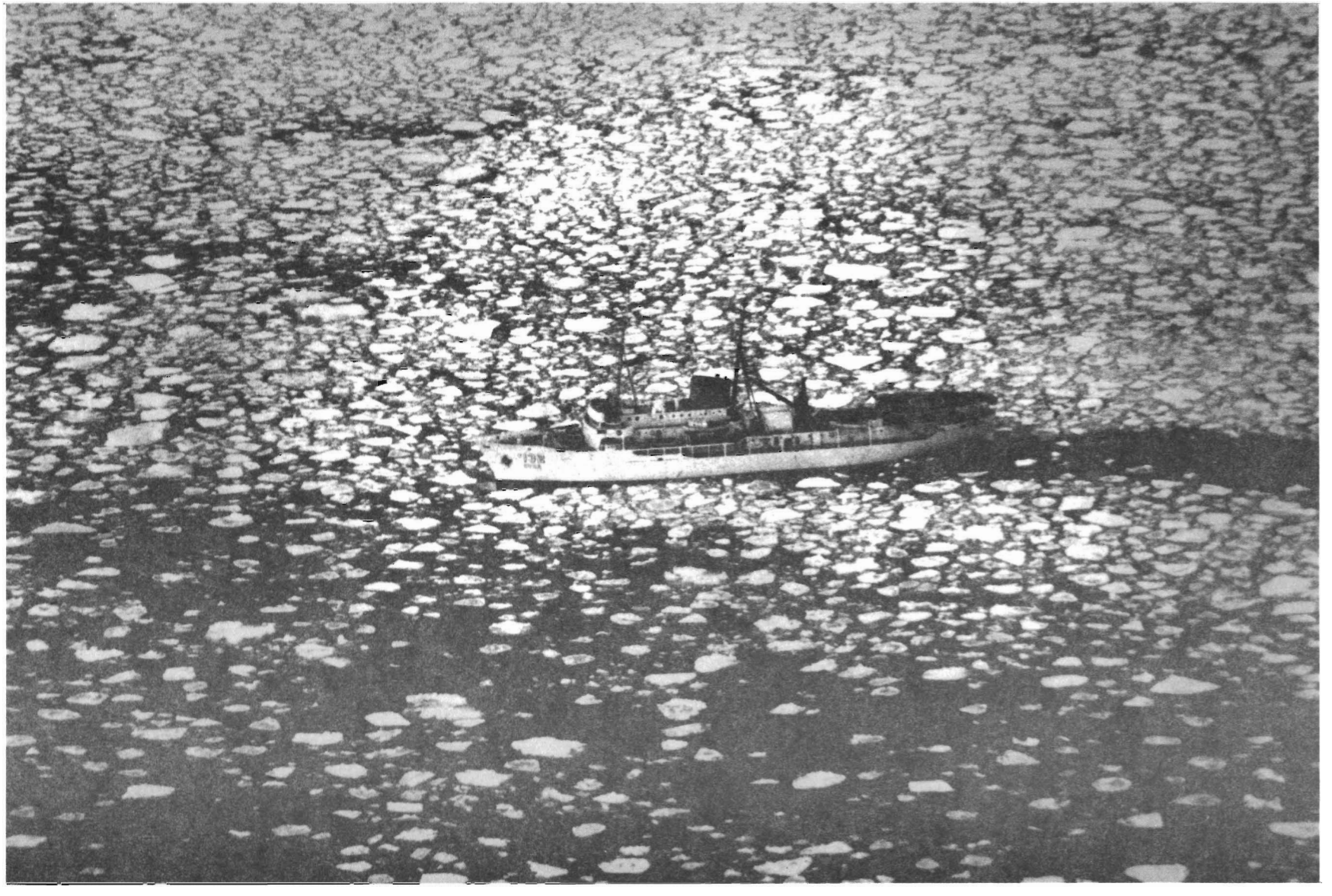
Bering Air-Sea-Ice Study (BASICS),

February and March 1981



Frontispiece. The NOAA Ship SURVEYOR in the Marginal Ice Zone of the Bering Sea, March 1981.

NOAA Technical Memorandum ERL PMEL-52

BERING AIR-SEA-ICE STUDY (BASICS), FEBRUARY AND MARCH 1981

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Seattle, Washington
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Bering Air-Sea-Ice Study (BASICS), February and March 1981

by

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ABSTRACT. An air-sea-ice interaction experiment was conducted in the eastern Bering Sea during late February and early March 1981. Observations of the atmospheric surface layer were made from a buoy anchored 100 km seaward of the ice edge, from a ship steaming in the marginal ice zone (MIZ), and from an instrumented tower erected 100 km into the ice pack. During typical off-ice wind conditions the atmospheric surface layer was found to warm and accelerate with passage over the MIZ. Observations of the atmospheric boundary layer made from sondes launched from the ship in the MIZ showed a gradual warming and rising of the mixed layer with off-ice winds. Oceanic profiles of density and temperature conducted from the ship indicated a homogeneous column seaward of the ice edge, a two-level system under the MIZ with a mixed layer of oceanic water lying below a cooler, fresher lens of water beneath the ice and a homogeneous column north of the MIZ. Near-surface current meter profiles conducted from the within-pack station verified the presence of a sub-ice logarithmic boundary layer. Wind tower and current meter measurements generated estimates of air and water drag coefficients for the ice of 3.09×10^{-3} at 10 m and 14.7×10^{-3} at -2 m, respectively. The ice floes in the vicinity of the station were tracked for about 2 weeks until they reached the ice edge and melted. Tidal forces were seen to be an important component in the motion of ice floes. Floes were also observed to accelerate as they approached the ice edge.

1. INTRODUCTION

The Bering Air-Sea-Ice Study (BASICS) was conducted during February and March 1981 from the NOAA Ship SURVEYOR (Frontispiece) in the eastern Bering Sea (Fig. 1). BASICS was designed to study the physical oceanographic, meteorological, and other physical quantities which determine the structure, position, and rate-of-advance of the marginal ice zone (MIZ) of the seasonal Bering Sea ice pack and the feedback of ice conditions to the surrounding environment.

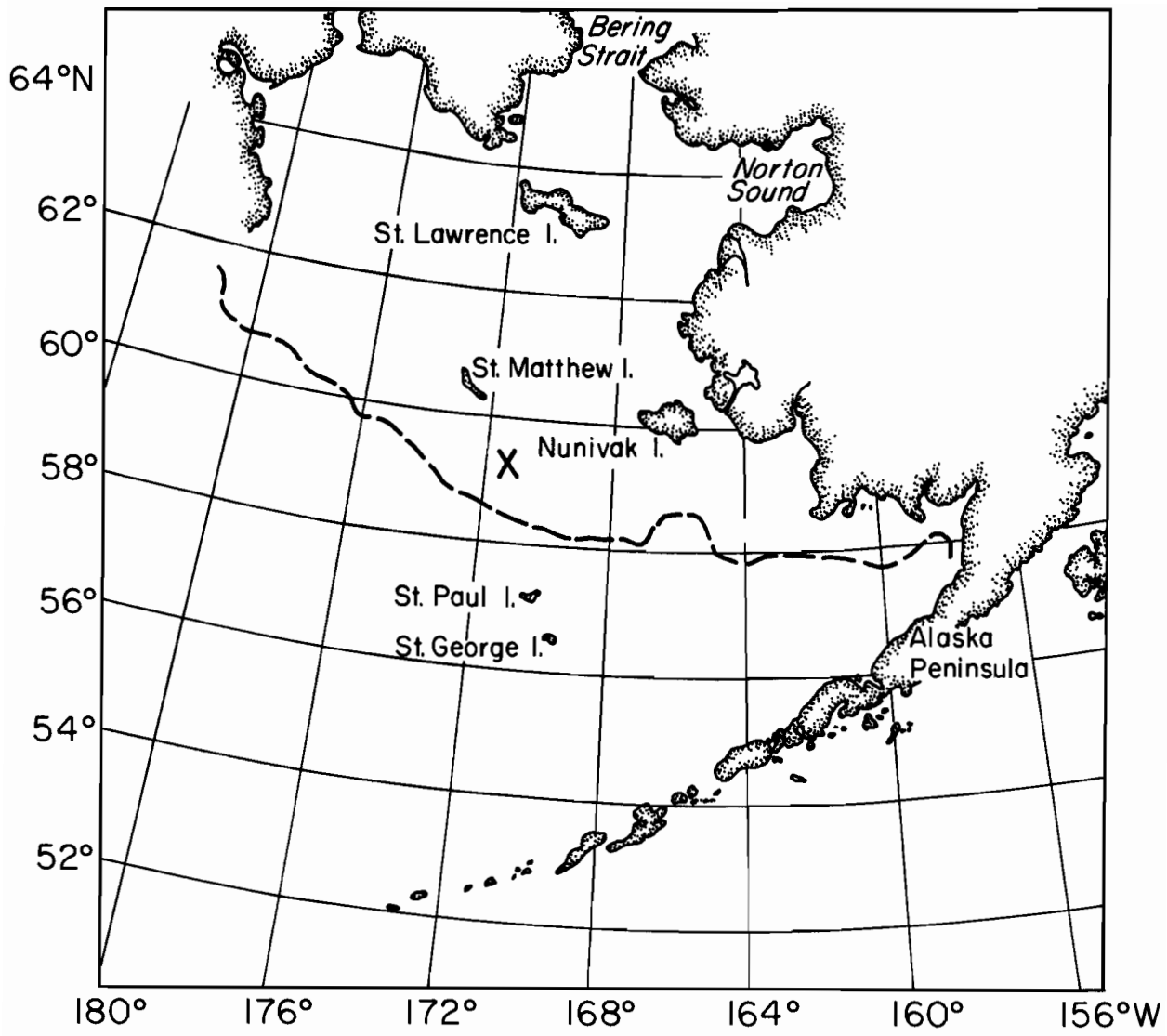


Figure 1. The Bering Sea and surrounding regions. A dashed line marks the approximate position of the ice edge. An X marks the site of the main camp deployment.

BASICS 81 was the third in a series of experiments performed by the Pacific Marine Environmental Laboratory addressing the dynamics of the Bering Sea ice pack. In the late winter of 1979 observations taken aboard the NOAA Ship SURVEYOR during a cruise to the eastern Bering Sea addressed the role of wind in advecting ice floes to the ice edge, the melting of ice at the edge, and the modification of cold, continental air flowing over the ice edge (Salo, *et al.*, 1980; Pease, 1980). The physical division of the ice edge into three distinct zones - edge, transition, and interior - was discussed by Bauer and Martin (1980). The following year an ice drift experiment was conducted in the northeastern Bering Sea to examine the relative roles of wind and current in ice floe advection (Pease and Salo, 1981).

Findings from these and other experiments led to the formulation of BASICS 81 and its goals:

1) evaluation of wind and current stress on thin, first-year sea ice by profile and slab methods,
2) observation of ice floe motion near the edge to determine the relative importance of wind, current, and swell to drift characteristics,
3) measurement of water property changes relative to sea ice conditions,
4) observation of the modification of the atmospheric boundary layer by the marginal ice zone and the adjacent water during off-ice winds,
5) radiometric observations of downward shortwave and longwave radiation near the ice edge to tie heat flux estimates to changes in the surface conditions of the ice,

6) collection and culture of phytoplankton endemic to the water and ice along the marginal ice zone.

Elements of goals 2 and 3 and all of goals 5 and 6 were performed by investigators from other institutions and will not be discussed in this report.

The experiment was carried out from February 26 through March 10, 1981. The following sections discuss in more detail the planned PMEL measurements, the platforms involved, and the actual measurements carried out, the results of the experiment, and a discussion of the results of BASICS with respect to the air-sea-ice system of the southeastern Bering Sea.

2. EXPERIMENT

Table 1 lists measurements planned for BASICS. With some modifications the measurements outlined in Table 1 were carried out. These modifications were caused by the passage of a severe storm (Fig. 2) on February 27, shortly after the ship had arrived in the operations area. The high wind and sea from the storm delayed deployment of the anchored meteorological buoy, and the accompanying swell caused a rapid destruction of ice floes and a general northward retreat of the MIZ (Fig. 3). Cold, northeasterly winds followed the storm, helped to refreeze the small fractured floes into larger ones, and resumed the southward floe drift (Fig. 4). The approximate locations of the ice edge before, during, and after the storm are portrayed in Figure 3. During this storm, observations were limited to experiments aboard ship - CTD's, boundary-layer sondes, and surface meteorological measurements. The meteorological buoy was deployed the day after the storm

Table 1. Measurements Planned for BASICS, 1981

1. Station 1 - Main Camp	Measurement	Sample Period	Data Medium
LORAN C	Position	20 min	Tape
GEM Platform	Level 1 speed, temperature	30 min	GOES
" "	Level 2 speed, temperature	"	"
" "	Level 3 speed, temperature	"	"
" "	Level 4 speed, temperature	"	"
" "	Level 4 direction	"	"
" "	Orientation	"	"
" "	Ice temperature	"	"
ARGOS platform	Position	≅4 hour	ARGOS
PMEL profiler	Detailed water profile	variable	Hard copy
Aanderaa CM	-2, -6 m CTV	10 min	Tape
2. Station 2			
GEM Platform	3 m wind speed, dir, temp.	20 min	GOES
" "	6 m wind speed, dir, temp.	"	"
" "	6 m vector winds	"	"
" "	6 m gust	"	"
" "	Ice temperature	"	"
" "	Orientation	"	"
ARGOS Platform	Position	≅4 hourly	ARGOS
Aanderaa CM	-2, -6 m CTV	10 min	Tape
3. Station 3			
GEM Platform	3 m wind speed, dir. temp.	20 min	GOES
" "	6 m wind speed, dir, temp.	"	"
" "	6 m vector winds	"	"
" "	6 m gust	"	"
" "	Ice temperature	"	"
" "	Orientation	"	"
ARGOS Platform	Position	≅4 hourly	ARGOS
Aanderaa CM	-2, -6 m CTV	10 min	Tape
4. Station 4			
PRL platform	Position	≅4 hourly	ARGOS
5. SURVEYOR			
CTD	Ocean profile	variable	7 track tape
Bridge observations	Surface meteor.	hourly	Hard copy
AIRSONDE	Atmos. profile	12 hours	Casette
Ocean Bucket Temp.	Surface temperature	hourly	Hard copy
6. Meteorological Buoy			
GEM3	Mean wind speed, dir	20 min	GOES
	Vector winds	"	"
	Gust, orientation	"	"
	Air, water temperature	"	"

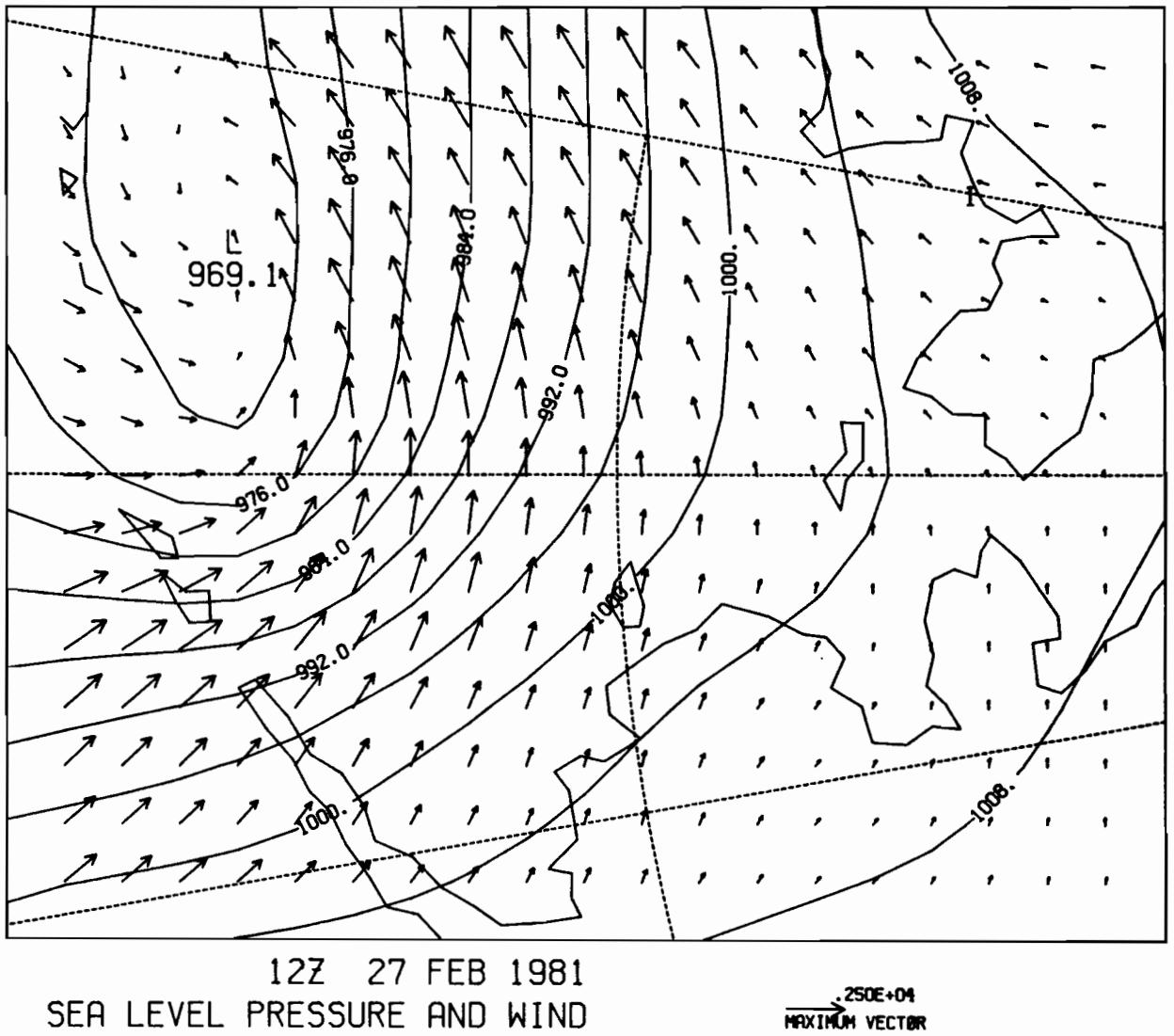


Figure 2. Sea level pressure (mb) and model-generated surface winds (m s^{-1}) for the Bering Sea, 12 GMT 27 February 1981.

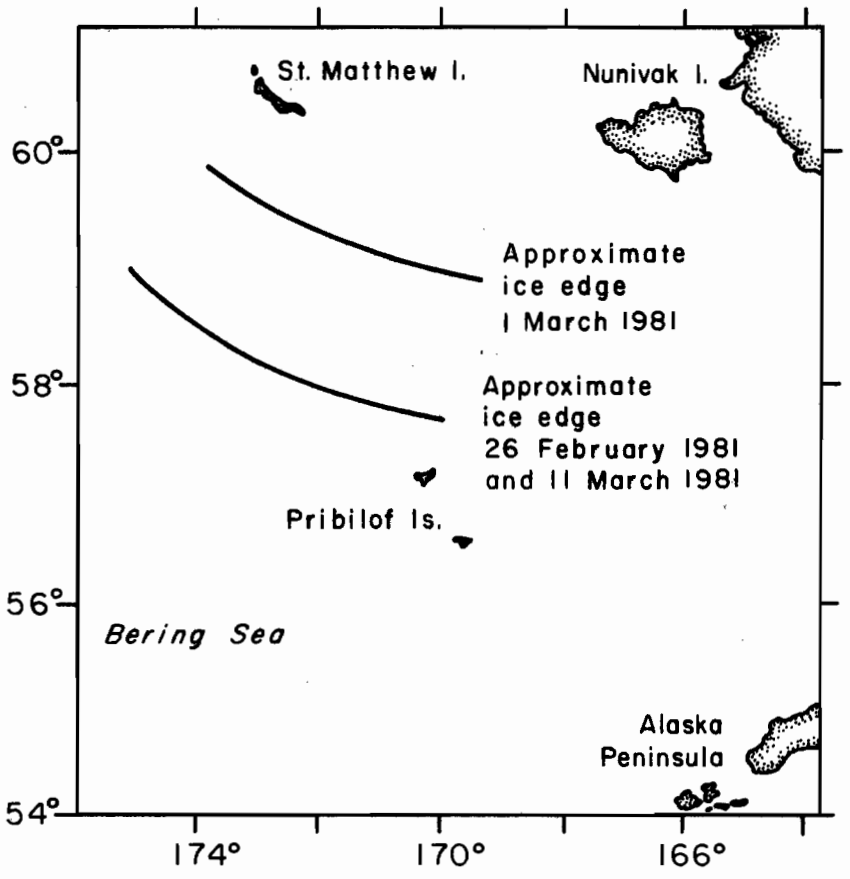


Figure 3. Approximate location of the ice edge before, during, and after the storm of Feb. 27-Mar. 1.

Figure 4. IR satellite image of the Bering and Chukchi Seas, 1920 GMT, 5 March (JD 64) 1981.

passed, and satellite (ARGOS) telemetering position buoys were installed within the pack several days after. The main camp containing the atmospheric and oceanic surface layer profiling equipment and ARGOS buoy was installed on the sixth of March. Because of the delay due to the storm, it was not feasible to install the GEM platforms or current meters at stations 2 and 3 (Table 1). All equipment was recovered by the tenth of March except for the three ARGOS ice buoys which were allowed to drift to the edge of the MIZ and sink when the floes melted. A chronology of the experiment is contained in Table 2. Table 3 lists a summary of data products gathered from each platform.

2.1 Shipboard Experiments

The NOAA Ship SURVEYOR served as the working platform for CTD profiling of the ocean, for airsonde profiling of the atmospheric boundary layer, and for observing both atmospheric and oceanic surface layer properties. The ship also served as a staging area for the deployment of the meteorological buoy and for the installation of the main camp within the MIZ. A plot of the ship's track during BASICS is presented in Figure 5.

2.1.1 CTD (Conductivity - Temperature - Depth) Profiling of the Ocean

A major objective of BASICS was to determine the oceanic temperature and salinity distributions associated in mid-winter with the Bering Sea MIZ. To accomplish this goal, 64 CTD casts (Fig. 6; Table 4; Appendix A) were taken in the MIZ from 26 February to 11 March, 1981 (GMT). An initial single cast (#1, Table 4) was performed at the onset of the cruise in the northern Gulf of Alaska off Unimak Pass in order to check CTD operation and to calibrate other equipment against the CTD. Of the 64 total casts, 23

TABLE 2. Chronology of BASICS, 1981

Date	Time (GMT)	Event
February 22	2000	Depart Kodiak aboard NOAA Ship SURVEYOR.
23	0100	Commence atmospheric boundary layer (ABL) twice daily observations.
	2330	Conduct test of ship's CTD.
26	1300	Commence CTD operations.
	2230	Helicopter reconnaissance of MIZ.
27	1330	Storm curtails operations, fractures MIZ.
March 1	0630	Meteorological buoy deployed.
	0900	Recommenced CTD operations.
	2100	Helicopter reconnaissance of MIZ.
2	0000	Helicopter reconnaissance of MIZ.
	2300	Helicopter reconnaissance, manual. atmospheric and oceanic measurements within MIZ.
3	1930	Helicopter reconnaissance of MIZ.
4	2100	Helicopter reconnaissance, manual atmospheric and oceanic measurements within MIZ.
6	0100	Helicopter deployment of three ARGOS ice buoys.
7	0400	Main camp atmospheric profile tower deployed.
	0500	Begin downwind ABL transect of MIZ.
	1130	End downwind ABL transect of MIZ.
	2000	Current meter array and position buoy at main camp deployed.
9	0000	Conduct manual oceanic measurements at main camp.
10	0000	Meteorological buoy recovered.
	2300	Main camp recovered.
11	0300	Begin downwind ABL; CTD transect of MIZ.
	0900	End downwind transect, final CTD cast.
12	0000	Final ABL sonde ascent.
14	0000	ARGOS ice buoys melt out of MIZ.
	1930	Arrive Kodiak aboard NOAA Ship SURVEYOR.

Table 3
BASICS 1981

DATA PRODUCTS SUMMARY

PLATFORM: NOAA Ship SURVEYOR

DATA PRODUCT	GREENWICH MEAN TIME FEBRUARY: 22 23 24 25 26 27 28 | MARCH: 1 2 3 4 5 6 7 8 9 10 11 12 13 14	COMMENTS
Ship's Weather Log		hrly; cloud, wind, temp, humid, sea state, pres
Ship's Marine Obs and Station Obs		time, position, record of events
In-line Seawater Analysis		half-hrly; temp, salinity
Bucket Seawater Analysis		hrly; temp, salinity
Barograph Trace		continuous; sea level pressure
Ship's Anemometer Trace		continuous; relative wind speed and dir
Ship's Gryo Trace		continuous; ship's heading
Airsonde Ascents		00 and 12 Z; sfc to 500mb; pres, temp, humid
CTD Observations		SAI; 64 casts; cond, temp, depth

PLATFORM: GOES Environmental Monitor Buoy

GEM Buoy		58°15'N, 173°29'W; 20 min aver; wind spd, gust, temp, sea temp

TABLE 3 (cont'd)
BASICS 1981

DATA PRODUCTS SUMMARY

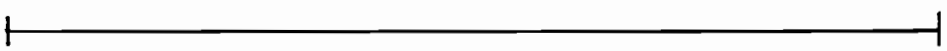
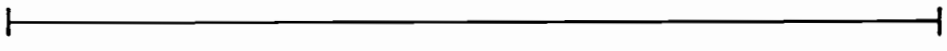
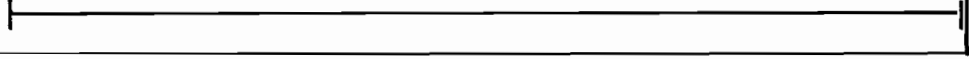
PLATFORM: Bering Sea Ice Pack

DATA PRODUCT	GREENWICH MEAN TIME FEBRUARY: 22 23 24 25 26 27 28 — MARCH: 1 2 3 4 5 6 7 8 9 10 11 12 13 14	COMMENTS
Floe Position Unit 2309		74 fixes; longest int between fixes: 10 hrs
Floe Position Unit 2310		71 fixes
Floe Position Unit 2311		67 fixes
Floe Position Unit 2312		26 fixes; 24 fixes at main camp
Ocean Sfc Layer Profiles (Manual)		to 15m by 1/2 m; 10 min aver; vel, cond, temp, pres
Ocean Sfc Layer Profiles (Auto)		2, 6m; 10 min aver; vel, cond, temp, pres
Atmos Sfc Layer Profiles		.75, 1.5, 3, 6m; 20 min aver; vel, temp
Sfc Weather Log		every 10 min; wind vel, temp, humid
LORAN-C Floe Position		LORAN, x, y, z freq; 5 min intervals
Small-scale Floe Motion		1/2-hrly positions; 4 buoys over 5 km; 2 buoys over 5 km

TABLE 3 (cont'd)
BASICS 1981

DATA PRODUCTS SUMMARY

PLATFORM: Shore-based Support

DATA PRODUCT	GREENWICH MEAN TIME FEBRUARY: 22 23 24 25 26 27 28 | MARCH: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	COMMENTS
Alaska Sfc Pressure Analysis		00 and 12 Z
Alaska Special Sea-level Analysis		00 Z; pres and temp fields
Alaska Satellite Photos		daily (19 Z); IR

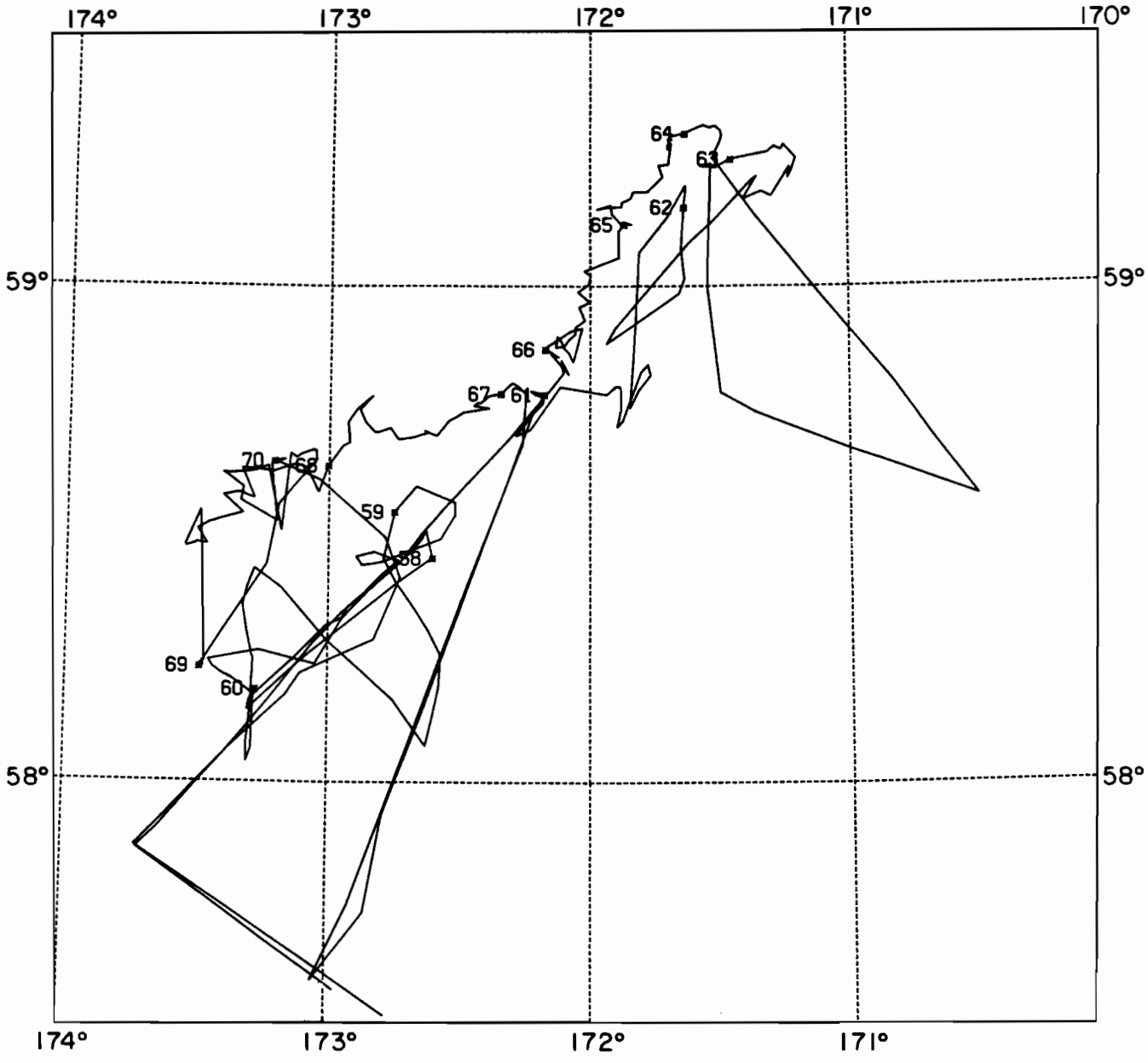


Figure 5. Hourly positions occupied by the NOAA Ship SURVEYOR during BASICS. The daily ØØ GMT positions are labeled with their Julian day.

