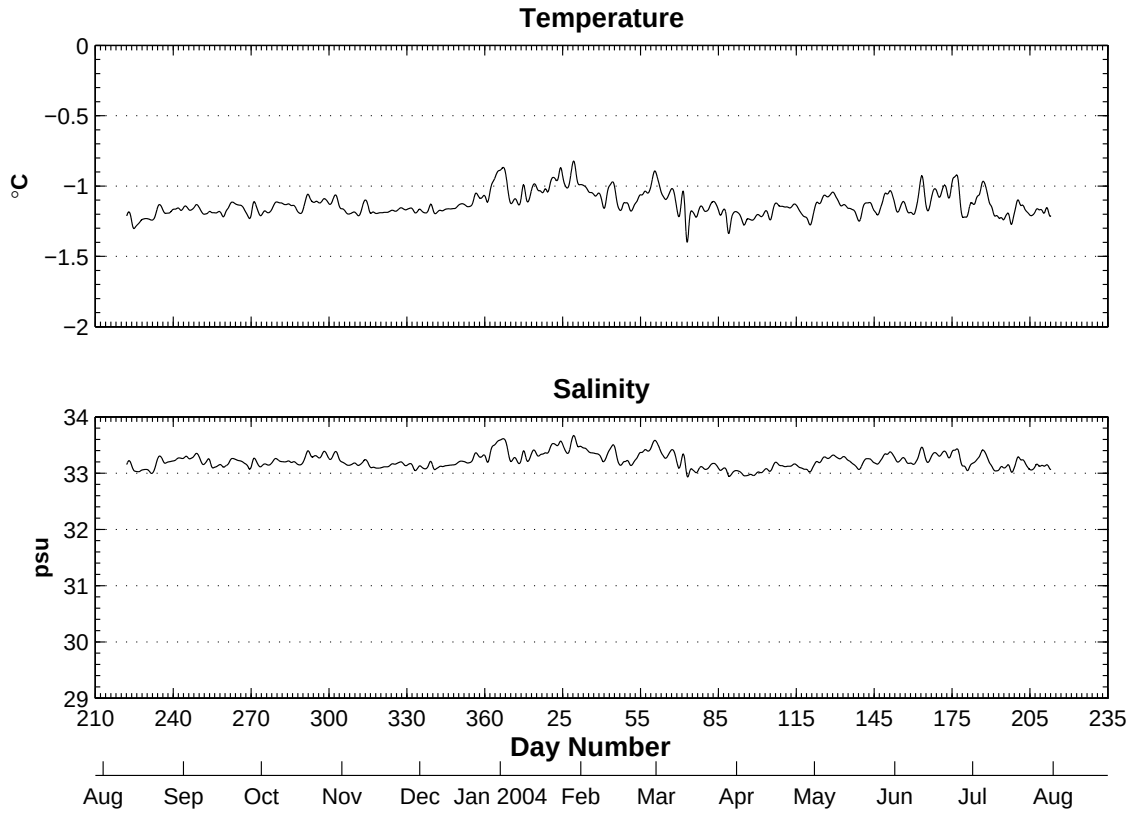


Figure 27 - Low-pass filtered T,S (261 m.).
South-Central Barrow Strait: August 2003 - August 2004.

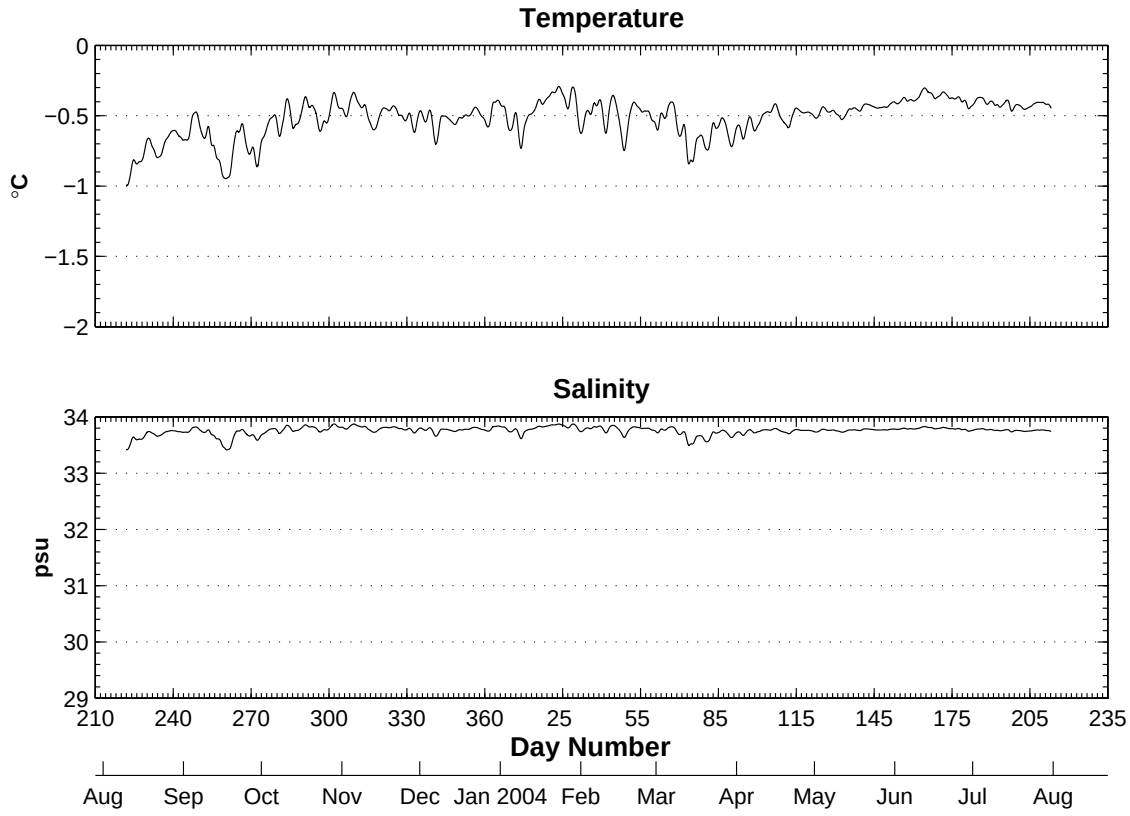


Figure 28 - Low-pass filtered T,S (40 m.) and current data (40 m.). Central Barrow Strait: August 2003 - August 2004.

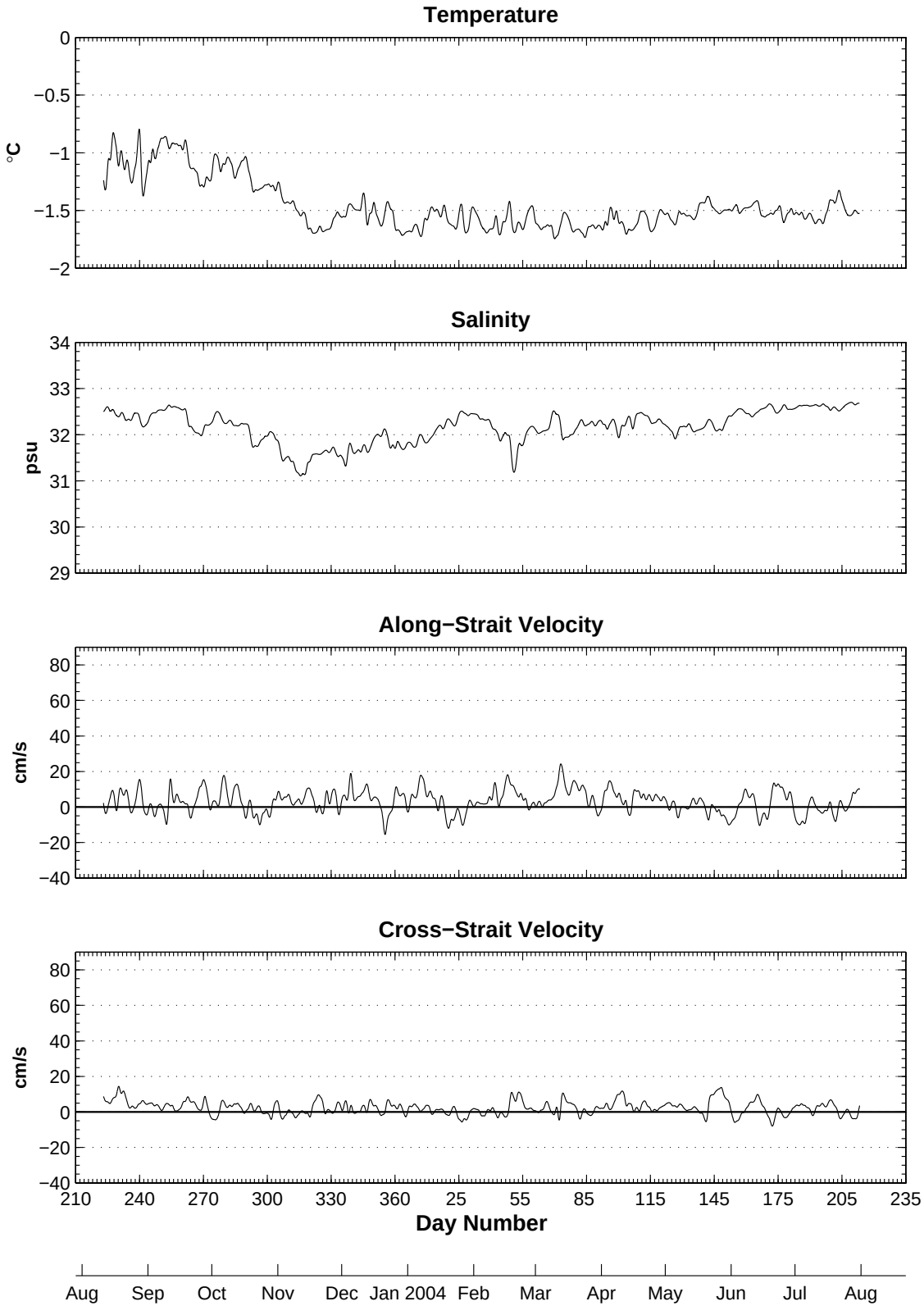


Figure 29 - Low-pass filtered T,S (79 m.) and current data (80 m.). Central Barrow Strait: August 2003 - August 2004.

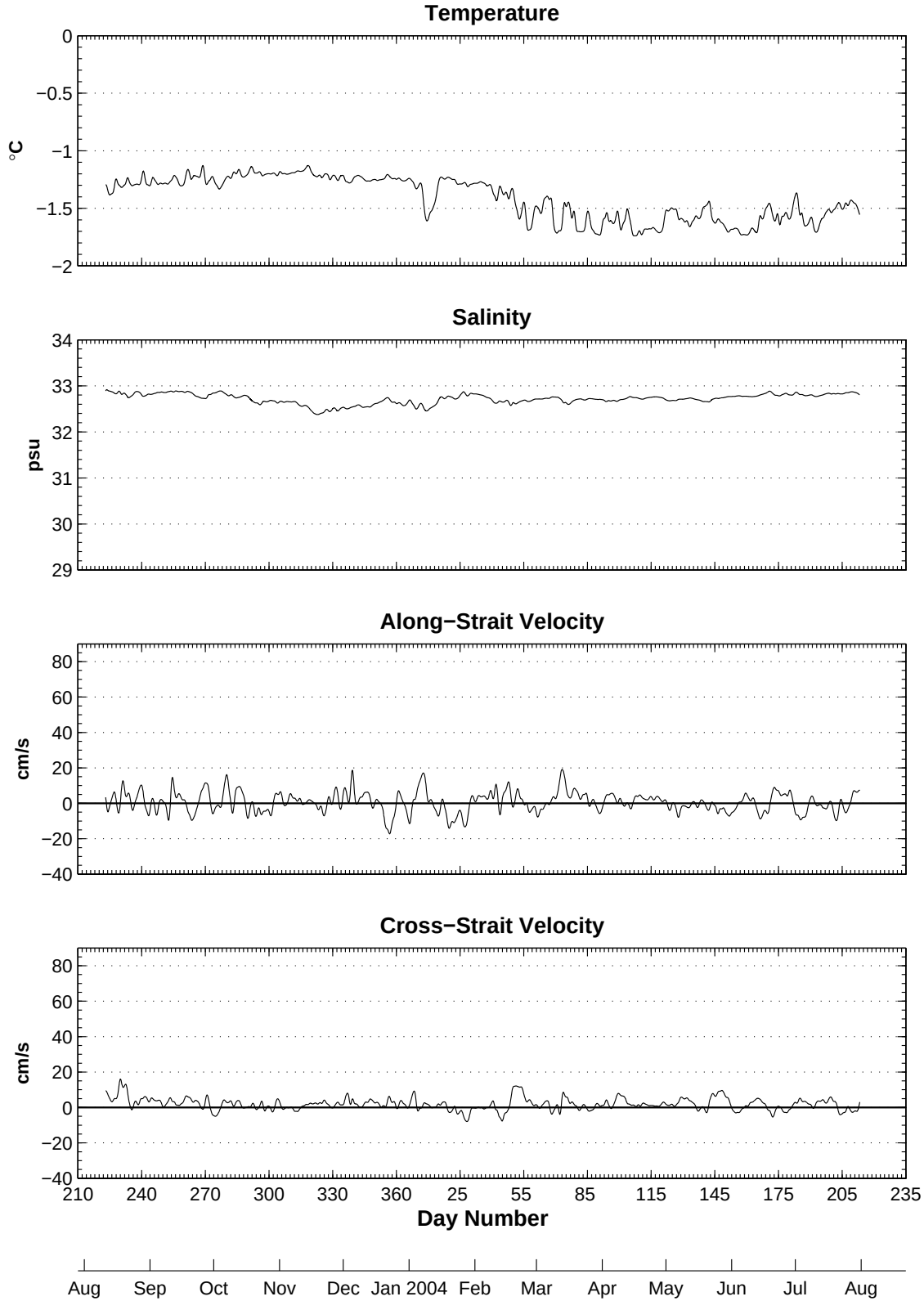


Figure 30 - Low-pass filtered T,S (159 m.) and current data (160 m.). Central Barrow Strait: August 2003 - August 2004.

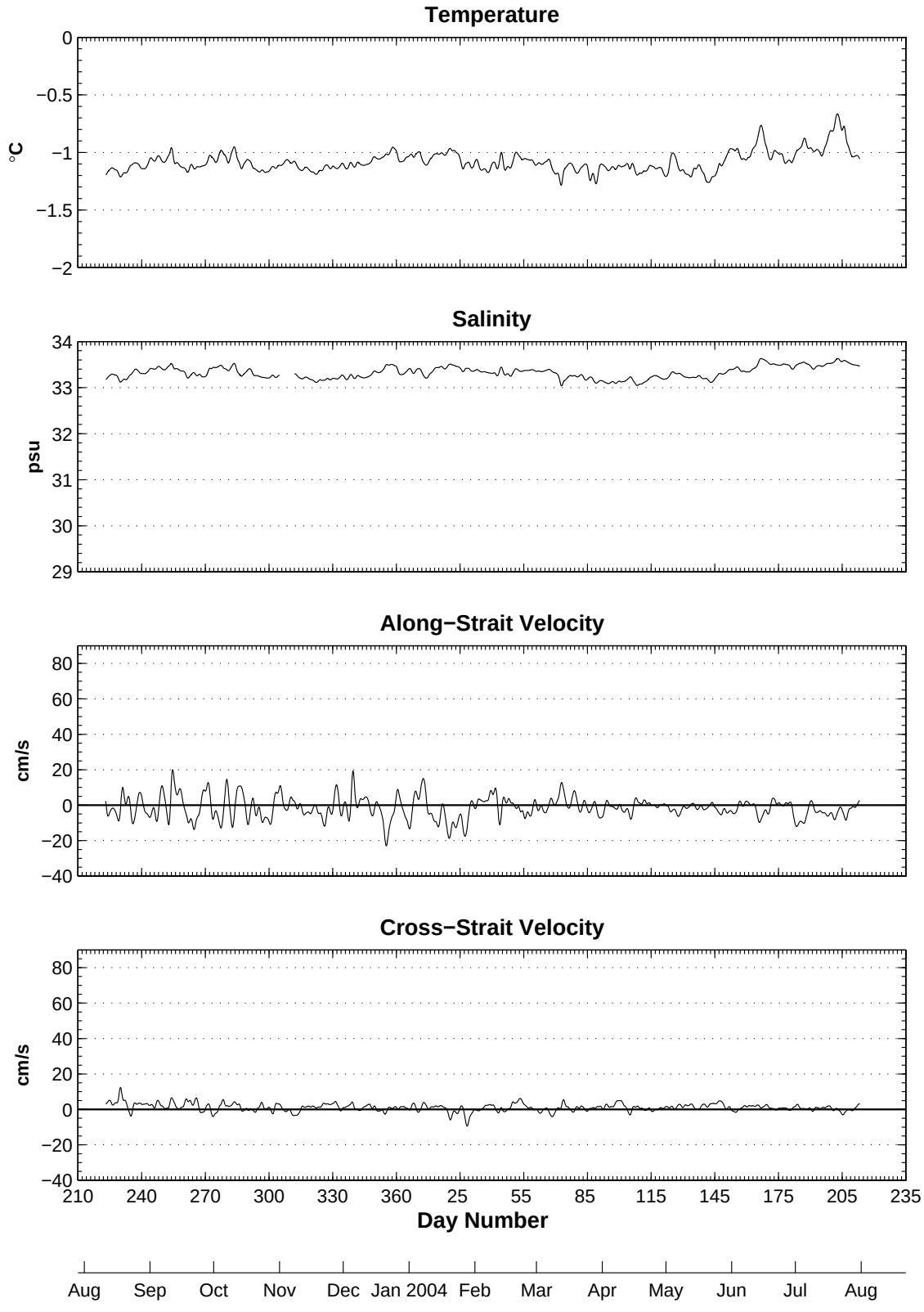


Figure 31 - Low-pass filtered T,S (38 m.) and current data (38 m.). North Side Barrow Strait: August 2003 - August 2004.

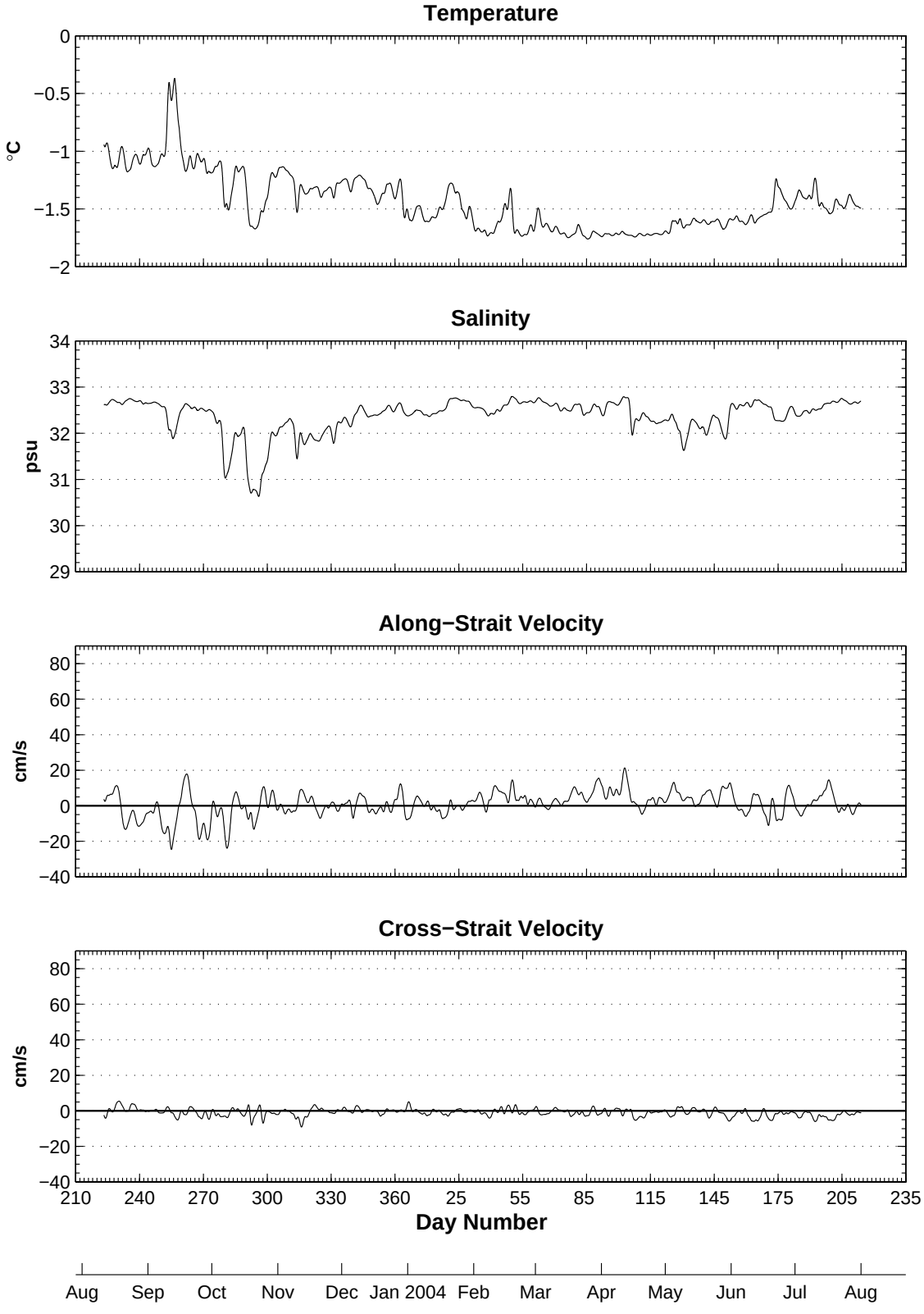


Figure 32 - Low-pass filtered T,S (78 m.) and current data (70 m.). North Side Barrow Strait: August 2003 - August 2004.

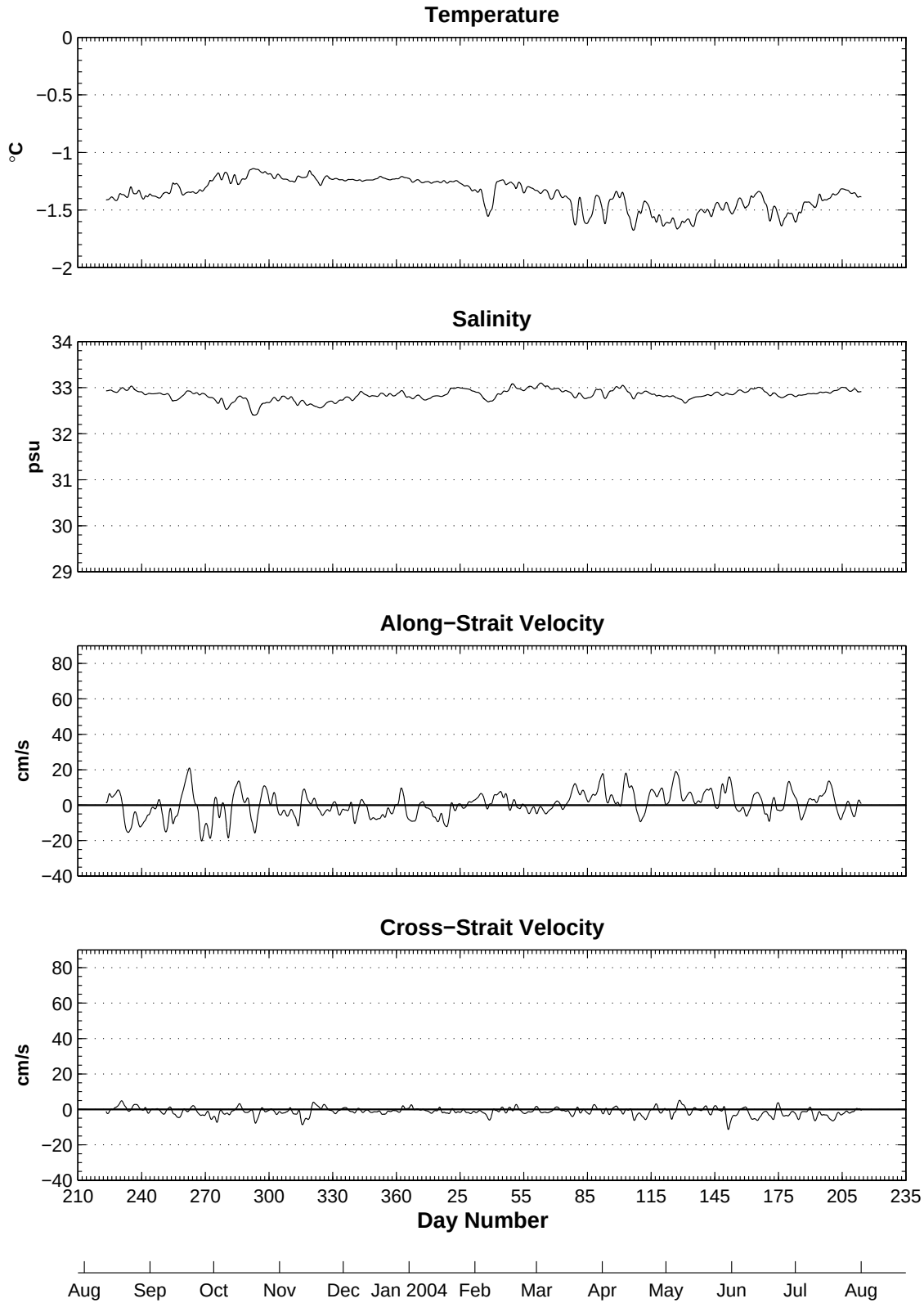


Figure 33 - Low-pass filtered T,S (158 m.).
North Side Barrow Strait: August 2003 - August 2004.

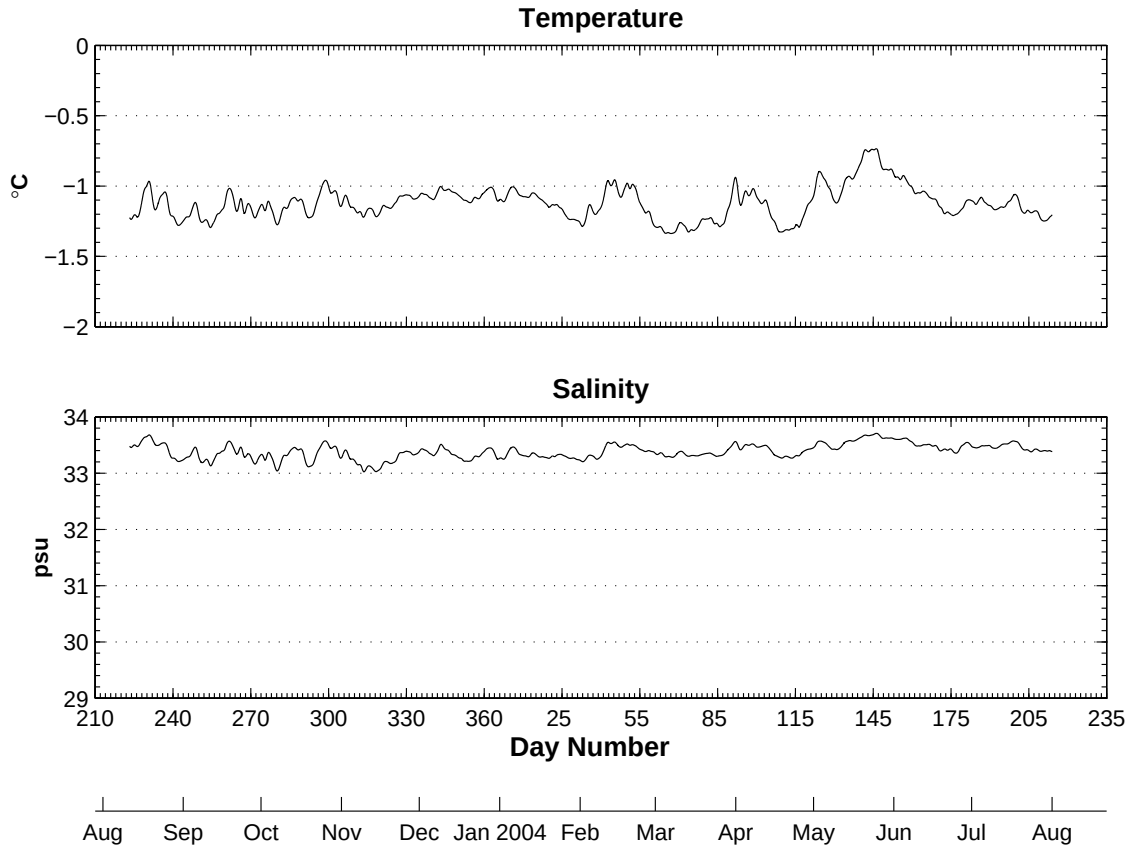
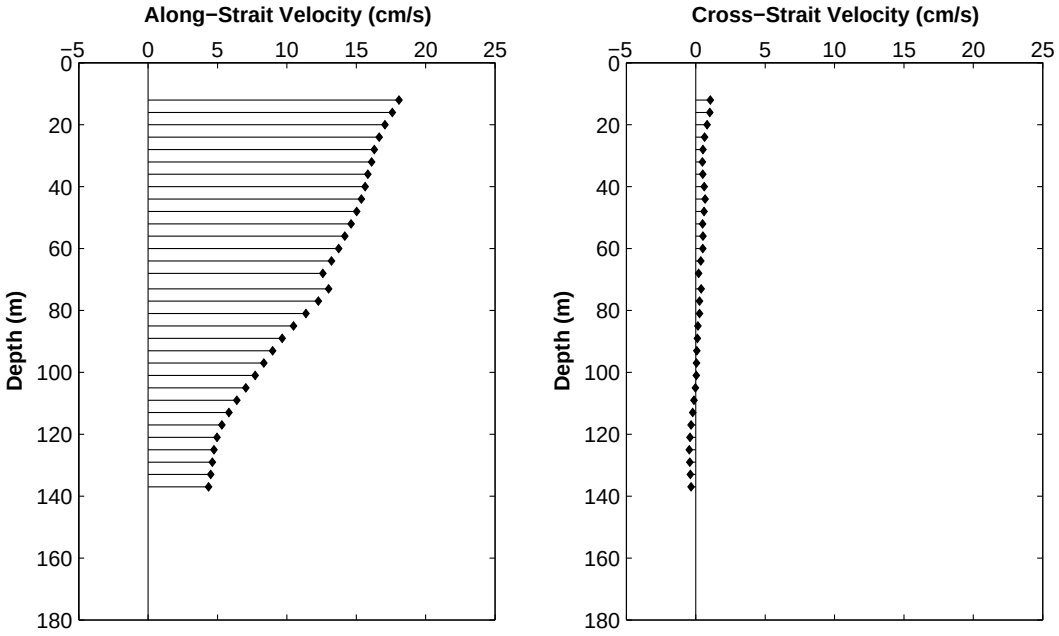


Figure 34: Mean Flows, August 7, 2003 to August 1, 2004.

