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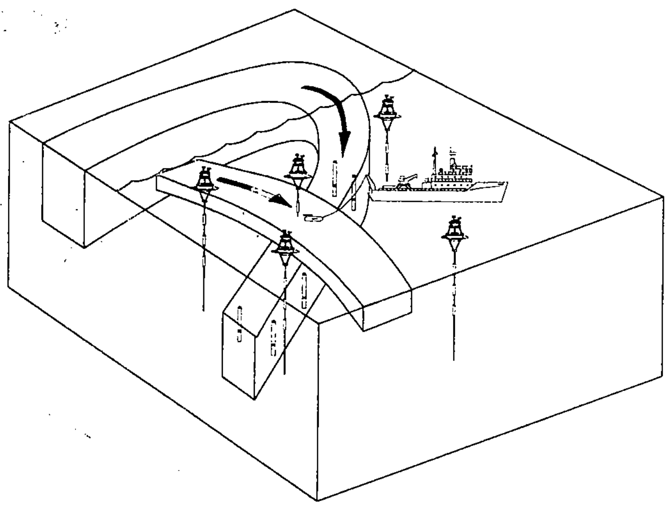
Technical Report
June 1995

The Subduction Experiment



Mooring Field Program and Data Summary

Sub1 June 1991 – February 1992
Sub2 – February 1992 – October 1992
Sub 3 October 1992 – June 1993

by

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Kerry A. Moyer
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UOP Technical Report 95-2

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Abstract

An array of five surface moorings carrying meteorological and oceanographic instrumentation was deployed for a period of two years beginning in June 1991 as part of an Office of Naval Research (ONR) funded Subduction experiment. Three eight month deployments were carried out. The five mooring locations were 18°N 34°W, 18°N 22°W, 25.5°N 29°W, 33°N 22°W and 33°N 34°W.

Two Woods Hole Oceanographic Institution (WHOI) and three Scripps Institution of Oceanography (SIO) moorings collected oceanographic and meteorological data, using a 3-meter discus or 2-meter toroid buoy and multiple Vector Measuring Current Meters (VMCMs), an Acoustic Doppler Current Profiler (ADCP) and Brancker temperature recorders (tpods). The surface buoys carried a Vector Averaging Wind Recorder (VAWR) and, on four of the five moorings, an Improved Meteorological Recorder (IMET) which measured wind speed and wind direction, sea surface temperature, air temperature, short wave radiation, barometric pressure and relative humidity. The IMET also measured precipitation. The VMCMs, ADCP and tpods, placed at depths 1 m to 3500 m, measured oceanic velocities and temperatures.

This report presents meteorological and oceanographic data from the WHOI Upper Ocean Processes Group (UOP) and the SIO Instrument and Development Group (IDG) instruments and contains summaries of the instruments used, their depths, mooring positions, mooring deployment and recovery times, and data return. Appendices contain information on supplementary Subduction data sets.

Table of Contents

List of Figures

List of Tables

Section 1: Introduction

A clockwise atmospheric circulation around the Bermuda/ Azores High makes the Subtropical North Atlantic a preferred region for Ekman layer convergence and subduction. Subduction is a process by which mixed layer water is injected into the main thermocline (Stommel, 1979; Luyten *et al.*, 1983; Cushman-Roisin, 1987). In an effort to more fully understand the sequence of events leading to subduction, an ambitious two year field experiment was undertaken in the eastern North Atlantic.

One of the primary components of the Subduction experiment was the maintenance of a large-scale mooring array from which both atmospheric and oceanographic data were collected. The five-mooring array straddled the eastern flank of the Bermuda/Azores High from June 1991 through June 1993. As shown in Figure 1, the moorings were located at 33°N 34°W, 33°N 22°W, 18°N 34°W, 18°N 22°W, and 25.5°N 29°W and are referred to by their relative positions (NW, NE, SW, SE, and C) within the framework of the array. Each mooring was outfitted with a full compliment of meteorological and oceanographic instrumentation. The meteorological instruments collected dynamic, thermodynamic, and radiometric data just above the sea surface, while their oceanographic counterparts measured temperature and velocity at fixed depths below the surface.

The two-year mooring component of Subduction was separated into three distinct eight month settings in order to reduce the deleterious effect that a prolonged exposure to the harsh oceanic environment would have upon the moorings. Thus, at eight month intervals, the moorings were systematically retrieved, refurbished, and redeployed (Trask *et al.*, 1993a, b, c, d). Precise deployment and recovery dates for each of the moorings are provided in Tables 1, 2, and 3. Despite this careful attention, several moorings did not survive their respective eight month settings. This was especially true on the first deployment, as three of the five moorings parted at one time or another during their initial deployment. However, as illustrated in Figure 2, subsequent deployments were not as susceptible to mooring failure and the overall scope and quality of the Subduction mooring data is exceptionally good. Percentages of the data return from both the meteorological and oceanographic instrumentation are found in Table 4.

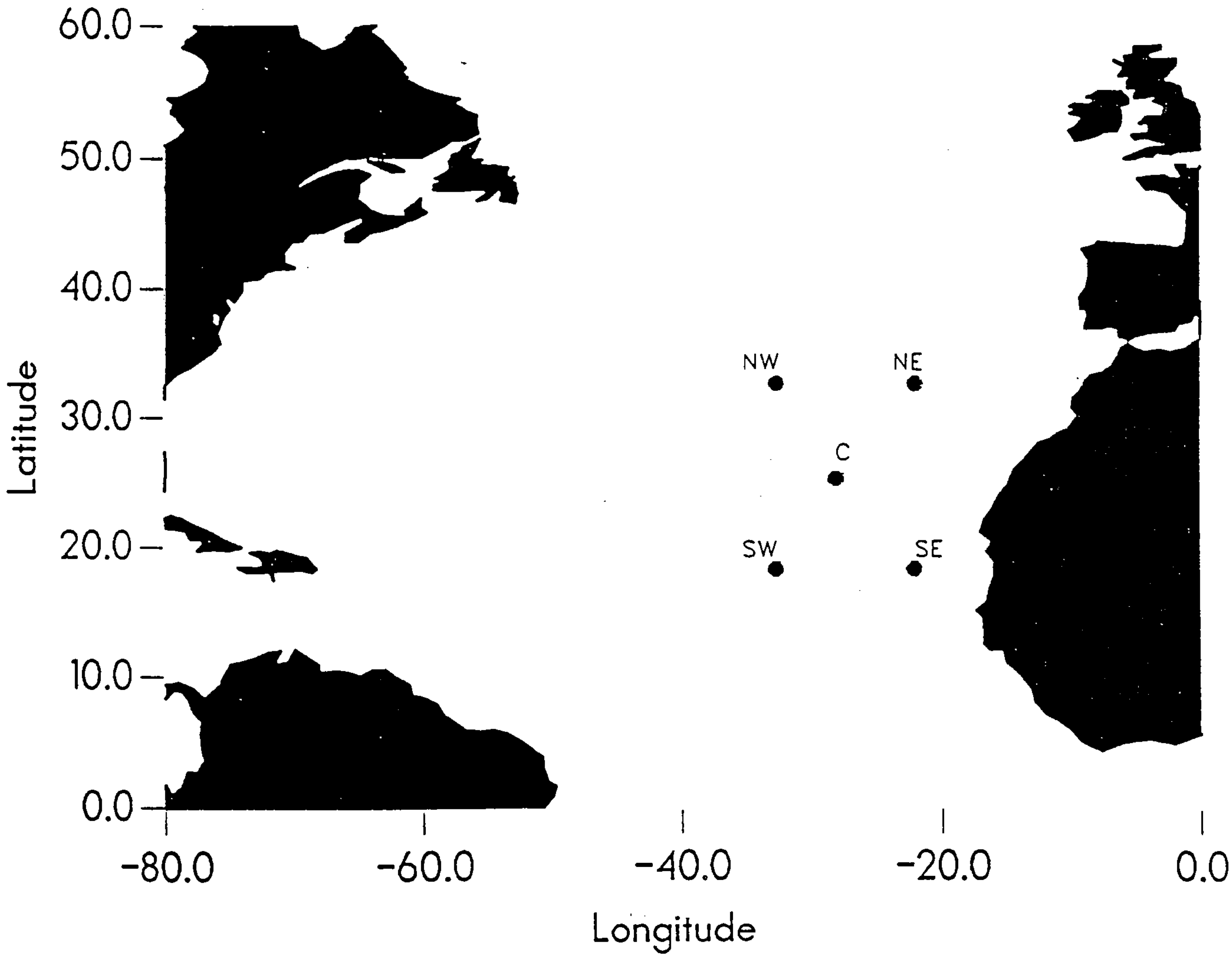


Figure 1. Subduction mooring locations.

Table 1
Subduction 1 Mooring Deployment Dates and Positions

Buoy	Mooring #	Deployment Date Time (UTC)	Recovery Date Time (UTC)	Position (GPS)
NE	914	18 Jun 1991 1642	14 Feb 1992 2315	33° 00.07'N 21° 59.75'W
C	915	23 Jun 1991 0026	11 Feb 1992 1120	25° 31.90'N 28° 57.17'W
SW*	916	25 Jun 1991 1312	4 Feb 1992 1844	18° 00.03'N 33° 59.96'W
SE**	917	29 Jun 1991 0137	8 Feb 1992 0843	18° 00.13'N 22° 00.00'W
NW***	918	3 Jul 1991 1323	23 Feb 1992 1022	32° 54.61'N 33° 53.50'W

* SW Mooring broke free on 3 November 1991. Top 110 m recovered 2 February 1992 remainder of mooring recovered 4 February 1992.

** SE Mooring broke free on 10 October 1991. Top 50 m recovered on 30 October 1991 remainder of mooring recovered 8 February 1992

*** NW Mooring broke free on 3 August 1991. Top 400 m recovered 15 September 1991 remainder of mooring recovered 23 February 1992

Table 2
Subduction 2 Mooring Deployment and Recovery Dates and Positions

Buoy	Mooring #	Deployment Date Time (UTC)	Recover Date Time (UTC)	Position (GPS)
SW*	924	5 Feb 1992 1318	23 Jun 1993 1840	17°59.93'N 34°00.65'W
SE	925	9 Feb 1992 0244	6 Oct 1992 1759	17°59.72'W 22°00.29'W
C	926	12 Feb 1992 1915	14 Oct 1992 1203	25°31.95'N 28°57.23'W
NE	927	20 Feb 1992 1547	1 Oct 1992 1857	33°01.98'N 22°00.27'W
NW	928	23 Feb 1992 2328	23 Oct 1992 0912	32°54.42'N 33°53.35'W

* SW Parted 4 June 1992, Toroid with upper instrument cage recovered 17 July 1992. Unsuccessful dragging attempt during DARWIN cruise 73. Final recovery was on KNORR 138 on 23 June 1993.

Table 3
Subduction 3 Mooring Deployment and Recovery Dates and Positions

Buoy	Mooring #	Deployment Date Time (UTC)	Recovery Date Time (UTC)	Position (GPS)
SW**	954	11 Oct 1992 1846	21 Jun 1993 1506	18° 05.57'N 33° 53.97'W
SE	953	7 October 1992 1157	19 Jun 1993 0526	17° 57.71'N 22° 02.77'W
C	955	15 October 1992 1023	16 Jun 1993 2009	25° 31.93'N 28° 56.52'W
NE	952	2 October 1992 1449	14 Jun 1993 1528	33° 01.80'N 21° 59.39'W
NW*	956	24 October 1992 0017	15 Jun 1993 0142	32° 54.38'N 33° 53.58'W

* NW parted 13 March 1993. Upper section recovered 11 April 1993. Bottom section recovered 15 June 1993.

** SW parted 22 May 1992. Upper section recovered 25 June 1993. Bottom section recovered 21 June 1993.

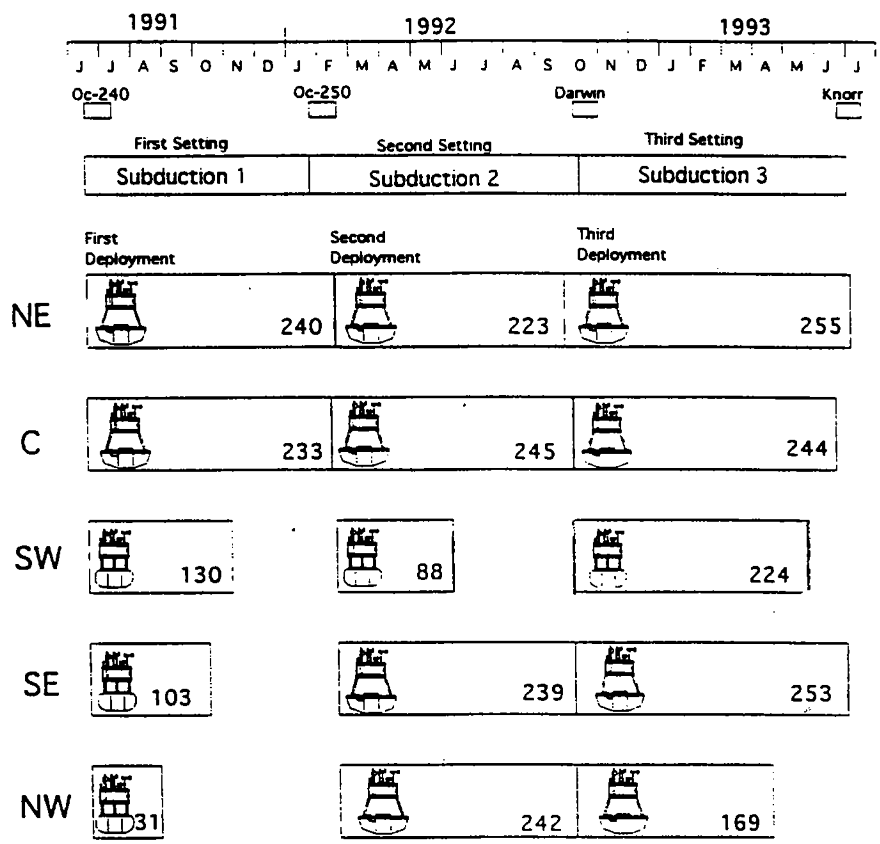


Figure 2. Subduction mooring time line.

Table 4. Subduction Data Return

SUB 1	NE	C	SW	SE	NW
met	100	100	100	95	100
1	-----	-----	-----	-----	-----
10	100	100	100	95	100
30	100	25*	100	0	100
50	100	100	100	10	60
60	10*	100	100	0	0
70	100	100	100	100	100
80	100	100	100	100	100
90	100	7*	100	100	100
100	2*	100	100	100	0
110	35*	100	0	100	100/100
130	100	100	100	100	100
150	100	20*	100	100	100
200	100	35*	100	100	100
300	0	0	100	100	100
310	-----	-----	-----	-----	-----
400	0	0	100	100	100
580	0	0	100	0	0
750	0	0	0	100	100
1500	0	100	0	0	0
3500	-----	100	-----	-----	-----

SUB 2	NE	C	SW	SE	NW
met	100	95	94	100	88
1	100	100	100	100	100
10	100	100	100	100	100
30	100	100	100	100	100
50	100	72	100	64	100
60	100	100	100	100	100
70	100	100	100	100	100
80	100	100	100	100	100
90	100	100	0	100	100
100	100	100	100	100	100
110	100	100	100	100	100/100
130	100	100	100	100	100
150	100	100	100	100	46
200	100	100	100	100	0
300	100	100	25	0	100
310	-----	100	-----	-----	-----
400	93	100	0	0	100
580	100	100	100	100	100
750	0	0	0	0	100
1500	0	100	100	100	100
3500	-----	100	-----	-----	-----

* bad cassette tape — additional processing required

Table 4. Subduction Data Return (cont.)

SUB3	NE	C	SW	SE	NW
met	100	100	100	100	100
1	100	100	100	100	100
10	100	100	100	66	100
30	100	100	100	100	100
50	100	100	100	70	100
60	100	100	100	100	100
70	100	95	100	0	100
80	100	100	0	100	100
90	100	100	100	100	100
100	100	100	100	100	100
110	100	100	100	100	0/100
130	100	100	100	100	100
150	100	0	100	100	100
200	100	100	100	100	100
300	100	100	100	100	100
310	-----	100	-----	-----	-----
400	100	100	100	100	100
580	100	100	0	100	100
750	100	100	100	100	100
1500	100	100	100	100	100
3500	-----	100	-----	-----	-----

Data return is the percent of good data collected by the individual instruments. If the instrument recorded good data for the total time period it remained on-station, it shows 100(%). If one or more of the variables died during the moored station time, it receives less than 100. This table is used for a quick look at the instruments that worked 100%, or 0%. Values in the middle tend to flag a missing variable or a short file.

Section 2: Instrumentation

A. Meteorological

Four of the five surface moorings carried two independent meteorological instrument systems. One of the systems was a Vector Averaging Wind Recorder (VAWR) which recorded barometric pressure, wind speed and direction, air temperature, sea temperature, relative humidity, and incoming shortwave and longwave radiation (Trask *et al.*, 1989). The other instrument system was an Improved Meteorological Recorder (IMET) which measured the same variables measured by the VAWR and rainfall as well (Hosom *et al.*, 1995). A summary of the individual sensors comprising the VAWR and IMET instrument systems including a general statement of their accuracy is provided in Tables 5 and 6, respectively.

The IMET recorded data every 1 min, while the VAWR recorded data every 15 min. While all of the IMET observables are representative of 1 min averages, the averaging intervals of the VAWR observables are variable dependent. Unlike the wind and radiation measurements which represent true 15 min averages, the remaining VAWR observables were averaged over a subset of the recording interval. For example, sea surface temperature was averaged over the initial 7.5 min, while air temperature was averaged over the final 7.5 min. Barometric pressure and relative humidity were sampled for 2.5 s and 3.5 s, respectively, midway through the 15 min period. The averaging intervals for all of the VAWR sensors are schematically depicted in Figure 3.

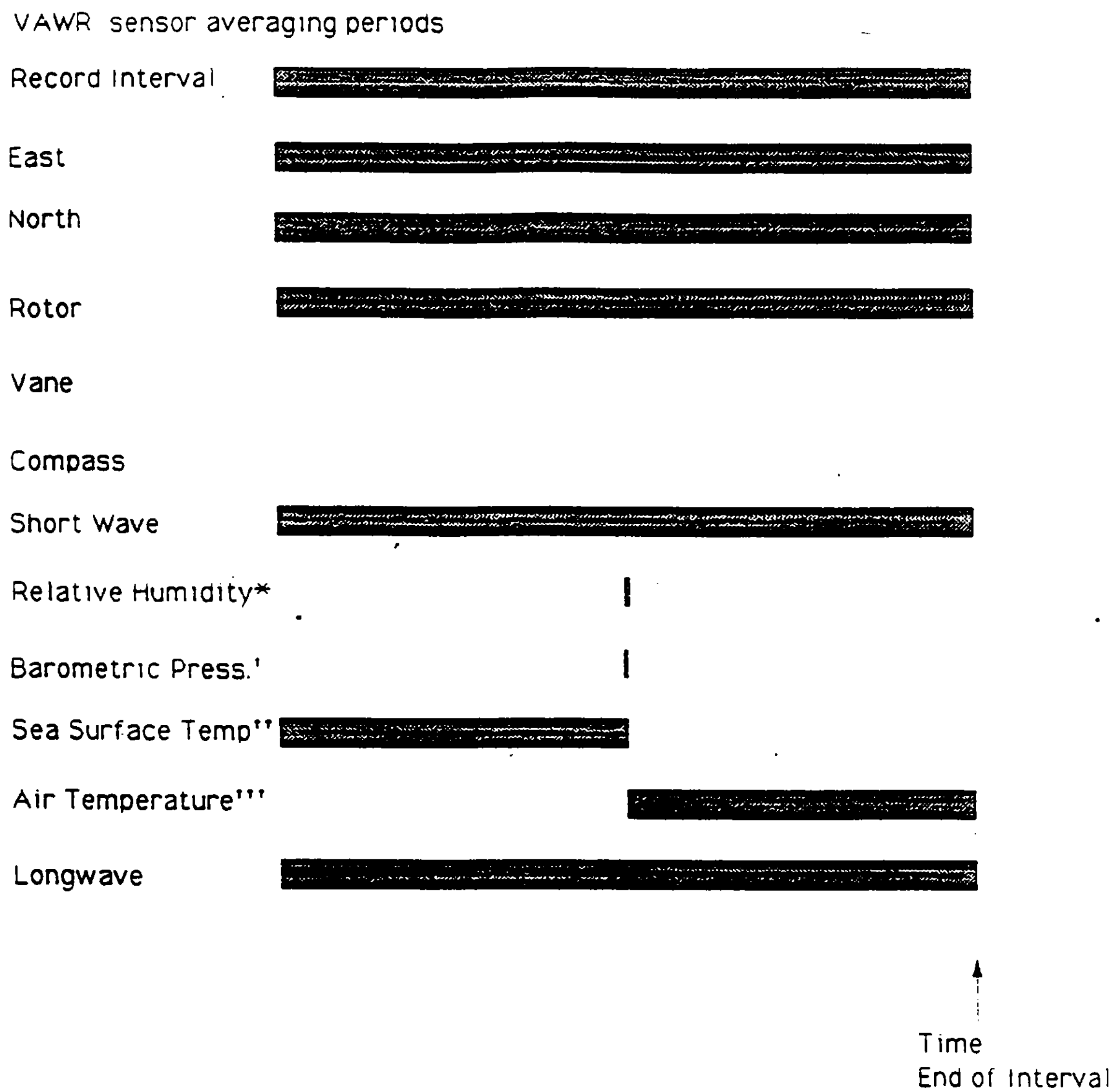
The two meteorological instrument systems were mounted on the deck of a 2 m high white aluminum tower which, in turn, was secured to the upper face of either a 3 m diameter discus or 2.4 m diameter toroid buoy. A vane was attached to one side of the tower in order to maintain the buoy's orientation relative to the wind. Special care was taken to ensure that the meteorological instrumentation was configured in an optimal manner. As shown in Figure 4, the radiometers, which require an unobstructed hemispheric view of the sky, occupied the uppermost position on the downwind side of the buoy, while the temperature, humidity, and wind instrumentation were mounted at slightly lower levels on the buoy's upwind side. The upwind positioning of these latter sensors was designed to reduce any inadvertent temperature modification or flow distortion associated with the surface mooring, itself. The precise heights at which each of these sensors were mounted are listed in Table 7 as a function of instrument system and buoy type.

Table 5. VAWR Sensor Specifications

Parameter	Sensor	Range	Accuracy	Comments
Wind speed	Gill 3-cup Anemometer R.M. Young Model 12170C 100 cm/rev	0.2–50 m/s	+/-2% above 0.7 m/s	Vector averaging
Wind direction	Integral Vane w/ Vane follower WHOI / EG&G	0–360°	+/- 1 bit 5.6 deg	Vector averaging
Short wave radiation	Pyranometer Eppley Model: 8-48	0–1400 watts/m^2	+/-3% of reading	Average system
Long wave radiation	Pyrgeometer Model: PIR	0–700 watts/m^2	+/-10%	Average system
Relative humidity	Variable Dielectric Conductor Vaisala Humicap	0–100%	+/-2%RH	3.5 sec sample
Barometric pressure	Quartz Crystal Digiquartz Paroscientific Model: 215	0–1034 mb	+/-0.2mbar wind>20m/s	2.5 sec sample (burst taken midway)
Sea temperature	Thermistor Thermometrics 4K @ 25° C	-5 to + 30°C	+/-0.005 deg C	1/2 time ave Measured in 1st half of avg. period.
Air temperature	Thermistor Yellow Springs #44034 5K @ 25°C	-10 to + 35° C	+/-0.2 deg C wind > 5m/s	1/2 time ave Measured in 2nd half of avg.period

Table 6. IMET Sensor Specifications

Parameter	Sensor	Range	Accuracy	Comments
Wind speed and wind direction	R.M. Young Model 5103 w/9 bit Gray Code encoder and KVH Industries Model MC202 compass	0–60 m/sec	+/-2% > 0.7m/s +/- 2 bit 0.7 degrees	Vector averaging Scalar ave over 1 min
Short wave radiation	Eppley Precision Spectral Pyranometer (PSP)	0–1400 watts/m^2	+/-3% of reading	1 min ave
Long wave radiation	Eppley Precision Infrared Pyrgeometer (PIR)	0–600 watts/m^2	+/- 10%	1 min ave
Relative humidity	Rotronic MP-100F	0–100%	+/- 2%RH	1 min ave
Barometric pressure	AIR Inc Model: DB-1A	850–1050 mb	+/-0.2 mbar wind >20m/s	1 min ave
Sea temperature	Platinum Resistance Thermometer	-5 to +45 deg C	+/-0.005 deg C	1 min ave
Air temperature	Platinum Resistance Thermometer	-40 to +45 deg C	+/-0.005 deg C wind >5m/s	1 min ave
Precipitation	R.M. Young Model: 50201 Siphon Rain Gauge	0–50 mm		



* Relative humidity sensor is on for 7 seconds and counted for 3.515 seconds

' Barometric Pressure sensor is on for 4.39 seconds and counts for 2.636 seconds

'' Sea surface temperature is averaged during the first half of the record rate Actual averaging interval is half the record rate minus 1.7578125 seconds (delay and settle time from SST to AT)

''' Air temperature is counted for the second half of the averaging interval. The air temp average interval is half the record rate minus 1.7578125.

Recorded compass and vane information is the last sample taken in the record interval.

Figure 3. VAWR sensor averaging periods.

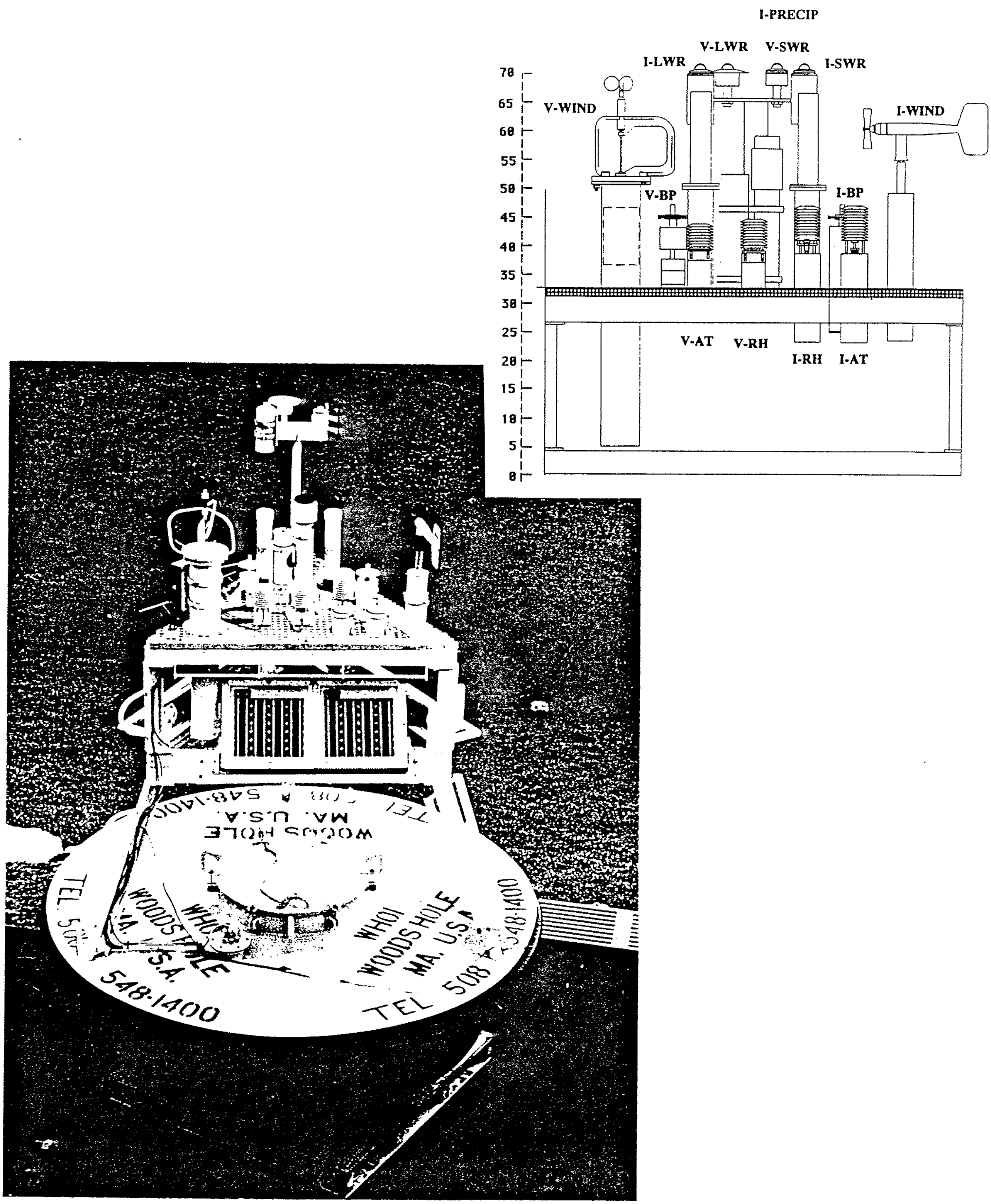


Figure 4. Discus buoy with fully instrumented tower top.

Table 7. Height of Meteorological Sensors above a Nominal Waterline

	Discus*	Toroid**
VAWR		
Air Temperature†	2.73	2.39
Relative Humidity†	2.74	2.40
Barometric Pressure	2.79	2.45
Short wave Radiation	3.45	3.11
Long wave Radiation	3.45	3.11
Wind Speed	3.40	3.06
Wind Direction	3.12	2.78
IMET		
Air Temperature†	2.79	2.45
Relative Humidity†	2.79	2.45
Barometric Pressure	2.76	2.41
Short wave Radiation	3.45	3.11
Long wave Radiation	3.45	3.11
Wind Speed and Direction	3.17	2.83
Precipitation	3.15	2.81

* Waterline approximately .41 m from buoy deck.
** Waterline approximately .43 m from buoy deck.
† Measurement to midpoint of shield.
Units = Meters above the waterline.

B. Subsurface

The five moorings were also outfitted with a full compliment of subsurface instrumentation. This subsurface hardware included multiple current meters and temperature loggers, and one Acoustic Doppler Current Profiler (ADCP).

The current meters deployed during Subduction were Vector Measuring Current Meters (VMCM's) (Weller and Davis, 1980). These current meters provided both velocity and temperature data at fixed depths. The VMCM's employ two propeller sensors and a compass to measure the east and north components of horizontal velocity and a pressure protected external thermistor to measure sea temperature. Most of the current meters utilized during Subduction were modified EG&G Sea Link instruments refitted with more durable bearings and blades by personnel from the Woods Hole Oceanographic Institution (WHOI). The remaining current meters were built and supplied by the Scripps Institution of Oceanography (SIO). The current meters supplied by WHOI possessed a sampling rate of 7.5 min, while those contributed by SIO recorded data every 15 min.

Fixed depth temperature measurements were also collected by temperature loggers. Several different Brancker temperature loggers were deployed during Subduction, as once again both WHOI and SIO contributed to the total logger pool. Although a majority of these temperature loggers possessed a sampling rate of 15 min, a few of the SIO models collected data at 30 min increments.

In addition to a number of VMCM's and temperature loggers, the NW mooring also carried an ADCP. Affixed to the mooring at a depth of 100 m, the upward looking ADCP measured the backscattered response generated by periodic pulses of acoustic energy. The backscattered energy possesses a distinctive Doppler shift from which a velocity profile of the water resident above the ADCP was derived. Further details regarding the ADCP, VMCM's and temperature loggers deployed during Subduction can be found in Trask *et al.* (1993a, b, c, d).

The precise positioning of the instrumentation along the length of the subsurface moorings varied not only between moorings, but also between deployments. However, the four moorings located on the perimeter of the array were typically outfitted to a depth of 1500 m, while instrumentation on the central mooring extended down through the main thermocline to 3500 m. A schematic representation of the positioning of the subsurface instrumentation on the second Subduction setting is provided in Figure 5. Complete listings of the specific instrumentation

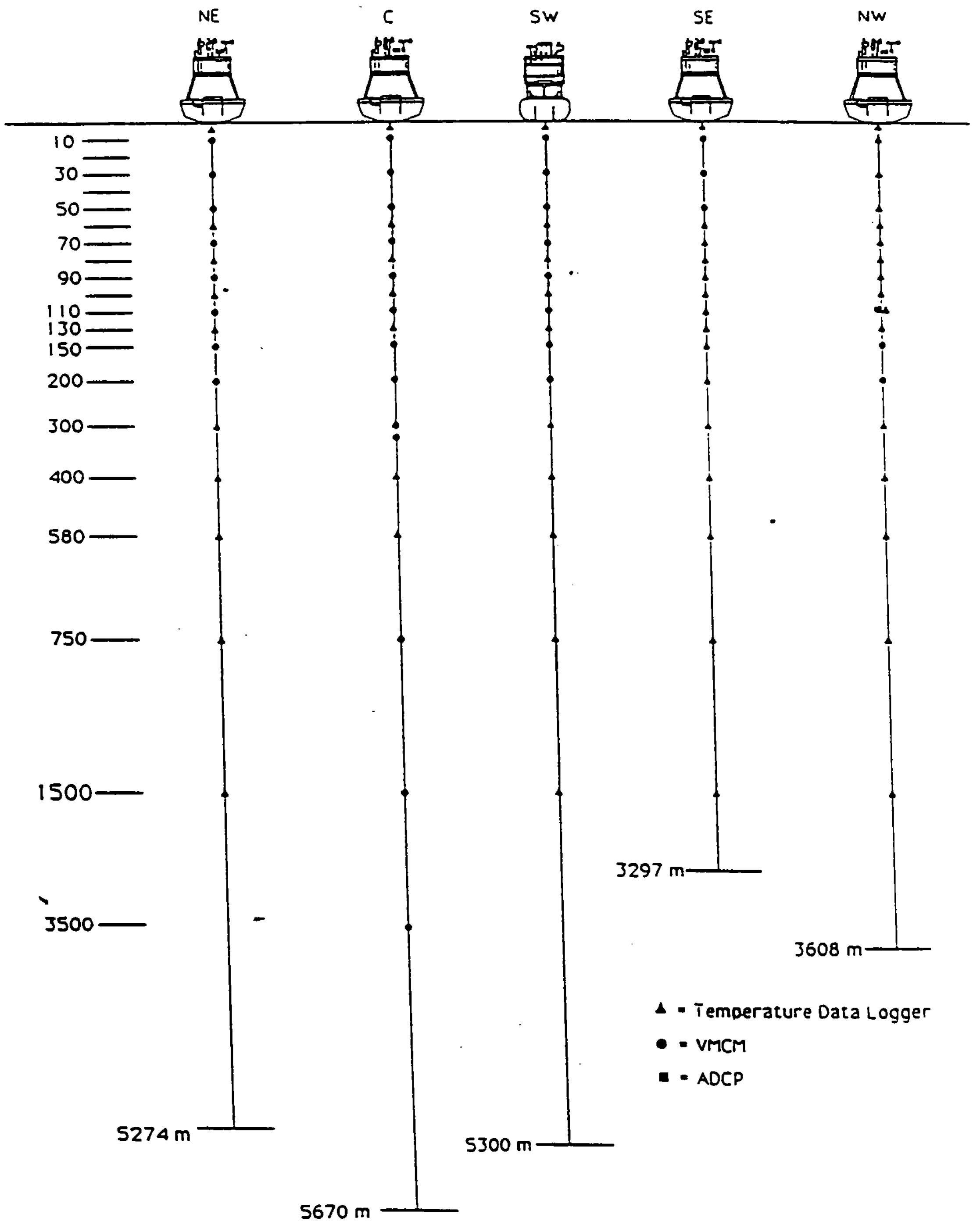


Figure 5: Instrumental configuration of the subsurface moorings deployed during Subduction 2.

affixed to each of the moorings during all three of the Subduction settings are found in Tables 8, 9, and 10.

Section 3: Subduction Data Processing

A. UOP Software Package

All the WHOI instruments, both meteorological and oceanographic, recorded data internally. The VAWRs and VMCMs wrote to Seadata cassette tape. The tpods stored data on a micro-chip. The IMETs wrote to an optical disk in the logger. The stored WHOI data files were read from their different sources and transferred to a SUN IPC workstation. All the meteorological and subsurface instruments were pre- and post-calibrated. All these datasets were processed on the SUN, using a software package written by K. Prada (1992), which was a conversion of the VAX processing system used by the WHOI Buoy Group for many years. The data were stored in netCDF format (Rew *et al.*, 1993) for the basic processing, then converted to EPIC (Denbo and Zhu, 1993) for additional processing. The SIO data files were processed by Lloyd Regier, IDG. These files were transferred back to WHOI and incorporated into the final Subduction moored data array. Most of the plots displayed in this report were generated by Plot Plus, (Denbo, 1993).

One final meteorological time series per buoy per deployment was chosen, from the VAWR and IMET datasets. See the next section for a complete description of the meteorological files advanced processing.

The majority of the subsurface instruments required only the basic processing. The temperatures were calculated using the pre-cal information, unless the post-cal showed better agreement. Data files were concatenated over the recovery and redeployment times to create a linearly interpolated two-year time series whenever the gap was considered minimal.

B. Meteorological Data Processing

Redundant meteorological measurements from the VAWR and IMET systems often allowed for gross deficiencies in the data collected by either system to be readily exposed in the field. In addition, several hours of shipboard meteorological observations were collected by hand-held and bridge-mounted sensors both prior to the retrieval of the moorings and immediately after their redeployment. These periods of intensive meteorological observations were utilized as yet another field check on the accuracy of the surface mooring data. However, gross malfunctions of

Table 8. Subduction 1 Instrumentation ID's

Depth	NE	C	SW	SE	NW
VAWR	V-704WR	V-722WR	V-720WR	V-721WR	V-121WR
10	VM-041	VM-035	SVM-04	SVM-12	S-3285
20	TEST STING1				TEST STING2
30	VM-021	VM-033	SVM-07	VM-007	S-3315
40	TEST STING3				
50	VM-039	VM-024	SVM-06	SVM-16	S-3294
60	W-3274	W-3309	S-3314	W-3297	W-3262
70	VM-032	VM-012	SVM-22	S-3282	S-3313
80	W-3265	W-3308	W-3279	S-3270	S-3260
90	VM-022	VM-038	SVM-02	S-3298	S-3261
100	W-3288	W-3296	W-3303	S-3284	W-3258
110	VM-030	VM-009	SVM-05	S-2425	ADCP S-3277
130	W-3269	W-3280	S-2427	S-2432	S-2434
150	VM-028	VM-037	SVM-20	S-2418	SVM-11
200	VM-018	VM-016	SVM-13	S-2424	SVM-10
206	COND				
300	W-3300	W-3289	S-2435	S-2433	S-2421
400	W-3305	W-3283	S-2437	S-2422	S-2431
580	W-3268	W-3271	W-3341	W-3290	W-3272
750	W-3286	VM-015	S-2436	S-2426	S-2420
1500	W-3293	VM-034	W-3287	W-3259	W-3273
3490		TENS 1029			
3500		VM-011			

W-# = WHOI Brancker Temperature Recorder
S-# = SIO Brancker Temperature Recorder
VM-# = WHOI Vector Measuring Current Meter
SVM-# = SIO Vector Measuring Current Meter

Table 9. Subduction 2 Instrumentation

Depth	NE	C	SW	SE	NW
VAWR	V-380WR	V-712WR	V-713WR	V-707WR	V-717WR
1	W-3507	W-3506	W-3665	W-3704	W-3508
10	VM-034	VM-002	SVM-01	SVM-03	S-3709
30	VM-027	VM-023	SVM-16	VM-010	W-3274
50	VM-036	VM-020	SVM-08	SVM-17	W-3288
60	W-2539	W-2541	S-3285	W-3279	W-3296
70	VM-014	VM-013	SVM-15	S-3707	W-3309
80	W-2542	W-2534	W-3263	S-3261	W-3269
90	VM-045	VM-019	SVM-14	S-3706	W-2536
100	W-3280	W-2537	W-3291	S-3714	W-2540
110	VM-035	VM-008	SVM-12	S-3710	ADCP-195 W-2535
130	W-3265	W-2538	S-3310	S-3294	S-3313
150	VM-009	VM-026	SVM-11	S-3715	SVM-09
200	VM-011	VM-025	SVM-18	S-3708	SVM-21
300	S-3260	VM-017	S-3713	S-3712	S-3276
310		VM-031			
400	S-3711	W-2533	S-2430	S-2423	S-3277
580	S-3298	W-3262	W-3299	W-3303	S-3316
750	S-2426	VM-029	S-2429	S-2434	S-3282
1500	S-2427	VM-001	W-3258	W-3341	S-3284
3500		VM-003			

W-# = WHOI Brancker Temperature Recorder
S-# = SIO Brancker Temperature Recorder
VM-# = WHOI Vector Measuring Current Meter
SVM-# = SIO Vector Measuring Current Meter

Table 10. Subduction 3 Instrumentation

Depth	NE	C	SW	SE	NW
VAWR	V-721WR	V-121WR	V-720WR	V-704WR	V-722WR
1	W-3283	W-3279	W-3297	W-3305	W-3262
10	VM-038	VM-032	SVM-02	SVM-06	S-3306
30	VM-021	VM-018	SVM-22	VM-022	W-3341
50	VM-012	VM-024	SVM-07	SVM-20	W-4492
60	W-4488	W-3303	S-2432	W-4481	W-2541
70	VM-033	VM-030	SVM-23	S-2418	W-2537
80	W-3259	W-4489	W-2539	S-2436	W-3665
90	VM-037	VM-028	SVM-13	S-2428	W-2533
100	W-4485	W-3265	W-4487	S-2422	W-3274
110	VM-041	VM-039	SVM-4	S-2420	ADCP-185 W-3309
130	W-4482	W-3280	S-2421	S-2424	S-3710
150	VM-015	VM-009	SVM-24	S-2437	VM-014
200	VM-016	VM-034	SVM-19	S-2433	SVM-03
300	W-4493	VM-035	S-2435	S-2425	S-3270
310		VM-027			
400	S-3302	W-4491	S-3295	S-3312	S-3314
580	S-3311	W-3662	W-2542	W-4490	S-3307
750	S-3278	VM-036	S-3292	S-3275	S-3708
1500	S-3281	VM-011	W-4483	W-3271	S-3304
3500		VM-045			

W-# = WHOI Brancker Temperature Recorder
S-# = SIO Brancker Temperature Recorder
VM-# = WHOI Vector Measuring Current Meter
SVM-# = SIO Vector Measuring Current Meter

either system were rare. More often, subtle deficiencies in the data were brought to light and corrected during the post-deployment calibration of the instrumentation.