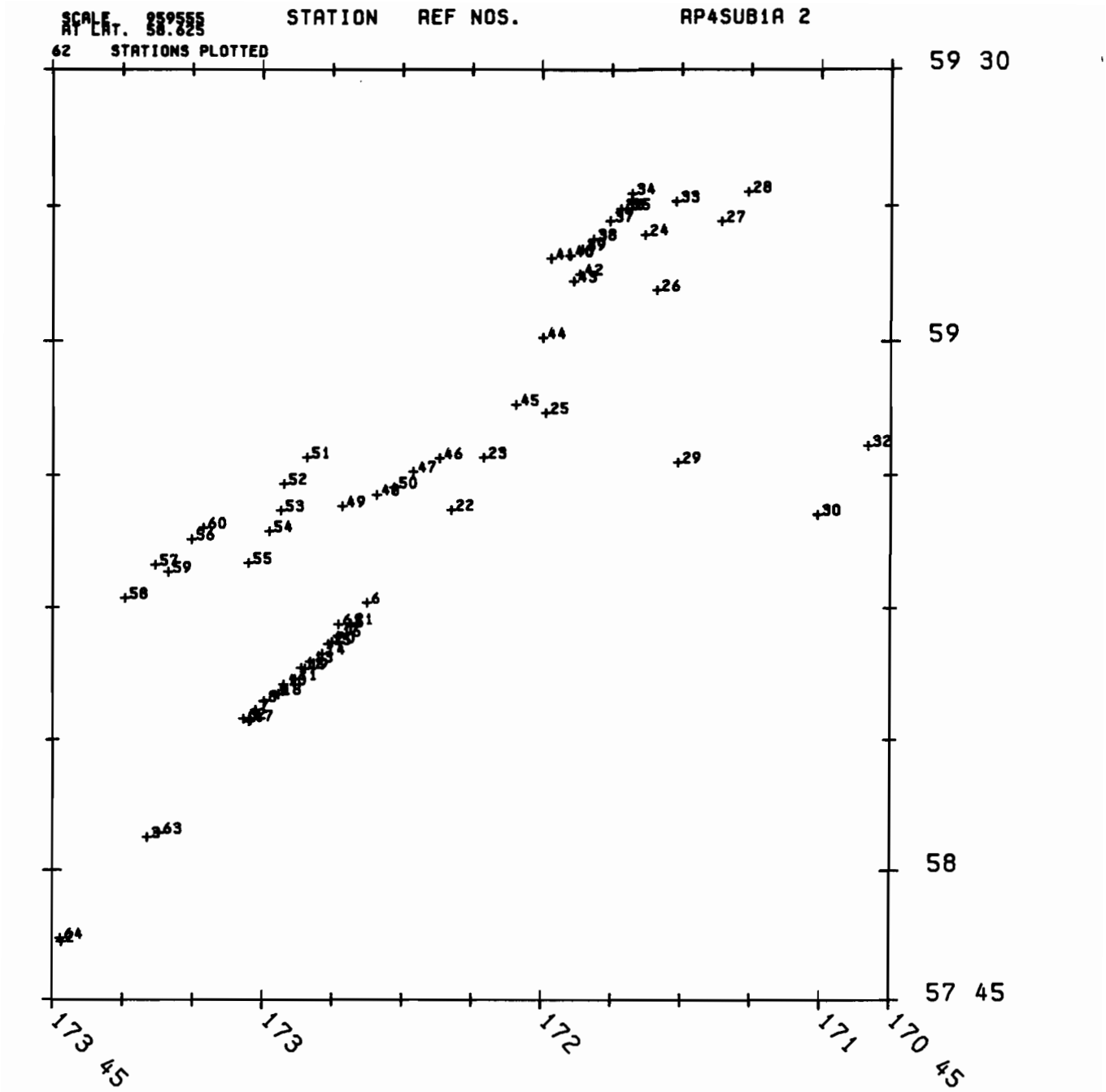


Figure 6. Locations of CTD casts during the experiment. Casts 1 and 31 are off the map.

Table 4

LIST OF CTD CASTS
23 February-11 March, 1981 (GMT)

Consecutive Cast #	Latitude (N)	Longitude (W)	Date (GMT)	JD (GMT)	Hour (GMT)	Bottom Depth (m)	Assigned Sta. #
1	55-36.3	158-59.7	2-23	54	2333	114	
2	57-51.7	173-43.0	2-26	57	1315	136	19
3	58-03.8	173-24.7	"	"	1610	113	18
4	58-17.1	173-02.9	"	"	1921	112	17
5	58-27.9	172-41.1	"	"	2116	109	BC24
6	58-30.6	172-37.6	"	"	2255	108	
7	58-18.4	173-01.5	2-27	58	0642	111	
8	58-19.4	172-59.7	"	"	0724	111	
9	58-20.1	172-57.3	"	"	0811	111	
10	58-21.3	172-55.5	"	"	0857	112	
11	58-21.9	172-53.1	"	"	0937	111	
12	58-23.2	172-51.7	"	"	1023	112	
13	58-23.9	172-49.8	"	"	1054	110	
14	58-24.8	172-47.2	"	"	1135	110	
15	58-25.9	172-45.9	"	"	1235	108	
16	58-26.8	172-43.8	"	"	1323	108	
17	58-17.2	173-02.6	3-1	60	0916	111	
18	58-20.2	172-56.6	"	"	1012	112	
19	58-23.1	172-50.9	"	"	1059	110	
20	58-26.1	172-45.1	"	"	1146	108	
21	58-28.2	172-41.1	"	"	1224	108	
22	58-41.1	172-19.6	"	"	1846	104	16
23	58-47.0	172-12.6	"	"	2200	101	BC23
24	59-11.9	171-37.9	3-2	61	2237	82	
25	58-52.0	171-59.2	3-3	62	0631	96	BC23
26	59-05.7	171-35.3	"	"	0827	83	
27	59-13.3	171-21.4	"	"	1048	81	
28	59-16.6	171-15.7	"	"	2037	78	BC22
29	58-46.5	171-30.8	3-4	63	0619	91	
30	58-40.6	171-00.7	"	"	0817	82	
31	58-34.9	170-30.7	"	"	1011	79	
32	58-48.3	170-49.9	"	"	1151	79	
33	59-15.5	171-31.2	"	"	1505	81	
34	59-16.4	171-40.7	3-5	64	0244	81	
35	59-14.7	171-41.8	"	"	0603	80	
36	59-14.7	171-43.1	"	"	0637	80	
37	59-13.4	171-45.4	"	"	0842	80	
38	59-11.4	171-49.0	"	"	1030	83	
39	59-10.3	171-51.4	"	"	1232	84	
40	59-09.6	171-54.0	"	"	1448	85	
41	59-09.3	171-58.1	"	"	1648	85	
42*	59-07.5	171-51.9	"	"	2045	86	
43*	59-06.7	171-53.2	3-6	65	0049	79	
44*	59-00.4	171-59.8	"	"	0449	93	
45*	58-52.9	172-05.6	"	"	1244	97	

*Temperature record only, due to icing of conductivity cell.

Table 4 (cont'd)

Consecutive Cast #	Latitude (N)	Longitude (W)	Date (GMT)	JD (GMT)	Hour (GMT)	Bottom Depth (m)	Assigned Sta. #
46	58-46.9	172-22.1	3-8	67	0037	102	
47	58-45.4	172-27.7	"	"	0442	104	
48	58-42.8	172-35.6	"	"	0915	106	
49	58-41.3	172-43.0	"	"	1230	108	
50	58-43.6	172-51.8	"	"	1654	112	
51	58-47.0	172-50.5	"	"	1913	110	
52	58-44.0	172-55.5	"	"	2029	112	
53	58-40.6	172-56.1	"	"	2200	112	
54	58-38.7	172-58.6	"	"	2340	113	
55	58-35.1	173-03.0	3-9	68	0100	114	
56	58-37.8	173-15.3	"	"	0438	119	
57	58-34.9	173-23.1	"	"	0845	122	
58	58-31.1	173-29.6	"	"	1232	123	
59	58-34.1	173-20.3	3-10	69	1940	121	
60	58-39.1	173-12.8	"	"	2348	119	
61	58-28.1	172-43.7	3-11	70	0236	108	BC24
62	58-17.4	173-04.1	"	"	0513	112	17
63	58-04.3	173-22.2	"	"	0703	113	18
64	57-52.1	173-43.3	"	"	0851	137	19

were calibrated against temperature and salinity values obtained using a rosette sampler, reversing thermometers, and a Guildline laboratory salinometer.

The CTD system included a Plessey Model 9040 unit, a Grundy Model 8700 Signal Processor, a frequency counter, and a 9-track digital data recorder. The frequency counter provided a real-time check on CTD performance at the beginning and end of each cast. After about every fifth cast, the digital data were copied onto a master data tape using the PDP-11 computer system to generate a data printout for each cast. This printout allowed monitoring of the oceanographic conditions in the field and check of CTD performance. The analog recorder provided with the Plessy system did not perform well during the cruise; most traces were extremely noisy, though they were adequate for determination of the general temperature and salinity structure on a given cast.

The CTD channels were last calibrated in July 1980 giving temperature to ±0.01°C, conductivity to ±0.013 mMho/cm (roughly equivalent to salinity to ±0.02°/$_{oo}$ at low temperatures), and pressure to ±70 mb. At ambient air temperatures below about -8°C, the conductivity head on the CTD unit iced up and gave invalid conductivity values (casts #42-45). A heat lamp directed at the conductivity head between casts solved the problem by maintaining conductivity head temperatures above freezing while the unit was on deck. In addition, there may have been a problem with the response of the conductivity cell during rapid changes in temperature at the thermocline, which caused small spikes in the computed salinity. These features appear in many of the profiles, typical examples being casts 9 and 46.

Appendix A contains the CTD data gathered during BASICS.

2.1.2 AIRSONDE Profiling of the Atmospheric Boundary Layer

Soundings of the air temperature, humidity, and pressure were made at regular intervals while the ship was at the ice edge. These data, in conjunction with other soundings around the Bering Sea, helped relate the locally measured air stress to the synoptic scale pressure and velocity fields. Such comparisons also allowed evaluation of regional variations in boundary-layer height and free-stream velocity during the experimental period. Downwind transects documented the rate of growth of the atmospheric mixed layer as the cold air passed over the warm water. The system used was that of the Atmospheric Instrumentation Research, Incorporated, and consisted of aerodynamically shaped observing and transmitting devices called AIRSONDES, 100-gm helium-inflated balloons, a receiving antenna, and a ground station. The AIRSONDE transmitted pressure, temperature, and wet bulb temperature every ten seconds. This information was recorded on digital cassette tapes with an HP-9830A computer system which was also used for preliminary analysis of each sounding.

The AIRSONDES were launched every 12 hours at 0000 and 1200 GMT, synoptic with the National Weather Service (NWS) upper air sounding program. In addition, two transects were made downwind from the MIZ, one on March 7 (ascents 21 through 27) and the second on March 11 (ascents 34 through 37). Before launching, the sondes were allowed to equilibrate with the ambient atmospheric conditions at the ship, and comparison measurements were made between the sonde and a Negretti and Zambia precision digital barometer and a spring-aspirated Assmann psychrometer. The time, location, and surface weather conditions of the 38 soundings made during BASICS are listed in Table 5. A detailed discussion of the measurements and the background weather can be obtained from Lindsay and Comiskey (1982). The actual profiles are presented in their Appendix D.

Table 5. TIME, LOCATION, AND SURFACE WEATHER CONDITIONS FOR BASICS AIRSONDE ASCENTS

ID	DAY	TIME (GMT)	LAT (°,')	LONG (°,')	WIND DIR (°T)	WIND SPD (KTS)	AIR TEMP (°C)	WET TEMP (°C)	AIR PRES (MB)	CLOUD COVER
1	23 FEB	0116	57 08.9	152 31.8	149	5	4.2	3.0	1003.8	3/10 CU & CIRRUS
2	25 "	1200	55 08.7	166 48.5	174	17	3.2	2.6	985.6	BROKEN
3	25 "	2330	56 32.7	170 19.0	005	21	-4.1	-4.6	988.2	OVERCAST, STRATO CU
4	26 "	1145	57 45.3	173 25.3	006	11	-9.1	-9.7	998.9	OVERCAST, SNOWING
5	26 "	1903	58 17.0	173 03.3	047	7	-10.7	-11.2	1000.5	OVERCAST, SNOWING
6	26 "	2330	58 29.0	172 37.1	003	7	-11.8	-12.0	1001.5	8/10 STRATO CU
7	27 "	1152	58 25.0	172 48.1	070	25	-6.5	-7.1	990.1	OVERCAST
8	27 "	2328	58 34.4	172 43.9	100	30	0.8	0.2	968.1	OVERCAST
9	28 "	1128	58 26.8	173 15.1	115	22	0.8	0.4	970.2	CLEAR, STARRY
10	01 MAR	1134	58 25.7	172 45.6	115	14	3.3	1.1	970.8	CLEAR, STARRY
11	01 "	2330	58 47.4	172 11.7	140	16	1.3	0.6	970.9	CLEAR
12	02 "	1135	58 44.1	171 53.0	171	30	0.3	-0.1	979.0	2/10 CUMULUS
13	02 "	2335	59 11.0	171 38.9	182	24	0.5	-0.5	989.0	5/10 CUMULUS
14	03 "	1132	59 12.0	171 22.8	148	17	-1.7	-1.7	998.0	OVERCAST
15	03 "	2334	59 15.2	171 23.1	-	0	-1.2	-1.7	997.3	FOG
16	04 "	1130	58 47.5	170 48.4	105	18	-1.2	-1.7	992.4	CLEAR, STARRY
17	05 "	1138	59 10.9	171 50.3	015	16	-7.5	-8.0	997.4	OVERCAST
18	05 "	2358	59 07.5	171 52.1	356	20	-12.6	-12.9	998.3	8/10 CU & SEA SMOKE
19	06 "	1201	58 53.9	171 05.1	010	17	-14.0	-14.4	998.4	OVERCAST
20	06 "	2330	58 42.5	172 10.3	003	12	-13.0	-13.2	997.0	OVERCAST, STRATO CU
21	07 "	0512	58 49.6	172 09.5	010	17	-10.5	-11.8	996.5	OVERCAST
22	07 "	0600	58 44.9	172 12.8	026	12	-10.2	-10.7	996.8	OVERCAST, SNOWING
23	07 "	0700	58 35.9	172 19.3	025	12	-9.6	-9.8	996.9	OVERCAST, SNOWING
24	07 "	0755	58 23.4	172 28.5	019	16	-7.8	-7.7	997.0	OVERCAST, SNOWING
25	07 "	0900	58 10.7	172 37.4	036	13	-6.0	-6.2	996.7	OVERCAST
26	07 "	1001	57 57.9	172 46.3	029	15	-6.5	-7.0	996.8	OVERCAST
27	07 "	1130	57 39.1	172 59.0	018	12	-5.5	-6.3	996.3	OVERCAST, LIGHT SNOW
28	07 "	2330	58 47.7	172 20.6	040	11	-6.8	-7.0	997.1	OVERCAST
29	08 "	1252	58 41.4	172 44.5	050	25	-1.1	-1.5	991.8	OVERCAST, SNOWING
30	09 "	1130	58 31.7	173 25.4	013	30	-9.5	-9.8	994.2	OVERCAST
31	09 "	2331	58 14.2	173 30.3	005	28	-8.1	-8.6	992.2	OVERCAST
32	10 "	1128	58 38.2	173 02.4	048	21	-5.0	-5.2	997.3	OVERCAST, LIGHT SNOW
33	10 "	2334	58 39.1	173 12.5	045	18	-8.0	-8.2	1002.8	OVERCAST, SNOW
34	11 "	0308	58 24.8	172 43.6	045	16	-6.3	-6.8	1002.0	OVERCAST
35	11 "	0548	58 12.5	173 09.7	045	18	-6.1	-6.3	1001.1	OVERCAST
36	11 "	0729	58 02.2	173 26.5	046	19	-3.0	-3.5	1000.5	OVERCAST
37	11 "	0902	57 51.0	173 40.0	054	21	-2.8	-3.1	1000.0	OVERCAST
38	11 "	2342	56 11.1	169 13.6	056	22	2.2	1.2	986.2	8/10 STRATO CUMULUS

2.1.3 Atmospheric and Oceanic Surface Layer Properties

During operations in the MIZ, hourly measurements and observations of air temperature, wet-bulb temperature, sea-level pressure, wind speed and direction, cloud cover, sea state, and sea-surface temperature were logged by the ship's quartermasters. Wet and dry bulb air temperatures (Fig. 7) were made from the windward bridge wing (10 m above sea level) using a standard NWS-type sling psychrometer; sea-level pressure was determined from an aneroid barometer corrected to sea level and calibrated by the NWS in January 1981. Wind speed and direction were monitored by selectable port and starboard aerovanes located on the ship's main mast at 27 m above sea level (Fig. 7). Sea-surface temperature was measured in two ways: using over-the-side bucket casts with precision mercury-in-glass thermometers, and by the in-line sea-water intake system. Appendix B contains the hourly observations recorded from the bridge of the SURVEYOR.

2.2 Off-ice buoy

In order to measure the surface meteorological conditions approximately 100-km downwind of the ice edge, a meteorological buoy (Fig. 8) was deployed during BASICS in 110 m of water at 58°14.6'N, 173°28.6'W. This buoy transmitted its data to the western Geostationary Orbiting Environmental Satellite (GOES), and was called a GOES Environmental Monitor (GEM). The buoy was a sphere approximately 1 m in diameter with weights attached underneath to keep it vertical and thereby minimize motion of the wind sensors (Reynolds, 1983). Wind and air temperature sensors at 3 m above sea level were affixed to a mast extending vertically from the GEM buoy. A 20-minute average of the wind speed was taken every half hour. Nominal vector averages of wind velocity are taken by combining high frequency

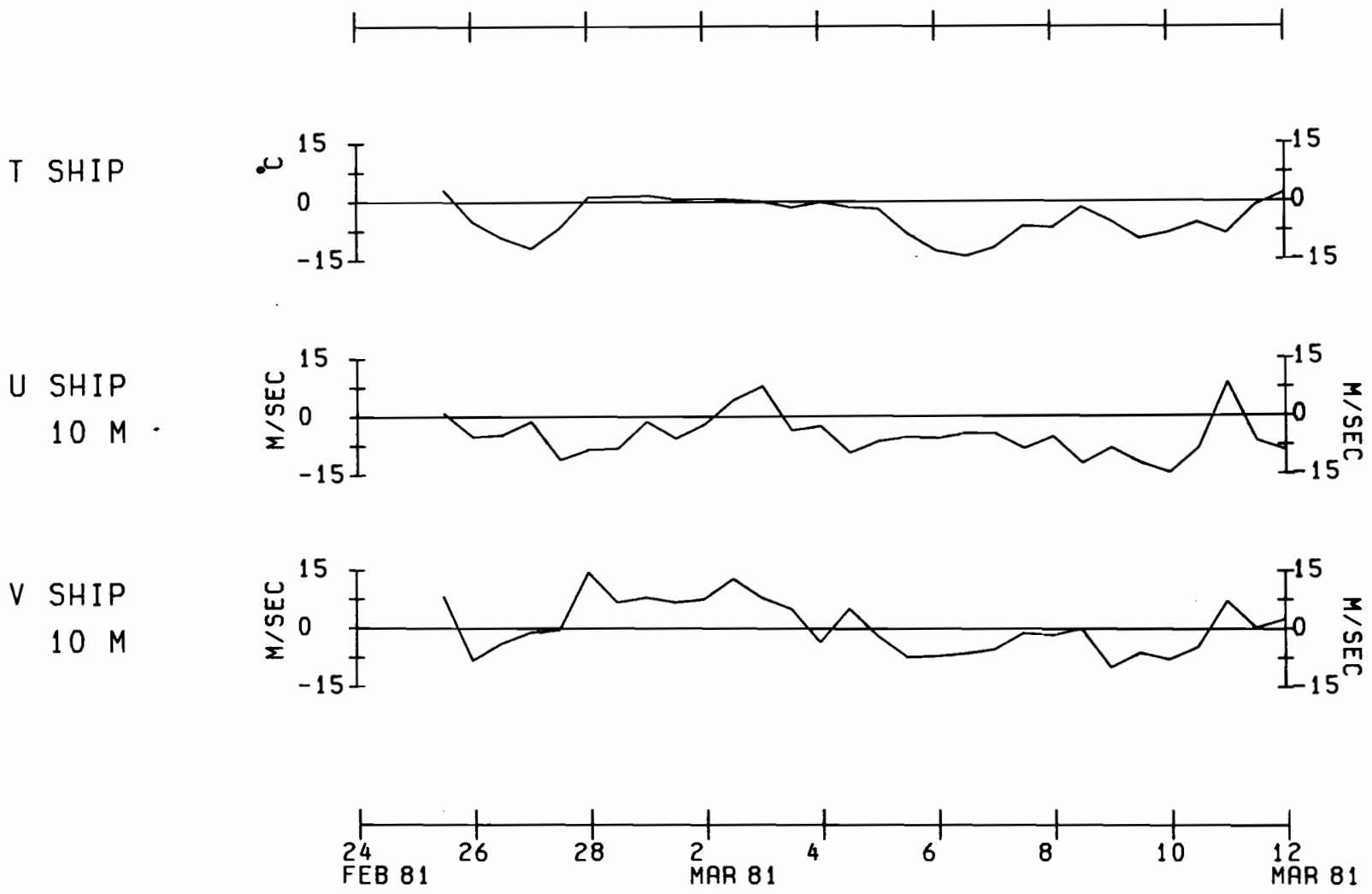


Figure 7. Hourly observations of the dry-bulb air temperature from the bridge level and the east and north components of the wind velocity adjusted to 10 meters from the NOAA Ship SURVEYOR.

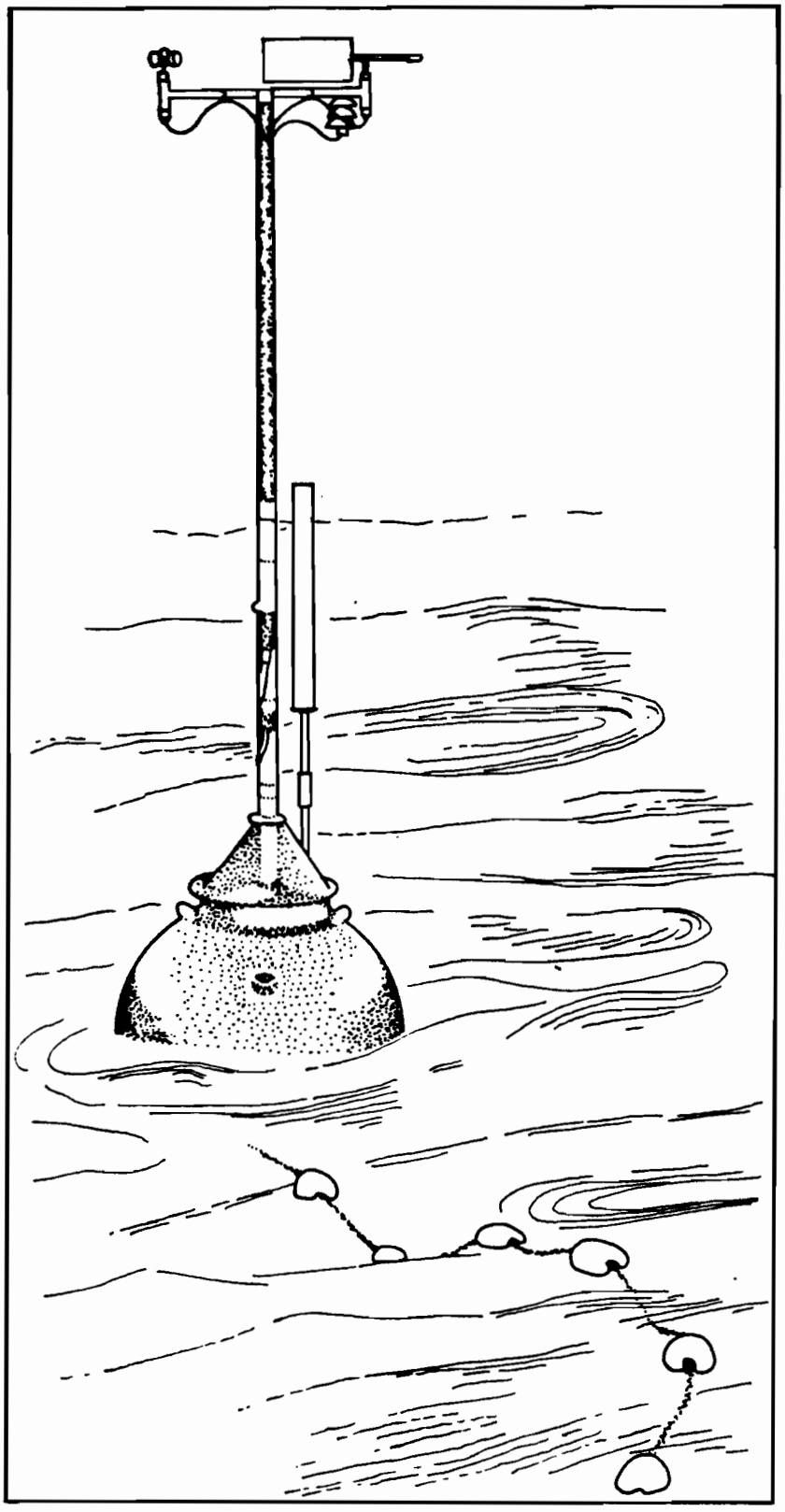


Figure 8. Configuration of the GOES Environmental Monitor (GEM) buoy.

observations of the cup anemometer, wind vane and buoy compass, but due to failure of the compass this was not possible. However, the average speed agreed with the vector-averaged speed to ±0.5 m/s, so reasonable speed values were recovered. Air temperature and water temperature (at 0.6 m below sea level) were averaged over a 1-minute period in the middle of the wind averaging period. The air temperature sensor was protected from radiation by a static sunscreen.

The GEM buoy was deployed on March 1 at 0630 GMT and remained moored until March 10 at 0000 GMT. Except for the compass, all systems functioned normally during the deployment.

2.3 Ice floe experiments

Besides the experiments conducted on the ship and off-ice buoy, the ice pack itself served as a platform for determination of air-sea-ice physical interactions. A ship-based helicopter was used to carry equipment and personnel about 100 km into the ice pack, and to survey the MIZ for suitable floes for experiment installations. In this manner, one floe ("Main Camp") was outfitted with equipment for measuring profiles of the atmospheric and oceanic surface layers (Fig. 9), and several other floes with ARGOS satellite-telemetering position buoys.

2.3.1 Atmospheric surface layer profiles

Figure 10 shows the four-level atmospheric surface layer profiling mast installed at the main camp at 59°26.2'N, 171°20.0'W, on March 7 at 0400 GMT. Winds and temperatures were measured at 6, 3, 1.5, and 0.75 meters; the tower was oriented to measure northerly winds without flow disturbance. Wind speeds relative to the ice floe were measured with R. M.

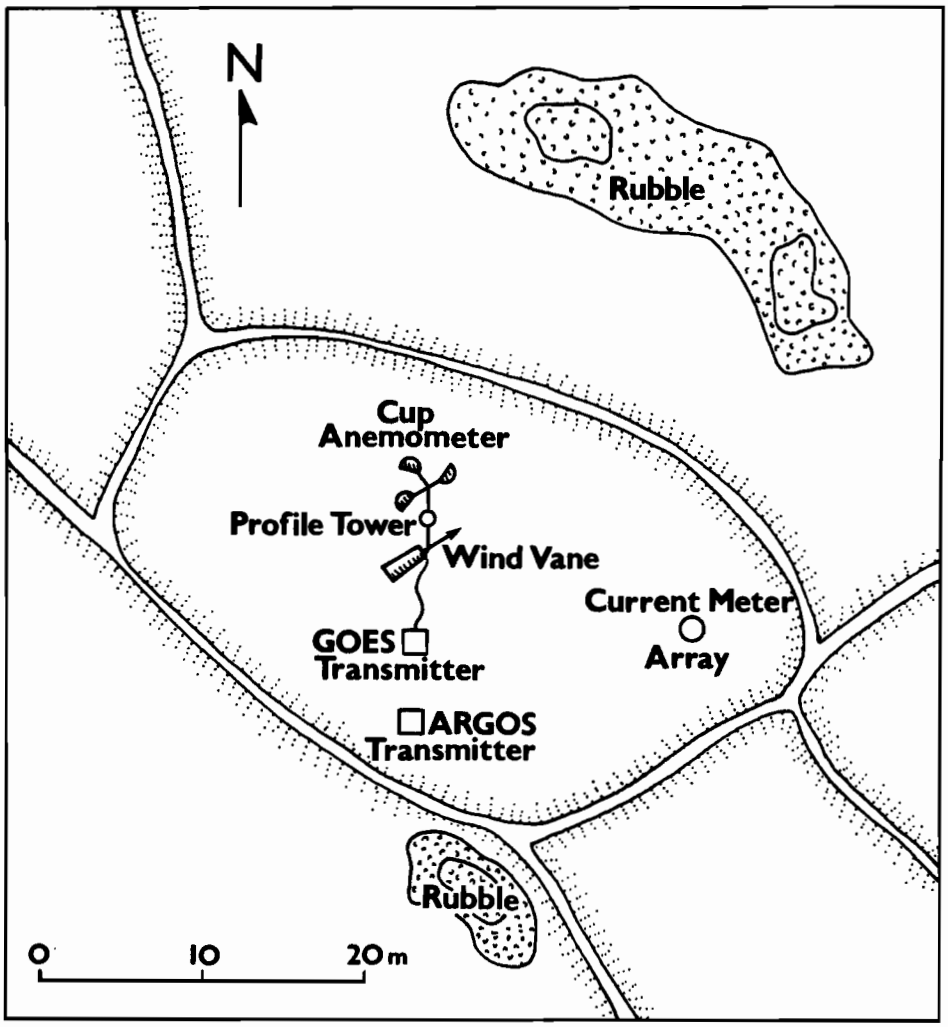


Figure 9. Site diagram of the main camp. Rubble piles on neighboring floes were about 1 m high.