South side of Barrow Strait



South−Central Barrow Strait

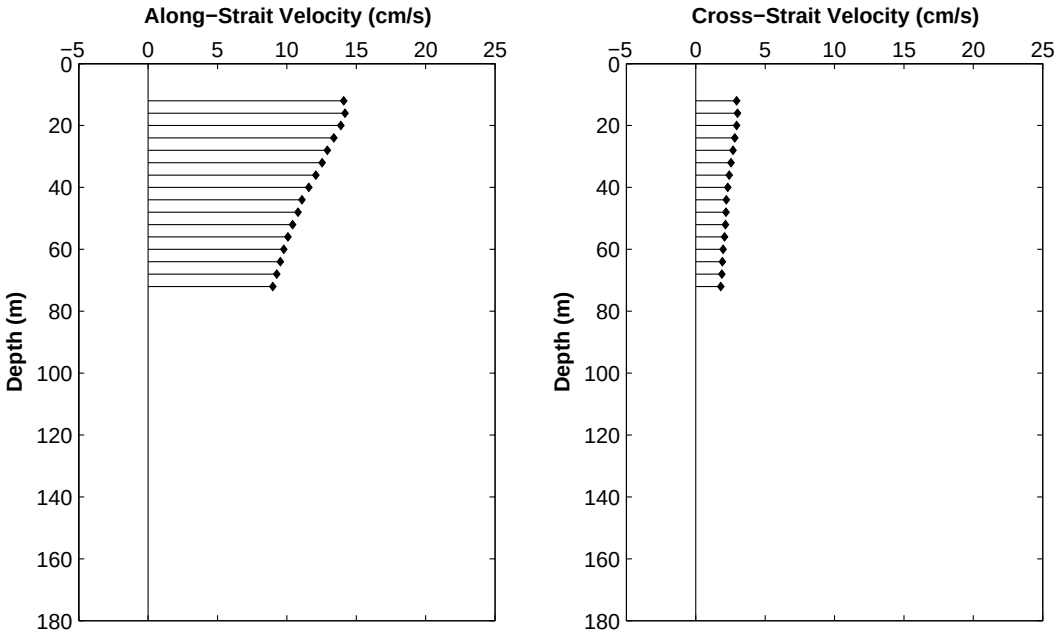
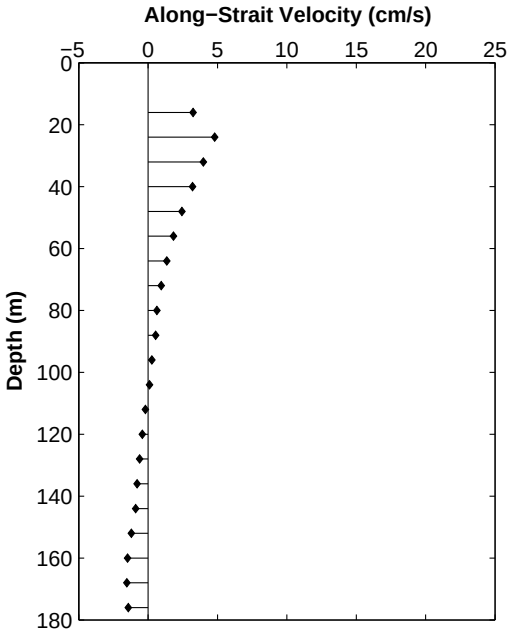
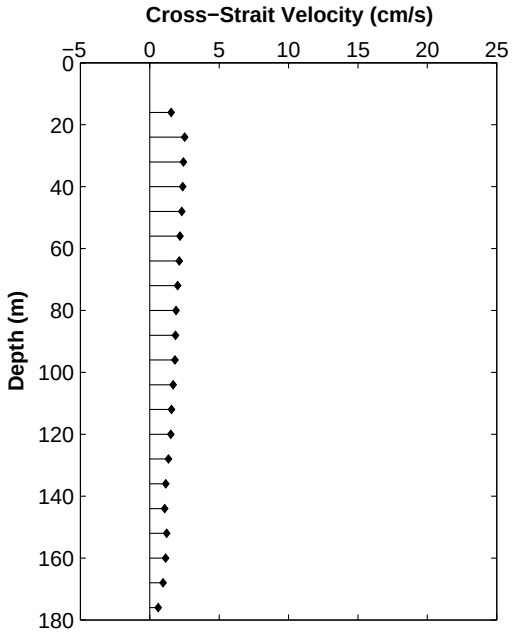


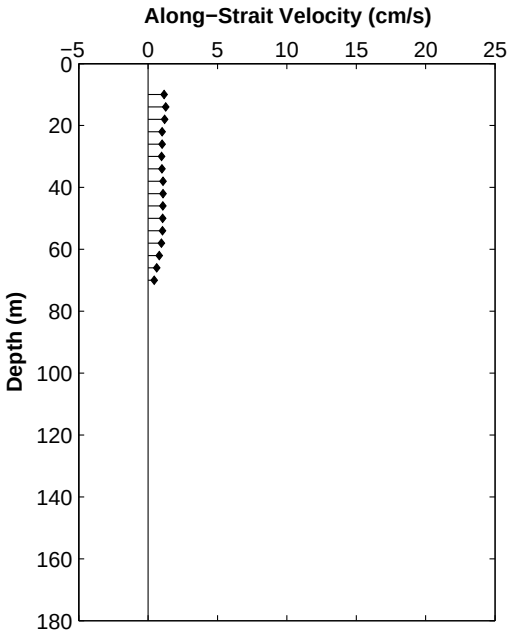
Figure 34: Mean Flows, August 7, 2003 to August 1, 2004. (continued)

Central Barrow Strait





North side of Barrow Strait



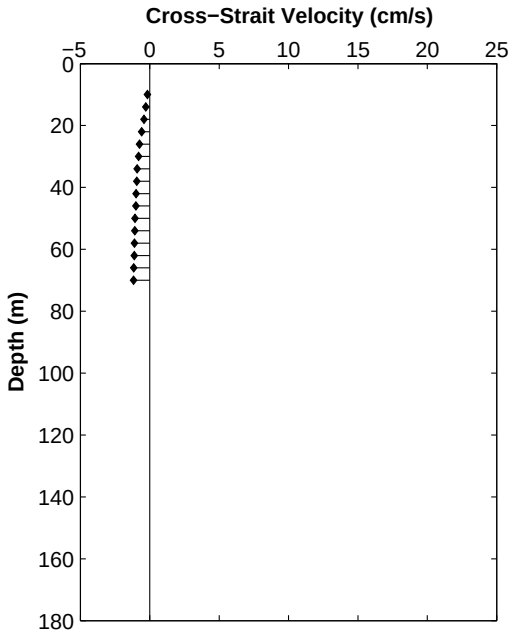
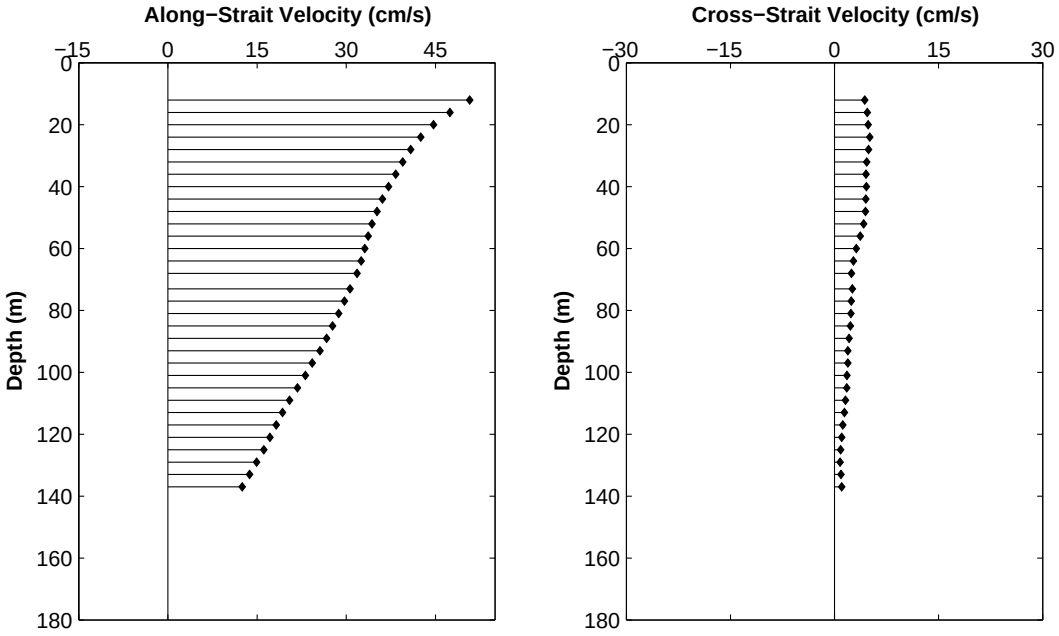


Figure 35: Mean Flows, Late Summer: Aug. 2003 to Sep. 2003.

South side of Barrow Strait



South−Central Barrow Strait

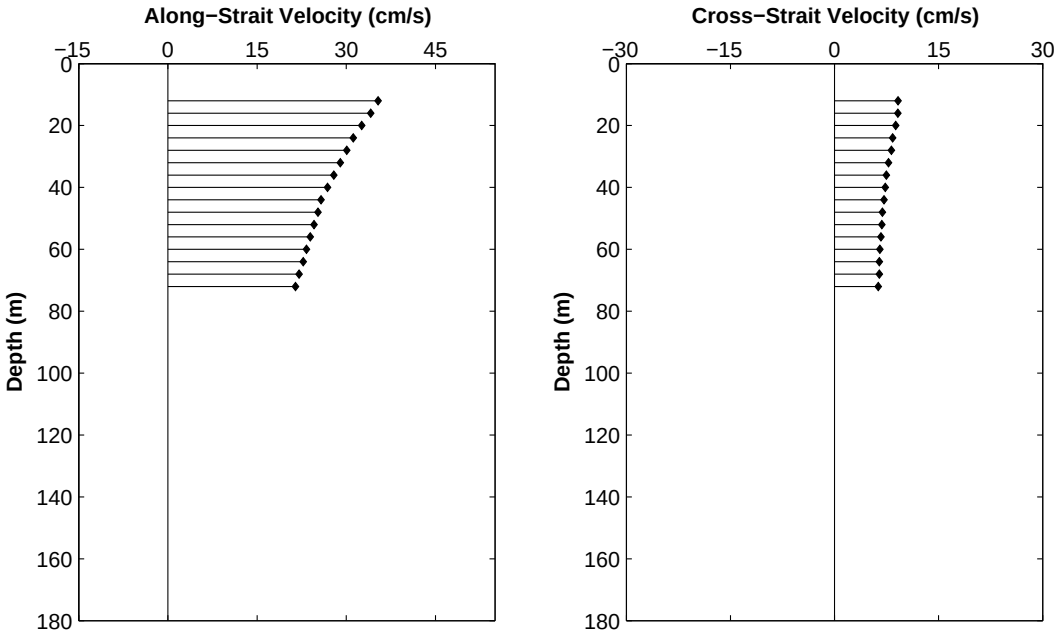
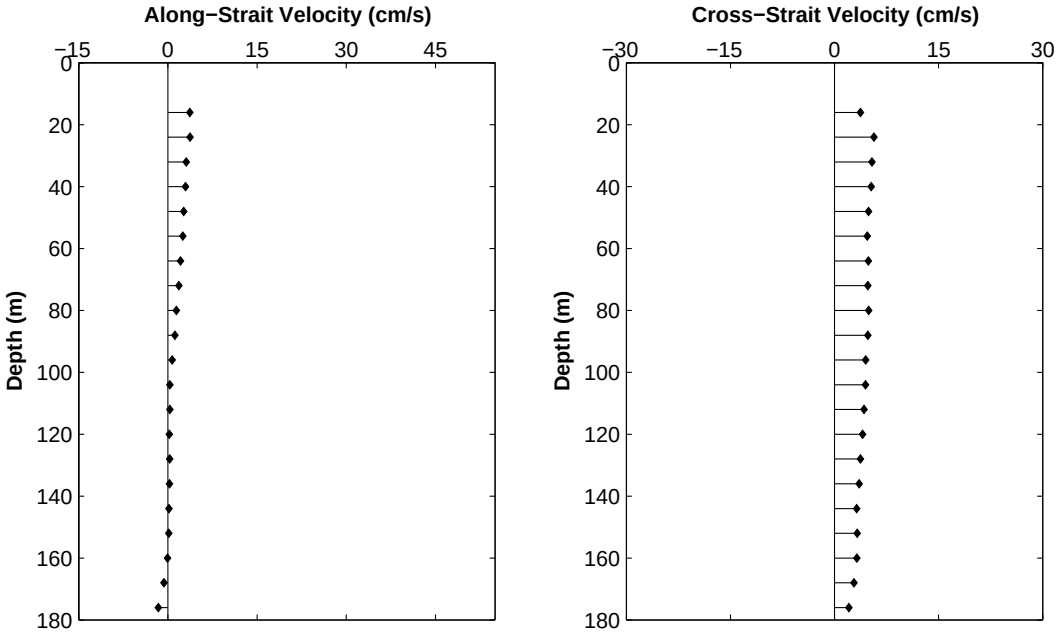


Figure 35: Mean Flows, Late Summer: Aug. 2003 to Sep. 2003 (continued)

Central Barrow Strait



North side of Barrow Strait

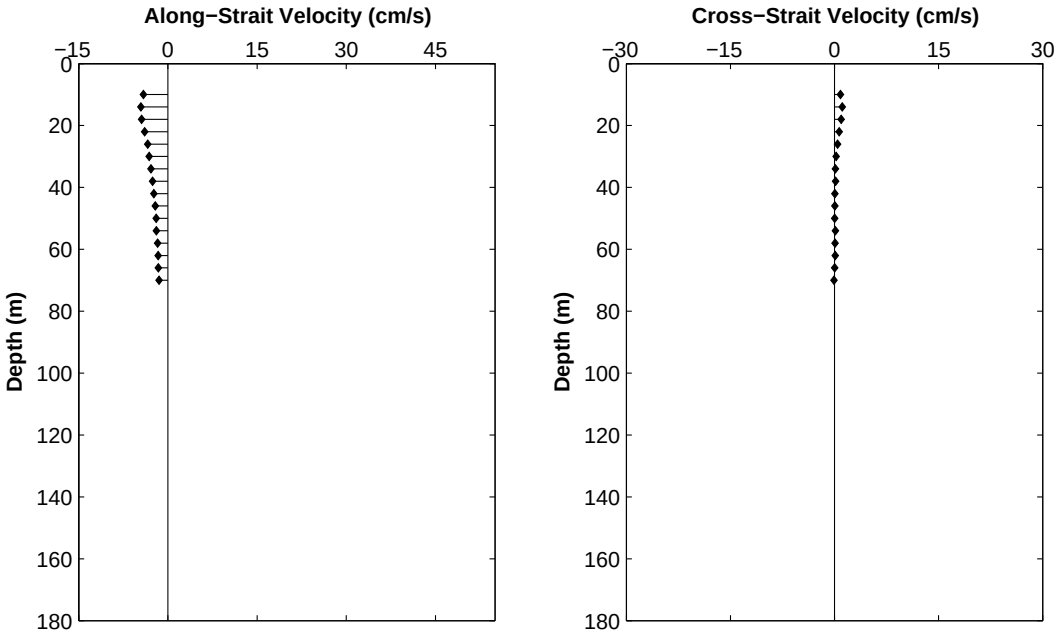
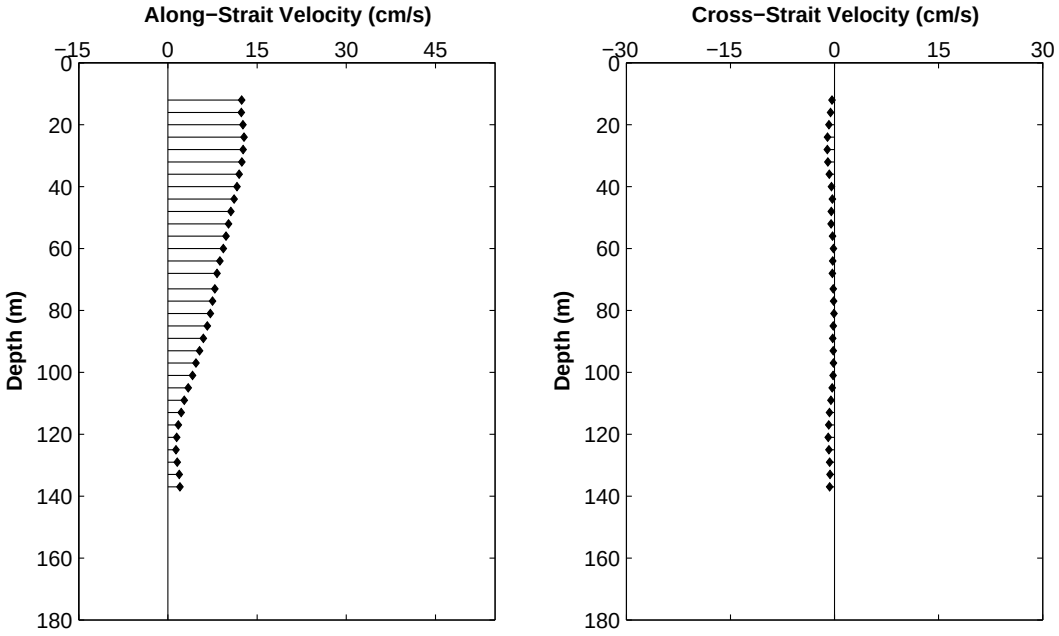


Figure 36: Mean Flows, Fall: Sep. 2003 to Dec. 2003.

South side of Barrow Strait



South−Central Barrow Strait

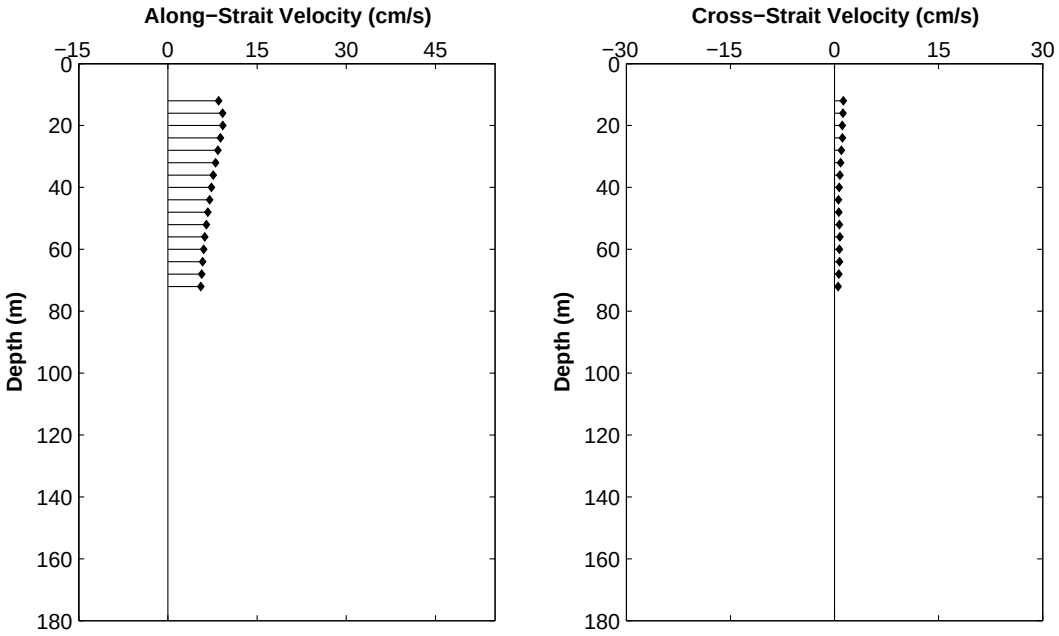
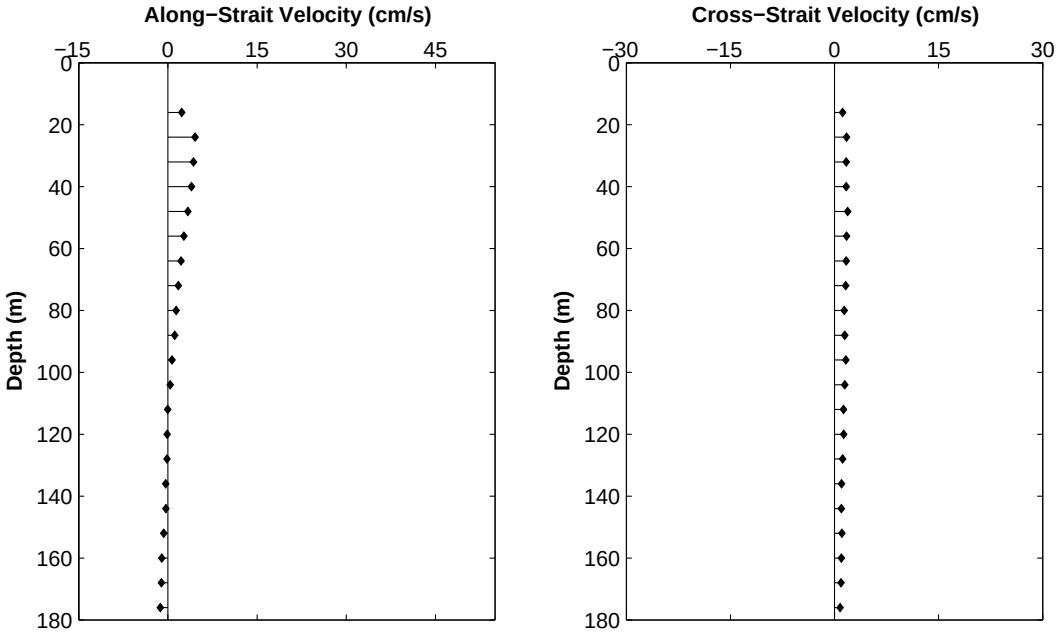


Figure 36: Mean Flows, Fall: Sep. 2003 to Dec. 2003 (continued).

Central Barrow Strait



North side of Barrow Strait

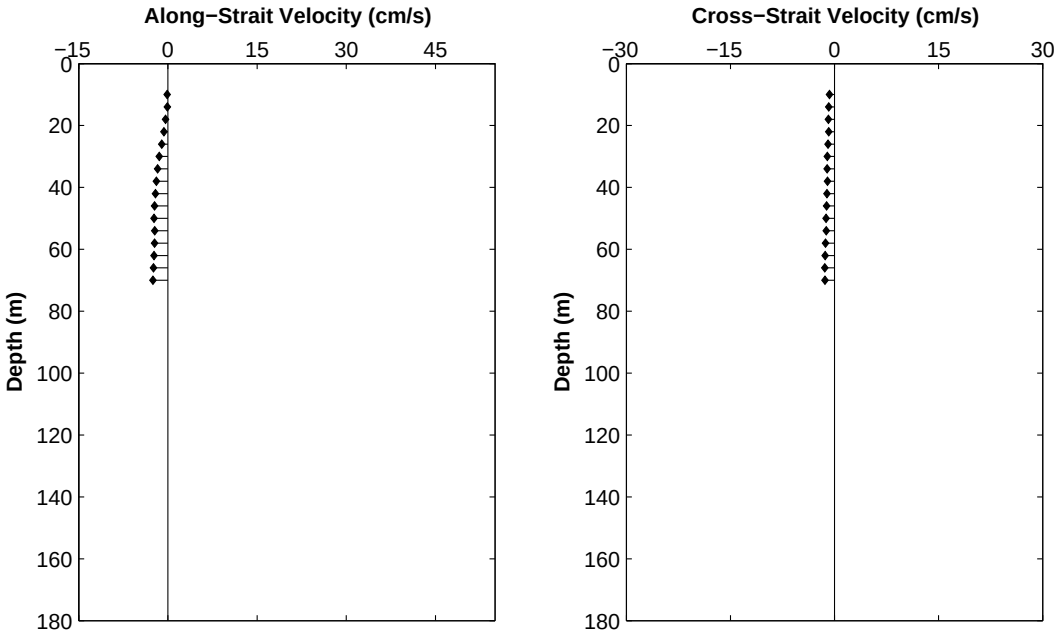
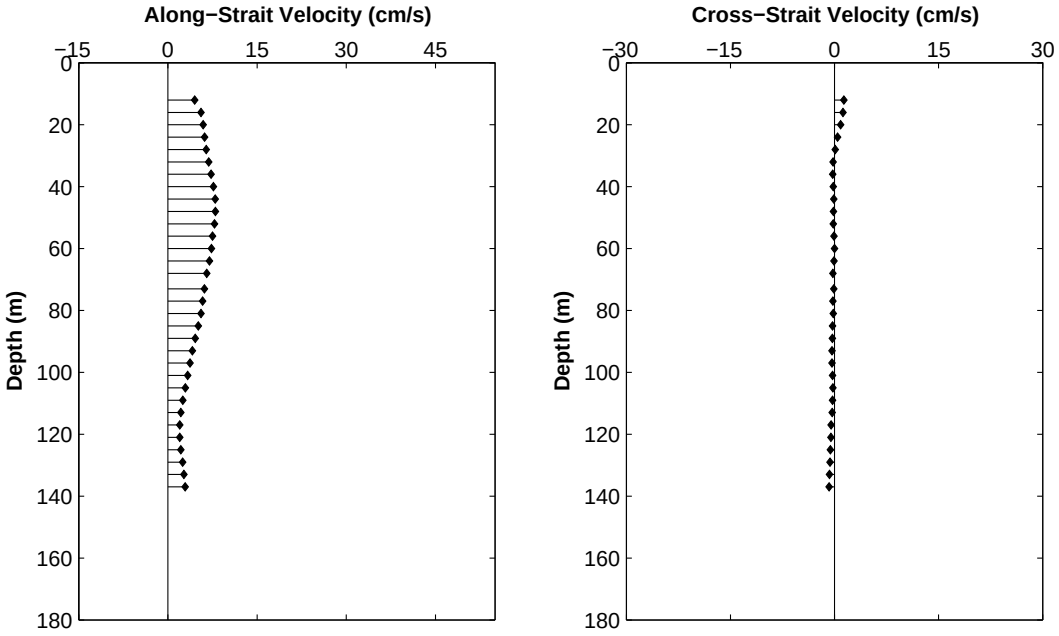


Figure 37: Mean Flows, Winter: Dec. 2003 to Mar. 2004.

South side of Barrow Strait



South−Central Barrow Strait

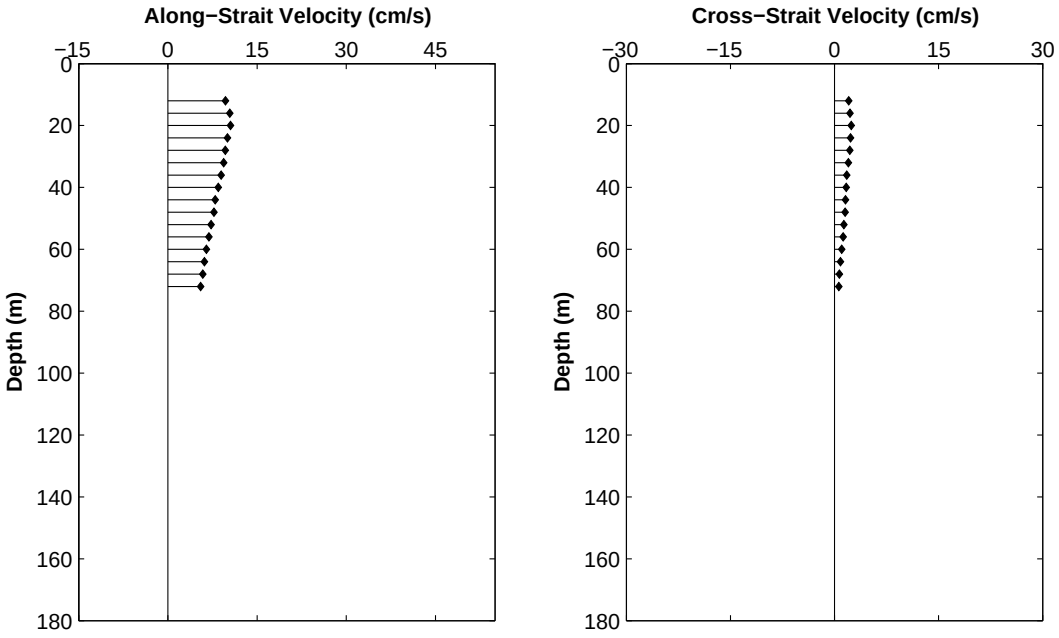
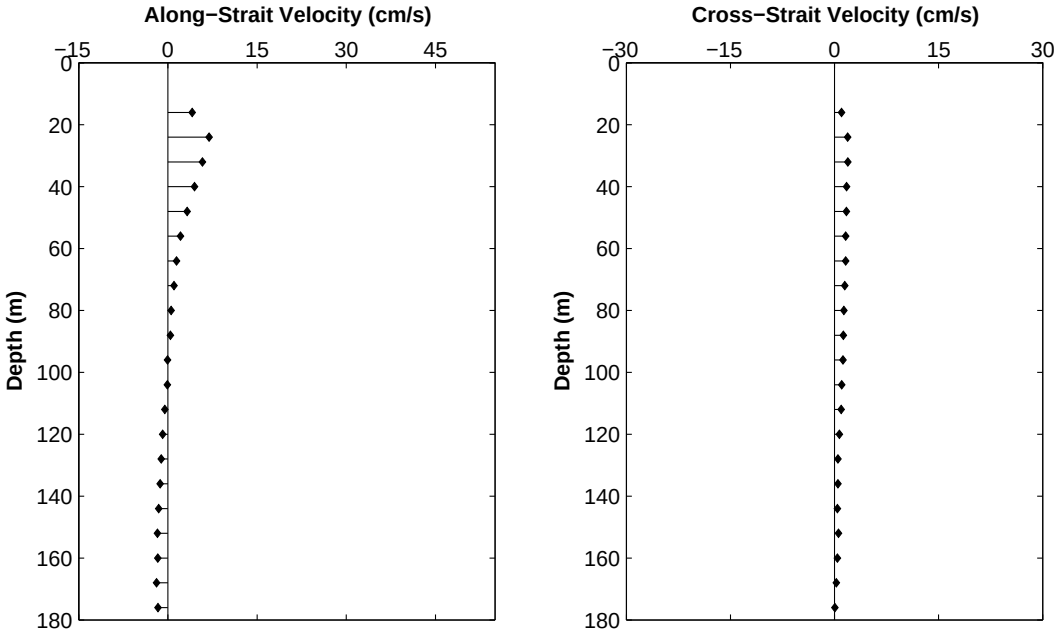


Figure 37: Mean Flows, Winter: Dec. 2003 to Mar. 2004 (continued).

Central Barrow Strait



North side of Barrow Strait

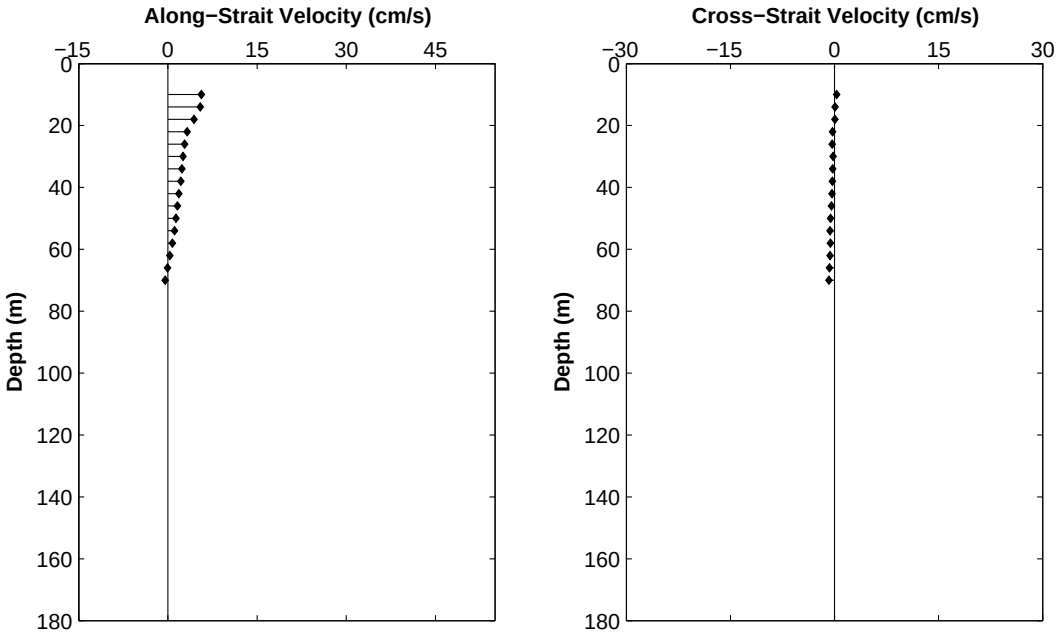
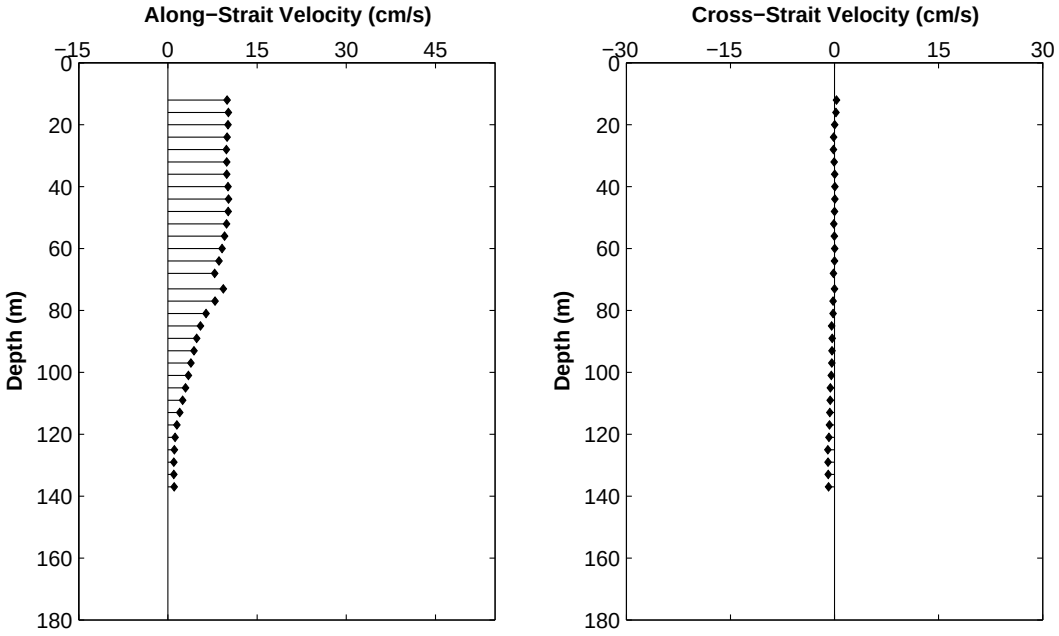


Figure 38: Mean Flows, Spring: Mar. 2004 to Jun. 2004.

South side of Barrow Strait



South−Central Barrow Strait

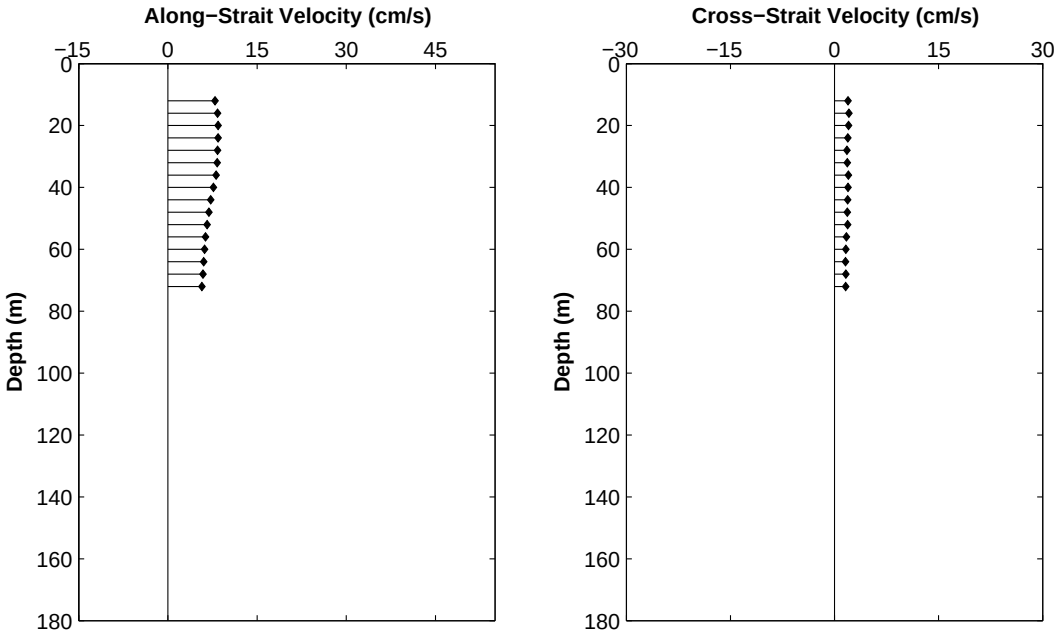
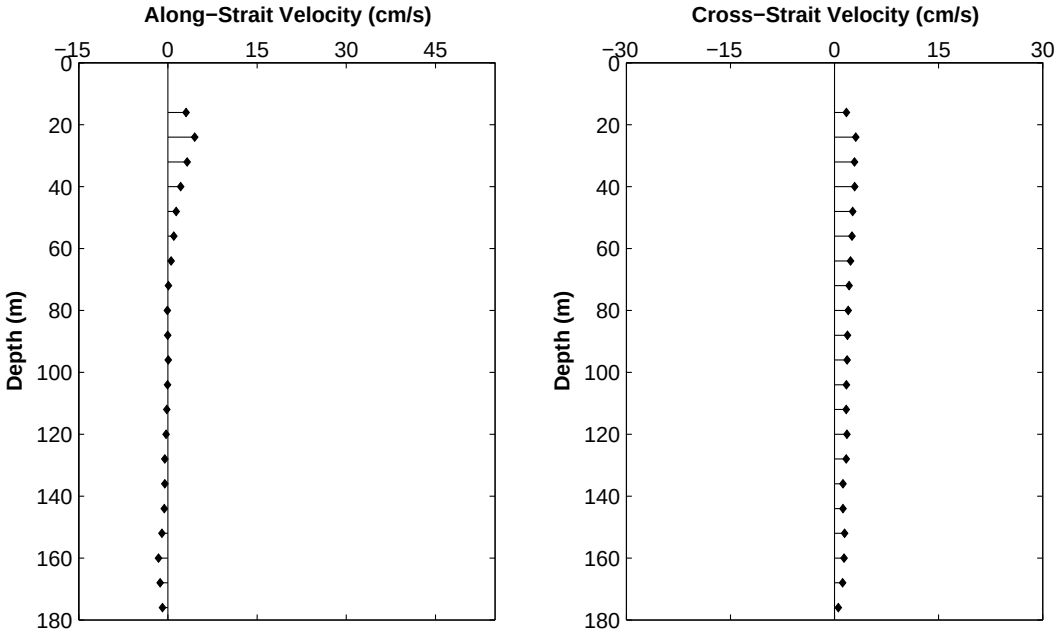


Figure 38: Mean Flows, Spring: Mar. 2004 to Jun. 2004 (continued).