Although the Subduction surface moorings were typically outfitted with both a VAWR and an IMET system, there were several occasions when a VAWR was singly deployed. Given that the VAWR systems were utilized more frequently and the quality of their data were comparable to that of the IMET systems, the VAWR was selected as the primary supplier of meteorological data from Subduction. However, data from the IMET system were utilized on those occasions when the VAWR data were either unavailable or deemed unreliable. For example, the IMET system supplied all of the basic observables on the northeast (6/18/91–2/14/92) and northwest (2/24/92–10/16/92) moorings, relative humidity (2/9/92–9/12/92) and barometric pressure (11/10/92–6/19/93) on the southeast mooring, barometric pressure (6/23/91–2/11/92) and incoming longwave (9/23/91–2/11/92) on the central mooring, and incoming longwave (8/24/91–11/2/91) on the southwest mooring. In order to account for the different sampling rates of the two instrument systems, the 1 min IMET data were subsequently averaged over 15 min to match the VAWR sampling rate.

The specific times when each of the five moorings were on station are illustrated in Figure 2. The moorings were necessarily off station for several hours between settings. During these brief intervals, a simple linear interpolation was employed to fill the void in the basic meteorological data. The one basic observable that was not subject to such a linear interpolation on account of its strong diurnal variation was incoming shortwave radiation. The estimation of incoming shortwave radiation during those periods when it was not measured in situ will be addressed shortly.

There were several occasions when the moorings experienced a structural failure and thus, were off station for an extended period of time. During these extended intervals, the lapse in the basic observables was filled by meteorological data generated by the European Centre for Medium Range Weather Forecasts (ECMWF) global operational numerical weather prediction analyses system (ECMWF Technical Attachment, 1994). The ECMWF analyses are produced four times daily at 0, 6, 12, and 18Z. The 6hr ECMWF data were linearly interpolated to match the desired 15min sampling rate of the Subduction observables. Since relative humidity was not directly available from the ECMWF analysis, it was computed using the temperature, dew point temperature, and barometric pressure analyses that were available from ECMWF (Bolton, 1980).

The 2 m height at which many of the ECMWF near surface variables are analyzed compares favorably with the 2.4 m–2.8 m height at which these basic observables were measured on the moorings. However, it should be noted that the mooring winds were measured at heights ranging between 2.8 m and 3.4 m, while the ECMWF winds are analyzed at a height of 10 m. Although the ECMWF winds appearing in the time series of basic observables were not altered to correct for this height difference, the discrepancy in height was taken into account prior to the estimation of heat flux and wind stress.

ECMWF analyses were not only used during those periods when the moorings were off station for an extended time, but were also used on several occasions when the moorings were on station, but neither the VAWR nor the IMET systems provided an accurate measure of a specific variable. Such instances relate to relative humidity on the southeast (9/12/92–10/6/92) and central (5/28/92–10/14/92) moorings, barometric pressure on the southwest mooring (3/28/92–6/3/92), and winds on the southeast (6/29/91–10/9/91) and northwest (7/3/91–8/3/91) moorings.

As previously mentioned, the strong diurnal variation in shortwave radiation prohibits the use of linear interpolation even on time scales as small as six hours. Thus, when the moorings were not on station, incoming shortwave radiation was estimated using both clear sky and model forecasting of incoming shortwave radiation. The former were calculated as a function of true solar time using formulae from the Smithsonian Meteorological Tables (List, 1984) along with an empirically determined atmospheric transmission coefficient of 0.8. The latter are simply forecasts of the average incoming shortwave radiation over successive 6 hr periods from the ECMWF global operational numerical weather prediction analysis/forecast system (ECMWF Technical Attachment, 1994). In order to construct a time series with the desired temporal resolution, the 15 min values of clear sky incoming shortwave were multiplied by the ratio of the sum of four successive ECMWF 6 hr forecasts of incoming shortwave to the average value of clear sky incoming shortwave over similar 24 hr periods beginning and ending at midnight.

It has been demonstrated that the incoming longwave radiation measured by a stock Eppley Model PIR pyrgeometer contains an additional output equivalent to 3.6% of incoming solar radiation (Alados-Arboledas *et al.*, 1988). For some time now, investigators have attributed the inflated measurements to a heating of the pyrgeometer's dome (Albrecht and Cox, 1977). It has been suggested that some of this heating may be caused by the inadvertent transmission of shortwave radiation through the dome (Dickey *et al.*, 1994). However, Olivieri (1991) found that the transmission of shortwave radiation was too small to explain the magnitude of the observed error. Further investigation has revealed that the predominant cause of dome heating is a previously unaccounted for emittance from a cover resident beneath the dome (personal communication S. Anderson). This removable cover shields the upper face of the pyrgeometer's case. The cover on the VAWR pyrgeometer is constructed of stainless steel, while the IMET cover is aluminum. The larger emissivity of the stainless steel significantly enhances the difference in temperature between the dome and the case and is now thought to be the primary source of error. Thus, the incoming longwave radiation measured by the Subduction VAWR's was reduced by the empirically determined value of 3.6% of incoming shortwave, while the IMET longwave data were left unaltered. This correction significantly reduced the daytime enhancement of incoming longwave caused by solar heating and produced a much better agreement between the VAWR and IMET pyrgeometers.

On those occasions when incoming longwave was not directly measured, it was estimated from basic observables or their model equivalents. Clear sky longwave radiation was computed as a function of sea surface temperature, air temperature, and near surface humidity (Clark *et al.*, 1974). Cloud cover was estimated in daylight as a function of clear sky incoming shortwave (List, 1984) and either measured or estimated incoming shortwave using the cloud factor formulation of Kimball (1928). This daytime cloud cover estimate was subsequently filtered using a 30 hr running mean to provide a continuous estimate of cloud cover. Incoming longwave was then estimated using clear sky longwave and a cloud correction factor as suggested by Fung *et al.* (1984). This procedure was employed to estimate incoming longwave radiation on those occasions when the moorings were not on station for an extended period of time. It was also used to derive incoming longwave on two additional occasions, the first occurring on the southeast mooring (8/26/91–10/9/91) and the second on the northwest mooring (2/24/92–10/16/92) when the moorings were on station, but no reliable longwave measurements were available. In these latter two instances, however, the incoming shortwave radiation required for the cloud cover estimation was measured directly.

Regardless of whether incoming shortwave and longwave radiation were measured or estimated at the moorings, their outgoing components were never measured and by necessity were always estimated. The surface albedo formulation of Payne (1972), which expresses albedo as a function of both solar altitude and atmospheric transmittance, was employed in the calculation of net shortwave radiation. Outgoing longwave radiation, on the other hand, was estimated by the Stefan-Boltzmann law using an infrared emissivity of 0.97.

Precipitation was successfully measured by the IMET system on the following occasions: (9/20/91–2/15/92) and (10/1/92–6/14/93) on the northeast mooring, (3/1/92–10/16/92) and (10/16/92–6/9/93) on the northwest mooring, (2/5/92–9/13/92) and (10/4/92–6/19/93) on the southeast mooring, and (8/9/91–2/10/92) on the central mooring. As mentioned previously, the fluid level within the rain gauge was recorded every 1min and subsequently averaged over 15 min intervals. Grossly flawed readings were replaced by the measurement immediately preceeding the bad data points. The bad readings commonly took the form of negative values or values which exceeded the capacity of the gauge. Differences between successive measurements were then computed and those differences that exceeded a certain threshold were retained. After a series of sensitivity tests, 0.25 mm was chosen as an appropriate threshold value. Smaller thresholds resulted in a noisier data series as the resolution limit of the gauge was apparently exceeded, while larger values caused potentially real precipitation events to go undetected.

Air–sea fluxes were estimated using the time series of 15 min averaged basic observables and a bulk flux algorithm developed in conjunction with TOGA COARE (Fairall *et al.*, 1995a). The bulk transfer coefficients used in the algorithm vary with both wind speed and stability and are based on the transfer coefficients employed within the Liu, Katsaros, Businger (LKB) model with some modifications based on observations from recent measurement programs (Liu *et al.*, 1979). The neutral transfer coefficients for momentum, heat, and moisture are functions of their respective roughness lengths. The LKB model parameterizes the more difficult to measure scalar roughness lengths in terms of a roughness Reynolds number. This roughness Reynolds number is, in turn, a function of the velocity roughness length which is simply expressed as the sum of the Charnock relation (Charnock, 1955) and a smooth flow limit (Smith, 1988). Whenever possible, the bulk heat fluxes and wind stress were estimated using a wind speed and direction relative to the measured current at 10 m depth.

In their strictest sense, the bulk formulae require the wind speed relative to the sea surface current as input. Since the current at the interface was not known, the current at 10 m was utilized to approximate the true surface current whenever the velocity at this depth was measured. When the 10 m velocity was not available, the surface current was arbitrarily set to zero. The uppermost sea temperatures were also measured at a depth of 1 m at the Subduction moorings. Since it is not the water temperature at depth, but rather the interfacial temperature that is required for bulk flux applications, cool skin and warm layer corrections were incorporated into the algorithm and were employed whenever the moorings were on station (Fairall *et al.*, 1995b). The cool skin correction takes into account the fact that the latent, sensible and longwave radiative fluxes are actually realized at the air-sea interface. This cooling effect is relatively persistent and can effectively lower the skin temperature by an average of 0.2K to 0.5K. The warm layer correction, on the other hand, accounts for the diurnal temperature variations which can occur as a result of the absorption of solar radiation within the upper few meters of the ocean. The precise profile shape and magnitude of this near surface warming is a function of the optical properties of the water and the extent to which the winds are acting to diffuse this heating through mixing. However, in light winds, the temperature of the water above the sensor can warm several degrees during the course of the day.

Light wind regimes, in general, represent a unique challenge in terms of accurately estimating the bulk air-sea exchanges for it is not the magnitude of the mean wind vector, but rather the average wind speed that should be used in the computation of the transfer coefficients. Godfrey and Beljaars (1991) suggest remedying this situation by augmenting the measured wind speed with a 'gustiness velocity' which they relate to the convective velocity scale. The inclusion of this 'gustiness velocity' within the TOGA COARE bulk algorithm accounts for the enhanced turbulent exchange generated by the passage of convective eddies near the free-convective limit. Such an enhancement in the degree of air–sea coupling during periods of light winds has been shown to produce more realistic simulations of atmospheric phenomena within the ECMWF global numerical model (Miller *et al.*, 1992).

Section 4: Data Display

The three eight-month deployments for the five moorings resulted in 300 possible datasets. Unfortunately, not all the instruments worked totally. The redundant meteorological file has been dropped. The VMCM files that had bad tapes (see Trask *et al.*, 1993a) have been dropped. The tpods that leaked or were crushed have been dropped. The result is 257 data files. Whenever possible, the gap from the resetting (somewhere between 1 and 5 days) of the moorings between Sub1 and Sub2, and Sub2 and Sub3, was filled with a simple linear interpolation after the files were concatenated. The meteorological files were filled out with ECMWF data, generating a 2-year me series, for the three moorings that drifted. This "building" of the longest continuous time series for each mooring and each depth, has resulted in 140 files. It is these files averaged to 15 min that are used in this data report.

The following list describes the order of the plots.

Figure 6a–e. Four day running mean time series of the basic meteorological variables by mooring.

Figure 7a–e. Four day running mean time series of the computed wind stress and heat and radiation fluxes by mooring.

Figure 8. Observed rainfall at each of the Subduction moorings.

Figure 9a–h. Monthly averaged wind and wind-driven current vectors.

Figure 10a–e. Composite temperature plot for moorings.

Figure 11. Calculated mixed layer depth plot.

Figure 12a–e. Stacked velocity stick plots for moorings.

Figure 13a–c. Composite progressive vector diagrams for Subduction.

Figure 14a–b. Meteorological variable spectra.

Figure 15a–c. Stacked rotary spectra.

Figure 16. Separate deployment spectra for NE and C moorings — 10 m depth.

Tables 11 and 12 contain the monthly statistics for all the met, VMCM and tpod data files. This includes the linear patches. If the files contain enough data for a representative monthly mean, it is included.

Figure 6a. Four day running mean time series of the basic meteorological observables at Northeast.

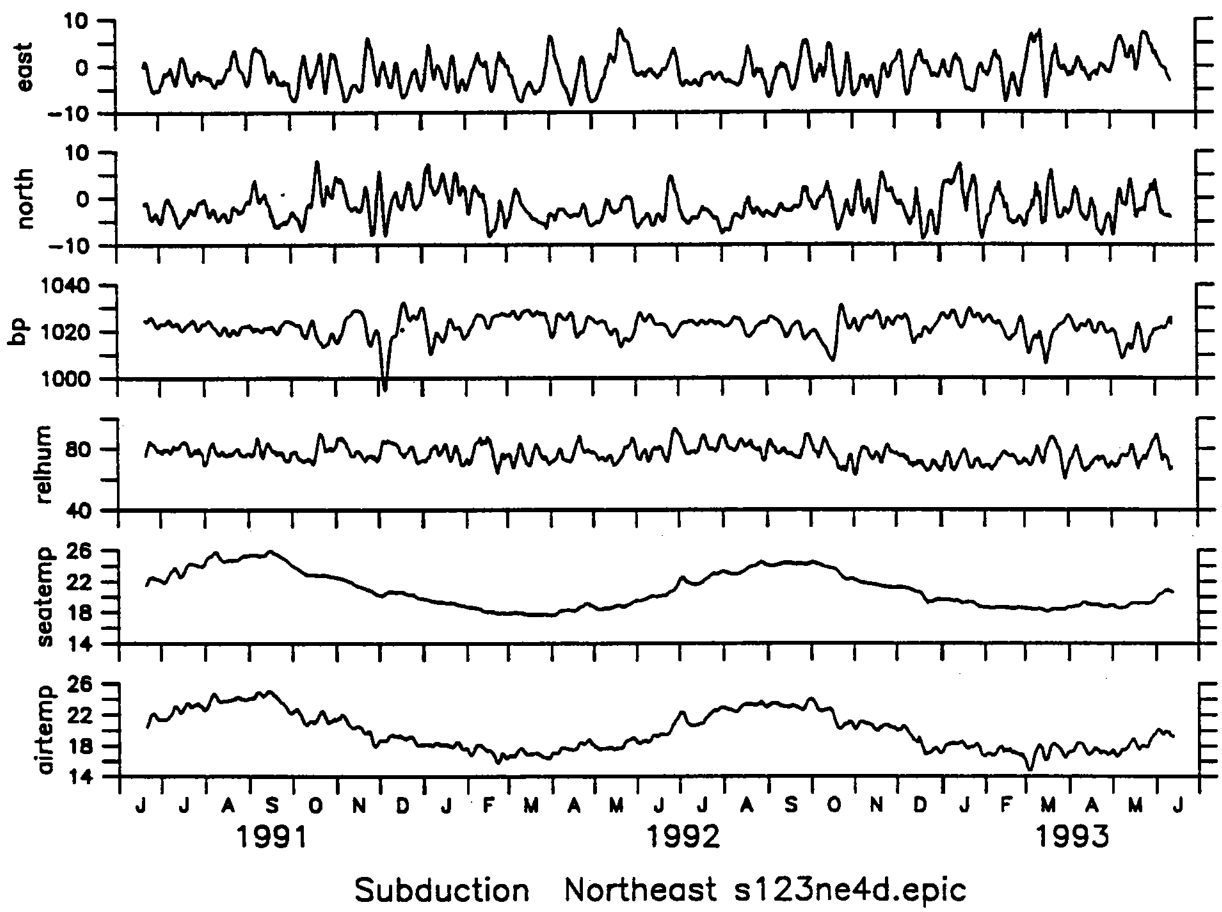


Figure 6b. Four day running mean time series of the basic meteorological observables at Central.

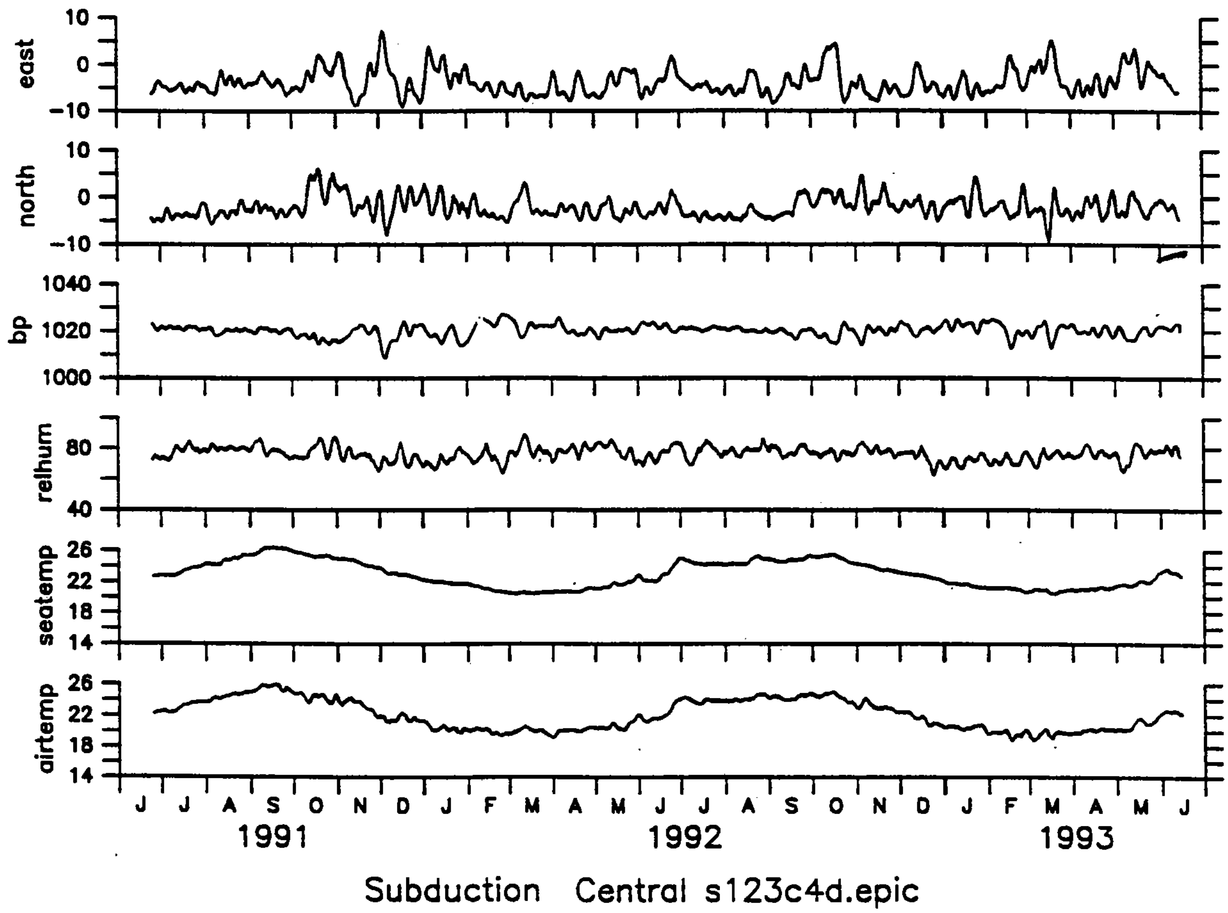


Figure 6c. Four day running mean time series of the basic meteorological observables at Southwest.

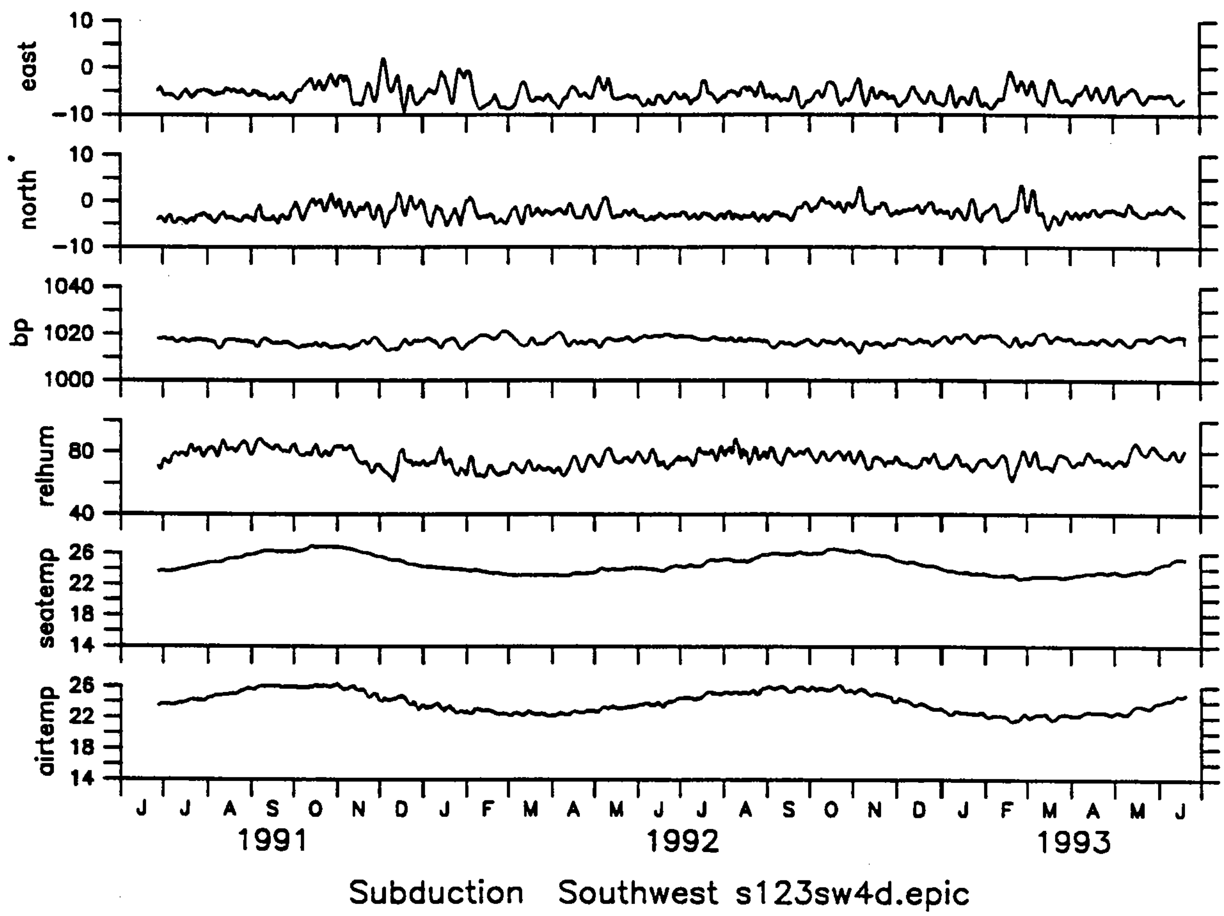


Figure 6d. Four day running mean time series of the basic meteorological observables at Southeast.

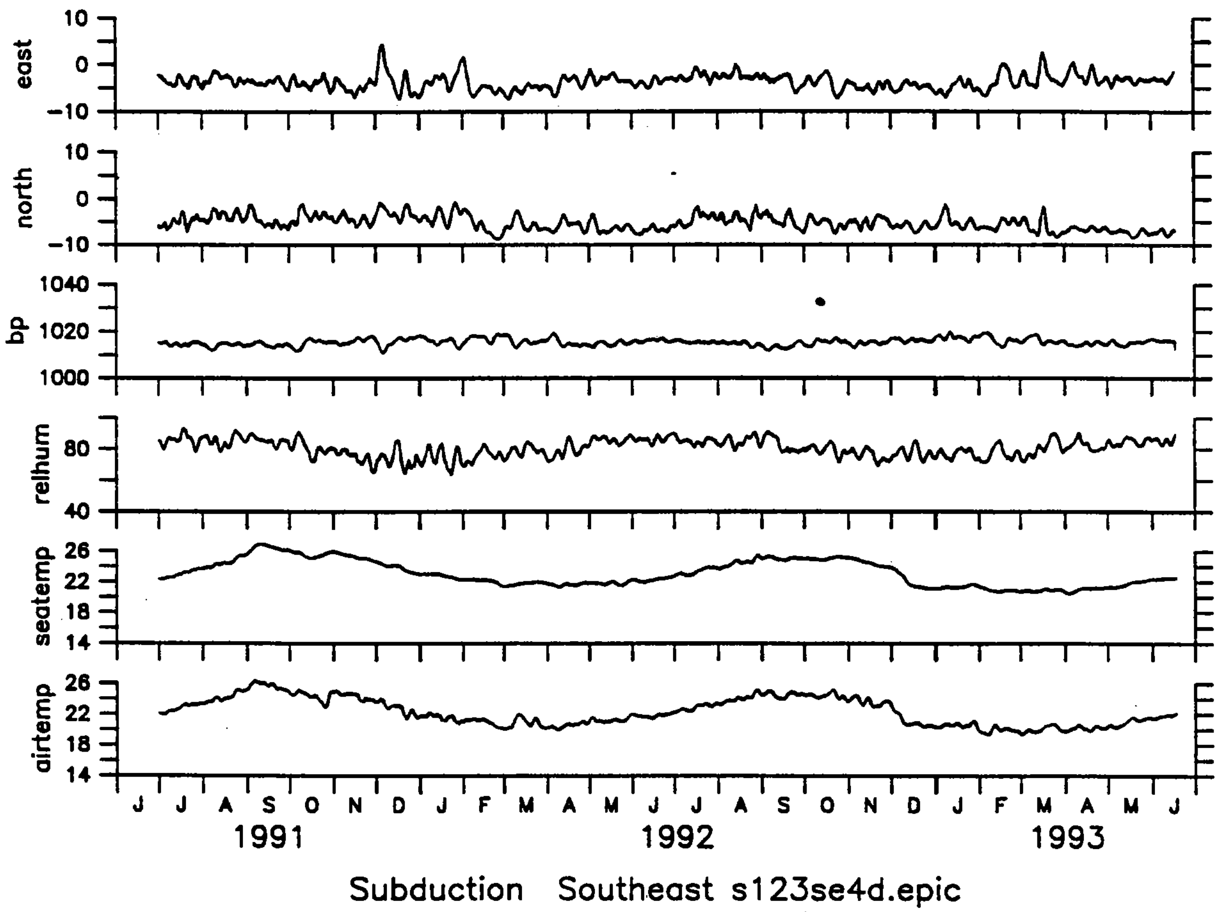


Figure 6e. Four day running mean time series of the basic meteorological observables at Northwest.

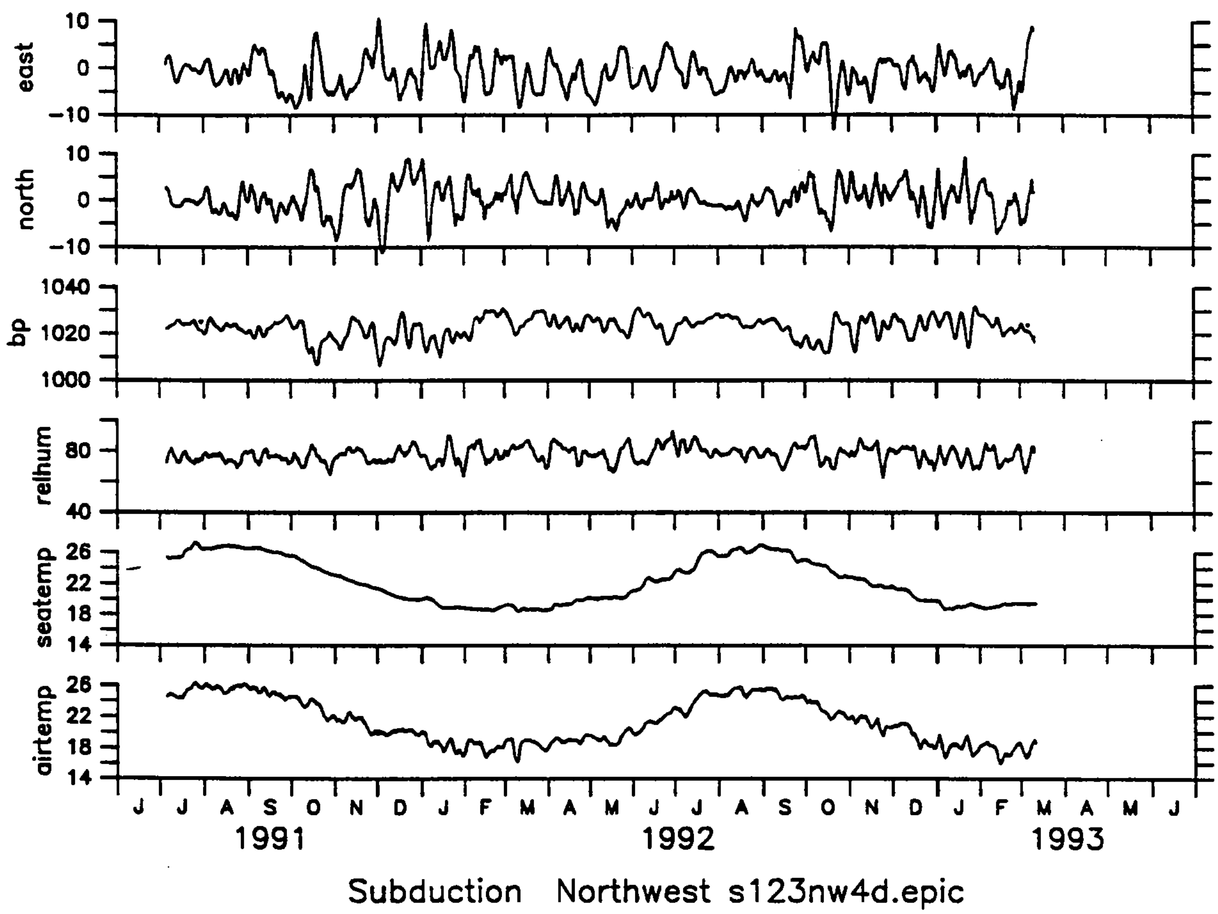


Figure 7a. Four day running mean time series of the computed wind stress and heat and radiation fluxes at Northeast.

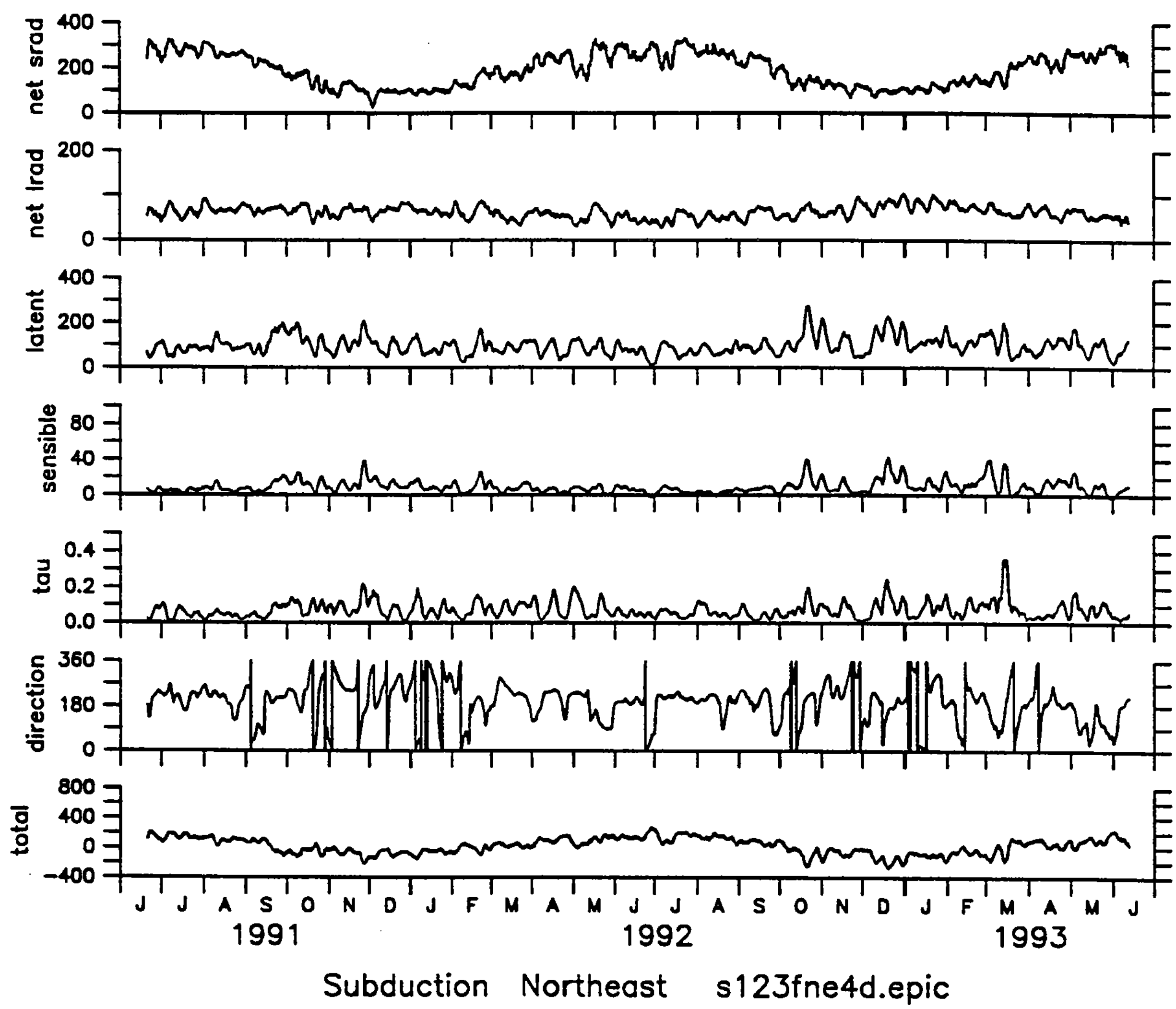


Figure 7b. Four day running mean time series of the computed wind stress and heat and radiation fluxes at Central.

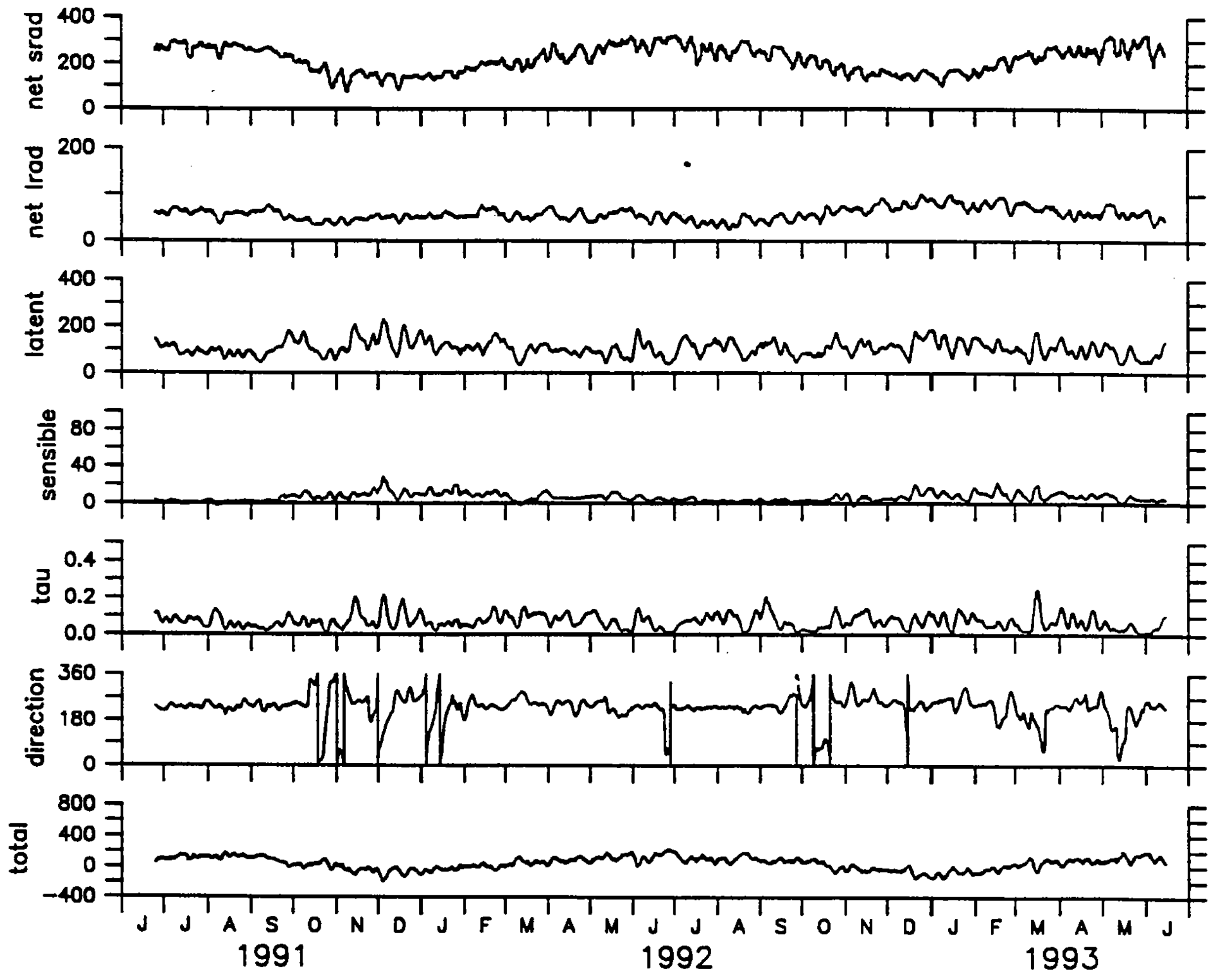


Figure 7c. Four day running mean time series of the computed wind stress and heat and radiation fluxes at Southwest.

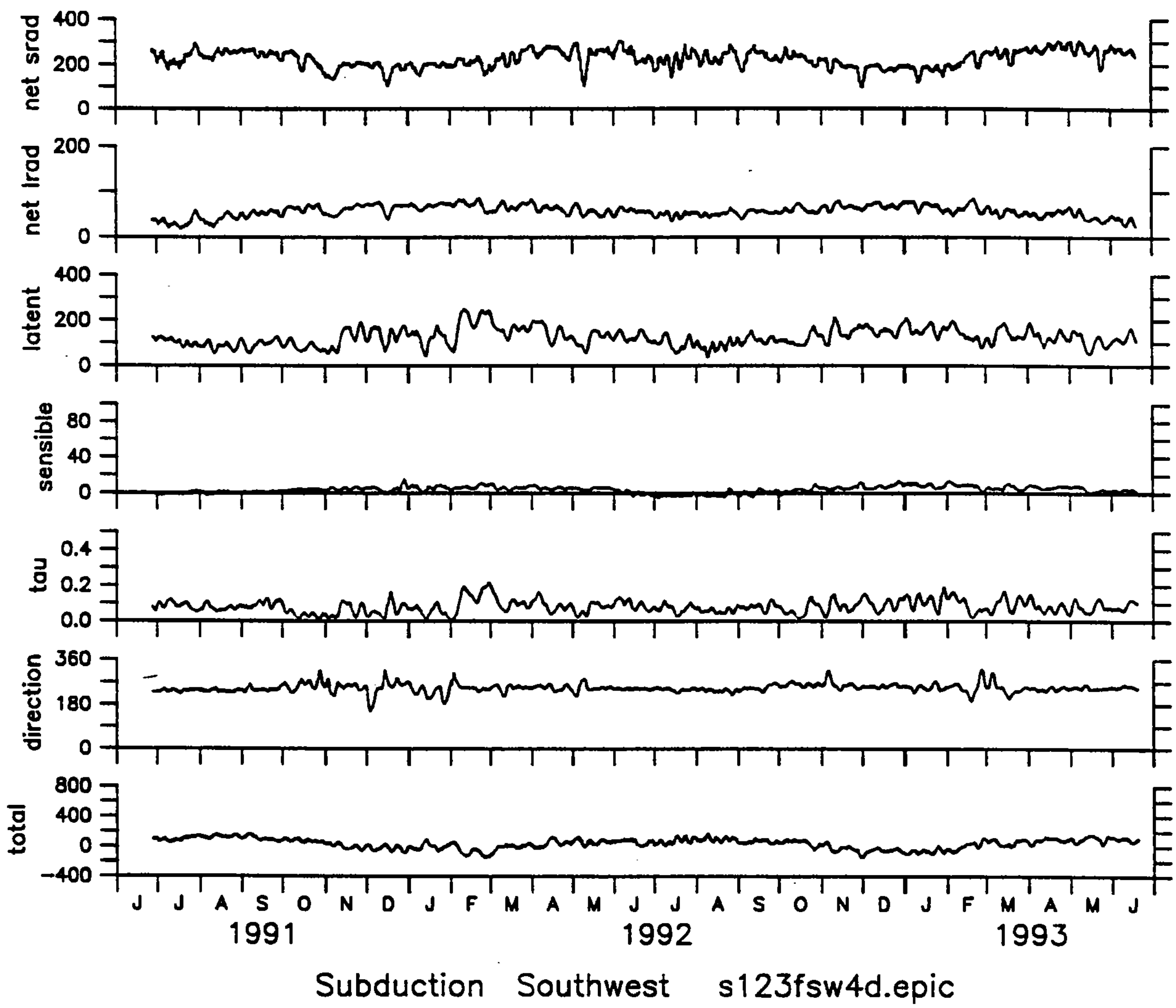


Figure 7d. Four day running mean time series of the computed wind stress and heat and radiation fluxes at Southeast.