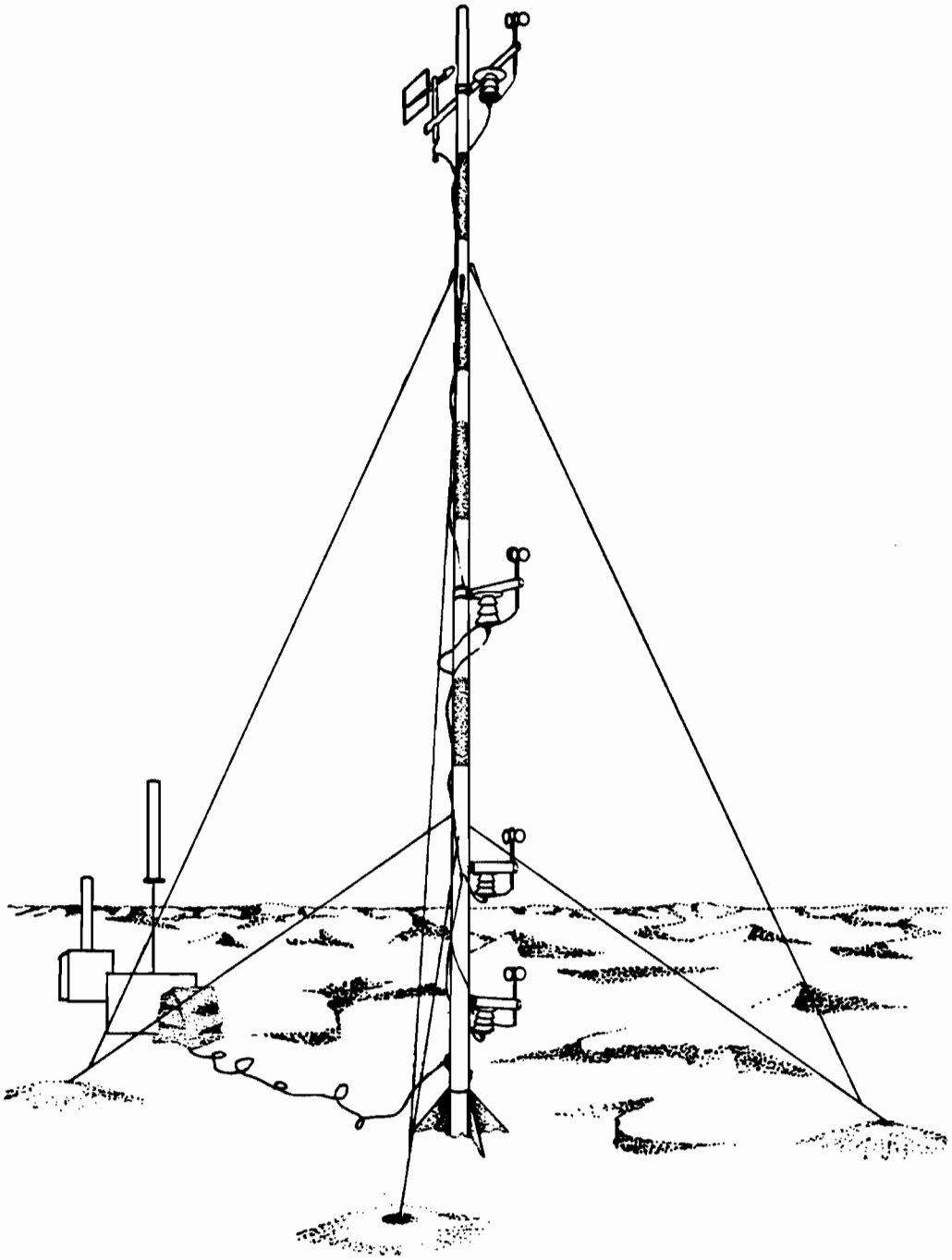


Figure 10. The four-level tower used for sampling profiles of wind speed and air temperature at the main camp.

Young cup anemometers at each level, and air temperatures were measured with Yellow Springs Instruments thermistors in laboratory-designed, radiation-shielded mounts. All anemometers and thermistors were calibrated before the experiment; the thermistors were recalibrated after the experiment; the anemometer and later thermistor calibrations are traceable to the National Bureau of Standards. In addition, an R. M. Young wind vane measured relative-wind direction at the 6-m level, and an Endeco flux gate compass sensed floe orientation relative to magnetic north.

A hybrid version of the GOES Environmental Monitor (GEM) electronics chassis collected, averaged, and telemetered the data. Wind speeds were averaged over a 20-minute period each half hour; temperatures and relative wind direction were averaged from minute 5 to minute 6 of the wind sampling period. These data were stored at the site for telemetry to GOES satellite every three hours.

Appendix C contains the observed profiles of wind speed and temperature over the ice floe.

2.3.2 Oceanic Surface Layer Profiles

The purpose of this experiment was to determine the ocean structure in the water just below the ice pack, and to infer from its properties the stress caused by the ice pack on the ocean. This was accomplished by measuring conductivity, temperature, current speed and current direction using two techniques.

In conjunction with atmospheric observations conducted at the main camp within the ice pack (Section 3.3.1), two current meters were suspended from the ice floe in a single mooring, the top meter being at 1.1 m (nominal 2 m) below the water level, the other at 5.1 m (nominal 6 m). The meters

used were RCM4's manufactured by Aanderaa with standard conductivity, temperature, current rotor, and vane; the meters were calibrated before the experiment. The speeds were averaged over 10-min periods, the directions were sampled at the end of the period, and both were internally recorded on magnetic tape. This mooring was established on March 8 at about 0200 GMT and remained in place until March 10 at about 2200 GMT. The deeper current meter failed after 14.5 hours (87 samples). The upper current meter experienced data dropouts aperiodically. The dropouts were either single events affecting only the compass or in four instances affected all the channels for up to an hour. The later type of problem may have been caused by a synchronization error with the recording unit. Missing data were interpolated by a linear fit.

Appendix D contains the observed current speeds, directions and water temperatures for both meters relative to the ice floe.

2.3.3 Ice floe trajectories

In order to determine the drift characteristics of ice floes in the MIZ with respect to wind, current and other lateral forces it is necessary to record floe position during the experiment. For this purpose four ARGOS ice buoys employing telemetry to NOAA polar-orbiting satellites were deployed at various locations within an array in the MIZ.

Three of these platforms were manufactured by Handar, the fourth by Polar Research Laboratory. All four were rated and tested for use at -30°C. Data messages from the satellites were processed by Service ARGOS in France, relayed to us by data line through a NOAA computer at Wallops Island, VA during the BASICS experiment, and stored on magnetic tape for later processing.

The first buoy deployed contained a Polar Research Laboratory transmitter with platform number 2312. It was installed at about 2125 GMT on March 4 at approximately 59°36'N and 171°05'W. Somewhat more than a day later, the three Handar platforms - 2309, 2310, and 2311 - were installed in quick succession between 0100 and 0200 GMT on March 6, at 59°47.5'N, 170°40'W; 59°57.5'N, 171°00'W; and 59°47.5'N, 171°00'W, respectively. Platform 2312 was recovered after about three days and installed as platform 2313 to replace a failed unit at the main camp at 59°20'N, 171°25'W at about 2000 GMT on March 7. This position buoy was recovered with the rest of the main camp by 0000 GMT on March 11 at 58°55'N, 172°45'W. The Handar locators were allowed to remain in place in the MIZ until they drifted to the ice edge and sank. This happened by 0000 GMT on March 14. A plot showing the drift record of all four platforms is shown in Figure 11.

Rotation of the floe at the main camp was measured by a flux gate compass contained in the box holding the electronics for the atmospheric profiling tower and the GOES transmitter. Rotation was sampled instantaneously once every 30 minutes at the end of the wind sampling period with an accuracy of ±3°. Figure 12 shows the rotation of the ice floe supporting the main camp (ARGOS platform 2313).

2.4 Ancillary data

Other data coincidental with and in support of the experiment were gathered. These data take the form of upper-air soundings from NWS stations at Nome and St. Paul, Alaska; sea-level pressure and surface air temperature analyses from the synoptic network of the NWS, and boundary-layer winds determined by computer model from the NWS analyses (Fig. 3) (Lindsay and Comiskey, 1982); and daily infrared satellite images of the Bering Sea area

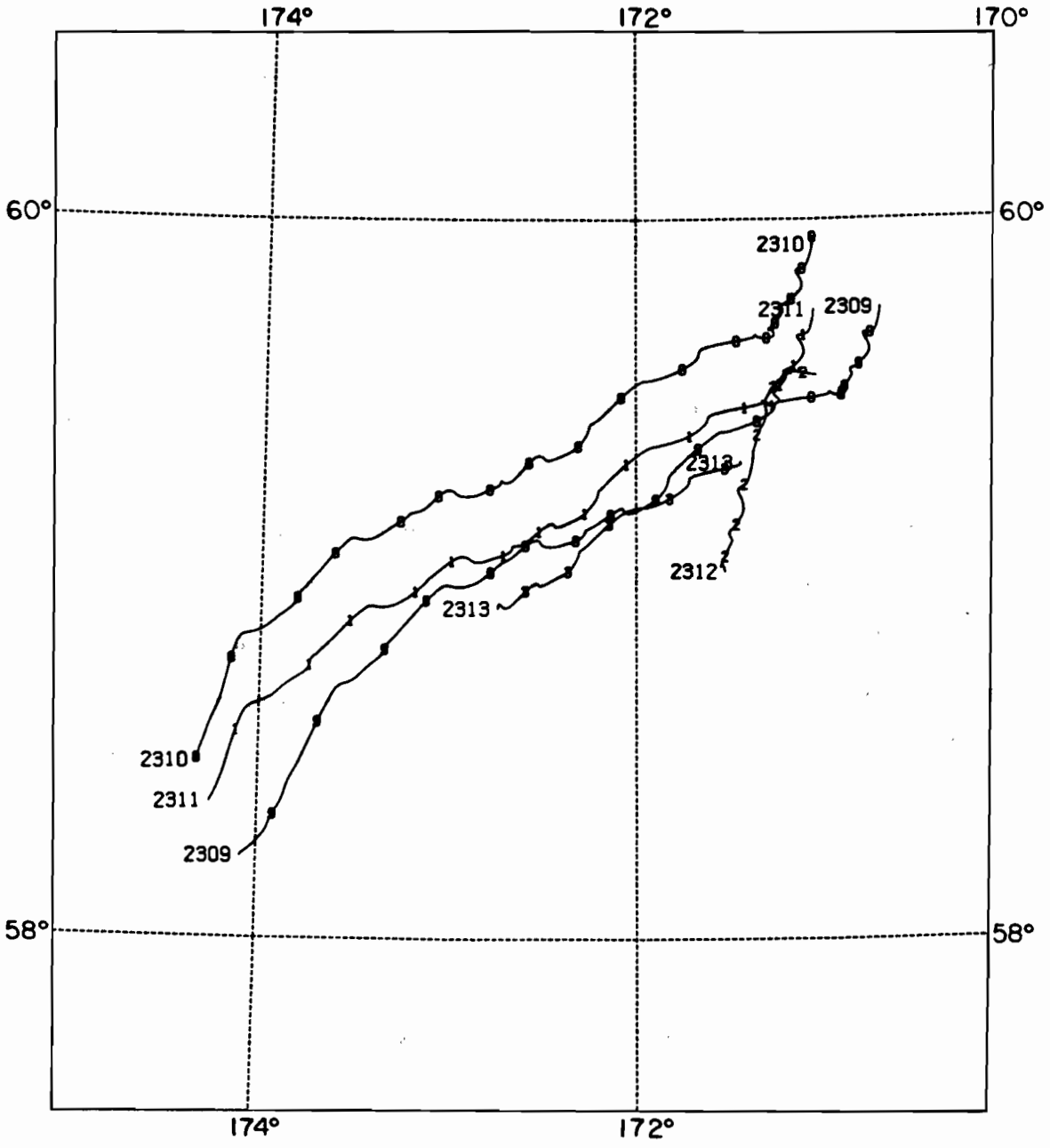


Figure 11. Positions of four ice floe locators during BASICS. The daily ØØ GMT position for each floe is marked by the last digit of the buoy number. Start time for each buoy is given in the text.

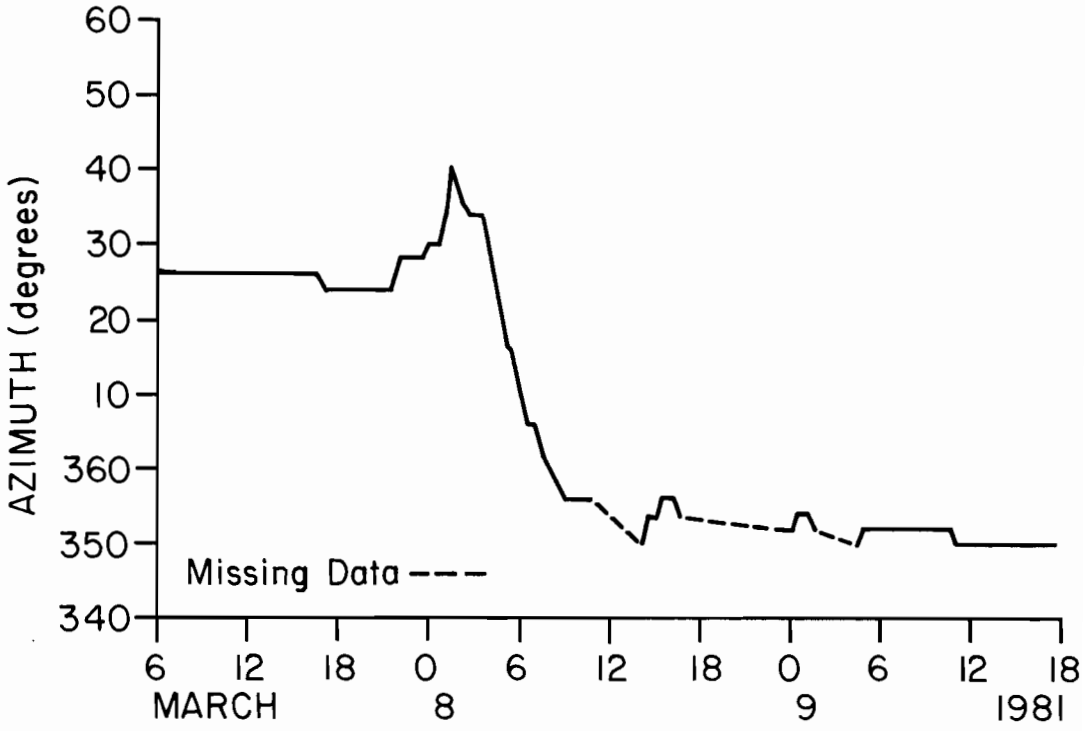


Figure 12. Rotation of the main camp ice floe (2313).

(Fig. 4). Once a day, the NWS sea-level pressure analysis was redrawn, giving careful scrutiny to ship reports and late reports not used in the original analysis (Lindsay and Comiskey, 1982).

3. DISCUSSION

The BASICS experiment provided data for the analysis and interpretation of air-sea-ice interactions in the Bering Sea MIZ. Although spatial variations of stress on the ice by the air and water flow could not be determined because of the shortening of the experiment by weather conditions, a single set of air and water observations from the main camp floe provided a confident estimate of air-ice and water-ice drag measurements for the storm-roughened interior MIZ.

3.1 Water structure in the MIZ

Measurements of water property changes relative to sea ice conditions and storm passage during BASICS are discussed by Pease and Muench (1981) and Muench (1983). Appendix A presents all of the CTD casts collected during BASICS. In general seaward of the ice edge, the water column was vertically homogeneous (see, for example, cast #3), while at the ice edge it exhibited a stratified upper layer and isothermal lower layer (cast #7). The stratified upper layer became well-mixed by the storm but the overall heat content did not change. Interior from the MIZ, the water column was again vertically well-mixed (cast #28) and at the freezing point.

3.2 Effect of gale on ice pack

At our arrival at the MIZ on February 26, the winds were northeasterly, and the ice was drifting toward the southwest through a nearly calm ocean

surface. The next day, however, brought southerly gale-force winds and 5 m seas. The ice was advected rapidly northward (Fig. 4) and mechanically fractured by the large swell for distances up to 100 km into the pack. The fracturing and rafting in the outer regions of the MIZ were particularly severe. Pease and Muench (1981) cite marked changes in the temperature structure beneath the ice edge (cast #44) due to wind mixing of the upper layer. Gross characteristics of the changes suggest that the oceanographic structure responds slowly to local meteorological processes.

3.3 Modification of the atmospheric boundary layer

Surface and upper-air weather conditions and modification of the atmospheric boundary layer by the MIZ and adjacent water during off-ice winds are described by Lindsay and Comiskey (1982), Overland *et al.* (1983), and Reynolds (1984). During the period of northeasterly winds following the storm passage, the SURVEYOR made two transects downwind from the ice edge. On both occasions the boundary layer was probed successively with AIRSONDES (Lindsay and Comiskey, 1982). These periods were characterized by a shallow mixed layer of about 200 m, capped by a strong inversion resulting from large-scale subsidence. With seaward passage, the mixed layer generally was observed to warm and deepen as a result of the estimated 70 - 80 W m^{-2} heat flux from the ocean.

Overland *et al.* (1983) present a model for the boundary layer over the MIZ in which the slow rate of inversion growth and rate of warming of the boundary layer seaward of the ice edge during off-ice winds are simulated. Reynolds (1984) applies a more detailed form of this model to the BASICS data. The horizontal temperature gradient in the boundary layer coupled with surface roughness changes over the MIZ induced an 18% increase in

the wind speed over the outer MIZ to a distance of about 40-km seaward of the ice edge.

3.4 Air and water drag on ice floes

Pease *et al.* (1983) and Macklin (1983) evaluate by profile and slab methods the wind and water stress on thin, first-year sea ice. The atmospheric surface layer profiling experiment is described in more detail by Macklin (1983). Based upon 138 profiles for near-constant ice conditions, northeast winds of 3 - 15 m s^{-1}, and near-neutral stability, the mean, near-neutral, 10-m drag coefficient over rough first-year sea ice was $3.09 \times 10^{-3} \pm 0.49 \times 10^{-3}$. This is among the largest drag coefficients ever measured for neutral conditions over sea ice. Much of the variance in the estimate is explained by relative orientation of local roughness features to the profile tower.

Pease *et al.* (1983) determine water-ice drag coefficients from current meter profiles at the main camp and air-ice and water-ice drag coefficients from slab drag theory, wind and current speeds, and ice drift. The current meter profiles yield an average water-ice drag coefficient of 14.7×10^{-3} adjusted to -2.0 m. The oceanic drag estimates, as the air drag, are the largest reported for the Arctic and somewhat larger than observed in other first-year ice conditions. Following a storm apparently, the interior MIZ is appreciably aerodynamically roughened on both upper and lower surfaces.

3.5 Ice floe motion in the MIZ

The importance of wind and current to ice drift characteristics are treated by Overland *et al.* (1984), Pease and Macklin (1984) and Martin *et al.* (1983). Figures 13a-e present the drift characteristics of the floes with ARGOS ice buoys as a function of inferred surface wind. These winds

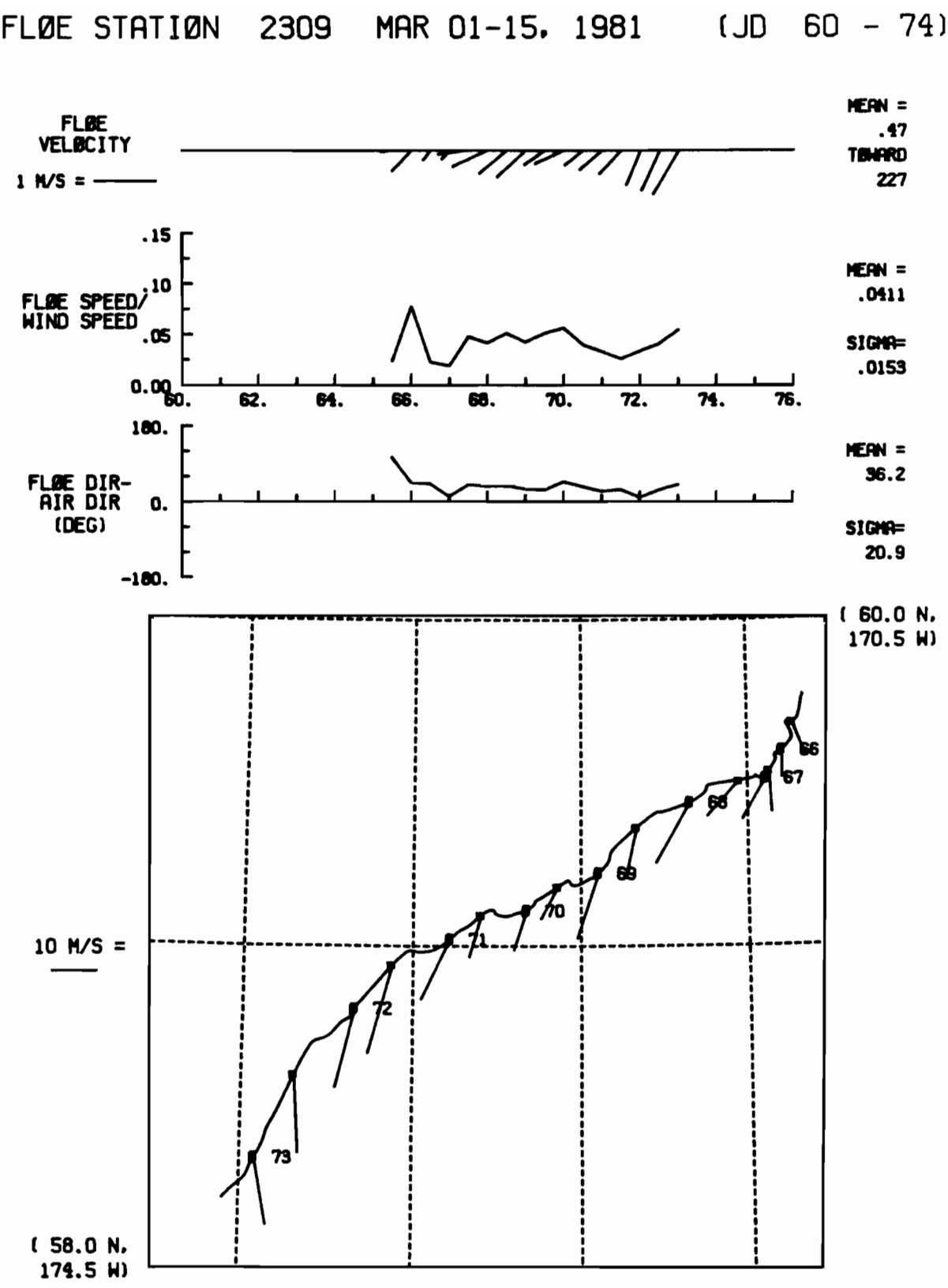


Figure 13a. Time plots of floe velocity, floe speed-wind ratio, and floe direction-wind direction difference; and spatial plot of floe trajectory as a function of time (ØØ GMT position is labeled by Julian day) and accompanying wind vector (oceangraphic convention) for floe station 2309.

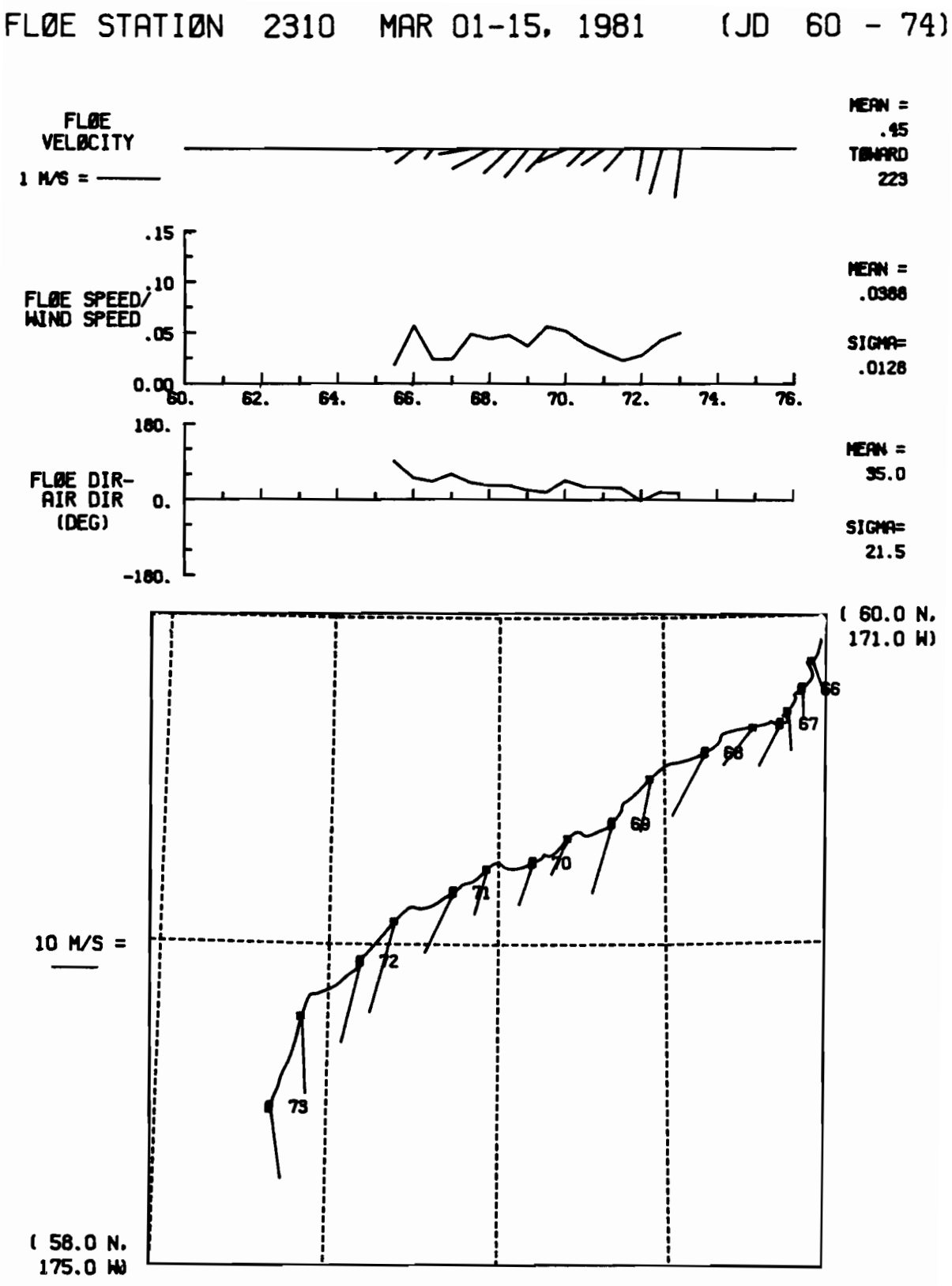


Figure 13b. As 13a but floe station 2310.

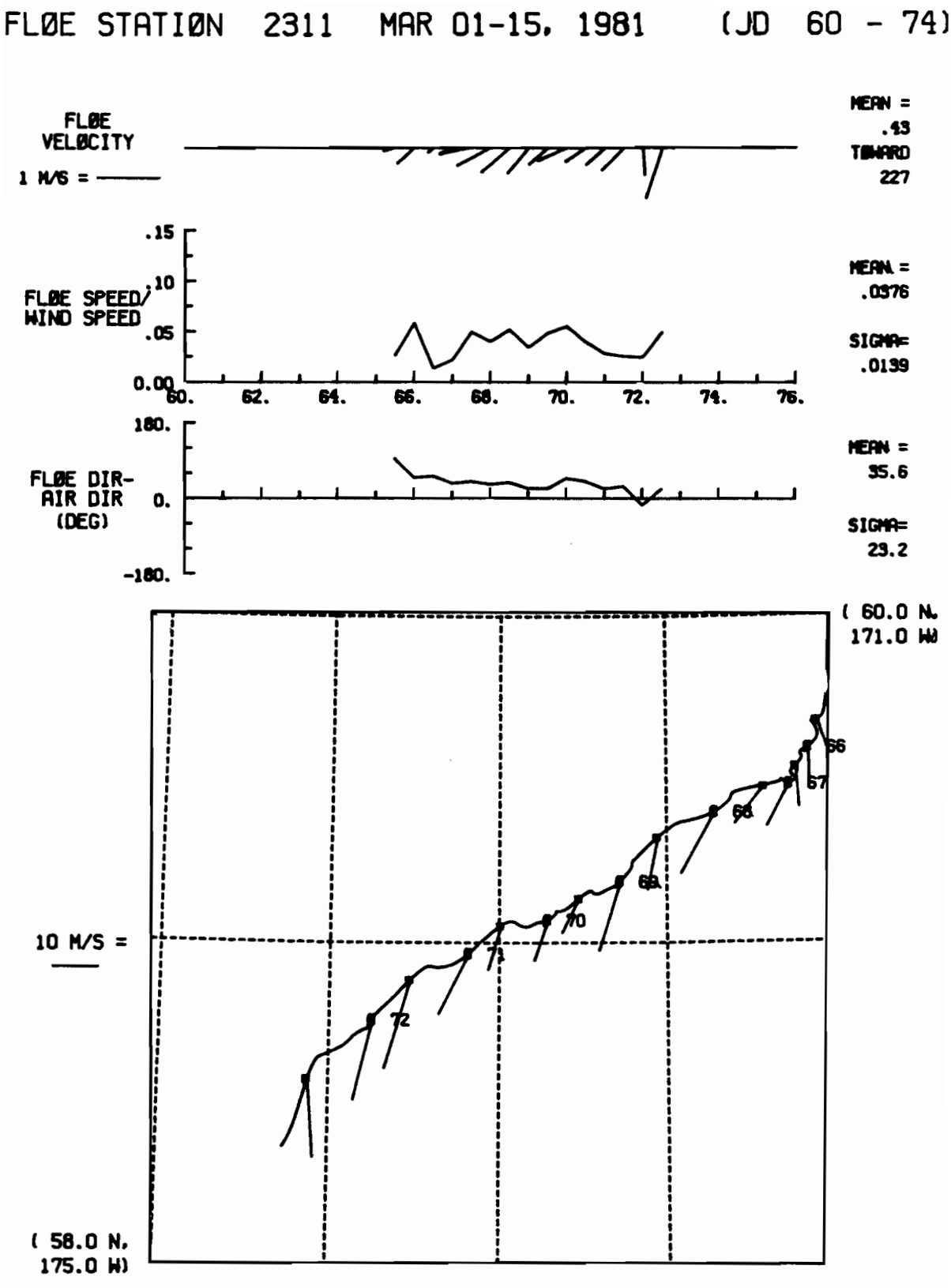


Figure 13c. As 13a but floe station 2311.