Central Barrow Strait



North side of Barrow Strait

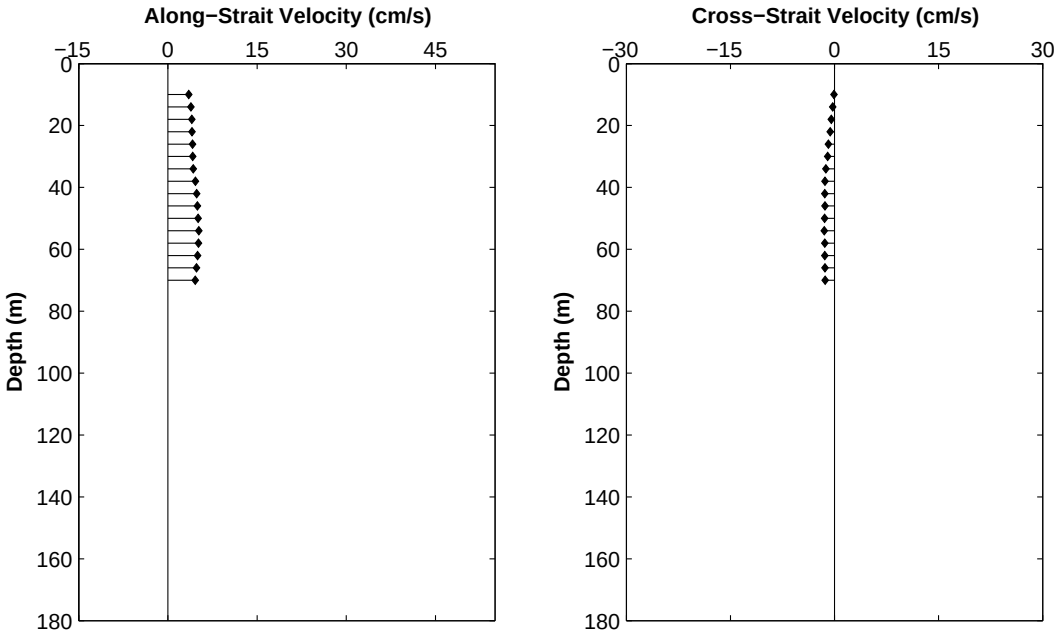
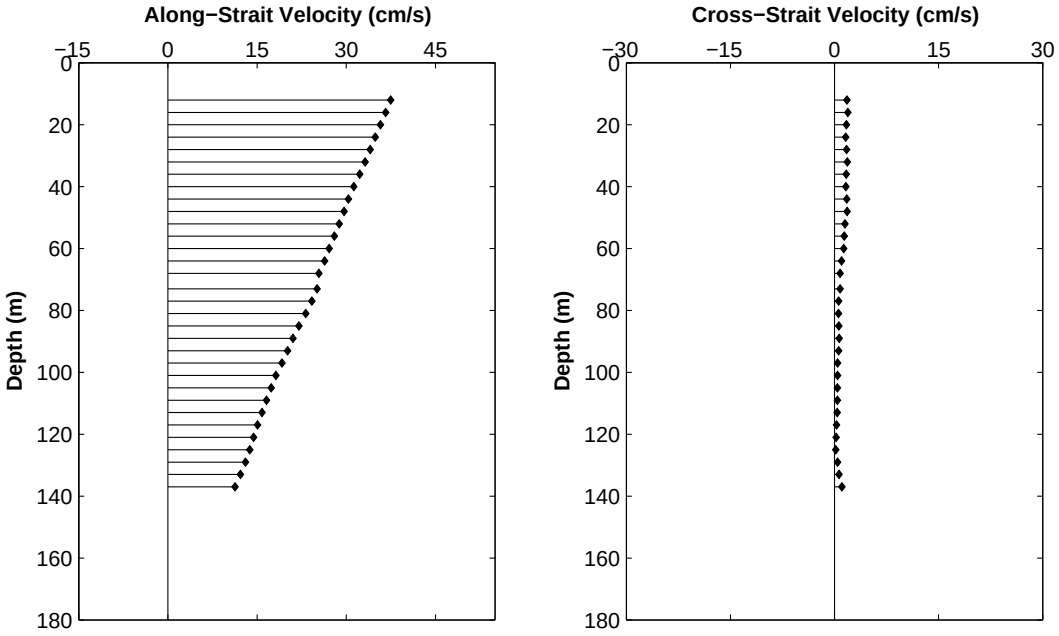


Figure 39: Mean Flows, Early Summer: Jun. 2004 to Aug. 2004.

South side of Barrow Strait



South−Central Barrow Strait

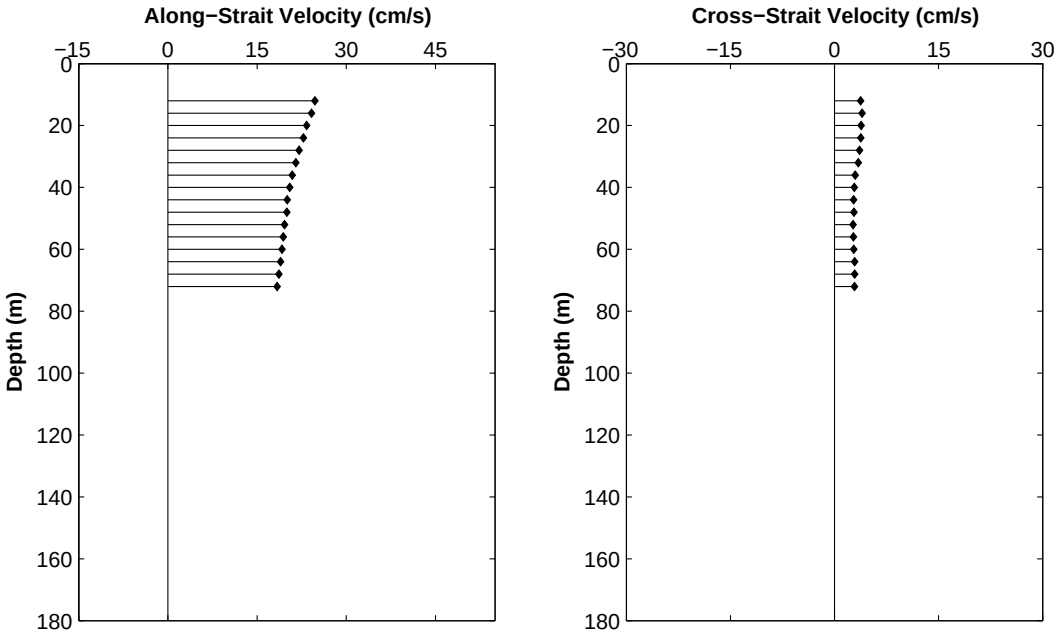
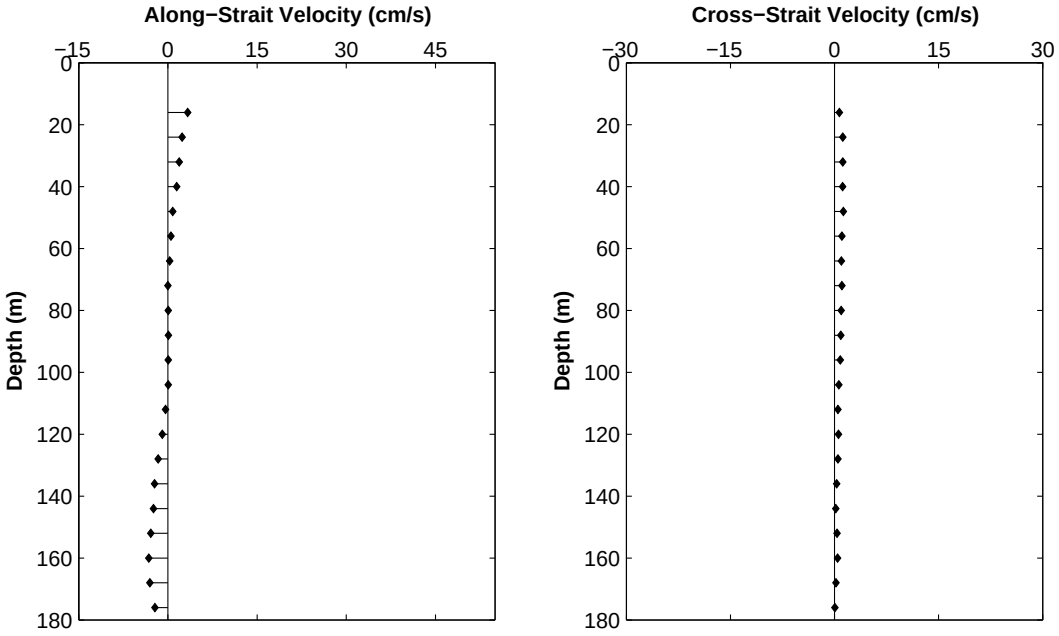


Figure 39: Mean Flows, Early Summer: Jun. 2004 to Aug. 2004 (continued).

Central Barrow Strait



North side of Barrow Strait

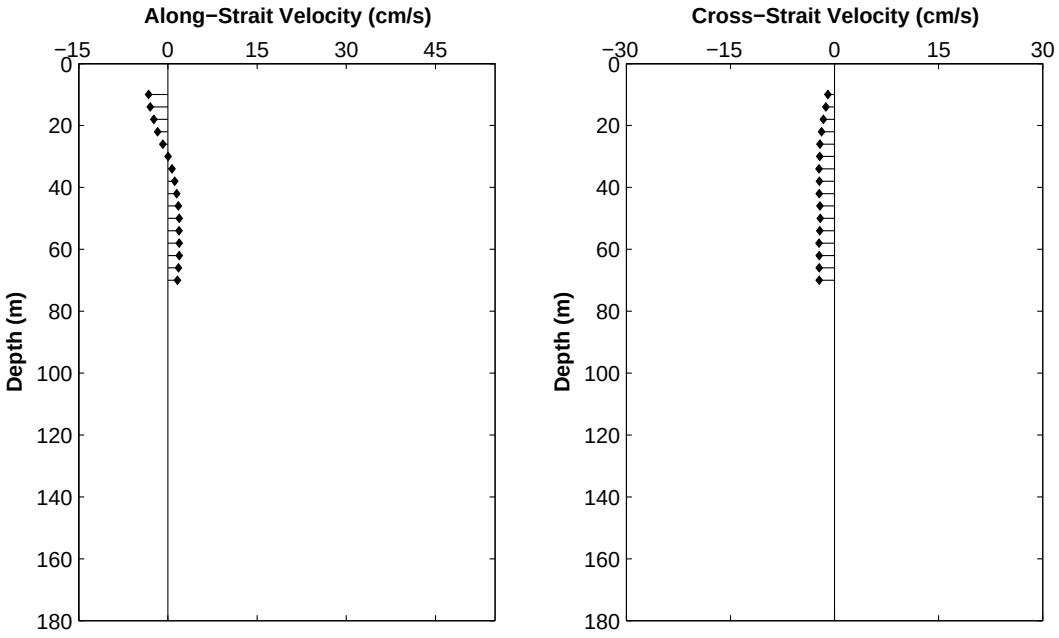


Figure 40: Variance in bi-hourly and low-pass filtered currents. August 2003 to August 2004.

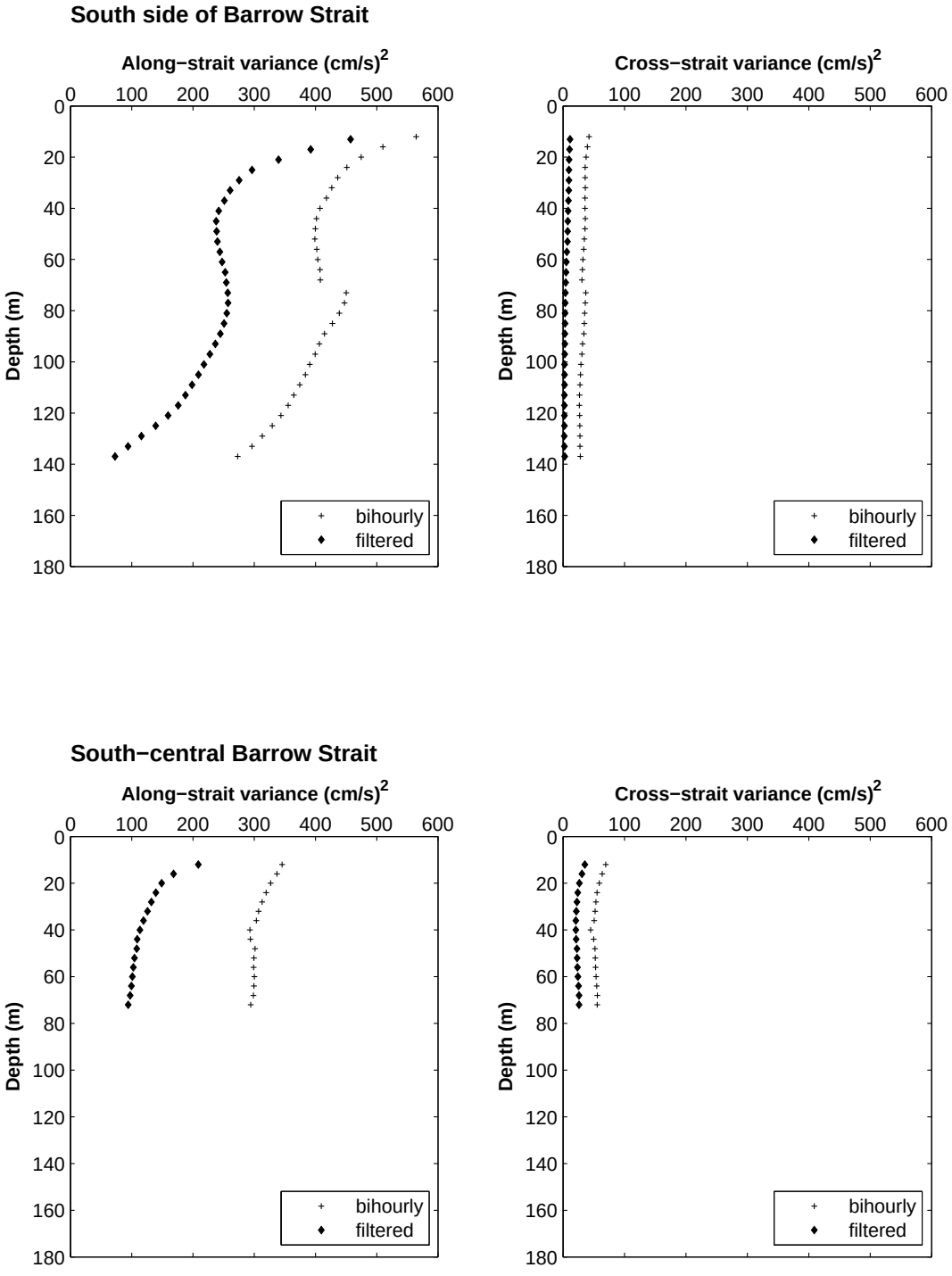
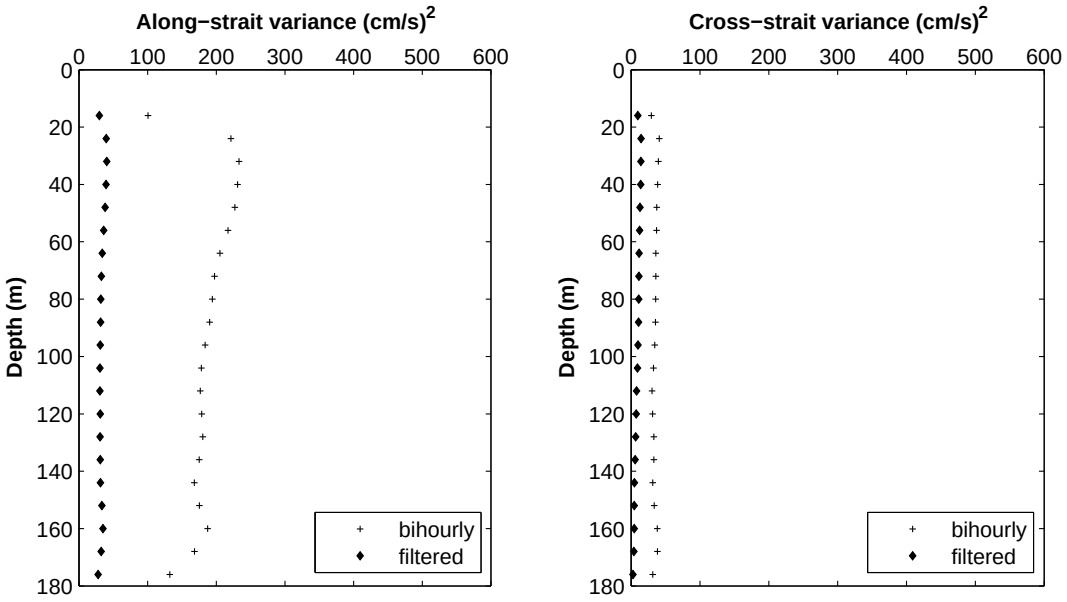


Figure 40: Variance in bi-hourly and low-pass filtered currents August 2003 to August 2004 (continued).

Central Barrow Strait



North side of Barrow Strait

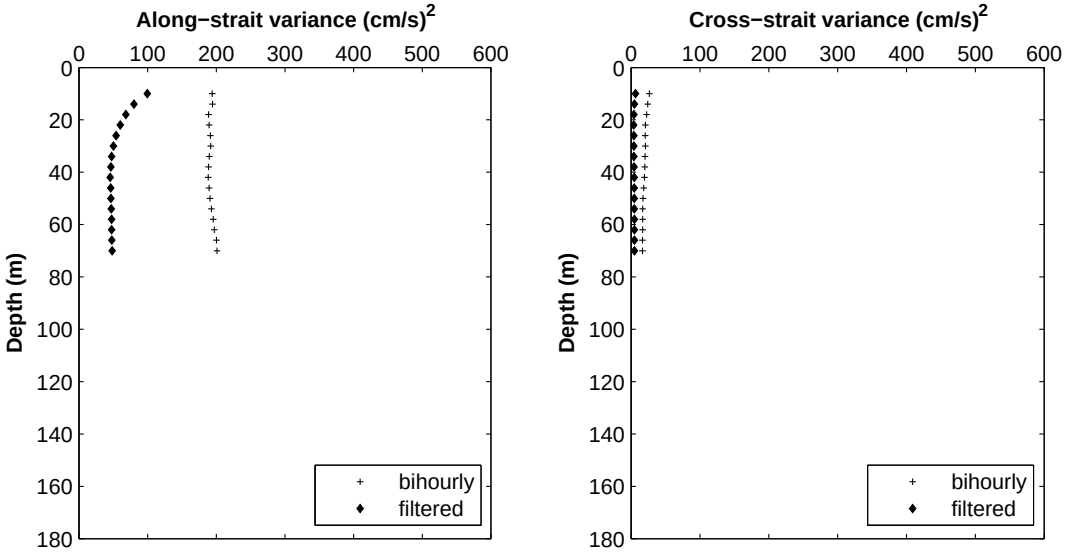
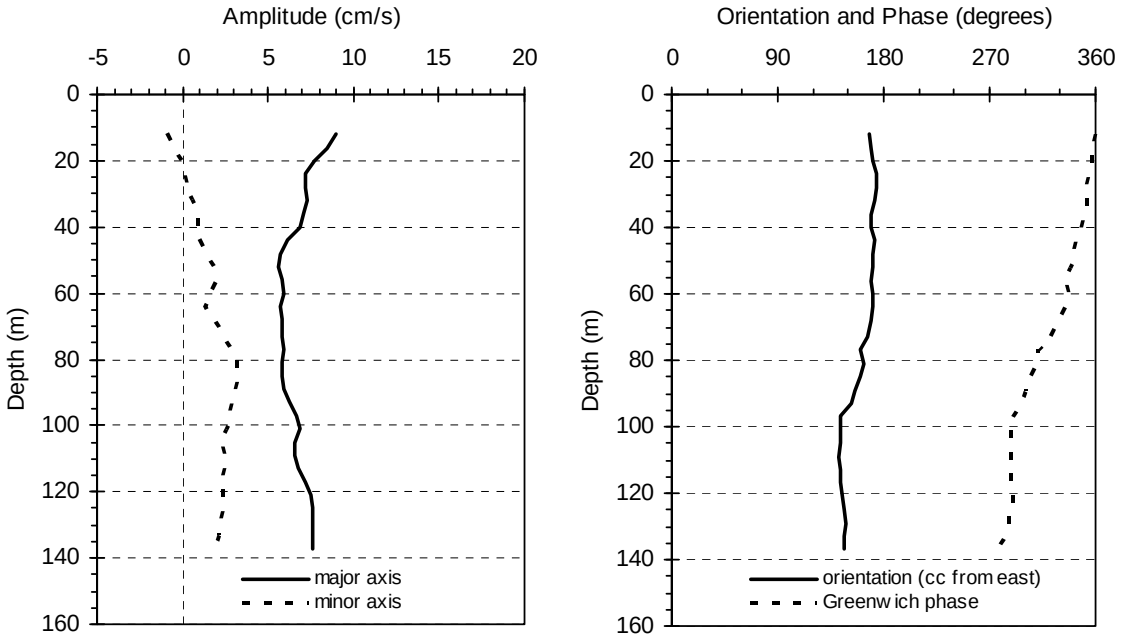


Figure 41 – K1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Jun. 03, 2004 to Aug. 01, 2004):



For Solid Ice Period (Dec. 08, 2003 to May 27, 2004):

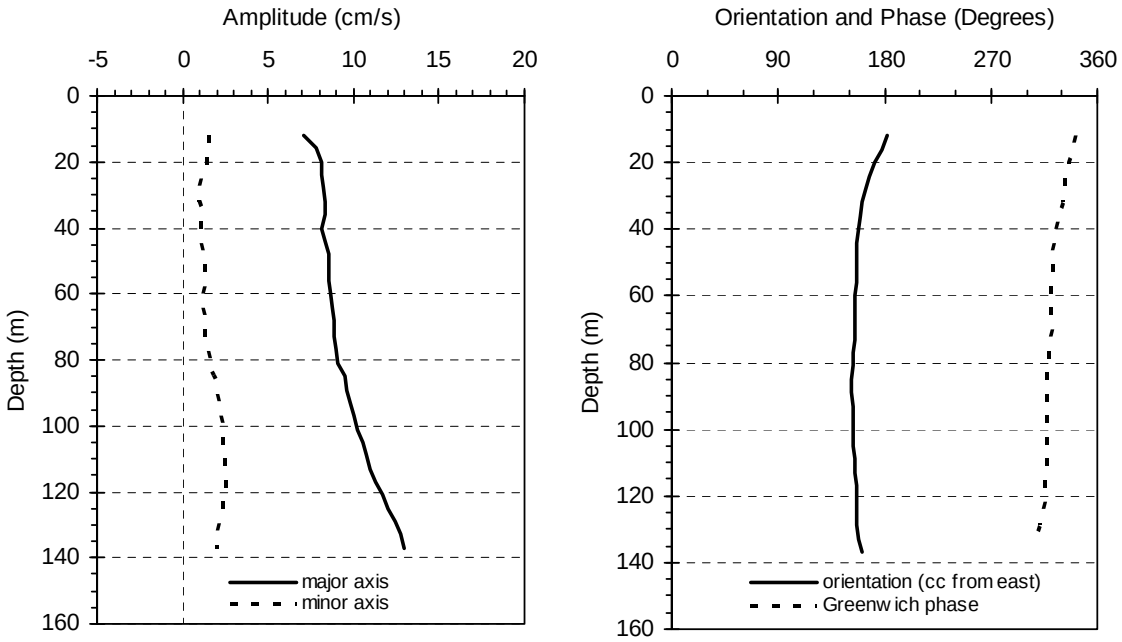
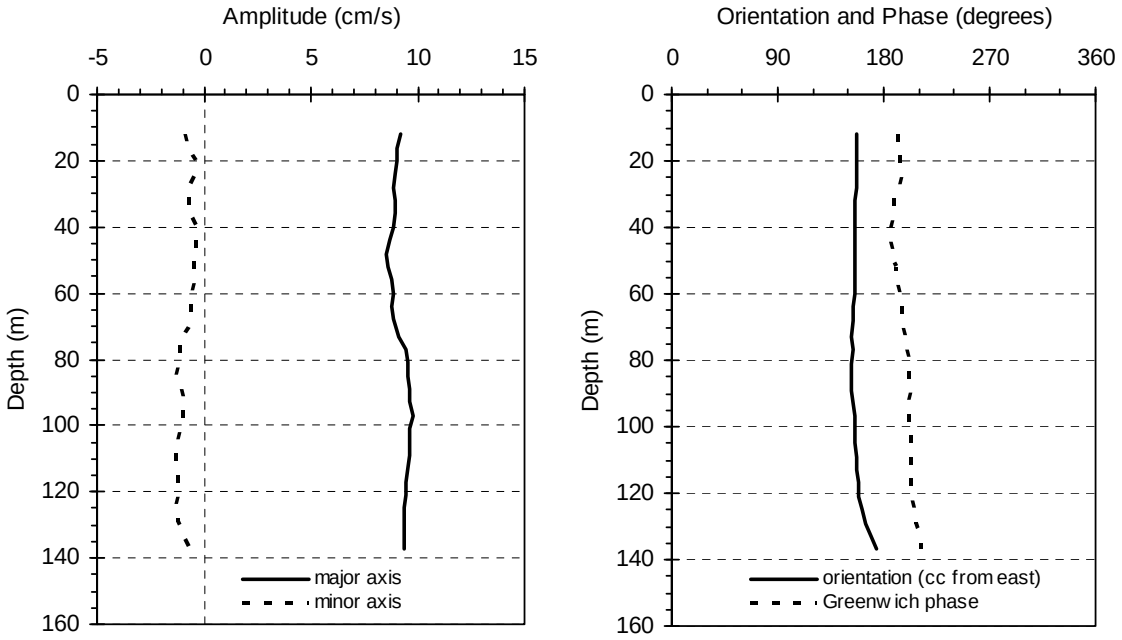


Figure 42 – M2 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Jun. 03, 2004 to Aug. 01, 2004):



For Solid Ice Period (Dec. 08, 2003 to May 27, 2004):

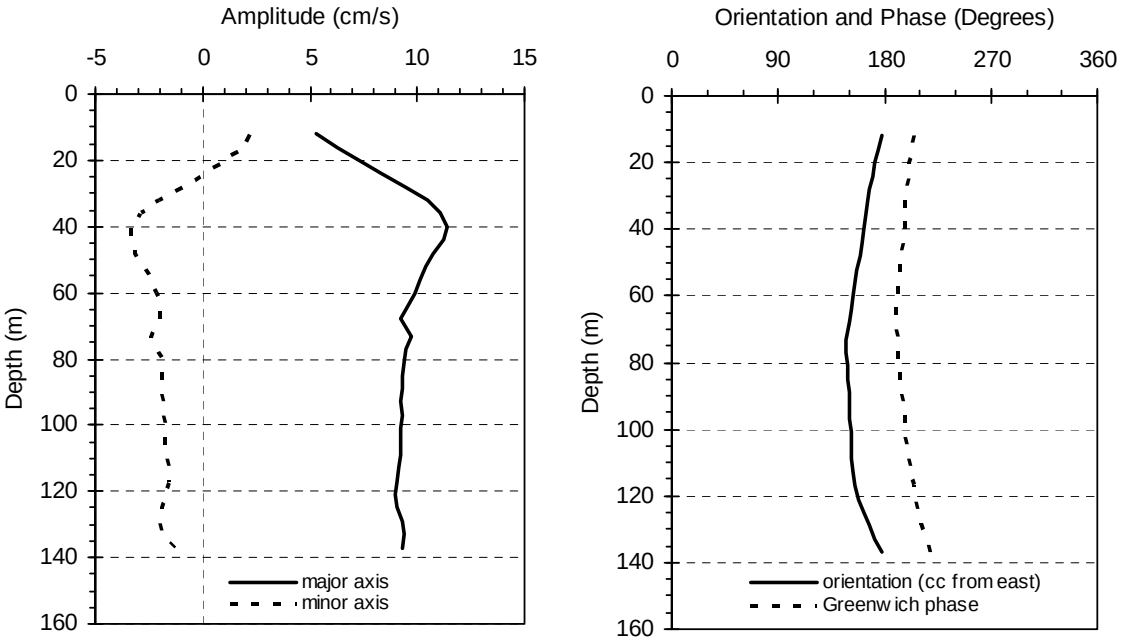
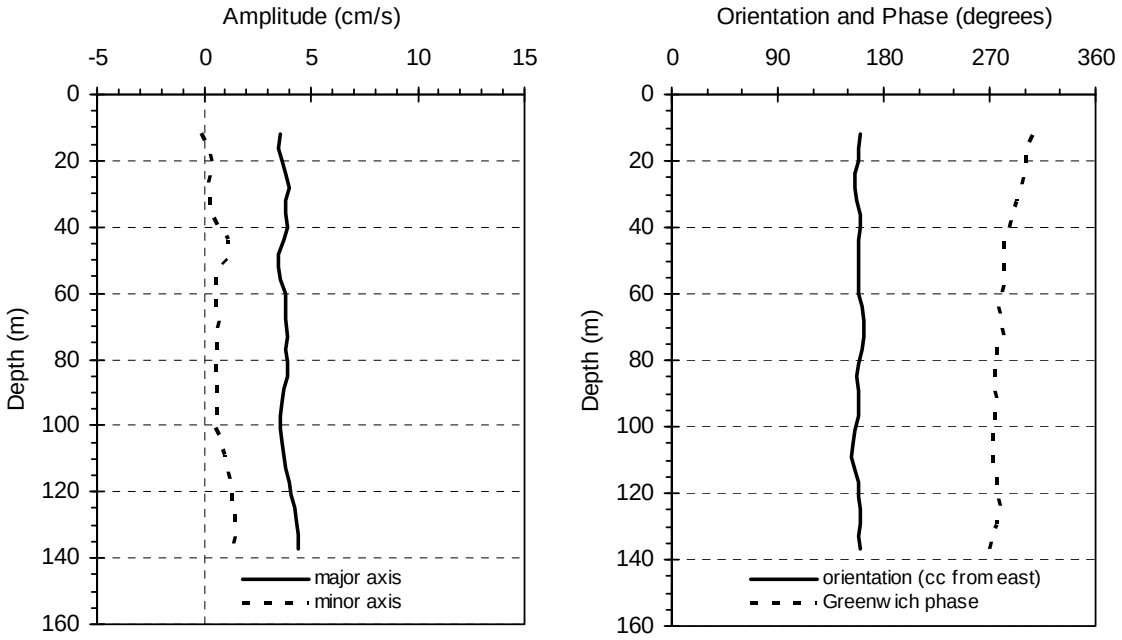


Figure 43 – O1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Jun. 03, 2004 to Aug. 01, 2004):



For Solid Ice Period (Dec. 08, 2003 to May 27, 2004):

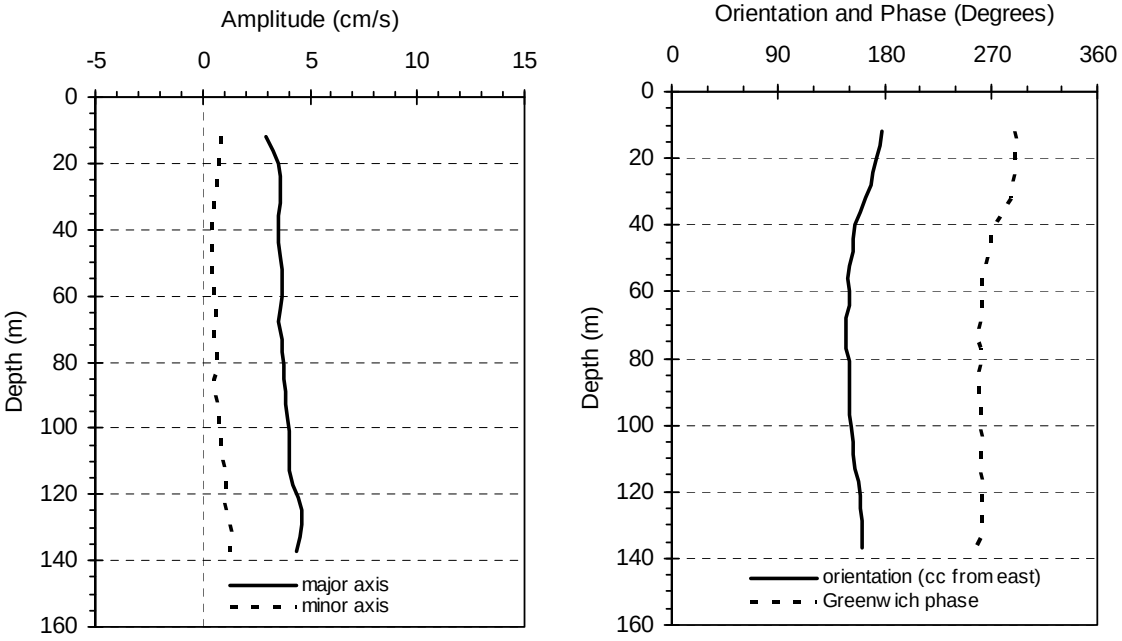
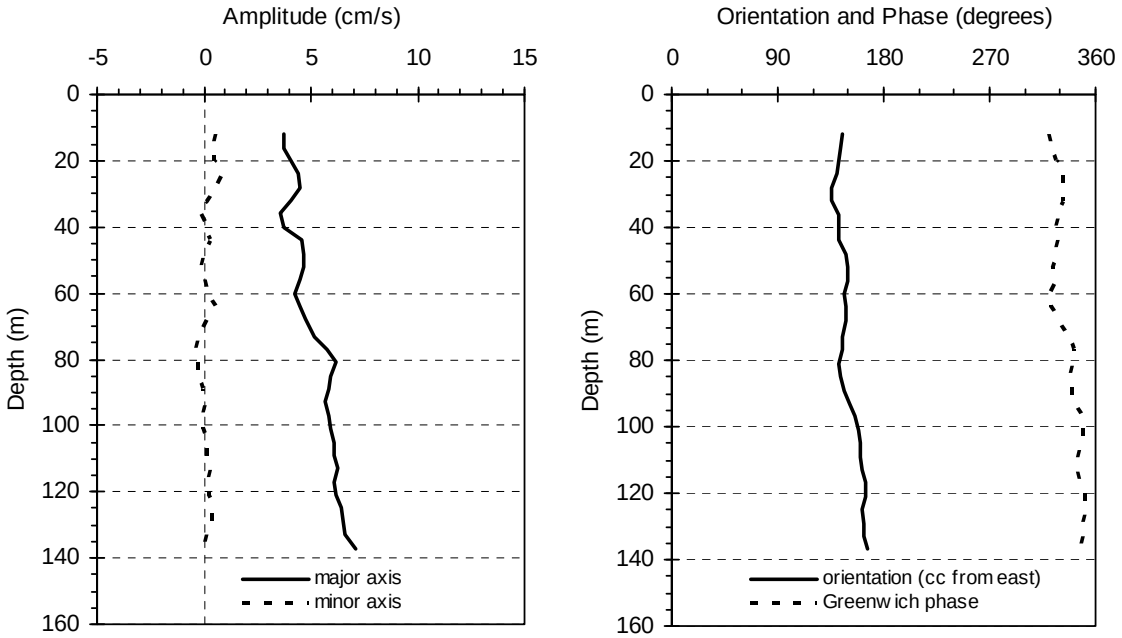