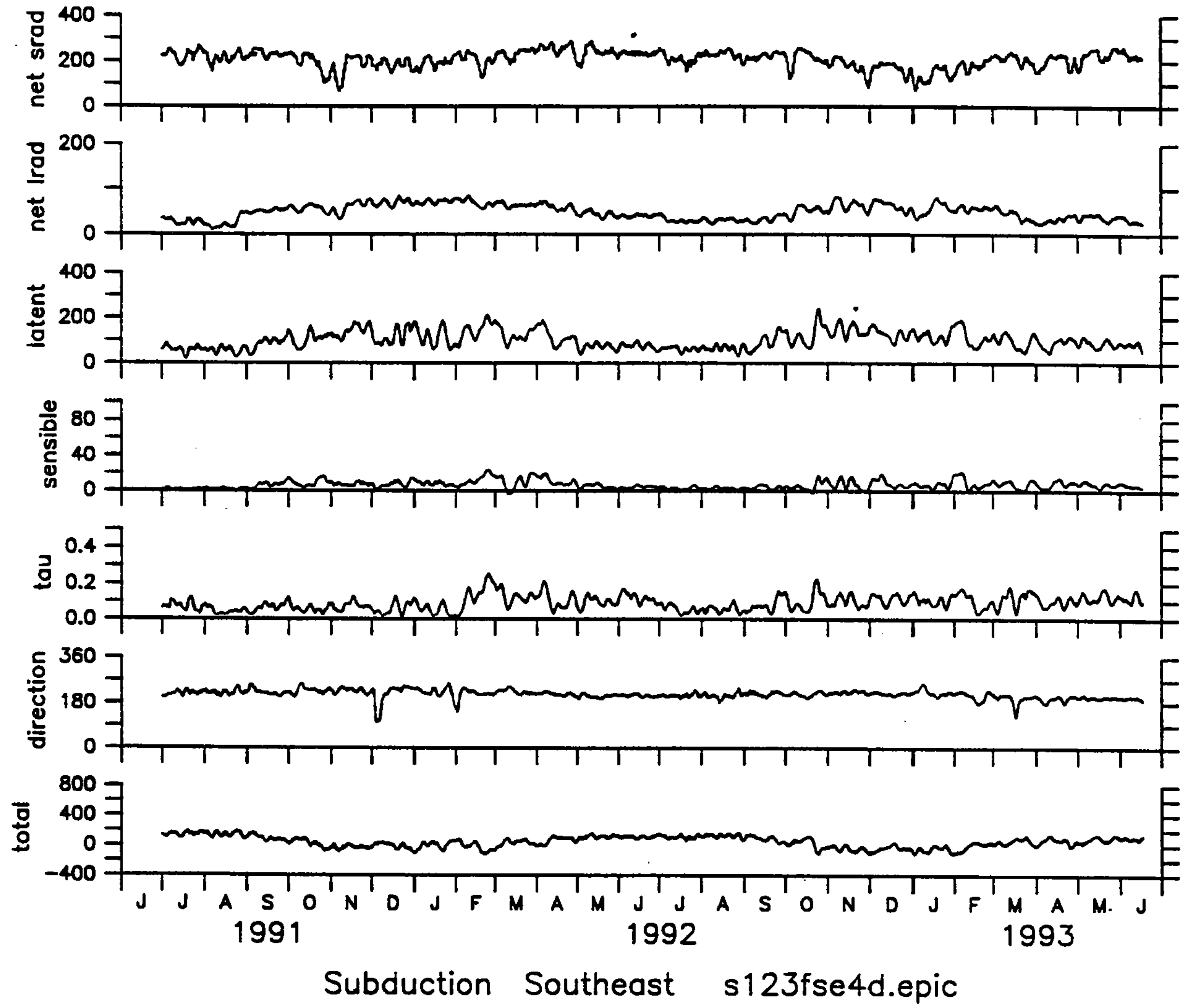


Figure 7e. Four day running mean time series of the computed wind stress and heat and radiation fluxes at Northwest.

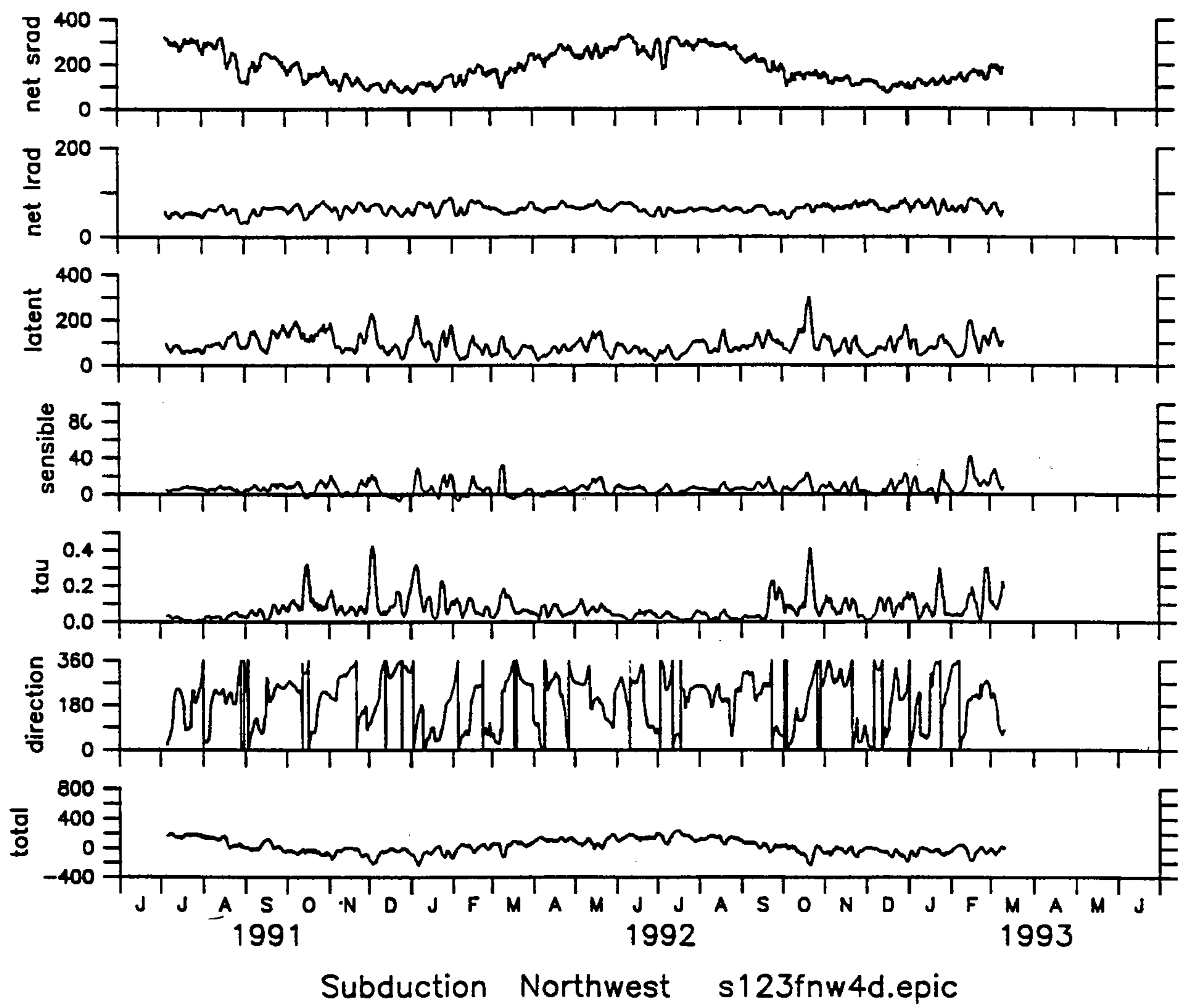


Figure 8. Observed rainfall at each of the Subduction moorings.

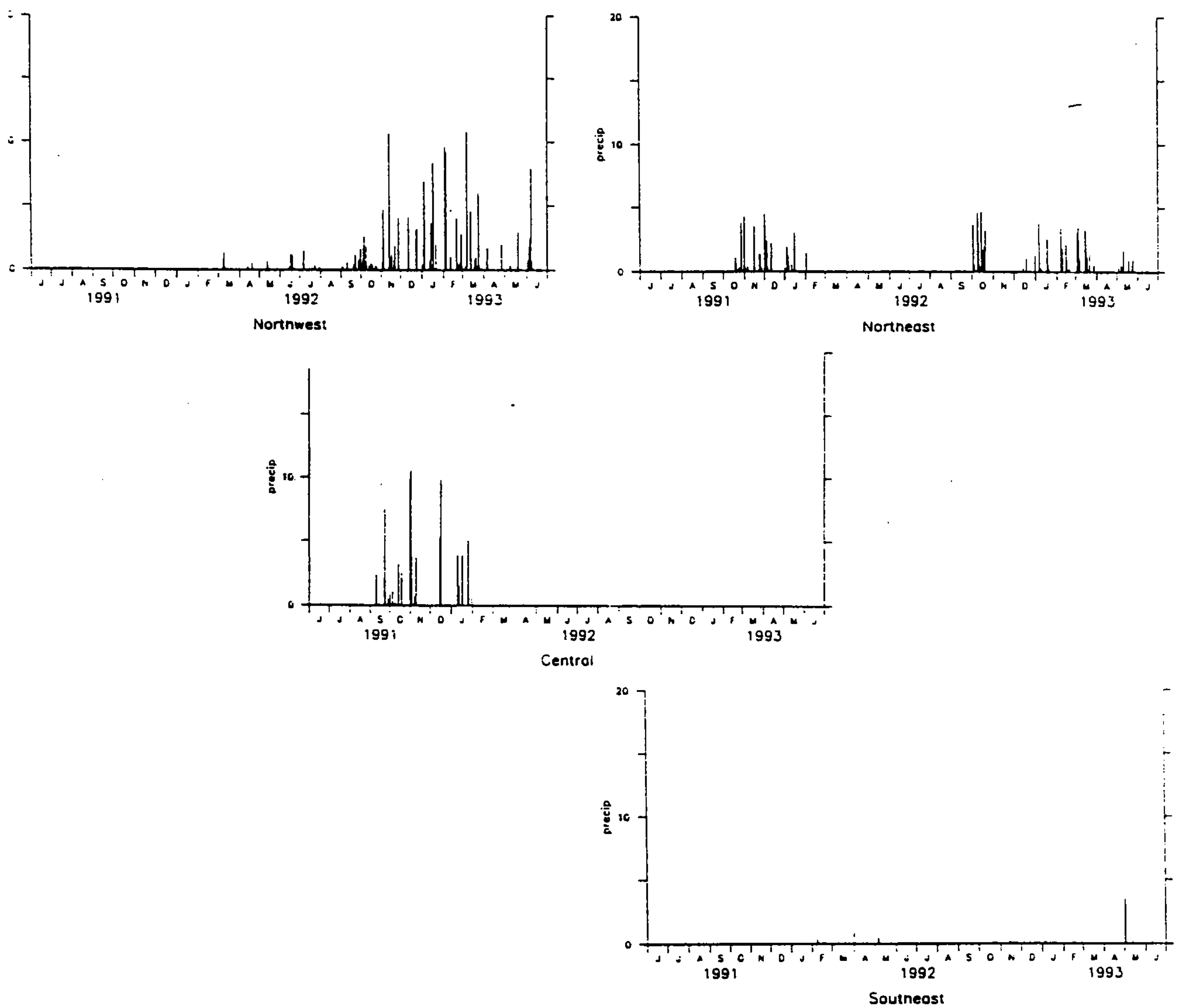


Figure 9a. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10m current from the current at a reference depth of 50 m.

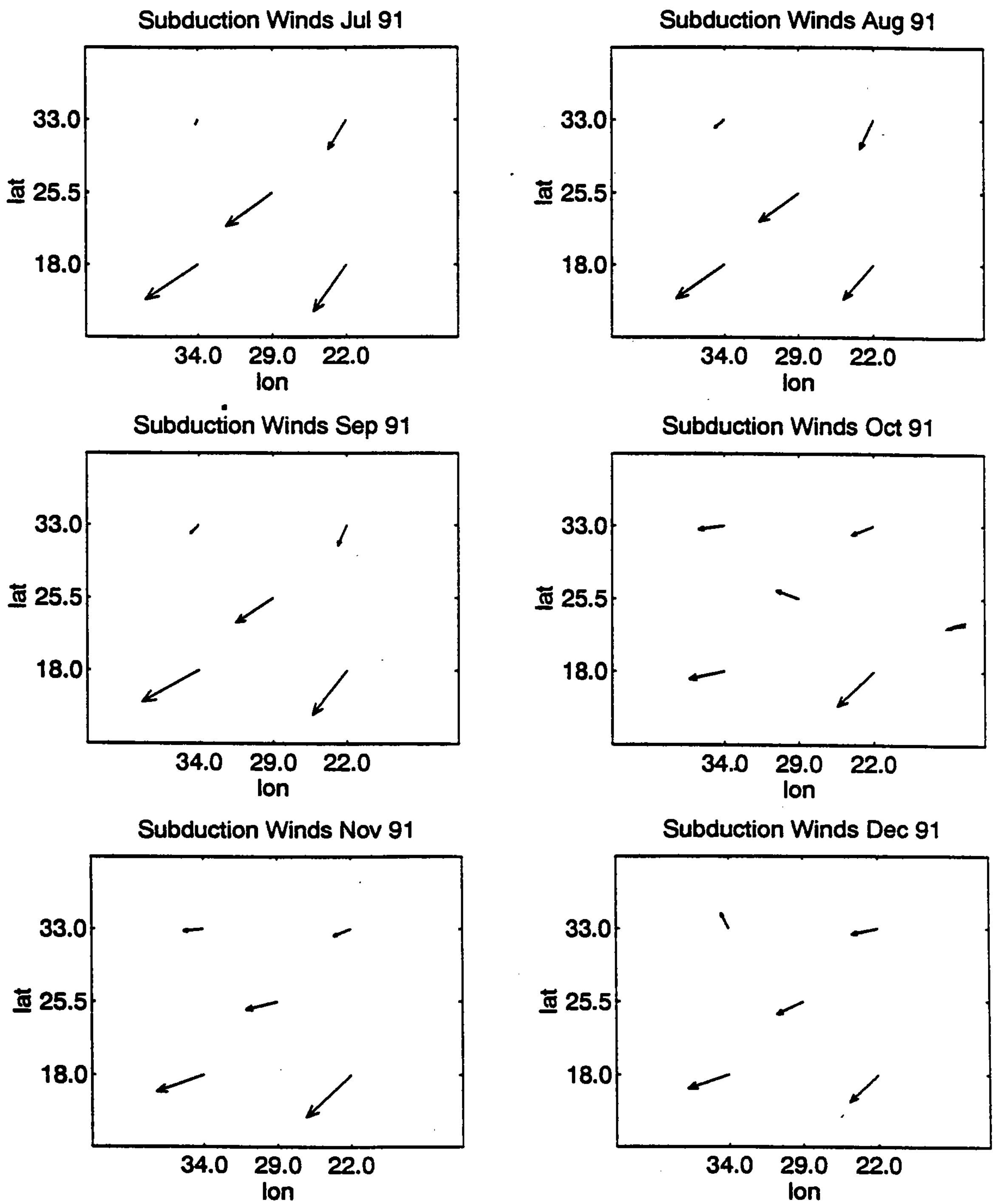


Figure 9b. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10m current from the current at a reference depth of 50 m.

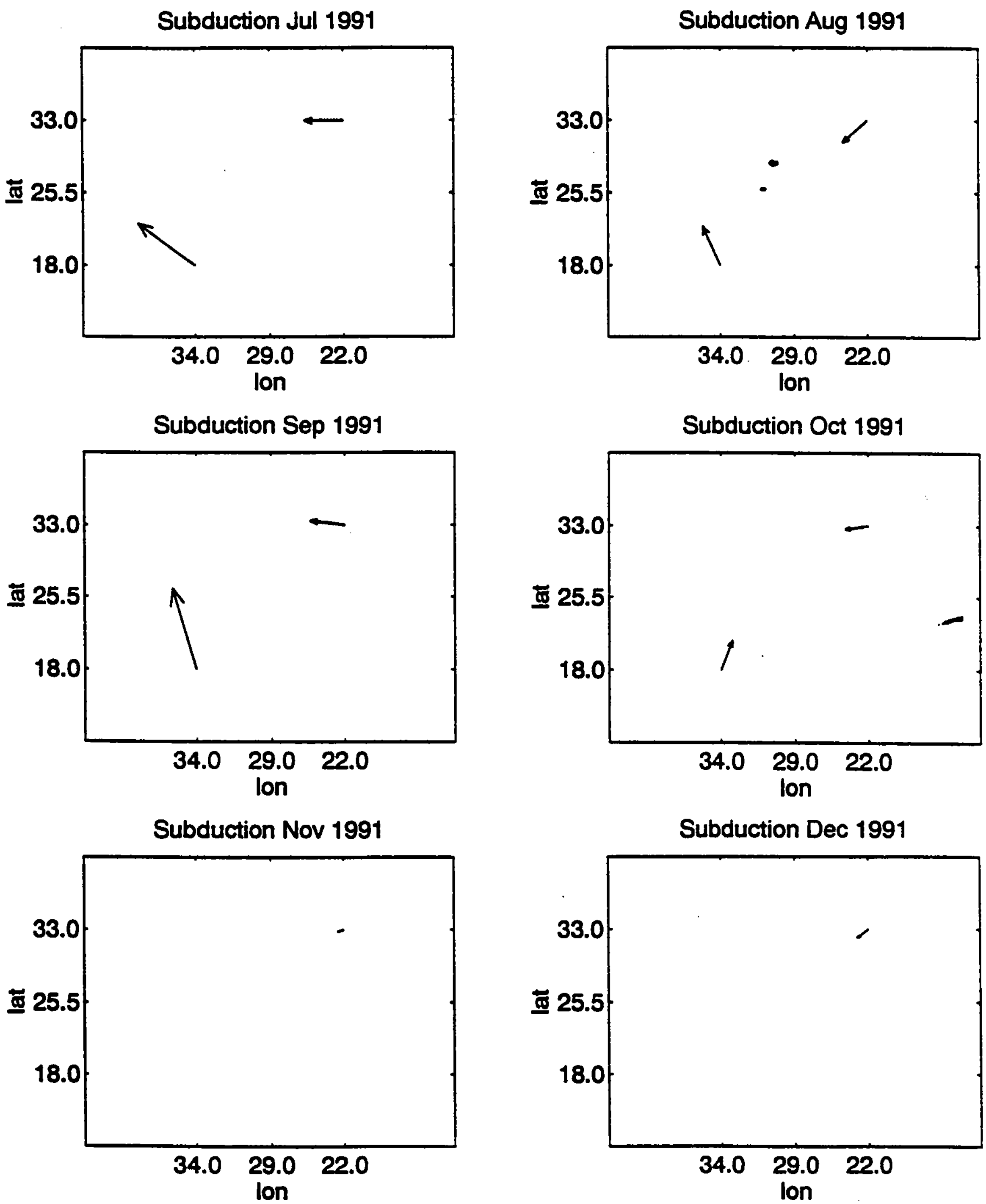


Figure 9c. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10m current from the current at a reference depth of 50 m.

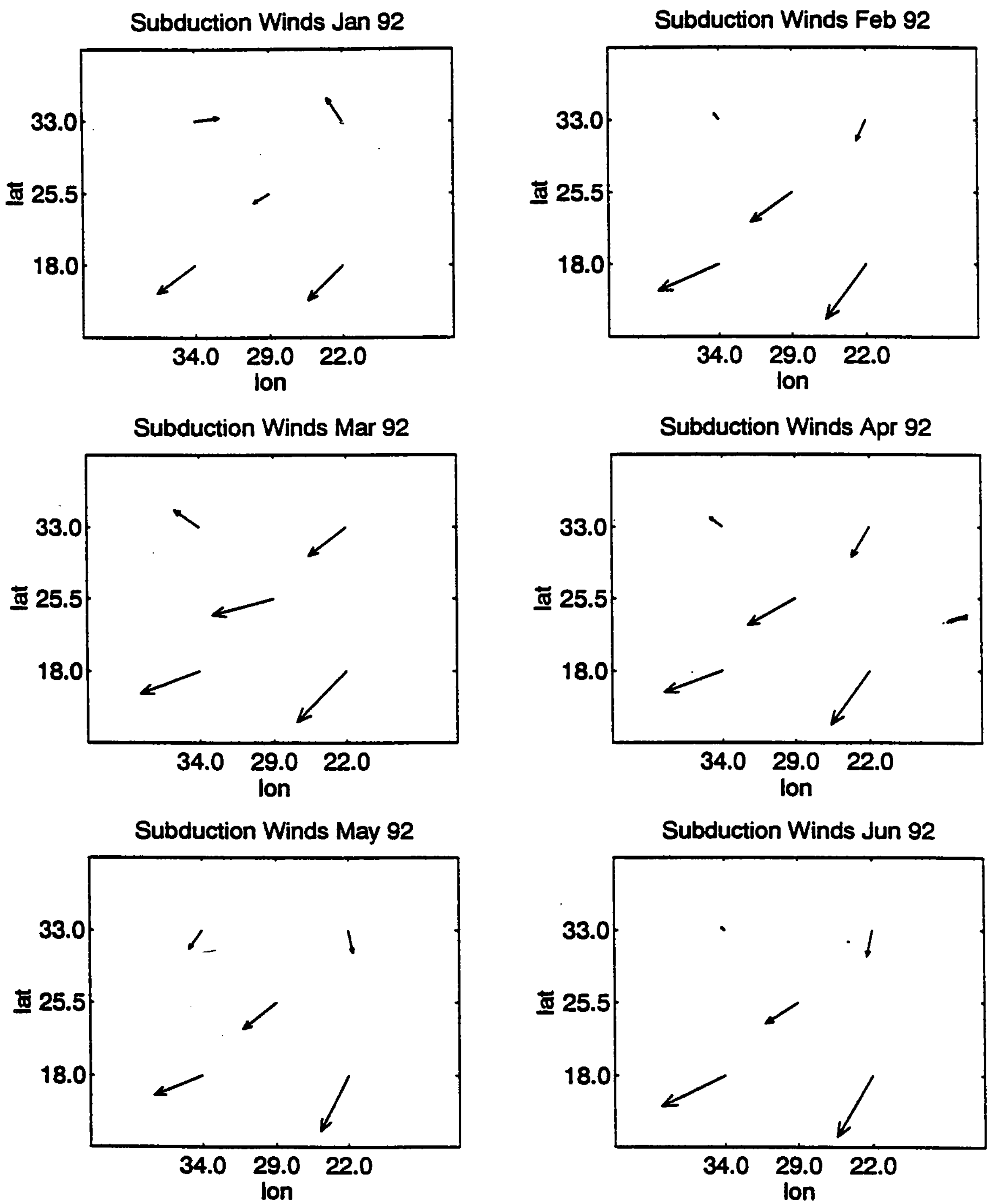


Figure 9d. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10m current from the current at a reference depth of 50 m.

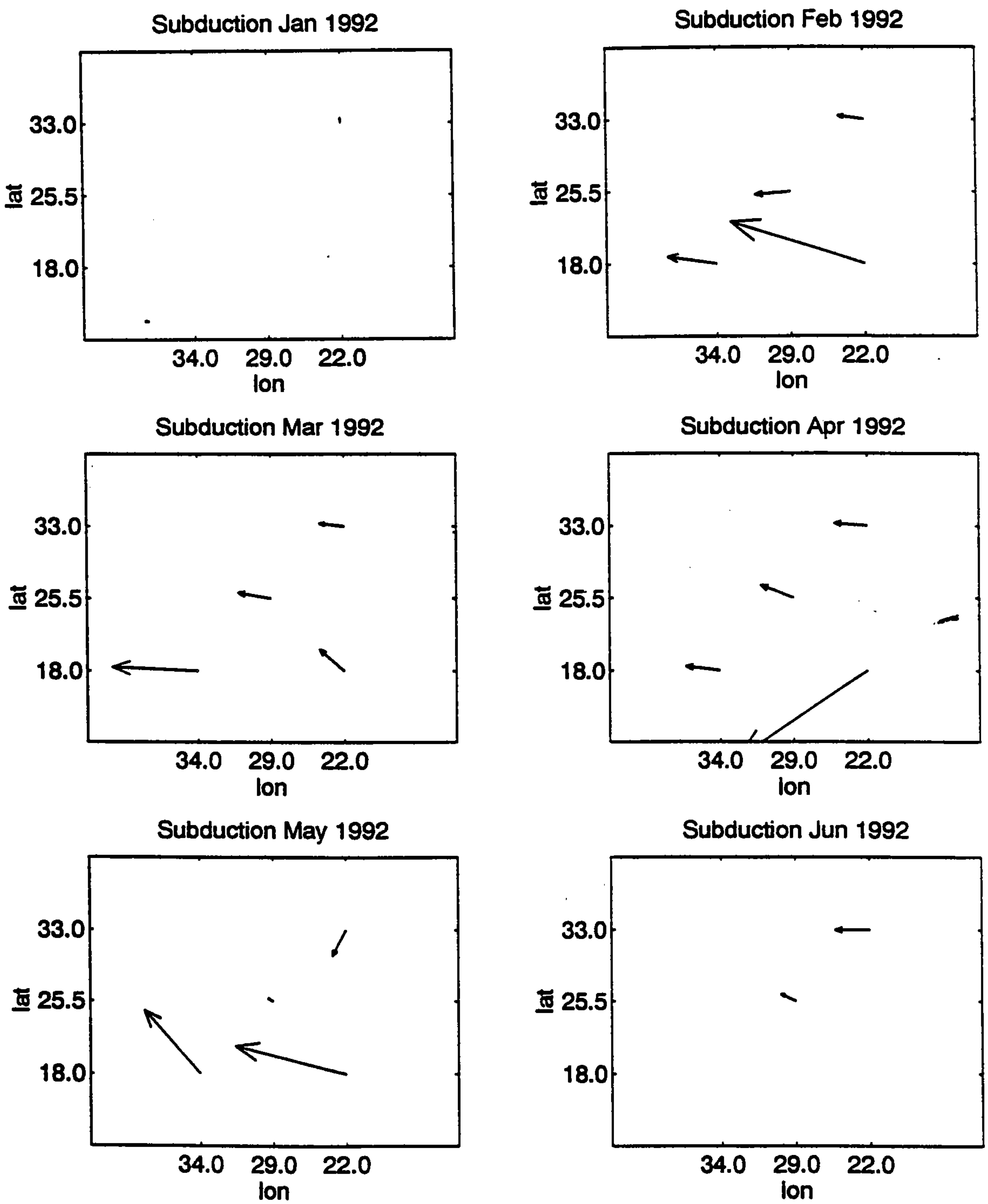


Figure 9e. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10m current from the current at a reference depth of 50 m.

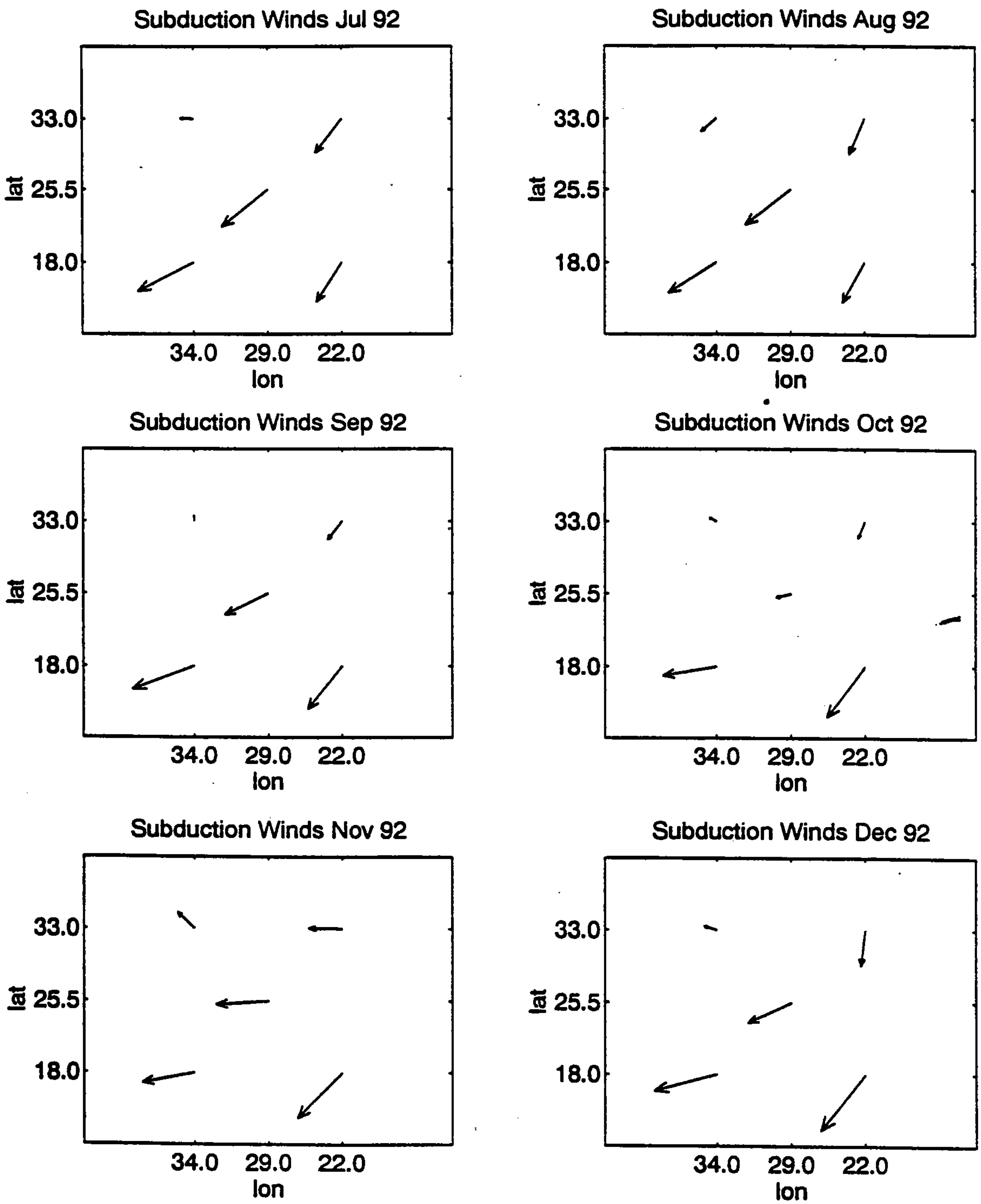


Figure 9f. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10 m current from the current at a reference depth of 50 m.

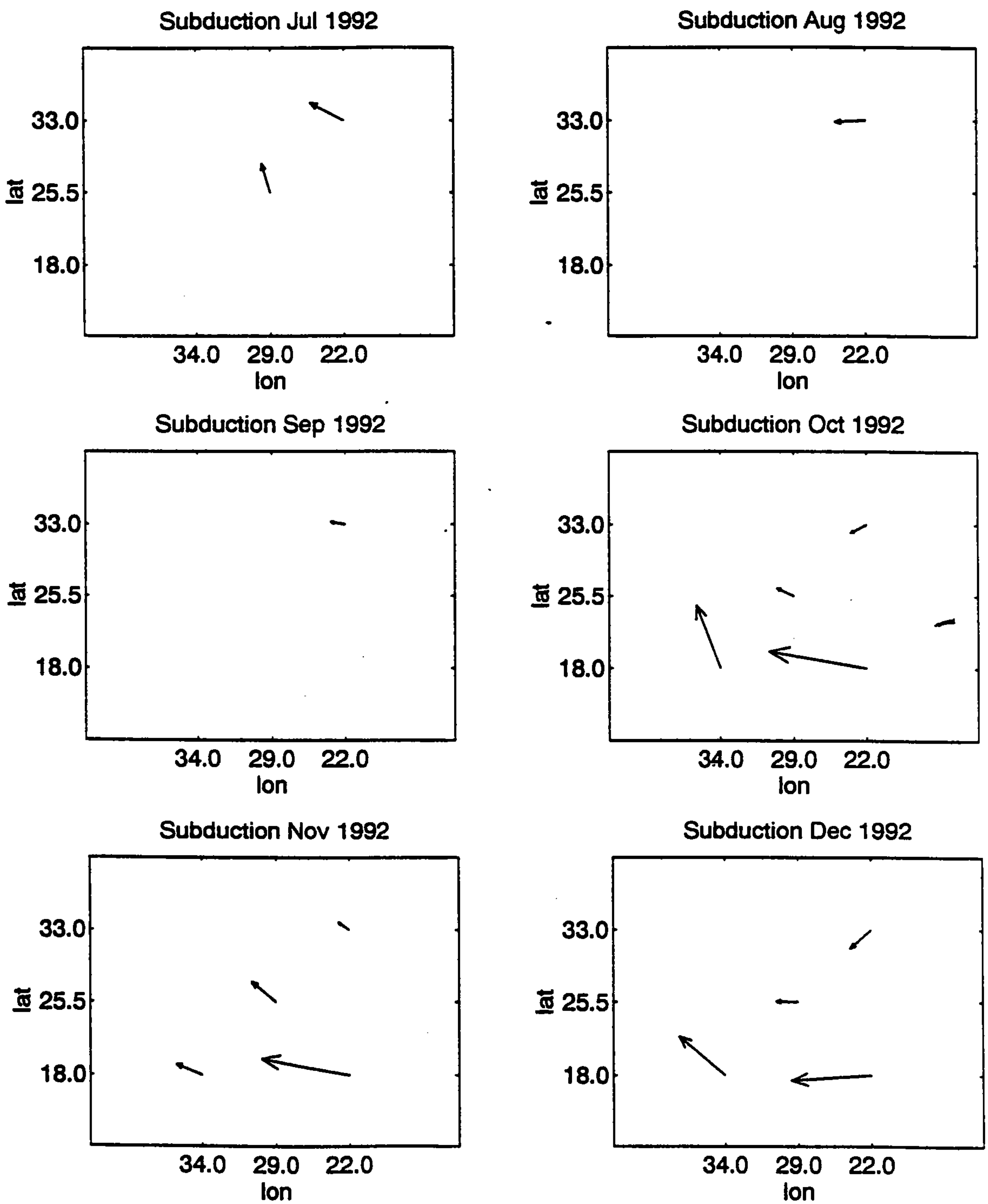


Figure 9g. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10 m current from the current at a reference depth of 50 m.

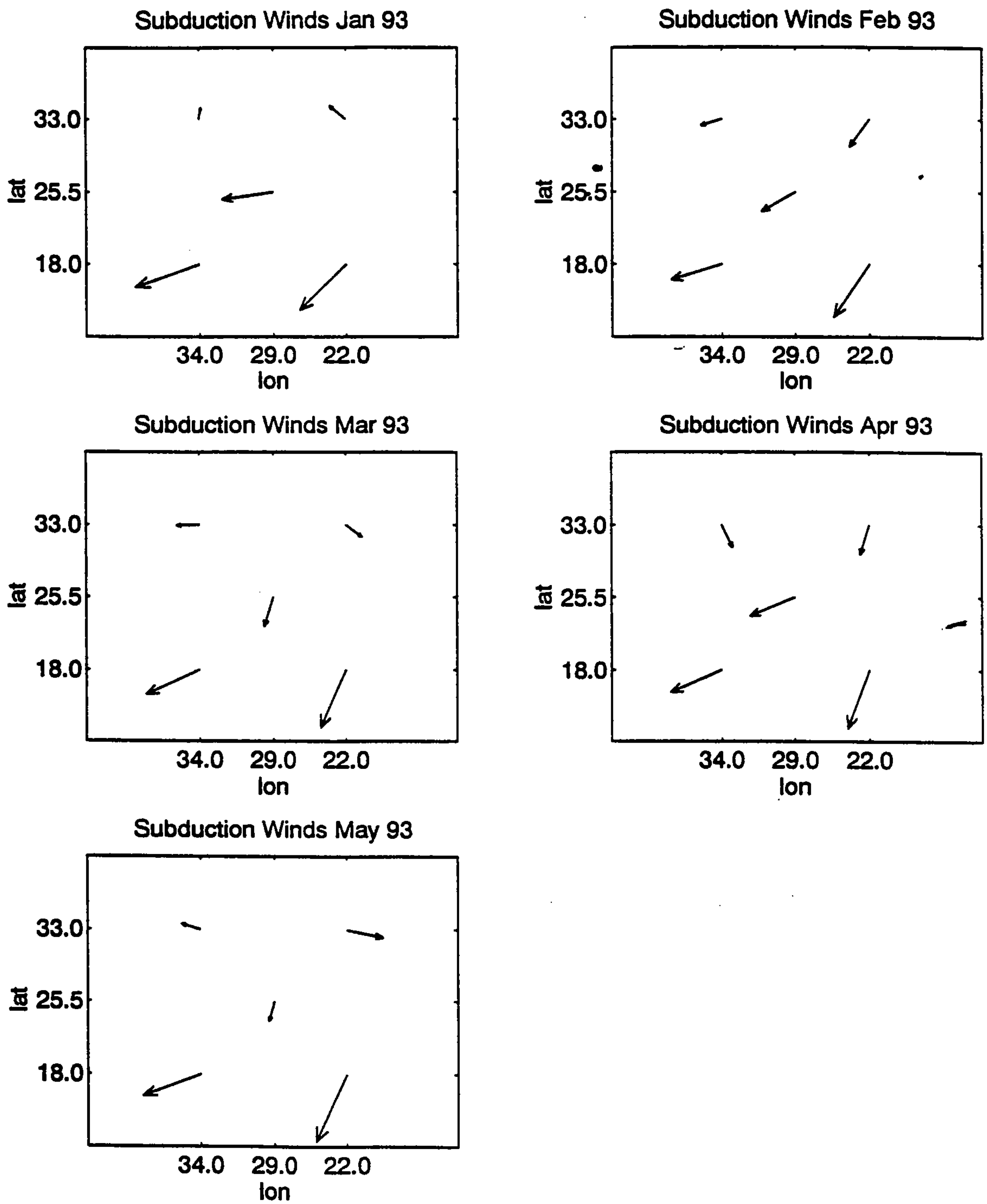


Figure 9h. Monthly averaged wind and wind-driven current vectors. The wind-driven current is estimated by subtracting the 10 m current from the current at a reference depth of 50 m.