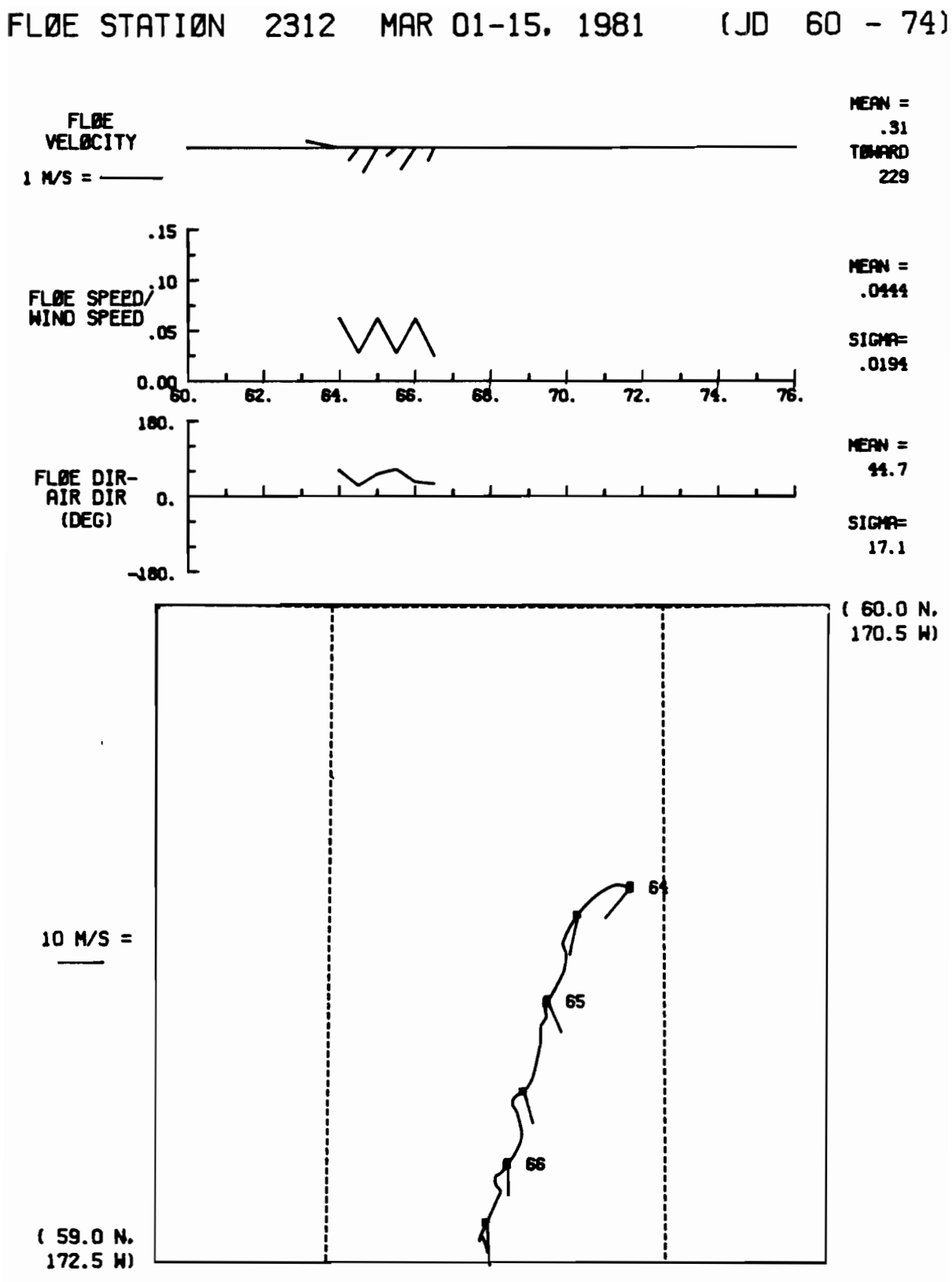


Figure 13d. As 13a but floe station 2312.

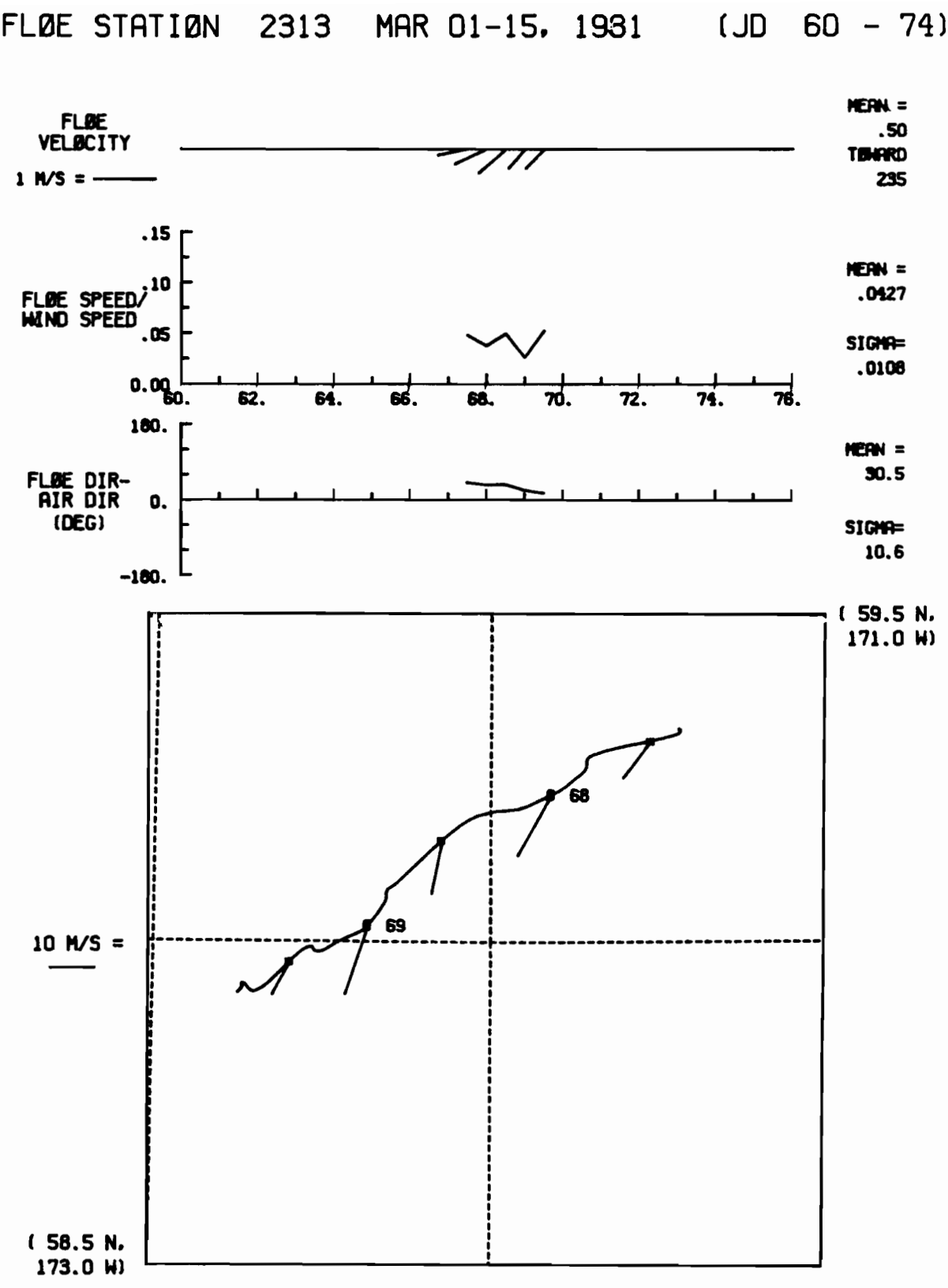


Figure 13e. As 13a but floe station 2313.

were determined by reducing gradient winds by 20% and rotating them 30° to the left from digitized sea-level pressure fields (Lindsay and Comiskey, 1982) using METLIB-II (Overland *et al.*, 1980; Macklin *et al.*, 1984). During the experiment, the floes drifted toward the southwest at a mean speed of about 0.45 m s^{-1}. The drift averaged 35° to the right of the reduced gradient wind. The average floe drift speed corresponded to an average of about 4% of the reduced gradient-wind speed. The scalloped floe trajectories in Figure 10 indicate the importance of tidal forces to ice floe drift. Also the floes accelerate as they approach the ice edge. Overland *et al.* (1983) suggest a mechanism for the observed acceleration based on boundary-layer wind acceleration over the outer MIZ. This acceleration is not represented in the reduced gradient winds used for Figures a-e.

The rapid cyclonic turning of the main camp ice floe (Fig. 12) at the beginning of March 8 corresponded with a shift in the winds from moderate northerly to strong northeasterly. The winds during the rotation were quite weak (<2 m/s). This signal is also visible in the floe trajectories of Figure 10 at Julian day 67. Thus the local rotation of the floe was representative of the rotation of the pack as a whole. Pease and Macklin (1983) discuss this feature in more detail. Overland *et al.* (1984) offer further insight into effects of bottom drag during high winds on the ice motion.

4. SUMMARY

Sixty-four CTD (conductivity, temperature, depth) casts were taken to examine the MIZ ocean structure. Seaward of the ice edge the water column was well-mixed. Within the MIZ a two-layer system was in evidence with

stratified colder, fresher water overlying well-mixed bottom water. When the upper layer was exposed to mechanical mixing by strong winds from a storm, it too became well-mixed resulting in sharp thermo- and pycnoclines between the two layers (Pease and Muench, 1981; Muench, 1983). Interior to the MIZ, the water column was well-mixed at the freezing point.

Profiling of the MIZ atmospheric boundary layer with balloon-borne sondes at 12-hour intervals showed the near-constant presence of a strong inversion overlying a mixed layer extending from the surface to 200-400 m. The inversion is attributed to subsidence during large-scale, anti-cyclonic circulation. As the air flowed seaward of the ice edge, the mixed layer was seen to warm and deepen from surface heat flux and entrainment of warmer air in the inversion layer (Lindsay and Comiskey, 1982; Overland *et al.*, 1983; Reynolds, 1984).

A four-level atmospheric surface-layer profiling tower was installed at the main camp 100 km into the ice pack. The profiling tower was in place from March 7 through March 10 under prevailing moderate northerly winds, and 152 profiles of mean relative wind speed and temperature were collected. From these profiles, the mean near-neutral 10-m drag coefficient over rough Bering Sea ice was found to be 3.09×10^{-3} (Macklin, 1983).

Similarly, profiling of the oceanic surface layer beneath the main camp was conducted by a two-level current meter array. The two-level system was installed on March 8 and removed March 10. These records showed currents turned clockwise with respect to the ice drift as would be expected from Ekman theory and yielded a drag coefficient at 2 m below the ice of 14.7×10^{-3} (Pease *et al.*, 1983).

A meteorological buoy was deployed 100-km downwind of the ice edge on March 1 and recovered March 9. Comparison of winds and air temperatures

measured at the buoy with those recorded at the ship and the main camp within the ice pack indicated a seaward warming and an 18% increase in wind speed during prevailing northeasterly winds (Reynolds, 1984).

Four satellite-tracked location sensors were installed on an array of ice floes with a 20-km separation distance between installations. These sensors transmitted their position about ten times a day from March 4 through March 13. Two basic facts observed from these position tracks were the importance of tidal forces in addition to wind and water forces on the floe motions within the ice pack, and the acceleration of the floes as they approached the ice edge (Pease *et al.*, 1983). Radar transponder buoys tracked from the ship showed similar behavior (Martin *et al.*, 1983).

5. ACKNOWLEDGMENTS

The BASICS program is a contribution to the Marine Services Project of the Pacific Marine Environmental Laboratory. It was financed in part by the Bureau of Land Management through an interagency agreement with the National Oceanic and Atmospheric Administration (NOAA) under a multiyear program, responding to needs of petroleum development of the Alaskan continental shelf and managed by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) office. Shipboard measurements were carried out with the help of the survey technicians and other crew members of the SURVEYOR under the command of Captain Bruce I. Williams. R. D. Muench supervised the collection of CTD data from the ship. NOAA's Research Flight Center provided the helicopter support vital to the experiment.

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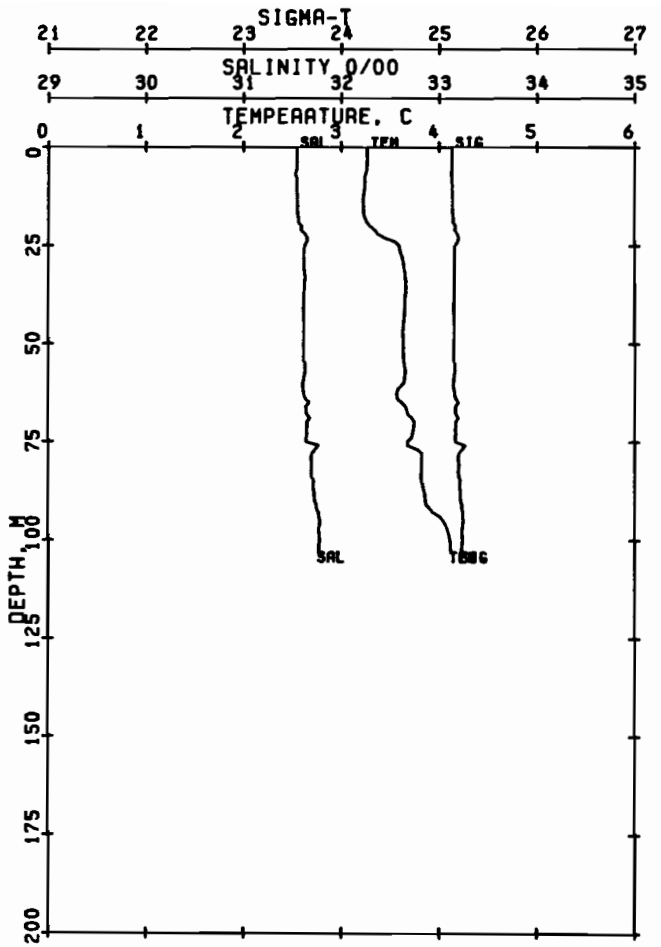
APPENDIX A

Salinity, Temperature, and Density Profiles

CTD Casts 1-64



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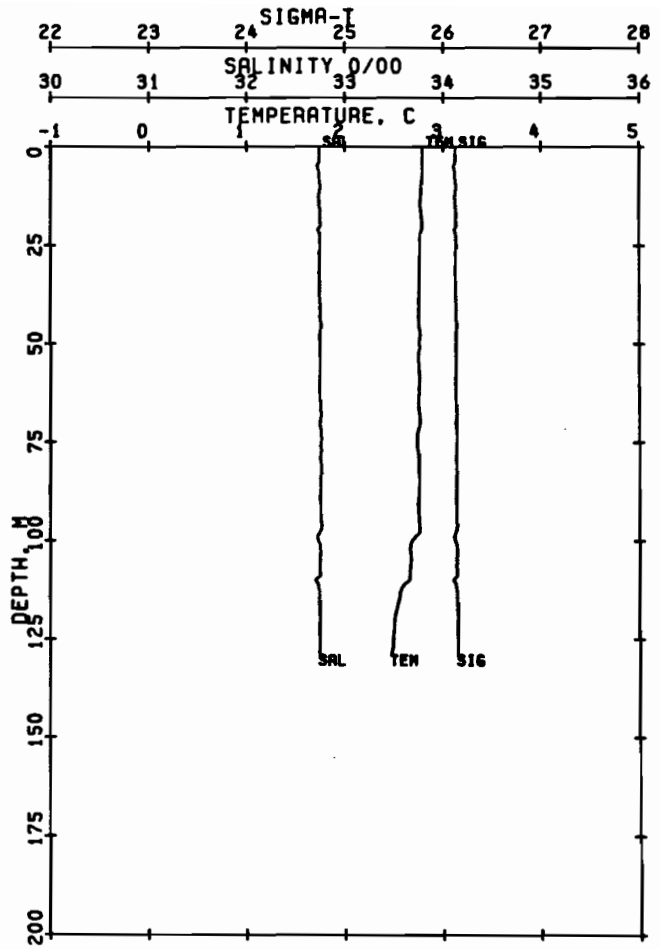

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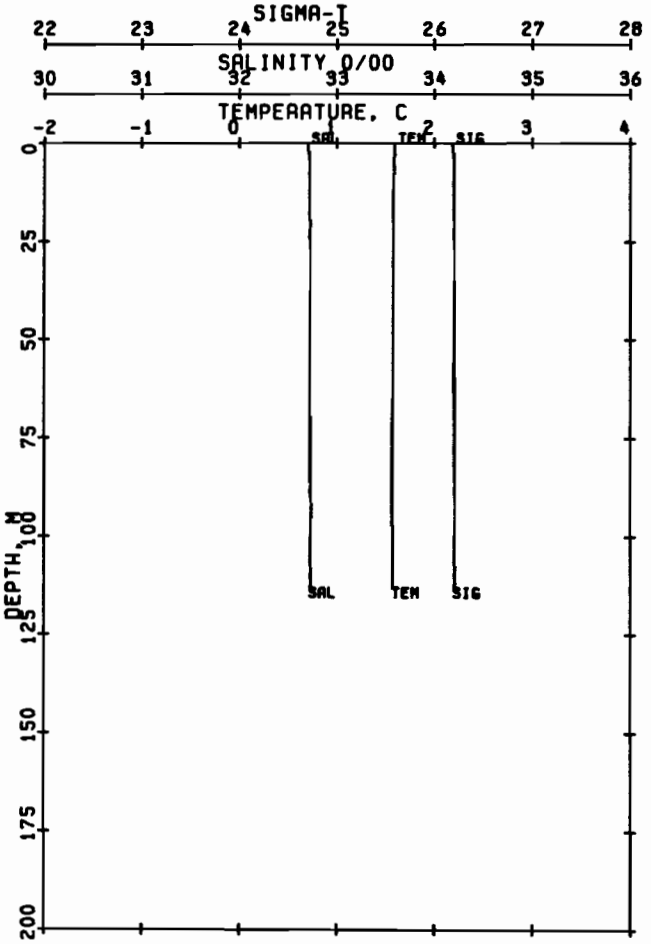

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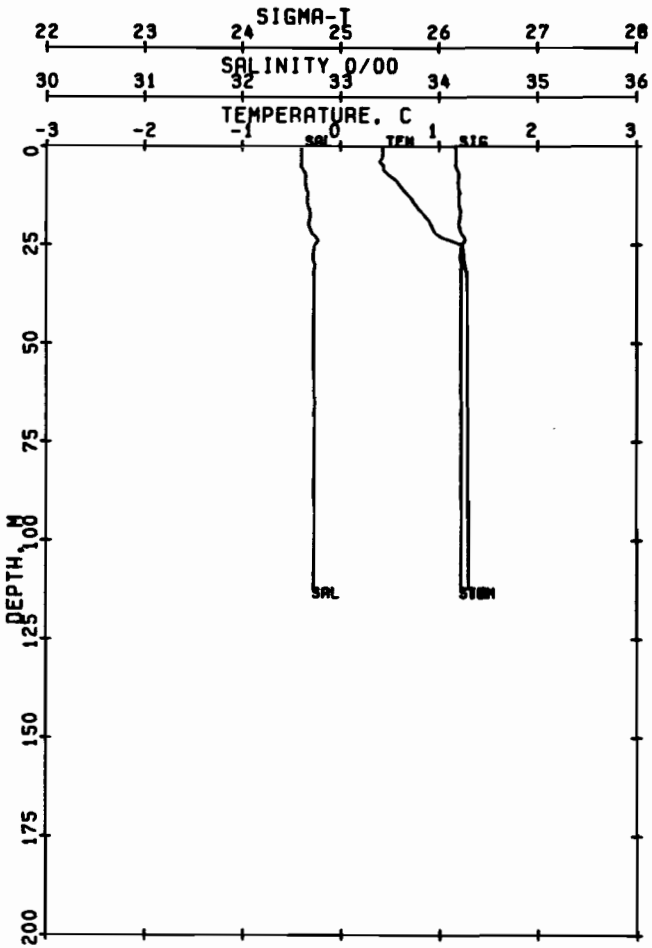

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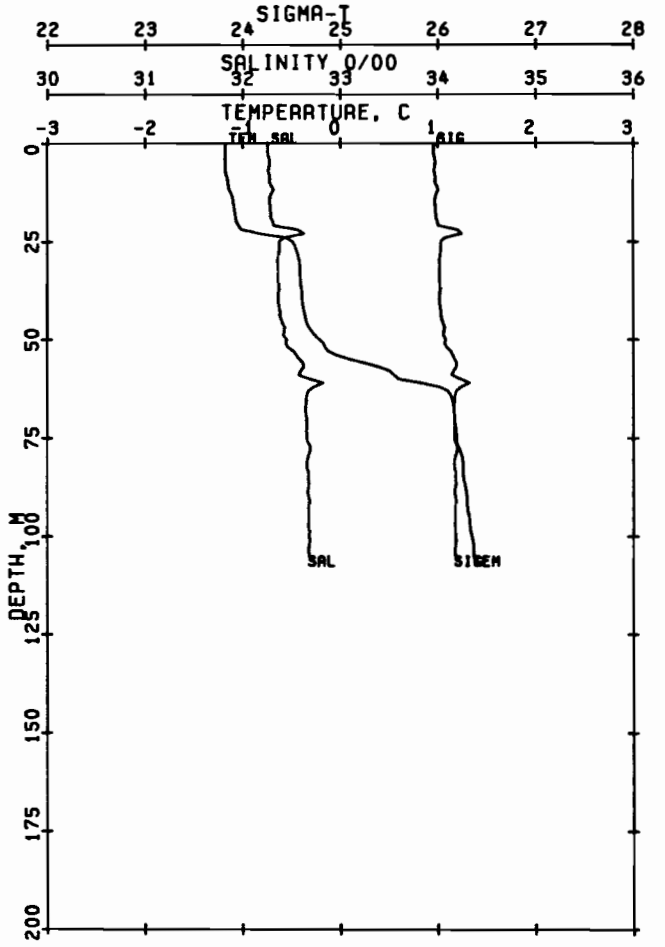

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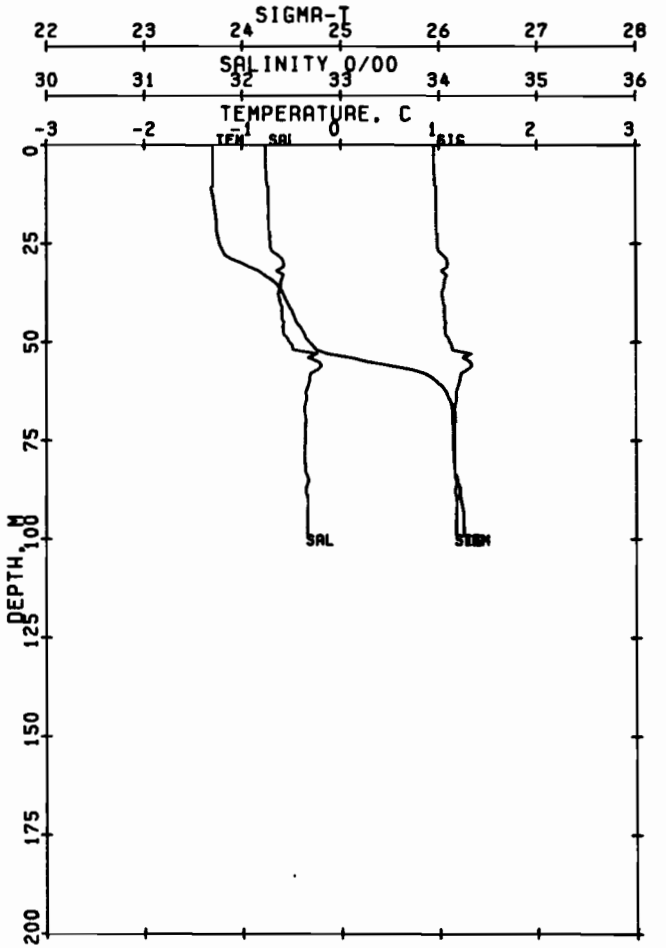

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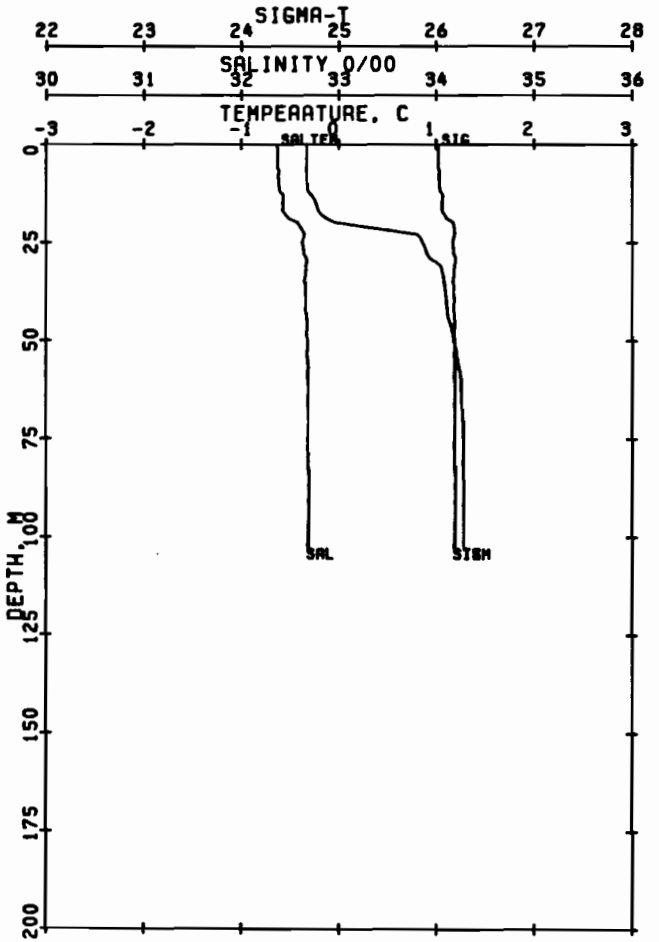

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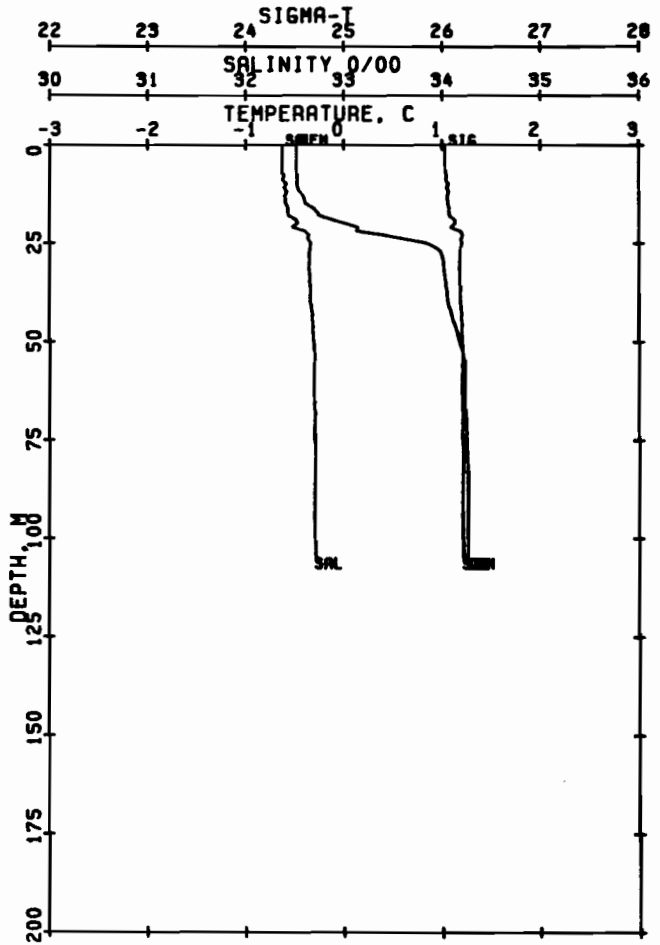

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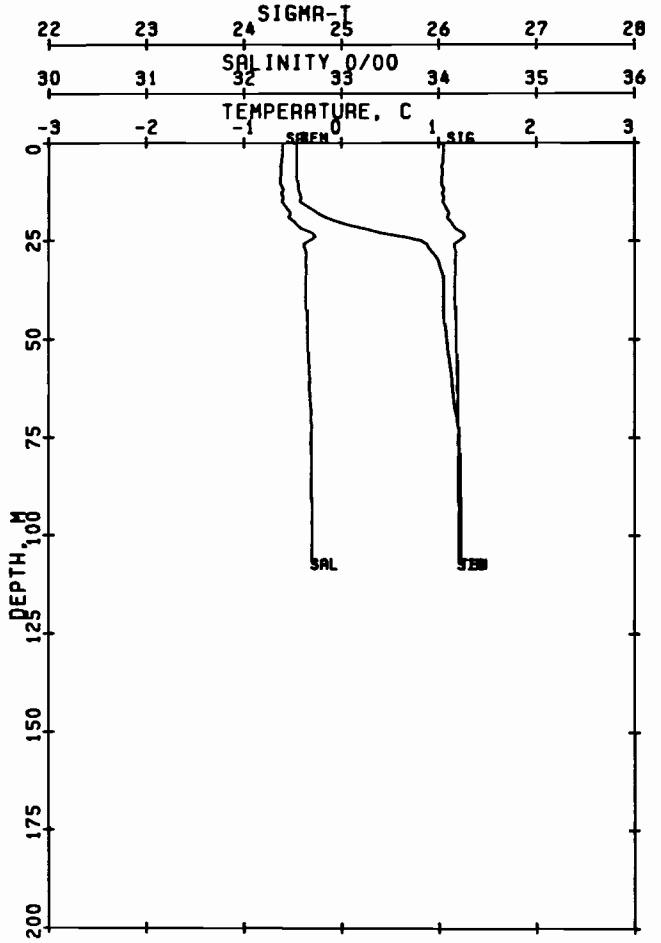

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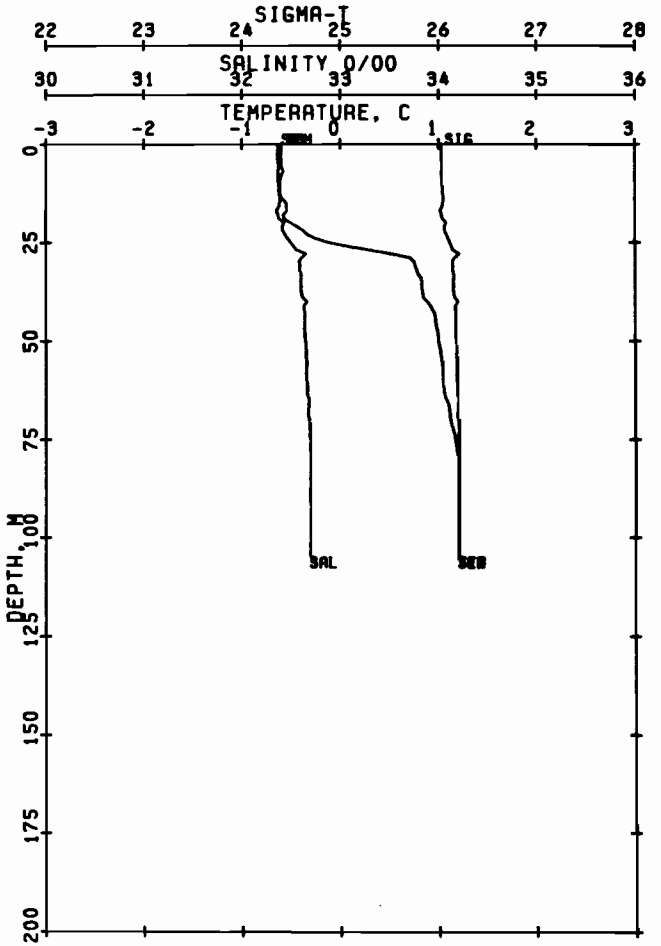