Figure 44 – P1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Jun. 03, 2004 to Aug. 01, 2004):



For Solid Ice Period (Dec. 08, 2003 to May 27, 2004):

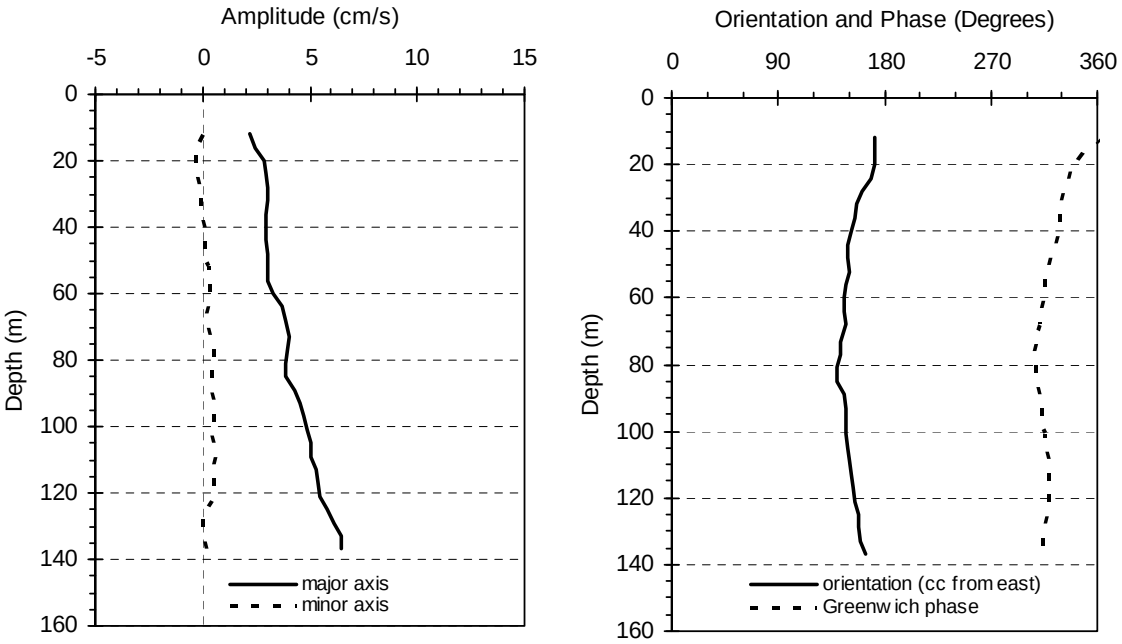
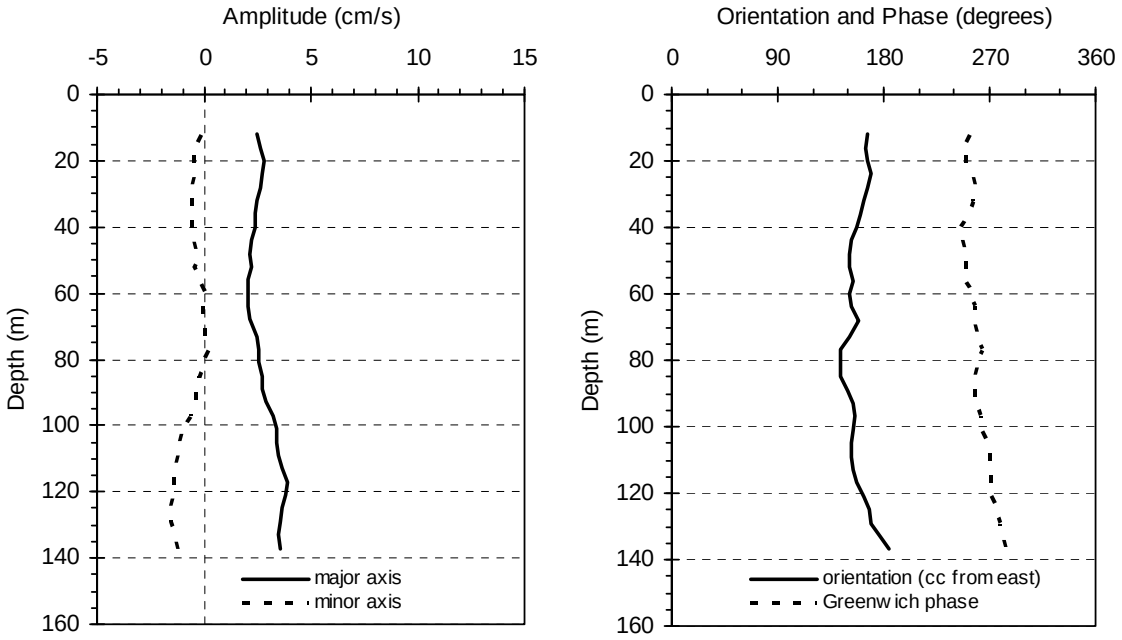


Figure 45 – S2 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Jun. 03, 2004 to Aug. 01, 2004):



For Solid Ice Period (Dec. 08, 2003 to May 27, 2004):

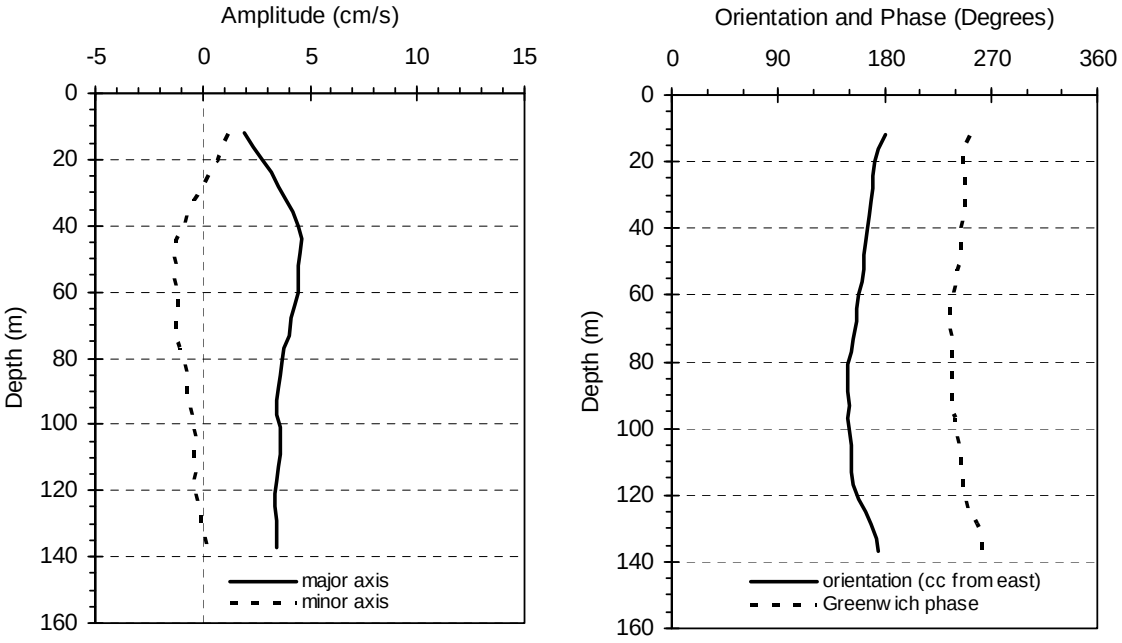
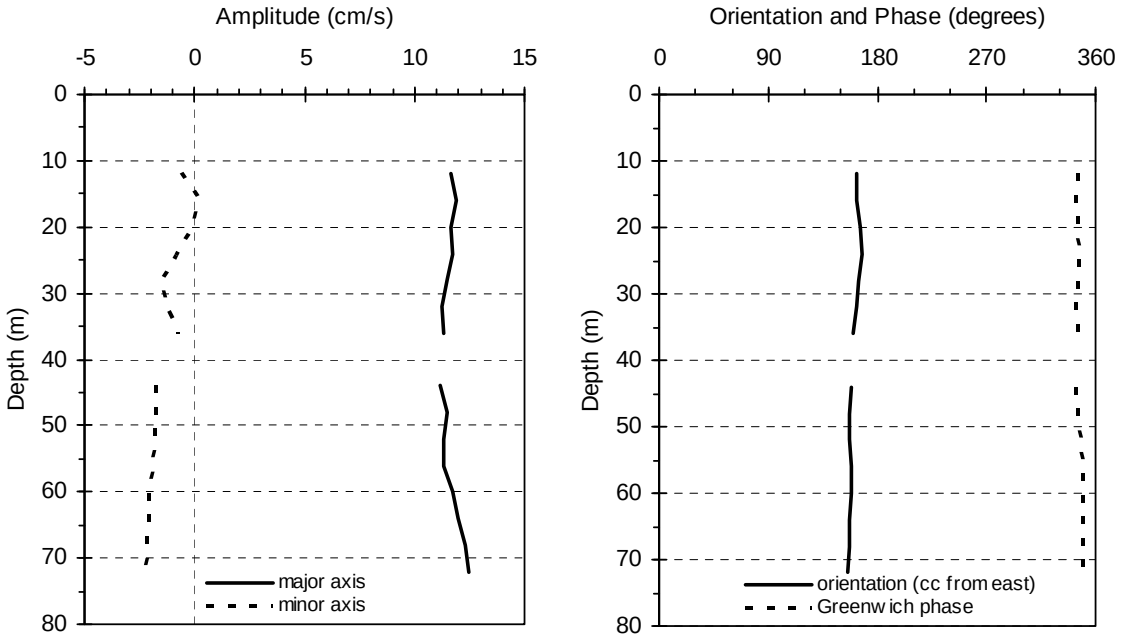


Figure 46 - K1 Tidal Constituent, South-Central Barrow Strait

For Ice Free Period (Jun. 01, 2004 to Aug. 01, 2004):



For Solid Ice Period

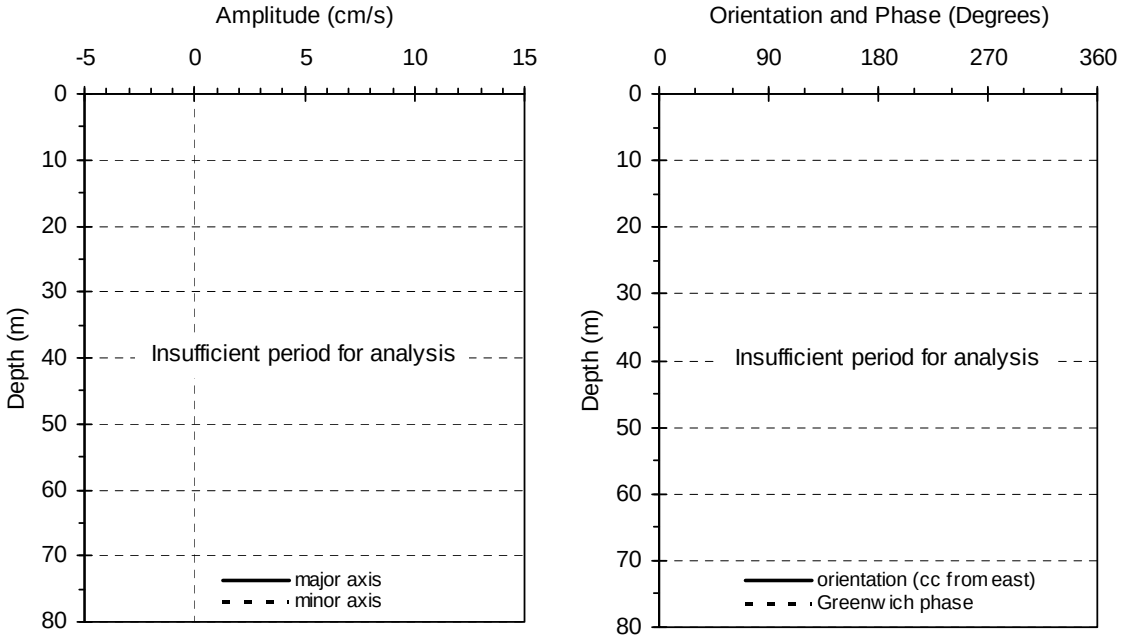
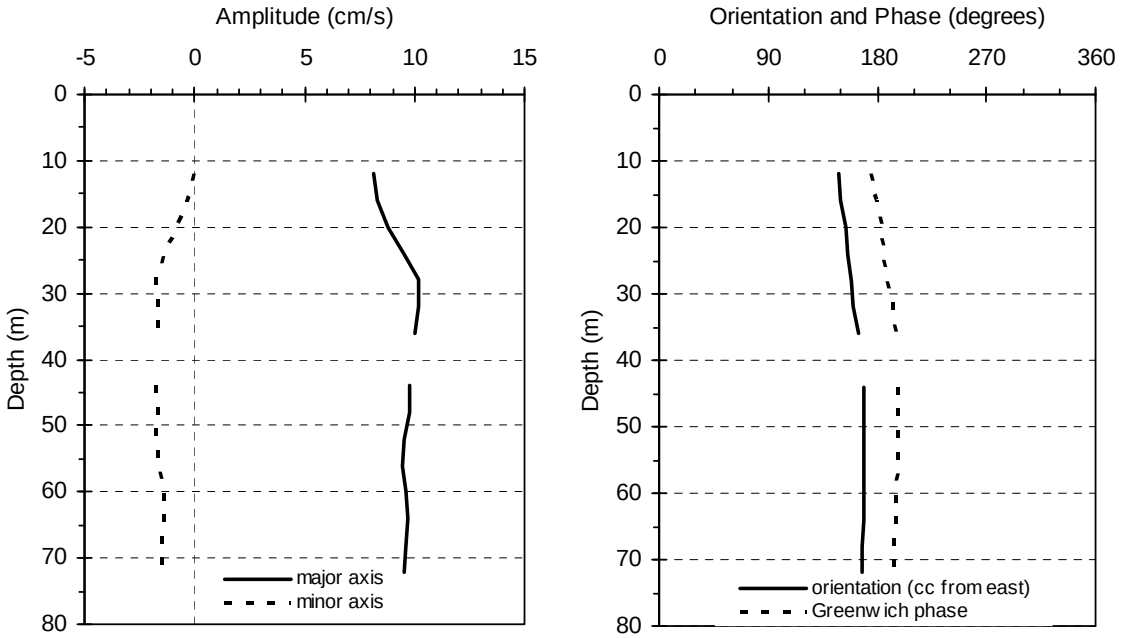


Figure 47 – M2 Tidal Constituent, South-Central Barrow Strait

For Ice Free Period (Jun. 01, 2004 to Aug. 01, 2004):



For Solid Ice Period

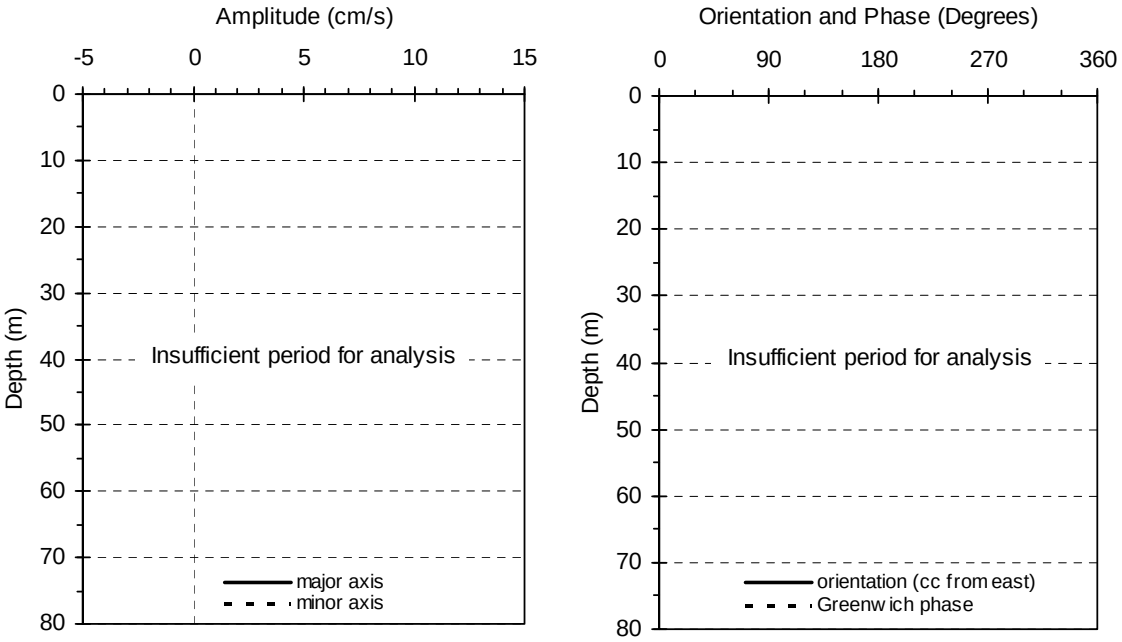
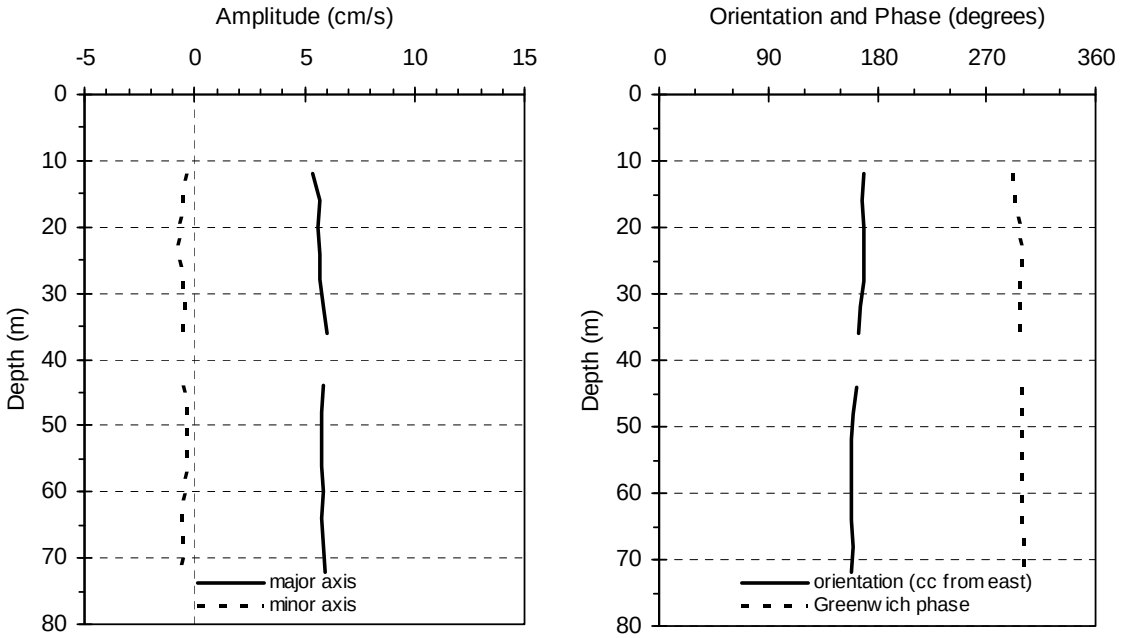


Figure 48 – O1 Tidal Constituent, South-Central Barrow Strait

For Ice Free Period (Jun. 01, 2004 to Aug. 01, 2004):



For Solid Ice Period

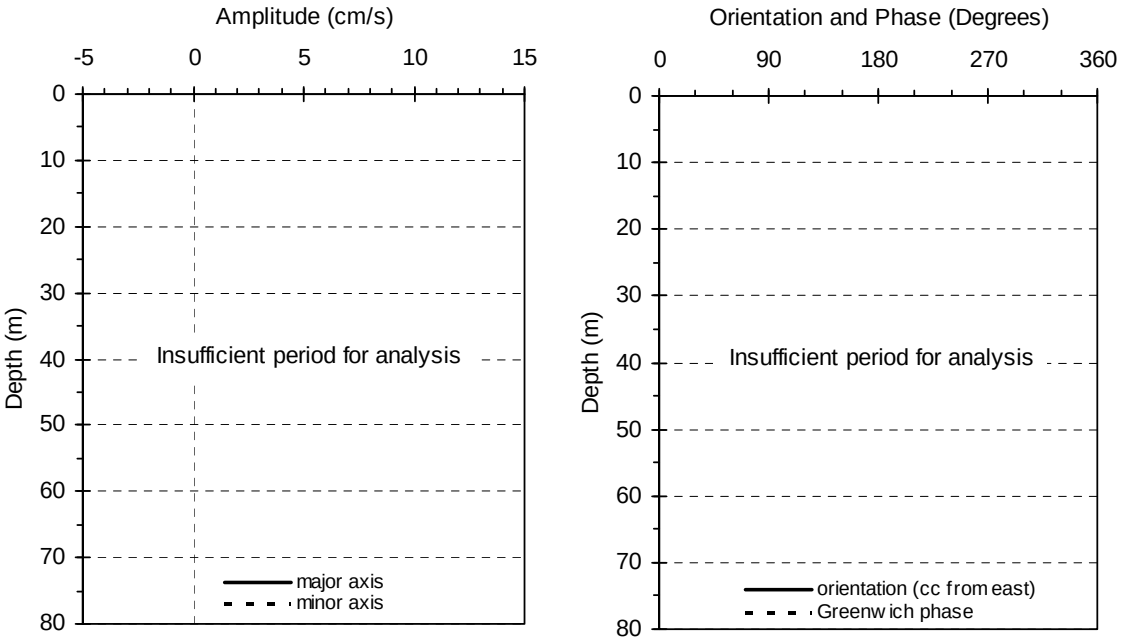
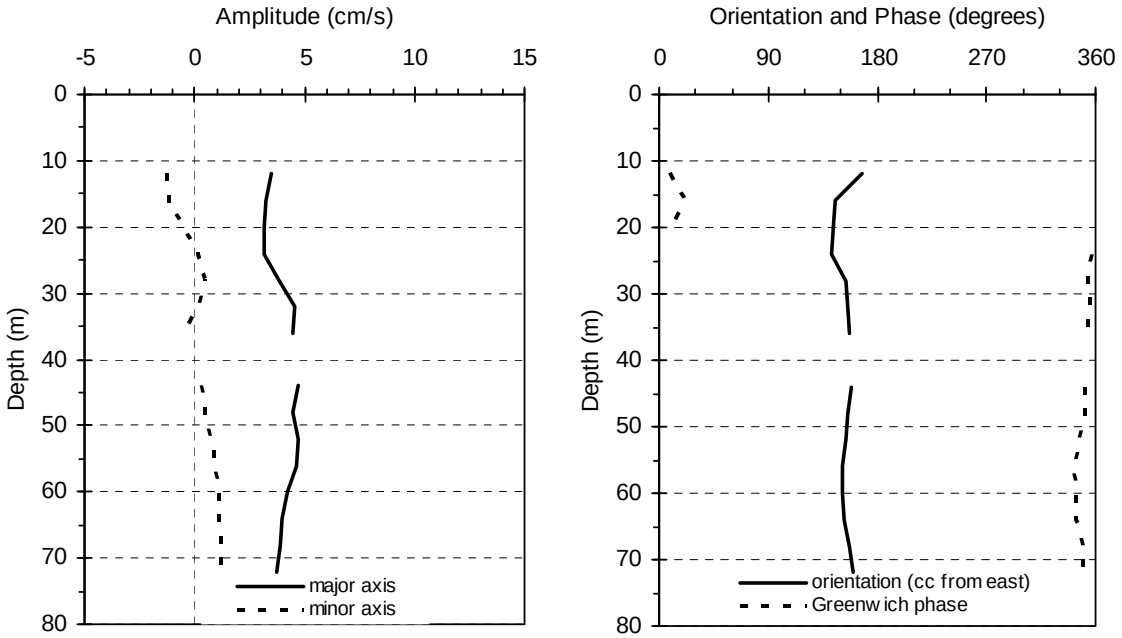


Figure 49 – P1 Tidal Constituent, South-Central Barrow Strait

For Ice Free Period (Jun. 01, 2004 to Aug. 01, 2004):



For Solid Ice Period

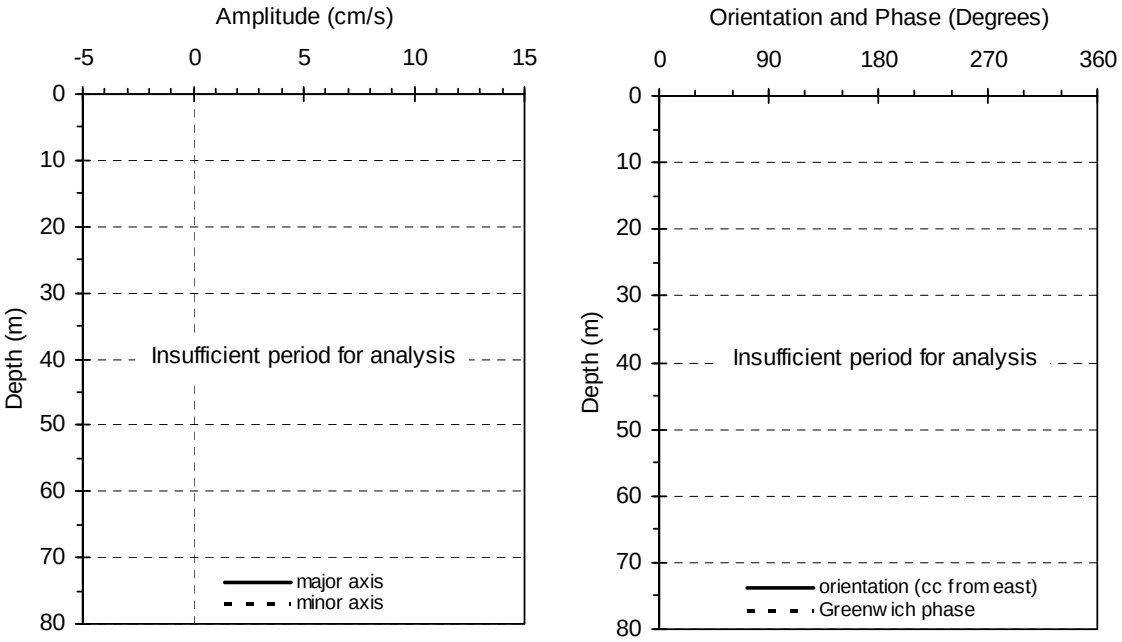
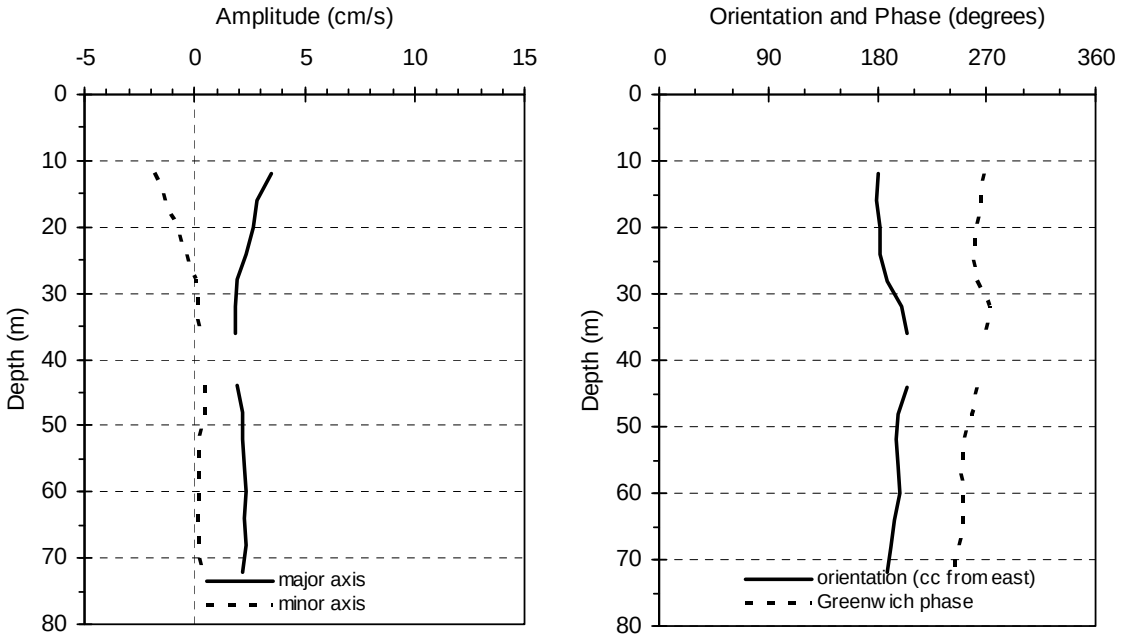


Figure 50 – S2 Tidal Constituent, South-Central Barrow Strait

For Ice Free Period (Jun. 01, 2004 to Aug. 01, 2004):



For Solid Ice Period

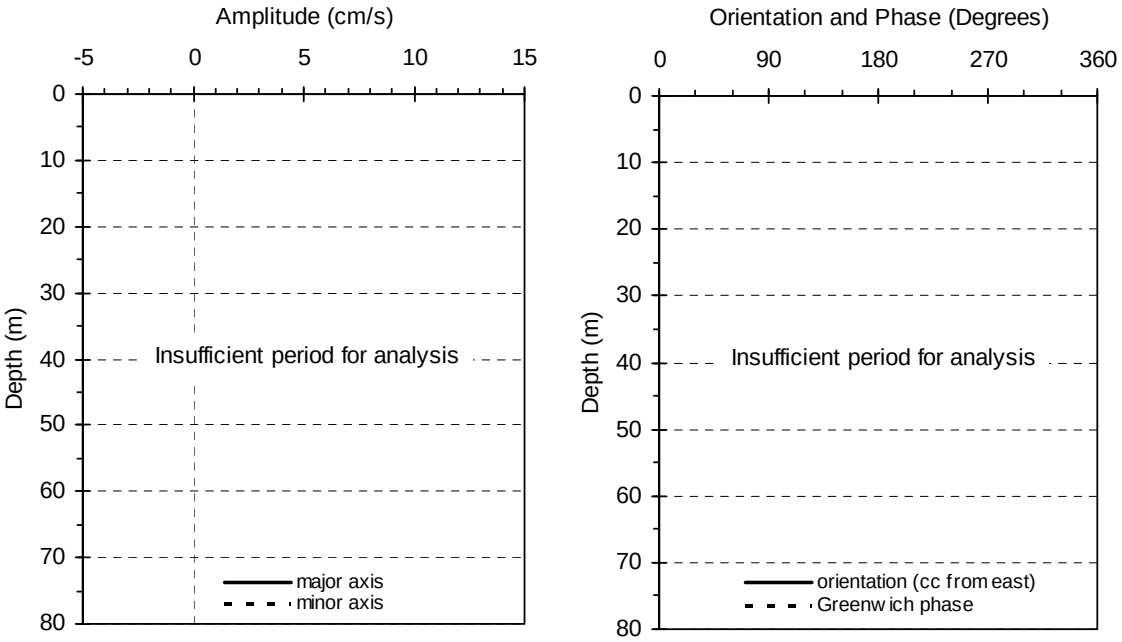
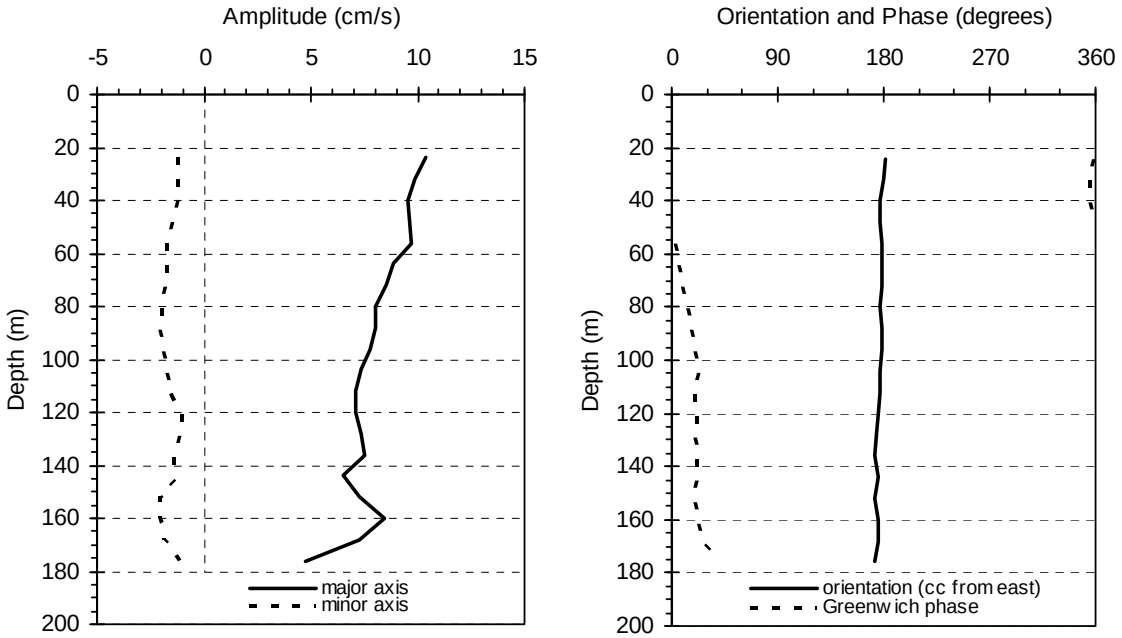


Figure 51 – K1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period:

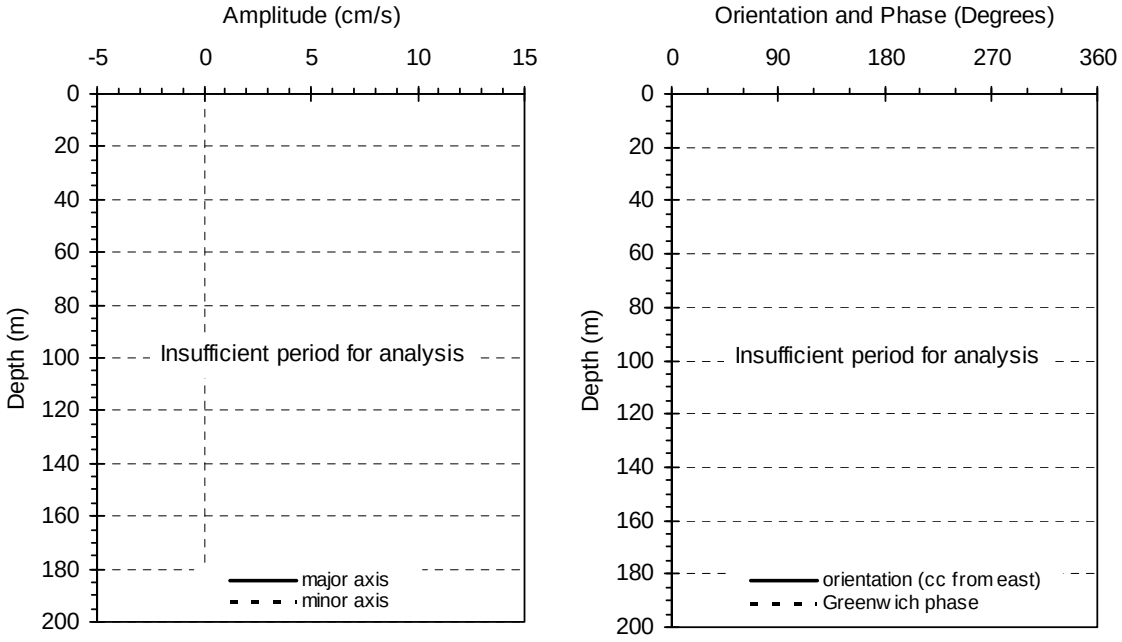
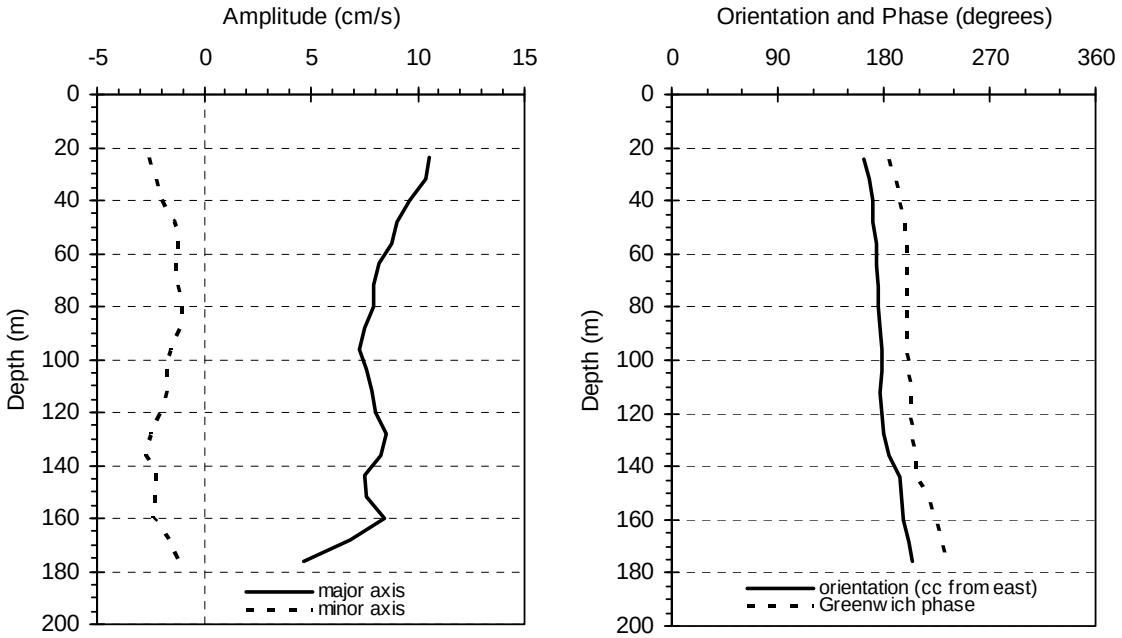


Figure 52 – M2 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period:

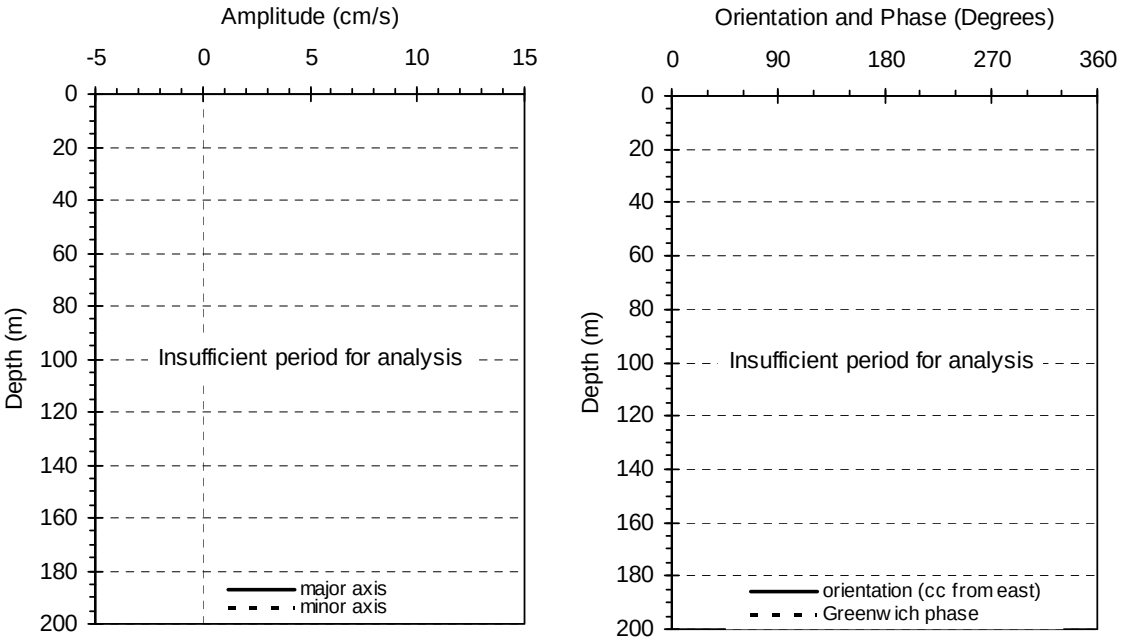
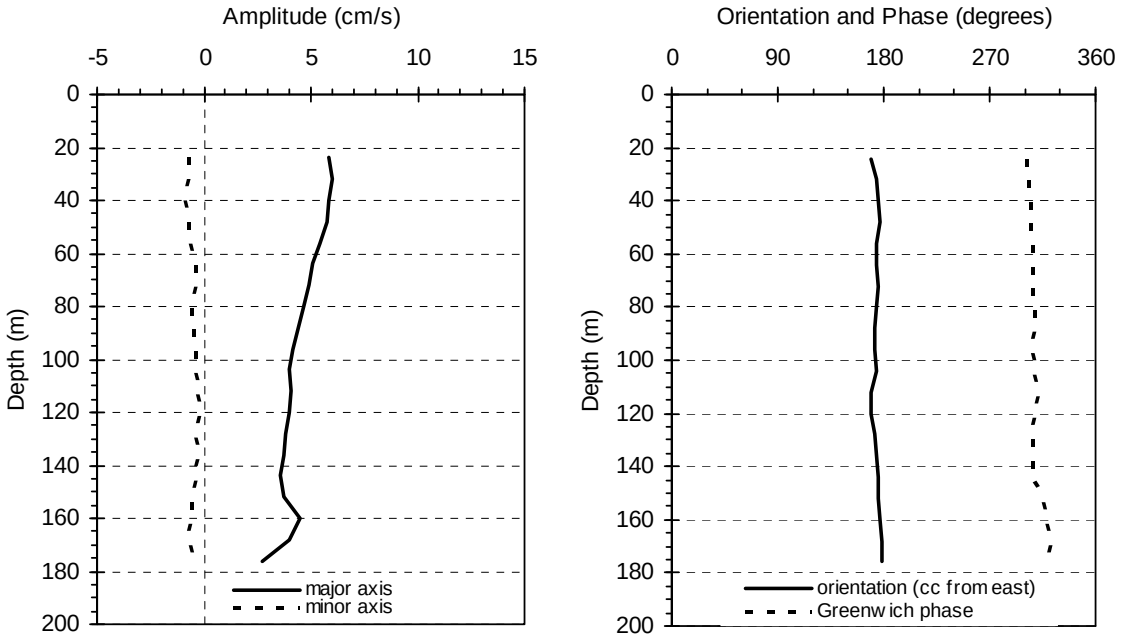


Figure 53 – O1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period:

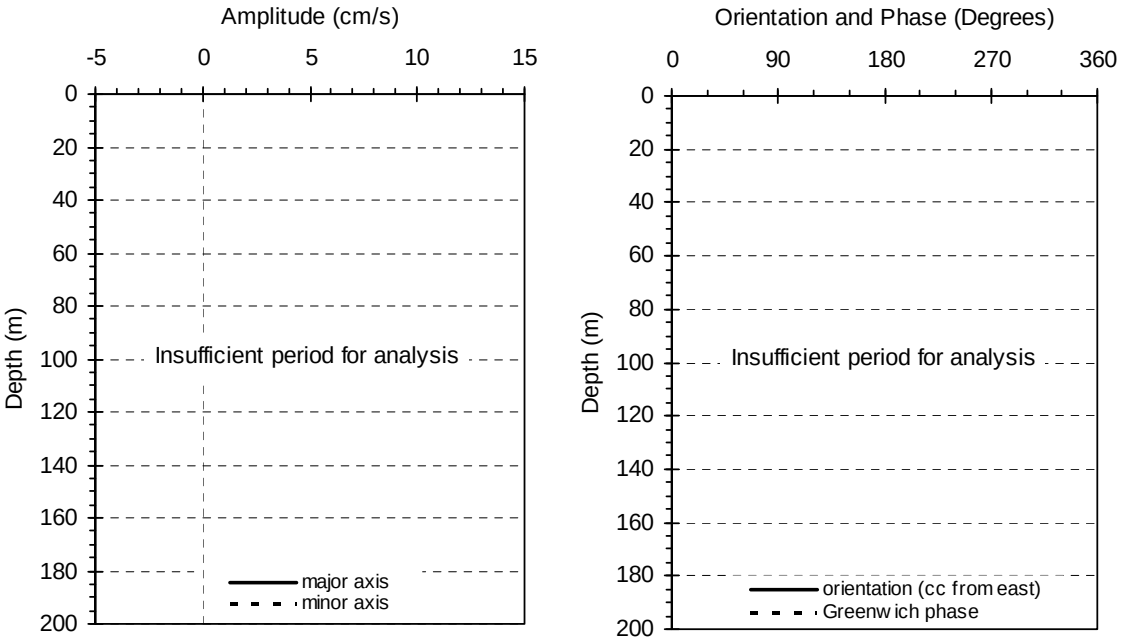
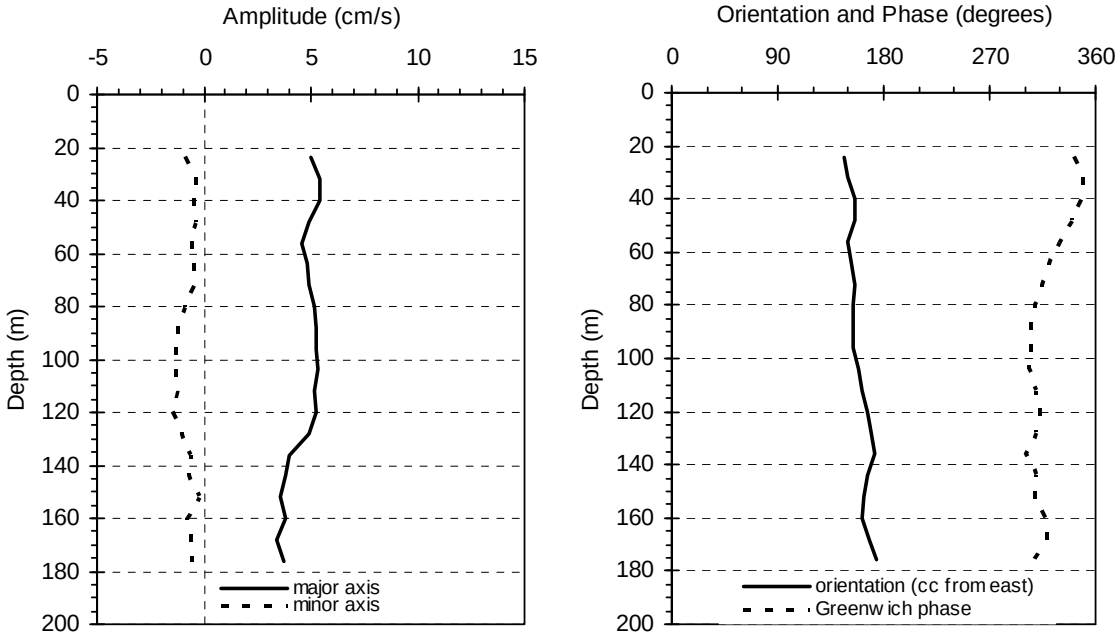


Figure 54 – P1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period:

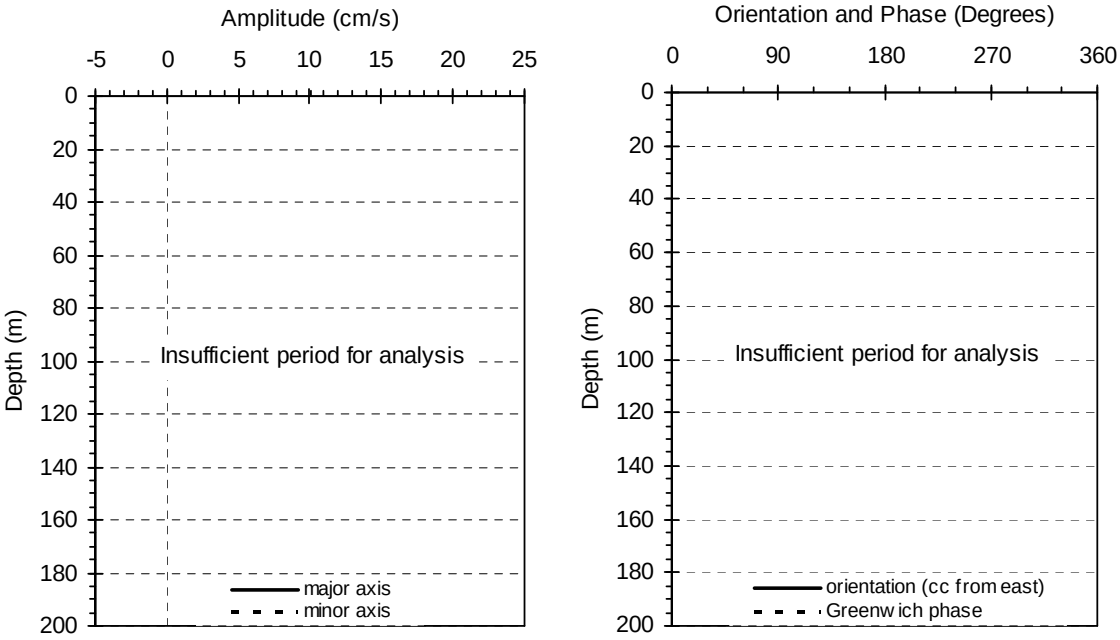
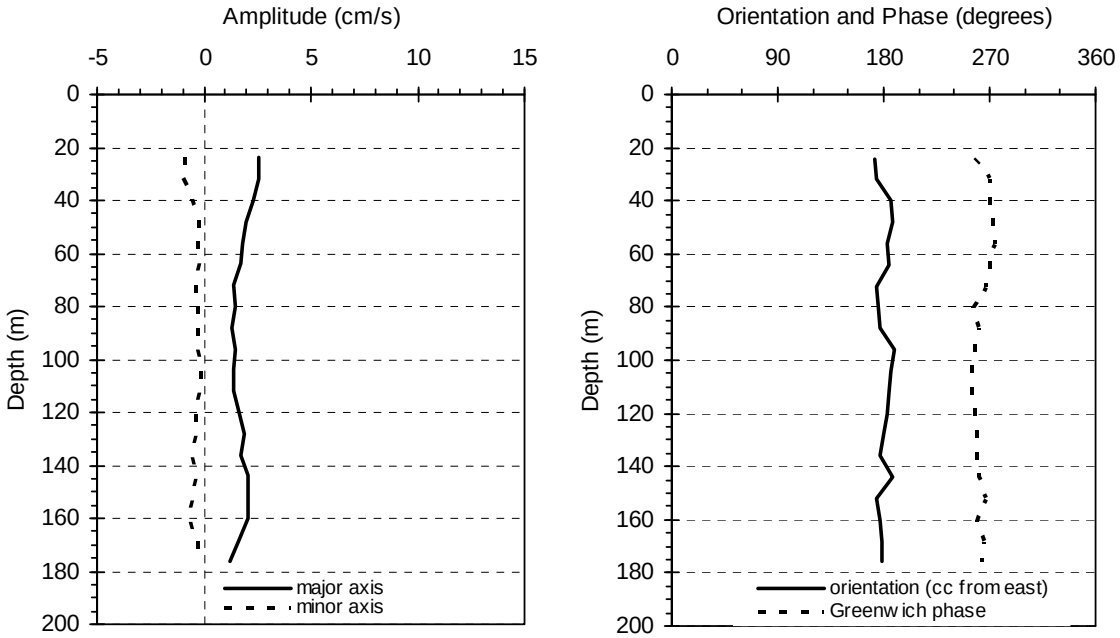


Figure 55 – S2 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period:

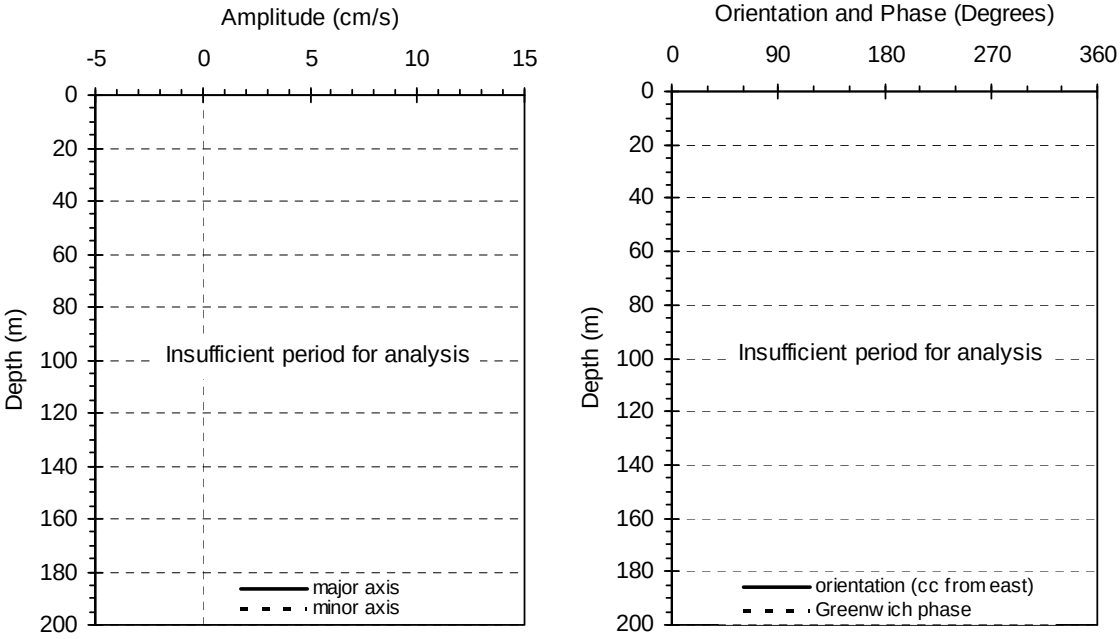
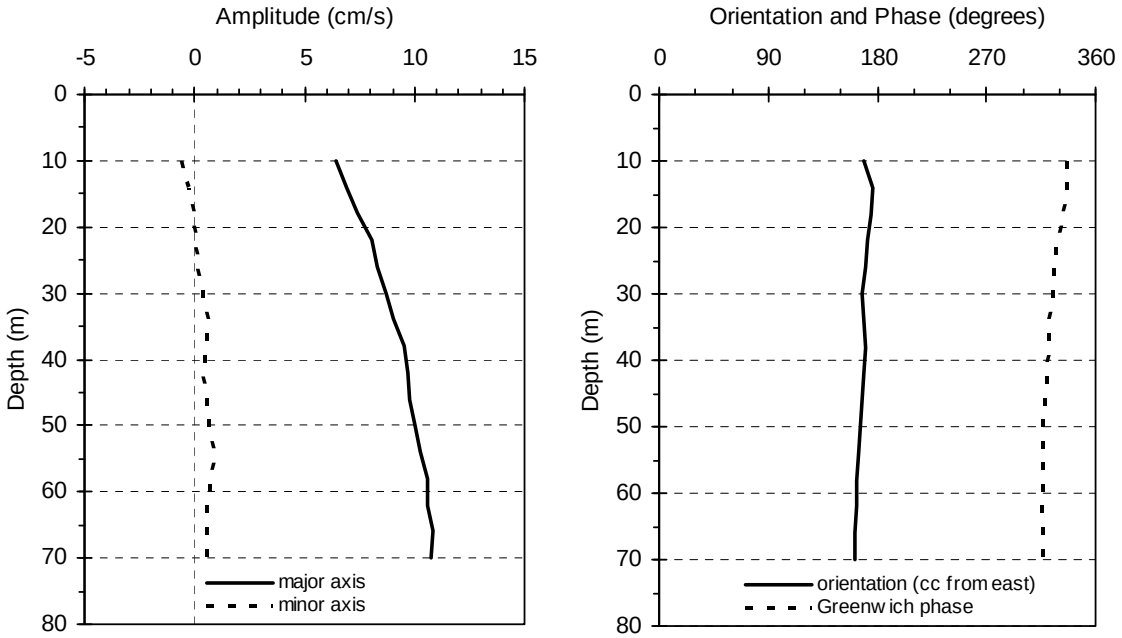


Figure 56 – K1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period

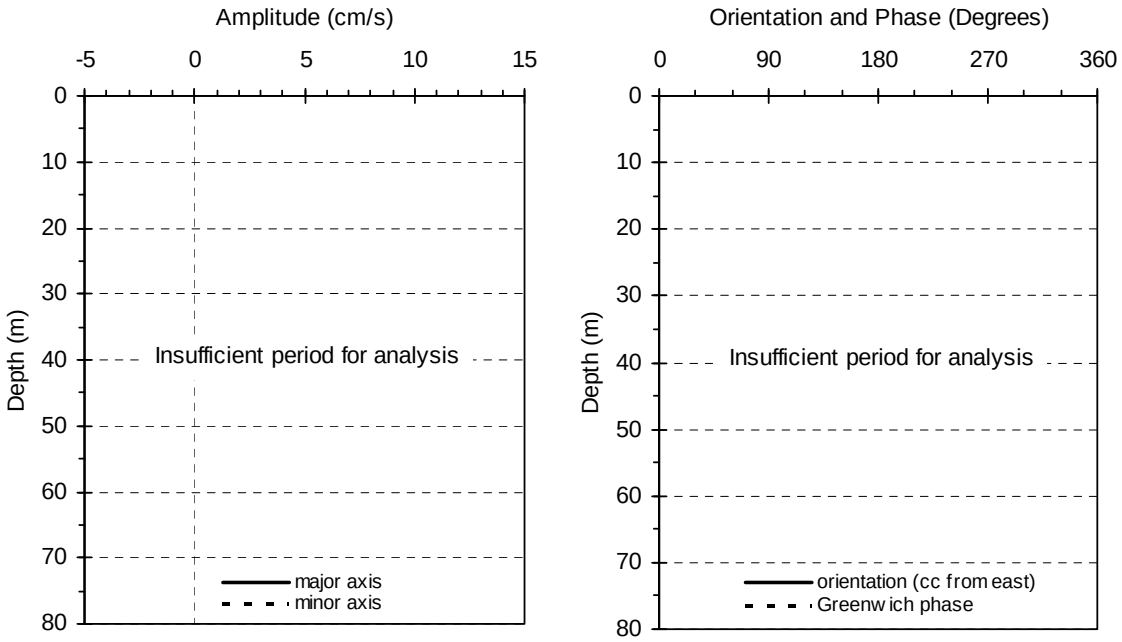
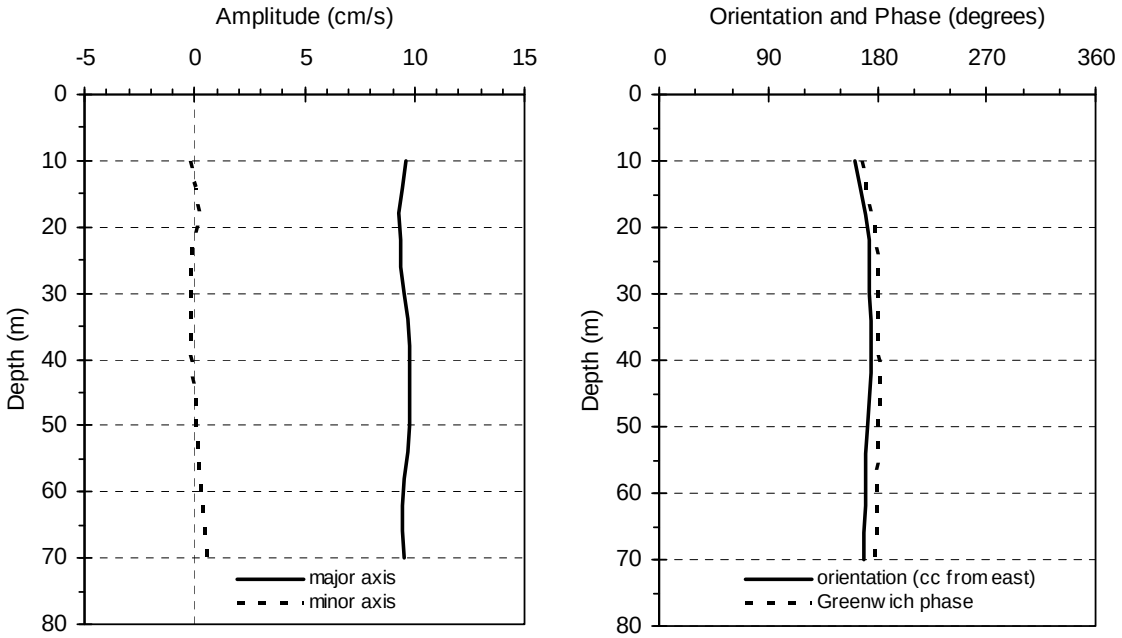


Figure 57 – M2 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period

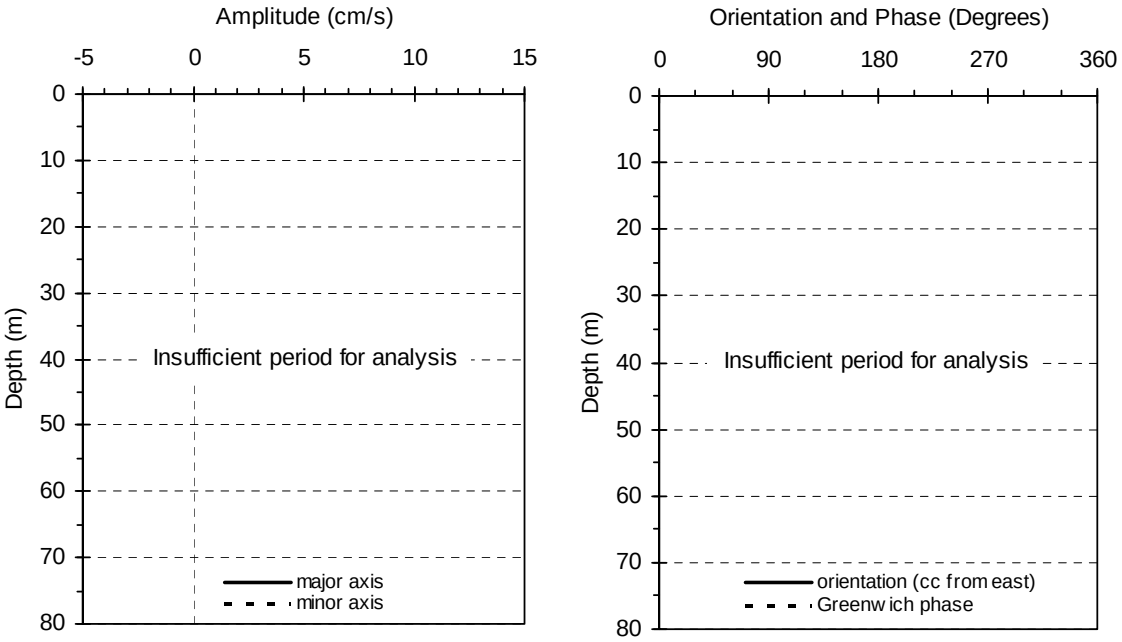
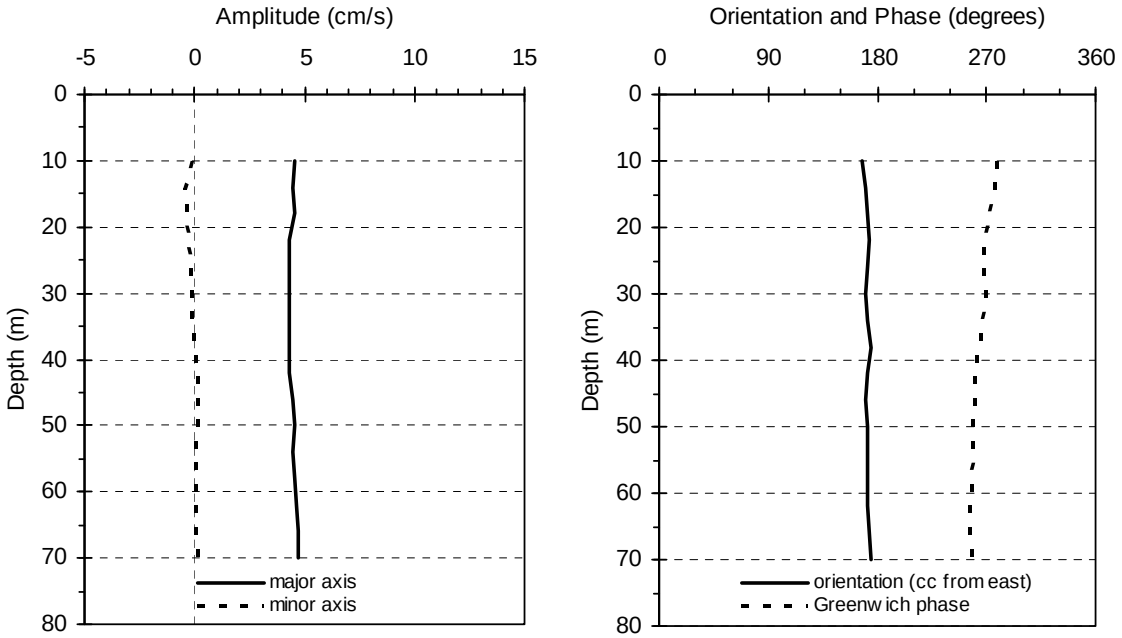


Figure 58 – O1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period

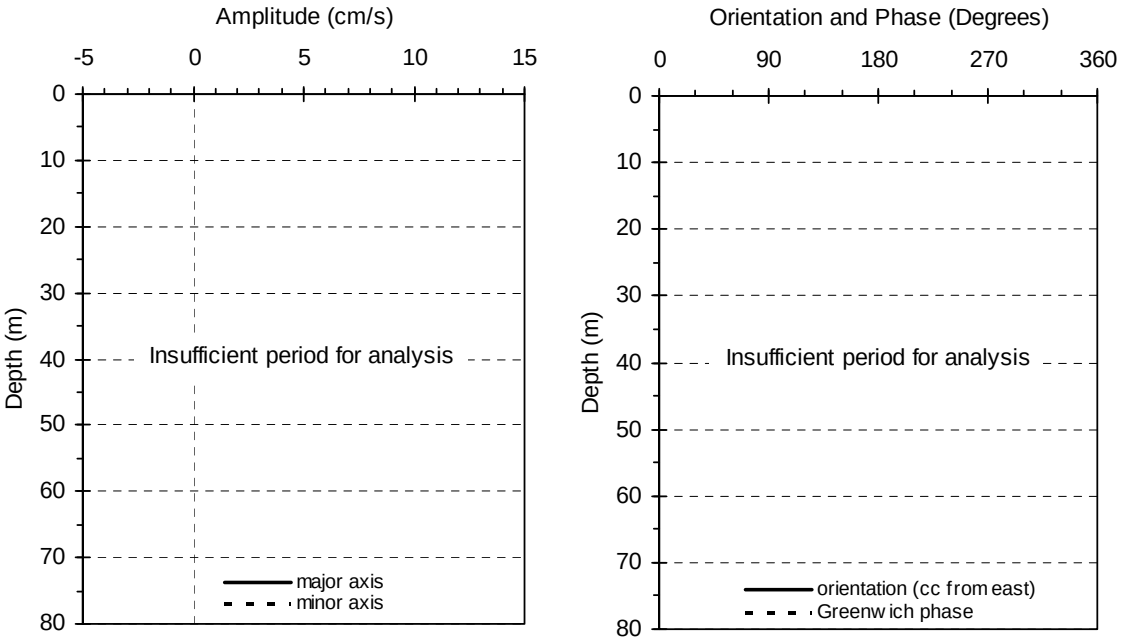
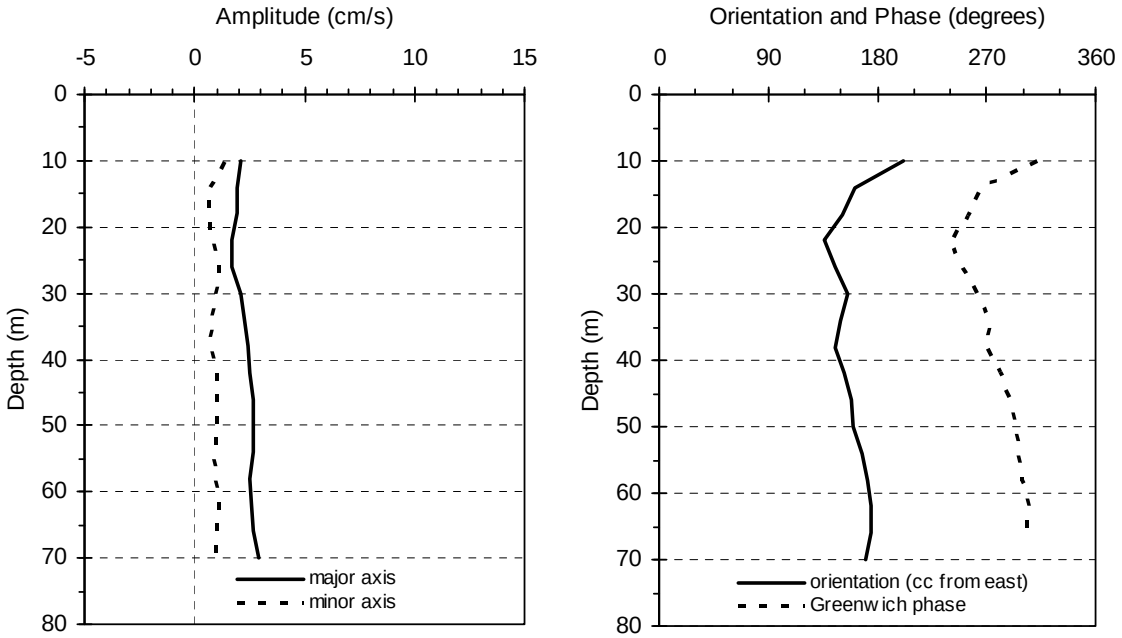