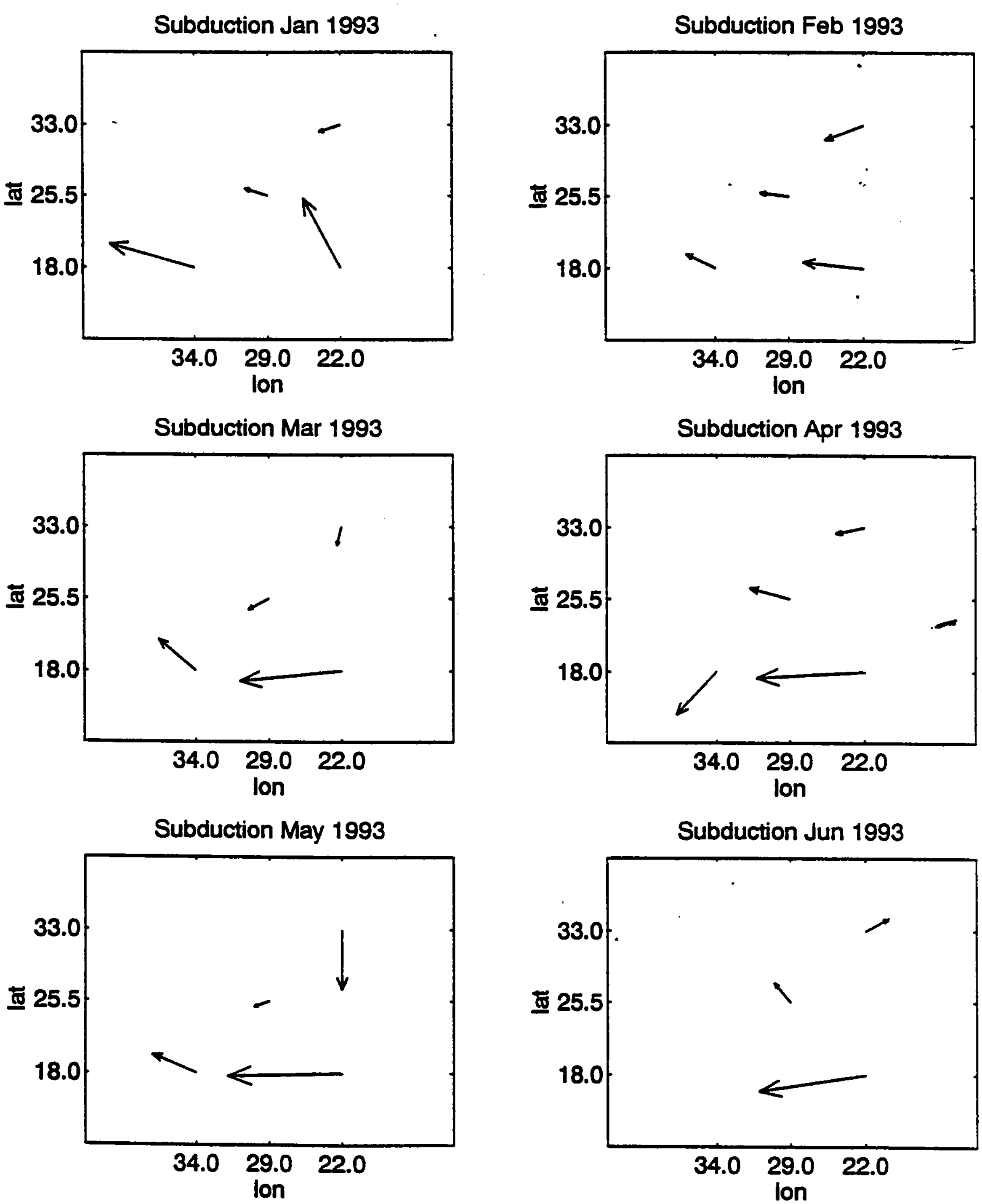
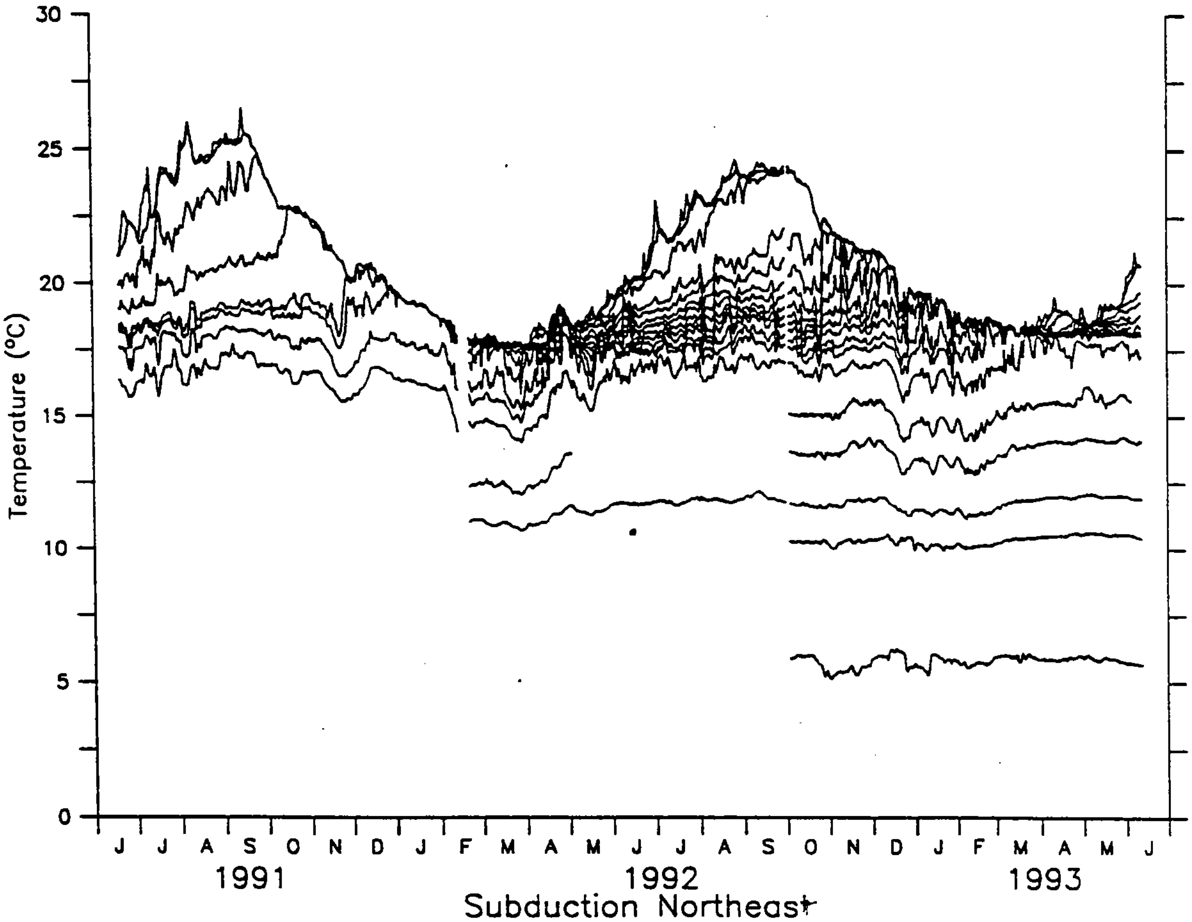
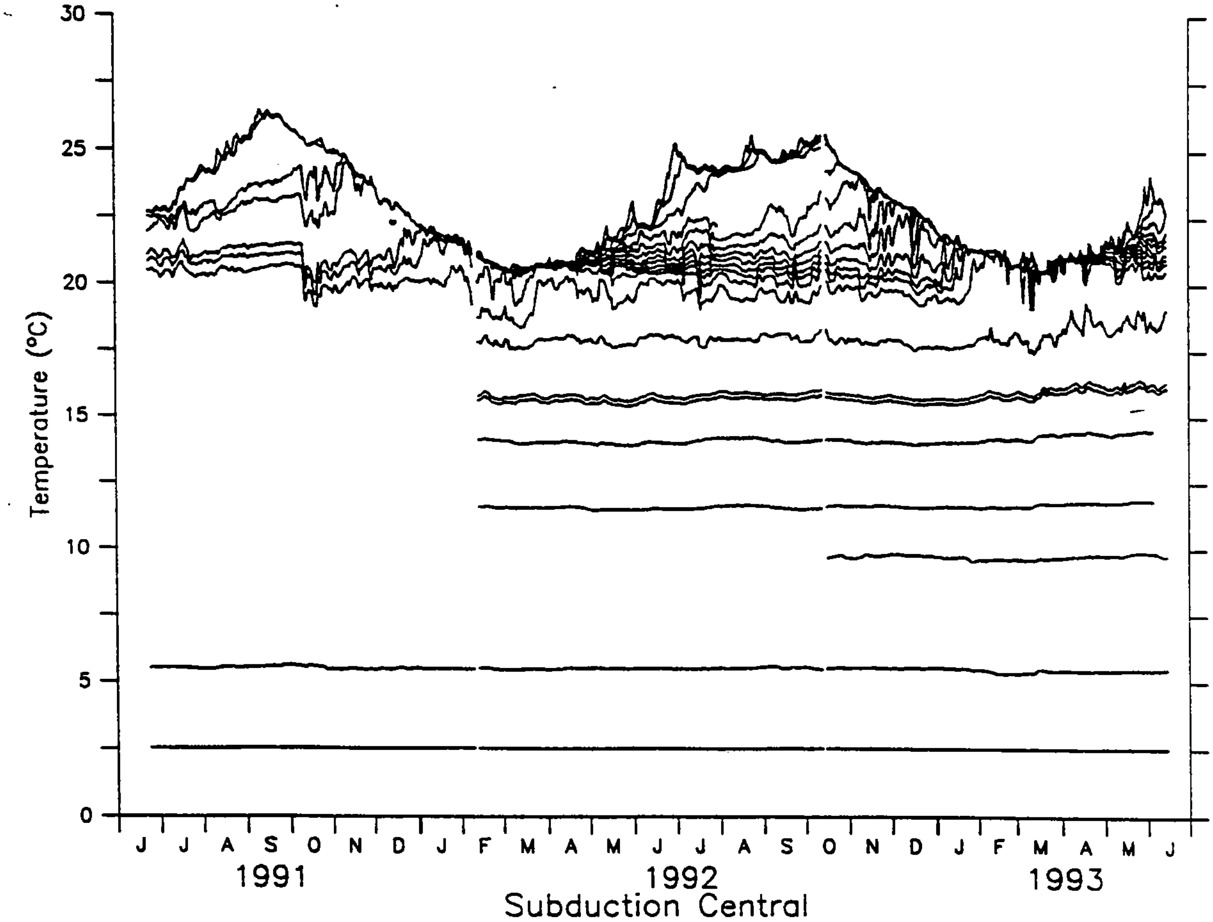


Figure 10a. Composite temperature plot for northeast mooring.



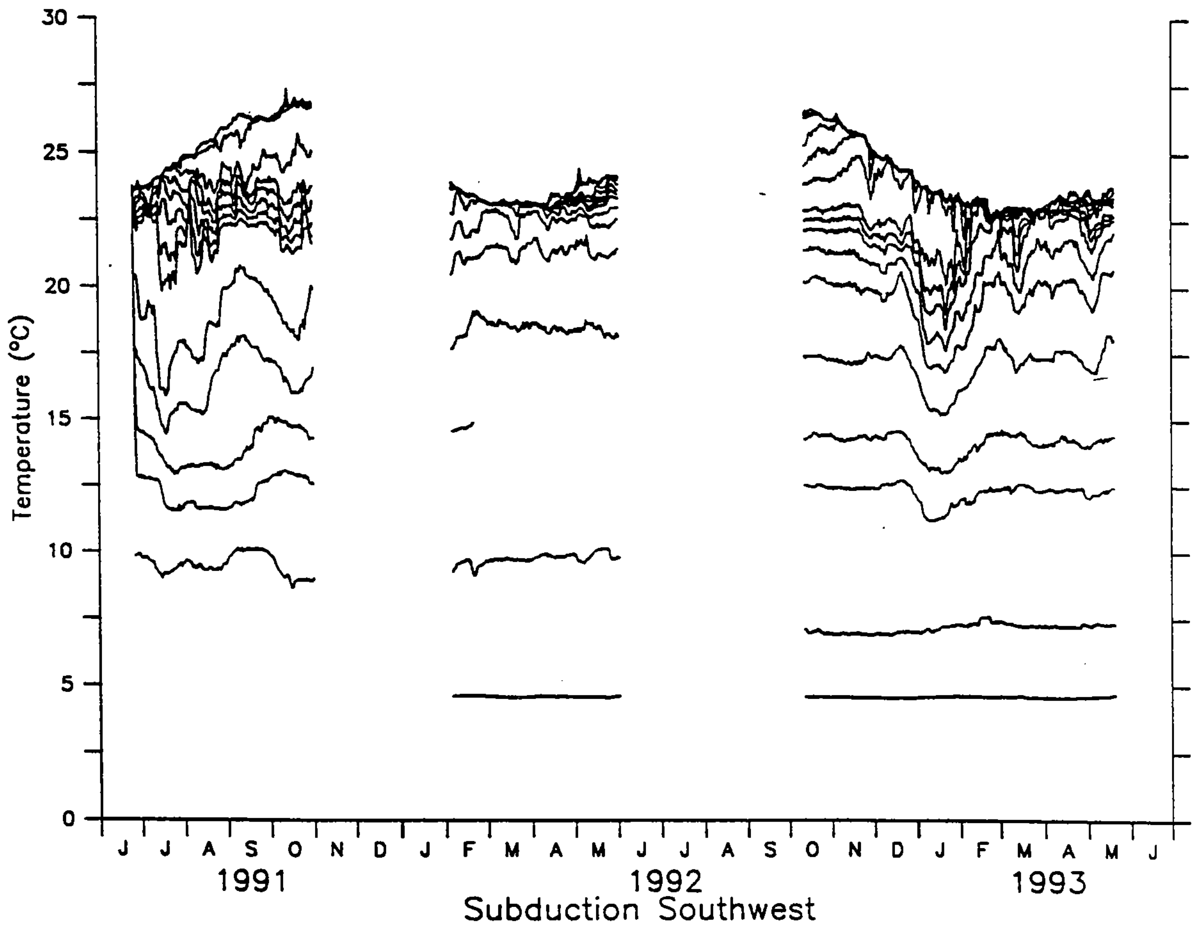
	1	1 m
10	10	10m
30	30	30m
50	50	50m
	60	60m
	70	70m
80	80	80m
90	90	90m
	100	100m
	110	110m
130		130m
150	150	150m
200	200	200m
	300	300m
	400	400m
	580	580m
		750m
		1500m

Figure 10b. Composite temperature plot for central mooring.



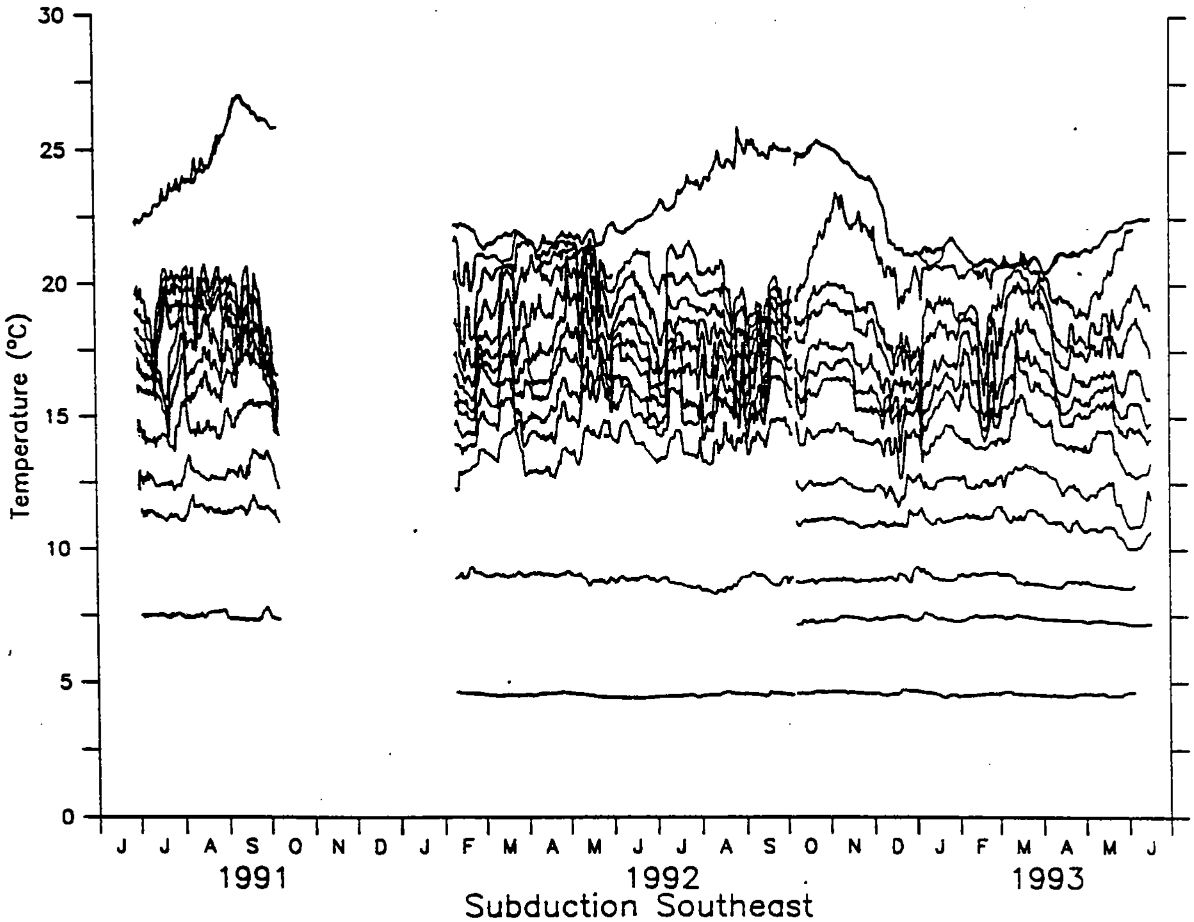
	1	1 m
10	10	10m
	30	30m
50	50	50m
60	60	60m
70	70	70m
80	80	80m
	90	90m
100	100	100m
110	110	110m
130	130	130m
	150	
	200	200m
	300	300m
	310	310m
	400	400m
	580	580m
		750m
1500	1500	1500m
3500	3500	3500m

Figure 10c. Composite temperature plot for southwest mooring.



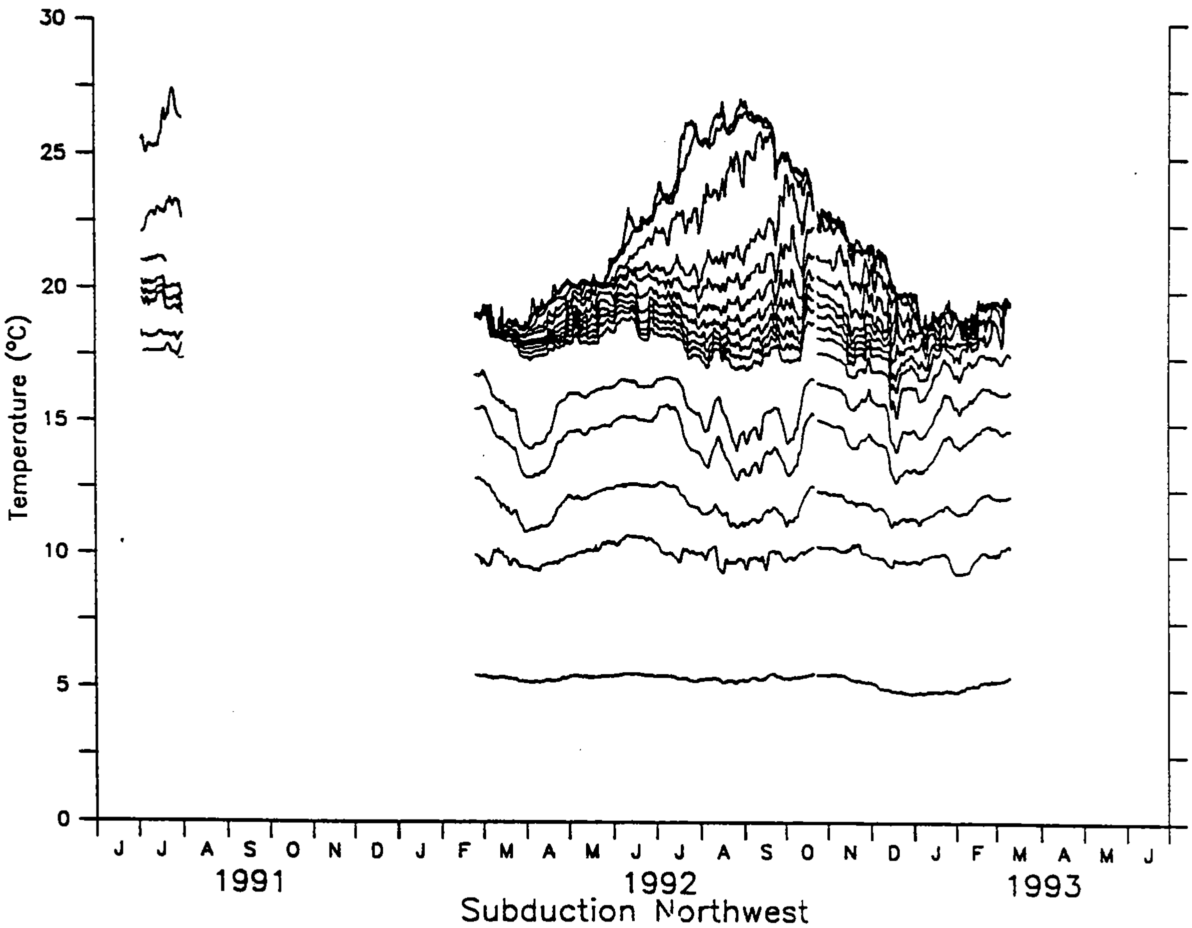
	1	1 m
10	10	10m
30	30	30m
50	50	50m
60	60	60m
70	70	70m
80	80	
90	90	90m
100		100m
	110	110m
	130	130m
150	150	150m
200	200	200m
300	300	300m
400		400m
580	580	
		750m
	1500	1500m

Figure 10d. Composite temperature plot for southeast mooring.



	1	1 m
10	10	10 m
	30	30 m
50	50	
60	60	60 m
70	70	
80	80	80 m
90	90	90 m
100	100	100 m
110	110	110 m
130	130	130 m
150	150	150 m
200	200	200 m
300		300 m
400		400 m
	580	580 m
750		750 m
	1500	1500 m

Figure 10e. Composite Temperature plot for northwest mooring.



	1	1 m
10	10	10m
30	30	30m
50	50	50m
	60	60m
70	70	70m
80	80	80m
90	90	90m
	100	100m
110	110	110m
130	130	130m
150	150	150m
200		200m
300	300	300m
400	400	400m
	580	580m
750	750	750m
	1500	1500m

Figure 11. Calculated mixed layer depth plot.

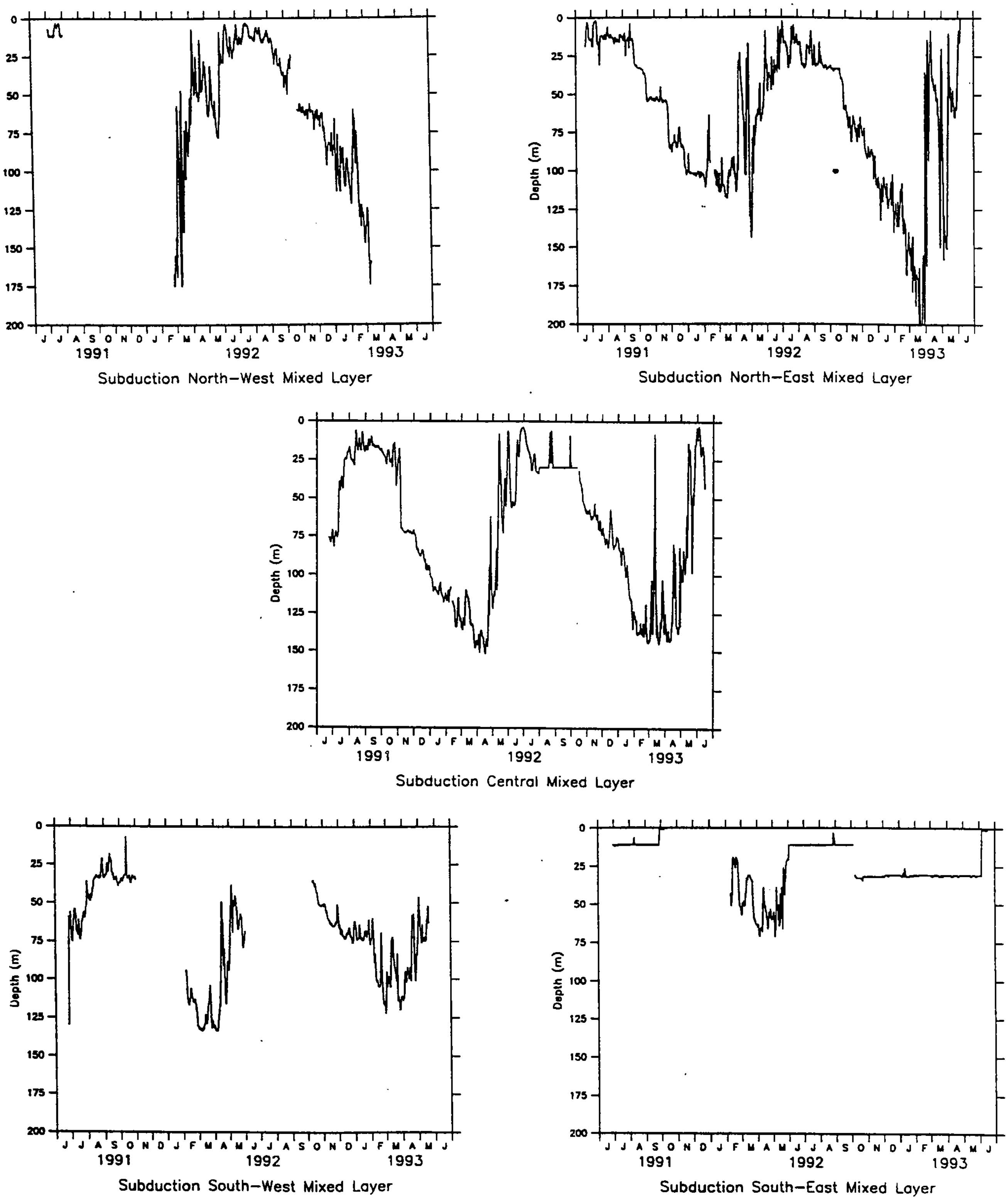


Figure 12a. Stacked velocity stick plots for northeast mooring.

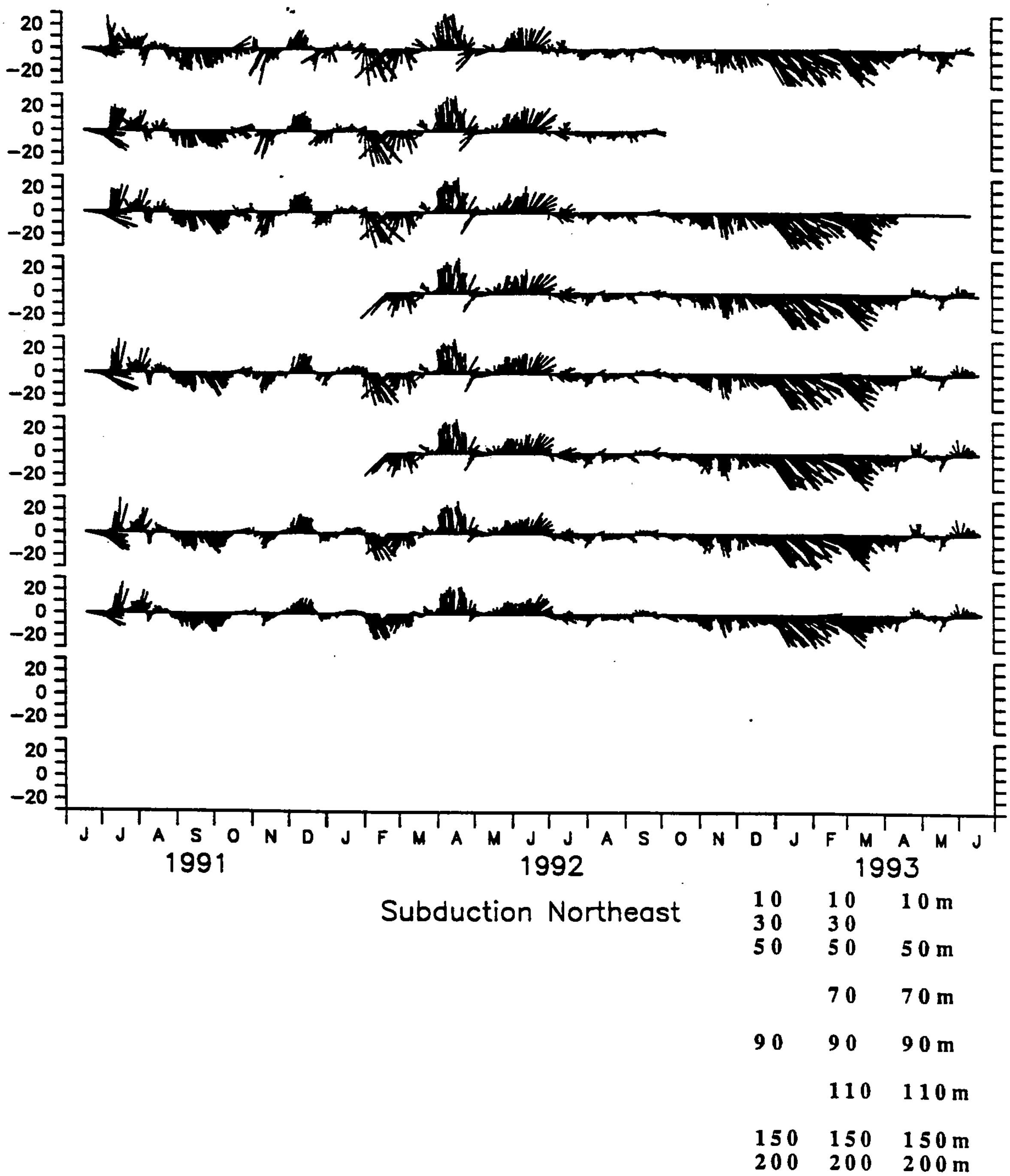


Figure 12b. Stacked velocity stick plots for central mooring.

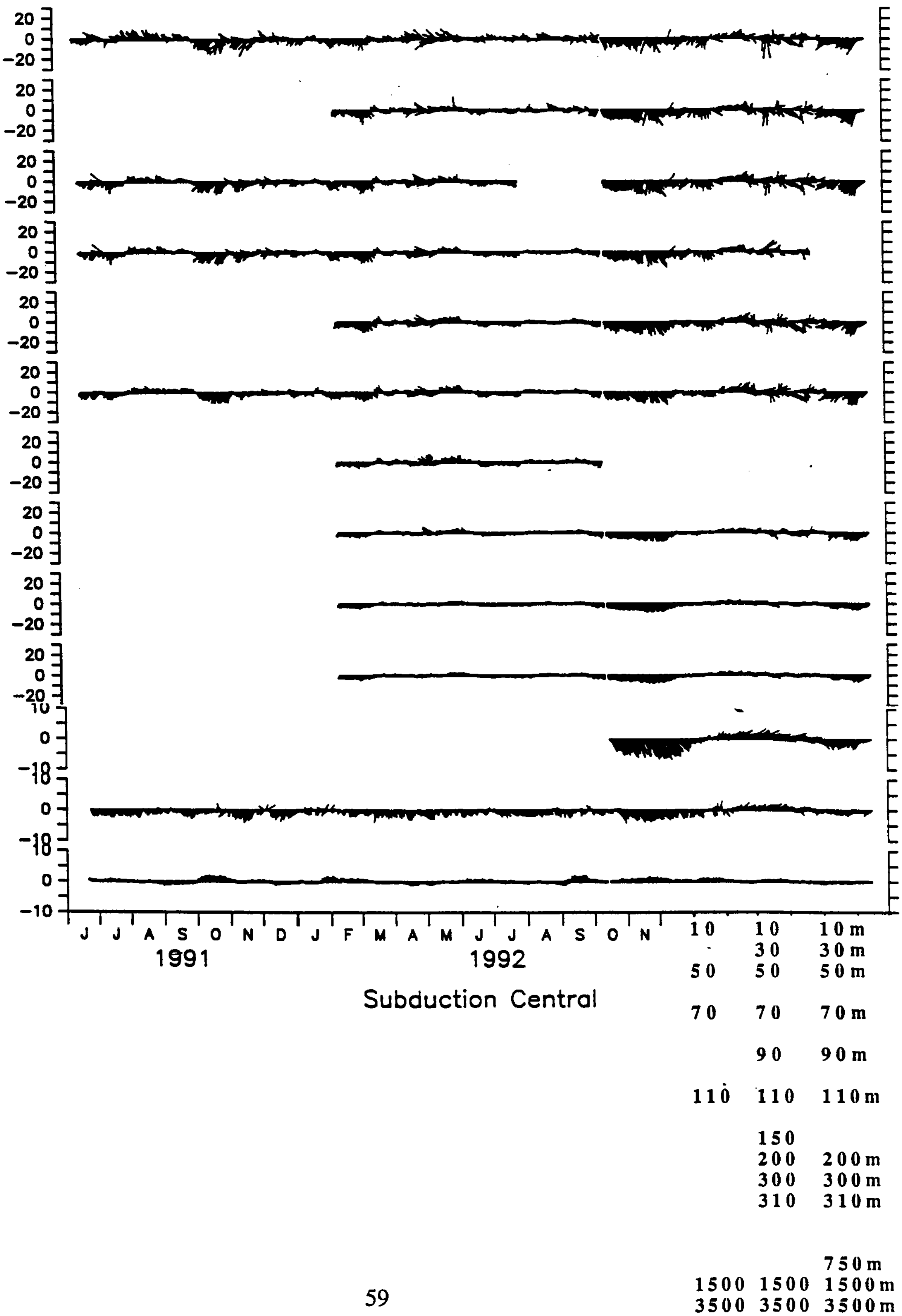


Figure 12c. Stacked velocity stick plots for southwest mooring.

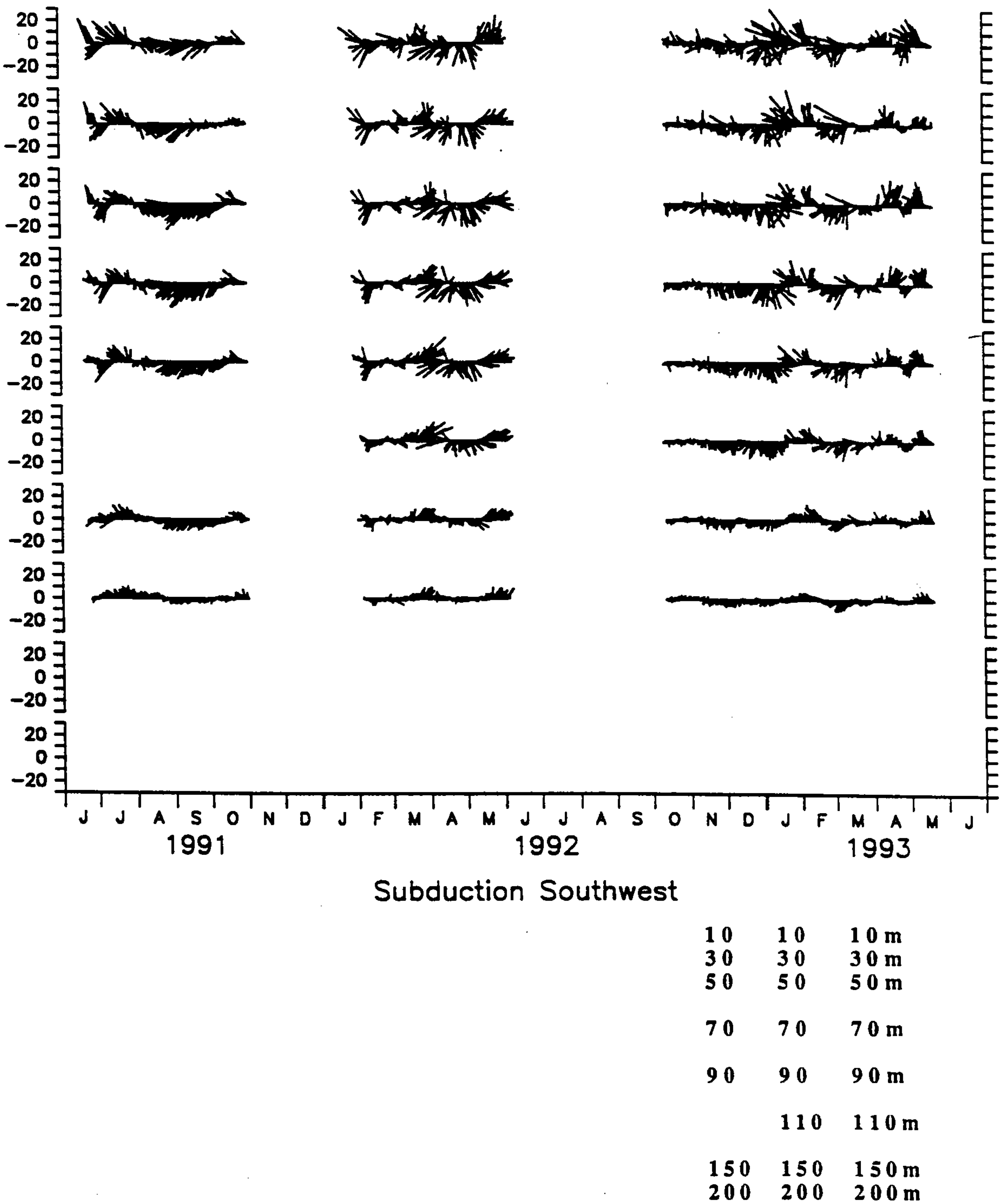


Figure 12d. Stacked velocity stick plots for southeast mooring.

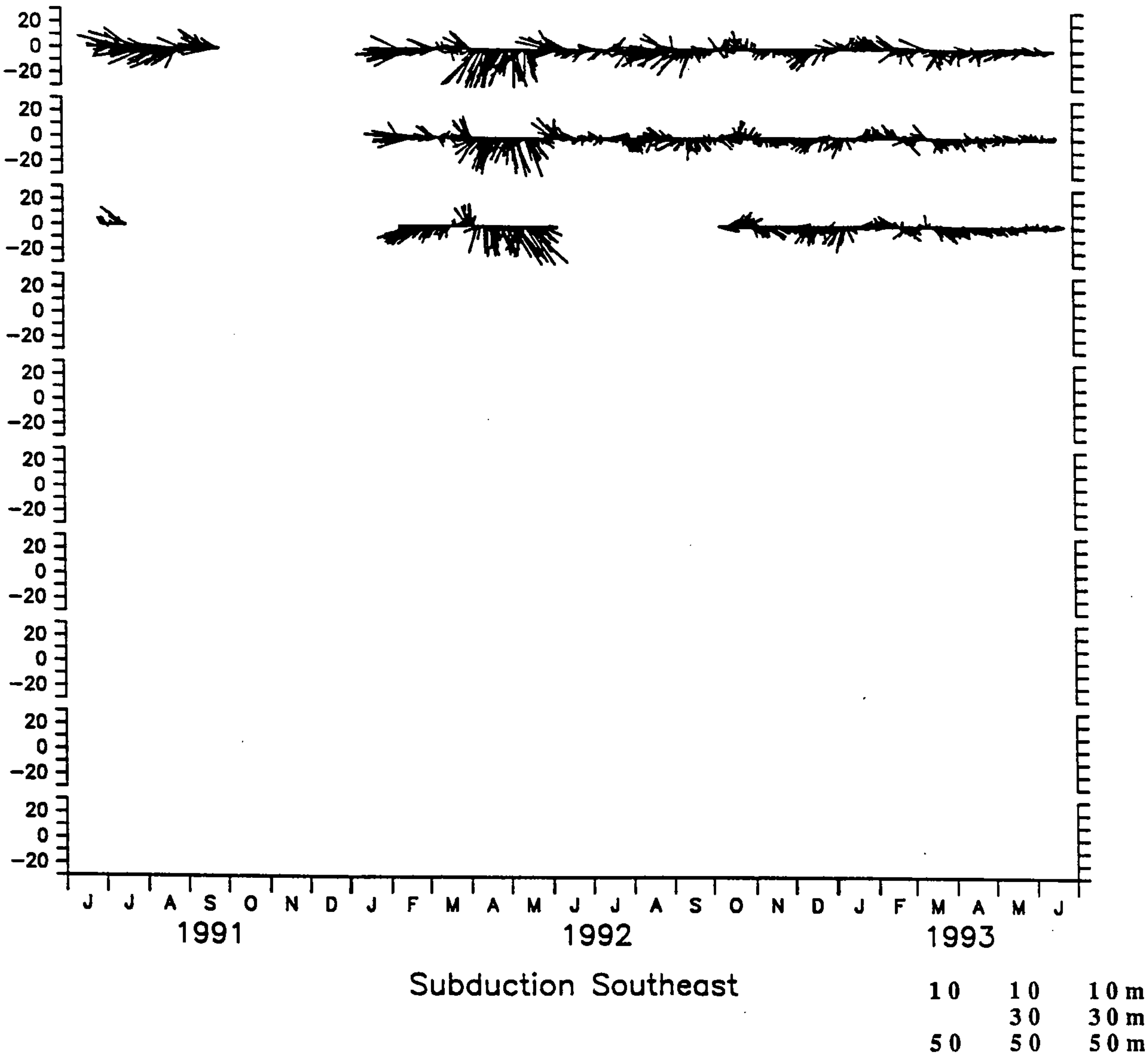


Figure 12e. Stacked velocity stick plots for northwest mooring.

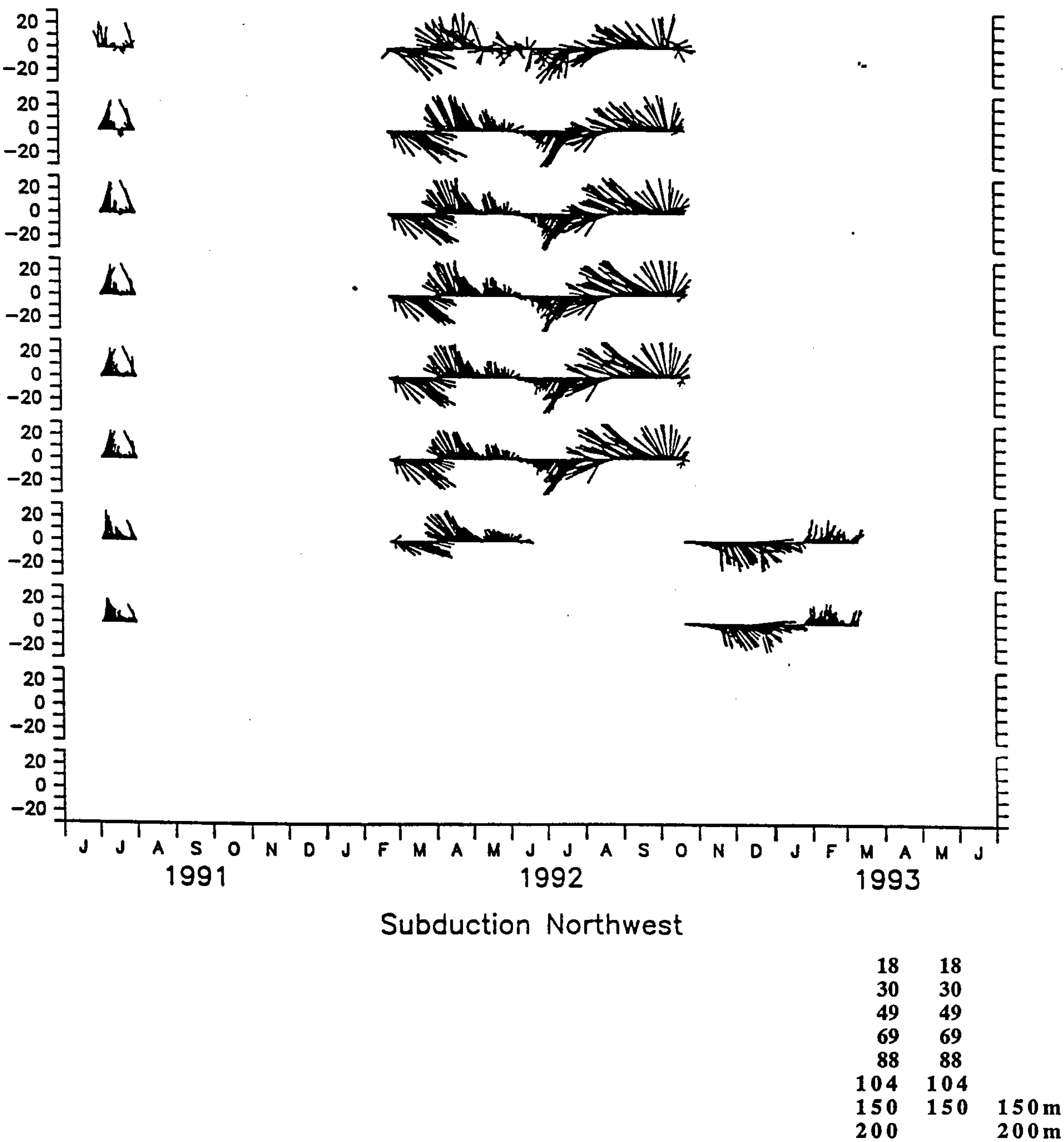


Figure 13a. Composite progressive vector diagrams for Subduction 1.