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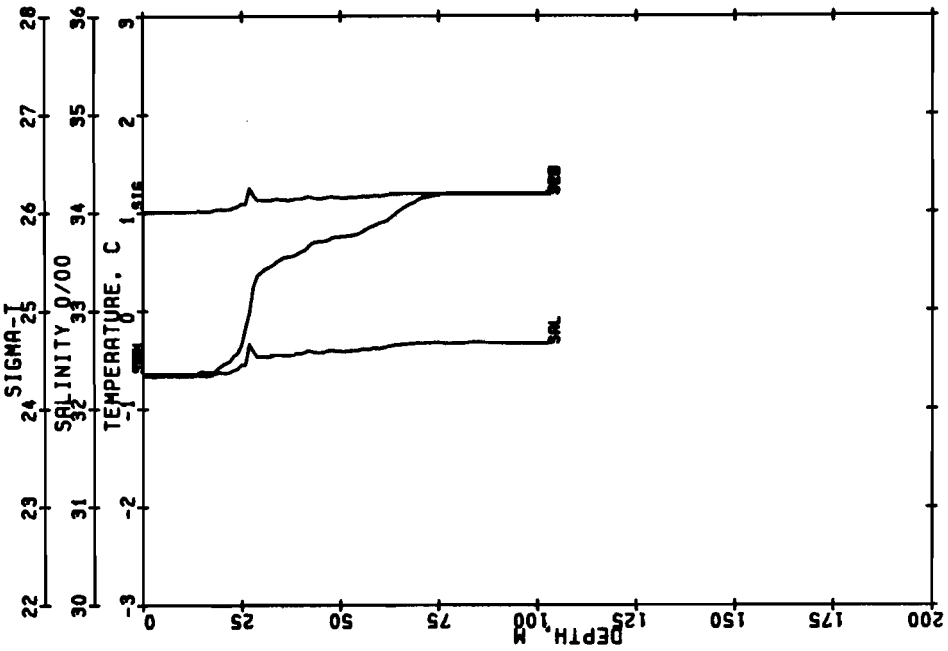
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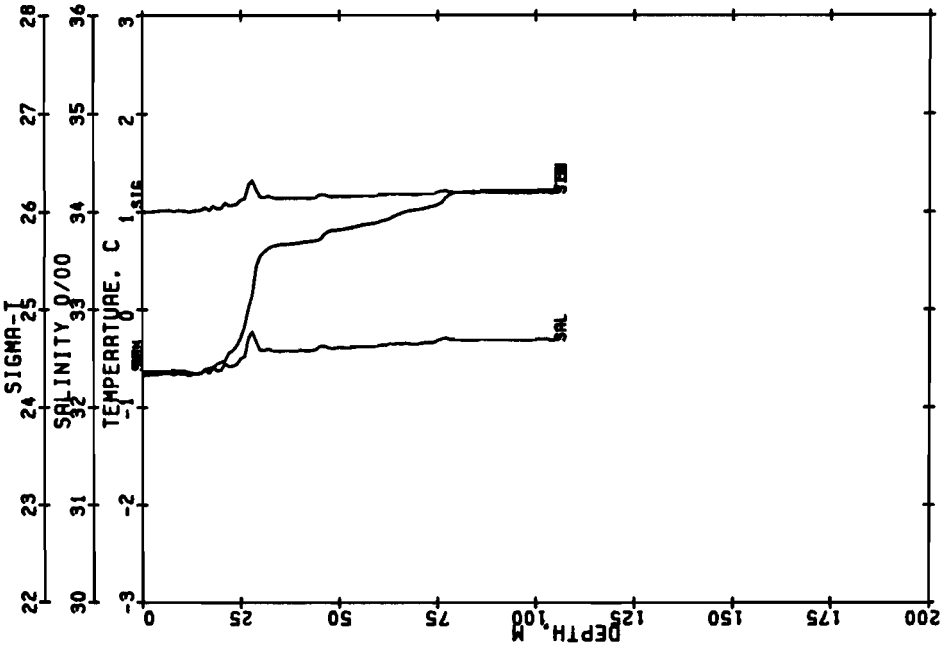
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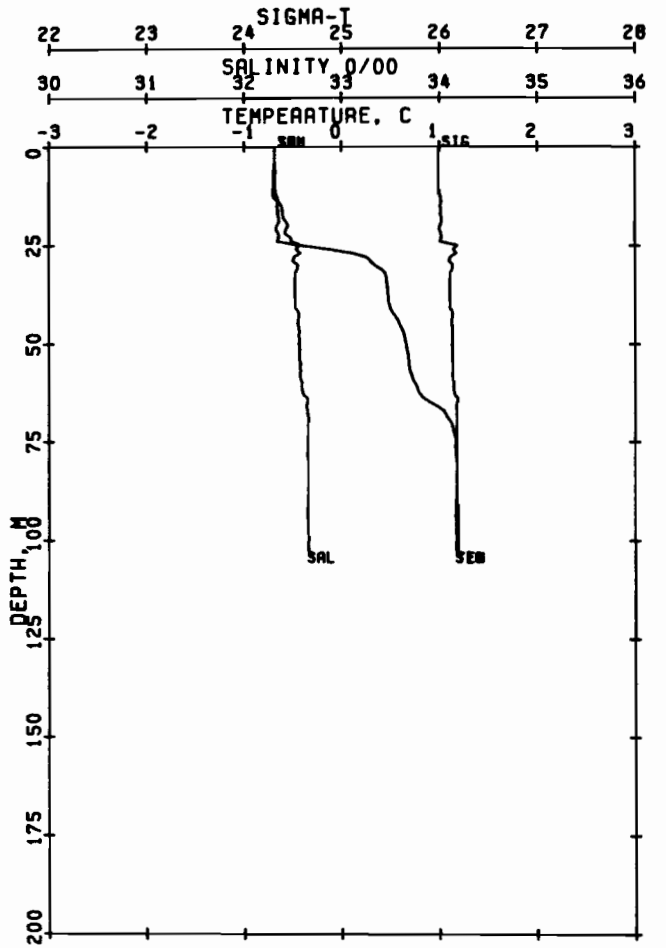

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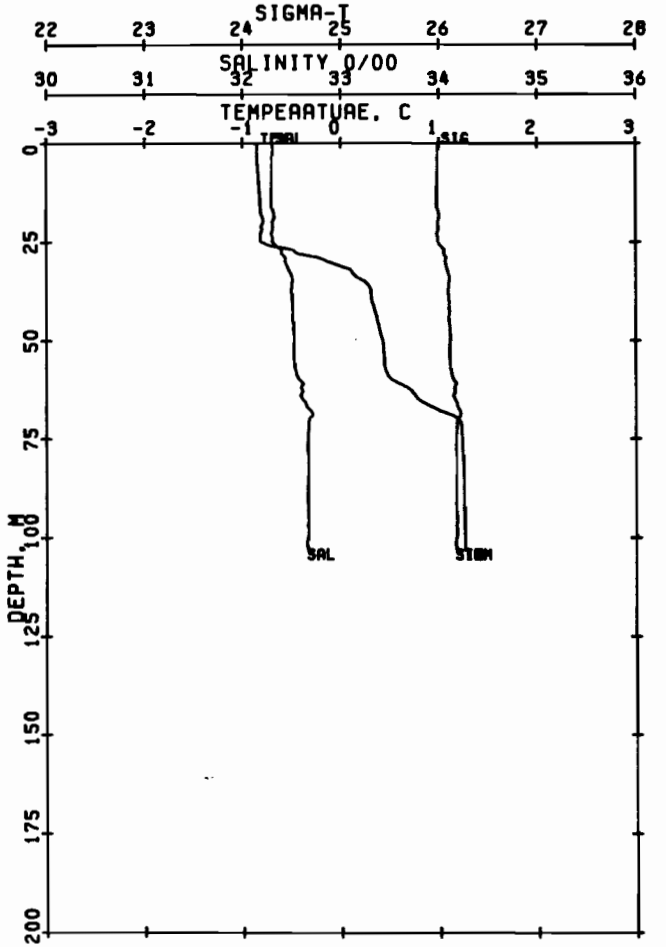

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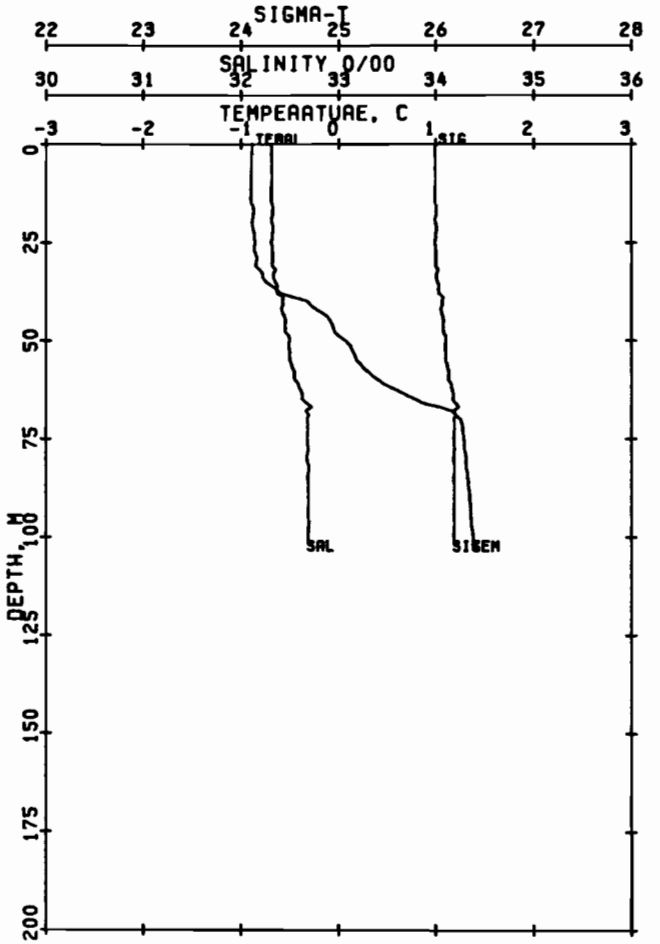

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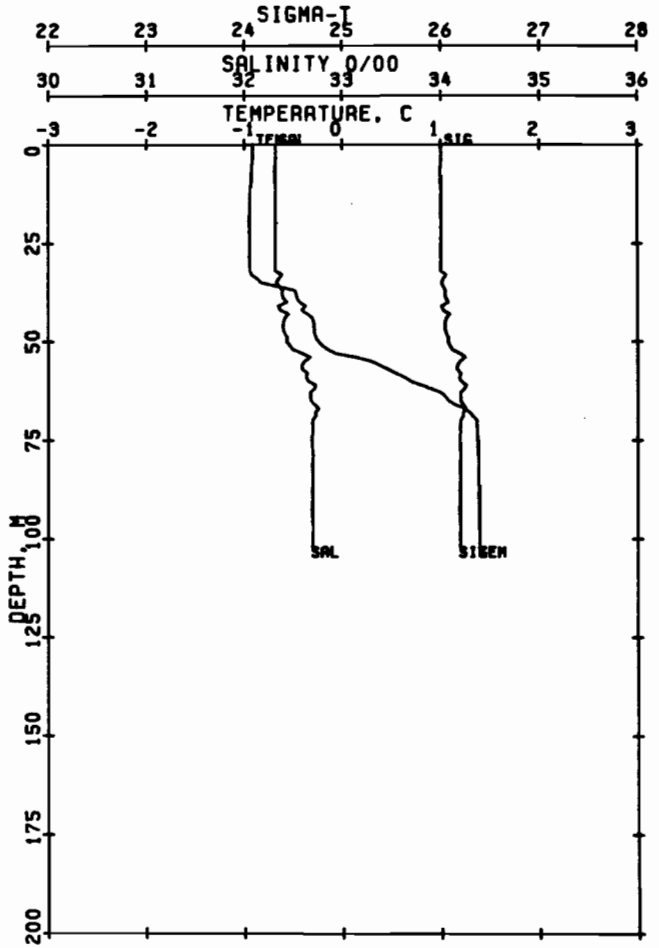

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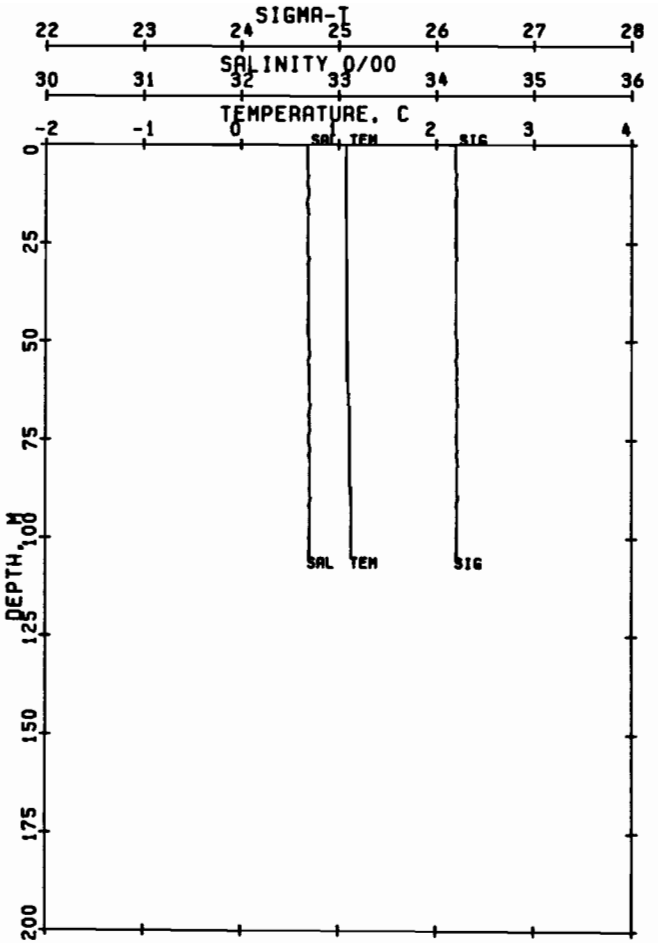

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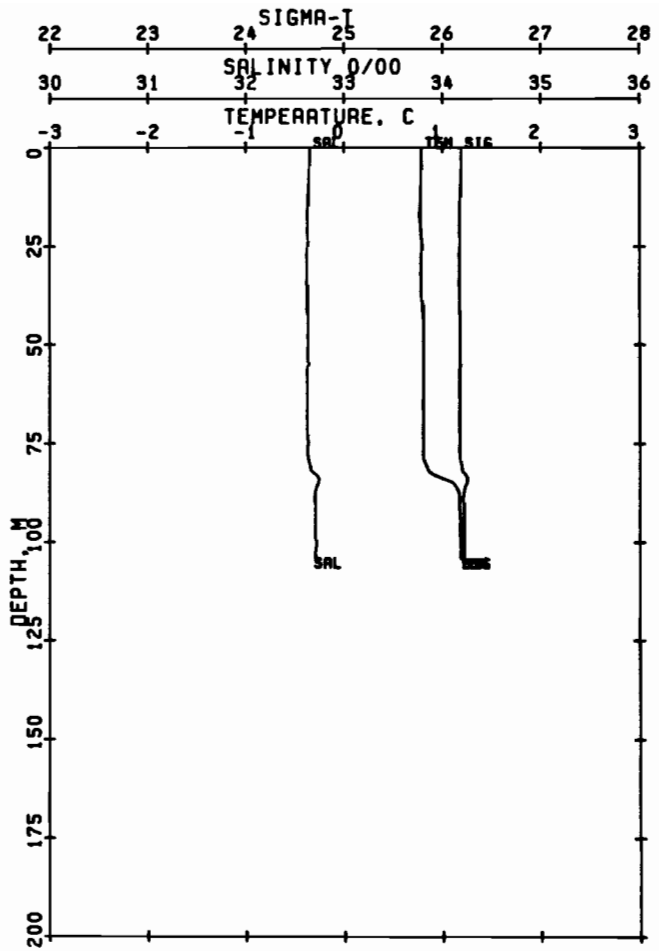

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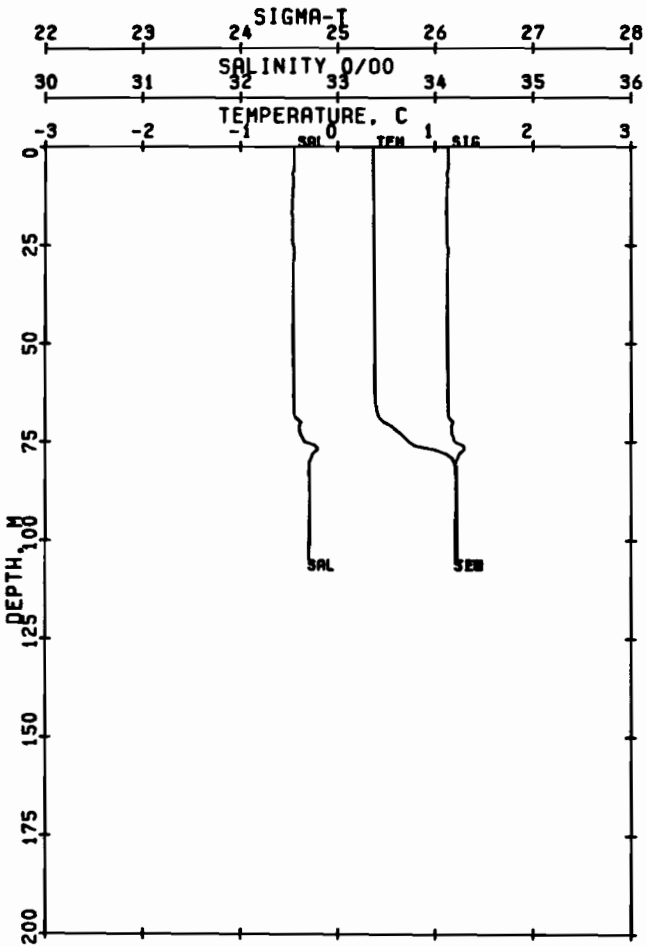

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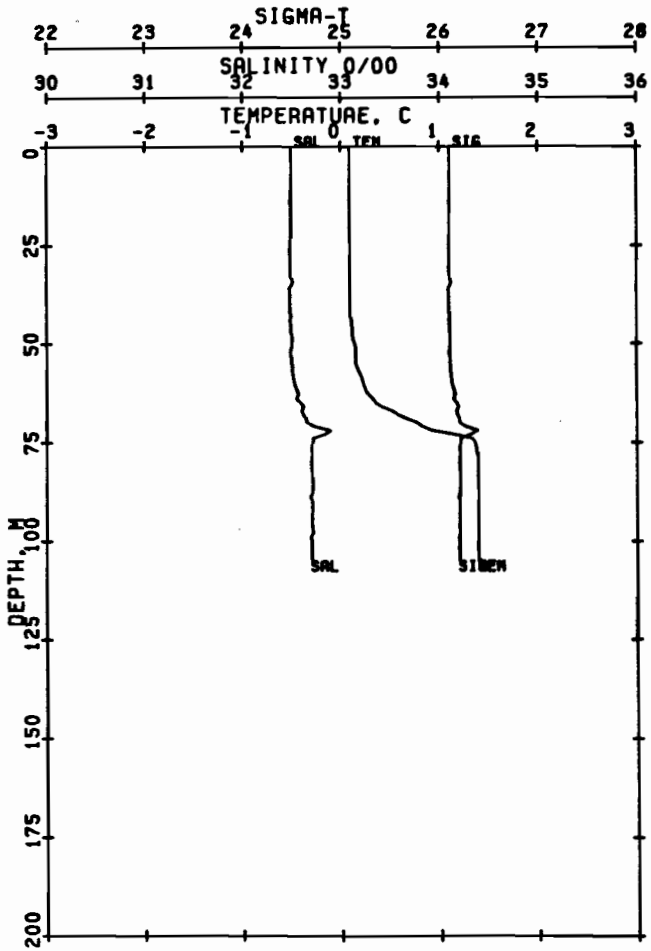

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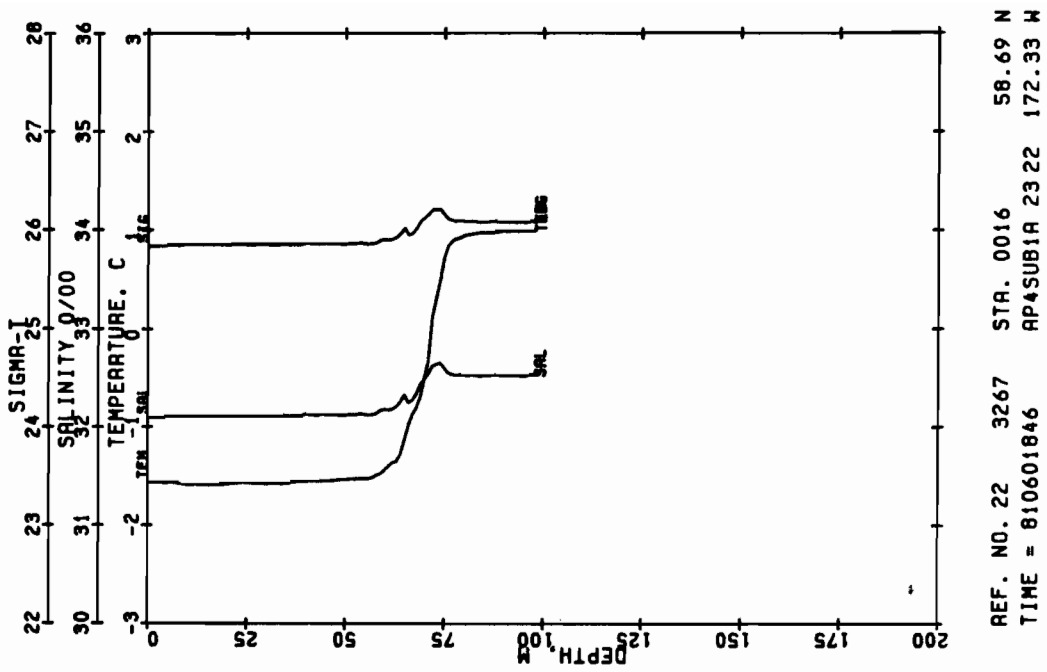
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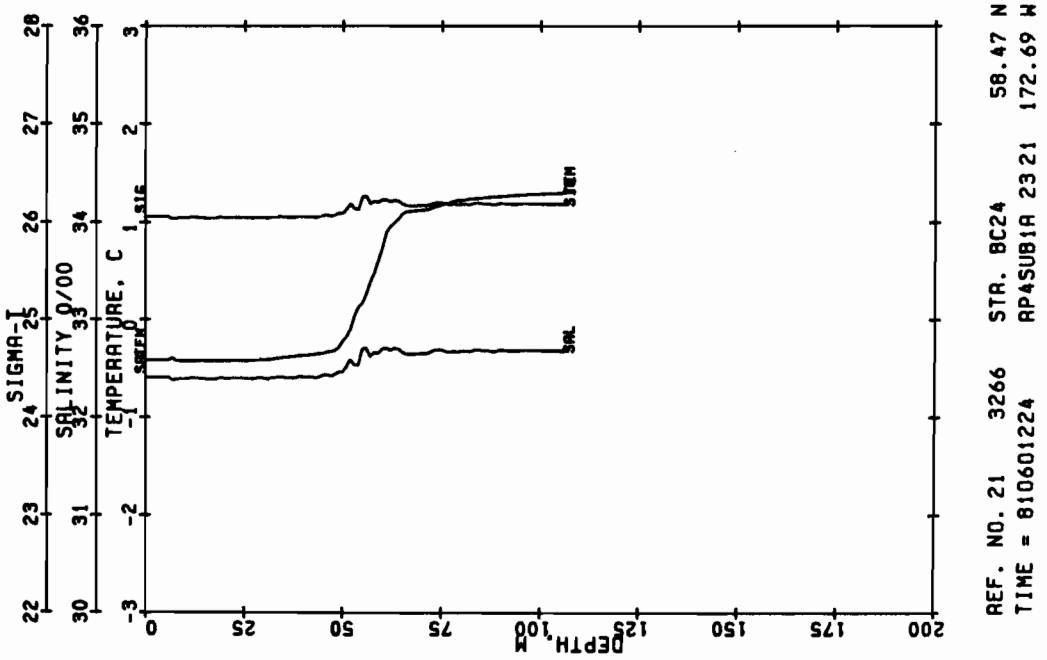
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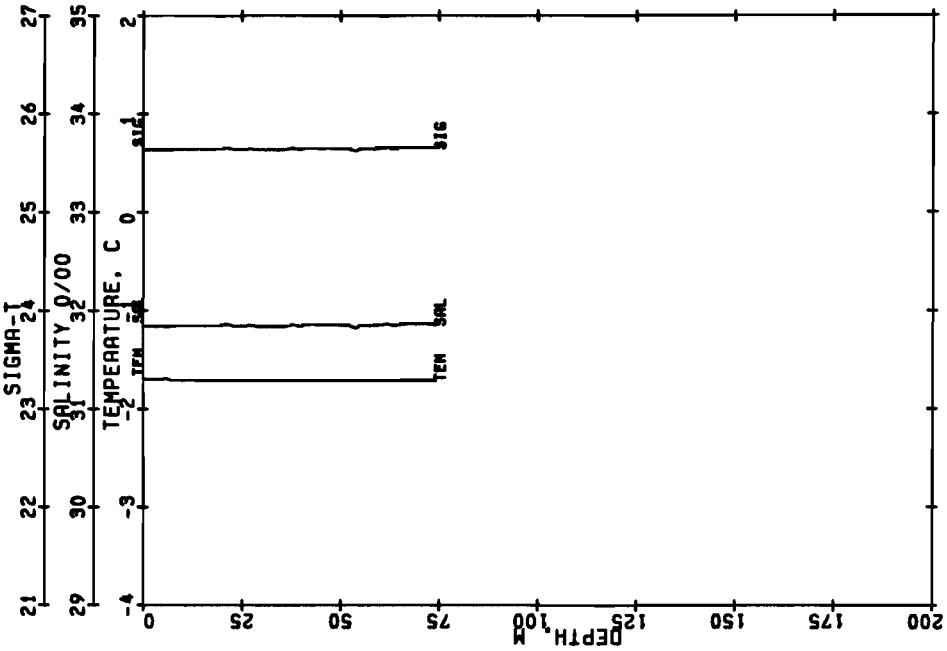

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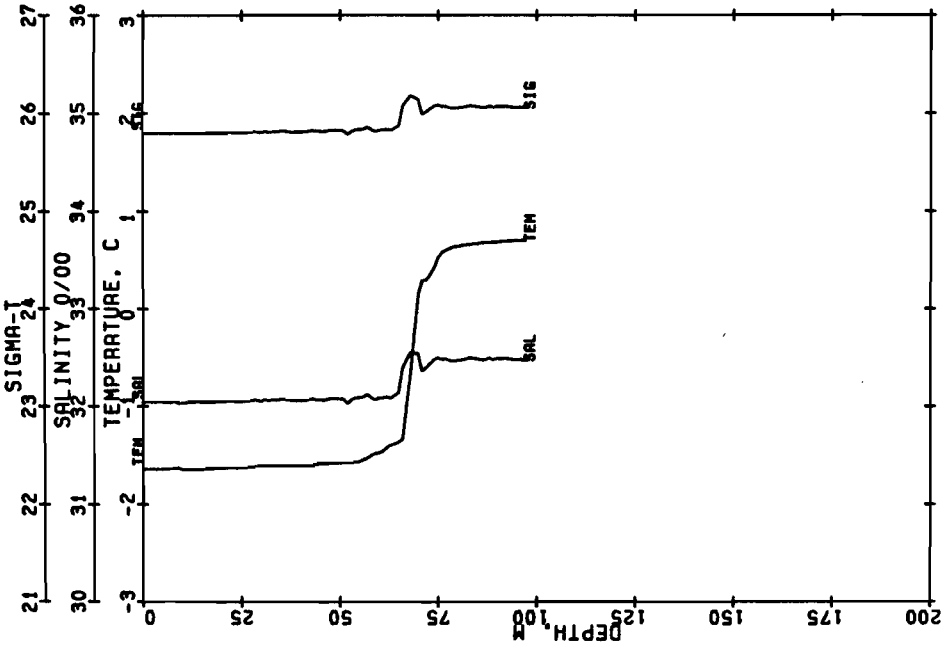

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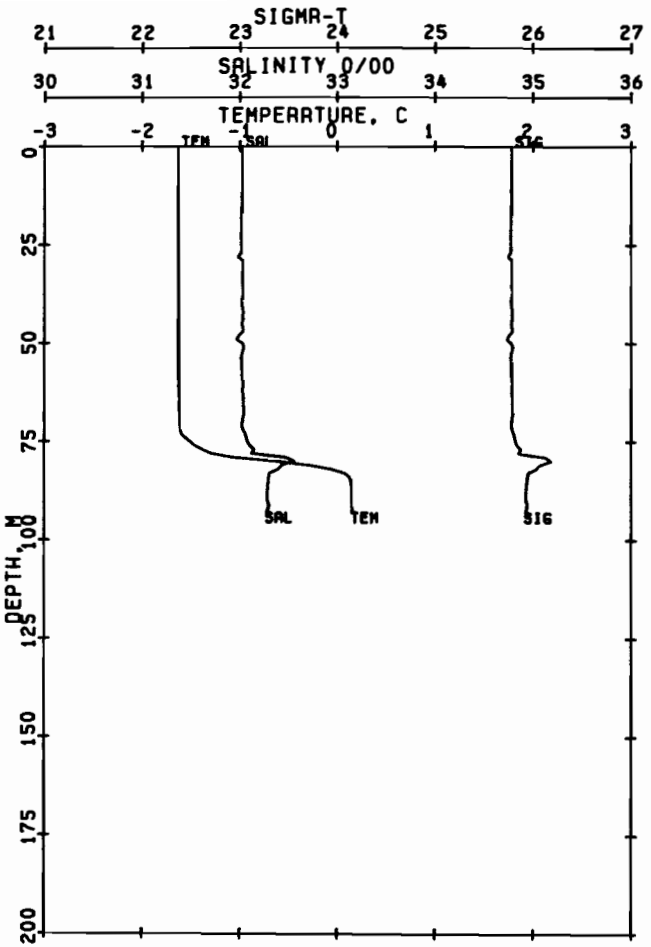