Figure 59 – P1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period

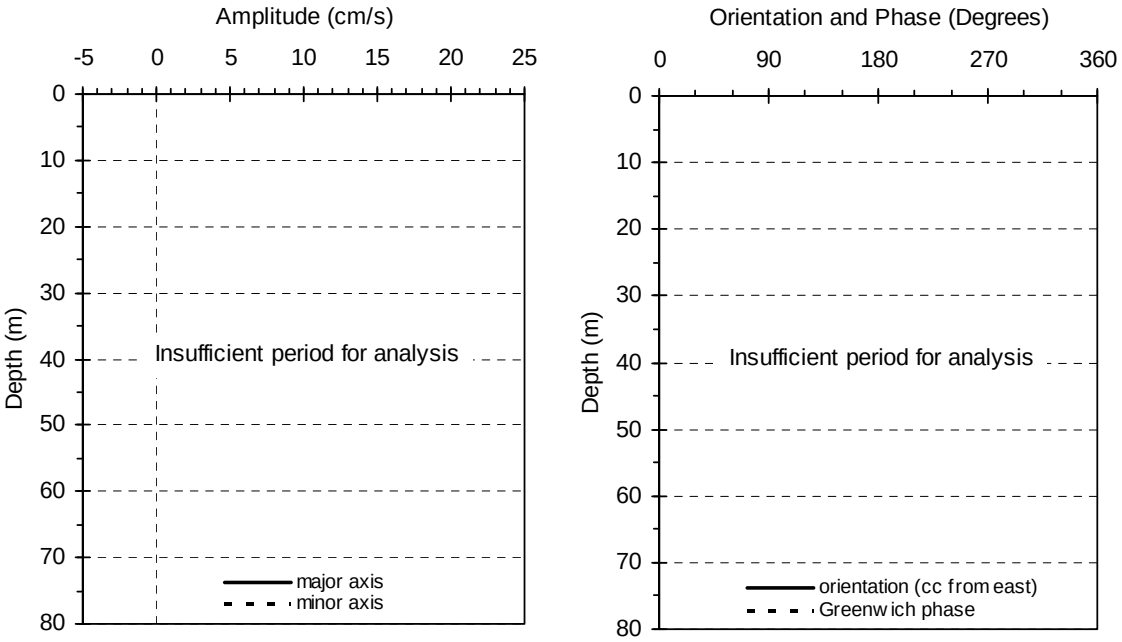
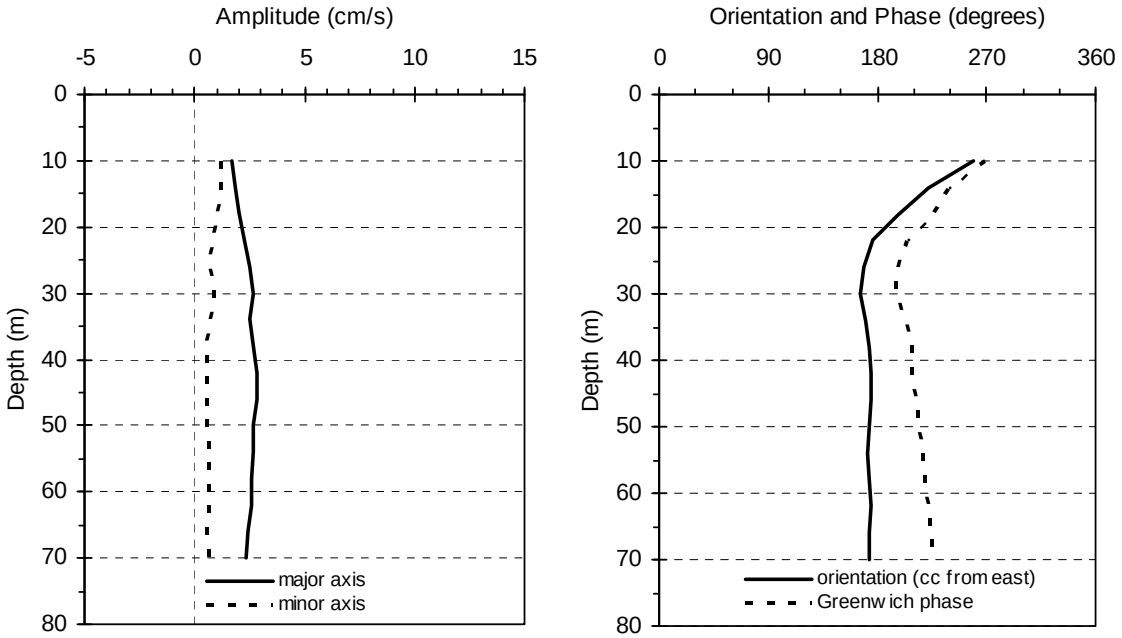


Figure 60 – S2 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Jun. 04, 2004 to Aug. 02, 2004):



For Solid Ice Period

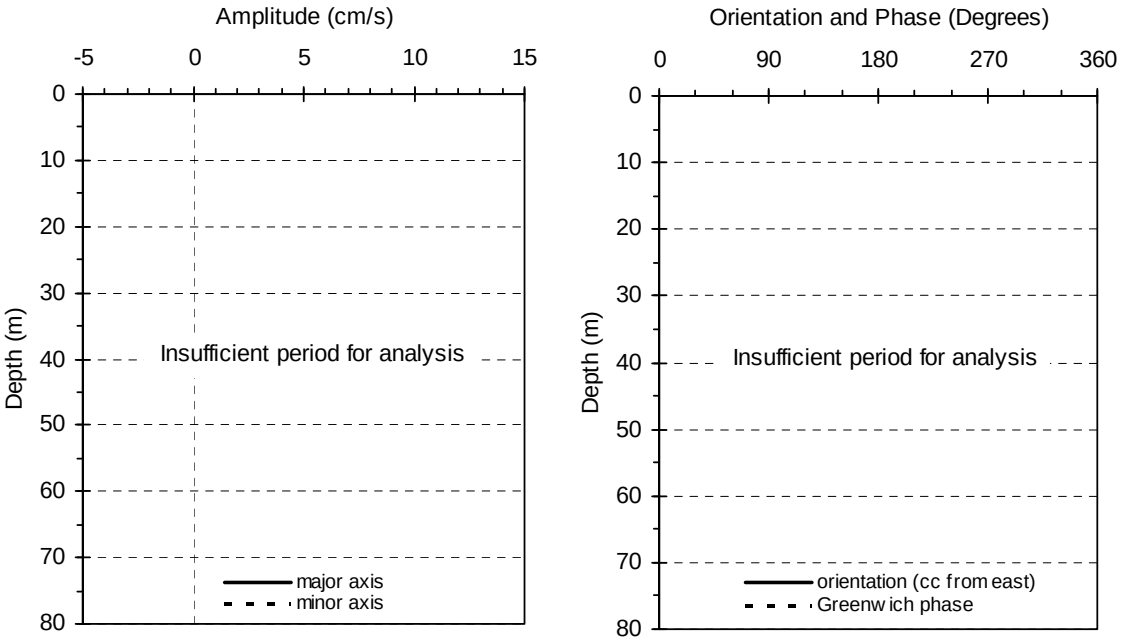


Figure 61 - Ice velocity data, South side of Barrow Strait
August 2003 - August 2004

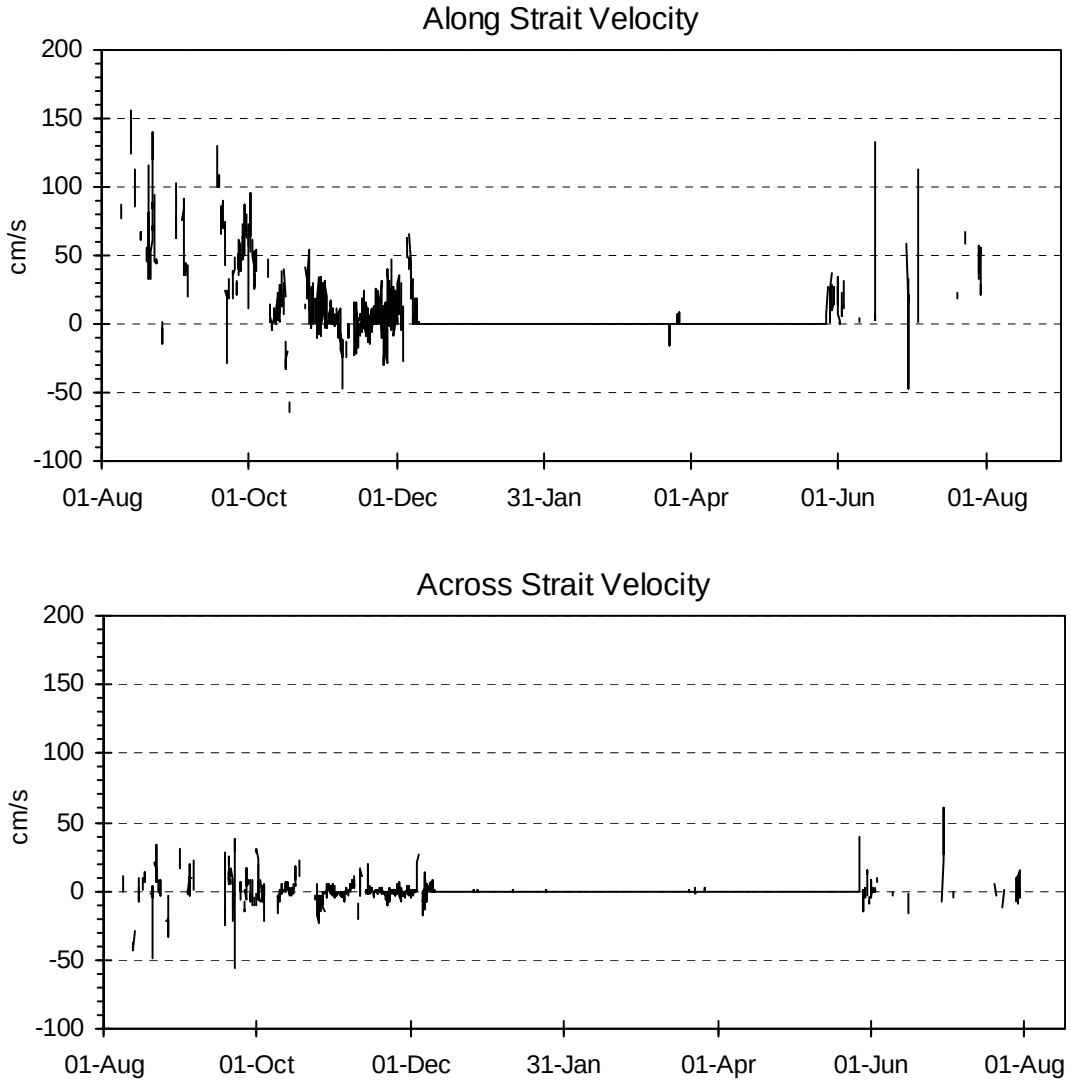
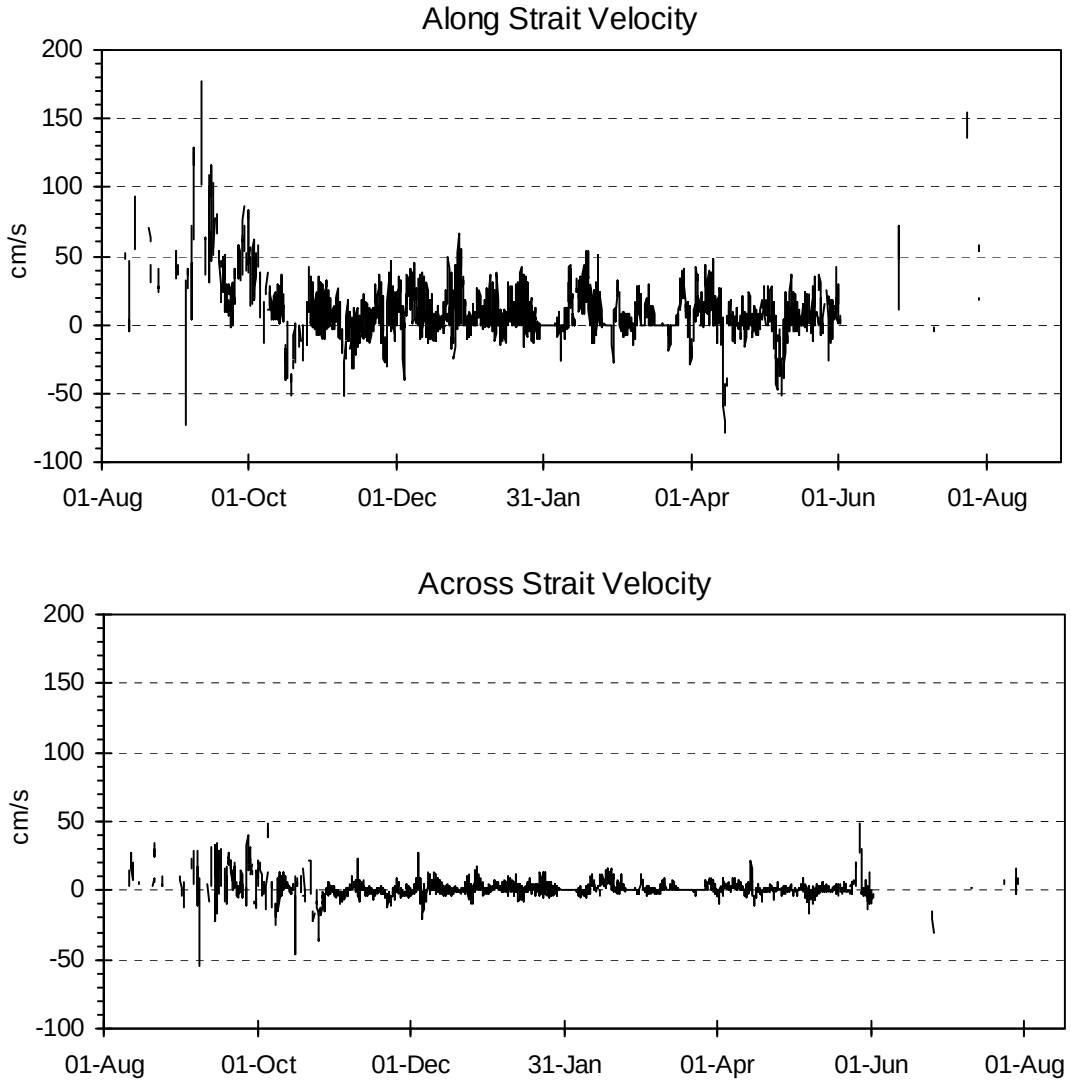


Figure 62 - Ice velocity data, South-central Barrow Strait
August 2003 - August 2004



<u>Figure 63</u> - Ice velocity data, Central Barrow Strait
August 2003 - August 2004

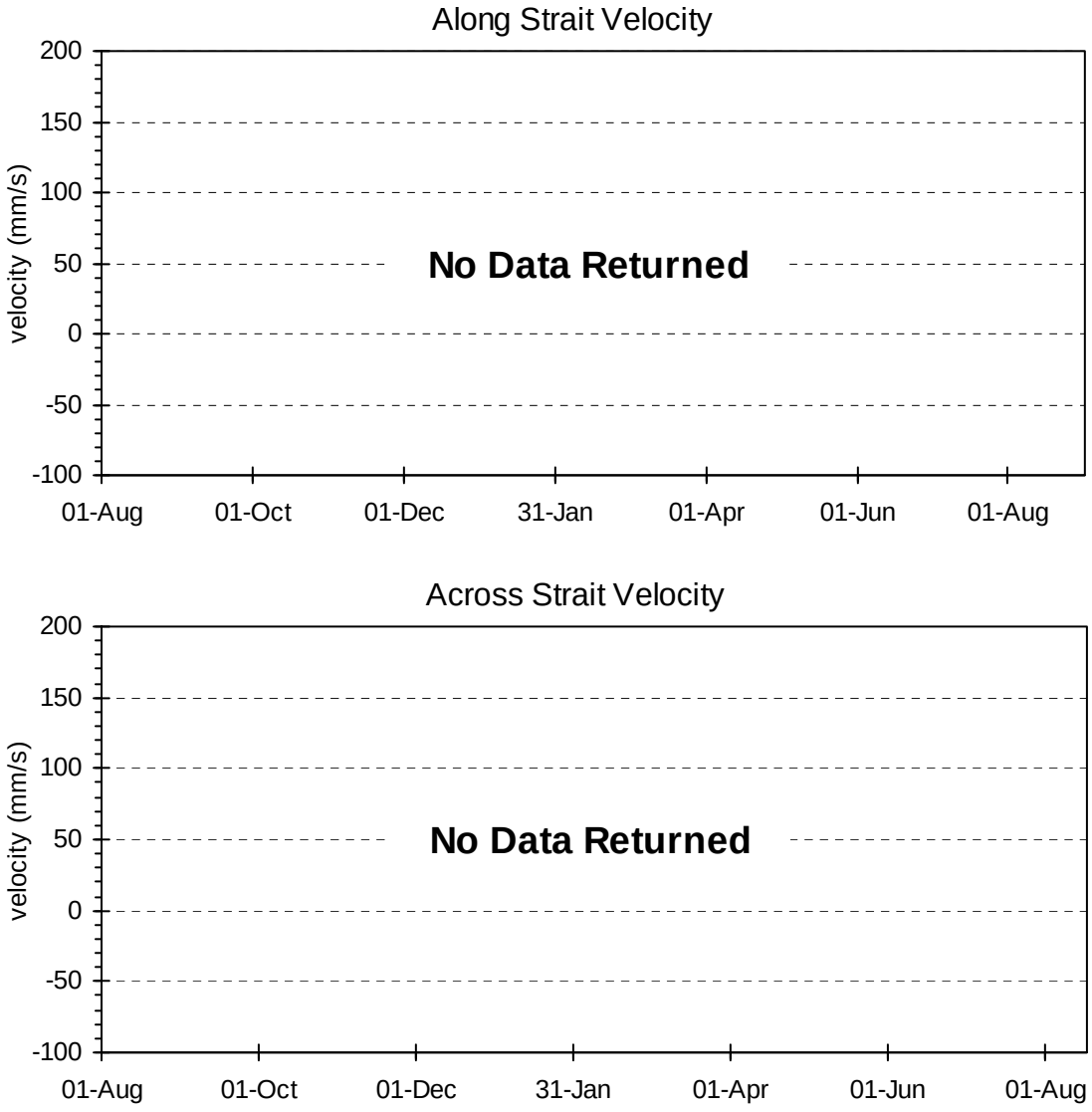


Figure 64 - Ice velocity data, North side of Barrow Strait
August 2003 - August 2004

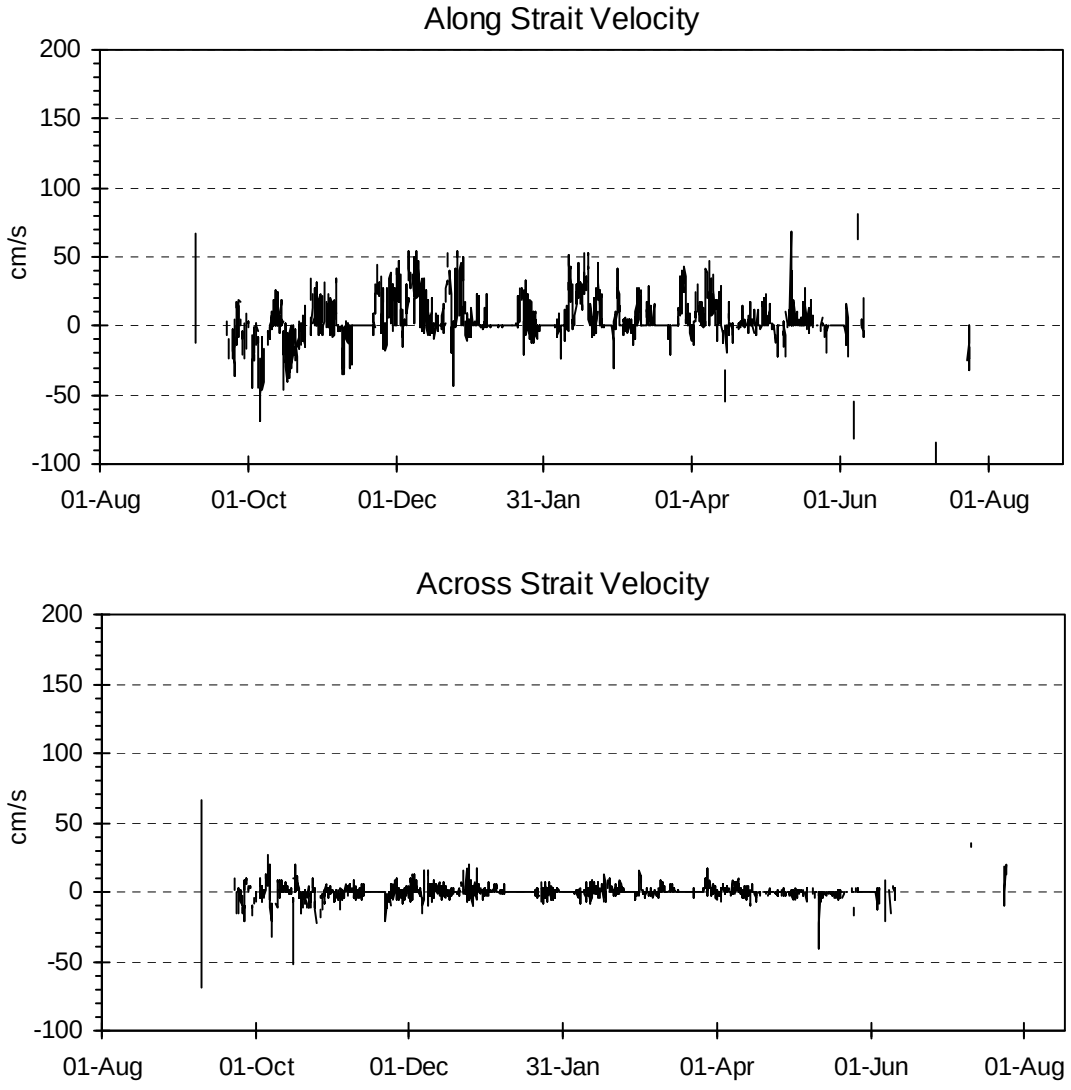


Figure 65: Ice Draft Statistics from Ice Profiling Sonar
South-Central Barrow Strait, August 2003 – July 2004

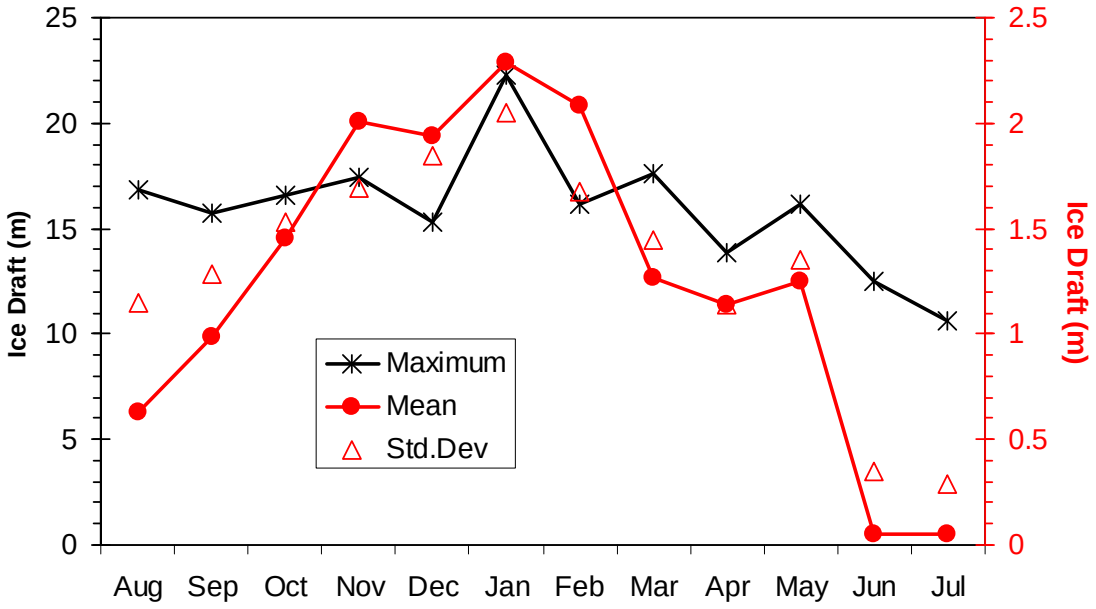


Figure 66: Frequency of Occurrence vs. Ice Draft in meters
South-Central Barrow Strait, August 2003 – July 2004

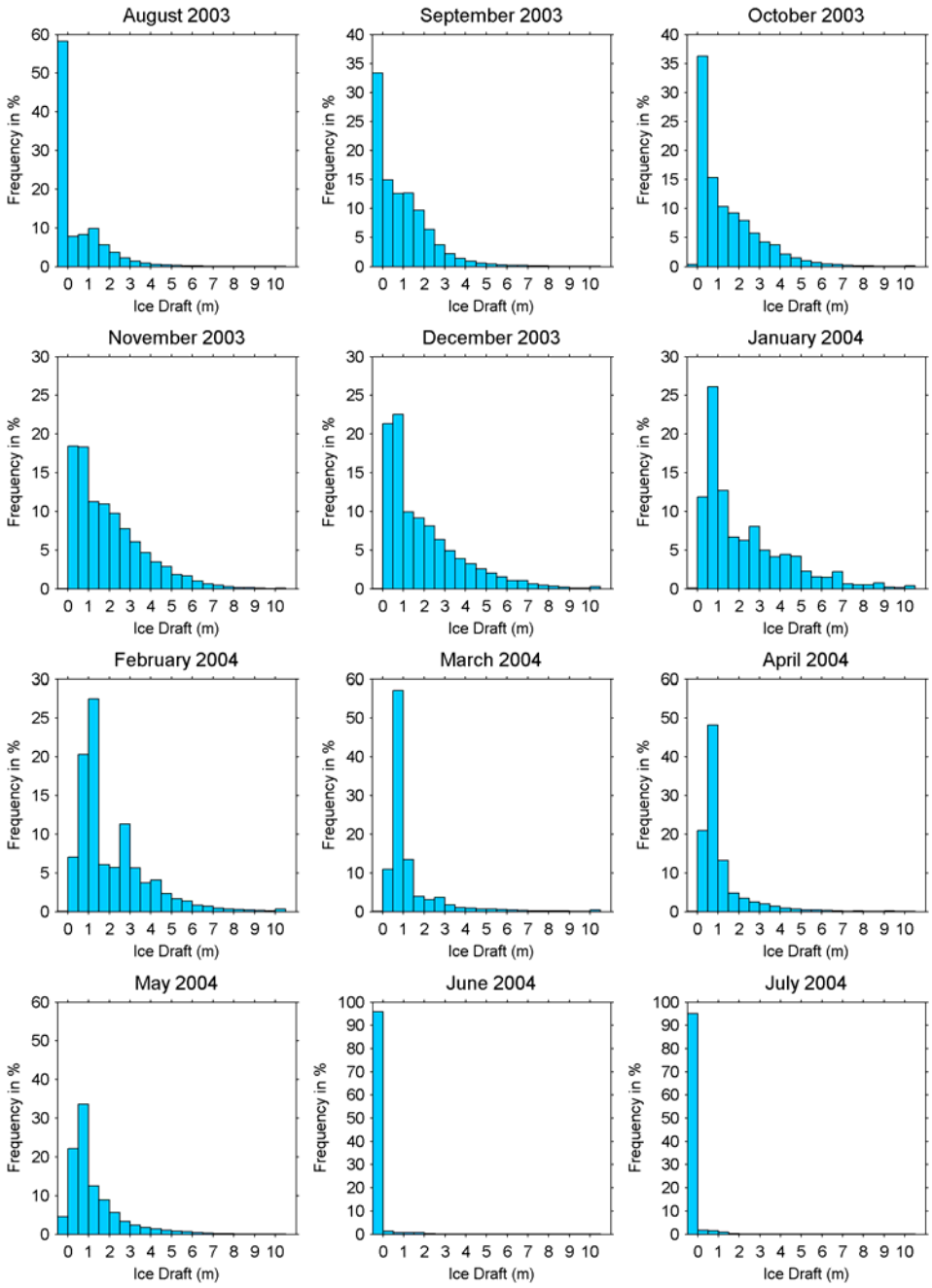


Figure 67: Low-pass filtered Pressure and Temperature. Central Barrow Strait, August 2003 – August 2004

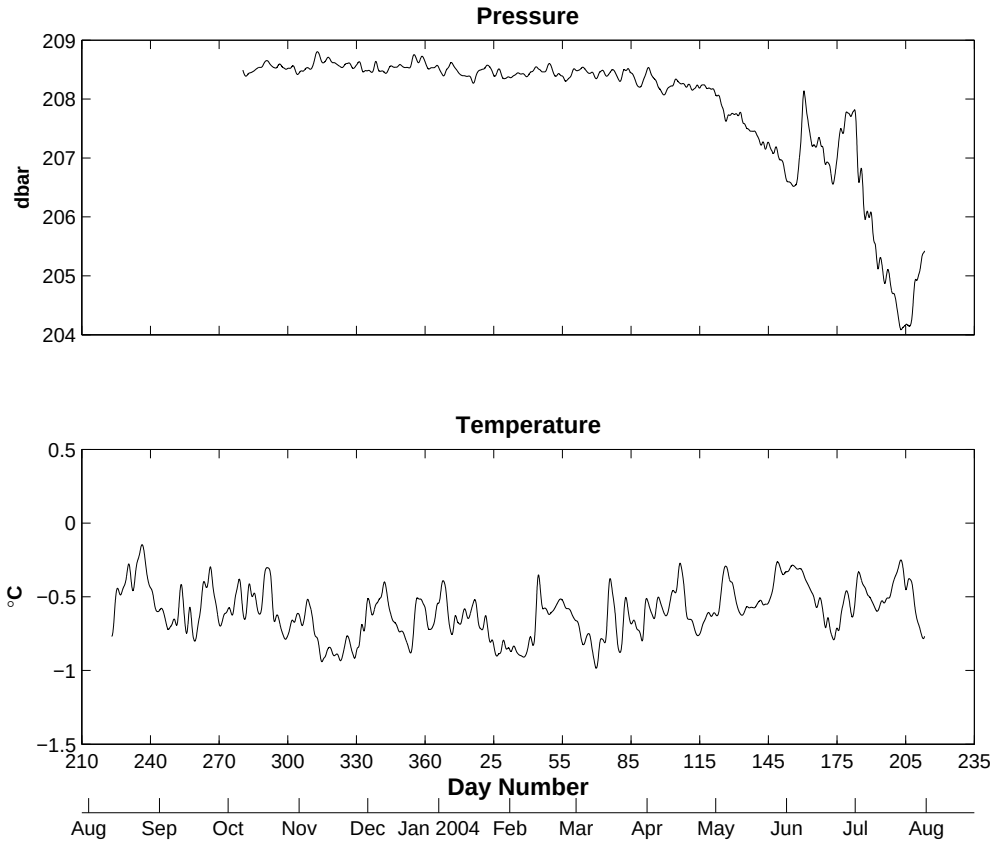
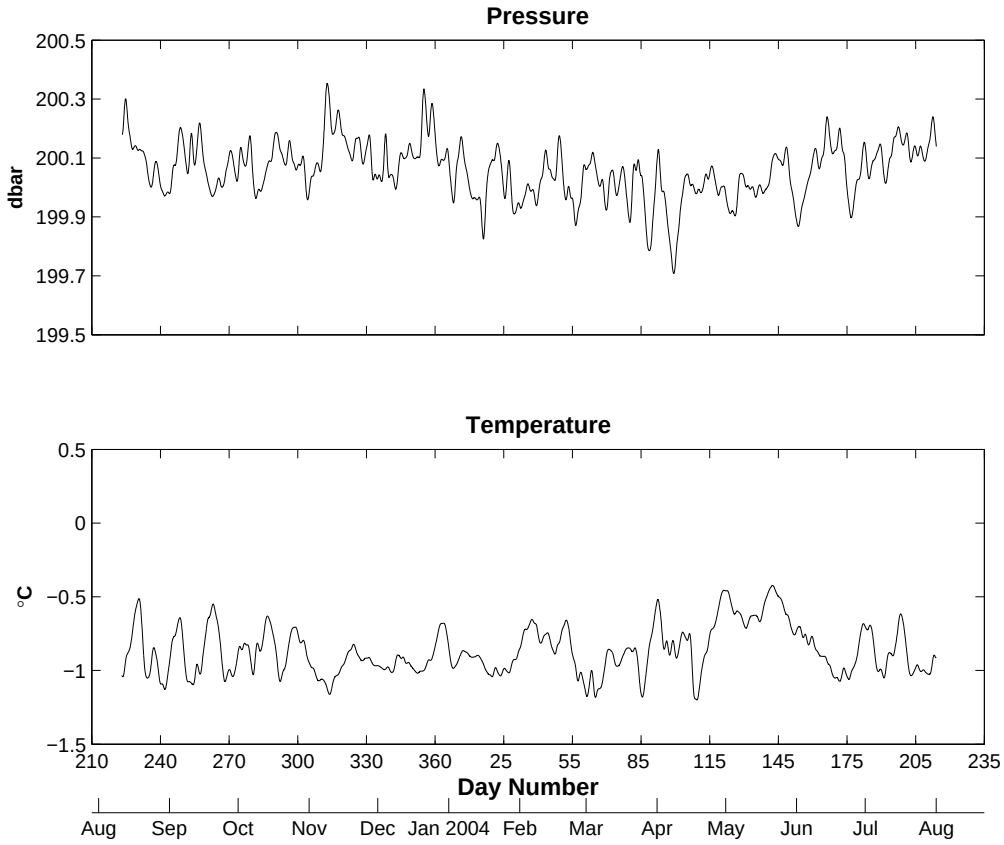