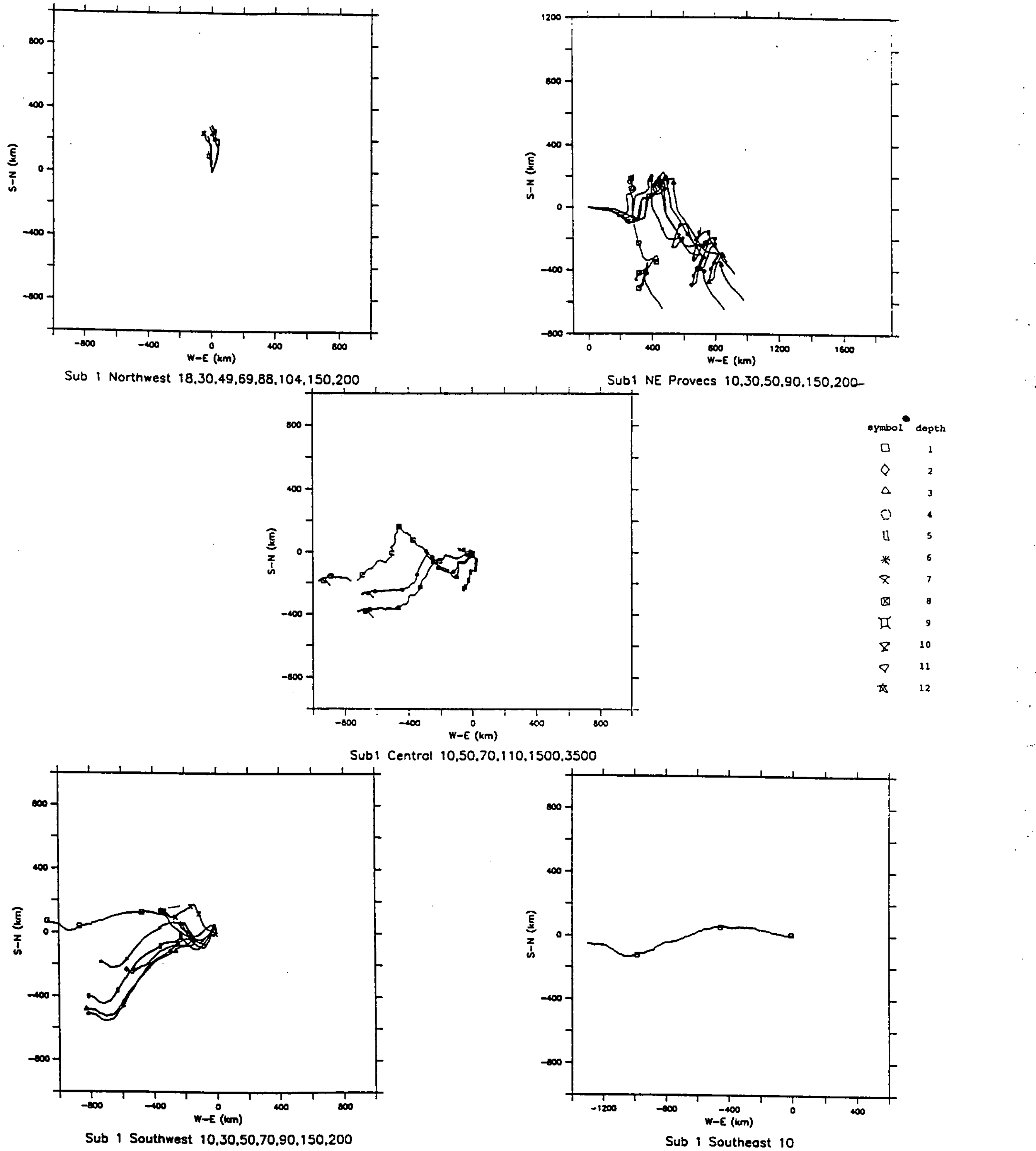


Figure 13b. Composite progressive vector diagrams for Subduction 2.

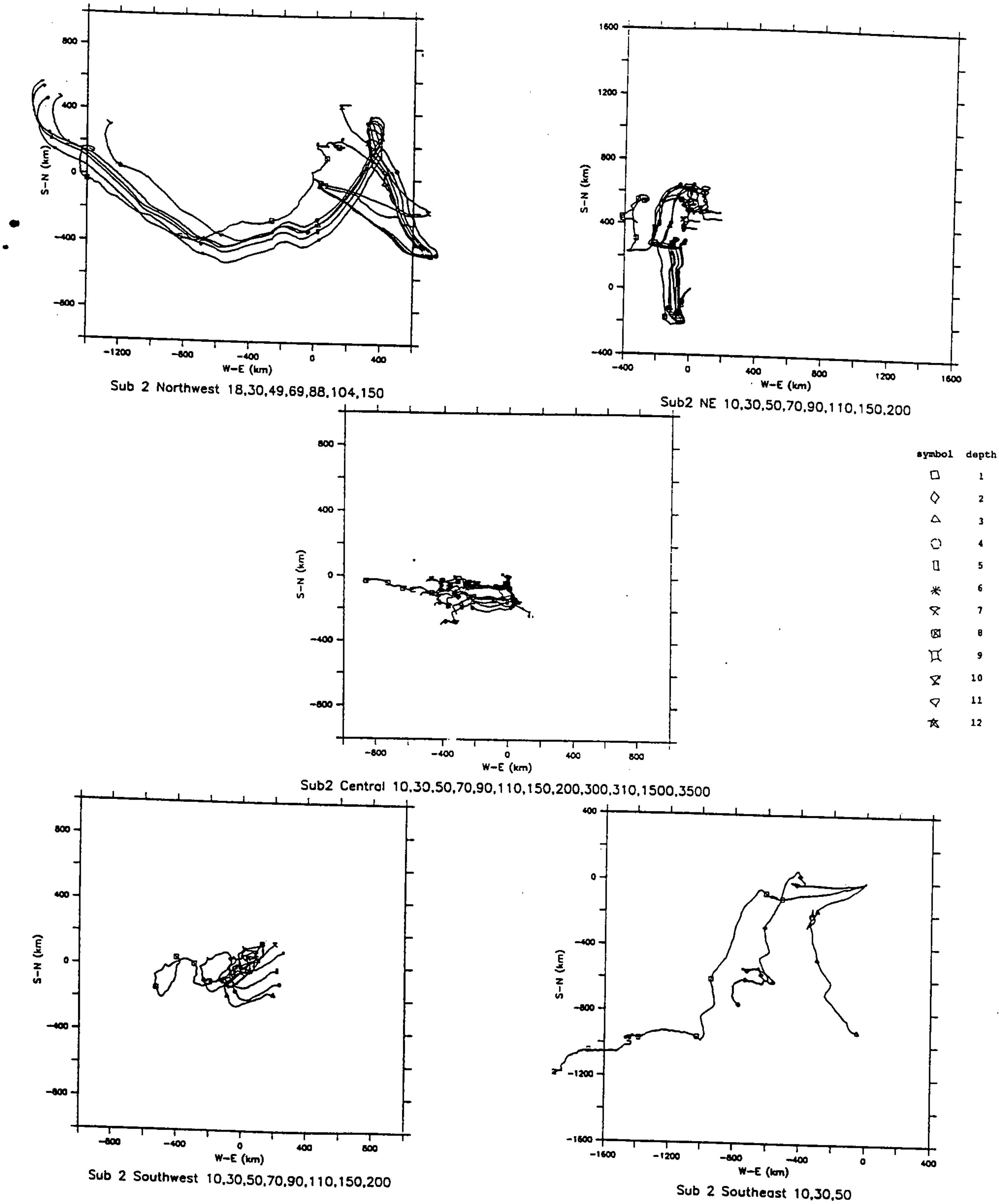


Figure 13c. Composite progressive vector diagrams for Subduction 3.

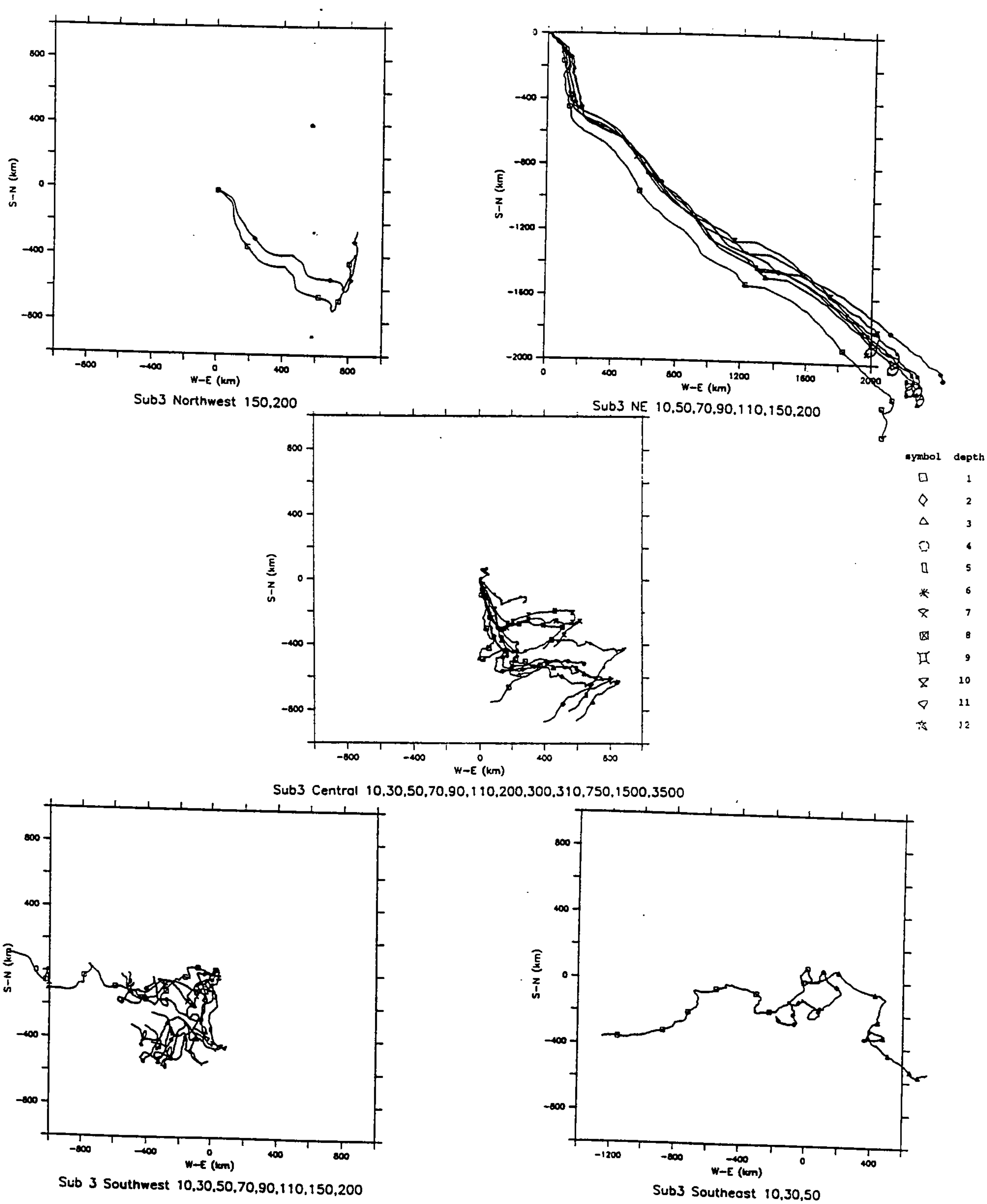


Figure 14a. Northeast meteorological spectra.

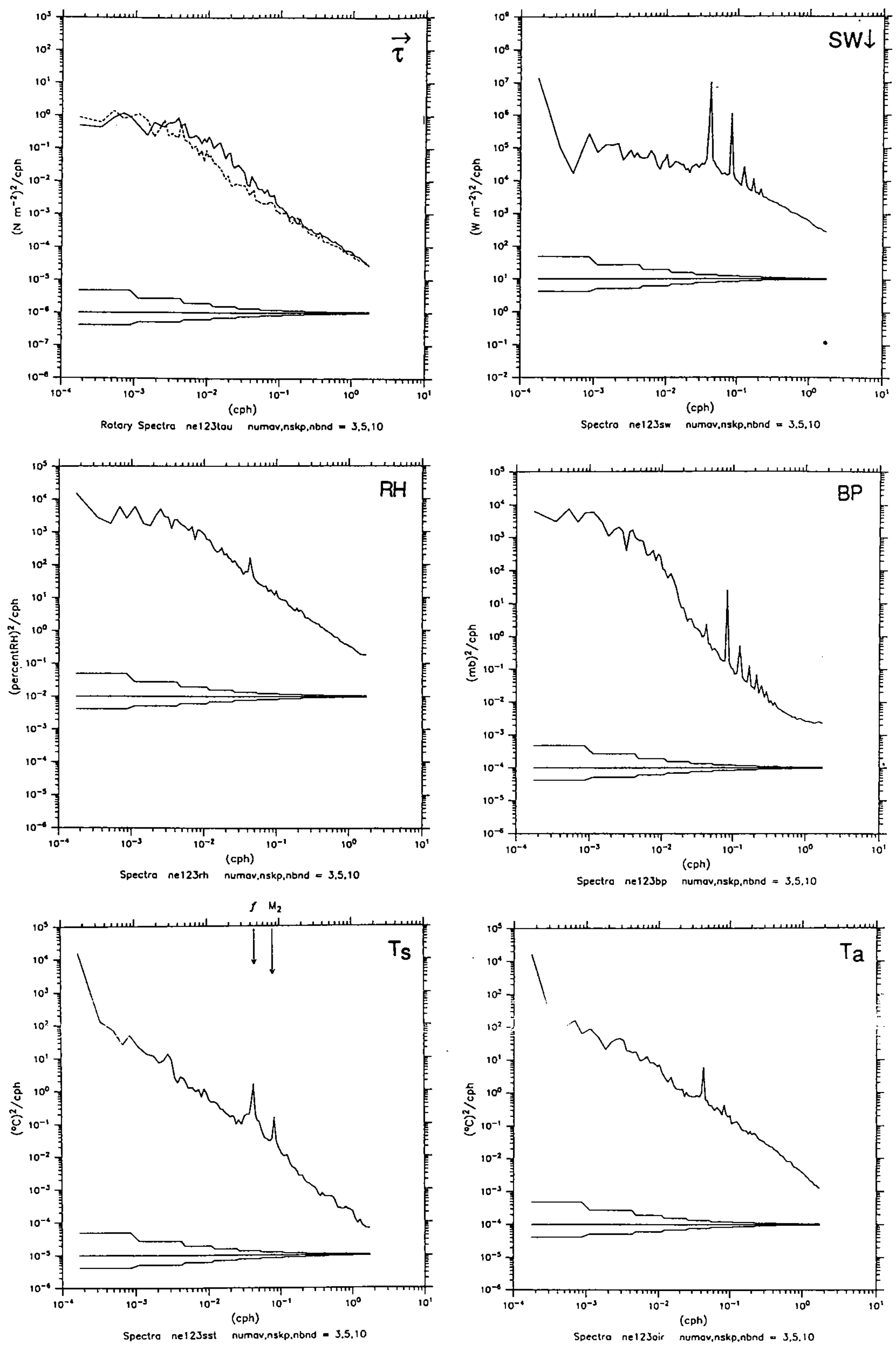


Figure 14b. Central meteorological spectra.

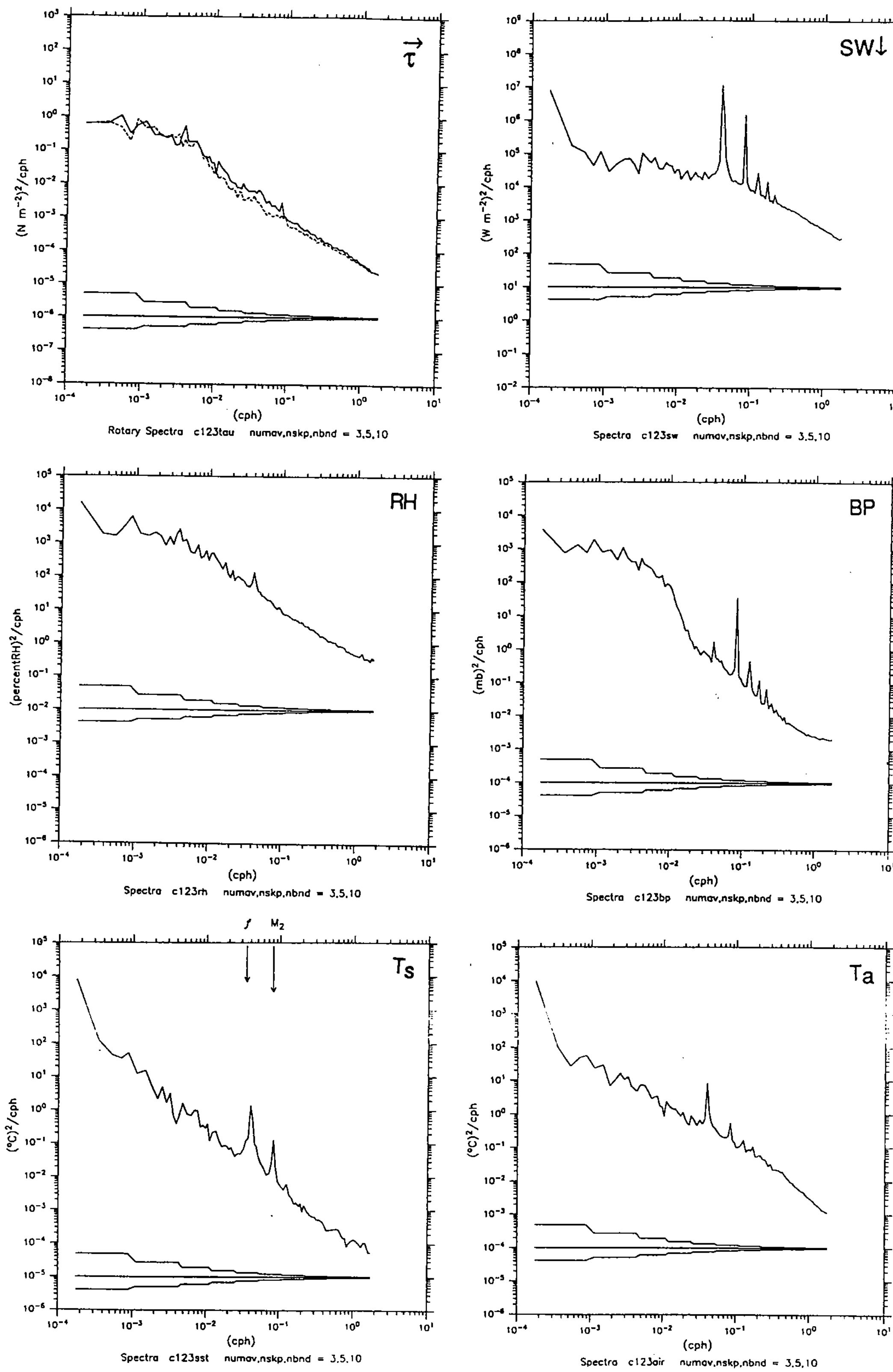


Figure 15a. Stacked rotary spectra for northeast mooring.

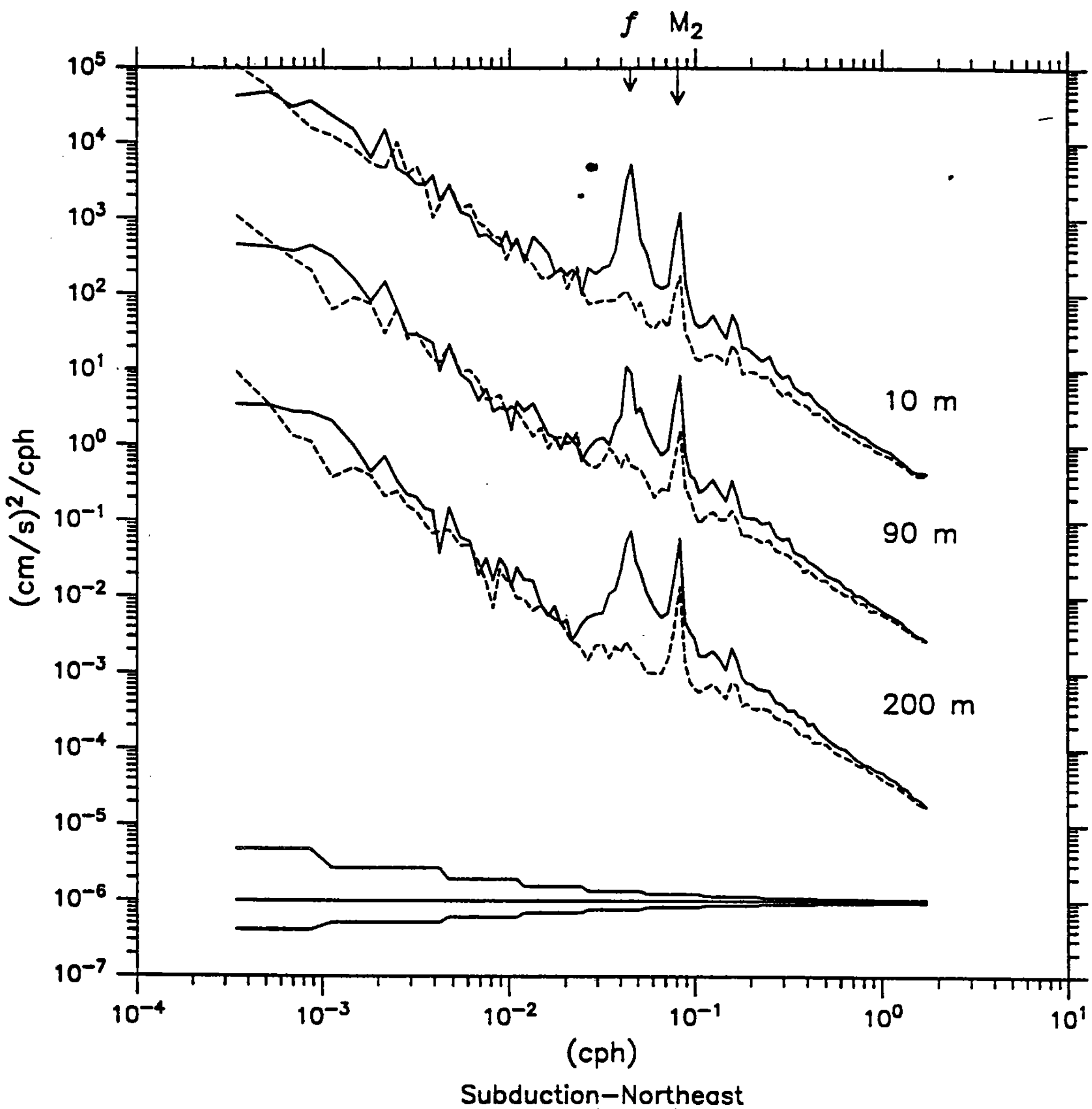


Figure 15b. Stacked rotary spectra for central mooring.

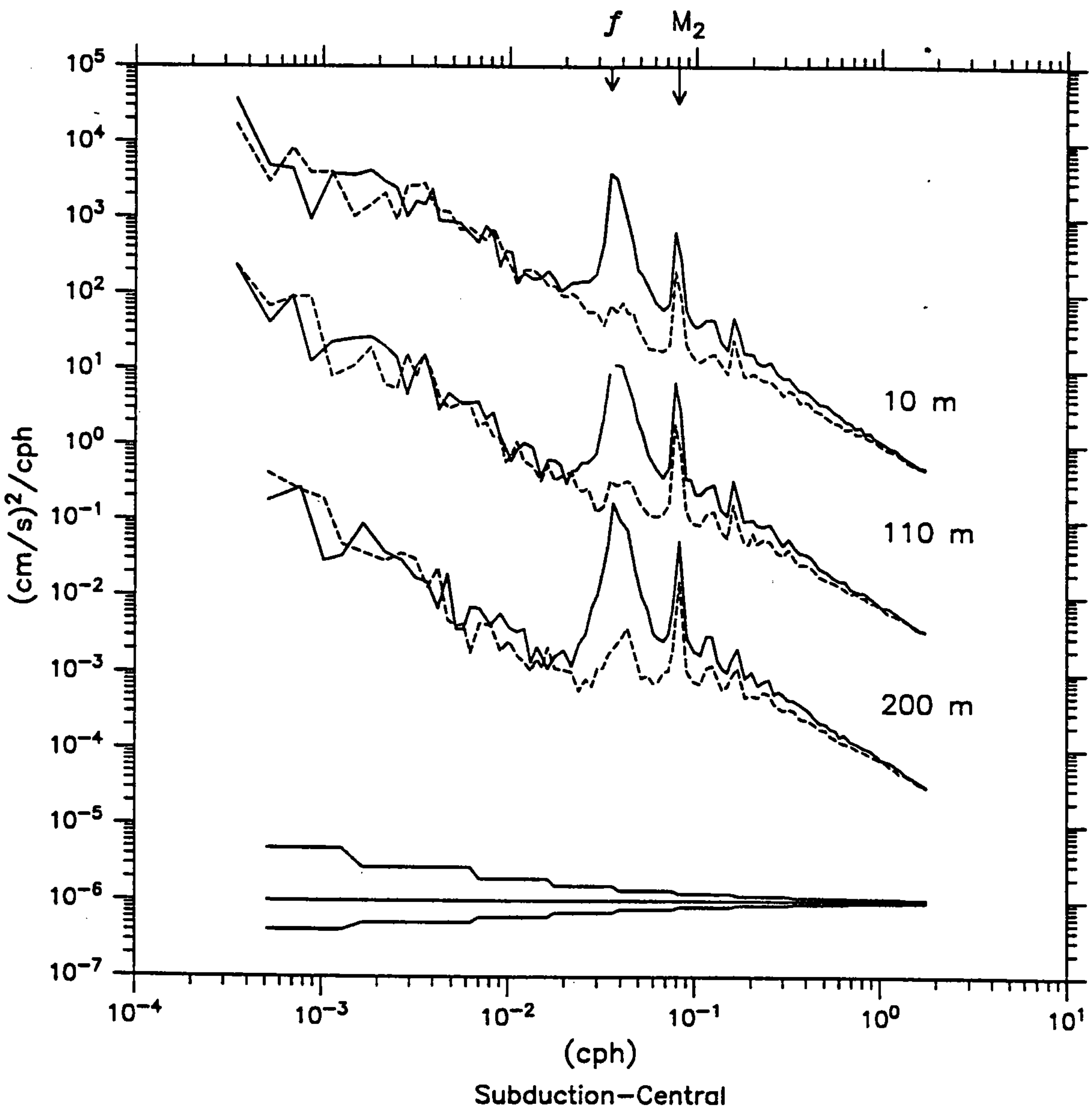


Figure 15c. Stacked rotary spectra for central mooring.

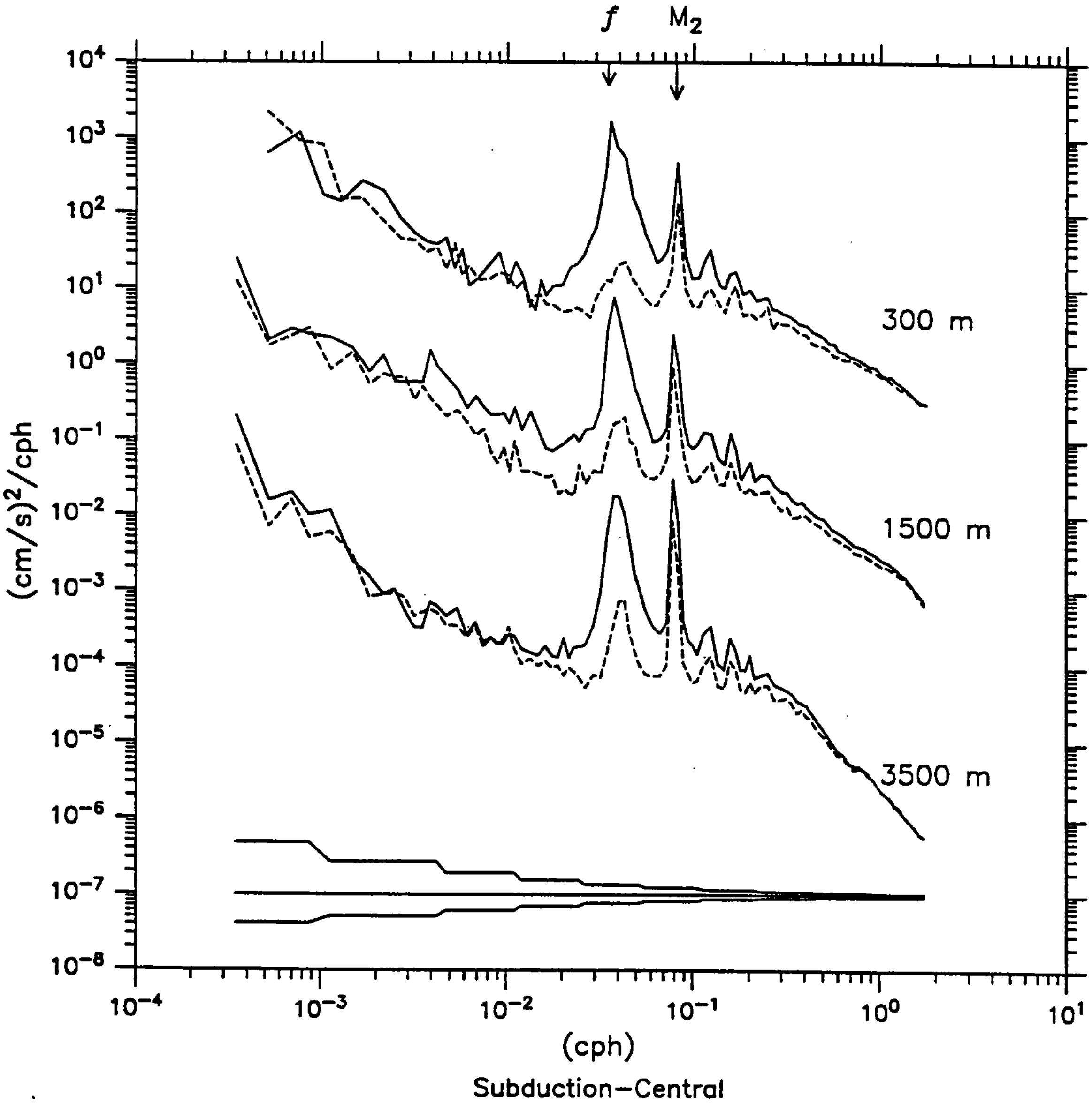


Figure 16. Northeast and central separate deployment spectra.

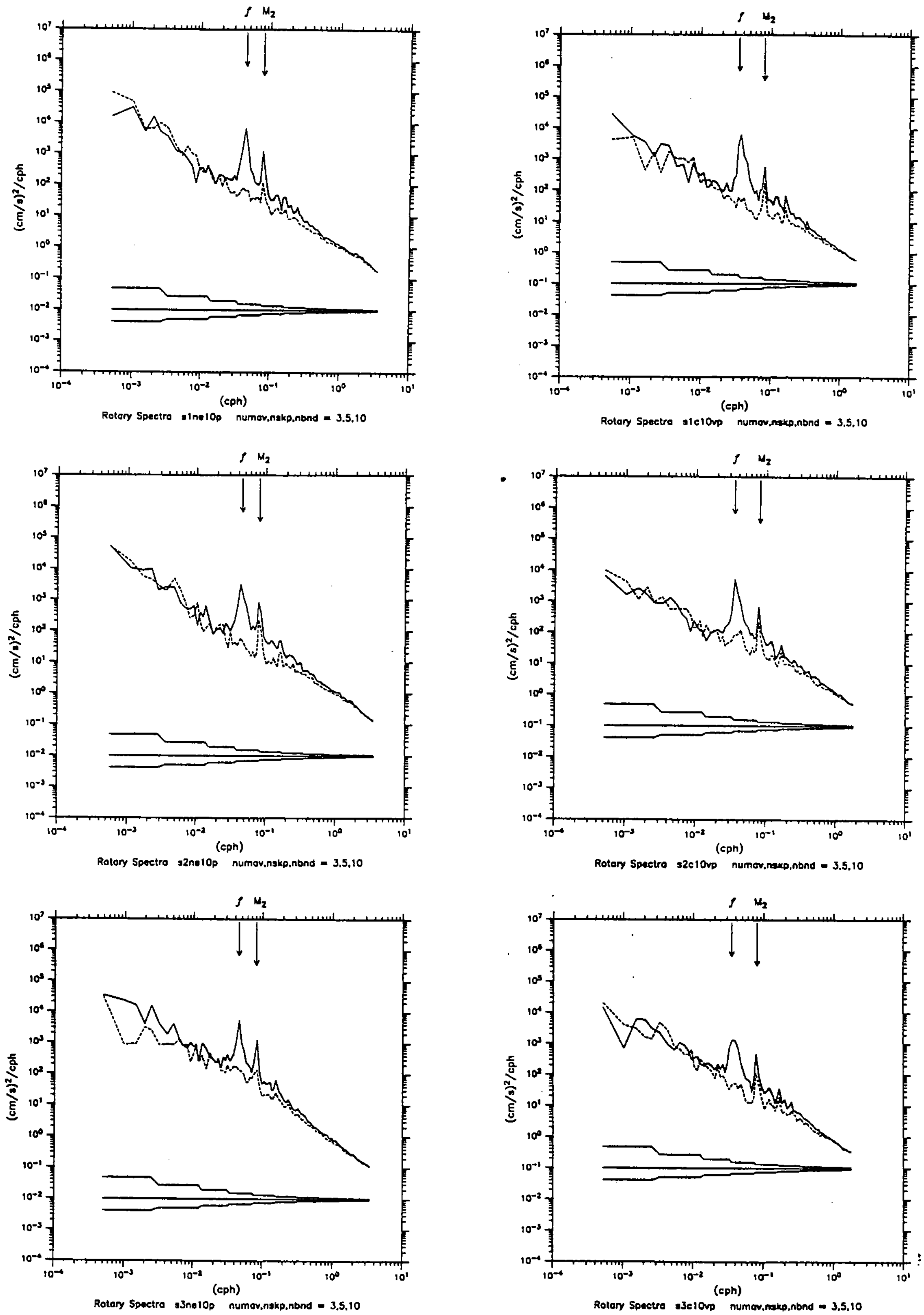


Table 11a. Monthly meteorological statistics — northeast.

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jun-91	east	-2.64	3.04				
	north	-2.87	1.99				
	srad	278.65					
	lrad	372.15	27.09				
	rh	79.35	6.52				
	bp	1024.05	2.3				
	sst	22.09	0.58				
	air	21.31	0.89				
	precip	0	0				
Jul-91	east	-1.92	2.93	Jan-92	east	-1.57	4.18
	north	-3.15	2.44		north	2.77	3.89
	srad	296.02			srad	104.54	
	lrad	375.27	26.01		lrad	350.77	22.2
	rh	79.13	6.21		rh	76.4	7.48
	bp	1022.68	2.18		bp	1019.26	5.37
	sst	23.37	0.92		sst	19.21	0.27
	air	22.65	0.88		air	18.09	0.65
	precip	0	0		precip	0.02	0.3
Aug-91	east	-1.5	2.65	Feb-92	east	-0.96	3.7
	north	-3.05	2.14		north	-2.56	4.58
	srad	286.87			srad	154.5	
	lrad	375.28	20.81		lrad	338.3	26.57
	rh	76.89	5.1		rh	77.77	9.99
	bp	1020.81	2.6		bp	1024.64	3.32
	sst	25.01	0.5		sst	18.19	0.32
	air	23.91	0.57		air	17.12	0.92
	precip	0	0		precip	0	0.08
Sep-91	east	-0.98	3.68	Mar-92	east	-3.92	3.22
	north	-2.33	3.66		north	-3.22	2.84
	srad	228.32			srad	183.08	
	lrad	379.71	21.47		lrad	348.49	25.86
	rh	77.69	6.83		rh	75.09	7.52
	bp	1021.5	2.49		bp	1026.99	2.33
	sst	25.24	0.53		sst	17.77	0.15
	air	24.01	0.97		air	16.93	0.57
	precip	0	0.01		precip	0	0
Oct-91	east	-2.06	4.4	Apr-92	east	-2.03	4.91
	north	-0.75	4.89		north	-3.35	2.19
	srad	161.23			srad	259.53	
	lrad	369.44	27.38		lrad	341.77	24.9
	rh	77.63	7.95		rh	77.05	7
	bp	1019.15	4.33		bp	1023.15	4.89
	sst	22.98	0.4		sst	18.41	0.49
	air	21.61	0.83		air	17.85	0.71
	precip	0.01	0.21		precip	0	0
Nov-91	east	-2.1	4.86	May-92	east	0.51	5.38
	north	-0.97	4.53		north	-2.48	2.98
	srad	116.43			srad	249.08	
	lrad	361.02	26.6		lrad	349.19	29.24
	rh	77.98	7.68		rh	76.35	7.4
	bp	1022.28	6.06		bp	1019.64	4.11
	sst	21.44	0.7		sst	18.76	0.35
	air	20.18	1.37		air	18.05	0.72
	precip	0.02	0.25		precip	0	0
Dec-91	east	-2.88	3.36	Jun-92	east	-0.56	2.43
	north	-0.61	4.43		north	-2.77	4.03
	srad	98.16			srad	289.77	
	lrad	351.34	23.97		lrad	360.62	26.84
	rh	79.36	6.62		rh	79.27	8.67
	bp	1019.71	11.75		bp	1023.05	3.39
	sst	20.33	0.33		sst	20.2	0.59
	air	18.9	0.68		air	19.5	1.06
	precip	0.04	0.39		precip	0	0

Table 11a. Monthly meteorological statistics — northeast (cont).

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jul-92	east	-2.74	1.95	Jan-93	east	-1.62	3.29
	north	-3.87	1.81		north	1.37	5.24
	srad	289.16			srad	118.45	
	lrad	371.53	25.32		lrad	326.82	25.41
	rh	81.56	6.09		rh	71.22	6.87
	bp	1023.48	1.44		bp	1025.89	2.98
	sst	22.33	0.67		sst	19.25	0.35
	air	21.69	0.98		air	17.94	0.76
	precip	0	0		precip	0.01	0.16
Aug-92	east	-1.62	3.03	Feb-93	east	-2.29	4.02
	north	-3.87	2.77		north	-2.61	3.82
	srad	275.65			srad	154.08	
	lrad	378.39	23.73		lrad	328.98	24.97
	rh	80.77	6.6		rh	72.29	5.61
	bp	1022.19	2.87		bp	1022.06	3.93
	sst	23.57	0.57		sst	18.57	0.18
	air	23.04	0.57		air	17.15	0.71
	precip	0	0		precip	0.01	0.1
Sep-92	east	-1.37	4.14	Mar-93	east	1.7	5.21
	north	-1.85	2.55		north	-1.48	5.22
	srad	236.63			srad	197.13	
	lrad	374.86	23.26		lrad	334.58	26.22
	rh	80.04	6.81		rh	75.62	9.96
	bp	1021.62	3.63		bp	1017.02	6.31
	sst	24.22	0.22		sst	18.39	0.25
	air	23.23	0.58		air	16.95	1.36
	precip	0	0		precip	0.02	0.16
Oct-92	east	-1.08	4.91	Apr-93	east	-1	2.55
	north	-1.95	3.67		north	-3.25	3.64
	srad	157.48			srad	251.44	
	lrad	370.34	26.93		lrad	337.96	28.45
	rh	75.15	9.22		rh	72	7.25
	bp	1018.3	7.44		bp	1022.03	3.16
	sst	23.37	0.8		sst	18.9	0.31
	air	21.78	1.36		air	17.46	0.75
	precip	0.03	0.26		precip	0	0
Nov-92	east	-3.23	3.18	May-93	east	3.66	3.46
	north	0.23	3.98		north	-0.99	4.53
	srad	126.3			srad	282.79	
	lrad	354.96	27.82		lrad	341.92	24.88
	rh	75.7	7.4		rh	75.46	7.47
	bp	1024.15	3.52		bp	1015.67	5.17
	sst	21.55	0.3		sst	19.01	0.34
	air	20.57	0.55		air	18.04	1.02
	precip	0	0		precip	0	0.05
Dec-92	east	-0.58	3.71	Jun-93	east	-0.38	2.53
	north	-4.09	4.55		north	-2.43	3.38
	srad	109.21			srad	276.53	
	lrad	335.1	29.01		lrad	361.86	30.02
	rh	70.59	6.44		rh	75.66	10.69
	bp	1021.51	4.62		bp	1022.03	28.36
	sst	20.35	0.77		sst	20.57	0.67
	air	18.53	1.4		air	19.67	0.85
	precip	0	0.04		precip	0	0

Table 11b. Monthly meteorological statistics — central.