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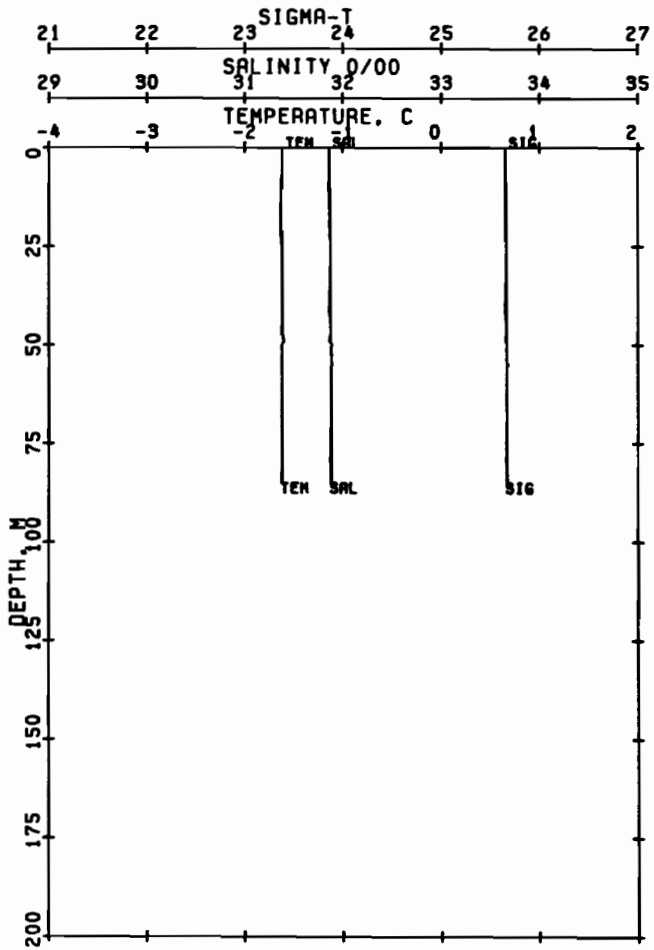

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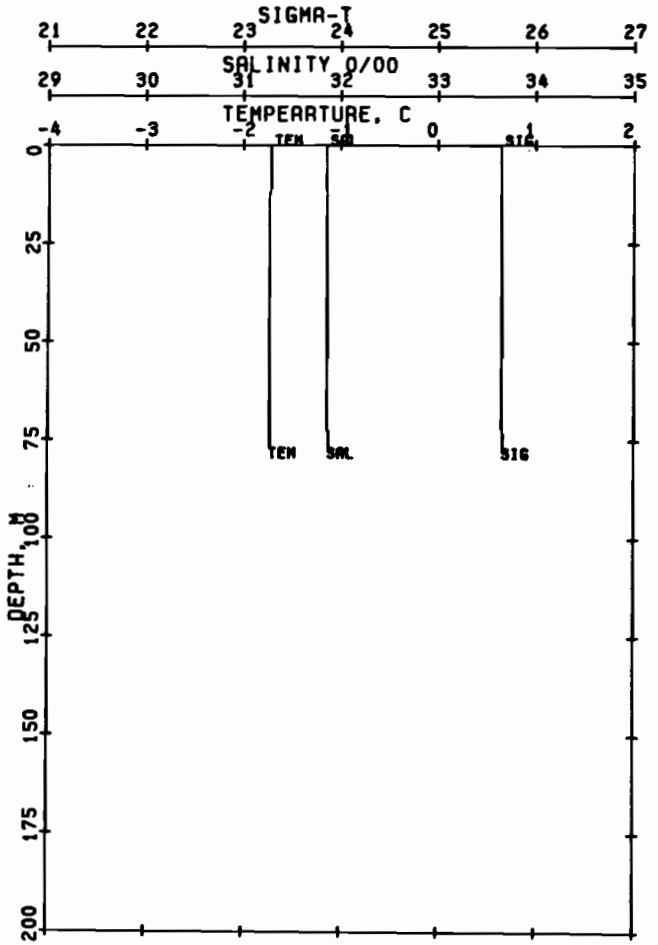

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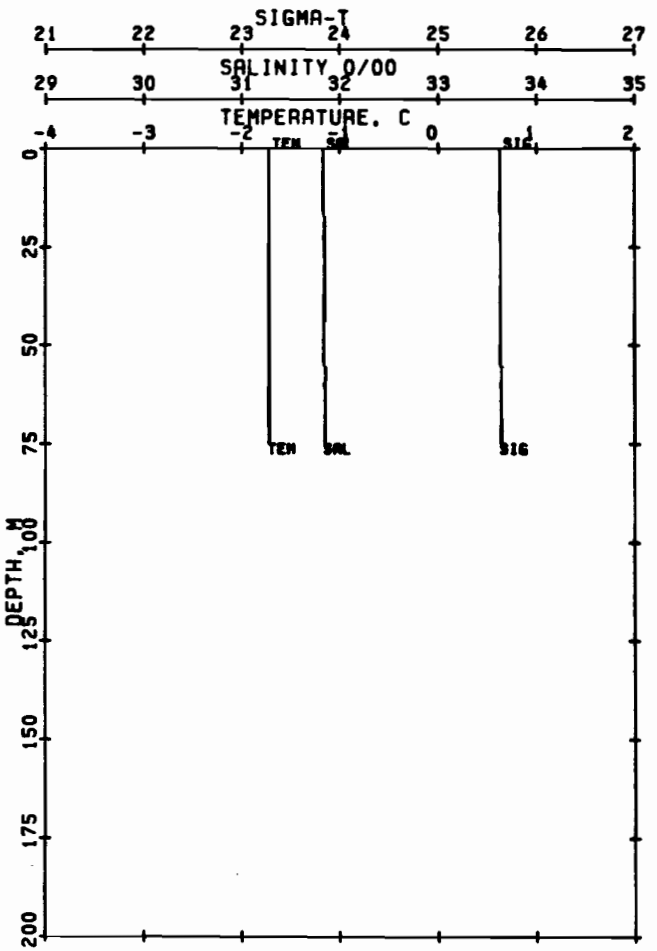

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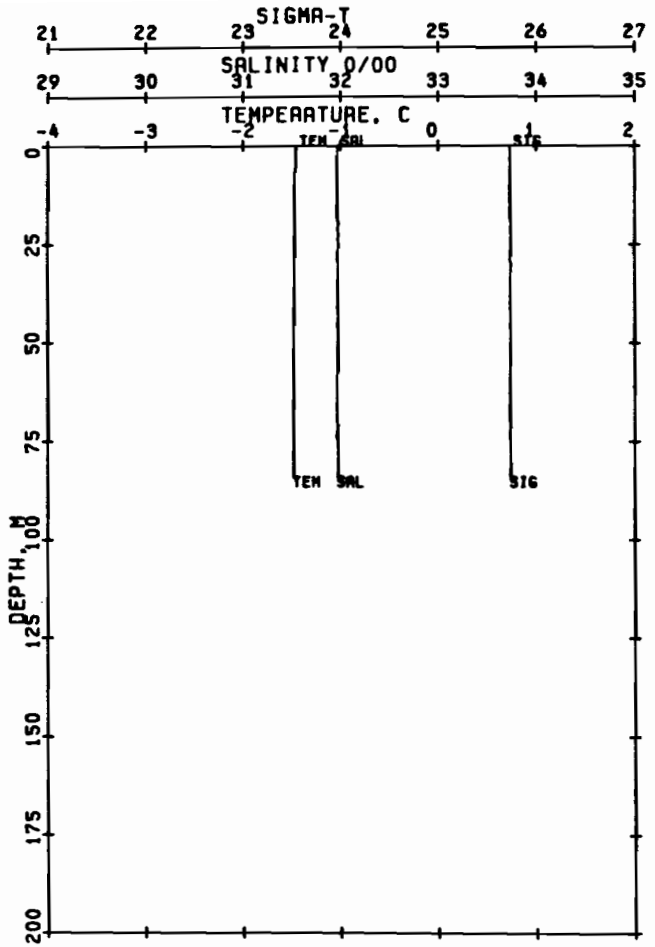

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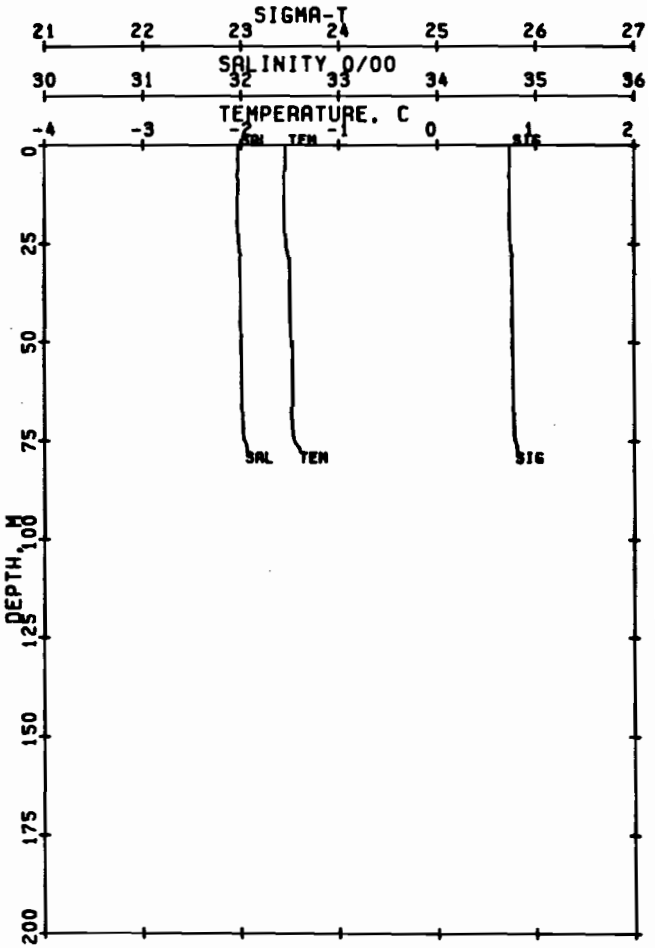

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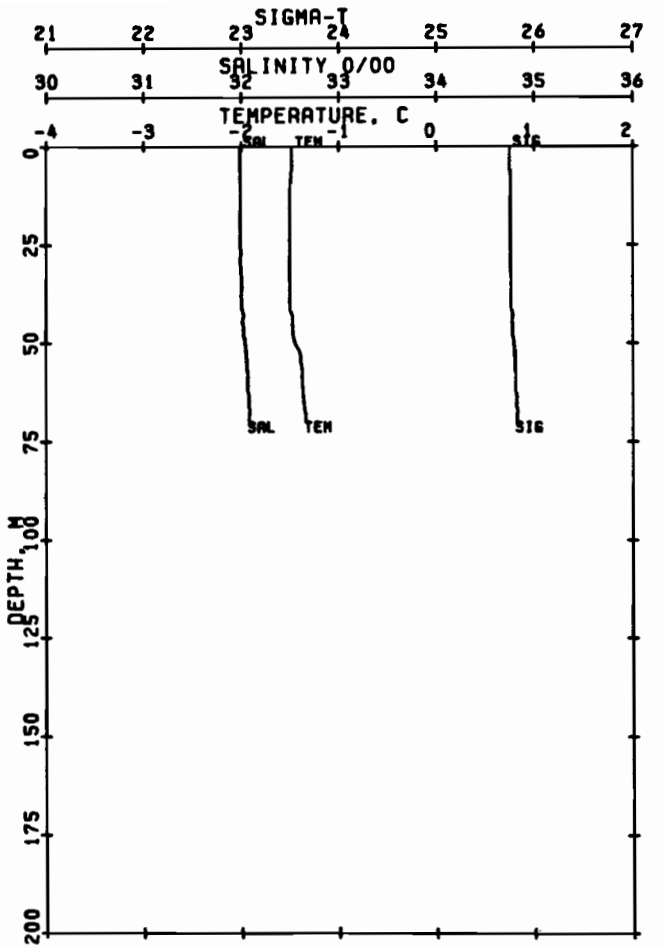

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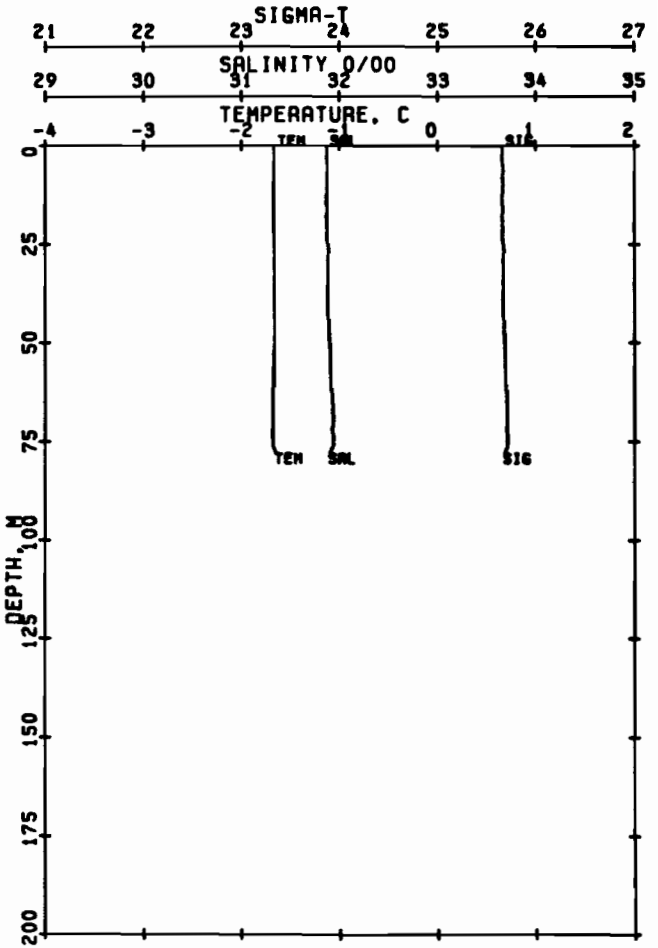

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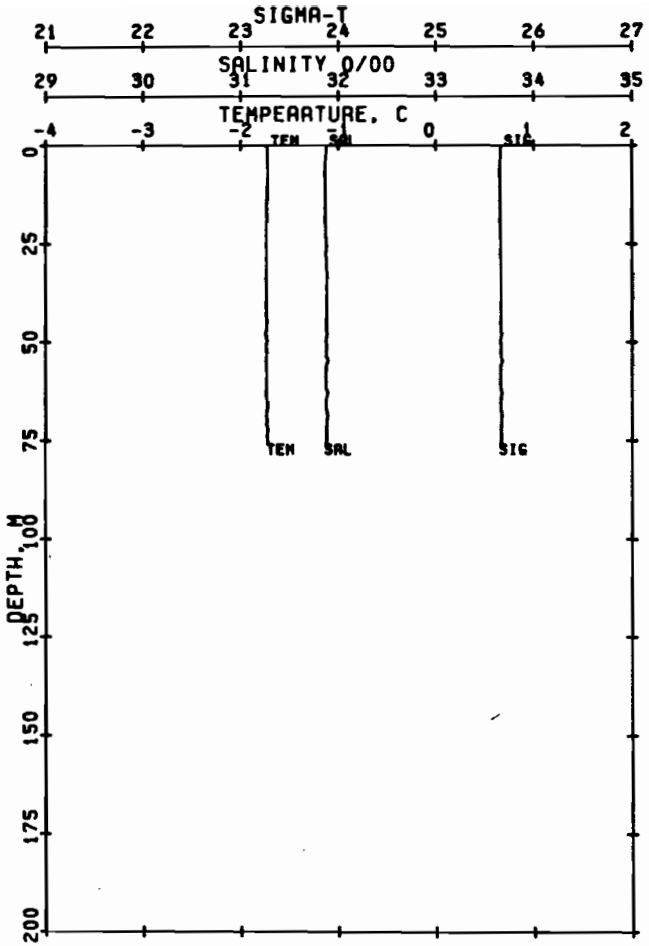

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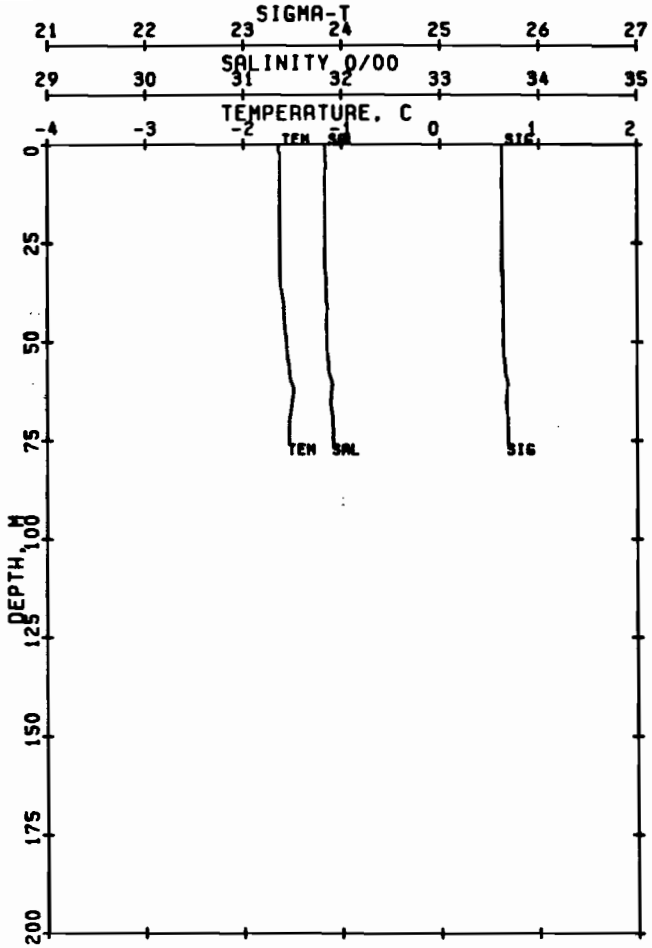

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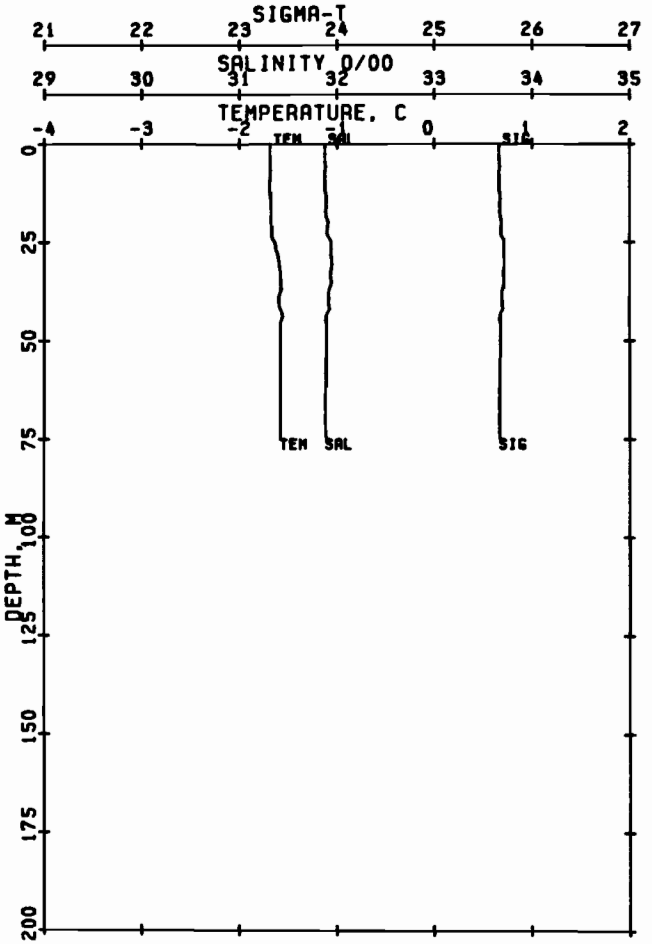

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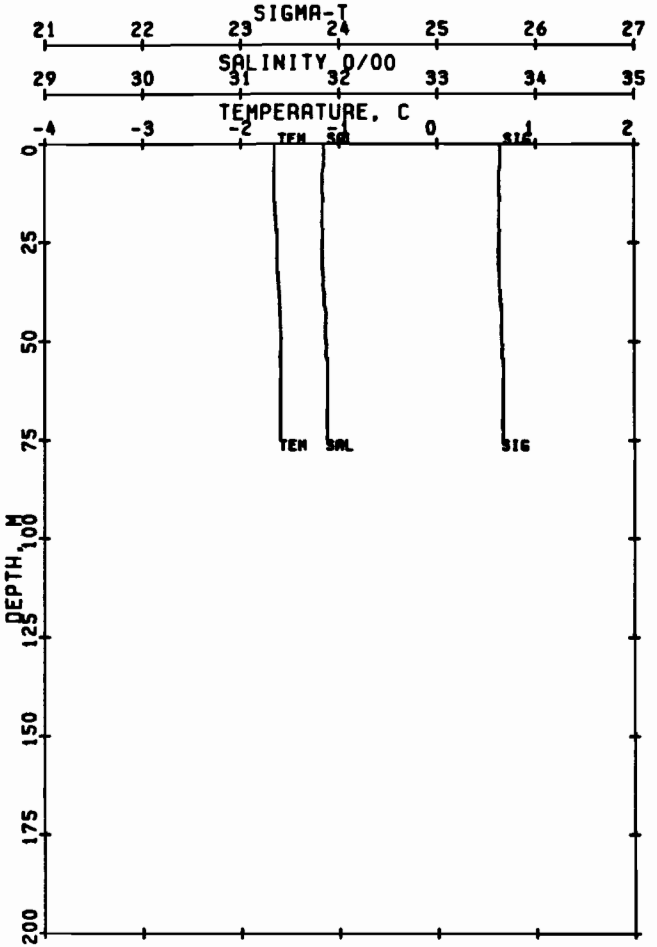

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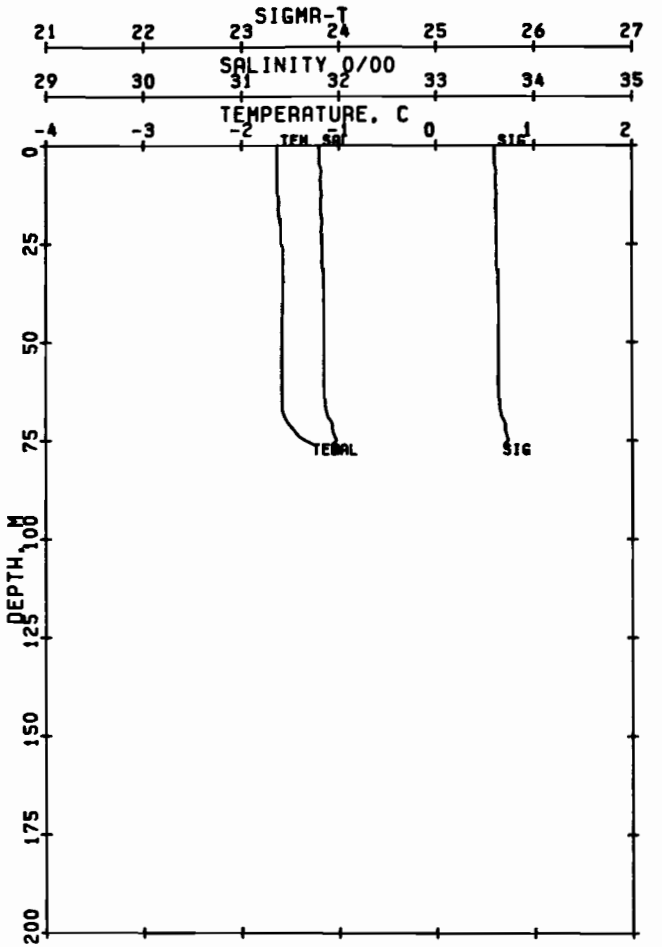

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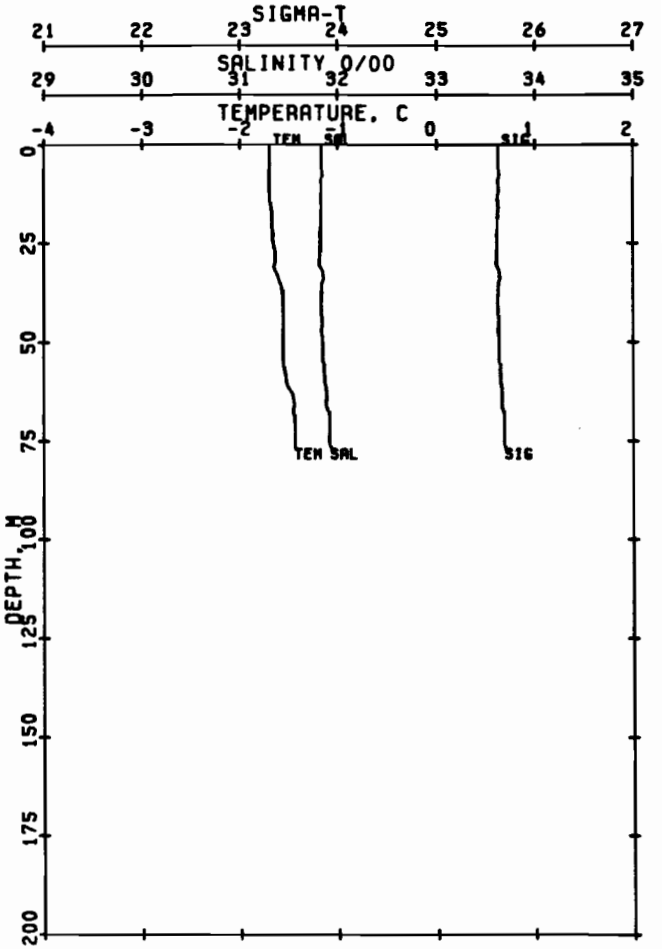

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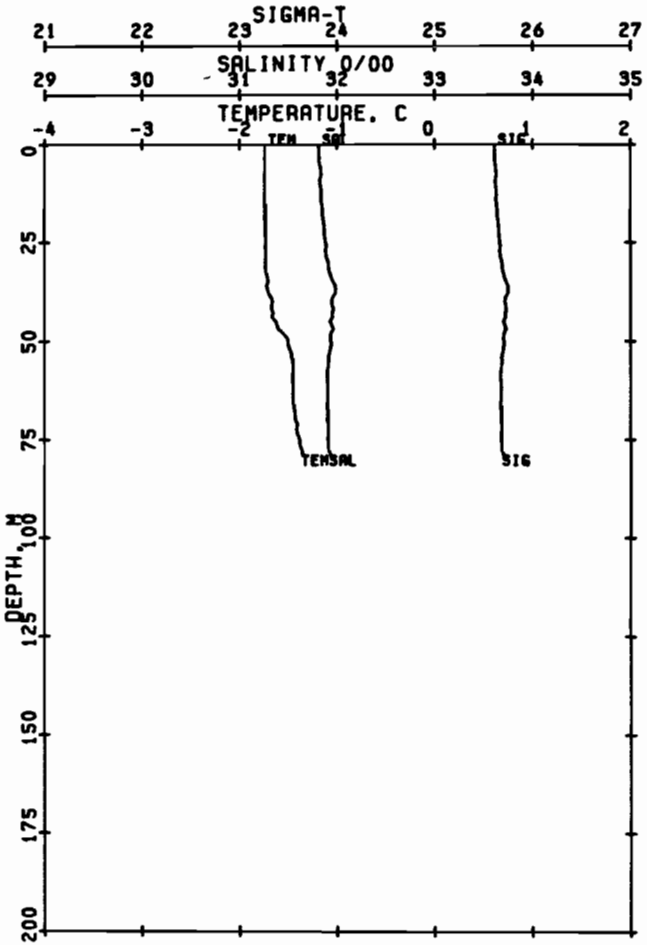

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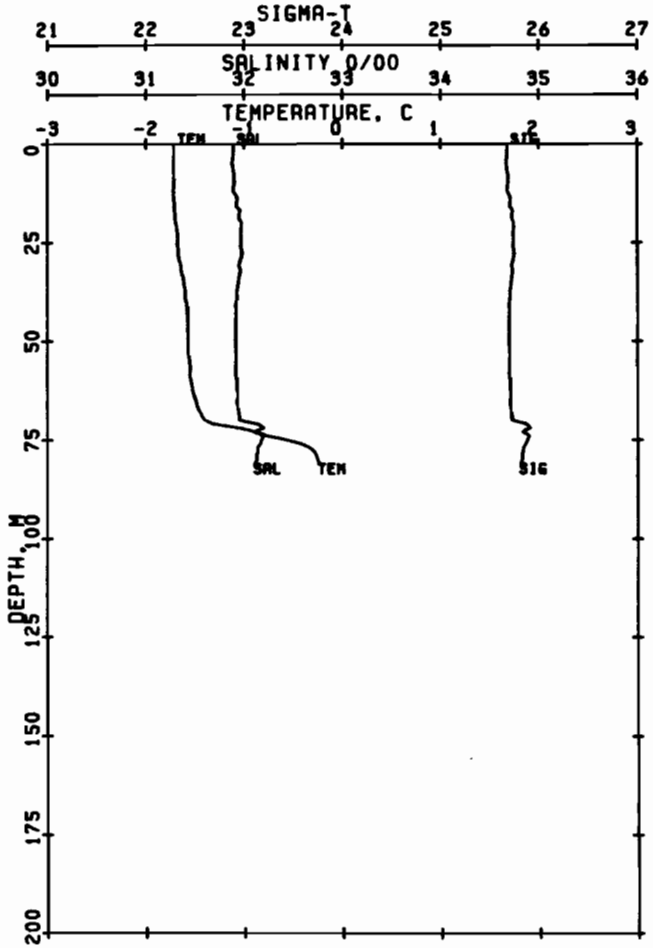

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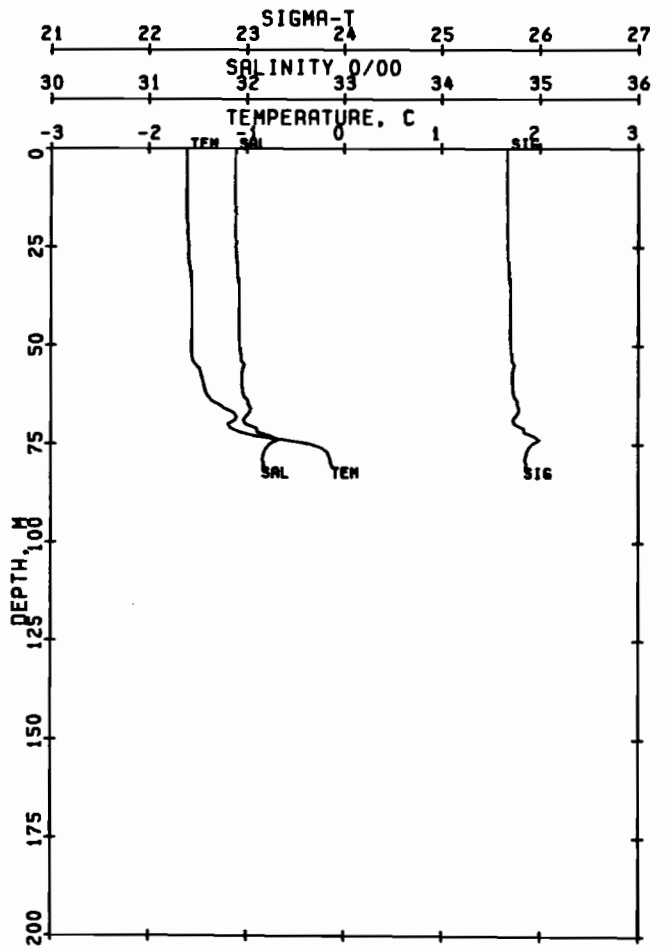