Figure 68: Low-pass filtered Pressure and Temperature.
North Side of Barrow Strait, August 2003 – August 2004



<u>Figure 69</u>: Low-pass filtered Pressure and Temperature.
West Barrow Strait, August 2003 – August 2004

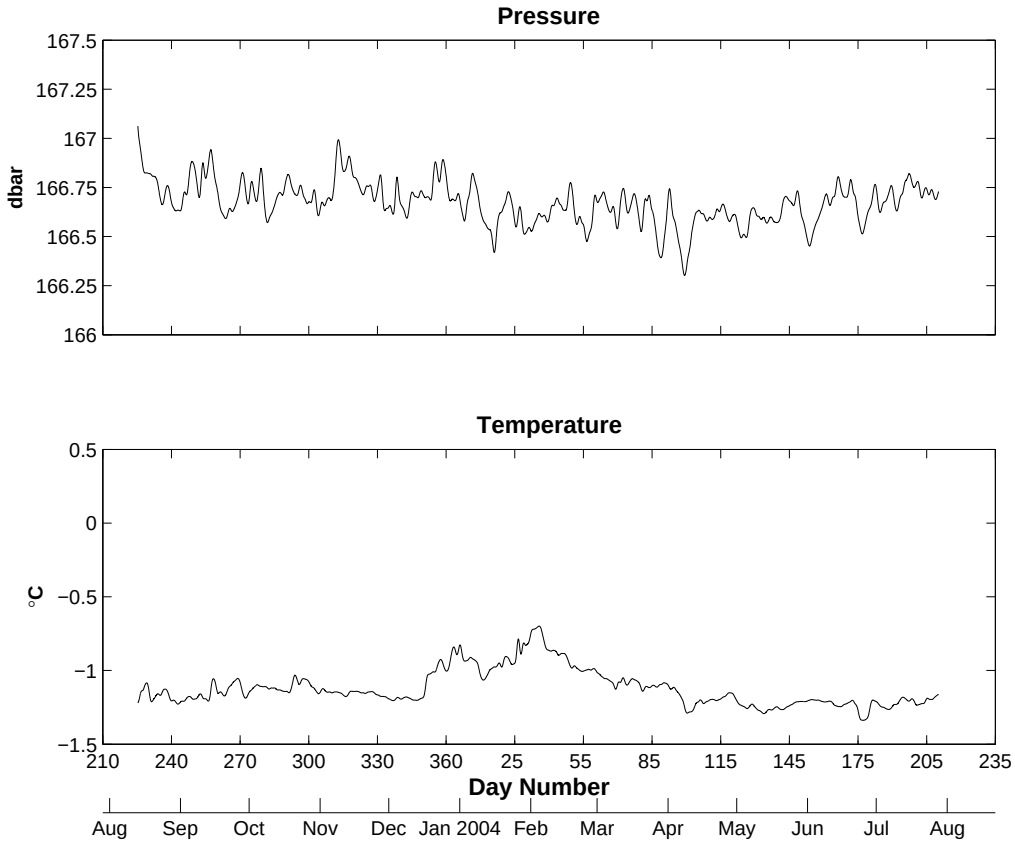
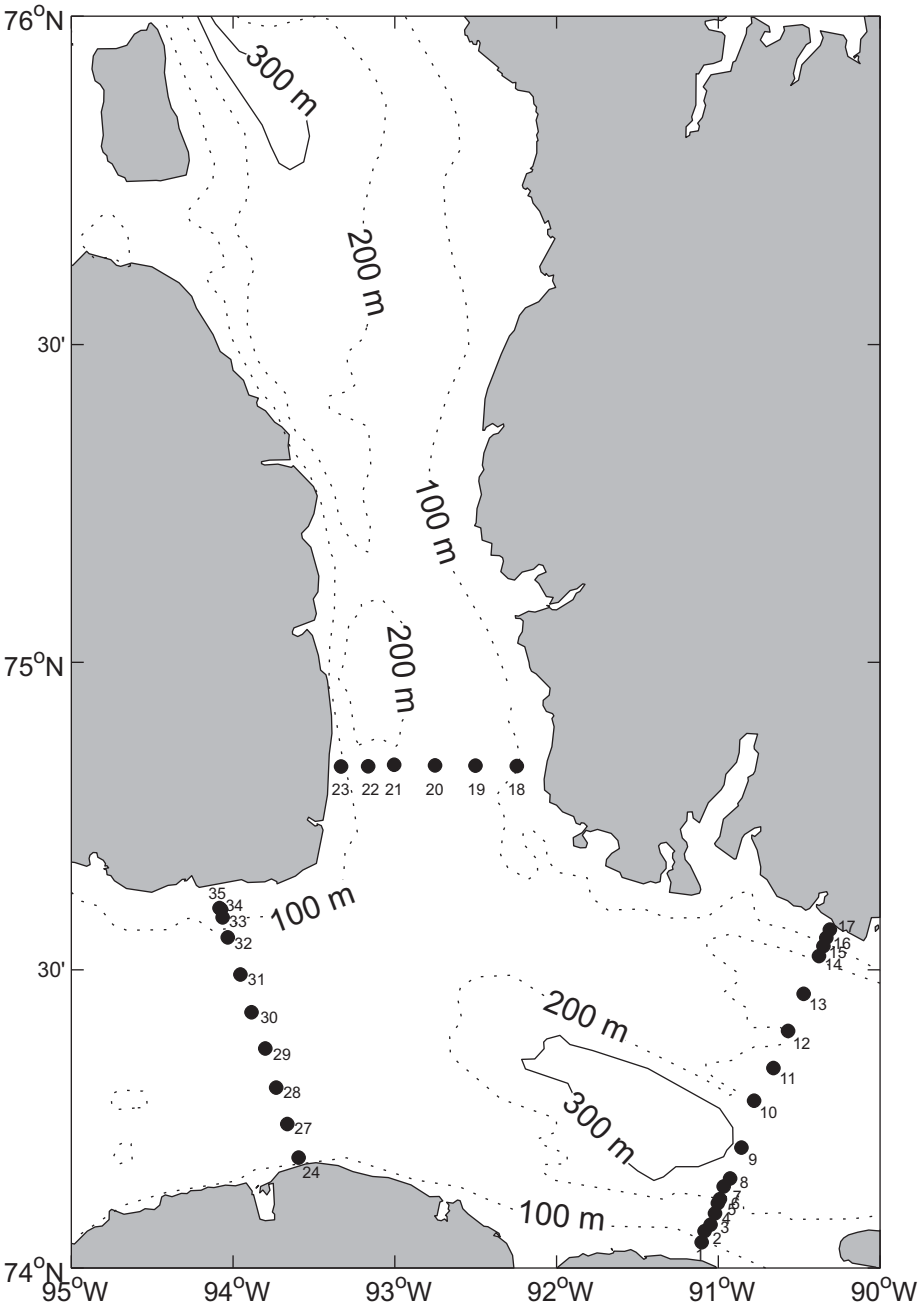


Figure 70 - CTD Station Positions, August 2004



<u>Figure 71</u> – Eastern Barrow Strait CTD Line, Aug 5-6, 2004.

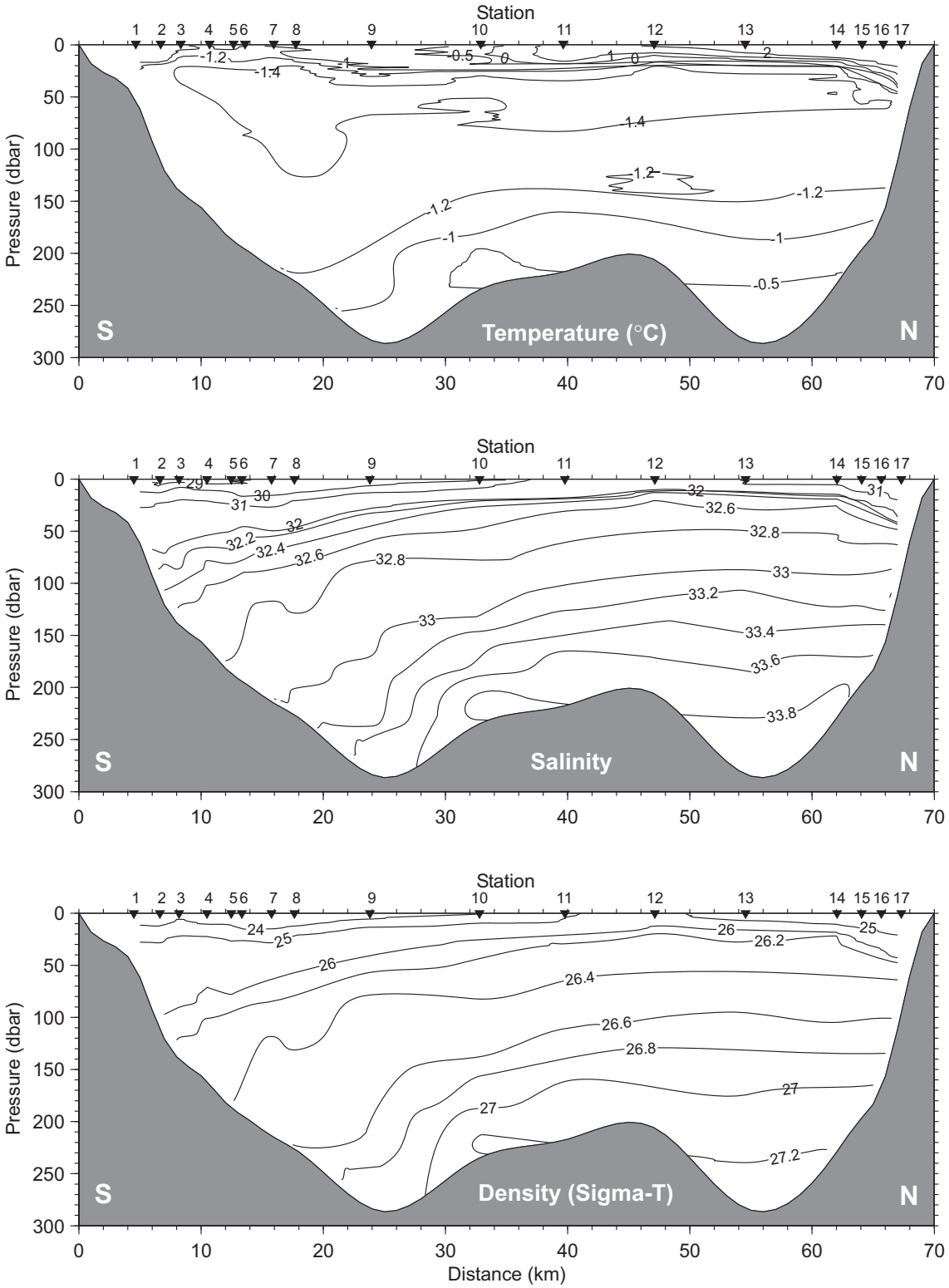
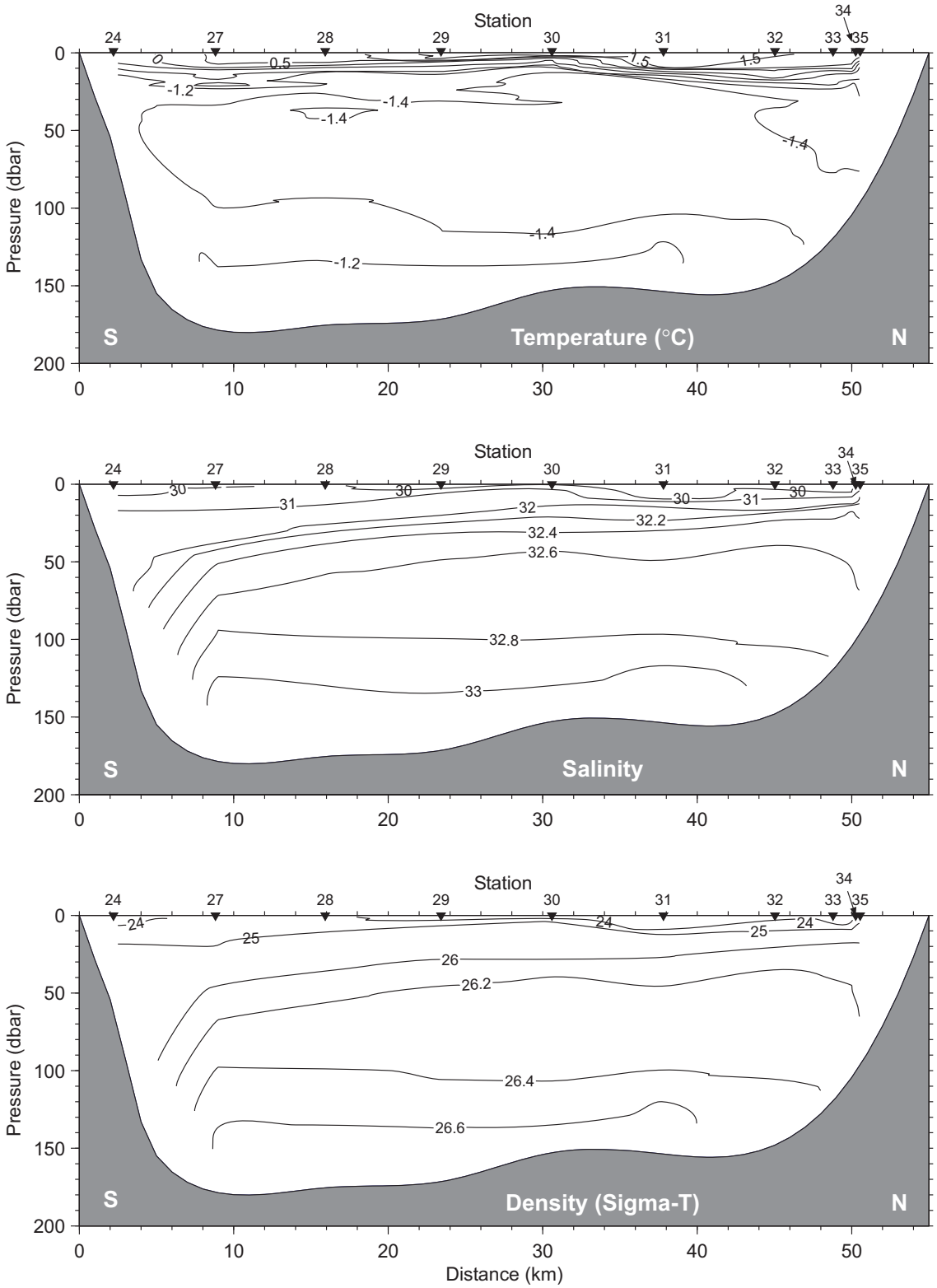


Figure 72 – Western Barrow Strait CTD Line, Jul. 30, 2004.



<u>Figure 73</u> – Wellington Channel CTD Line, Aug. 7, 2004.

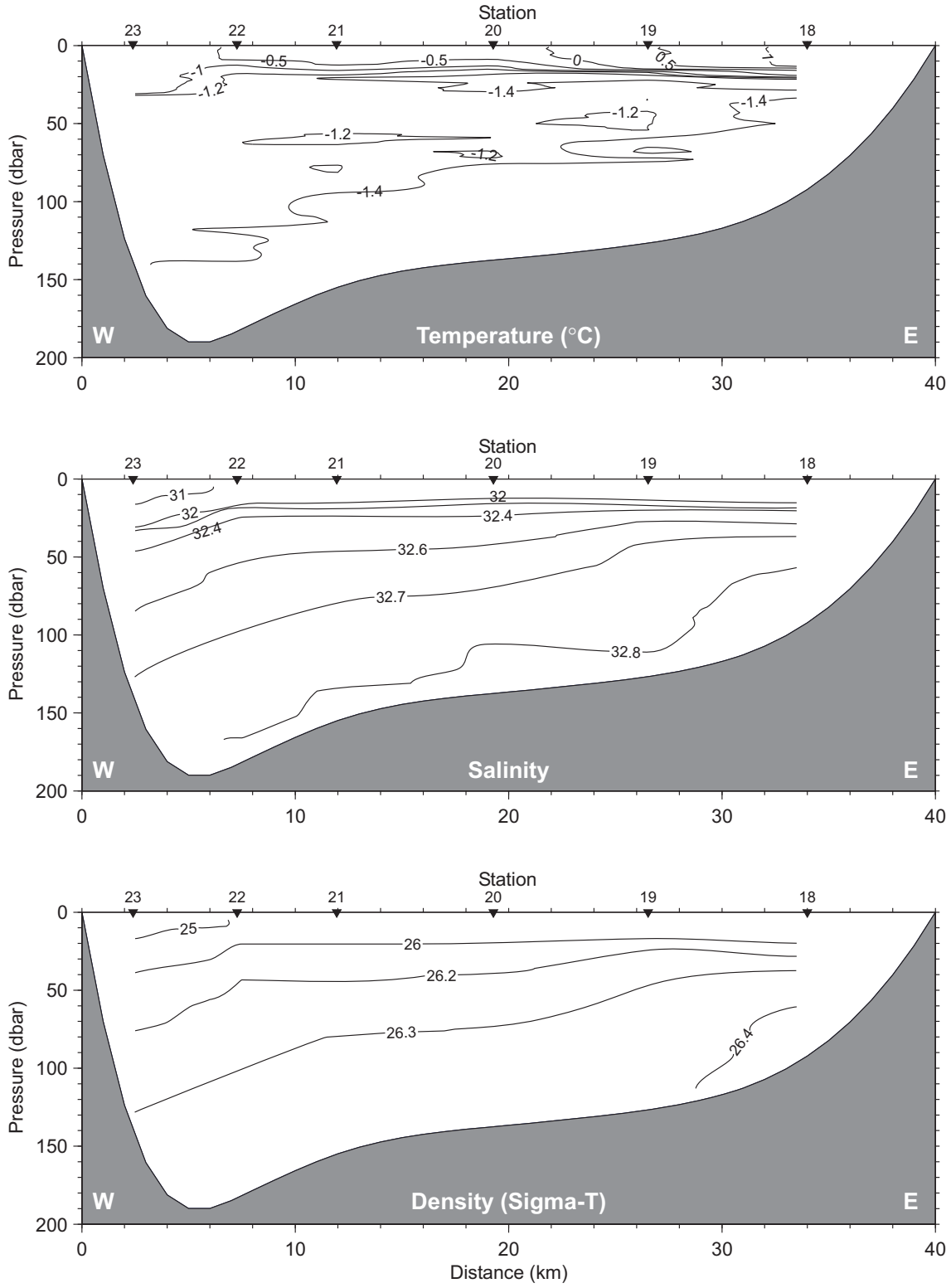


Table 1: Mooring Information, Barrow Strait, 2003-04

South Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1482	ICYCLER	54	154	74.0817	-90.9867	11-Aug-2003 12:00	01-Aug-2004 12:00	86400
1483	ADCP	74	146	74.0834	-91.0443	07-Aug-2003 18:00	01-Aug-2004 12:00	7200
1483	MCTD	76	146	74.0834	-91.0443	07-Aug-2003 18:00	01-Aug-2004 12:30	1800
1483	WLR	146	146	74.0834	-91.0443	Instrument Flooded, No Data Returned		3600
1484	ADCP	143	147	74.0817	-91.0331	07-Aug-2003 16:00	01-Aug-2004 12:00	7200
1484	MCTD	145	147	74.0817	-91.0331	07-Aug-2003 15:30	01-Aug-2004 12:30	1800
1485	MCTD	34	151	74.0837	-91.0150	07-Aug-2003 15:00	01-Aug-2004 12:00	1800
1485	MCTD	39	151	74.0837	-91.0150	07-Aug-2003 15:00	01-Aug-2004 12:00	1800

South-Central Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1486	ADCP	78	263	74.1961	-90.8468	08-Aug-2003 14:00	01-Aug-2004 16:00	7200
1486	MCTD	261	263	74.1961	-90.8468	08-Aug-2003 13:30	01-Aug-2004 17:00	1800
1486	MCTD	37	263	74.1961	-90.8468	08-Aug-2003 13:30	01-Aug-2004 17:00	1800
1486	MCTD	158	263	74.1961	-90.8468	08-Aug-2003 13:30	01-Aug-2004 17:00	1800
1487	MCTD	65	259	74.1953	-90.8367	07-Aug-2003 20:00	01-Aug-2004 15:00	1800
1487	IPS	52	259	74.1953	-90.8367	07-Aug-2003 19:54	01-Aug-2004 15:04	2

†**ADCP**: RDI Workhorse ADCP, **LRADCP**: Long Range ADCP, **MCTD**: Moored CTD, **WLR**: Water Level Recorder, **IPS**: Ice Profiling Sonar

Table 1: Mooring Information, Barrow Strait, 2003-04 (continued)

Central Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1488	LRADCP	192	205	74.3191	-90.7501	09-Aug-2003 16:00	01-Aug-2004 18:00	7200
1489	MCTD	159	207	74.3198	-90.7332	09-Aug-2003 14:00	01-Aug-2004 18:30	1800
1489	MCTD	40	207	74.3198	-90.7332	09-Aug-2003 14:00	01-Aug-2004 18:30	1800
1489	MCTD	79	207	74.3198	-90.7332	09-Aug-2003 14:00	01-Aug-2004 18:30	1800
1489	WLR	207	207	74.3198	-90.7332	09-Aug-2003 14:00	01-Aug-2004 18:30	3600

North Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1490	ADCP	76	200	74.5358	-90.4248	09-Aug-2003 20:00	02-Aug-2004 12:00	7200
1490	MCTD	78	200	74.5358	-90.4248	09-Aug-2003 18:30	02-Aug-2004 12:30	1800
1490	MCTD	158	200	74.5358	-90.4248	09-Aug-2003 18:30	02-Aug-2004 12:30	1800
1491	MCTD	38	198	74.5367	-90.4068	09-Aug-2003 18:00	02-Aug-2004 12:00	1800
1491	WLR	198	198	74.5367	-90.4068	09-Aug-2003 18:00	02-Aug-2004 12:00	3600

West Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1492	WLR	164	164	74.3940	-93.8275	11-Aug-2003 21:00	29-Jul-2004 17:00	3600

†**ADCP**: RDI Workhorse ADCP, **LRADCP**: Long Range ADCP, **MCTD**: Moored CTD, **WLR**: Water Level Recorder, **IPS**: Ice Profiling Sonar

Table 2: South Side Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 7, 2003 - September 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.32	0.12	-1.64	-0.63	31.19	0.50	29.51	32.25	25.07	0.40	23.72	25.93	39.50	25.25	-26.04	118.16	4.65	8.46	-24.63	36.30
39	40	-1.34	0.11	-1.64	-0.76	31.47	0.42	29.90	32.51	25.30	0.34	24.03	26.14	37.11	24.23	-24.43	118.43	4.60	7.90	-20.29	46.97
76	77	-1.35	0.11	-1.55	-0.60	32.32	0.14	31.86	32.67	25.99	0.11	25.62	26.27	29.69	22.01	-33.72	92.13	2.40	6.81	-19.53	30.11
145	137	-1.30	0.05	-1.45	-1.00	32.73	0.17	32.29	33.18	26.32	0.14	25.97	26.68	12.48	15.22	-35.84	60.60	1.05	5.78	-14.69	17.25

Table 3: South-Central Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 8, 2003 - September 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.15	0.34	-1.60	0.01	32.05	0.30	30.76	32.71	25.77	0.24	24.73	26.30	27.90	16.42	-18.10	77.43	7.48	6.53	-11.17	25.50
65	64	-1.14	0.25	-1.52	-0.45	32.50	0.15	31.70	33.04	26.14	0.12	25.46	26.57	22.74	16.54	-20.97	69.40	6.47	6.64	-11.91	25.20
158		-1.19	0.06	-1.44	-0.89	33.18	0.12	32.89	33.65	26.68	0.10	26.46	27.06								
261		-0.73	0.18	-1.22	-0.38	33.66	0.16	33.10	33.87	27.06	0.12	26.62	27.21								

Table 4: Central Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 9, 2003 - September 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.03	0.23	-1.49	-0.39	32.46	0.15	31.96	32.80	26.09	0.12	25.68	26.38	2.95	14.53	-34.28	40.55	5.29	5.62	-7.46	22.35
79	80	-1.28	0.08	-1.57	-0.95	32.84	0.06	32.58	33.07	26.42	0.05	26.19	26.60	1.43	14.10	-35.54	37.63	4.92	6.01	-11.11	25.39
159	160	-1.11	0.07	-1.26	-0.74	33.32	0.11	33.07	33.70	26.80	0.09	26.59	27.09	-0.07	15.36	-41.69	44.74	3.23	7.26	-18.39	26.00

Table 5: North Side Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 9, 2003 - September 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-0.98	0.25	-1.40	0.20	32.56	0.24	31.06	32.91	26.18	0.20	24.92	26.46	-2.57	15.43	-47.33	33.37	0.17	4.65	-15.15	22.69
78	70	-1.36	0.05	-1.50	-1.12	32.89	0.08	32.62	33.12	26.45	0.07	26.23	26.64	-1.47	14.91	-40.55	38.00	-0.08	3.73	-11.73	11.25
158		-1.17	0.11	-1.36	-0.77	33.40	0.17	33.02	33.83	26.86	0.13	26.56	27.21								

Table 6: South Side Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2003 - December 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.45	0.13	-1.71	-1.06	31.23	0.50	29.70	32.29	25.11	0.40	23.87	25.97	12.45	18.68	-36.26	65.79	-0.95	6.26	-27.92	22.35
39	40	-1.42	0.11	-1.71	-1.16	31.38	0.43	29.99	32.38	25.23	0.35	24.11	26.05	11.63	18.85	-39.27	70.10	-0.45	5.95	-27.76	25.45
76	77	-1.31	0.07	-1.71	-1.06	32.31	0.18	31.74	32.86	25.99	0.15	25.52	26.43	7.51	20.79	-57.72	69.07	-0.12	6.06	-19.93	20.51
145	137	-1.11	0.16	-1.35	-0.69	33.11	0.32	32.25	33.71	26.63	0.26	25.93	27.09	2.03	17.70	-48.18	48.23	-0.70	5.10	-21.29	13.59

Table 7: South-Central Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2003 - December 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.43	0.14	-1.72	-0.94	31.62	0.29	30.64	32.29	25.43	0.23	24.63	25.96	7.63	15.97	-36.39	71.15	0.78	6.75	-17.97	35.64
65	64	-1.31	0.12	-1.72	-0.91	32.31	0.16	31.86	32.78	25.99	0.13	25.62	26.36	5.83	15.73	-34.46	57.66	0.72	6.68	-20.71	27.68
158		-1.16	0.05	-1.32	-0.93	33.18	0.10	32.87	33.58	26.69	0.08	26.43	27.00								
261		-0.52	0.14	-1.01	-0.14	33.77	0.08	33.40	33.98	27.14	0.06	26.86	27.29								

Table 8: Central Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2003 - December 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.38	0.21	-1.74	-0.89	31.82	0.35	30.60	32.61	25.59	0.28	24.60	26.23	3.96	15.25	-35.27	47.66	1.69	5.92	-16.58	24.09
79	80	-1.22	0.05	-1.48	-0.93	32.64	0.13	32.23	32.95	26.24	0.11	25.92	26.50	1.37	15.28	-33.12	46.44	1.41	5.74	-15.32	20.97
159	160	-1.10	0.06	-1.22	-0.88	33.28	0.10	32.80	33.62	26.76	0.08	26.38	27.03	-1.02	15.43	-39.18	47.60	0.98	6.71	-18.62	22.53

Table 9: North Side Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2003 - December 20, 2003

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-1.30	0.17	-1.70	-0.85	32.00	0.53	29.74	32.70	25.73	0.42	23.90	26.30	-1.95	13.22	-40.84	33.67	-1.01	4.82	-21.54	16.73
78	70	-1.23	0.05	-1.38	-1.01	32.72	0.12	32.26	33.08	26.31	0.10	25.94	26.61	-2.51	13.72	-41.25	32.78	-1.37	4.20	-18.13	11.18
158		-1.12	0.08	-1.31	-0.87	33.30	0.15	32.89	33.68	26.78	0.12	26.45	27.08								

Table 10: South Side Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2003 - March 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.63	0.07	-1.75	-1.35	31.41	0.37	30.75	32.43	25.26	0.30	24.72	26.09	6.87	14.46	-40.13	47.40	-0.21	4.49	-15.10	17.67
39	40	-1.59	0.09	-1.76	-1.34	31.57	0.40	30.75	32.51	25.38	0.33	24.72	26.16	7.65	16.21	-45.64	55.43	-0.19	5.24	-14.83	15.49
76	77	-1.40	0.10	-1.77	-1.20	32.44	0.21	31.49	32.87	26.09	0.17	25.32	26.44	5.84	21.31	-64.37	68.34	-0.24	6.24	-22.56	22.88
145	137	-1.04	0.22	-1.54	-0.60	33.21	0.35	32.54	33.79	26.71	0.28	26.17	27.15	2.91	17.85	-52.16	43.97	-0.78	5.23	-20.94	17.02

Table 11: South-Central Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2003 - March 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.61	0.09	-1.77	-1.34	31.64	0.38	30.62	32.51	25.45	0.31	24.62	26.15	8.95	15.49	-32.36	55.77	1.77	7.01	-33.38	25.00
65	64	-1.50	0.12	-1.78	-1.26	32.31	0.24	31.02	32.74	25.98	0.20	24.94	26.34	6.15	16.88	-50.00	65.09	0.85	9.01	-25.44	27.59
158		-1.05	0.12	-1.68	-0.67	33.33	0.18	32.78	33.75	26.80	0.14	26.37	27.13								
261		-0.50	0.16	-1.10	-0.18	33.77	0.10	33.10	33.92	27.14	0.08	26.61	27.24								

Table 12: Central Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2003 - March 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.60	0.11	-1.78	-1.29	32.06	0.29	31.10	32.60	25.79	0.23	25.01	26.23	4.46	15.87	-42.39	52.99	1.74	6.31	-20.89	30.41
79	80	-1.39	0.17	-1.76	-1.19	32.68	0.10	32.22	33.03	26.29	0.08	25.91	26.57	0.53	16.26	-49.92	58.60	1.35	7.31	-26.11	25.67
159	160	-1.08	0.08	-1.66	-0.83	33.35	0.10	32.77	33.61	26.82	0.08	26.36	27.02	-1.71	15.60	-45.98	46.21	0.42	6.58	-20.84	22.60

Table 13: North Side Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2003 - March 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-1.57	0.16	-1.77	-1.20	32.57	0.13	32.14	33.00	26.20	0.11	25.85	26.55	2.16	13.12	-36.55	35.43	-0.32	4.24	-20.70	13.81
78	70	-1.31	0.10	-1.74	-1.19	32.89	0.11	32.51	33.17	26.46	0.09	26.15	26.68	-0.47	13.48	-35.21	31.80	-0.81	3.57	-12.69	11.95
158		-1.15	0.13	-1.42	-0.68	33.35	0.12	33.01	33.71	26.82	0.09	26.55	27.11								

Table 14: South Side Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2004 - June 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.53	0.14	-1.75	-0.53	31.75	0.24	31.15	32.41	25.53	0.19	25.02	26.06	9.88	13.35	-26.63	54.27	-0.06	4.45	-16.43	13.93
39	40	-1.49	0.13	-1.75	-0.66	31.89	0.23	31.31	32.58	25.64	0.19	25.18	26.21	10.12	12.95	-30.11	48.59	0.04	4.70	-15.22	15.43
76	77	-1.42	0.11	-1.74	-1.28	32.52	0.10	32.16	32.82	26.16	0.08	25.86	26.41	7.94	13.07	-31.75	42.38	-0.20	4.97	-18.86	15.21
145	137	-1.22	0.13	-1.65	-0.74	33.02	0.18	32.65	33.61	26.56	0.14	26.26	27.02	1.05	14.03	-42.36	33.82	-0.86	5.07	-22.98	14.94

Table 15: South-Central Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2004 - June 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.55	0.13	-1.76	-0.31	31.98	0.29	31.09	32.67	25.72	0.23	25.00	26.29	8.12	15.44	-40.22	54.57	2.00	6.43	-17.41	22.49
65	64	-1.55	0.11	-1.77	-1.29	32.56	0.10	32.24	32.91	26.19	0.09	25.93	26.48	6.03	15.18	-35.71	53.64	1.59	5.93	-19.36	21.13
158		-1.15	0.11	-1.77	-0.75	33.17	0.16	32.76	33.67	26.68	0.12	26.36	27.08								
261		-0.48	0.11	-1.05	-0.22	33.76	0.06	33.19	33.87	27.13	0.04	26.69	27.21								

Table 16: Central Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2004 - June 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.55	0.10	-1.76	-1.32	32.29	0.19	31.51	32.75	25.97	0.15	25.33	26.34	2.14	14.43	-36.15	38.27	2.90	6.45	-19.96	22.87
79	80	-1.63	0.11	-1.77	-1.27	32.73	0.05	32.49	33.02	26.33	0.04	26.13	26.57	-0.08	9.47	-30.51	28.10	1.96	4.62	-11.47	17.04
159	160	-1.11	0.11	-1.35	-0.68	33.26	0.14	32.96	33.72	26.74	0.11	26.51	27.11	-1.59	8.57	-29.07	26.71	1.38	4.53	-16.14	17.91

Table 17: North Side Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2004 - June 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-1.66	0.07	-1.77	-1.36	32.39	0.28	31.47	32.82	26.06	0.23	25.31	26.41	4.61	12.87	-33.60	42.60	-1.38	4.16	-13.68	12.78
78	70	-1.50	0.12	-1.75	-1.20	32.86	0.10	32.44	33.19	26.44	0.08	26.10	26.69	4.60	13.66	-38.27	46.82	-1.35	4.36	-17.58	10.76
158		-1.06	0.17	-1.37	-0.58	33.48	0.13	33.18	33.80	26.93	0.10	26.69	27.17								