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jun-91	east	-5.02	1.72				
	north	-4.43	1.28				
	srad	283.92					
	lrad	377.19	21.09				
	rh	73.17	4.22				
	bp	1021.55	1.87				
	sst	22.73	0.11				
	air	22.35	0.3				
	precip	0	0				
Jul-91	east	-4.91	1.29	Jan-92	east	-1.21	3.78
	north	-3.66	1.63		north	-1.17	3.82
	srad	288.21			srad	162.48	
	lrad	378.13	18.58		lrad	358.56	13.5
	rh	78.2	5.26		rh	72.78	7.1
	bp	1021.28	1.26		bp	1017.88	3.17
	sst	23.35	0.53		sst	21.9	0.18
	air	23.12	0.62		air	20.35	0.67
	precip	0	0		precip	0.01	0.14
Aug-91	east	-4.17	2.11	Feb-92	east	-4.74	1.9
	north	-3.16	1.95		north	-3.26	2.25
	srad	284.8			srad	209.99	
	lrad	393.73	14.4		lrad	360.28	18.92
	rh	79.79	2.85		rh	72.8	6.82
	bp	1020.03	1.56		bp	1023.41	3.3
	sst	24.77	0.51		sst	21.05	0.36
	air	24.46	0.48		air	19.95	0.46
	precip	0	0		precip	0	0
Sep-91	east	-3.99	1.87	Mar-92	east	-6.42	1.6
	north	-2.71	1.86		north	-1.8	2.67
	srad	264.85			srad	217.47	
	lrad	390.15	13.86		lrad	373.91	21.08
	rh	78.85	5.3		rh	79.22	6.2
	bp	1020.41	1.57		bp	1021.79	2.74
	sst	26.07	0.35		sst	20.54	0.11
	air	25.48	0.61		air	19.99	0.57
	precip	0.01	0.21		precip	0	0
Oct-91	east	-2.37	3.14	Apr-92	east	-5.15	2.68
	north	1.05	4.03		north	-2.9	1.86
	srad	186.48			srad	255.68	
	lrad	392.78	11.17		lrad	371.98	23.38
	rh	79.01	6.65		rh	78.34	5.83
	bp	1017	2.51		bp	1020.8	2.75
	sst	25.36	0.27		sst	20.84	0.23
	air	24.35	0.77		air	20.13	0.48
	precip	0.01	0.22		precip	0	0
Nov-91	east	-3.34	4.53	May-92	east	-3.45	2.79
	north	-1.02	3.12		north	-2.8	2.25
	srad	157.16			srad	293.71	
	lrad	381.46	13.73		lrad	372.3	20.57
	rh	74.8	6.59		rh	79.07	6.37
	bp	1019.56	2.78		bp	1019.75	1.74
	sst	24.43	0.43		sst	21.7	0.54
	air	23.25	0.99		air	20.76	0.74
	precip	0.02	0.29		precip	0	0
Dec-91	east	-3.04	5.25	Jun-92	east	-3.57	3.02
	north	-1.35	3.91		north	-2.27	2.16
	srad	144.94			srad	305.5	
	lrad	368.11	12.86		lrad	386.5	20.95
	rh	73.14	6.77		rh	76.72	5.81
	bp	1018.02	5.26		bp	1021.99	1.81
	sst	22.9	0.36		sst	22.93	0.98
	air	21.6	0.67		air	22.21	1.03
	precip	0.01	0.3		precip	0	0

Table 11b. Monthly meteorological statistics — central (cont).

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jul-92	east	-4.95	1.56	Jan-93	east	-5.41	2.55
	north	-4.01	1.44		north	-0.9	3.15
	srad	280.67			srad	163.37	
	lrad	405.72	19.64		lrad	337.37	21.93
	rh	77.43	6.93		rh	71.78	5.61
	bp	1021.04	1.09		bp	1022.69	2.58
	sst	24.37	0.26		sst	21.56	0.25
	air	23.91	0.4		air	20.47	0.51
	precip	0	0		precip	0	0
Aug-92	east	-4.73	2.35	Feb-93	east	-3.41	3.17
	north	-3.86	1.68		north	-2.03	2.93
	srad	277.37			srad	200.6	
	lrad	407.77	19.37		lrad	336.79	23.89
	rh	78.74	5.27		rh	72.34	5.2
	bp	1020.37	1.33		bp	1020.49	4.16
	sst	24.59	0.47		sst	21.08	0.23
	air	24.19	0.5		air	19.73	0.6
	precip	0	0		precip	0	0
Sep-92	east	-4.63	2.99	Mar-93	east	-1.02	3.81
	north	-2.21	2.72		north	-3.16	3.54
	srad	252.78			srad	258.75	
	lrad	402.87	16.72		lrad	337.15	22.65
	rh	78.58	4.86		rh	74.81	5.92
	bp	1019.41	1.84		bp	1020.13	3.8
	sst	24.8	0.3		sst	20.83	0.28
	air	24.34	0.46		air	19.6	0.67
	precip	0	0		precip	0	0
Oct-92	east	-1.59	4.57	Apr-93	east	-4.78	2.7
	north	-0.5	2.48		north	-2.14	2.9
	srad	208.7			srad	260.81	
	lrad	384.97	24.32		lrad	357.64	23.03
	rh	76.2	5.46		rh	77.15	5
	bp	1018.62	3.08		bp	1020.03	2.45
	sst	25.03	0.41		sst	21.15	0.24
	air	24.3	0.77		air	20.14	0.46
	precip	0	0		precip	0	0
Nov-92	east	-5.61	2.41	May-93	east	-0.71	3.29
	north	-0.35	3.2		north	-2.06	2.62
	srad	168.88			srad	302.94	
	lrad	359.6	20.28		lrad	353.03	24.28
	rh	78.86	4.94		rh	75.93	7.35
	bp	1019.34	3.13		bp	1019.46	2.55
	sst	23.7	0.34		sst	22.05	0.59
	air	23.11	0.71		air	21.04	0.77
	precip	0	0		precip	0	0
Dec-92	east	-4.64	3.01	Jun-93	east	-4.23	1.97
	north	-2.22	2.43		north	-2.24	1.92
	srad	163.41			srad	281	
	lrad	345.99	23.79		lrad	374.98	26.13
	rh	73.8	7.07		rh	78.83	6.77
	bp	1020.81	2.32		bp	1021.53	26.23
	sst	22.69	0.3		sst	23.21	0.73
	air	21.55	0.8		air	22.51	0.71
	precip	0	0		precip	0	0

Table 11c. Monthly meteorological statistics — southwest.

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jun-91	east	-4.78	1.52				
	north	-3.67	1.3				
	srad	259.43					
	lrad	392.67	20.16				
	rh	71.6	5.83				
	bp	1018.02	0.9				
	sst	23.71	0.19				
	air	23.6	0.37				
	precip	0	0				
Jul-91	east	-5.57	1.11	Jan-92	east	-3.84	2.74
	north	-3.83	1.61		north	-3.15	2.29
	srad	238.01			srad	206	
	lrad	401.08	21.2		lrad	389.64	2.2
	rh	78.94	5.02		rh	72.54	6.57
	bp	1017.52	1.13		bp	1016.33	1.99
	sst	24.14	0.36		sst	24.05	0.14
	air	23.99	0.37		air	23.13	0.58
	precip	0	0		precip	0	0
Aug-91	east	-5.17	1.07	Feb-92	east	-6.72	2.89
	north	-3.65	1.34		north	-2.92	2.25
	srad	257.67			srad	218.27	
	lrad	402.6	18.12		lrad	372.71	20.24
	rh	82.61	4.52		rh	68.12	6.34
	bp	1016.59	1.57		bp	1018.7	1.78
	sst	25.28	0.37		sst	23.54	0.2
	air	25.12	0.43		air	22.73	0.45
	precip	0	0		precip	0	0
Sep-91	east	-6.1	1.32	Mar-92	east	-6.27	2.05
	north	-3.36	1.98		north	-2.52	2.03
	srad	259.81			srad	243.38	
	lrad	401.57	16.55		lrad	373.6	20.69
	rh	83.36	3.86		rh	70.16	3.87
	bp	1016.34	1.56		bp	1016.81	1.94
	sst	26.23	0.16		sst	23.16	0.08
	air	25.96	0.29		air	22.42	0.42
	precip	0	0		precip	0	0
Oct-91	east	-3.72	1.81	Apr-92	east	-6.25	1.68
	north	-0.95	2.24		north	-2.36	1.7
	srad	233.73			srad	269.88	
	lrad	393.69	15.51		lrad	379.66	23.21
	rh	80.18	4.13		rh	71.23	5.43
	bp	1015.04	1.45		bp	1017.36	2.21
	sst	26.73	0.34		sst	23.3	0.2
	air	26.03	0.4		air	22.62	0.42
	precip	0	0		precip	0	0
Nov-91	east	-5.01	2.74	May-92	east	-5.11	2.16
	north	-1.75	2.16		north	-2.23	2.07
	srad	194.38			srad	254.46	
	lrad	404.48	3.86		lrad	389.7	23.07
	rh	76.56	6.39		rh	75.93	4.52
	bp	1015.98	1.81		bp	1017.23	1.57
	sst	26.27	0.39		sst	23.98	0.22
	air	25.45	0.59		air	23.26	0.42
	precip	0	0		precip	0	0
Dec-91	east	-4.41	3.74	Jun-92	east	-6.88	1.32
	north	-1.43	2.78		north	-3.37	1.16
	srad	193.91			srad	259.55	
	lrad	397.27	2.2		lrad	397.2	5.93
	rh	71.43	6.74		rh	74.86	5.11
	bp	1015.39	1.99		bp	1019.08	0.87
	sst	24.92	0.39		sst	24.05	0.23
	air	24.11	0.71		air	23.89	0.45
	precip	0	0		precip	0	0

Table 11c. Monthly meteorological statistics — southwest (cont).

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jul-92	east	-5.93	1.84	Jan-93	east	-6.7	2.11
	north	-3.21	1.17		north	-2.54	2.13
	srad	230.22			srad	186.64	
	lrad	399.07	0.77		lrad	362.05	20.92
	rh	78.06	6.02		rh	72.53	4.2
	bp	1018.16	0.92		bp	1018.24	1.73
	sst	24.7	0.38		sst	23.55	0.2
	air	24.79	0.45		air	22.62	0.4
	precip	0	0		precip	0	0
Aug-92	east	-5.15	1.7	Feb-93	east	-5.36	2.99
	north	-3.35	1.54		north	-1.62	2.87
	srad	250.35			srad	228.88	
	lrad	401.74	0.77		lrad	362.98	23.27
	rh	79.59	8.06		rh	73.08	6.71
	bp	1017.36	1.27		bp	1017.46	2.28
	sst	25.27	0.32		sst	23.03	0.22
	air	25.3	0.48		air	22.05	0.5
	precip	0	0		precip	0	0
Sep-92	east	-6.61	1.69	Mar-93	east	-5.61	2.25
	north	-2.54	1.78		north	-2.78	2.81
	srad	243.08			srad	264.6	
	lrad	404.38	0.75		lrad	369.07	22.63
	rh	78.8	5.63		rh	73.94	5.41
	bp	1015.9	1.36		bp	1018.08	1.87
	sst	25.98	0.14		sst	22.94	0.12
	air	25.74	0.41		air	22.2	0.43
	precip	0	0		precip	0	0
Oct-92	east	-5.72	1.86	Apr-93	east	-5.56	1.83
	north	-0.96	1.52		north	-2.55	1.47
	srad	238.53			srad	289.14	
	lrad	392.59	16.28		lrad	373.78	20.57
	rh	77.37	3.96		rh	74.2	4.01
	bp	1016.35	1.4		bp	1016.72	1.43
	sst	26.29	0.25		sst	23.39	0.2
	air	25.74	0.46		air	22.52	0.33
	precip	0	0		precip	0	0
Nov-92	east	-5.58	2.48	May-93	east	-6	1.48
	north	-1.12	2.64		north	-2.34	1.53
	srad	197.53			srad	273.97	
	lrad	378.03	16.48		lrad	383.85	19.03
	rh	74.43	5.19		rh	79.02	5.02
	bp	1015.11	1.96		bp	1017.27	1.63
	sst	25.84	0.34		sst	23.67	0.32
	air	24.99	0.72		air	23.13	0.53
	precip	0	0		precip	0	0
Dec-92	east	-6.64	1.74	Jun-93	east	-6.49	1.09
	north	-1.8	1.64		north	-2.1	1.33
	srad	194.76			srad	274.82	
	lrad	367.27	18.89		lrad	399.07	23.61
	rh	73.47	4.17		rh	78.15	4.12
	bp	1016.73	1.56		bp	1018.27	22.9
	sst	24.59	0.29		sst	24.96	0.66
	air	23.7	0.58		air	24.5	0.72
	precip	0	0		precip	0	0

Table 11d. Monthly meteorological statistics — southeast.

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jun-91	east	-1.55	1.85				
	north	-5.28	1.22				
	srad	243.46					
	lrad	390.09	17.65				
	rh	84.02	3.56				
	bp	1015.02	0.89				
	sst	22.3	0.1				
	air	21.99	0.41				
	precip	0	0				
Jul-91	east	-3.62	2.24	Jan-92	east	-3.4	2.25
	north	-5.08	2.5		north	-3.71	2.17
	srad	240.63			srad	208.56	
	lrad	399.16	15.89		lrad	329.4	0.89
	rh	85.58	5.34		rh	74.61	9.32
	bp	1014.67	1.6		bp	1015.7	1.85
	sst	23	0.51		sst	22.73	0.3
	air	22.8	0.59		air	21.55	0.66
	precip	0	0		precip	0	0
Aug-91	east	-3.08	1.98	Feb-92	east	-4.62	2.57
	north	-3.74	1.95		north	-6.01	2.47
	srad	224.89			srad	216.43	
	lrad	402.22	37.58		lrad	357.74	21.48
	rh	85.38	5.37		rh	75.81	5.39
	bp	1014.09	1.52		bp	1017.25	1.69
	sst	24.55	0.63		sst	22.08	0.24
	air	24.25	0.67		air	20.96	0.55
	precip	0	0		precip	0	0.01
Sep-91	east	-3.8	1.34	Mar-92	east	-5.38	1.53
	north	-4.81	2.41		north	-5.61	1.72
	srad	245.13			srad	246.52	
	lrad	319.62	0		lrad	368.52	11.77
	rh	85.58	3.66		rh	78.74	4.83
	bp	1014.45	1.44		bp	1015.78	1.98
	sst	26.45	0.37		sst	21.73	0.21
	air	25.67	0.56		air	20.85	0.77
	precip	0	0		precip	0	0
Oct-91	east	-3.96	2.02	Apr-92	east	-4.12	1.92
	north	-3.69	2.13		north	-5.87	1.62
	srad	200.68			srad	267.53	
	lrad	320.39	0.73		lrad	370.8	18.36
	rh	80.72	7.23		rh	78.74	5.69
	bp	1014.9	1.95		bp	1015.26	2.24
	sst	25.58	0.33		sst	21.59	0.22
	air	24.33	0.84		air	20.53	0.45
	precip	0	0		precip	0	0.02
Nov-91	east	-4.69	1.85	May-92	east	-3.03	1.61
	north	-4.59	1.65		north	-6.11	1.69
	srad	194.93			srad	248.25	
	lrad	323.29	0.86		lrad	389.82	14.26
	rh	74.82	7.26		rh	85.99	3.12
	bp	1016.16	1.5		bp	1014.77	1.4
	sst	25.29	0.37		sst	21.78	0.23
	air	24.35	0.63		air	21.26	0.4
	precip	0	0		precip	0	0.02
Dec-91	east	-3.17	4.04	Jun-92	east	-3.81	1.46
	north	-2.96	1.94		north	-6.77	1.33
	srad	195.51			srad	245.95	
	lrad	326.32	0.89		lrad	396.09	10.38
	rh	73.64	8.95		rh	86.23	3.14
	bp	1015.65	2.44		bp	1016.08	1.15
	sst	23.79	0.5		sst	22.26	0.24
	air	22.69	0.96		air	21.82	0.3
	precip	0	0		precip	0	0

Table 11d. Monthly meteorological statistics — southeast (cont).

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jul-92	east	-2.62	1.77	Jan-93	east	-4.96	1.92
	north	-4.4	2.17		north	-4.98	2.06
	srad	220.05			srad	139.06	
	lrad	413.81	14.14		lrad	363.84	19.57
	rh	84.76	3.54		rh	77.09	5.1
	bp	1015.37	1.18		bp	1017.45	1.79
	sst	23.32	0.44		sst	21.34	0.19
	air	22.9	0.5		air	20.58	0.5
	precip	0	0		precip	0	0
Aug-92	east	-2.47	1.83	Feb-93	east	-3.79	2.58
	north	-4.35	2.36		north	-5.68	1.59
	srad	238.15			srad	192.44	
	lrad	419.44	13.26		lrad	357.67	13.74
	rh	84.61	5.06		rh	77.04	5.71
	bp	1014.68	1.51		bp	1016.59	2.39
	sst	24.49	0.57		sst	20.87	0.19
	air	24.07	0.61		air	19.9	0.46
	precip	0	0		precip	0	0
Sep-92	east	-3.61	1.89	Mar-93	east	-2.77	2.71
	north	-4.77	2.45		north	-6.29	2.64
	srad	236.27			srad	220.04	
	lrad	419.68	14.01		lrad	369.55	18.53
	rh	82.66	6.63		rh	80.11	6.46
	bp	1013.57	1.77		bp	1016.24	1.8
	sst	25.04	0.23		sst	20.84	0.21
	air	24.55	0.5		air	20.04	0.5
	precip	0	0		precip	0	0
Oct-92	east	-4.06	2.13	Apr-93	east	-2.39	2.03
	north	-5.5	1.77		north	-6.49	1.07
	srad	219.37			srad	207.55	
	lrad	389.77	20.8		lrad	381.44	15.17
	rh	79.3	4.98		rh	82.32	4.48
	bp	1015.43	1.62		bp	1014.61	1.34
	sst	25.04	0.17		sst	20.98	0.3
	air	24.39	0.55		air	20.17	0.4
	precip	0	0		precip	0	0
Nov-92	east	-4.75	1.94	May-93	east	-3.31	1.36
	north	-4.93	1.79		north	-7.28	1.11
	srad	184.31			srad	240.17	
	lrad	371.98	17.99		lrad	380.28	14.36
	rh	75.74	5.73		rh	84.94	3.42
	bp	1014.87	1.68		bp	1015.27	1.41
	sst	24.41	0.42		sst	21.78	0.37
	air	23.63	0.72		air	21.06	0.52
	precip	0	0.01		precip	0	0.09
Dec-92	east	-4.82	1.28	Jun-93	east	-2.86	1.52
	north	-6.09	1.21		north	-7.17	1.3
	srad	180.03			srad	233.67	
	lrad	357.54	14.67		lrad	392.07	18.13
	rh	77.29	5.08		rh	85.8	4.5
	bp	1016.18	1.32		bp	1015.43	24.3
	sst	21.93	0.95		sst	22.44	0.55
	air	21.02	0.79		air	21.82	0.61
	precip	0	0		precip	0	0

Table 11e. Monthly meteorological statistics — northwest.

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jun-91							
Jul-91	east	0.7	3.5	Jan-92	east	2.49	5.64
	north	0.3	3.16		north	0.15	6.44
	srad	307.96			srad	120.13	
	lrad	390.12	17.65		lrad	74.04	17.18
	rh	75.43	5.64		rh	75.02	9.4
	bp	1023.74	1.94		bp	1017.29	5.15
	sst	26.01	0.78		sst	19.32	0.53
	air	25.14	0.88		air	18.34	1.15
	precip	0	0		precip	0	0
Aug-91	east	-0.85	3.04	Feb-92	east	-0.44	5.26
	north	-0.86	3.33		north	0.91	4.45
	srad	262.58			srad	162.63	
	lrad	368.06	18.14		lrad	18.26	14.35
	rh	75.65	5.1		rh	78.88	7.96
	bp	1022.83	2.56		bp	1025.87	4.82
	sst	26.67	0.18		sst	18.72	0.15
	air	25.7	0.61		air	18.11	0.9
	precip	0	0		precip	0	0
Sep-91	east	-0.87	4.72	Mar-92	east	-2.51	4.3
	north	-0.89	3.47		north	1.86	3.81
	srad	217.68			srad	183.06	
	lrad	309.11	16.62		lrad	0	0
	rh	76.29	6.29		rh	79.51	7.6
	bp	1022.95	3.63		bp	1026.06	3.73
	sst	26.15	0.35		sst	18.77	0.35
	air	25	0.79		air	18.35	1.29
	precip	0	0		precip	0.01	0.08
Oct-91	east	-2.72	6.39	Apr-92	east	-1.28	3.86
	north	-0.55	5.01		north	1.01	3.8
	srad	175.38			srad	260.27	
	lrad	250.58	17.18		lrad	0	0
	rh	74.83	7		rh	80.98	7.13
	bp	1017.71	6.42		bp	1024.47	3.62
	sst	24.26	0.79		sst	19.53	0.51
	air	23.33	1.09		air	19.04	0.59
	precip	0	0		precip	0	0.03
Nov-91	east	-2.11	4.04	May-92	east	-1.47	4.6
	north	-0.1	5.39		north	-1.97	3.32
	srad	129.84			srad	265.08	
	lrad	192.05	16.62		lrad	0	0
	rh	77.9	5.4		rh	77.48	8.42
	bp	1020.95	4.84		bp	1023.48	3.45
	sst	22.19	0.52		sst	20.29	0.31
	air	21.28	1.01		air	19.31	0.86
	precip	0	0		precip	0	0.04
Dec-91	east	-0.95	5.64	Jun-92	east	-0.42	3.72
	north	1.7	6.75		north	0.24	2.85
	srad	108.14			srad	295.95	
	lrad	133.53	17.18		lrad	0	0
	rh	78.46	6.22		rh	80.08	9.03
	bp	1018.81	7.47		bp	1024.21	5.34
	sst	20.41	0.47		sst	22.24	0.67
	air	20.06	0.51		air	21.35	1.11
	precip	0	0		precip	0.01	0.09

Table 11e. Monthly meteorological statistics — northwest (cont).

Time	Name	Mean	StdDev	Time	Name	Mean	StdDev
Jul-92	east	-1.24	3.29	Jan-93	east	0.23	3.88
	north	0.09	2.25		north	1.33	5.64
	srad	294.22			srad	124.81	
	lrad	0	0		lrad	323.61	27.34
	rh	82.09	6.64		rh	76.2	8.08
	bp	1025.22	2.19		bp	1024.47	6.26
	sst	24.75	1.19		sst	19.11	0.36
	air	23.94	1.22		air	18.18	1.21
	precip	0.01	0.09		precip	0.02	0.2
Aug-92	east	-1.55	2.77	Feb-93	east	-2.08	4.47
	north	-1.43	2.08		north	-0.68	5.1
	srad	295.21			srad	157.98	
	lrad	0	0		lrad	321.73	25.45
	rh	78.86	5.16		rh	77.57	8.46
	bp	1025.49	2.33		bp	1023.56	3.73
	sst	26.22	0.57		sst	19.2	0.29
	air	25.18	0.66		air	17.83	1.21
	precip	0	0.02		precip	0.01	0.15
Sep-92	east	0	5.25	Mar-93	east	2.55	5.97
	north	0.57	3.55		north	-1.1	4.62
	srad	215.33			srad	196.52	
	lrad	0	0		lrad	327.13	28.82
	rh	78.18	6.88		rh	75.14	9.73
	bp	1021.24	4.69		bp	1020.24	30.25
	sst	25.96	0.72		sst	19.44	0.6
	air	24.83	0.78		air	17.9	1.22
	precip	0.01	0.13		precip	0	0.03
Oct-92	east	-0.87	6.17	Apr-93			
	north	0.36	4.9				
	srad	157.37					
	lrad	131.85	156.24				
	rh	78.31	8.5				
	bp	1019	6.4				
	sst	23.83	0.79				
	air	22.74	0.97				
	precip	0.02	0.2				
Nov-92	east	-1.64	3.9	May-93			
	north	1.76	4.48				
	srad	134.73					
	lrad	340.17	21.72				
	rh	79.9	8.96				
	bp	1022.39	6.03				
	sst	22.07	0.5				
	air	21.16	1.14				
	precip	0.02	0.28				
Dec-92	east	-1.42	3.61	Jun-93			
	north	0.47	5.18				
	srad	112.53					
	lrad	329.85	24.32				
	rh	77.57	8.16				
	bp	1024.18	4.86				
	sst	20.48	0.7				
	air	19.6	1.44				
	precip	0.02	0.2		precip		

Table 12a. Monthly oceanic velocities and temperature statistics northeast.

	1 m			10 m			30 m			50 m			60 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91				U	21.38	9.32	U	25.85	6.03	U	30.41	5.43			
				V	-4.56	6.9	V	-8.81	6.92	V	-6.63	6.69			
				T	21.68	0.5	T	20.14	0.41	T	19.09	0.3			
Jul-91				U	2.91	9.54	U	6.6	8.3	U	7.02	7.87			
				V	8.13	10.31	V	7.9	9.67	V	8.16	9.08			
				T	22.94	0.96	T	21.31	0.89	T	19.59	0.46			
Aug-91				U	0.09	6.88	U	2.67	5.94	U	2.72	4.5			
				V	-1.9	8.86	V	-0.19	8.35	V	0.52	8.2			
				T	24.83	0.42	T	22.9	0.84	T	20.33	0.41			
Sep-91				U	1.53	6.51	U	3.78	6.68	U	5.19	6.27			
				V	-13.4	7.46	V	-12.6	6.26	V	-13.9	5.46			
				T	25.14	0.36	T	24.02	0.95	T	20.82	0.38			
Oct-91				U	4.01	6.03	U	5.45	6.15	U	6.47	6.38			
				V	-4.8	7.02	V	-4.45	6.48	V	-4.42	7.31			
				T	22.98	0.41	T	22.96	0.41	T	21.99	0.94			
Nov-91				U	-4.05	10.98	U	-2.98	10.4	U	-3.45	10.47			
				V	-6.32	14.45	V	-6.56	13.13	V	-6.1	12.84			
				T	21.45	0.69	T	21.43	0.7	T	21.36	0.66			
Dec-91				U	0.44	7.16	U	1.59	5.78	U	1.57	5.33			
				V	3.84	9.86	V	4.17	9.66	V	4.77	9.5			
				T	20.35	0.34	T	20.36	0.33	T	20.38	0.32			
Jan-92				U	1.48	6.23	U	1.57	6	U	1.49	5.82			
				V	-0.12	6.34	V	-0.91	6.48	V	-0.61	6.56			
				T	19.22	0.27	T	19.2	0.27	T	19.22	0.27			
Feb-92				U	-1.32	13.46	U	0.84	13.06	U	1.93	12.85			
				V	-18.5	8.01	V	-18.5	8.47	V	-17.6	8.04			
	T	17.91	0.14	T	18.14	0.32	T	18.1	0.32	T	18.07	0.33	T	17.79	0.05
Mar-92				U	-3.8	6.98	U	-1.34	6.28	U	-1.24	6.16			
				V	-3.75	9.18	V	-3.91	9.49	V	-4.08	9.32			
	T	17.83	0.15	T	17.76	0.11	T	17.73	0.1	T	17.71	0.08	T	17.69	0.08
Apr-92				U	-2.05	6.78	U	0.26	6.04	U	1.41	5.6			
				V	17.87	10.17	V	18.17	9.01	V	17.61	9.19			
	T	18.47	0.49	T	18.32	0.46	T	18.13	0.44	T	18.04	0.46	T	17.99	0.46
May-92				U	-4.8	9.65	U	-4.45	8.41	U	-3.39	8.68			
				V	0.57	8.49	V	3.11	8.72	V	3.41	8.91			
	T	18.83	0.35	T	18.71	0.29	T	18.58	0.18	T	18.48	0.15	T	18.38	0.18
Jun-92				U	1.96	8.33	U	4.91	7.59	U	5.62	7.9			
				V	9.23	9.67	V	9.92	8.61	V	9.24	8.08			
	T	20.27	0.58	T	20.07	0.45	T	19.76	0.39	T	19.05	0.27	T	18.81	0.29
Jul-92				U	-1.28	6.77	U	1.57	7.62	U	2.2	7.76			
				V	0.49	6.38	V	-0.82	5.71	V	-1.39	5.29			
	T	22.38	0.65	T	22.07	0.51	T	21.03	0.56	T	19.71	0.39	T	19.29	0.31
Aug-92				U	-3.68	6.93	U	-0.6	5.88	U	-0.42	5.87			
				V	-4.11	6.9	V	-3.85	5.68	V	-3.89	5.39			
	T	23.62	0.54	T	23.49	0.46	T	22.81	0.77	T	20.53	0.49	T	19.94	0.42
Sep-92				U	3.56	7.25	U	4.81	6.28	U	5.02	5.88			
				V	-1.68	6.8	V	-1.88	6.18	V	-1.96	5.36			
	T	24.2	0.2	T	24.08	0.1	T	23.88	0.38	T	21.3	0.67	T	20.47	0.45
Oct-92				U	5.15	9.55	U	5.79	9.49	U	6.62	7.78			
				V	-6.14	10.07	V	-5.17	9.78	V	-5.37	8.02			
	T	23.37	0.77	T	23.34	0.76	T	23.33	0.74	T	21.5	0.83	T	20.37	0.87
Nov-92				U	1.26	7.31	U	3.13	7.2	U	2.36	6.91			
				V	-10.7	7.66	V	-8.21	10.06	V	-11.5	8.16			
	T	21.55	0.3	T	21.53	0.3	T	21.54	0.31	T	21.56	0.31	T	21.51	0.35
Dec-92				U	16.04	12.92	U	12.73	16.37	U	18.26	12.8			
				V	-18.9	11.13	V	-11	15.37	V	-16.9	10.65			
	T	20.36	0.76	T	20.35	0.76	T	20.35	0.76	T	20.35	0.78	T	20.34	0.78
Jan-93				U	24.24	9.43	U	3.33	15.69	U	26.49	8.64			
				V	-21.1	8.66	V	11.32	23.5	V	-20.3	8.34			
	T	19.26	0.35	T	19.26	0.35	T	19.27	0.35	T	19.29	0.35	T	19.31	0.35
Feb-93				U	24.98	11.11	U	17.79	15.77	U	29.01	9.51			
				V	-16.3	10.31	V	-2.6	19.89	V	-14.7	9.62			
	T	18.57	0.18	T	18.55	0.18	T	18.56	0.19	T	18.57	0.21	T	18.58	0.23
Mar-93				U	11.76	9.15	U	3.22	11.74	U	12.23	7.95			
				V	-11.2	7.9	V	-1.86	10.03	V	-9.15	6.62			
	T	18.39	0.23	T	18.34	0.15	T	18.31	0.15	T	18.29	0.15	T	18.29	0.16
Apr-93				U	-2.47	5.48	U	1.62	4.27	U	1.31	3.29			
				V	-2.38	5.71	V	-1.2	4.03	V	-3.88	3.67			
	T	18.89	0.27	T	18.78	0.2	T	18.41	0.13	T	18.19	0.21	T	18.24	0.23
May-93				U	0.19	5.27									
				V	-6.54	6.1									
	T	19.02	0.33	T	18.94	0.3							T	18.6	0.12
Jun-93				U	2.62	5.97									
				V	1.35	6.02									
	T	20.36	0.29	T	20.35	0.34							T	18.75	0.12

Table 12a. Monthly oceanic velocities and temperature statistics northeast (cont).

	70 m			80 m			90 m			100 m			110 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91							U	30.29	5.54						
							V	-7.14	7.49						
				T	18.24	0.31	T	18.01	0.31						
Jul-91							U	6.19	7.04						
							V	8.83	9.39						
				T	18.58	0.23	T	18.37	0.22						
Aug-91							U	1.81	3.92						
							V	0.59	8.61						
				T	18.87	0.37	T	18.58	0.36						
Sep-91							U	4.67	5.17						
							V	-13.3	5.08						
				T	19.18	0.22	T	18.89	0.19						
Oct-91							U	6.65	4.78						
							V	-2.71	6.57						
				T	19.28	0.38	T	18.85	0.28						
Nov-91							U	-3.51	6.57						
							V	-5.88	8.35						
				T	19.14	0.79	T	18.49	0.68						
Dec-91							U	1.57	5.35						
							V	6.27	9.37						
				T	20.17	0.51	T	19.31	0.79						
Jan-92							U	1.95	5.57						
							V	0.73	6.3						
				T	19.22	0.26	T	19.19	0.28						
Feb-92	U	-9.88	7.13				U	-0.05	13.08				U	-9.86	6.42
	V	-11.6	6.34				V	-16.5	7.75				V	-11.8	5.92
	T	17.77	0.04	T	17.96	0.37	T	17.85	0.44	T	17.57	0.33	T	17.15	0.55
Mar-92	U	-1.11	6.17				U	-1.7	6.36				U	-1.72	6.41
	V	-3.83	9.12				V	-3.55	9.07				V	-3.58	9.04
	T	17.66	0.07	T	17.66	0.09	T	17.58	0.19	T	17.4	0.41	T	17.03	0.64
Apr-92	U	1.44	5.18				U	-0.35	6.17				U	0.18	5.57
	V	17.76	8.95				V	17.72	8.72				V	18.09	8.49
	T	17.93	0.47	T	17.91	0.48	T	17.82	0.48	T	17.71	0.51	T	17.51	0.6
May-92	U	-3.33	8.26				U	-3.58	7.8				U	-3.76	7.88
	V	3.6	8.96				V	3.46	8.46				V	3.5	7.66
	T	18.15	0.26	T	18.02	0.28	T	17.86	0.29	T	17.75	0.31	T	17.62	0.34
Jun-92	U	5.24	7.51				U	4.76	7.13				U	5.73	6.25
	V	9.59	7.82				V	9.16	7.6				V	8.7	6.97
	T	18.52	0.33	T	18.35	0.32	T	18.14	0.29	T	17.98	0.3	T	17.78	0.31
Jul-92	U	2.41	7.89				U	2.49	7.92				U	2.73	7.73
	V	-1.36	4.79				V	-1.42	4.83				V	-1.54	4.78
	T	18.94	0.27	T	18.71	0.27	T	18.42	0.25	T	18.22	0.23	T	18	0.23
Aug-92	U	-0.73	5.29				U	-0.61	5.08				U	-1.02	4.86
	V	-3.85	4.99				V	-3.49	5.02				V	-3.57	5.15
	T	19.43	0.36	T	19.1	0.38	T	18.73	0.38	T	18.48	0.39	T	18.26	0.39
Sep-92	U	4.94	5.82				U	4.91	5.54				U	4.62	5.67
	V	-1.3	4.92				V	-0.49	4.63				V	-0.31	4.83
	T	19.82	0.3	T	19.43	0.27	T	19.06	0.23	T	18.8	0.24	T	18.56	0.25
Oct-92	U	5.99	6.05				U	5.14	5.09				U	4.85	4.79
	V	-5.27	6.69				V	-4.78	5.81				V	-4.37	5.36
	T	19.48	0.59	T	18.93	0.44	T	18.54	0.37	T	18.27	0.32	T	18.02	0.29
Nov-92	U	2.79	6.71				U	2.16	5.24				U	1.44	5.15
	V	-11.5	8.08				V	-11.4	7.24				V	-11.2	6.59
	T	21.03	0.7	T	20.01	0.89	T	19.11	0.58	T	18.6	0.35	T	18.25	0.25
Dec-92	U	17.68	11.96				U	17.43	11.27				U	17.28	10.92
	V	-16.9	10.61				V	-16.4	10.29				V	-16.2	10.23
	T	20.32	0.79	T	20.13	0.79	T	19.65	0.8	T	18.98	0.67	T	18.45	0.55
Jan-93	U	24.33	8.25				U	24.97	8.6				U	24.93	8.71
	V	-21.8	7.94				V	-21.4	8.27				V	-21.7	7.85
	T	19.32	0.34	T	19.31	0.34	T	19.3	0.37	T	19.23	0.48	T	18.95	0.66
Feb-93	U	27.22	8.5				U	27.5	8.54				U	27.36	8.69
	V	-16.7	9.96				V	-15.9	10.14				V	-16.1	9.68
	T	18.59	0.24	T	18.59	0.26	T	18.59	0.27	T	18.56	0.31	T	18.49	0.36
Mar-93	U	11.93	7.32				U	11.98	7.08				U	11.89	6.93
	V	-9.01	6.36				V	-9.04	6.15				V	-9.18	6.17
	T	18.29	0.16	T	18.28	0.16	T	18.28	0.17	T	18.28	0.17	T	18.27	0.17
Apr-93	U	-0.75	3.92				U	-1.09	4.17				U	-1.33	4.4
	V	-2.11	5.89				V	-1.73	6.58				V	-1.69	7.21
	T	18.16	0.19	T	18.11	0.14	T	18.1	0.11	T	18.11	0.1	T	18.12	0.08
May-93	U	0.3	4.4				U	0.42	5.2				U	0.26	5.4
	V	-2.32	4.49				V	-2.62	4.41				V	-3.03	4.34
	T	18.5	0.1	T	18.37	0.13	T	18.26	0.12	T	18.21	0.09	T	18.17	0.05
Jun-93	U	3.93	4.79				U	3.97	4.95				U	4.3	5.16
	V	3.41	4.53				V	4.22	4.28				V	5.37	5.1
	T	18.7	0.19	T	18.37	0.14	T	18.28	0.17	T	18.11	0.09	T	18.16	0.09

Table 12a. Monthly Oceanic Velocities and Temperature Statistics northeast (cont).