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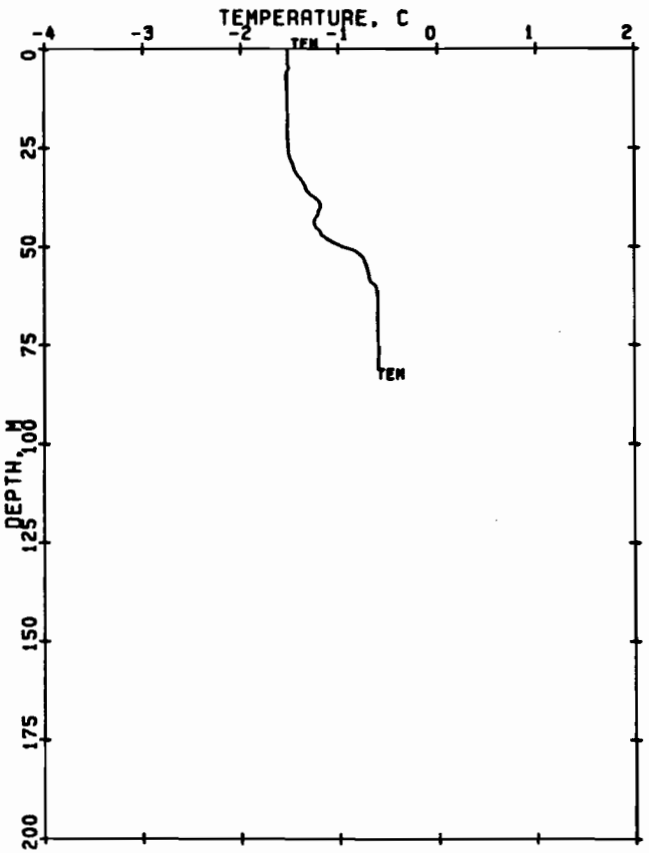

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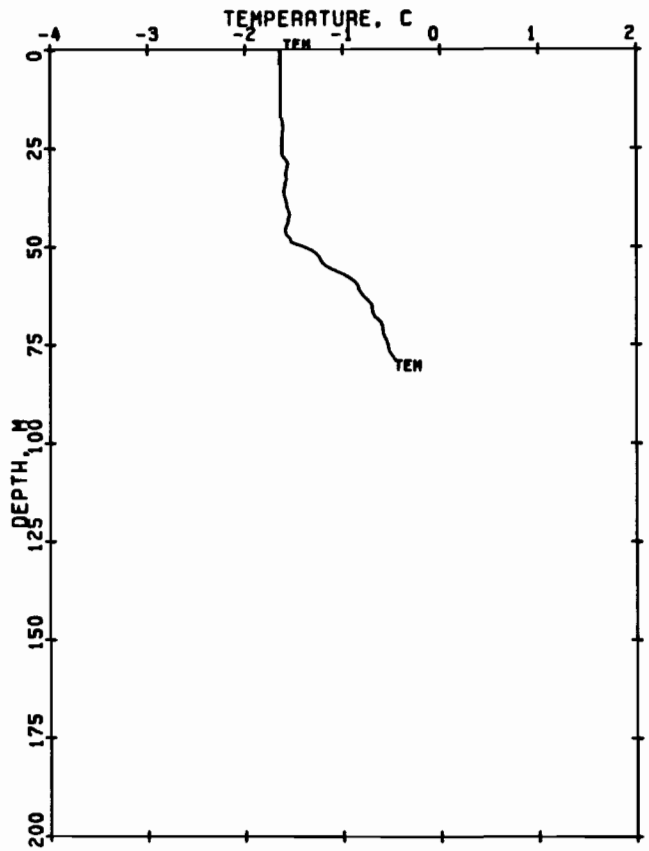

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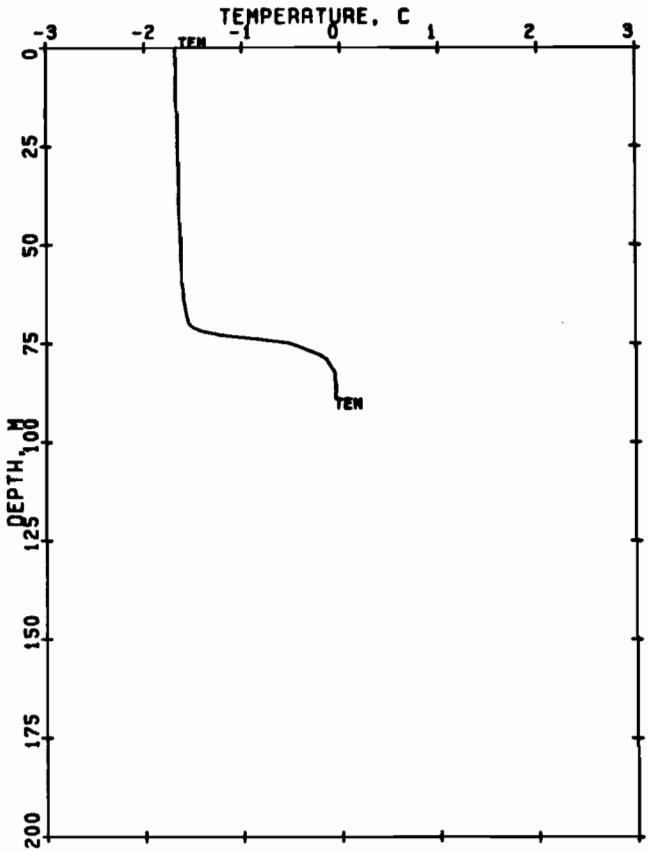

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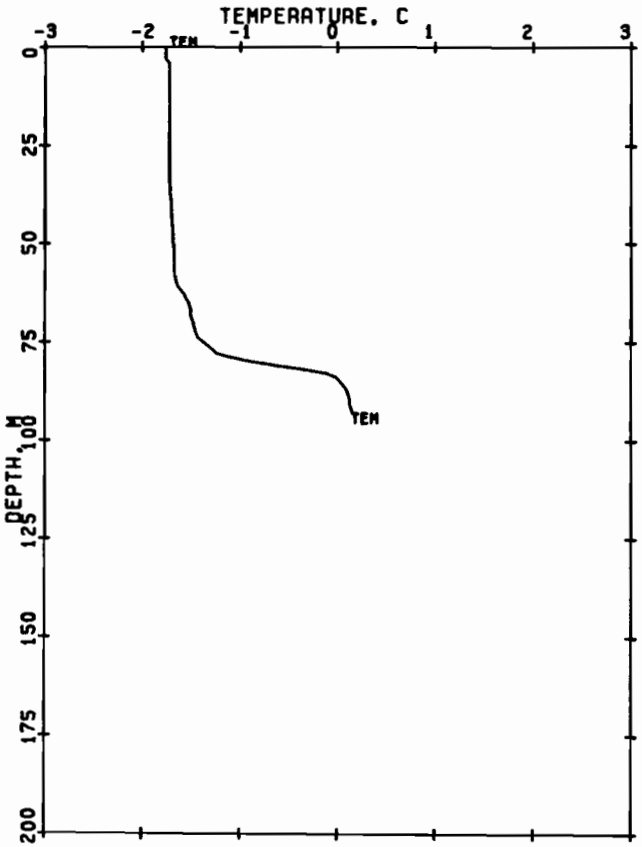

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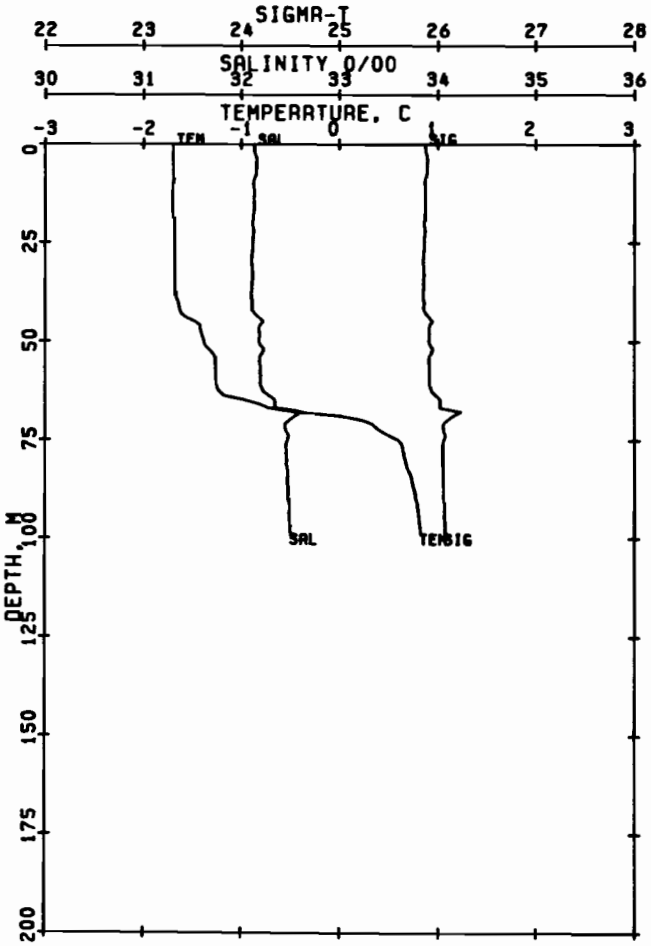

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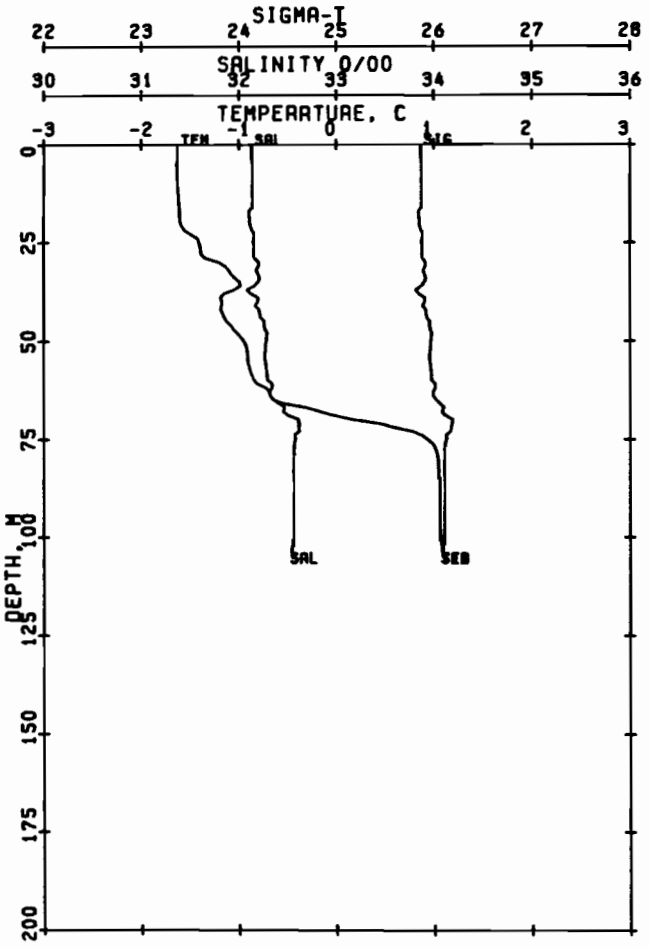

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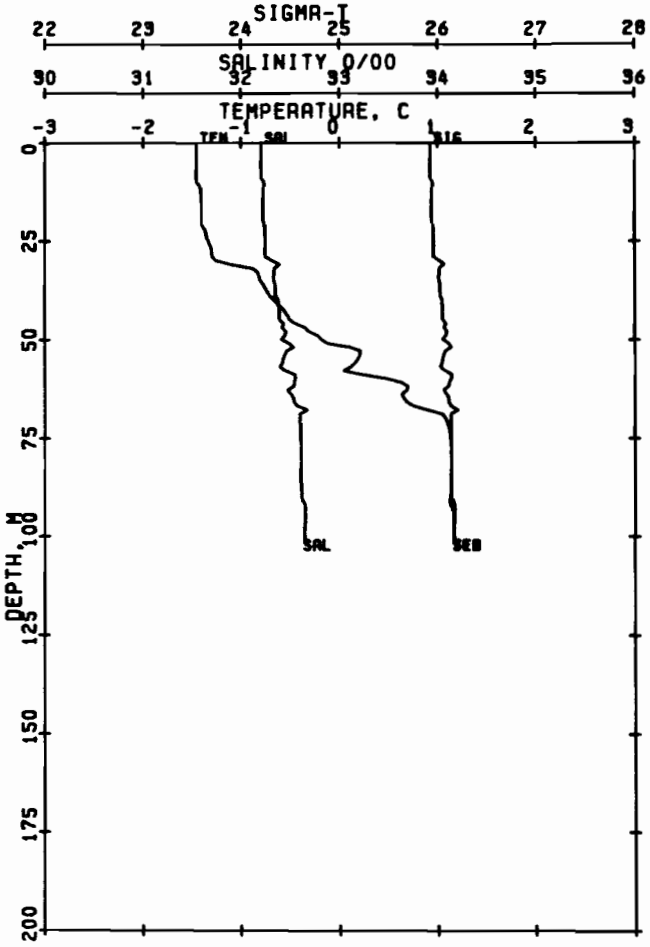
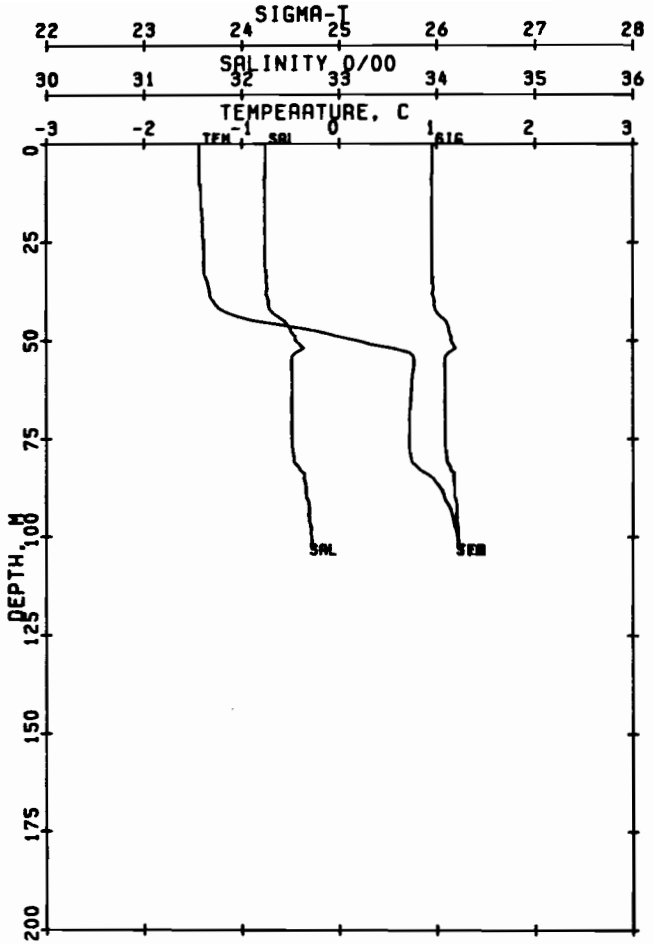
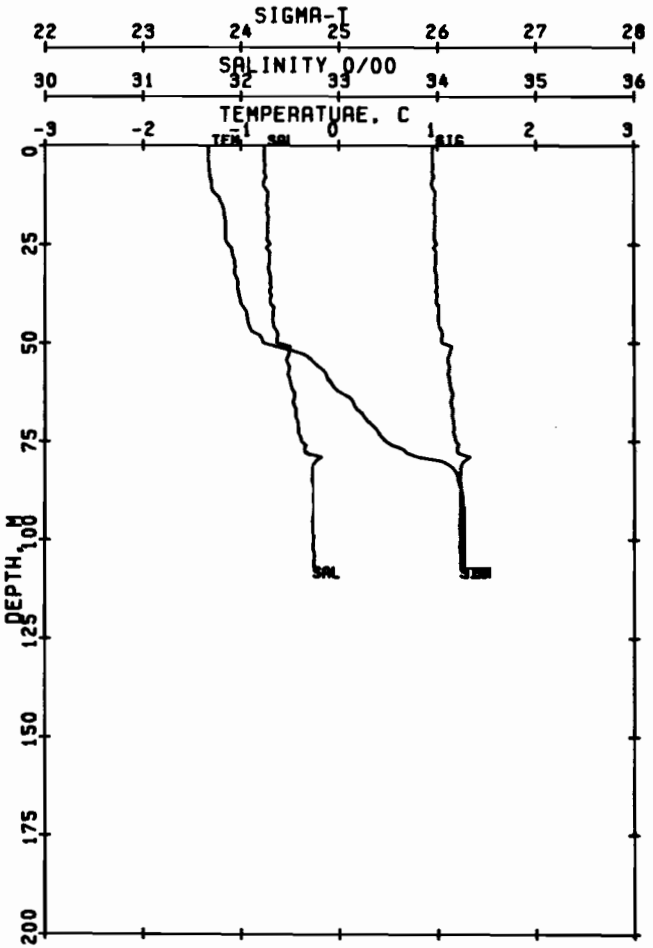


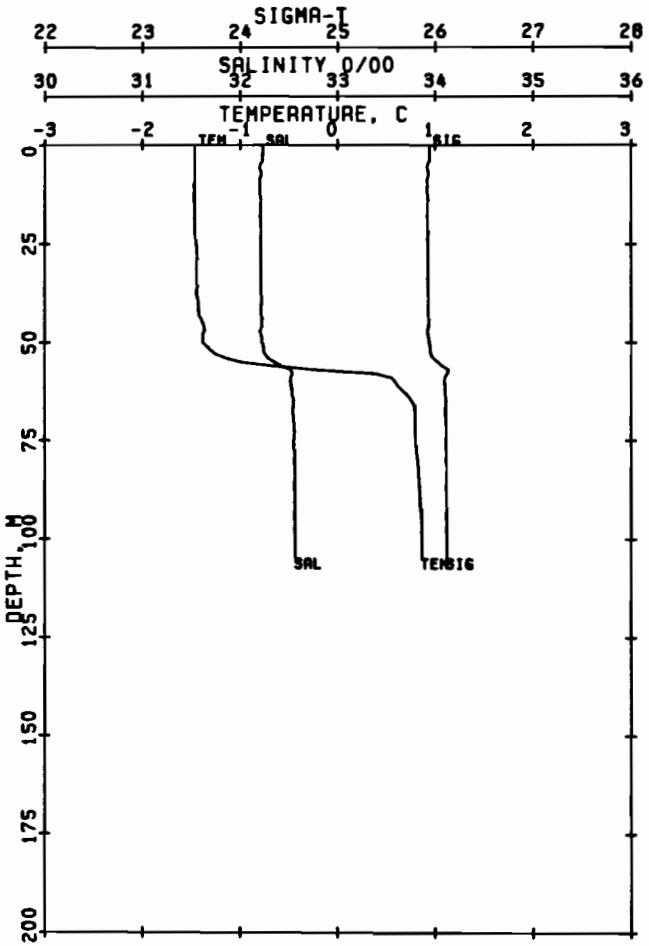
REF. NO. 48 3293 STA. 1050 58.71 N
TIME = 810670915 RP4SUB1A 23 48 172.59 W



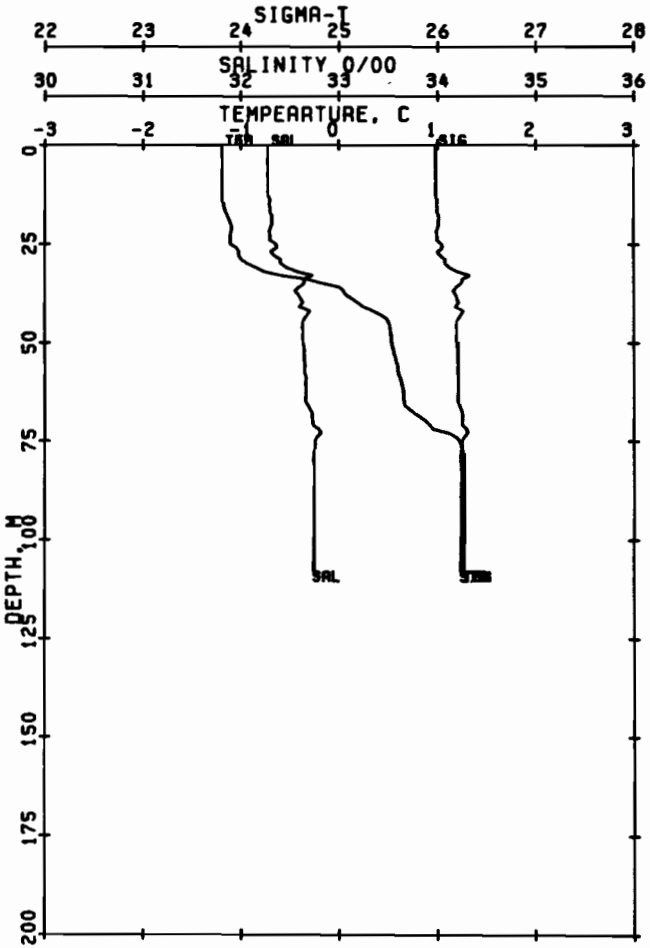
REF. NO. 49 3294 STA. 105P 58.69 N
TIME = 810671242 RP4SUB1A 23 49 172.72 W



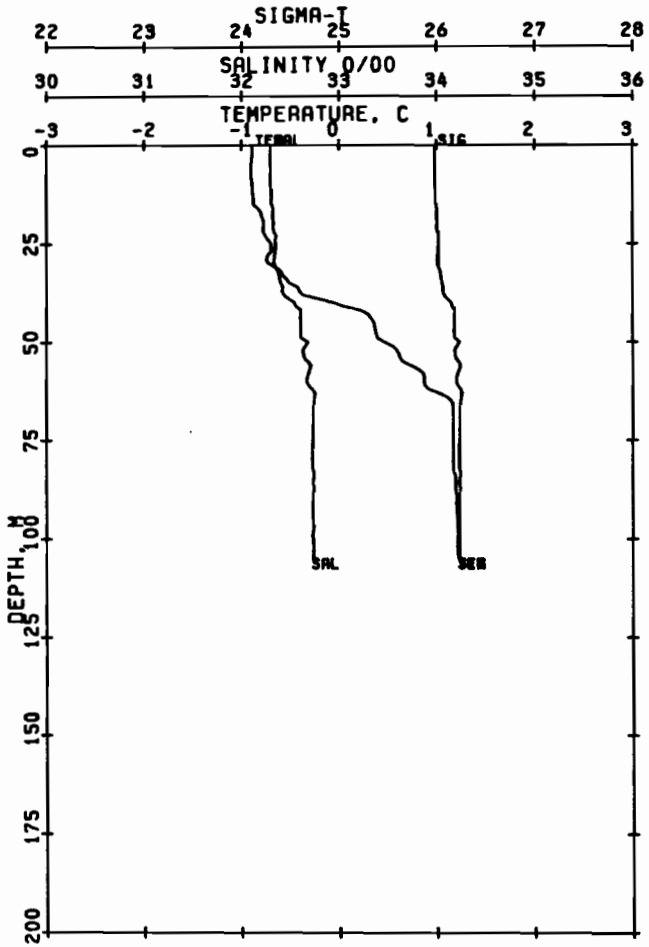
REF. NO. 50 3295 STA. 105Q 58.73 N
TIME = 810671654 RP4SUB1A 23 50 172.53 W



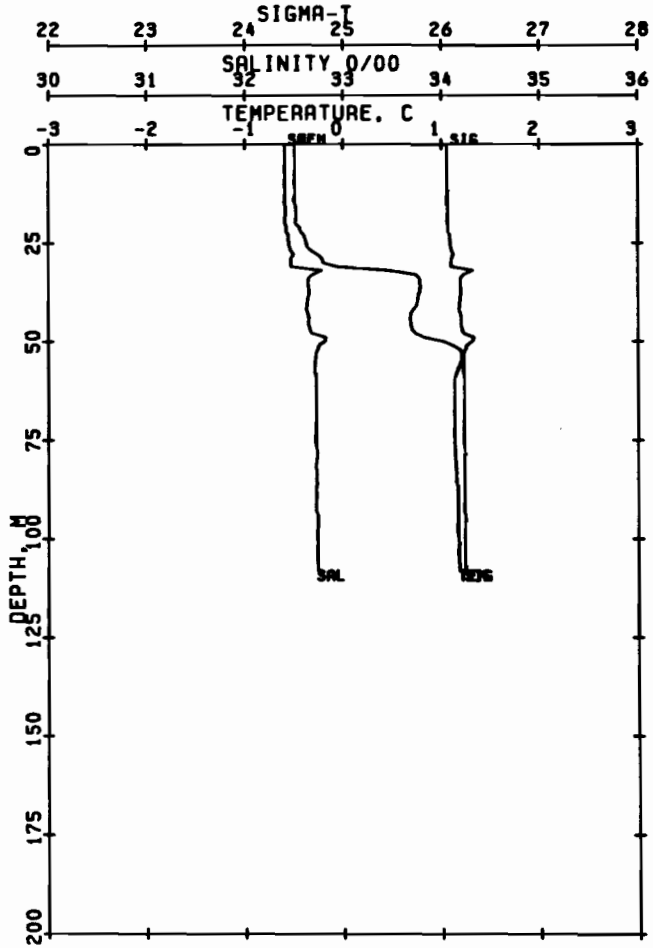
REF. NO. 51 3296 STA. 106 58.78 N
TIME = 810671913 RP4SUB1A 23 51 172.84 W



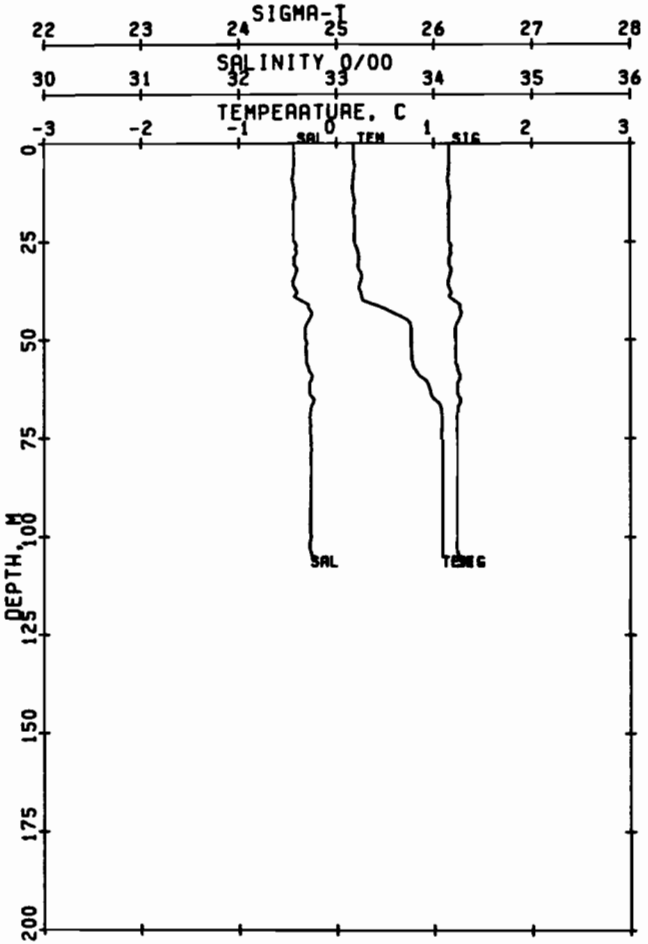
REF. NO. 52 3297 STA. 107 58.73 N
TIME = 810672029 RP4SUB1A 23 52 172.93 W



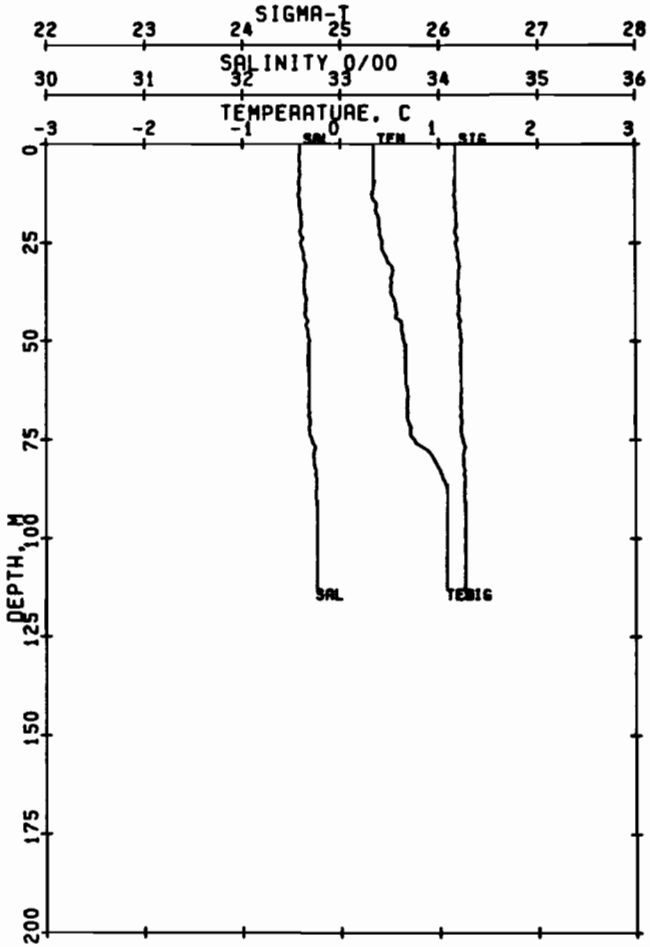
REF. NO. 53 3298 STA. 108 58.68 N
TIME = 810672212 RP4SUB1A 23 53 172.94 W