Table 18: South Side Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2004 - August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.42	0.14	-1.64	-0.28	31.77	0.21	30.50	32.29	25.55	0.17	24.51	25.97	33.17	14.97	-11.03	71.44	1.85	6.08	-14.68	29.31
39	40	-1.43	0.13	-1.64	-0.32	31.93	0.19	30.56	32.47	25.68	0.16	24.55	26.12	31.27	14.22	-11.32	67.27	1.63	5.83	-13.56	24.25
76	77	-1.41	0.10	-1.67	-1.28	32.52	0.09	32.01	32.77	26.15	0.07	25.74	26.36	24.22	13.41	-25.39	72.64	0.61	5.28	-15.10	18.51
145	137	-1.32	0.07	-1.53	-0.91	32.79	0.12	32.54	33.44	26.37	0.09	26.17	26.88	11.28	11.85	-36.61	43.25	1.06	5.53	-14.07	16.65

Table 19: South-Central Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2004 - August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.46	0.18	-1.74	-0.17	32.42	0.18	31.53	32.77	26.08	0.15	25.31	26.36	20.91	17.05	-20.06	60.82	2.98	7.69	-22.46	23.57
65	64	-1.56	0.10	-1.75	-1.29	32.67	0.07	32.39	32.92	26.28	0.06	26.05	26.48	18.94	16.59	-22.48	58.27	2.91	6.86	-16.07	20.44
158		-1.14	0.17	-1.56	-0.63	33.18	0.21	32.82	33.72	26.68	0.16	26.40	27.11								
261		-0.41	0.08	-1.04	-0.28	33.76	0.05	33.29	33.84	27.13	0.04	26.77	27.18								

Table 20: Central Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2004 - August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.51	0.09	-1.74	-0.80	32.60	0.08	32.11	32.84	26.23	0.06	25.81	26.42	1.47	15.65	-39.85	39.47	1.17	5.69	-17.42	17.56
79	80	-1.54	0.11	-1.76	-1.24	32.82	0.04	32.58	33.04	26.40	0.03	26.20	26.58	0.05	13.35	-37.90	36.02	0.96	4.87	-12.01	15.38
159	160	-0.95	0.12	-1.17	-0.52	33.50	0.07	33.29	33.76	26.94	0.05	26.77	27.14	-3.20	12.41	-36.57	32.79	0.45	5.41	-14.00	20.10

Table 21: North Side Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2004 - August 2, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-1.43	0.13	-1.68	-0.14	32.54	0.18	31.49	32.83	26.17	0.15	25.30	26.41	1.16	14.01	-37.43	35.87	-2.18	4.34	-28.17	10.49
78	70	-1.44	0.11	-1.71	-1.23	32.89	0.08	32.59	33.15	26.45	0.06	26.22	26.66	1.60	14.82	-43.42	33.62	-2.21	4.19	-14.89	17.19
158		-1.16	0.07	-1.34	-0.85	33.46	0.09	33.25	33.76	26.91	0.07	26.74	27.15								

Table 22: South Side Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 7, 2003 – August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
34	32	-1.50	0.16	-1.75	-0.28	31.46	0.45	29.51	32.43	25.30	0.37	23.72	26.09	16.11	20.65	-40.13	118.16	0.48	6.01	-27.92	36.30
39	40	-1.47	0.14	-1.76	-0.32	31.64	0.41	29.90	32.58	25.44	0.34	24.03	26.21	15.64	20.19	-45.64	118.43	0.60	5.98	-27.76	46.97
76	77	-1.38	0.11	-1.77	-0.60	32.42	0.18	31.49	32.87	26.07	0.15	25.32	26.44	12.27	21.15	-64.37	92.13	0.27	6.01	-22.56	30.11
145	137	-1.17	0.19	-1.65	-0.60	33.03	0.31	32.25	33.79	26.56	0.25	25.93	27.15	4.36	16.52	-52.16	60.60	-0.34	5.32	-22.98	17.25

Table 23: South-Central Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 8, 2003 – August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
37	36	-1.48	0.22	-1.77	0.01	31.86	0.41	30.62	32.77	25.62	0.33	24.62	26.36	12.08	17.42	-40.22	77.43	2.41	7.11	-33.38	35.64
65	64	-1.43	0.20	-1.78	-0.45	32.44	0.22	31.02	33.04	26.09	0.18	24.94	26.57	9.53	17.31	-50.00	69.40	1.93	7.41	-25.44	27.68
158		-1.13	0.11	-1.77	-0.63	33.22	0.17	32.76	33.75	26.71	0.13	26.36	27.13								
261		-0.52	0.16	-1.22	-0.14	33.75	0.10	33.10	33.98	27.12	0.07	26.61	27.29								

Table 24: Central Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 9, 2003 – August 1, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	40	-1.45	0.23	-1.78	-0.39	32.17	0.37	30.60	32.84	25.87	0.30	24.60	26.42	3.21	15.20	-42.39	52.99	2.37	6.22	-20.89	30.41
79	80	-1.41	0.20	-1.77	-0.93	32.72	0.12	32.22	33.07	26.32	0.09	25.91	26.60	0.64	13.94	-49.92	58.60	1.89	5.98	-26.11	25.67
159	160	-1.08	0.10	-1.66	-0.52	33.32	0.13	32.77	33.76	26.80	0.11	26.36	27.14	-1.48	13.70	-45.98	47.60	1.14	6.17	-20.84	26.00

Table 25: North Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 9, 2003 – August 2, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	38	-1.43	0.27	-1.77	0.20	32.37	0.40	29.74	33.00	26.04	0.32	23.90	26.55	1.07	13.75	-47.33	42.60	-0.93	4.49	-28.17	22.69
78	70	-1.36	0.14	-1.75	-1.01	32.84	0.13	32.26	33.19	26.41	0.10	25.94	26.69	0.44	14.18	-43.42	46.82	-1.17	4.07	-18.13	17.19
158		-1.12	0.13	-1.42	-0.58	33.39	0.15	32.89	33.83	26.85	0.12	26.45	27.21								

Table 26 - Tidal Constants for K1 Constituent

South Side Barrow Strait

For Ice Free Period (June 3, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	8.95	-0.91	168	359
16	8.42	-0.45	169	358
20	7.71	-0.05	171	357
24	7.15	0.18	174	354
28	7.16	0.32	175	353
32	7.30	0.56	173	352
36	7.13	0.92	170	350
40	6.91	0.87	169	347
44	6.17	0.98	172	343
48	5.74	1.40	171	341
52	5.58	1.80	171	339
56	5.78	1.89	169	335
60	5.89	1.62	171	336
64	5.74	1.34	171	333
68	5.87	1.83	170	328
73	5.86	2.36	167	322
77	5.92	2.79	161	311
81	5.82	3.21	164	309
85	5.80	3.27	160	306
89	5.93	3.06	156	301
93	6.23	2.91	152	298
97	6.67	2.77	144	289
101	6.87	2.61	143	289
105	6.59	2.37	143	289
109	6.55	2.41	142	288
113	6.74	2.42	143	288
117	7.22	2.31	143	288
121	7.52	2.30	145	289
125	7.62	2.33	147	288
129	7.57	2.21	148	287
133	7.63	2.17	147	283
137	7.62	1.82	146	277

Table 26 - Tidal Constants for K1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Dec. 08, 2003 – May 27, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	7.10	1.49	182	343
16	7.77	1.52	177	341
20	8.09	1.37	172	339
24	8.16	1.14	167	336
28	8.29	0.99	164	333
32	8.37	0.96	161	332
36	8.29	1.15	160	330
40	8.18	1.14	158	328
44	8.29	1.12	156	325
48	8.55	1.21	156	324
52	8.58	1.33	156	323
56	8.54	1.28	156	321
60	8.63	1.23	155	321
64	8.76	1.21	155	321
68	8.88	1.29	156	321
73	8.83	1.29	154	321
77	8.92	1.48	154	320
81	9.10	1.64	153	320
85	9.53	1.86	152	319
89	9.61	2.02	152	318
93	9.84	2.10	153	318
97	10.03	2.26	153	317
101	10.27	2.34	154	317
105	10.50	2.35	154	318
109	10.79	2.47	154	317
113	10.95	2.50	155	317
117	11.26	2.58	156	317
121	11.71	2.48	156	317
125	12.07	2.39	157	316
129	12.46	2.19	157	314
133	12.79	2.09	158	312
137	12.93	2.07	161	309

Table 26 - Tidal Constants for K1 Constituent (continued)

South-Central Barrow Strait

For Ice Free Period (Jun. 1, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	11.69	-0.56	162	345
16	11.92	0.19	164	344
20	11.66	-0.14	165	345
24	11.70	-0.85	167	346
28	11.46	-1.51	165	346
32	11.26	-1.24	163	344
36	11.36	-0.74	160	345
44	11.16	-1.75	158	344
48	11.48	-1.73	158	346
52	11.33	-1.79	157	347
56	11.36	-1.87	158	349
60	11.72	-2.09	158	349
64	11.99	-2.06	157	350
68	12.28	-2.12	157	350
72	12.51	-2.23	156	350

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 26 - Tidal Constants for K1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	10.34	-1.23	181	358
32	9.91	-1.19	180	355
40	9.54	-1.23	177	355
48	9.60	-1.49	177	359
56	9.74	-1.75	178	3
64	8.85	-1.75	178	6
72	8.50	-1.83	178	9
80	8.02	-1.94	177	14
88	8.06	-2.08	178	17
96	7.74	-1.93	179	20
104	7.37	-1.73	177	23
112	7.14	-1.61	176	20
120	7.06	-1.06	175	21
128	7.32	-1.15	174	20
136	7.49	-1.41	172	21
144	6.51	-1.30	175	22
152	7.30	-2.04	173	20
160	8.47	-2.03	175	23
168	7.28	-1.87	175	26
176	4.79	-1.14	173	38

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
	Insufficient period for analysis			

Table 26 - Tidal Constants for K1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	6.47	-0.57	169	336
14	6.89	-0.24	176	337
18	7.42	-0.04	175	334
22	8.09	0.02	172	329
26	8.33	0.16	170	326
30	8.70	0.38	168	324
34	9.04	0.60	169	322
38	9.55	0.54	170	322
42	9.67	0.43	169	320
46	9.77	0.51	167	319
50	10.03	0.63	166	318
54	10.23	0.87	164	317
58	10.59	0.78	163	317
62	10.60	0.53	162	316
66	10.85	0.56	161	317
70	10.79	0.52	162	317

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
		Insufficient period for analysis		

Table 27 - Tidal Constants for M2 Constituent

South Side Barrow Strait

For Ice Free Period (Jun. 3, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	9.17	-0.91	158	193
16	9.06	-0.75	157	193
20	9.03	-0.39	157	194
24	8.94	-0.50	158	195
28	8.89	-0.68	157	193
32	8.93	-0.75	155	190
36	8.95	-0.60	155	187
40	8.83	-0.39	155	186
44	8.70	-0.37	155	186
48	8.57	-0.39	155	188
52	8.61	-0.45	155	191
56	8.81	-0.47	156	193
60	8.89	-0.54	155	194
64	8.80	-0.63	155	195
68	8.86	-0.58	154	195
73	9.15	-1.02	153	199
77	9.42	-1.10	153	199
81	9.55	-1.17	152	201
85	9.57	-1.27	152	202
89	9.61	-1.06	152	203
93	9.61	-0.91	153	202
97	9.75	-1.00	155	202
101	9.66	-1.14	156	203
105	9.65	-1.25	156	203
109	9.64	-1.28	156	203
113	9.56	-1.22	157	203
117	9.43	-1.19	158	203
121	9.42	-1.22	159	205
125	9.38	-1.26	162	206
129	9.37	-1.24	165	208
133	9.36	-1.06	169	210
137	9.35	-0.73	174	212

Table 27 - Tidal Constants for M2 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Dec. 8, 2003 – May 27, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	5.27	2.20	177	205
16	6.33	1.78	175	203
20	7.28	1.06	172	201
24	8.27	0.12	170	200
28	9.46	-0.95	167	198
32	10.51	-2.06	165	197
36	11.06	-2.87	164	197
40	11.43	-3.29	163	198
44	11.26	-3.37	161	196
48	10.75	-3.15	159	194
52	10.36	-2.72	157	192
56	10.16	-2.41	155	192
60	9.92	-2.17	153	191
64	9.57	-2.00	151	190
68	9.19	-1.96	151	188
73	9.71	-2.43	147	191
77	9.48	-2.14	148	191
81	9.38	-1.80	148	194
85	9.33	-1.89	150	193
89	9.34	-1.90	150	194
93	9.26	-1.83	150	196
97	9.31	-1.85	151	197
101	9.25	-1.77	152	198
105	9.26	-1.73	152	199
109	9.26	-1.63	152	200
113	9.18	-1.60	154	202
117	9.09	-1.59	156	205
121	9.01	-1.70	159	207
125	9.10	-1.89	163	209
129	9.28	-1.98	168	212
133	9.36	-1.88	172	215
137	9.34	-1.30	178	218

Table 27 - Tidal Constants for M2 Constituent (continued)

South-Central Barrow Strait

For Ice Free Period (Jun. 1, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	8.17	0.00	148	175
16	8.33	-0.34	150	180
20	8.81	-0.85	154	184
24	9.53	-1.41	155	185
28	10.16	-1.76	158	188
32	10.16	-1.69	161	192
36	10.01	-1.67	164	195
44	9.80	-1.76	169	197
48	9.81	-1.69	169	197
52	9.53	-1.71	169	197
56	9.45	-1.58	169	197
60	9.64	-1.38	169	196
64	9.68	-1.39	169	195
68	9.62	-1.51	167	194
72	9.51	-1.47	167	194

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
	Insufficient period for analysis			

Table 27 - Tidal Constants for M2 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	10.56	-2.59	163	185
32	10.41	-2.25	168	190
40	9.59	-1.96	171	194
48	9.06	-1.35	172	198
56	8.77	-1.25	173	199
64	8.22	-1.29	174	200
72	7.95	-1.24	176	200
80	7.91	-1.08	175	200
88	7.50	-1.14	177	200
96	7.30	-1.53	178	200
104	7.61	-1.68	178	201
112	7.86	-1.73	176	203
120	8.01	-2.06	179	203
128	8.54	-2.46	179	205
136	8.24	-2.73	185	205
144	7.54	-2.21	193	209
152	7.60	-2.27	196	217
160	8.42	-2.37	196	224
168	6.88	-1.62	202	229
176	4.66	-1.21	205	235

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 27 - Tidal Constants for M2 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	9.58	-0.21	161	167
14	9.42	0.07	166	171
18	9.32	0.21	171	176
22	9.38	-0.06	173	180
26	9.37	-0.16	173	181
30	9.52	-0.17	174	181
34	9.67	-0.18	175	181
38	9.76	-0.19	175	181
42	9.78	-0.12	174	182
46	9.73	0.06	173	182
50	9.78	0.05	172	181
54	9.66	0.18	171	181
58	9.51	0.27	170	180
62	9.49	0.40	170	179
66	9.42	0.44	169	179
70	9.49	0.54	169	178

For Solid Ice period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10				
14				
18				
22				
26				
30				
34	**Insufficient period for analysis**			
38				
42				
46				
50				
54				
58				
62				
66				
70				

Table 28 - Tidal Constants for O1 Constituent

South Side Barrow Strait

For Ice Free Period (Jun. 3, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.61	-0.11	160	306
16	3.49	0.26	158	303
20	3.64	0.36	158	301
24	3.82	0.26	156	300
28	3.95	0.22	156	297
32	3.79	0.26	158	293
36	3.86	0.27	159	290
40	3.89	0.64	160	287
44	3.76	1.09	159	283
48	3.52	1.17	159	282
52	3.51	0.75	159	283
56	3.60	0.52	158	282
60	3.79	0.57	159	280
64	3.82	0.59	162	278
68	3.82	0.71	163	279
73	3.90	0.63	164	283
77	3.86	0.61	161	276
81	3.90	0.56	159	275
85	3.90	0.58	157	274
89	3.73	0.66	158	274
93	3.63	0.65	158	276
97	3.53	0.60	158	274
101	3.53	0.56	156	273
105	3.64	0.79	154	272
109	3.74	0.94	153	273
113	3.82	1.11	156	275
117	3.96	1.18	158	277
121	4.08	1.27	159	278
125	4.22	1.38	160	278
129	4.31	1.45	161	275
133	4.38	1.46	159	273
137	4.39	1.42	161	270

Table 28 - Tidal Constants for O1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Dec. 8, 2003 – May 27, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	2.99	0.86	178	290
16	3.30	0.82	176	292
20	3.53	0.78	173	290
24	3.58	0.73	171	290
28	3.65	0.68	168	289
32	3.63	0.56	164	287
36	3.50	0.44	159	280
40	3.52	0.41	155	274
44	3.54	0.43	153	270
48	3.58	0.44	153	269
52	3.70	0.47	151	266
56	3.72	0.54	150	263
60	3.70	0.56	151	263
64	3.62	0.60	150	262
68	3.50	0.64	148	261
73	3.66	0.55	148	259
77	3.72	0.66	147	261
81	3.79	0.66	151	262
85	3.81	0.56	151	260
89	3.86	0.62	150	259
93	3.87	0.72	150	261
97	3.91	0.75	151	261
101	4.03	0.81	152	262
105	4.05	0.88	154	263
109	4.04	0.93	153	261
113	4.04	1.02	155	261
117	4.22	1.10	158	263
121	4.44	1.05	159	263
125	4.58	1.13	160	263
129	4.65	1.24	160	263
133	4.53	1.34	161	261
137	4.36	1.24	161	257

Table 28 - Tidal Constants for O1 Constituent (continued)

South-Central Barrow Strait

For Ice Free Period (Jun. 1, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	5.37	-0.33	169	291
16	5.66	-0.49	168	293
20	5.60	-0.65	170	298
24	5.68	-0.73	169	299
28	5.72	-0.52	169	298
32	5.89	-0.45	166	298
36	6.02	-0.47	165	298
44	5.86	-0.48	162	299
48	5.75	-0.36	160	299
52	5.74	-0.31	159	300
56	5.76	-0.32	158	300
60	5.88	-0.44	158	300
64	5.77	-0.59	159	299
68	5.85	-0.54	159	300
72	5.94	-0.58	159	300

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 28 - Tidal Constants for O1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	5.81	-0.71	170	302
32	5.98	-0.75	174	304
40	5.82	-0.91	176	306
48	5.79	-0.74	176	305
56	5.38	-0.63	174	306
64	5.04	-0.41	174	306
72	4.96	-0.37	175	306
80	4.69	-0.53	174	308
88	4.45	-0.42	173	308
96	4.18	-0.42	173	307
104	4.00	-0.41	173	308
112	4.04	-0.27	169	311
120	3.99	-0.22	170	308
128	3.81	-0.36	172	306
136	3.76	-0.32	175	306
144	3.60	-0.35	175	307
152	3.71	-0.50	175	314
160	4.53	-0.60	177	319
168	4.02	-0.68	178	322
176	2.74	-0.46	179	320

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
	Insufficient period for analysis			

Table 28 - Tidal Constants for O1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Jun. 1, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	4.55	-0.11	168	279
14	4.50	-0.44	170	278
18	4.51	-0.38	171	272
22	4.35	-0.25	174	268
26	4.33	-0.14	172	267
30	4.28	-0.09	170	270
34	4.29	-0.13	172	266
38	4.27	0.01	174	264
42	4.34	0.13	172	260
46	4.44	0.13	171	261
50	4.53	0.13	172	259
54	4.48	0.06	172	259
58	4.53	0.05	172	258
62	4.61	0.04	173	256
66	4.74	0.07	174	256
70	4.70	0.13	175	257

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 29 - Tidal Constants for P1 Constituent

South Side Barrow Strait

For Ice Free Period (Jun. 3, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.72	0.57	145	320
16	3.74	0.46	143	323
20	4.09	0.47	142	327
24	4.41	0.77	140	333
28	4.51	0.52	136	333
32	4.05	0.15	136	332
36	3.59	-0.18	142	329
40	3.75	0.17	142	326
44	4.55	0.33	143	329
48	4.69	0.00	148	327
52	4.64	-0.14	150	323
56	4.45	0.00	150	324
60	4.21	0.24	146	320
64	4.52	0.57	148	321
68	4.72	0.14	148	328
73	5.19	-0.24	145	336
77	5.77	-0.42	145	341
81	6.16	-0.29	141	340
85	5.93	-0.28	143	339
89	5.81	-0.01	147	340
93	5.67	0.09	151	342
97	5.88	-0.13	155	348
101	5.97	-0.01	158	350
105	6.07	0.09	161	347
109	6.11	0.14	160	345
113	6.22	0.33	162	345
117	6.13	0.17	164	347
121	6.14	0.23	164	350
125	6.45	0.34	162	351
129	6.52	0.38	163	350
133	6.64	0.14	164	349
137	7.11	-0.06	167	347

Table 29 - Tidal Constants for P1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Dec. 8, 2003– May. 27, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	2.22	-0.02	172	3
16	2.46	-0.20	172	348
20	2.83	-0.27	172	340
24	2.99	-0.26	168	336
28	3.05	-0.12	161	332
32	3.04	-0.06	157	328
36	2.98	0.03	155	328
40	2.98	0.10	152	327
44	2.97	0.13	149	324
48	3.02	0.13	149	321
52	3.02	0.25	150	318
56	3.07	0.34	147	316
60	3.30	0.33	145	314
64	3.67	0.29	146	313
68	3.85	0.20	147	311
73	4.02	0.40	143	308
77	3.99	0.49	142	307
81	3.90	0.49	140	308
85	3.87	0.47	140	310
89	4.27	0.47	145	312
93	4.52	0.49	147	312
97	4.68	0.50	147	313
101	4.90	0.47	148	316
105	5.02	0.56	150	318
109	5.07	0.57	151	318
113	5.30	0.55	152	320
117	5.34	0.53	153	319
121	5.48	0.52	156	318
125	5.75	0.22	157	318
129	6.15	0.04	158	316
133	6.44	0.03	160	315
137	6.49	0.15	165	314

Table 29 - Tidal Constants for P1 Constituent (continued)

South-Central Barrow Strait

For Ice Free Period (Jun. 1, 2004 – Aug. 01, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.51	-1.20	168	9
16	3.21	-1.14	145	20
20	3.20	-0.55	143	9
24	3.14	0.14	142	357
28	3.80	0.43	154	355
32	4.52	0.11	156	355
36	4.46	-0.57	156	352
44	4.74	0.30	159	352
48	4.50	0.49	155	350
52	4.71	0.77	154	347
56	4.60	0.97	152	342
60	4.26	1.14	151	343
64	4.01	1.10	152	344
68	3.86	1.24	157	349
72	3.71	1.23	160	350

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12				
16				
20				
24				
28				
32	**Insufficient period for analysis**			
36				
44				
48				
52				
56				
60				
64				
68				
72				

Table 29 - Tidal Constants for P1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	5.01	-0.87	146	342
32	5.46	-0.35	149	349
40	5.39	-0.44	156	348
48	4.92	-0.41	155	340
56	4.55	-0.52	150	330
64	4.83	-0.48	153	321
72	4.89	-0.50	156	314
80	5.20	-0.85	153	309
88	5.26	-1.19	155	304
96	5.27	-1.29	154	305
104	5.33	-1.34	159	304
112	5.14	-1.18	161	309
120	5.23	-1.48	166	313
128	4.89	-1.04	169	310
136	4.01	-0.59	172	301
144	3.79	-0.71	166	310
152	3.54	-0.23	164	308
160	3.79	-0.79	162	317
168	3.38	-0.66	168	319
176	3.71	-0.58	175	306

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 29 - Tidal Constants for P1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	2.10	1.34	202	311
14	1.96	0.70	161	264
18	1.92	0.64	151	256
22	1.69	0.80	137	239
26	1.73	1.08	145	248
30	2.07	0.98	156	262
34	2.30	0.78	150	272
38	2.40	0.75	145	271
42	2.53	1.04	153	282
46	2.68	1.01	159	289
50	2.69	1.03	160	295
54	2.71	0.86	167	297
58	2.48	0.97	171	299
62	2.60	1.09	174	306
66	2.70	1.02	175	303
70	2.89	0.95	170	301

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
	Insufficient period for analysis			

Table 30 - Tidal Constants for S2 Constituent

South Side Barrow Strait

For Ice Free Period (Jun. 3, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	2.48	-0.11	167	253
16	2.68	-0.37	165	249
20	2.84	-0.43	167	250
24	2.74	-0.42	169	255
28	2.63	-0.58	167	258
32	2.45	-0.57	164	256
36	2.38	-0.58	160	252
40	2.37	-0.57	157	245
44	2.20	-0.47	153	247
48	2.15	-0.33	151	249
52	2.24	-0.43	152	251
56	2.08	-0.24	154	249
60	2.08	0.01	151	254
64	2.08	-0.05	153	258
68	2.15	-0.01	158	256
73	2.44	0.06	151	261
77	2.54	0.17	144	263
81	2.54	-0.02	143	260
85	2.70	-0.18	144	258
89	2.72	-0.36	149	258
93	2.93	-0.40	154	260
97	3.24	-0.62	155	262
101	3.39	-0.93	153	264
105	3.41	-1.15	153	268
109	3.49	-1.23	153	270
113	3.67	-1.28	155	272
117	3.87	-1.35	158	271
121	3.85	-1.41	163	272
125	3.68	-1.58	167	276
129	3.56	-1.58	169	279
133	3.52	-1.36	177	281
137	3.59	-1.23	184	284

Table 30 - Tidal Constants for S2 Constituent (continued)

South Side Barrow Strait

For Solid ice Period (Dec. 8, 2003 – May 27, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	1.92	1.19	181	252
16	2.38	0.97	175	246
20	2.80	0.70	171	247
24	3.16	0.32	171	247
28	3.55	0.00	170	248
32	3.89	-0.36	169	248
36	4.22	-0.64	166	246
40	4.49	-0.93	165	245
44	4.61	-1.25	165	244
48	4.58	-1.28	162	244
52	4.46	-1.26	162	242
56	4.44	-1.31	160	240
60	4.42	-1.22	158	238
64	4.31	-1.15	157	236
68	4.13	-1.20	156	235
73	4.00	-1.25	154	237
77	3.77	-1.08	152	237
81	3.68	-0.89	149	239
85	3.64	-0.76	148	237
89	3.50	-0.71	149	237
93	3.43	-0.64	150	237
97	3.42	-0.48	150	240
101	3.60	-0.39	150	241
105	3.59	-0.33	152	244
109	3.63	-0.39	152	244
113	3.56	-0.34	152	245
117	3.47	-0.40	154	246
121	3.39	-0.29	158	248
125	3.35	-0.15	164	252
129	3.43	-0.02	169	259
133	3.46	0.03	173	262
137	3.42	0.22	175	263

Table 30 - Tidal Constants for S2 Constituent (continued)

South-Central Barrow Strait

For Ice Free Period (Jun 1, 2004 – Aug. 1, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.50	-1.79	181	268
16	2.84	-1.36	180	266
20	2.68	-0.80	182	262
24	2.37	-0.31	183	259
28	1.94	0.07	189	263
32	1.84	0.17	200	272
36	1.87	0.19	204	269
44	1.92	0.44	204	262
48	2.14	0.46	198	258
52	2.17	0.22	196	253
56	2.27	0.25	196	249
60	2.34	0.19	198	250
64	2.28	0.10	194	250
68	2.31	0.23	191	247
72	2.16	0.30	188	243

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 30 - Tidal Constants for S2 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	2.58	-0.85	172	257
32	2.54	-1.00	174	269
40	2.30	-0.55	185	271
48	1.98	-0.25	188	274
56	1.77	-0.27	183	275
64	1.75	-0.17	184	270
72	1.42	-0.41	173	267
80	1.44	-0.30	176	256
88	1.33	-0.32	177	260
96	1.43	-0.29	189	257
104	1.37	-0.09	186	254
112	1.41	-0.18	185	255
120	1.66	-0.37	182	257
128	1.92	-0.39	181	259
136	1.72	-0.52	177	260
144	2.07	-0.39	188	260
152	2.08	-0.51	174	267
160	2.07	-0.71	177	259
168	1.62	-0.30	178	265
176	1.22	-0.23	178	263

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
Insufficient period for analysis				

Table 30 - Tidal Constants for S2 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Jun. 4, 2004 – Aug. 2, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	1.70	1.18	259	268
14	1.85	1.18	222	238
18	2.00	1.01	197	225
22	2.23	0.83	177	204
26	2.49	0.75	169	197
30	2.66	0.87	165	196
34	2.55	0.75	170	203
38	2.64	0.54	173	209
42	2.82	0.53	174	209
46	2.81	0.51	175	212
50	2.70	0.55	174	216
54	2.67	0.60	172	218
58	2.62	0.65	173	219
62	2.58	0.61	175	222
66	2.40	0.52	174	224
70	2.38	0.63	174	225

For Solid Ice Period:

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10				
14				
18				
22				
26				
30				
34	**Insufficient period for analysis**			
38				
42				
46				
50				
54				
58				
62				
66				
70				

Table 31: Ice Profiling Sonar, Ice Draft Monthly Statistics
South-Central Barrow Strait, August 2003 – July 2004

		Ice Draft (m)		
Year	**Month**	**Mean**	**Maximum**	**Std.Dev**
2003	August	0.63	16.88	1.15
	September	0.98	15.72	1.28
	October	1.46	16.62	1.53
	November	2.00	17.41	1.69
	December	1.94	15.29	1.85
2004	January	2.29	22.27	2.05
	February	2.08	16.20	1.68
	March	1.26	17.61	1.45
	April	1.14	13.86	1.14
	May	1.25	16.20	1.35
	June	0.05	12.50	0.35
	July	0.05	10.60	0.29

Table 32: Ice Profiling Sonar, Ice Draft Percent Frequency by Month
South-Central Barrow Strait, August 2003 – July 2004

	2003					2004						
Ice Draft (m)	August	September	October	November	December	January	February	March	April	May	June	July
Open Water	58.29	33.38	0.40	0.02	0.04	0.11	0.01	0.00	0.00	4.56	95.83	95.05
0.0-0.5	7.77	14.94	36.24	18.45	21.32	11.83	7.05	10.94	20.92	22.17	1.38	1.77
0.5-1.0	8.22	12.56	15.31	18.33	22.54	26.08	20.33	57.10	48.23	33.63	0.69	1.48
1.0-1.5	9.89	12.66	10.31	11.27	9.95	12.73	27.51	13.45	13.25	12.48	0.65	0.83
1.5-2.0	5.60	9.72	9.23	10.95	9.14	6.65	6.07	3.94	4.77	8.83	0.79	0.37
2.0-2.5	3.74	6.37	7.91	9.76	8.12	6.23	5.73	3.12	3.45	5.58	0.27	0.19
2.5-3.0	2.22	3.71	5.78	7.76	6.36	8.06	11.29	3.73	2.53	3.35	0.13	0.12
3.0-3.5	1.38	2.17	4.21	6.08	4.93	4.98	5.63	1.75	1.97	2.33	0.07	0.07
3.5-4.0	0.87	1.43	3.71	4.70	3.90	4.16	3.69	1.05	1.37	1.74	0.04	0.04
4.0-4.5	0.59	0.89	2.13	3.45	3.26	4.42	4.07	0.96	0.94	1.39	0.04	0.03
4.5-5.0	0.41	0.61	1.48	2.84	2.59	4.17	2.34	0.66	0.67	1.06	0.04	0.02
5.0-5.5	0.27	0.42	1.03	1.86	2.05	2.24	1.66	0.63	0.48	0.82	0.03	0.01
5.5-6.0	0.20	0.29	0.70	1.64	1.52	1.52	1.35	0.52	0.37	0.63	0.01	0.01
6.0-6.5	0.12	0.22	0.48	1.00	1.07	1.45	0.79	0.47	0.29	0.46	0.01	0.01
6.5-7.0	0.10	0.16	0.35	0.63	1.08	2.23	0.71	0.30	0.22	0.30	0.01	0.00
7.0-7.5	0.07	0.12	0.23	0.42	0.65	0.62	0.45	0.23	0.12	0.21	0.01	0.00
7.5-8.0	0.06	0.09	0.14	0.25	0.45	0.48	0.32	0.22	0.13	0.14	0.01	0.00
8.0-8.5	0.05	0.06	0.11	0.17	0.35	0.52	0.24	0.14	0.06	0.09	0.00	0.00
8.5-9.0	0.04	0.05	0.07	0.13	0.21	0.77	0.20	0.12	0.05	0.06	0.00	0.00
9.0-9.5	0.03	0.04	0.05	0.09	0.12	0.20	0.14	0.10	0.13	0.04	0.00	0.00
9.5-10.0	0.02	0.03	0.05	0.06	0.11	0.16	0.10	0.10	0.01	0.03	0.00	0.00
>=10.0	0.08	0.08	0.10	0.12	0.25	0.38	0.33	0.46	0.04	0.10	0.00	0.00

Table 33: Central Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg.**	**SD.**	**Min.**	**Max.**	**Avg.**	**SD.**	**Min.**	**Max.**
Late Summer	-0.53	0.18	-0.84	-0.12	Good data didn't start until Oct. 5, 2003			
Fall	-0.65	0.18	-1.08	-0.19	206.29	0.53	205.01	207.65
Winter	-0.69	0.16	-1.05	-0.25	206.20	0.53	205.06	207.77
Spring	-0.53	0.15	-0.94	-0.19	Pressure drifted downward beginning in April 2004, so the data are of little use from that point onward.			
Early Summer	-0.52	0.15	-0.84	-0.19				
Year	-0.60	0.18	-1.08	-0.12				

Table 34: North Side Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg.**	**SD.**	**Min.**	**Max.**	**Avg.**	**SD.**	**Min.**	**Max.**
Late Summer	-0.87	0.20	-1.22	-0.43	197.92	0.58	196.68	199.41
Fall	-0.92	0.13	-1.22	-0.50	197.93	0.57	196.56	199.37
Winter	-0.90	0.15	-1.32	-0.47	197.86	0.57	196.63	199.53
Spring	-0.76	0.21	-1.36	-0.33	197.84	0.56	196.35	199.25
Early Summer	-0.90	0.16	-1.19	-0.47	197.93	0.56	196.61	199.33
Year	-0.87	0.18	-1.36	-0.33	197.89	0.57	196.35	199.53

Table 35: West Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg.**	**SD.**	**Min.**	**Max.**	**Avg.**	**SD.**	**Min.**	**Max.**
Late Summer	-1.17	0.05	-1.25	-1.01	164.98	0.42	164.01	166.21
Fall	-1.14	0.05	-1.21	-0.97	164.93	0.41	163.95	165.96
Winter	-0.95	0.11	-1.25	-0.66	164.85	0.41	163.88	166.07
Spring	-1.21	0.06	-1.35	-1.04	164.81	0.41	163.68	165.77
Early Summer	-1.23	0.05	-1.35	-1.14	164.91	0.39	163.96	165.85
Year	-1.12	0.13	-1.35	-0.66	164.88	0.41	163.68	166.21