	130 m			150 m			200 m			300 m			310 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91				U	27.12	4.41	U	23.36	4.76						
				V	-9.07	5.74	V	-6.26	5.17						
	T	17.29	0.38	T	16.93	0.43	T	15.99	0.27						
Jul-91				U	6.55	6.56	U	6.24	6.22						
				V	8.51	9.05	V	8.1	8.15						
	T	17.83	0.35	T	17.59	0.41	T	16.62	0.44						
Aug-91				U	1.26	3.57	U	0.76	3.54						
				V	0.52	8.32	V	0.54	7.01						
	T	17.84	0.36	T	17.62	0.35	T	16.73	0.35						
Sep-91				U	4.11	4.75	U	2.37	4.2						
				V	-12.8	4.74	V	-11.8	4.28						
	T	18.22	0.14	T	18.17	0.16	T	17.24	0.28						
Oct-91				U	6.1	3.99	U	4.89	3.68						
				V	-2.14	5.54	V	-2.45	4.95						
	T	17.88	0.26	T	17.75	0.25	T	16.64	0.28						
Nov-91				U	-2.51	5.11	U	-2.33	4.12						
				V	-3.73	6.49	V	-2.2	5.35						
	T	17.23	0.59	T	17.11	0.55	T	16.11	0.46						
Dec-91				U	1.4	3.92	U	1.59	3.97						
				V	6.28	8.32	V	5.28	7.09						
	T	17.67	0.42	T	17.56	0.46	T	16.43	0.41						
Jan-92				U	2.15	4.05	U	1.85	3.58						
				V	0.07	4.84	V	-0.08	3.92						
	T	17.62	0.3	T	17.42	0.24	T	16.23	0.19						
Feb-92				U	0.82	10.75	U	-0.47	8.79						
				V	-14.9	5.55	V	-13.3	5.59						
	T	16.37	0.82	T	16.01	0.87	T	14.96	0.68	T	13.37	0.16			
Mar-92				U	-2.4	5.1	U	-2.76	4.44						
				V	-2.95	7.79	V	-2.34	7.05						
	T	16.03	0.65	T	15.36	0.37	T	14.5	0.3	T	13.32	0.24			
Apr-92				U	0.07	4.83	U	0.75	3.95						
				V	16.4	7.77	V	15.1	7.08						
	T	16.99	0.85	T	16.5	0.94	T	15.39	0.77	T	13.9	0.56			
May-92				U	-4.02	7.11	U	-4.04	6.21						
				V	3.23	6.04	V	3.41	5.27						
	T	17.39	0.45	T	17.06	0.56	T	15.96	0.5	T	14.37	0.32			
Jun-92				U	5.53	5.95	U	5.9	5.69						
				V	7.97	6.23	V	7.51	6.16						
	T	17.51	0.24	T	17.42	0.2	T	16.73	0.4	T	14.72	0.18			
Jul-92				U	2.22	6.89	U	2.02	6.59						
				V	-1.87	4.22	V	-2.32	4.03						
	T	17.71	0.21	T	17.53	0.2	T	16.9	0.33	T	14.98	0.25			
Aug-92				U	-1.07	4.03	U	-1.15	3.6						
				V	-3.56	4.62	V	-3.96	4.11						
	T	17.84	0.35	T	17.49	0.3	T	16.78	0.36	T	15.07	0.22			
Sep-92				U	3.86	5.15	U	2.94	5.14						
				V	-0.53	4.51	V	-0.59	4.66						
	T	18.12	0.26	T	17.75	0.24	T	17.04	0.22	T	15.35	0.2			
Oct-92				U	4.82	4.57	U	4.34	4.71						
				V	-4.1	5.12	V	-4.34	5.05						
	T	17.63	0.28	T	17.34	0.26	T	16.73	0.27	T	15.05	0.15			
Nov-92				U	2.09	4.97	U	1.7	4.27						
				V	-10.8	6.21	V	-10.3	5.61						
	T	17.8	0.21	T	17.47	0.19	T	16.82	0.2	T	15.32	0.29			
Dec-92				U	15.99	10.11	U	15.1	9.1						
				V	-15.1	8.86	V	-13.8	7.84						
	T	17.77	0.41	T	17.36	0.4	T	16.57	0.54	T	14.93	0.55			
Jan-93				U	23.58	7.07	U	22.65	6.69						
				V	-20.2	6.6	V	-19	6.16						
	T	18.02	0.72	T	17.37	0.44	T	16.43	0.34	T	14.68	0.27			
Feb-93				U	25.9	7.11	U	24.52	6.22						
				V	-14.9	9.21	V	-13.4	8.34						
	T	18.16	0.53	T	17.58	0.58	T	16.38	0.4	T	14.51	0.34			
Mar-93				U	11.68	6.72	U	10.98	6.03						
				V	-8.75	6.04	V	-8.43	5.02						
	T	18.25	0.19	T	18.17	0.29	T	17.33	0.59	T	15.29	0.23			
Apr-93				U	-1.6	4.47	U	-1.52	4.17						
				V	-1.91	7.18	V	-2.44	6.05						
	T	18.14	0.07	T	18.15	0.06	T	17.65	0.4	T	15.53	0.17			
May-93				U	-0.12	5.34	U	-0.69	4.72						
				V	-2.95	4.11	V	-2.81	3.94						
	T	18.14	0.06	T	18.09	0.08	T	17.68	0.19	T	15.78	0.26			
Jun-93				U	4.11	5.52	U	3.87	5.19						
				V	5.6	5.13	V	4.44	4.38						
	T	18.16	0.07	T	18.07	0.1	T	17.39	0.29	T	15.66	0.17			

Table 12a. Monthly Oceanic Velocities and Temperature Statistics Northeast (cont)

	400 m			580 m			750 m			1500m			3500m	
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
Aug-91															
Sep-91															
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92	T	12.42	0.13	T	11.07	0.09									
Apr-92	T	12.32	0.2	T	10.87	0.13									
May-92	T	12.78	0.43	T	11.13	0.24									
Jun-92	T	13.55	0.17	T	11.44	0.14									
Jul-92				T	11.7	0.09									
Aug-92				T	11.77	0.13									
Sep-92				T	11.82	0.11									
Oct-92				T	11.94	0.15									
Nov-92	T	13.56	0.14	T	11.63	0.11	T	10.25	0.07	T	5.8	0.27			
Dec-92	T	13.82	0.25	T	11.75	0.14	T	10.24	0.13	T	5.44	0.19			
Jan-93	T	13.52	0.45	T	11.62	0.25	T	10.34	0.15	T	5.93	0.27			
Feb-93	T	13.26	0.24	T	11.4	0.14	T	10.09	0.13	T	5.75	0.24			
Mar-93	T	13.11	0.25	T	11.33	0.14	T	10.11	0.09	T	5.71	0.15			
Apr-93	T	13.78	0.21	T	11.77	0.14	T	10.37	0.1	T	5.96	0.13			
May-93	T	14.05	0.15	T	11.97	0.1	T	10.53	0.09	T	5.9	0.12			
Jun-93	T	14.13	0.14	T	12.03	0.1	T	10.58	0.08	T	5.88	0.14			
	T	14.04	0.18	T	11.92	0.12	T	10.49	0.1	T	5.71	0.06			

Table 12b. Monthly Oceanic Velocities and Temperature Statistics Central

	1 m			10 m			30 m			50 m			60 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91				U	-5.22	5.17				U	-1.12	3.15			
				V	-1.56	4.87				V	-3.44	4.2			
				T	22.65	0.05				T	22.5	0.18	T	22.08	0.33
Jul-91				U	-6.69	6.18				U	-3.52	5.16			
				V	-1.64	6.02				V	-5.02	5.78			
				T	23.26	0.5				T	22.61	0.3	T	22.25	0.38
Aug-91				U	-5.95	8.12				U	-4.17	5.38			
				V	4.71	8.94				V	2.06	6.28			
				T	24.56	0.41				T	23.01	0.35	T	22.59	0.33
Sep-91				U	-3.52	7.81				U	-1.72	4.87			
				V	3.42	8.22				V	2.55	4.77			
				T	25.93	0.32				T	23.74	0.37	T	23.1	0.28
Oct-91				U	-1.56	6.64				U	-2.62	6.03			
				V	-5.73	7.4				V	-6.68	6.23			
				T	25.3	0.27				T	23.96	0.79	T	22.74	0.64
Nov-91				U	-7.15	6.17				U	-5.17	5.57			
				V	-5.87	8.36				V	-5.42	6.93			
				T	24.38	0.42				T	24.14	0.44	T	23.7	0.7
Dec-91				U	-7.39	6.2				U	-6.7	5.74			
				V	-0.5	6.74				V	-0.5	5.77			
				T	22.88	0.36				T	22.88	0.36	T	22.88	0.36
Jan-92				U	-2.04	5.35				U	-1.5	5.93			
				V	-0.94	4.62				V	-0.53	4.12			
				T	21.77	0.2				T	21.76	0.2	T	21.76	0.2
Feb-92				U	-1.09	6.25	U	-1.14	4.99	U	2.03	6.01			
				V	-4.82	5.07	V	-3.86	5.11	V	-5.15	5.2			
	T	20.87	0.18	T	21.01	0.3	T	20.78	0.16	T	20.97	0.29	T	20.97	0.29
Mar-92				U	-1.41	5.49	U	1.41	4.48	U	2.12	4.23			
				V	-2.99	5.94	V	-3.07	6.83	V	-3.61	6.48			
	T	20.62	0.11	T	20.54	0.09	T	20.51	0.09	T	20.5	0.1	T	20.49	0.1
Apr-92				U	-4.45	4.6	U	-1.61	4.42	U	-1.01	4.46			
				V	0.5	4.36	V	0	4.18	V	-0.88	4.2			
	T	20.93	0.23	T	20.84	0.22	T	20.79	0.2	T	20.74	0.18	T	20.71	0.16
May-92				U	-9.61	6.79	U	-8.74	4.92	U	-9.06	4.13			
				V	1.07	7.86	V	0.99	5.26	V	0.74	5.19			
	T	21.77	0.49	T	21.55	0.31	T	21.4	0.26	T	21.22	0.2	T	21.11	0.18
Jun-92				U	-4.47	8.3	U	-2.75	6.32	U	-2.92	5.51			
				V	0.63	8.61	V	0.66	7.2	V	-0.15	5.94			
	T	23	0.95	T	22.58	0.52	T	22.19	0.24	T	21.73	0.29	T	21.33	0.25
Jul-92				U	-2.22	6.73	U	0.5	5.51	U	-1.29	5.71			
				V	0.29	7.93	V	-1.36	5.81	V	-2.85	5.43			
	T	24.48	0.26	T	24.3	0.23	T	23.47	0.59	T	22.22	0.33	T	21.76	0.39
Aug-92				U	-3.42	5.13	U	-0.52	5.25	U	8.48	5.09			
				V	1.15	5.38	V	0.47	6.06	V	5.81	2.59			
	T	24.68	0.42	T	24.52	0.31	T	24.34	0.25	T	22.81	0.48	T	21.85	0.33
Sep-92				U	-5.19	6.66	U	-3.5	5.73						
				V	0.44	5.53	V	1.44	6.33						
	T	24.9	0.28	T	24.76	0.15	T	24.67	0.11				T	22.5	0.78
Oct-92				U	0.93	6.38	U	0.13	5.74	U	3.12	4.49			
				V	-2.99	7.9	V	-5.35	6.79	V	-8.19	5.66			
	T	25.09	0.43	T	25.01	0.36	T	24.88	0.28	T	24.32	0.35	T	23.17	0.79
Nov-92				U	0.84	5.56	U	2.35	5.84	U	3.46	6.01			
				V	-7.75	5.73	V	-9.33	5.72	V	-9.94	5.74			
	T	23.73	0.35	T	23.74	0.34	T	23.73	0.35	T	23.71	0.36	T	23.45	0.6
Dec-92				U	0.83	6.22	U	2.11	6.13	U	3.19	5.84			
				V	-4.8	6.19	V	-5.07	6.05	V	-4.89	6.15			
	T	22.72	0.29	T	22.72	0.29	T	22.72	0.29	T	22.7	0.29	T	22.67	0.35
Jan-93				U	-1.55	6.22	U	-0.1	6.03	U	0.89	5.77			
				V	-2.54	5.23	V	-3.27	4.92	V	-3.32	4.8			
	T	21.59	0.24	T	21.59	0.23	T	21.58	0.23	T	21.57	0.23	T	21.57	0.23
Feb-93				U	5.85	4.17	U	8.39	4.04	U	8.89	3.87			
				V	2.2	4.48	V	1.19	4.93	V	1.79	5.08			
	T	21.1	0.22	T	21.1	0.22	T	21.08	0.22	T	21.07	0.23	T	21.07	0.23
Mar-93				U	4.5	8.02	U	6	7.79	U	6.72	7.69			
				V	-2.34	8.06	V	-2.09	7.25	V	-1.14	6.63			
	T	20.85	0.26	T	20.78	0.22	T	20.73	0.23	T	20.7	0.23	T	20.69	0.23
Apr-93				U	3.61	5.35	U	6.77	5.19	U	7.87	5.27			
				V	-0.9	5.74	V	-1.98	6.12	V	-2.08	5.96			
	T	21.17	0.22	T	21.13	0.14	T	21.08	0.12	T	21.04	0.12	T	21.03	0.13
May-93				U	-7.09	7.16	U	-5.93	6.94	U	-5.45	7.02			
				V	-5.03	6.38	V	-4.27	5.85	V	-4.38	5.49			
	T	22.07	0.56	T	21.87	0.35	T	21.7	0.27	T	21.57	0.21	T	21.51	0.19
Jun-93				U	-9.76	6.01	U	-9.63	5.07	U	-8.01	4.55			
				V	-7.09	7.23	V	-8.54	6.69	V	-9.24	5.63			

Table 12b. Monthly Oceanic Velocities and Temperature Statistics Central (cont)

		70 m			80 m			90 m			100 m			110 m	
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91	U	-1.12	3.15										U	-2.83	2.85
	V	-3.43	4.21										V	-4.42	3.87
	T	22.49	0.18	T	22.07	0.15				T	21.16	0.16	T	20.88	0.15
Jul-91	U	-3.52	5.16										U	-3.88	4.36
	V	-5.02	5.78										V	-3.72	4.54
	T	22.6	0.31	T	22.12	0.37				T	21.12	0.26	T	20.83	0.23
Aug-91	U	-4.17	5.38										U	-4.69	4.94
	V	2.06	6.28										V	2.03	5.8
	T	23	0.35	T	22.35	0.31				T	21.24	0.22	T	20.91	0.2
Sep-91	U	-1.71	4.87										U	-1.96	4.52
	V	2.55	4.77										V	2.92	4.65
	T	23.73	0.37	T	22.7	0.28				T	21.42	0.2	T	21.06	0.17
Oct-91	U	-2.62	6.03										U	-1.91	4.38
	V	-6.69	6.22										V	-5.31	5.7
	T	23.95	0.79	T	22.04	0.58				T	20.82	0.55	T	20.46	0.55
Nov-91	U	-5.17	5.56										U	-3.4	5.1
	V	-5.42	6.93										V	-3.97	6.16
	T	24.13	0.44	T	22.46	0.55				T	20.94	0.32	T	20.51	0.28
Dec-91	U	-6.7	5.74										U	-6.4	5.44
	V	-0.51	5.77										V	-0.5	5.4
	T	22.87	0.36	T	23.04	0.57				T	21.26	0.66	T	20.59	0.33
Jan-92	U	-1.5	5.93										U	-2.16	5.89
	V	-0.52	4.12										V	-0.4	4.34
	T	21.74	0.2	T	22.32	0.21				T	21.78	0.26	T	21.38	0.5
Feb-92	U	1.9	6.31				U	-0.29	5.15				U	1.26	5.83
	V	-5.01	5.13				V	-3.91	5.27				V	-4.56	5.38
	T	20.96	0.28	T	21.16	0.53	T	20.76	0.14	T	20.96	0.29	T	20.86	0.31
Mar-92	U	1.93	4.04				U	1.65	4				U	1.07	4.19
	V	-3.72	6.14				V	-3.22	6.13				V	-2.61	6.21
	T	20.49	0.1	T	20.46	0.1	T	20.48	0.11	T	20.47	0.13	T	20.44	0.2
Apr-92	U	-1.21	4.29				U	-1.54	4.17				U	-1.99	3.96
	V	-1.24	4.01				V	-0.58	3.96				V	-0.21	3.87
	T	20.69	0.13	T	20.64	0.12	T	20.65	0.12	T	20.63	0.11	T	20.6	0.1
May-92	U	-8.73	4.28				U	-9.07	4.42				U	-9.46	4.45
	V	-0.31	5.11				V	0.69	5.28				V	0.72	5.03
	T	20.99	0.22	T	20.83	0.23	T	20.73	0.21	T	20.63	0.19	T	20.55	0.17
Jun-92	U	-2.73	4.37				U	-2.47	4.41				U	-2.57	4.61
	V	0.19	4.7				V	0.91	5				V	1.37	5.41
	T	21.07	0.18	T	20.85	0.18	T	20.71	0.15	T	20.57	0.11	T	20.46	0.08
Jul-92	U	-2.01	4.93				U	-2.68	4.61				U	-3.19	4.52
	V	-3.26	4.51				V	-2.64	4.19				V	-2.68	4.23
	T	21.31	0.31	T	21	0.25	T	20.81	0.23	T	20.59	0.24	T	20.42	0.24
Aug-92	U	0.5	4.52				U	0.47	4				U	0	3.79
	V	-0.24	4.46				V	0.11	3.83				V	0.84	3.87
	T	21.43	0.19	T	21.12	0.19	T	20.87	0.18	T	20.62	0.19	T	20.4	0.19
Sep-92	U	-2.36	5.35				U	-2.09	4.29				U	-2.35	3.76
	V	0.32	4.9				V	0.73	4.35				V	0.72	3.84
	T	21.64	0.36	T	21.13	0.26	T	20.84	0.19	T	20.6	0.2	T	20.39	0.2
Oct-92	U	0.44	5.71				U	-0.31	4.96				U	0.05	5.13
	V	-5.18	6.21				V	-5.11	5.77				V	-5	5.67
	T	21.98	0.47	T	21.35	0.31	T	20.94	0.24	T	20.63	0.24	T	20.39	0.24
Nov-92	U	3.57	5.63				U	2.1	4.41				U	3.4	4.1
	V	-9.69	5.24				V	-9.71	5.02				V	-8.48	4.83
	T	22.37	0.8	T	21.43	0.62	T	20.8	0.35	T	20.4	0.27	T	20.11	0.23
Dec-92	U	3.72	5.75				U	3.42	5.31				U	4.09	4.95
	V	-4.67	6.09				V	-4.39	5.93				V	-3.29	5.47
	T	22.47	0.58	T	21.82	0.89	T	20.78	0.61	T	20.25	0.32	T	19.97	0.26
Jan-93	U	1.14	5.58				U	0.93	5.3				U	1.75	5.03
	V	-3.04	4.72				V	-2.74	4.75				V	-1.76	4.95
	T	21.56	0.23	T	21.49	0.29	T	21.18	0.51	T	20.81	0.68	T	20.42	0.74
Feb-93	U	6.63	3.67				U	8.91	3.79				U	8.54	3.73
	V	1.89	3.96				V	1.37	5.04				V	2.4	4.96
	T	21.07	0.23	T	21.07	0.23	T	21.07	0.23	T	21.06	0.23	T	21.05	0.23
Mar-93	U	4.37	4.83				U	6.68	7.4				U	6.96	7.1
	V	0.37	4.56				V	-1.36	6.18				V	-0.27	5.97
	T	20.68	0.23	T	20.66	0.23	T	20.63	0.24	T	20.58	0.26	T	20.51	0.31
Apr-93	U	3.85	3.89				U	7.83	5.12				U	7.9	5.21
	V	-0.69	3.17				V	-2.62	6.16				V	-1.5	6.06
	T	21.01	0.15	T	20.97	0.17	T	20.93	0.19	T	20.87	0.2	T	20.83	0.21
May-93	U						U	-5.09	7.06				U	-4.36	6.17
	V						V	-3.47	5.13				V	-3.98	5.69
	T	21.43	0.18	T	21.32	0.2	T	21.17	0.23	T	21	0.25	T	20.85	0.28
Jun-93	U						U	-8.37	4.07				U	-7.41	3.8
	V						V	-7.96	5.43				V	-8.62	5.18
	T	21.51	0.19	T	21.38	0.2	T	21.14	0.2	T	20.94	0.2	T	20.76	0.2

Table 12b. Monthly Oceanic Velocities and Temperature Statistics Central (cont)

	130 m			150 m			200 m			300 m			310 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
	T	20.48	0.18												
Jul-91															
	T	20.41	0.24												
Aug-91															
	T	20.43	0.23												
Sep-91															
	T	20.58	0.2												
Oct-91															
	T	19.95	0.59												
Nov-91															
	T	19.93	0.25												
Dec-91															
	T	19.96	0.25												
Jan-92															
	T	20.14	0.44												
Feb-92				U	-0.75	3.92	U	-1.08	3.99	U	-1.41	3.12	U	-1.58	3.22
				V	-2.96	4.9	V	-2.61	5.12	V	-2.75	4.08	V	-2.52	3.88
	T	20.07	0.72	T	18.8	0.33	T	17.78	0.22	T	15.74	0.19	T	15.56	0.19
Mar-92				U	0.31	3.5	U	-0.4	3.7	U	-0.64	3.25	U	-0.6	3.34
				V	-1.2	4.9	V	-0.87	4.93	V	-0.9	4.33	V	-1.07	4.34
	T	20.06	0.71	T	18.95	0.76	T	17.67	0.24	T	15.72	0.21	T	15.54	0.2
Apr-92				U	-2.17	3.97	U	-1.72	3.63	U	-1.51	3.04	U	-1.33	3.1
				V	0.27	4.06	V	-0.03	3.7	V	0.12	3.64	V	0.22	3.74
	T	20.55	0.15	T	19.94	0.53	T	17.91	0.21	T	15.74	0.2	T	15.55	0.19
May-92				U	-7.85	4.28	U	-6.46	4.31	U	-4.25	3.23	U	-4.15	3.28
				V	0.73	5.01	V	0.65	4.75	V	0.35	4.13	V	0.56	3.91
	T	20.32	0.24	T	19.49	0.48	T	17.74	0.23	T	15.63	0.19	T	15.44	0.18
Jun-92				U	-2.28	4.54	U	-2.63	4.16	U	-2.23	3	U	-2.15	3.25
				V	1.41	5.24	V	0.61	4.96	V	0.33	3.69	V	0.43	3.81
	T	20.36	0.09	T	19.97	0.33	T	17.96	0.24	T	15.73	0.19	T	15.53	0.18
Jul-92				U	-3.27	4.52	U	-2.2	3.68	U	-0.38	3.06	U	-0.12	3.28
				V	-2.32	4.27	V	-1.43	4.36	V	-1.21	3.81	V	-1.12	3.93
	T	20.17	0.28	T	19.59	0.37	T	17.85	0.23	T	15.77	0.18	T	15.59	0.17
Aug-92				U	0.01	3.74	U	0.45	3.2	U	1.13	3.39	U	1.29	3.48
				V	0.92	3.96	V	0.57	3.5	V	0.33	3.87	V	0.2	3.96
	T	20.12	0.21	T	19.55	0.31	T	17.9	0.18	T	15.88	0.17	T	15.7	0.17
Sep-92				U	-2.11	3.91	U	-1.89	3.5	U	-1.56	3.1	U	-1.51	3.26
				V	1.11	4.07	V	0.89	3.85	V	0.46	3.33	V	0.51	3.45
	T	20.08	0.23	T	19.51	0.27	T	18.02	0.23	T	15.83	0.16	T	15.64	0.15
Oct-92				U	-3.1	4.34	U	-0.13	4.82	U	0.01	4.15	U	0.25	4.09
				V	-2.54	5.01	V	-3.72	5.35	V	-3.43	4.78	V	-3.33	4.73
	T	20	0.3	T	19.58	0.31	T	17.96	0.27	T	15.89	0.18	T	15.7	0.17
Nov-92							U	2.04	3.01	U	1.63	3.05	U	2.03	3.33
							V	-6.47	3.99	V	-6.57	3.94	V	-6.32	4.08
	T	19.68	0.22				T	17.82	0.22	T	15.75	0.17	T	15.57	0.17
Dec-92							U	2.92	3.44	U	2.55	3.2	U	2.48	3.13
							V	-2.67	4.22	V	-2.99	3.79	V	-2.75	3.67
	T	19.5	0.25				T	17.68	0.23	T	15.68	0.17	T	15.5	0.17
Jan-93							U	0.56	4	U	0.31	3.63	U	0.38	3.48
							V	0.14	4.34	V	0.1	3.95	V	0.39	3.96
	T	19.65	0.6				T	17.64	0.21	T	15.68	0.17	T	15.5	0.17
Feb-93							U	5.64	3.64	U	4.38	3.86	U	4.35	3.89
							V	1.98	3.91	V	1.41	4.33	V	1.46	4.42
	T	20.82	0.49				T	17.96	0.27	T	15.88	0.17	T	15.7	0.17
Mar-93							U	6.19	4.86	U	5.59	3.95	U	5.61	4.09
							V	-0.09	4.93	V	-0.21	4.53	V	-0.02	4.57
	T	20.27	0.53				T	17.86	0.34	T	15.97	0.22	T	15.79	0.21
Apr-93							U	5.59	4.2	U	4.55	3.77	U	4.6	3.62
							V	-0.08	4.41	V	-0.5	3.55	V	-0.37	3.43
	T	20.73	0.28				T	18.61	0.47	T	16.24	0.2	T	16.04	0.2
May-93							U	-3.42	3.91	U	-2.36	3.55	U	-2.07	3.59
							V	-3	4.44	V	-2.8	3.67	V	-2.68	3.78
	T	20.58	0.3				T	18.54	0.45	T	16.24	0.22	T	16.05	0.22
Jun-93							U	-4.91	3.51	U	-4.1	3.57	U	-3.94	3.33
							V	-5.92	4.54	V	-4.71	3.42	V	-4.76	3.5

Table 12b. Monthly Oceanic Velocities and Temperature Statistics Central (cont)

	400 m			580 m			750 m			1500m			3500m	
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91										U	0.71	2.11	U	-1.13	1.37
										V	-1.61	2.44	V	0.45	1.51
										T	5.51	0.06	T	2.53	0.01
Jul-91										U	0.75	2.15	U	-0.3	1.45
										V	-1.67	2.04	V	0.26	1.77
										T	5.51	0.06	T	2.52	0.01
Aug-91										U	-0.09	2.07	U	-0.08	1.66
										V	-1.04	2.6	V	-0.28	1.92
										T	5.51	0.06	T	2.52	0.01
Sep-91										U	-0.07	1.87	U	-0.48	1.55
										V	-1.13	2.59	V	-0.64	2
										T	5.57	0.06	T	2.53	0.01
Oct-91										U	-1.14	2.06	U	-0.94	1.46
										V	-0.69	2.66	V	1.25	1.91
										T	5.56	0.08	T	2.54	0.01
Nov-91										U	-0.51	1.96	U	0.03	1.56
										V	-2.07	2.63	V	0.12	2.01
										T	5.47	0.06	T	2.53	0.01
Dec-91										U	-0.66	2.36	U	-0.11	1.42
										V	-1.52	2.97	V	-0.37	1.94
										T	5.49	0.07	T	2.52	0.01
Jan-92										U	-0.54	2.84	U	-0.81	1.64
										V	-0.48	2.93	V	0.11	1.93
										T	5.48	0.06	T	2.53	0.01
Feb-92										U	-0.16	2.29	U	-1.22	1.42
										V	-0.91	2.96	V	0.93	1.84
	T	14.08	0.14	T	11.54	0.13				T	5.48	0.07	T	2.52	0.01
Mar-92										U	0.46	1.6	U	0.21	1.48
										V	-1.65	2.31	V	-0.03	1.74
	T	13.98	0.17	T	11.51	0.14				T	5.45	0.06	T	2.52	0.01
Apr-92										U	0.5	2.32	U	0.3	1.69
										V	-1.59	2.82	V	-0.45	1.85
	T	14	0.16	T	11.54	0.13				T	5.48	0.06	T	2.52	0.01
May-92										U	-0.13	2.07	U	-0.08	1.28
										V	-1.26	2.96	V	-0.16	1.56
	T	13.92	0.17	T	11.45	0.13				T	5.49	0.05	T	2.52	0.01
Jun-92										U	0.18	2.11	U	-0.15	1.37
										V	-0.72	2.41	V	0.46	1.9
	T	13.97	0.16	T	11.47	0.12				T	5.49	0.05	T	2.52	0.01
Jul-92										U	2.09	2.29	U	0.45	1.15
										V	-1.33	2.89	V	-0.06	1.54
	T	14.07	0.17	T	11.52	0.12				T	5.49	0.06	T	2.52	0.01
Aug-92										U	1.59	2.25	U	-0.29	1.49
										V	-0.85	2.47	V	-0.12	1.93
	T	14.18	0.16	T	11.62	0.13				T	5.51	0.07	T	2.52	0.01
Sep-92										U	-0.11	2.53	U	-1.44	2.01
										V	-0.79	3.2	V	0.73	2.37
	T	14.04	0.16	T	11.52	0.12				T	5.54	0.06	T	2.53	0.01
Oct-92							U	2.65	2.98	U	1.51	2.31	U	0.28	1.18
							V	-4.14	3.1	V	-1.16	2.95	V	0.42	1.42
	T	14.1	0.15	T	11.56	0.12	T	9.69	0.11	T	5.5	0.06	T	2.52	0.01
Nov-92							U	2.28	3.84	U	2.41	2.36	U	1.59	1.37
							V	-4.91	4.01	V	-2.65	2.79	V	1.02	1.8
	T	14.01	0.17	T	11.61	0.12	T	9.71	0.14	T	5.51	0.06	T	2.52	0.01
Dec-92							U	3	3.09	U	1.71	2.11	U	-0.48	1.53
							V	-3.33	4.04	V	-1.48	2.32	V	0.42	2.02
	T	13.97	0.16	T	11.56	0.11	T	9.75	0.12	T	5.51	0.06	T	2.51	0.01
Jan-93							U	1.32	2.88	U	0.09	1.78	U	-0.76	1.37
							V	0.39	3.59	V	-0.75	2.7	V	0.69	1.9
	T	14.01	0.16	T	11.57	0.1	T	9.64	0.12	T	5.49	0.06	T	2.51	0.01
Feb-93							U	3.96	3.48	U	1.92	2.71	U	0.49	1.34
							V	1.66	3.73	V	0.79	2.97	V	-0.08	1.58
	T	14.12	0.17	T	11.57	0.11	T	9.6	0.11	T	5.37	0.07	T	2.52	0.01
Mar-93							U	5.91	3.28	U	2.59	2.55	U	0.56	1.39
							V	1.01	3.84	V	0.9	2.82	V	0.35	1.58
	T	14.23	0.2	T	11.66	0.14	T	9.62	0.15	T	5.41	0.08	T	2.52	0.01
Apr-93							U	4.19	3.11	U	1.27	2.35	U	-0.22	1.53
							V	-0.34	3.36	V	-0.12	2.56	V	-0.21	1.75
	T	14.4	0.17	T	11.75	0.14	T	9.74	0.14	T	5.43	0.04	T	2.52	0.01
May-93							U	0.18	3.1	U	-0.03	2.48	U	-0.49	1.46
							V	-2.22	3.56	V	-0.92	3.06	V	-0.34	1.69
	T	14.41	0.18	T	11.8	0.14	T	9.82	0.15	T	5.45	0.05	T	2.52	0.01
Jun-93							U	-1.82	2.87	U	-1.28	2.47	U	-0.55	0.96
							V	-1.21	3.33	V	-0.73	3.06	V	0	1.15

Table 12c. Monthly Oceanic Velocities and Temperature Statistics Southwest

	1 m			10 m			30 m			50 m			60 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91							U	-2.87	3.59	U	-3	3.71			
							V	10.9	7.97	V	10.35	7.47			
							T	23.62	0.03	T	23.62	0.13	T	23.3	0.3
Jul-91							U	-8.04	6.91	U	-6.35	6.46			
							V	1.02	10.88	V	-0.75	10.21			
							T	24.09	0.3	T	24.04	0.31	T	23.68	0.44
Aug-91							U	-0.5	9.7	U	-2.72	9.23			
							V	-4.32	7.96	V	-4.26	7			
							T	25.04	0.33	T	24.07	0.4	T	23.52	0.52
Sep-91							U	10.87	9.42	U	-12.9	7.23			
							V	-6.72	9.7	V	-12.4	6.84			
							T	25.87	0.48	T	24.37	0.54	T	23.75	0.39
Oct-91							U	-1.86	4.06	U	-8.63	6.24			
							V	0.06	4.86	V	-2.02	9.09			
							T	26.55	0.24	T	24.89	0.85	T	23.62	0.58
Nov-91															
Dec-91															
Jan-92															
Feb-92							U	-7.6	5.47	U	-6.09	5.79			
							V	-2.85	10.29	V	-4.21	9.92			
	T	23.49	0.2				T	24.1	0.16	T	23.49	0.18	T	23.5	0.18
Mar-92							U	2.42	7.66	U	5.78	6.55			
							V	4.36	7.99	V	3.08	7.73			
	T	23.15	0.08				T	23.78	0.03	T	23.1	0.04	T	23.1	0.04
Apr-92							U	-6.58	9.18	U	-5.66	9.7			
							V	-4.62	11.7	V	-5.58	11.89			
	T	23.29	0.19				T	23.86	0.14	T	23.14	0.15	T	23.11	0.13
May-92							U	10.32	6.63	U	11.03	6.63			
							V	2.02	10.96	V	-0.2	9.82			
	T	23.96	0.21				T	24.39	0.2	T	23.62	0.29	T	23.49	0.29
Jun-92							U	-2	5.68	U	0.01	5.91			
							V	6.44	5.49	V	-0.23	6.12			
	T	24.09	0.04				T	24.64	0.05	T	24	0.11	T	23.8	0.14
Jul-92															
Aug-92															
Sep-92															
Oct-92							U	-1.69	7.11	U	-1.59	6.6			
							V	-0.26	7.41	V	-4.2	6.92			
	T	26.45	0.17				T	26.34	0.1	T	25.8	0.54	T	24.93	0.67
Nov-92							U	-0.89	9.76	U	0.07	9.9			
							V	-2.47	11.19	V	-3.51	10.87			
	T	25.84	0.34				T	25.78	0.3	T	25.72	0.38	T	25.36	0.61
Dec-92							U	-2.07	7.94	U	0.16	7.9			
							V	-4.44	7.78	V	-7.04	8.01			
	T	24.6	0.29				T	24.56	0.28	T	24.57	0.28	T	24.55	0.35
Jan-93							U	-5.39	13.69	U	-1.63	13.79			
							V	0.62	14.83	V	-1.99	13.17			
	T	23.56	0.2				T	23.52	0.21	T	23.53	0.23	T	23.49	0.31
Feb-93							U	-5.65	10.54	U	-5.7	9.43			
							V	3.13	11.34	V	1.44	10.45			
	T	23.04	0.22				T	22.96	0.2	T	23.01	0.24	T	23	0.3
Mar-93							U	-5.88	10.51	U	-4.52	8.82			
							V	-3.3	8.56	V	-6.47	8.68			
	T	22.95	0.12				T	22.86	0.1	T	22.83	0.11	T	22.81	0.12
Apr-93							U	2.14	5.49	U	3.55	5.86			
							V	4.24	8.07	V	6.49	11.2			
	T	23.39	0.2				T	23.3	0.14	T	23.21	0.15	T	23.15	0.15
May-93							U	-0.57	4.18	U	-8.38	10.07			
							V	4.06	5.06	V	7.47	10.18			
	T	23.54	0.22				T	23.38	0.13	T	23.27	0.12	T	23.15	0.17
Jun-93															

Table 12c. Monthly Oceanic Velocities and Temperature Statistics Southwest (cont)

	70 m			80 m			90 m			100 m			110 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91	U	-4.33	4.39				U	-5.48	5.67	T	22.36	0.28			
	V	5.66	6.12				V	1.91	6.55						
	T	23.06	0.35	T	22.72	0.34	T	22.48	0.28						
Jul-91	U	-6.25	6.37				U	-7.51	7.11	T	21.42	1.22			
	V	-1.28	10.96				V	-0.69	10.98						
	T	23.37	0.55	T	22.81	0.7	T	22.04	0.96						
Aug-91	U	-4.04	8.44				U	-4.87	7.44	T	21.51	0.73			
	V	-3.4	6.62				V	-2.42	5.71						
	T	23.11	0.6	T	22.55	0.6	T	22	0.64						
Sep-91	U	-11.7	6.34				U	-10.4	5.62	T	22.35	0.22			
	V	-13.6	6.3				V	-10.7	4.94						
	T	23.45	0.38	T	23.03	0.34	T	22.67	0.25						
Oct-91	U	-8.2	5.87				U	-7	5.11	T	21.75	0.47			
	V	-2.08	8.58				V	-1.66	7.41						
	T	23.11	0.54	T	22.6	0.52	T	22.16	0.47						
Nov-91										T	21.57	0.19			
Dec-91															
Jan-92															
Feb-92	U	-5.55	5.67				U	-6.44	5.92				U	-4.01	4.32
	V	-4.75	9.51				V	-3.3	9.24				V	-2.35	5.55
	T	23.47	0.17	T	23.49	0.16	T	23.5	0.16				T	23.15	0.46
Mar-92	U	6.33	6.22				U	7.26	7.44				U	7.71	8.04
	V	4	7.59				V	4.8	7.82				V	5.44	7.82
	T	23.08	0.04	T	23.09	0.03	T	23.11	0.03				T	23	0.17
Apr-92	U	-4.65	10.32				U	-5.47	9.67				U	-5.61	8.39
	V	-5.61	11.37				V	-4.8	10.16				V	-2.57	8.54
	T	23.06	0.12	T	23.04	0.12	T	23.03	0.12				T	22.85	0.18
May-92	U	10.35	5.61				U	10.42	6.17				U	10.14	5.8
	V	1.37	8.95				V	1.84	9.09				V	2.29	7.85
	T	23.31	0.27	T	23.19	0.23	T	23.08	0.19				T	22.79	0.17
Jun-92	U	1.2	4.35				U	0.72	3.86				U	1.14	3.64
	V	-0.19	4.57				V	1.17	4.98				V	2.09	4.46
	T	23.58	0.1	T	23.44	0.13	T	23.3	0.12				T	22.94	0.15
Jul-92															
Aug-92															
Sep-92															
Oct-92	U	-1.47	5.29				U	-0.06	6.01				U	-0.24	5.28
	V	-2.91	5.35				V	-2.01	5.71				V	-0.97	5.23
	T	23.98	0.35				T	22.88	0.28	T	22.51	0.25	T	22.13	0.31
Nov-92	U	-0.11	7.33				U	1.09	7.82				U	0.53	6.28
	V	-5.03	8.66				V	-4.13	8.42				V	-3.54	7.65
	T	24.34	0.62				T	22.84	0.44	T	22.4	0.39	T	21.98	0.36
Dec-92	U	-2.56	6.98				U	-0.97	7				U	-2.49	5.95
	V	-8.06	7.35				V	-7.17	6.69				V	-6.36	6.38
	T	24.11	0.58				T	22.35	0.49	T	21.86	0.37	T	21.45	0.34
Jan-93	U	-0.82	11.84				U	0.37	9.59				U	-1.05	7.4
	V	-3.27	12.87				V	-3.6	9.9				V	-3.55	8.79
	T	23.18	0.55				T	21.06	1.02	T	20.12	0.86	T	19.45	0.84
Feb-93	U	-5.18	8.3				U	-7.47	6.53				U	-8.16	6.53
	V	3.39	8.1				V	1.59	8.8				V	2.82	8.07
	T	22.95	0.43				T	22.54	0.78	T	22.21	0.95	T	21.65	1.05
Mar-93	U	-6.59	7.54				U	-4.65	7.77				U	-5.65	6.6
	V	-5.23	8.38				V	-6.67	7.94				V	-5.37	6.81
	T	22.79	0.15				T	22.58	0.36	T	22.41	0.58	T	22.04	0.78
Apr-93	U	3.84	6.17				U	1.65	5.02				U	0.83	4.84
	V	3.32	8.87				V	2.58	7.99				V	1.83	6.82
	T	23.14	0.16				T	22.94	0.15	T	22.81	0.25	T	22.51	0.43
May-93	U	-5.4	8.66				U	-7.79	8.23				U	-5.18	5.96
	V	7.74	9.63				V	4.47	9.41				V	4.85	7.44
	T	23	0.21				T	22.54	0.3	T	22.34	0.39	T	22.06	0.52
Jun-93															

Table 12c. Monthly Oceanic Velocities and Temperature Statistics Southwest (cont)

	130 m			150 m			200 m			300 m			310 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91				U	-5.01	6.05									
				V	-3.27	5.09									
	T	22.14	0.79	T	20.04	0.67				T	16.45	3.42			
Jul-91				U	-6.7	5.39									
				V	2.45	7.73									
	T	19.8	1.96	T	17.73	1.28				T	13.64	0.59			
Aug-91				U	-5.82	5.06									
				V	-0.67	5.09									
	T	18.9	0.68	T	18.15	0.93				T	13.21	0.2			
Sep-91				U	-8.1	4.44									
				V	-7.56	4.61									
	T	20.18	1.03	T	20.25	0.54				T	14.01	0.65			
Oct-91				U	-6.14	4.65									
				V	-0.81	6.3									
	T	21.42	0.31	T	18.87	0.7				T	14.76	0.33			
Nov-91															
Dec-91															
Jan-92															
Feb-92				U	-2	6.42	U	0.36	5.25						
				V	-1.59	6.31	V	-1.73	5.12						
	T	22.14	0.61	T	21.05	0.51	T	18.44	0.74	T	14.68	0.26			
Mar-92				U	4.44	5.98	U	3.14	5.5						
				V	3.79	6.81	V	2.78	6.46						
	T	22.59	0.54	T	21.38	0.55	T	18.56	0.51						
Apr-92				U	-3.28	5.45	U	-2.13	5.84						
				V	-0.42	6.4	V	0.35	6.27						
	T	22.52	0.41	T	21.38	0.65	T	18.42	0.6						
May-92				U	7.36	5.9	U	3.24	5.5						
				V	2.9	7.77	V	3.34	6.34						
	T	22.42	0.37	T	21.33	0.57	T	18.37	0.59						
Jun-92				U	3.55	4.7	U	1.94	6.41						
				V	3.32	4.06	V	4.92	7.12						
	T	22.5	0.31	T	21.35	0.49	T	18.17	0.69						
Jul-92															
Aug-92															
Sep-92															
Oct-92				U	1.04	4.47	U	1.6	4.33						
				V	-0.23	4.79	V	0.98	4.67						
	T	21.38	0.32	T	20.26	0.31	T	17.36	0.34	T	14.39	0.21			
Nov-92				U	-0.43	5.85	U	0.68	4.95						
				V	-2.07	6.87	V	-1.52	5.94						
	T	21.17	0.38	T	20	0.35	T	17.22	0.37	T	14.29	0.24			
Dec-92				U	-3.54	4.24	U	-2.12	4.81						
				V	-3.2	5.03	V	-2.72	5.24						
	T	20.76	0.42	T	19.77	0.52	T	17.38	0.44	T	14.35	0.32			
Jan-93				U	-2.17	5.05	U	-2.68	4.76						
				V	-1.31	6.4	V	-0.82	4.86						
	T	18.43	0.78	T	17.36	0.65	T	15.63	0.49	T	13.22	0.32			
Feb-93				U	-6.95	5.51	U	-8.2	4.18						
				V	5.25	6.26	V	2.14	5.22						
	T	20.39	1.13	T	19.2	1.04	T	17.08	0.74	T	14.06	0.44			
Mar-93				U	-6.74	4.91	U	-4.57	4.42						
				V	-2.66	6.22	V	-3.79	5.75						
	T	20.96	0.82	T	19.77	0.56	T	17.36	0.49	T	14.32	0.33			
Apr-93				U	-0.24	5.5	U	-0.98	4.37						
				V	1.35	5.75	V	0.44	4.58						
	T	21.45	0.59	T	20.08	0.42	T	17.43	0.41	T	14.18	0.32			
May-93				U	-3.04	6.2	U	-4.09	6.62						
				V	4.27	7.09	V	2.68	6.88						
	T	21.29	0.74	T	20.07	0.72	T	17.53	0.73	T	14.27	0.28			
Jun-93															

Table 12c. Monthly Oceanic Velocities and Temperature Statistics Southwest (cont)

	400 m			580 m			750 m			1500m			3500m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91	T	14.98	4.1	T	9.86	0.2									
Aug-91	T	12.16	0.56	T	9.42	0.31									
Sep-91	T	11.67	0.18	T	9.43	0.2									
Oct-91	T	12.1	0.43	T	10.03	0.2									
Nov-91	T	12.88	0.22	T	9.09	0.37									
Dec-91															
Jan-92															
Feb-92															
Mar-92				T	9.49	0.29				T	4.61	0.05			
Apr-92				T	9.71	0.22				T	4.56	0.06			
May-92				T	9.84	0.21				T	4.59	0.06			
Jun-92				T	9.87	0.29				T	4.56	0.05			
Jul-92				T	9.74	0.26				T	4.6	0.06			
Aug-92															
Sep-92															
Oct-92															
Nov-92	T	12.48	0.17				T	6.99	0.12	T	4.57	0.04			
Dec-92	T	12.4	0.18				T	6.92	0.12	T	4.55	0.05			
Jan-93	T	12.52	0.24				T	6.96	0.16	T	4.54	0.05			
Feb-93	T	11.5	0.35				T	7.13	0.17	T	4.59	0.05			
Mar-93	T	12.17	0.28				T	7.38	0.18	T	4.6	0.04			
Apr-93	T	12.43	0.24				T	7.27	0.17	T	4.59	0.06			
May-93	T	12.36	0.24				T	7.24	0.16	T	4.57	0.04			
Jun-93	T	12.31	0.27				T	7.32	0.16	T	4.63	0.06			

Table 12d. Monthly Oceanic Velocities and Temperature Statistics Southeast

	1 m			10 m			30 m			50 m			60 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91				U	-16.1	14.11				U	-4.89	7.03			
				V	1.91	10.9				V	3.99	5.66			
				T	22.97	0.43									
Aug-91				U	-20.6	15.17									
				V	-6.72	14.87									
				T	24.41	0.61									
Sep-91				U	-13.3	13.71									
				V	2.88	12.61									
				T	26.49	0.37									
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92				U	-30.3	11.77	U	-24.3	12.02	U	-15.7	12.47			
				V	-5.07	10.26	V	-0.16	9.53	V	-9.61	8.68			
	T	22	0.26	T	22.03	0.25				T	20.68	1.22			
Mar-92				U	-3.66	10.94	U	0.68	9.48	U	-1.06	8.38			
				V	0.73	8.81	V	1.53	8.42	V	-1.66	10.48			
	T	21.71	0.21	T	21.74	0.2				T	21.19	0.44			
Apr-92				U	-12.9	9.39	U	-8.29	7.93	U	0.92	8.4			
				V	-19.1	17.07	V	-11.1	14.13	V	-9.48	14.5			
	T	21.58	0.21	T	21.59	0.2				T	21.37	0.24			
May-92				U	-2.99	11.31	U	1.64	10.25	U	8.96	12.78			
				V	-14.2	14.16	V	-13.2	12.65	V	-17.2	12.52			
	T	21.76	0.23	T	21.78	0.22				T	21.08	0.58			
Jun-92				U	-14	11.9	U	-5.78	9.75	U	6.33	7.4			
				V	-0.02	12.97	V	2.75	11.76	V	2.63	11.4			
	T	22.25	0.24	T	22.28	0.23				T	20.47	0.65			
Jul-92				U	-2.34	10.65	U	2.72	9.05						
				V	-0.53	9.11	V	-0.36	8.05						
	T	23.3	0.44	T	23.27	0.41									
Aug-92				U	-9.17	15.77	U	-3.12	10.92						
				V	-2.88	15.24	V	-1.71	11.85						
	T	24.47	0.55	T	24.31	0.38									
Sep-92				U	-8.89	13.85	U	-1.67	9.94						
				V	-5.28	14.15	V	-5.86	11.03						
	T	25.02	0.23	T	24.97	0.18									
Oct-92				U	-0.77	10.68	U	4.74	9.76	U	10.3	8.83			
				V	2.97	10.96	V	1.77	10.37	V	2.42	9.51			
	T	25.05	0.17	T	25.03	0.18	T	25.01	0.29						
Nov-92				U	-0.73	6.87	U	3.35	6.04	U	8.69	6.34			
				V	-3.14	7.71	V	-3.62	7.05	V	-4.9	7.74			
	T	24.43	0.42	T	24.42	0.41	T	24.44	0.41						
Dec-92				U	-7.85	10.26	U	-3.71	9.17	U	0.75	9.84			
				V	-6.82	10.49	V	-4.97	9.24	V	-6.23	10.08			
	T	21.95	0.95	T	21.95	0.95	T	21.95	0.96						
Jan-93				U	-2.97	11.6	U	-0.36	9.28	U	1.03	9.29			
				V	3.95	9.28	V	-0.67	8.21	V	-3.6	8.46			
	T	21.36	0.19	T	21.35	0.19	T	21.1	0.36						
Feb-93				U	-9.99	10.71	U	-5.09	9.13	U	-3.65	10.32			
				V	0.93	10.03	V	2.21	8.44	V	0.24	8.75			
	T	20.89	0.19	T	20.89	0.18	T	20.87	0.2						
Mar-93				U	-6.5	11.45	U	-1.31	8.64	U	4.46	9.34			
				V	-5.26	9.46	V	-2.78	8.44	V	-4.09	8.26			
	T	20.86	0.2	T	20.82	0.12	T	20.78	0.11						
Apr-93				U	-5.92	8.37	U	0.27	7.3	U	5.47	6.19			
				V	-4.37	9.5	V	-2.22	8.39	V	-3.63	7.27			
	T	21	0.3	T	20.98	0.29	T	20.93	0.29						
May-93				U	-10.4	7.8	U	-3.56	6.86	U	1.95	7.47			
				V	-1.54	8.44	V	0.73	7.29	V	-1.2	7.61			
	T	21.8	0.37	T	21.8	0.37	T	21.78	0.37						
Jun-93				U	-7.02	6.53	U	-0.9	5.3	U	4.18	5.37			
				V	-0.5	5.98	V	1.94	5.22	V	1.31	5.72			
	T	22.4	0.06	T	22.48	0.08	T	22.46	0.07						

Table 12d. Monthly Oceanic Velocities and Temperature Statistics Southeast (cont)

	70 m			80 m			90 m			100 m			110 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
	T	19.55	0.95							T	17.83	1.02			
Aug-91															
	T	20.21	0.49							T	18.87	0.62			
Sep-91															
	T	19.56	0.94							T	17.62	0.88			
Oct-91															
	T	16.62	1.21							T	15.19	0.68			
Nov-91															
Dec-91															
Jan-92															
Feb-92															
	T	17.68	0.99	T	16.89	0.74				T	15.84	0.76	T	15.43	0.7
Mar-92															
	T	19.86	1	T	18.94	1.16				T	17.1	0.77	T	16.48	0.65
Apr-92															
	T	20.49	0.78	T	19.16	1.1				T	16.94	0.95	T	16.33	0.79
May-92															
	T	20.28	0.98	T	19.59	1.14				T	17.82	1.04	T	17.17	0.78
Jun-92															
	T	19.66	0.89	T	18.75	0.78				T	17.42	0.78	T	16.87	0.73
Jul-92															
	T	19.62	1.11	T	18.7	1.05				T	17.28	0.94	T	16.66	0.86
Aug-92															
	T	19.28	0.74	T	18.54	0.77				T	17.07	0.88	T	16.45	0.78
Sep-92															
	T	18.89	0.8	T	18.41	0.9				T	17.34	1.04	T	16.85	0.99
Oct-92															
	T	19.11	0.47	T	19.12	0.75				T	17.26	0.38	T	17.23	0.63
Nov-92										U	8.69	6.34			
										V	-4.9	7.74			
				T	19.54	0.7							T	17.33	0.55
Dec-92										U	0.75	9.84			
										V	-6.23	10.08			
				T	17.87	0.83							T	16.27	0.47
Jan-93										U	1.03	9.29			
										V	-3.6	8.46			
				T	18.8	1.06							T	16.6	0.64
Feb-93										U	-3.65	10.32			
										V	0.24	8.75			
				T	18.68	0.9							T	16.96	1.23
Mar-93										U	4.46	9.34			
										V	-4.09	8.26			
				T	20.07	0.6							T	17.91	0.82
Apr-93										U	5.47	6.19			
										V	-3.63	7.27			
				T	18.32	0.85							T	16.48	0.68
May-93										U	1.95	7.47			
										V	-1.2	7.61			
				T	18.51	0.96							T	16.37	0.48
Jun-93										U	4.18	5.37			
										V	1.31	5.72			
				T	19.46	1.17							T	16.3	0.72

Table 12d. Monthly Oceanic Velocities and Temperature Statistics Southeast (cont)

	130 m			150 m			200 m			300 m			310 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
Aug-91	T	16.51	0.95	T	15.85	0.93	T	14.37	1.03	T	12.65	11.19			
Sep-91	T	17.02	0.59	T	16.12	0.59	T	14.64	0.48	T	12.82	0.31			
Oct-91	T	17.64	0.62	T	16.94	0.51	T	15.3	0.39	T	13.21	0.43			
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92	T	14.68	0.58	T	14.06	0.48	T	12.99	0.45						
Apr-92	T	15.6	0.63	T	14.93	0.6	T	13.85	0.55						
May-92	T	15.34	0.65	T	14.52	0.54	T	13.09	0.4						
Jun-92	T	16.25	0.64	T	15.63	0.67	T	14.17	0.57						
Jul-92	T	15.9	0.65	T	15.24	0.58	T	14.1	0.49						
Aug-92	T	15.66	0.78	T	15	0.67	T	13.77	0.43						
Sep-92	T	15.64	0.65	T	15.05	0.56	T	13.85	0.52						
Oct-92	T	16.11	0.9	T	15.56	0.82	T	14.41	0.49						
Nov-92	T	16.41	0.57	T	15.75	0.53	T	14.36	0.37	T	12.41	0.2			
Dec-92	T	16.56	0.62	T	15.91	0.65	T	14.31	0.37	T	12.4	0.24			
Jan-93	T	15.52	0.41	T	14.96	0.46	T	13.87	0.57	T	12.22	0.36			
Feb-93	T	15.88	0.65	T	15.25	0.6	T	14.16	0.43	T	12.56	0.26			
Mar-93	T	15.96	1.1	T	15.12	0.77	T	13.96	0.26	T	12.48	0.26			
Apr-93	T	16.81	0.74	T	16.08	0.71	T	14.9	0.6	T	12.95	0.28			
May-93	T	15.79	0.62	T	15.22	0.52	T	14.1	0.44	T	12.42	0.35			
Jun-93	T	15.67	0.53	T	15.06	0.53	T	13.92	0.59	T	11.98	0.49			
	T	15.21	0.53	T	14.38	0.36	T	12.91	0.31	T	11.25	0.53			

Table 12d. Monthly Oceanic Velocities and Temperature Statistics Southeast (cont)

	400 m			580 m			750 m			1500m			3500m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91	T	11.4	1.22				T	7.73	1.8						
Aug-91	T	11.5	0.25				T	7.54	0.15						
Sep-91	T	11.57	0.26				T	7.43	0.18						
Oct-91	T	11.23	0.25				T	7.4	0.11						
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92				T	9.06	0.21				T	4.59	0.07			
Apr-92				T	9	0.15				T	4.51	0.05			
May-92				T	9.06	0.15				T	4.58	0.06			
Jun-92				T	8.85	0.2				T	4.5	0.08			
Jul-92				T	8.87	0.16				T	4.43	0.05			
Aug-92				T	8.69	0.17				T	4.49	0.05			
Sep-92				T	8.53	0.22				T	4.57	0.06			
Oct-92				T	8.88	0.2				T	4.56	0.07			
Nov-92	T	11.06	0.19	T	8.81	0.16	T	7.26	0.1	T	4.6	0.06			
Dec-92	T	10.98	0.2	T	8.83	0.11	T	7.38	0.1	T	4.62	0.05			
Jan-93	T	10.99	0.24	T	8.92	0.19	T	7.41	0.12	T	4.62	0.09			
Feb-93	T	11.13	0.26	T	8.97	0.23	T	7.4	0.15	T	4.56	0.09			
Mar-93	T	11.26	0.22	T	9.05	0.17	T	7.44	0.13	T	4.54	0.06			
Apr-93	T	11.29	0.27	T	8.82	0.2	T	7.44	0.12	T	4.58	0.07			
May-93	T	10.93	0.24	T	8.68	0.17	T	7.34	0.11	T	4.53	0.06			
Jun-93	T	10.65	0.28	T	8.62	0.17	T	7.27	0.1	T	4.55	0.06			
	T	10.25	0.27	T	8.58	0.14	T	7.19	0.09	T	4.65	0.04			

Table 12e. Monthly Oceanic Velocities and Temperature Statistics Northwest

	1 m			10 m			30 m			50 m			60 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
Aug-91				T	25.42	0.55	T	22.87	0.85	T	21.06	0.57			
Sep-91															
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92				T	19.04	0.04	T	18.98	0.03	T	18.98	0.03	T	19.05	0.04
Apr-92				T	18.76	0.33	T	18.64	0.31	T	18.5	0.32	T	18.5	0.32
May-92				T	19.41	0.48	T	19.2	0.45	T	18.88	0.43	T	18.67	0.4
Jun-92				T	20.24	0.21	T	20.11	0.14	T	19.94	0.27	T	19.78	0.39
Jul-92				T	21.98	0.57	T	21.29	0.56	T	20.65	0.27	T	20.42	0.26
Aug-92				T	24.21	0.99	T	22.44	0.65	T	20.72	0.47	T	20.15	0.4
Sep-92				T	25.88	0.4	T	23.95	1.17	T	21.15	0.76	T	20.19	0.57
Oct-92				T	25.84	0.65	T	25.23	0.91	T	22.3	1.24	T	20.91	0.84
Nov-92				T	23.81	0.79	T	23.68	0.83	T	23.11	0.94	T	21.89	0.97
Dec-92				T	22.07	0.49	T	22.06	0.49	T	21.97	0.5	T	21.76	0.66
Jan-93				T	20.49	0.69	T	20.49	0.7	T	20.47	0.7	T	20.42	0.66
Feb-93				T	19.12	0.36	T	19.1	0.36	T	19.04	0.36	T	19.03	0.37
Mar-93				T	19.19	0.29	T	19.17	0.33	T	19.1	0.39	T	19.1	0.42
Apr-93				T	19.47	0.18	T	19.5	0.16	T	19.49	0.15	T	19.53	0.15
May-93															
Jun-93															

Table 12e. Monthly Oceanic Velocities and Temperature Statistics Northwest (cont)

	70 m			80 m			90 m			100 m			110 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
Aug-91	T	20.16	0.29	T	19.78	0.3	T	19.45	0.31				T	18.82	0.29
Sep-91															
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92	T	18.96	0.04	T	18.97	0.05	T	18.96	0.05	T	18.94	0.06	T	18.93	0.07
Apr-92	T	18.37	0.32	T	18.34	0.33	T	18.29	0.35	T	18.23	0.37	T	18.17	0.4
May-92	T	18.38	0.35	T	18.24	0.29	T	18.12	0.26	T	17.99	0.25	T	17.84	0.24
Jun-92	T	19.43	0.43	T	19.14	0.38	T	18.89	0.34	T	18.67	0.34	T	18.43	0.32
Jul-92	T	19.96	0.33	T	19.56	0.34	T	19.27	0.35	T	19.04	0.37	T	18.83	0.37
Aug-92	T	19.56	0.4	T	19.13	0.41	T	18.78	0.4	T	18.48	0.39	T	18.23	0.38
Sep-92	T	19.37	0.48	T	18.76	0.39	T	18.31	0.33	T	17.96	0.28	T	17.64	0.27
Oct-92	T	19.91	0.64	T	19.16	0.52	T	18.62	0.42	T	18.19	0.37	T	17.81	0.34
Nov-92	T	20.69	0.84	T	19.94	0.73	T	19.4	0.7	T	18.98	0.69	T	18.58	0.67
Dec-92	T	20.76	0.94	T	19.75	0.79	T	19.05	0.59	T	18.69	0.51	T	18.35	0.44
Jan-93	T	20.06	0.57	T	19.53	0.59	T	18.88	0.62	T	18.35	0.53	T	17.85	0.41
Feb-93	T	19	0.38	T	18.96	0.4	T	18.79	0.42	T	18.55	0.44	T	18.15	0.45
Mar-93	T	19.06	0.47	T	19.06	0.5	T	18.99	0.53	T	18.97	0.57	T	18.84	0.62
Apr-93	T	19.53	0.16	T	19.56	0.16	T	19.52	0.16	T	19.56	0.17	T	19.52	0.2
May-93															
Jun-93															

Table 12e. Monthly Oceanic Velocities and Temperature Statistics Northwest (cont)

	130 m			150 m			200 m			300 m			310 m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91				U	-1.34	4.74	U	-0.32	4.31						
				V	10.91	7.9	V	9.93	7.27						
	T	19.15	1.72	T	18.22	0.13	T	17.68	0.37	T	17.26	2.49			
Aug-91															
Sep-91															
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92				U	6.94	5.04									
				V	-2.18	5.75									
	T	18.88	0.11	T	18.73	0.25				T	16.74	0.17			
Mar-92				U	24.65	7.48									
				V	-6.77	7.12									
	T	18.05	0.44	T	17.96	0.48				T	15.53	0.75			
Apr-92				U	13.53	7.98									
				V	15.87	8.38									
	T	17.62	0.23	T	17.5	0.27				T	14.76	0.74			
May-92				U	-6.55	6.4									
				V	8.31	5									
	T	18.13	0.25	T	17.99	0.19				T	16.13	0.19			
Jun-92				U	4.65	4.58									
				V	0.95	5.75									
	T	18.53	0.34	T	18.48	0.23				T	16.44	0.17			
Jul-92															
	T	17.95	0.36							T	16.17	0.57			
Aug-92															
	T	17.32	0.29							T	14.96	0.58			
Sep-92															
	T	17.42	0.33							T	14.97	0.47			
Oct-92				U	-0.13	4.9	U	-0.42	5.01						
				V	-0.67	4.39	V	-0.25	4.4						
	T	18.11	0.63	T	18.14	0.13	T	17.59	0.09	T	15.76	0.93			
Nov-92				U	6.52	6.64	U	8.15	6.74						
				V	-12.5	8.78	V	10.64	8.59						
	T	18.02	0.37	T	17.72	0.34	T	17.14	0.3	T	15.96	0.33			
Dec-92				U	15.93	9.72	U	16.98	8.37						
				V	-11.8	8.31	V	-9.76	8.84						
	T	17.41	0.43	T	17.05	0.48	T	16.36	0.56	T	14.94	0.67			
Jan-93				U	5	7.76	U	5.22	7.4						
				V	-1.24	7.78	V	-0.39	7.39						
	T	17.66	0.45	T	17.27	0.5	T	16.6	0.54	T	15.2	0.61			
Feb-93				U	2.84	5.64	U	0.95	5.31						
				V	9.54	6.09	V	9.91	6.37						
	T	18.47	0.64	T	17.99	0.5	T	17.25	0.33	T	15.94	0.36			
Mar-93				U	3.1	4.99	U	1.76	5.13						
				V	7.53	4.74	V	7.72	6.88						
	T	19.34	0.48	T	18.88	0.76	T	17.43	0.22	T	16.07	0.19			
Apr-93															
May-93															
Jun-93															

Table 12e. Monthly Oceanic Velocities and Temperature Statistics Northwest (cont)

	400 m			580 m			750 m			1500m			3500m		
Time	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev	Var	Mean	StdDev
Jun-91															
Jul-91															
Aug-91	T	16.13	2.96				T	12.1	4.61						
Sep-91															
Oct-91															
Nov-91															
Dec-91															
Jan-92															
Feb-92															
Mar-92	T	15.48	0.14	T	12.83	0.17	T	9.84	0.17	T	5.42	0.12			
Apr-92	T	14.21	0.72	T	11.8	0.56	T	9.76	0.26	T	5.32	0.1			
May-92	T	13.51	0.62	T	11.31	0.45	T	9.61	0.19	T	5.25	0.11			
Jun-92	T	14.72	0.22	T	12.26	0.19	T	10.18	0.21	T	5.41	0.09			
Jul-92	T	15.11	0.16	T	12.6	0.13	T	10.56	0.17	T	5.47	0.13			
Aug-92	T	14.88	0.74	T	12.28	0.4	T	10.04	0.19	T	5.35	0.12			
Sep-92	T	13.56	0.48	T	11.42	0.3	T	9.82	0.3	T	5.28	0.11			
Oct-92	T	13.53	0.38	T	11.45	0.24	T	9.85	0.24	T	5.38	0.13			
Nov-92	T	14.39	0.89	T	12	0.53	T	10.1	0.2	T	5.43	0.1			
Dec-92	T	14.49	0.36	T	12.07	0.2	T	10.18	0.17	T	5.36	0.14			
Jan-93	T	13.52	0.58	T	11.44	0.26	T	9.75	0.14	T	4.92	0.14			
Feb-93	T	13.76	0.53	T	11.54	0.24	T	9.83	0.22	T	4.86	0.12			
Mar-93	T	14.51	0.35	T	11.93	0.33	T	9.71	0.35	T	5.1	0.17			
Apr-93	T	14.63	0.22	T	12.16	0.12	T	10.21	0.2	T	5.33	0.13			
May-93															
Jun-93															

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References

Alados-Arboledas, L., J. Vida, and J. I. Jimenez, 1988: Effects of solar radiation on the performance of pyrgeometers with silicon domes. *Journal of Atmospheric and Oceanic Technology*, **5**, 666–670.

Albrecht, B. and S. K. Cox, 1977: Procedures for improving pyrgeometer performance. *Journal of Applied Meteorology*, **46**, 188–197.

Bolton, D., 1980: The computation of equivalent potential temperature. *Monthly Weather Review*, **108**, 1046–1053.

Charnock, H., 1955: Wind stress on a water surface. *Quarterly Journal of the Royal Meteorological Society*, **81**, 639–640.

Clark, N. E., L. Eber, R. M. Laurs, J. A. Renner, and J. F. T. Saur, 1974: Heat exchange between ocean and atmosphere in the eastern North Pacific for 1961–1971. NOAA Technical Report, NMFS SSRF-682, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C..

Cushman-Roisin, B., 1987: Subduction, in Dynamics of the Oceanic Surface Mixed Layer, *Proceedings, 'Aha Huliko'a, Hawaiian Winter Workshop, University of Hawaii at Manoa, January 14–16, 1987*, Hawaii Institute of Geophysics Special Publication, University of Hawaii, Honolulu, Hawaii, pp. 181–196.

Denbo, D. W. 1993: Plot Plus, Scientific Graphics System. Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration, 150 pages.

Denbo, D. W., and W. H. Zhu, 1993: EPS Library Users Guide Version 2.1, Pacific Marine Laboratory, National Oceanic and Atmospheric Administration, 131 pp.

Dickey, T. D., D. V. Manov, R. A. Weller, and D. A. Siegel, 1994: Determination of longwave heat flux at the air-sea interface using measurements from buoy platforms. *Journal of Atmospheric and Oceanic Technology*, **11**, 1057–1078.

ECMWF Technical Attachment, 1994: The Description of the ECMWF/WCRP Level III-A Global Atmospheric Data Archive. European Centre for Medium Range Weather Forecast, Reading, England, U.K., 72 pp.

Fairall, C. W., E. F. Bradley, D. P. Rogers, J. B. Edson, and G. S. Young, 1995a: Bulk parameterization of air-sea fluxes for TOGA COARE. *Journal of Geophysical Research*, submitted.

Fairall, C. W., E. F. Bradley, J. S. Godfrey, G. A. Wick, J. B. Edson, and G. S. Young, 1995b: Cool Skin and warm layer effects on sea surface temperature. *Journal of Geophysical Research,* submitted.

Fung, I. Y., D. E. Harrison, and A. A. Lacis, 1984: On the variability of the net longwave radiation at the ocean surface. *Reviews of Geophysics and Space Physics*, **22**, 177–193.

Godfrey, J. S., and A. C. M. Beljaars, 1991: On the turbulent fluxes of buoyancy, heat, and moisture at the air-sea interface at low wind speeds. *Journal of Geophysical Research*, **96**, 22043–22048.

Hosom, D. S., R. A. Weller, R. E. Payne, and K. E. Prada, 1995: The IMET (Improved METeorology) ship and buoy systems. *Journal of Atmospheric and Oceanic Technology*, in press.

Kimball, H. H., 1928: Amount of solar radiation that reaches the surface of the earth on the land and on the sea and methods by which it is measured. *Monthly Weather Review*, **56**, 393–399.

List, R. J., 1984: Smithsonian Meteorological Tables. Smithsonian Institution Press, Washington, D.C., 572 pp.

Liu, W. T., K. B. Katsaros, and J. A. Businger, 1979: Bulk parameterization of air–sea exchanges of heat and water vapor including the molecular constraints at the interface. *Journal of the Atmospheric Sciences*, **36**, 1722–1735.

Luyten, J. R., J. Pedlosky, and H. Stommel, 1983: The ventilated thermocline. *Journal of Physical Oceanography*, **13**, 292–309.

Miller, M. J., A. C. M. Beljaars, and T. N. Palmer, 1992: The sensitivity of the ECMWF model to the parameterization of evaporation from the tropical oceans. *Journal of Climate,* **5**, 418–434.

Olivieri, J., 1991: Measurement of longwave downward irradiance using a PIR pyrgeometer, in Radiation and Climate, Second Workshop on Implementation of the Baseline Surface Radiation Network. Davos, Switzerland, August 6–9, 25pp.

Payne, R. E., 1972: Albedo of the sea surface. *Journal of the Atmospheric Sciences*, **29**, 959–970.

Prada, K. E., 1992: A System for Shipboard Analysis of Buoy Data. Woods Hole Oceanographic Institution Technical Report, WHOI-92-42, 29 pp.

Rew, R., G. Davis, and S. Emmerson, 1993. NetCDF users guide, An interface for data access, Version 2.3, Unidata Program Center, 186 pp.

Smith, S. D., 1988: Coefficients for sea surface wind stress, heat flux, and wind profiles as a function of wind speed and temperature. *Journal of Geophysical Research*, **93**, 15,467–15,472.

Stommel, H. M., 1979: Determination of the water mass properties of water pumped down from the Ekman layer to the geostrophic flow below. *Proceedings of the National Academy of Sciences, USA*, **76**, 3051–3055.

Trask, R. P., J. P. Dean, J. R. Valdes, and C. D. Marquette, 1989: FASINEX Moored Instrumentation. Woods Hole Oceanographic Institution Tech. Rep. WHOI-89-3, 58 pp.

Trask, R. P., and N. J. Brink, 1993a: Cruise Report R/V Oceanus Subduction 1 Mooring Deployment Cruise. Woods Hole Oceanographic Institution Tech. Rep. WHOI-93-12, 77 pp.

Trask, R. P., N. J. Brink, L. Regier, and N. McPhee, 1993b: Cruise Report R/V *Oceanus* Subduction 2 Mooring Deployment and Recovery Cruise. Woods Hole Oceanographic Institution Tech. Rep.WHOI-93-13, 102 pp.

Trask, R. P., W. Jenkins, J. Sherman, N. McPhee, W. Ostrom, and R. Payne, 1993c: Cruise Report RRS Charles Darwin Subduction 3 Mooring Deployment and recovery Cruise. Woods Hole Oceanographic Institution Tech. Rep. WHOI-93-18, 98 pp.

Trask, R. P., N. Galbraith, P. Robbins, W. Ostrom, L. Regier, G. Pezzoli, and N. McPhee, 1993d: Cruise Report R/V *Knorr* Subduction 3 Mooring Recovery Cruise. Woods Hole Oceanographic Institution Tech. Rep. WHOI-93-54, 79 pp.

Weller, R. A. and R. E. Davis, 1980: A vector measuring current meter. *Deep-Sea Research*, **27A**, 565–582.

Appendix A Subduction VAWRs and IMETs

VAWR Serial Numbers

Instrument No.	Sub 1	Sub 2	Sub 3
V121-WR	NW		NE
V380-WR		NE	
V704-WR	NE		SE
V707-WR		SE	
V712-WR		C	
V713-WR		SW	
V717-WR		NW	
V720-WR	SW		SW
V721-WR	SE		C
V722-WR	C		NW

IMET Module Serial Numbers

Instrument No.	Sub 1	Sub 2	Sub 3
Module 01			NE
Module 02	C	NE	SE
Module 03	SE		
Module 04	SW		
Module 05	NE	NW	
Module 06		C	NW
Module 07		SE	C

Appendix B Subduction VMCMs

Instrument No.	Sub 1	Sub 2	Sub 3
1		C-1500	
2		C-10	
3		C-3500	
7	SE-30		
8		C-110	
9	C-110	NE-150*	C-150*
10		SE-30	
11	C-3500	NE-200*	C-1500*
12	C-70		NE-50
13		C-70	
14		NE-70	NW-150
15	C-750		NE-150
16	C-200		NE-200
17		C-300	
18	NE-200		C-30
19		C-90	
20		C-50	
21	NE-30		NE-30
22	NE-90		SE-30
23		C-30	
24	C-50		C-50
25		C-200	
26		C-150	
27		NE-30	C-310
28	NE-150		C-90
29		C-750	
30	NE-110		C-70
31		C-310	
32	NE-70		C-10
33	C-30		NE-70
34	C-1500	NE-10	C-200
35	C-10	NE-110	C-300
36		NE-50	C-750
37	C-150		NE-90
38	C-90		NE-10
39	NE-50		C-110
41	NE-10		NE-110
45		NE-90	C-3500
SVM-01		SW-10	
SVM-02	SW-90		SW-10
SVM-03		SE-10	NW-200
SVM-04	SW-10		SW-110
SVM-05	SW-110		
SVM-06	SW-50		SE-10
SVM-07	SW-30		SW-50
SVM-08		SW-50	
SVM-09		NW-150	
SVM-10	NW-200		
SVM-11	NW-150	SW-150	
SVM-12	SE-10	SW-110	

Instrument No.	Sub 1	Sub 2	Sub 3
SVM-13	SW-200		SW-90
SVM-14		SW-90	
SVM-15		SW-70	
SVM-16	SE-50	SW-30	
SVM-17		SE-50	
SVM-18		SW-200	
SVM-19			SW-200
SVM-20	SW-150		SE-50
SVM-21		NW-200	
SVM-22	SW-70		SW-30
SVM-23			SW-70
SVM-24			SW-150

* = Reused sting from previous deployment

VMCM RECORD FORMAT

1. RECORD COUNTER (TIME)
The first 16 bits (4 characters) of data comprise the record number. The counter is incremented once each data record. The first record number is one and is used to initialize the instrument. The data and length of the first record may be invalid and should be ignored. Record two contains data for the first record interval. After 65535 records, the record counter will reset to zero and begin its normal counting.

2. NORTH VECTOR
Each vector is scaled from a 24 bit accumulator and stored in a 16 bit floating-point representation. This vector is the algebraic sum of the NORTH component of current flow from each sample.

3. EAST VECTOR
Each vector is scaled from a 24 bit accumulator and stored in a 16 bit floating-point representation. This vector is the algebraic sum of the EAST component of current flow from each sample.

4. ROTOR 2 (X CURRENT FLOW) (UPPER)
The rotor counts are an algebraic sum of the counts for a record interval. Rotor counts are scaled from a 24 bit accumulator and stored as a 16 bit floating number.

5. ROTOR 1 (Y CURRENT FLOW) (LOWER)
The rotor counts are an algebraic sum of the counts for a record interval. Rotor counts are scaled from a 24 bit accumulator and stored as a 16 bit floating number.

6. COMPASS
The compass field is an 8 bit 2's complement number (-128 to +128 decimal). The stored value is measured at the beginning of the last sample of the record interval.

7. TEMPERATURE
One temperature sample is taken just before the end of the last record interval.

Record interval = 2 seconds to 2 hours
Sample interval = .25 seconds to 2 seconds in quarter second steps

PREAMBLE/	TIME/	NORTH/	EAST/	R2/	R1/	COMPASS/	TEMP./	PARITY
(2)	(4)	(4)	(4)	(4)	(4)	(2)	(4)	(1)

(X) = Number of characters

Appendix C Subduction Brancker Temperature Recorders

Instrument No.	Sub 1	Sub 2	Sub 3
S-2418	SE-150		SE-70
S-2420	NW-750		SE-110
S-2421	NW-300		SW-130
S-2422	SE-400		SE-100
S-2423		SE-400	
S-2424	SE-200		SE-130
S-2425	SE-110		SE-300
S-2426	SE-750	NE-750	
S-2427	SW-130	NE-1500	
S-2428			SE-90
S-2429		SW-750	
S-2430		SW-400	
S-2431	NW-400		
S-2432	SE-130		SW-60
S-2433	SE-300		SE-200
S-2434	NW-130	SE-750	
S-2435	SW-300		SW-300
S-2436	SW-750		SE-80
S-2437	SW-400		SE-150
2533		C-400	NW-90
2534		C-80	
2535		NW-110	
2536		NW-90	
2537		C-100	NW-70
2538		C-130	
2539		NE-60	SW-80
2540		NW-100	
2541		C-60	NW-59
2542		NE-80	SW-580
3258	NW-100	SW-1500	
3259	SE-1500		NE-80
S-3260	NW-80	NE-300	NW-300
S-3261	NW-90	SE-80	
3262	NW-60	C-580	NW-1
3263		SW-80	
3265	NE-80	NE-130	C-100
3268	NE-580		
3269	NE-130	NW-80	
S-3270	SE-80		NW-300
3271	C-580		SE-1500
3272	NW-580		
3273	NW-1500		
3274	NE-60	NW-30	NW-100
S-3275			SE-750
S-3276		NW-300	
S-3277	NW-110	NW-400	
S-3278			NE-750
3279	SW-80	SE-60	C-1
3280	C-130	NE-100	C-130
S-3281			NE-1500
S-3282	SE-70	NW-750	

Instrument No.	Sub 1	Sub 2	Sub 3
3283	C-400		NE-1
S-3284	SE-100	NW-1500	
S-3285	NW-10	SW-60	
3286	NE-750		
3287	SW-1500		
3288	NE-100	NW-50	
3289	C-300		
3290	SE-580		
3291		SW-100	
S-3292			SW-750
3293	NE-1500		
S-3294	NW-50	SE-130	
S-3295			SW-400
3296	C-100	NW-60	
3297	SE-60		SW-1
S-3298	SE-90	NE-580	
3299		SW-580	
3300	NE-300		
S-3302			NE-400
3303	SW-100	SE-580	C-60
S-3304			NW-1500
3305	NE-400		SE-1
S-3306			NW-10
S-3307			NW-580
3308	C-80		
3309	C-60	NW-70	NW-111
S-3310		SW-130	
S-3311			NE-580
S-3312			SE-400
S-3313	NW-70	NW-130	
S-3314	SW-60		NW-400
S-3315	NW-30		
S-3316		NW-580	
3341	SW-580	SE-1500	NW-30
3506		C-1	
3507		NE-1	
3508		NW-1	
3662			C-580
3665		SW-1	NW-80
3704		SE-1	
S-3706		SE-90	
S-3707		SE-70	
S-3708		SE-200	NW-750
S-3709		NW-10	
S-3710		SE-110	NW-130
S-3711		NE-400	
S-3712		SE-300	
S-3713		SW-300	
S-3714		SW-100	
S-3715		SE-150	

Instrument No.	Sub 1	Sub 2	Sub 3
4481			SE-60
4482			NE-130
4483			SW-1500
4485			NE-100
4487			SW-100
4488			NE-60
4489			C-80
4490			SE-580
4491			C-400
4492			NW-50
4493			NE-300

Appendix D XBT Data

Expendable Bathythermographs were dropped on all the Subduction deployment and recovery cruises. Information on the times and positions, along with composite "waterfall" plots are included in the cruise report. Listed below with the ship and cruise is the reference for the technical report where this information can be found.

SUBDUCTION 1 — RV OCEANUS 240

Trask, Richard P. and Nancy J. Brink, 1993. The Subduction Experiment, Cruise Report, R/V *Oceanus* Cruise Number 240, Subduction 1 Mooring Deployment Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-12, UOP-93-1, 77 pp.

SUBDUCTION 2 — RV OCEANUS 250

Trask, Richard P., Nancy J. Brink, Lloyd Regier and Neil McPhee, 1993. The Subduction Experiment, Cruise Report, R/V *Oceanus* Cruise Number 250, Subduction 2 Mooring Deployment and Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-13, UOP-93-2, 102 pp.

SUBDUCTION 3 — RRS DARWIN 73

Trask, Richard P., William Jenkins, Jeffrey Sherman, Neil McPhee, William Ostrom and Richard Payne, 1993. The Subduction Experiment, Cruise Report, RRS *Darwin* Cruise Number 73, Subduction 3 Mooring Deployment and Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-18, UOP-93-3, 102 pp.

SUBDUCTION 4 — RV KNORR 138

Trask, Richard P., Nancy Galbraith, Paul Robbins, William Ostrom, Lloyd Regier, Glenn Pezzoli and Neil McPhee, 1993. The Subduction Experiment, Cruise Report, R/V *Knorr* Cruise Number 138 Leg XV, Subduction 4 Mooring Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-54, UOP-93-8, 94 pp.

Appendix E Underway Data Collection

Underway data gathered on the four Subduction cruises, varied depending on the ship. Meteorological data were always manually collected. Additional datasets are described in the four cruise reports referenced in Appendix 5.

Meteorological Observations

From the time the ship left port, manual meteorological observations were taken hourly on the hour. The manual observations consisted of recording the time, GPS position, ship's speed, ship's heading, wind speed and wind direction from the bridge readout, barometric pressure from the bridge, wet and dry bulb temperatures from a Bendix psychrometer, sea surface temperature from a bucket thermometer, cloud type, and visual cloud cover estimates. Relative humidity was computed using a conversion program on the MacIntosh computer.

On several of the cruises, when applicable, corresponding ship mounted IMET data displayed on the PC monitor were also recorded by hand or meteorological data from a shipboard IMET system mounted on the bow mast were recorded on optical disk. The IMET sensors included wind speed and direction, seawater temperature (made in the seawater intake of the main engine), barometric pressure, air temperature, relative humidity, precipitation and shortwave radiation. Minute data was logged to a dedicated PC with optical disk.

Acoustic Doppler Current Profiler

Velocity and temperature data were collected by an Acoustic Doppler Current Profiler mounted in the hull. See the following references for a list of data collected.

SUBDUCTION 2 — RV OCEANUS 250
Trask, Richard P., Nancy J. Brink, Lloyd Regier and Neil McPhee, 1993. The Subduction Experiment, Cruise Report, R/V *Oceanus* Cruise Number 250, Subduction 2 Mooring Deployment and Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-13, UOP-93-2, 102 pp.

SUBDUCTION 3 — RRS DARWIN 73
Trask, Richard P., William Jenkins, Jeffrey Sherman, Neil McPhee, William Ostrom and Richard Payne, 1993. The Subduction Experiment, Cruise Report, RRS *Darwin* Cruise Number 73, Subduction 3 Mooring Deployment and Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-18, UOP-93-3, 102 pp.

SUBDUCTION 4 - RV KNORR 138
Trask, Richard P., Nancy Galbraith, Paul Robbins, William Ostrom, Lloyd Regier, Glenn Pezzoli and Neil McPhee, 1993. The Subduction Experiment, Cruise Report, R/V *Knorr* Cruise Number 138 Leg XV, Subduction 4 Mooring Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-54, UOP-93-8, 94 pp.

Appendix F ALACE micro-temperature profiler

ALACE (Autonomous LAgrangian Circulation Explorer) is a freely drifting body that has been ballasted to be neutrally buoyant at a depth of about 400 meters. Periodically it pumps oil from an internal bladder to an external bladder, changing its displacement and causing it to rise to the surface. Any data taken during the previous dive is then relayed to shore using the ARGOS satellite system. Estimates of the average current experienced by the buoy while submerged are computed from ARGOS fixes of the buoy's positions at the start and end of a dive. The buoy remains at the surface transmitting for one day. After retracting the external bladder, it sinks back to its resting depth. Between 50 and 100 dive cycles can be repeated before the batteries are exhausted.

See the following references for information.

SUBDUCTION 2 — RV OCEANUS 250
Trask, Richard P., Nancy J. Brink, Lloyd Regier and Neil McPhee, 1993. The Subduction Experiment, Cruise Report, R/V *Oceanus* Cruise Number 250, Subduction 2 Mooring Deployment and Recovery Cruise, Woods Hole Oceanographic Institution Technical Report, WHOI-93-13, UOP-93-2, 102 pp.

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16. Abstract (Limit: 200 words)

An array of five surface moorings carrying meteorological and oceanographic instrumentation was deployed for a period of two years beginning in June 1991 as part of an Office of Naval Research (ONR) funded Subduction experiment. Three eight month deployments were carried out. The five mooring locations were 18°N 34°W, 18°N 22°W, 25.5°N 29°W, 33°N 22°W and 33°N 34°W.

Two Woods Hole Oceanographic Institution (WHOI) and three Scripps Institution of Oceanography (SIO) moorings collected oceanographic and meteorological data, using a 3-meter discus or 2-meter toroid buoy and multiple Vector Measuring Current Meters (VMCMs), an Acoustic Doppler Current Profiler (ADCP) and Brancker temperature recorders (tpods). The surface buoys carried a Vector Averaging Wind Recorder (VAWR) and, on four of the five moorings, an Improved Meteorological Recorder (IMET) which measured wind speed and wind direction, sea surface temperature, air temperature, short wave radiation, barometric pressure and relative humidity. The IMET also measured precipitation. The VMCMs, ADCP and tpods, placed at depths 1 m to 3500 m, measured oceanic velocities and temperatures.

This report presents meteorological and oceanographic data from the WHOI Upper Ocean Processes Group (UOP) and the SIO Instrument and Development Group (IDG) instruments and contains summaries of the instruments used, their depths, mooring positions, mooring deployment and recovery times, and data return. Appendices contain information on supplementary Subduction data sets.

17. Document Analysis a. Descriptors

1. Air-sea interaction
2. moored data
3. subduction

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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