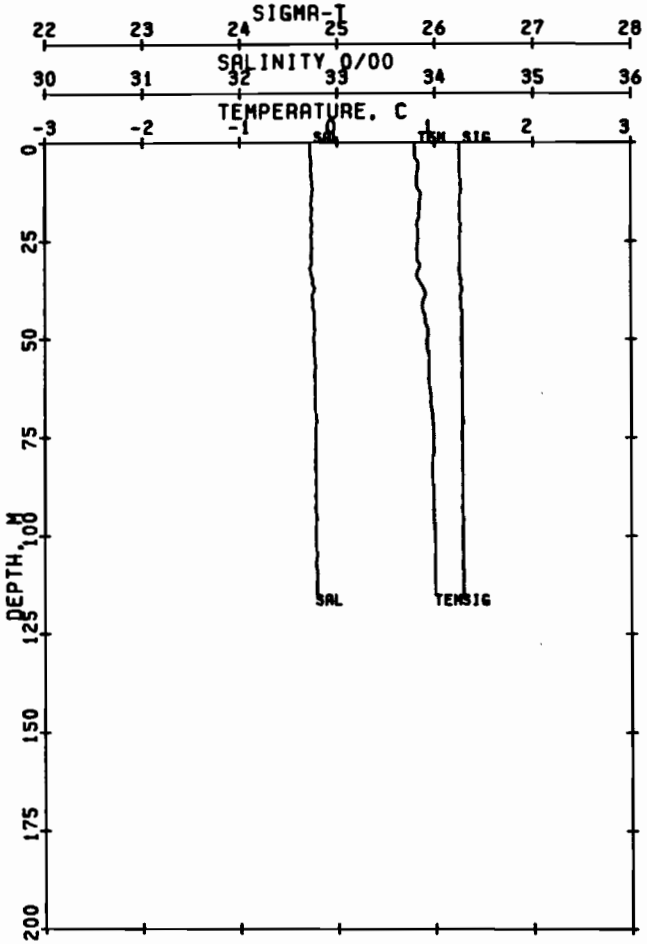
REF. NO. 54 3299 STA. 109 58.65 N
TIME = 810672340 RP4SUB1A 23 54 172.98 W



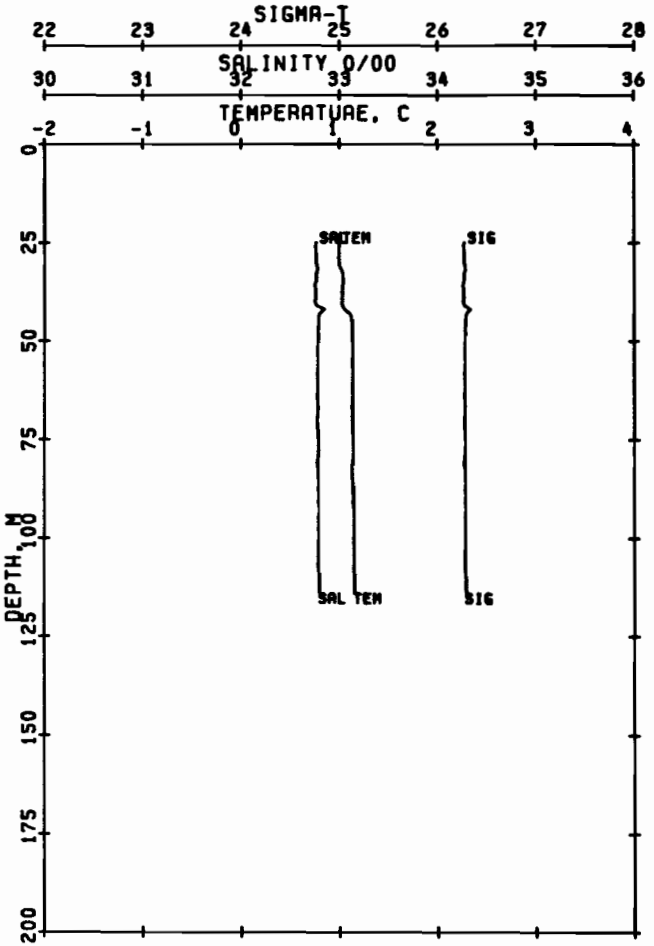
REF. NO. 55 3300 STA. 110 58.59 N
TIME = 810680110 AP4SUB1A 23 55 173.05 W



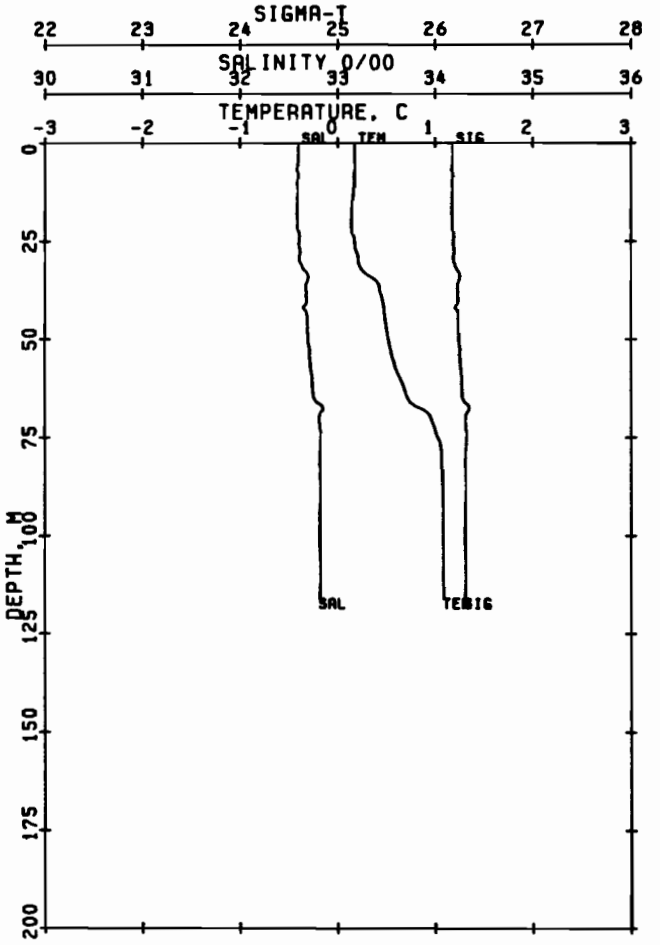
REF. NO. 56 3301 STA. 105A 58.63 N
TIME = 810680439 AP4SUB1A 23 56 173.26 W



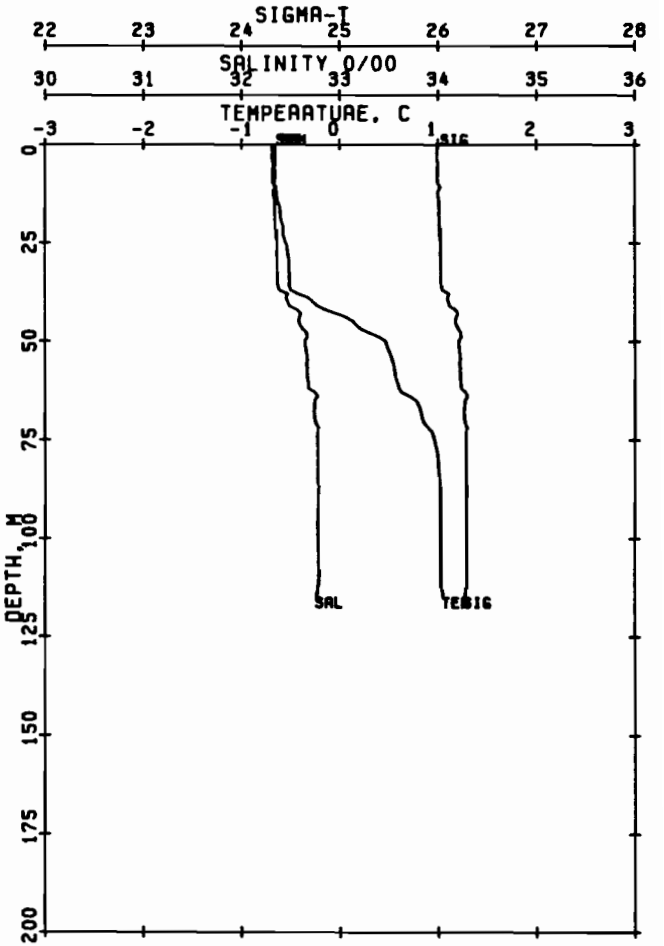
REF. NO. 57 3302 STA. 105S 58.58 N
TIME = 810680844 RP4SUB1A 23 57 173.39 W



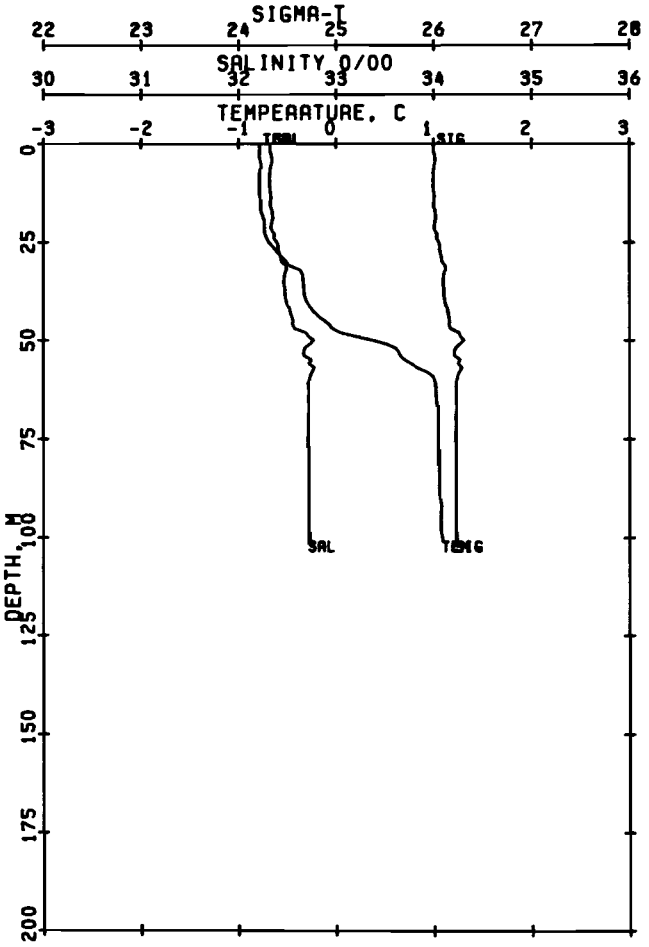
REF. NO. 58 3303 STA. 105T 58.52 N
TIME = 810681232 RP4SUB1A 23 58 173.49 W



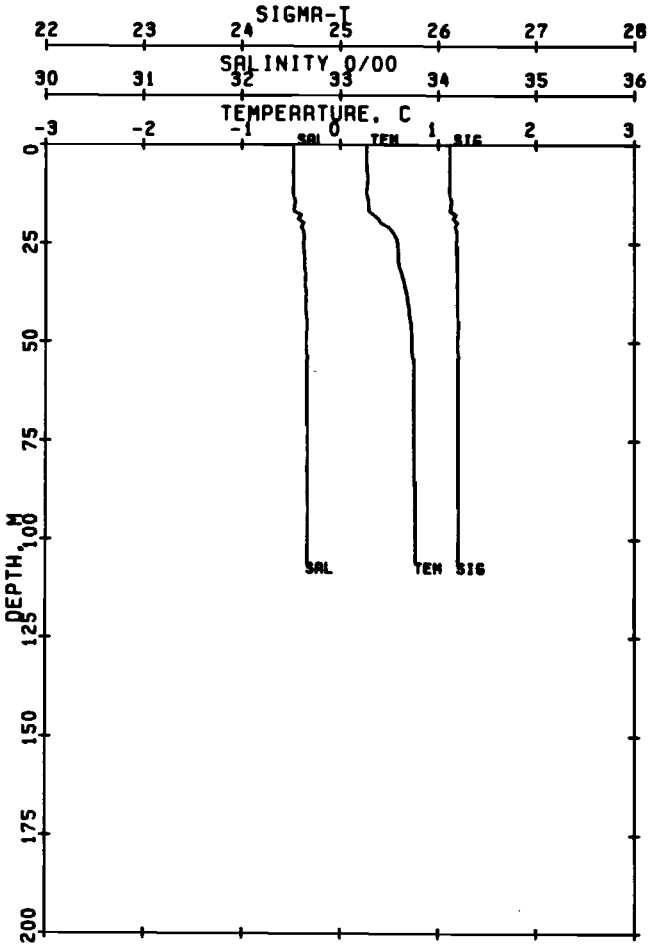
REF. NO. 59 3304 STA. 105U 58.57 N
TIME = 810691940 RP4SUB1A 23 60 173.34 W



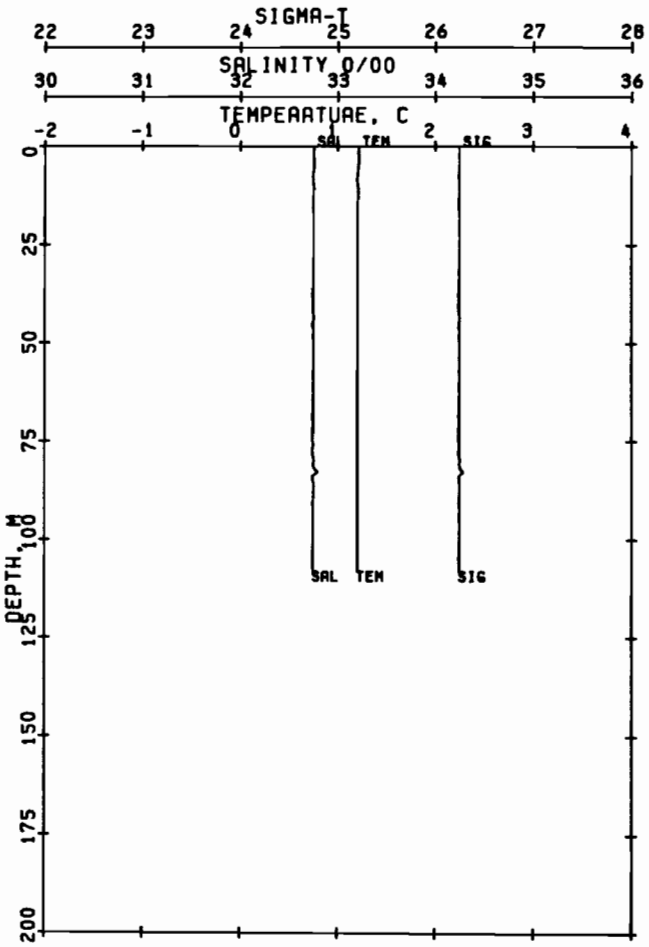
REF. NO. 60 3305 STA. 105V 58.65 N
TIME = 810692348 RP4SUB1A 23 61 173.21 W



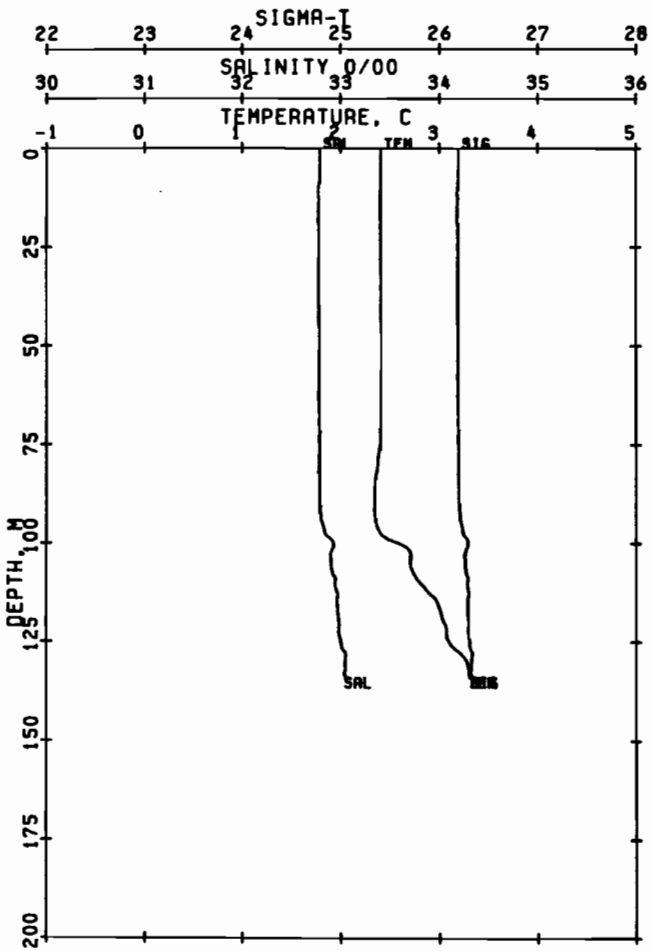
REF. NO. 61 3306 STA. BC24 58.47 N
TIME = 810700236 RP4SUB1A 2362 172.73 W



REF. NO. 62 3307 STA. 178 58.29 N
TIME = 810700513 RP4SUB1A 2363 173.07 W



REF. NO. 63 3308 STA. 018B 58.07 N
TIME = 810700703 RP4SUB1A 23 64 173.37 W



REF. NO. 64 3309 STA. 019B 57.87 N
TIME = 810700851 RP4SUB1A 23 65 173.72 W

APPENDIX B

Hourly Surface Meteorological and Oceanographic Measurements from the NOAA Ship SURVEYOR

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/2/22	18	57.728	152.515	999.4	000	0.0	2.0	1.0				
81/2/22	21	57.735	152.387	1001.8	221	2.1	5.2	3.8	1.1	0.0	110	0.3
81/2/22	22	57.653	152.048	1002.4	197	5.2	5.2	3.0	4.4	0.6	170	1.8
81/2/22	23	57.317	152.060	1003.3	221	3.1	4.8	3.0	3.9	0.6	170	1.8
81/2/23	0	57.325	152.222	1003.6	285	1.5	5.0	3.3	3.9	0.0	185	2.4
81/2/23	1	57.185	152.470	1003.9	149	2.6	4.2	3.0	4.4	0.3	185	2.4
81/2/23	2	57.053	152.683	1005.5	225	3.1	3.6	-99.0	3.9	0.0	190	2.4
81/2/23	3	56.903	153.920	1006.0	225	4.1	1.1	-99.0	3.9	0.0	190	2.4
81/2/23	4	56.752	153.705	1007.2	260	9.3	2.8	-99.0	3.9	0.3	180	2.4
81/2/23	5	56.632	153.473	1008.0	305	14.4	0.0	-2.2	3.9	0.6	175	2.4
81/2/23	6	56.492	153.688	1010.4	311	14.9	1.4	-99.0	3.9	0.9	280	2.7
81/2/23	7	56.357	153.942	1011.9	311	17.5	1.1	1.2	3.5	0.9	290	2.7
81/2/23	8	56.260	154.228	1114.2	330	16.5	-1.5	-1.7	3.3	0.9	310	2.7
81/2/23	9	56.208	154.532	1016.4	337	13.4	-1.4	-1.6	2.8	0.9	305	2.4
81/2/23	10	56.165	154.853	1017.5	306	9.3	0.0	-1.1	3.3	0.6	285	2.4
81/2/23	11	56.140	155.132	1018.2	303	11.8	-.5	-2.2	2.8	0.9	285	3.1
81/2/23	12	56.107	155.337	1018.8	305	12.4	-1.2	-2.6	2.8	0.9	290	3.1
81/2/23	13	56.052	155.537	1019.0	313	12.4	-1.3	-3.0	2.8	0.9	290	3.1
81/2/23	14	55.978	155.733	1020.8	308	9.3	-3.5	-5.0	3.3	0.9	290	3.1
81/2/23	15	55.928	155.983	1020.5	310	10.3	-3.6	-5.9	3.3	0.9	290	3.1
81/2/23	16	55.897	156.233	1021.0	328	5.2	-3.8	-6.1	3.3	0.6	330	2.4
81/2/23	17	55.870	156.573	1021.3	290	4.1	-4.0	-6.1	3.3	0.6	340	1.5
81/2/23	18	55.850	156.955	1020.6	331	2.1	-3.9	-5.0	3.3	0.3	310	1.2
81/2/23	19	55.833	157.352	1020.6	129	3.1	-2.6	-4.2	3.3	0.3	320	1.2
81/2/23	20	55.787	157.762	1020.5	154	5.2	-1.4	-2.6	3.3	0.3	210	1.2
81/2/23	21	55.735	158.133	1019.3	160	5.7	-.8	-2.2	3.3	0.3	210	1.2
81/2/23	22	55.683	158.513	1018.8	147	6.2	-.1	-2.2	3.3	0.3	210	0.9
81/2/23	23	55.625	158.888	1017.2	122	7.7	1.0	-1.1	3.3	0.3	160	0.6
81/2/24	0	55.653	158.997	1015.9	107	6.2	1.8	.6	2.8	0.3	160	0.6
81/2/24	1	85.552	159.385	1013.2	080	9.3	1.5	1.1	2.8	0.6	160	0.6
81/2/24	2	55.518	159.708	1010.0	060	11.3	0.0	-.5	2.8	0.3	100	0.6
81/2/24	3	55.587	160.053	1008.4	060	14.4	.5	-.7	2.8	0.3	060	1.2
81/2/24	4	55.392	160.427	1006.2	060	12.9	1.0	1.0	2.8	0.6	060	1.2
81/2/24	5	55.417	160.805	1003.8	060	14.4	1.2	1.2	2.8	0.6	060	1.5
81/2/24	6	55.310	161.088	1001.3	065	11.3	4.0	3.4	2.2	0.6	060	1.5
81/2/24	7	55.297	161.463	998.2	107	12.4	4.1	3.8	1.1	0.6	100	1.5
81/2/24	8	55.207	161.812	995.4	128	10.3	3.8	3.6	1.1	0.6	110	1.5
81/2/24	9	55.073	161.897	992.8	120	11.8	3.8	3.6	1.1	0.6	130	1.5
81/2/24	10	55.015	162.185	991.1	186	3.6	3.8	3.7	1.7	0.3		
81/2/24	11	55.063	162.533	987.8	142	17.0	4.2	3.8	1.7	0.6	170	1.2
81/2/24	12	55.072	162.550	984.0	141	18.0	5.0	4.5	1.7	0.9	165	1.8

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/2/24	13	55.072	162.550	981.8	145	22.7	4.8	4.0	.6	0.9	165	1.8
81/2/24	14	55.072	162.550	980.0	140	19.6	4.2	4.0	2.8	0.9	165	1.8
81/2/24	15	55.072	162.550	978.7	135	14.9	4.3	4.0	2.8	0.9	165	1.8
81/2/24	16	55.072	162.550	977.5	135	19.6	4.0	3.8	2.8	0.9	160	1.8
81/2/24	17	55.072	162.550	977.8	150	12.4	3.2	3.0	2.8	0.9	160	1.8
81/2/24	18	55.072	162.550	977.9	169	13.4	3.1	3.0	2.8	0.9	165	1.8
81/2/24	19	55.080	162.550	979.5	158	7.7	3.0	2.6	0.0	0.6	165	1.5
81/2/24	20	54.987	162.468	980.0	109	8.2	3.8	2.8	0.0	0.6	210	1.5
81/2/24	21	54.843	162.660	981.4	280	5.2	4.2	3.4	.6	0.6	240	1.5
81/2/24	22	54.717	162.910	981.8	211	11.8	4.0	3.8	1.7	0.9	230	1.5
81/2/24	23	54.603	163.158	983.3	218	12.9	3.8	3.1	1.7	0.9	235	1.8
81/2/25	0	54.550	163.452	983.6	227	15.4	3.8	2.8	2.8	1.2	235	1.8
81/2/25	1	54.498	163.722	985.0	225	16.0	4.2	3.2	2.2	1.2	235	1.8
81/2/25	2	54.452	163.988	986.0	195	11.3	4.5	3.5	2.8	1.2	235	3.1
81/2/25	3	54.410	164.170	986.5	195	16.5	4.0	3.0	2.8	1.2	225	3.1
81/2/25	4	54.347	164.377	987.1	190	15.4	4.0	3.0	2.9	1.2	225	4.0
81/2/25	5	54.297	164.680	987.5	190	17.5	3.9	2.8	2.8	1.2	220	4.0
81/2/25	6	54.398	165.035	987.7	192	13.9	3.8	2.8	2.2	0.9	245	2.1
81/2/25	7	54.532	165.342	987.1	180	13.9	3.2	2.6	3.3	0.9	210	2.1
81/2/25	8	54.655	165.638	986.9	170	11.8	3.8	2.8	3.0	0.9	210	2.1
81/2/25	9	54.788	165.940	986.4	164	9.3	3.7	2.6	3.2	0.6	190	1.8
81/2/25	10	54.913	166.223	986.2	171	9.8	3.8	2.8	2.9	0.6	210	1.2
81/2/25	11	55.037	166.508	985.8	159	8.8	3.5	2.6	3.1	0.6	200	1.2
81/2/25	12	55.145	166.808	985.5	179	8.8	3.2	2.6	3.2	0.6	200	1.2
81/2/25	13	55.282	167.083	985.3	189	11.8	3.2	2.7	3.0	0.6	200	1.2
81/2/25	14	55.390	167.357	984.8	175	12.4	3.9	3.0	3.4	0.6	200	1.2
81/2/25	15	55.527	167.678	984.5	175	10.8	3.2	2.9	3.4	0.6	210	1.2
81/2/25	16	55.650	167.980	984.0	180	5.7	3.5	2.1	3.3	0.6	210	1.2
81/2/25	17	55.720	168.147	984.0	180	5.2	3.9	2.9	3.4	0.3	210	0.9
81/2/25	18	55.898	168.600	984.0	184	7.7	3.1	2.2	3.4	0.3	210	0.9
81/2/25	19	56.018	168.910	984.0	170	5.2	3.2	2.8	3.7	0.3	190	0.9
81/2/25	20	56.142	169.228	984.3	015	10.3	0.0	0.0	3.6	0.6	015	1.5
81/2/25	21	56.262	169.543	984.9	025	10.3	-.6	-.8	3.3	0.6	020	1.8
81/2/25	22	56.375	169.842	986.2	020	10.3	-2.2	-3.0	2.6	0.9	355	1.2
81/2/25	23	56.495	170.168	987.2	007	10.8	-3.7	-4.2	2.7	0.9	355	1.5
81/2/26	0	56.602	170.465	988.1	004	10.3	-5.0	-5.5	2.9	0.9	340	1.5
81/2/26	1	56.705	170.715	989.0	360	8.8	-6.0	-6.4	2.9	0.9	335	1.5
81/2/26	2	56.797	170.950	990.6	350	8.2	-6.8	-7.0	2.9	0.6	360	1.5
81/2/26	3	56.902	171.218	991.5	028	7.2	-7.3	-7.3	2.7	0.6	360	1.2
81/2/26	4	56.992	171.437	992.8	020	7.7	-8.0	-8.0	2.4	0.6	360	1.2
81/2/26	5	57.072	171.543	993.8	025	7.2	-7.8	-8.0	2.7	0.6	360	1.2

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/2/26	6	57.177	171.958	994.6	354	3.6	-6.0	-7.2	2.5	0.3	310	1.2
81/2/26	7	57.280	172.215	995.0	350	6.2	-8.0	-8.3	2.2	0.6	340	1.2
81/2/26	8	57.382	172.467	995.6	356	7.2	-8.0	-8.2	2.1	0.6	345	1.2
81/2/26	9	57.480	172.717	996.5	351	3.6	-7.8	-8.0	2.1	0.6	350	1.2
81/2/26	10	57.580	172.968	997.5	355	5.2	-8.7	-9.1	2.3	0.6	340	1.2
81/2/26	11	57.677	173.222	997.8	003	6.7	-9.0	-9.5	2.2	0.6	340	1.2
81/2/26	12	57.772	173.468	998.4	006	5.7	-9.1	-9.7	2.5	0.6	355	1.2
81/2/26	13	57.865	173.715	999.2	004	3.6	-8.8	-9.3	2.8	0.3	020	0.9
81/2/26	14	57.903	173.642	999.5	020	4.1	-9.1	-9.5	2.6	0.3	010	0.9
81/2/26	15	57.995	173.497	999.8	015	5.2	-9.5	-9.9	2.3	0.3	010	0.9
81/2/26	16	58.040	173.423	1000.0	015	4.1	-7.0	-7.8	1.6	0.3	010	0.9
81/2/26	17	58.085	173.350	1000.5	020	3.1	-10.0	-10.0	1.9		010	0.6
81/2/26	18	58.163	173.230	1000.4	339	2.6	-10.6	-10.8	1.5	0.0	340	0.6
81/2/26	19	58.283	173.055	1001.2	047	3.6	-10.7	-11.2	.6	0.0	280	0.0
81/2/26	20	58.343	172.948	1001.2	021	4.6	-11.8	-12.0	-.4	0.0	170	0.0
81/2/26	21	58.465	172.685	1001.9	006	4.1	-12.5	-12.6	-1.1			
81/2/26	22	58.492	172.643	1002.5	311	2.1	-12.5	-12.7	-1.3		170	0.9
81/2/26	23	58.510	172.628	1002.6	003	3.6	-11.8	-12.0	-1.3		220	0.9
81/2/27	0	58.453	172.603	1002.4	025	4.1	-11.8	-12.0	-1.1		220	0.6
81/2/27	1	58.403	172.737	1002.4	050	7.2	-10.5	-11.2	-1.0	0.3	220	0.6
81/2/27	2	58.253	173.088	1001.5	075	5.7	-8.5	-8.9	.5		220	0.6
81/2/27	3	58.147	173.303	1000.0	095	6.2	-9.0	-9.5	1.4		220	0.6
81/2/27	4	58.168	173.295	999.9	060	7.2	-10.2	-10.2	1.4	0.0		
81/2/27	5	58.245	173.140	999.0	085	10.3	-10.5	-10.5	.8	0.0		
81/2/27	6	58.307	173.027	998.5	094	11.3	-10.2	-10.6	-.4		130	0.3
81/2/27	7	58.317	173.010	997.8	086	11.3	-8.9	-9.0	-.3		120	0.6
81/2/27	8	58.332	172.948	996.6	072	11.3	-9.2	-9.2	-.4	0.3	100	0.9
81/2/27	9	58.355	172.925	995.6	072	10.3	-9.4	-9.7	-.5	0.3	105	0.9
81/2/27	10	58.377	172.873	993.8	074	13.4	-9.5	-9.8	-.5	0.3	050	0.9
81/2/27	11	58.400	172.833	992.5	072	12.4	-7.5	-8.0	-.6	0.6	045	0.9
81/2/27	12	58.422	172.792	988.8	070	12.9	-6.5	-7.1	-.8	0.6	045	0.9
81/2/27	13	58.448	172.733	987.8	059	15.4	-6.0	-6.5	-.8	0.6	045	0.9
81/2/27	14	58.453	172.763	986.0	050	18.0	-5.2	-5.5	-.9	0.6	040	0.9
81/2/27	15	58.465	172.825	983.1	050	18.0	-6.0	-6.1	-.7	0.6	040	0.9
81/2/27	16	58.455	172.855	980.2	055	18.0	-5.0	-5.0	-.4	0.6	040	0.9
81/2/27	17	58.438	172.872	976.9	060	25.2	-4.0	-4.0	-.4	0.6	070	1.5
81/2/27	18	58.445	172.795	975.2	071	24.7	-4.0	-4.0	-.6	0.9	070	2.1
81/2/27	19	58.475	172.653	972.9	060	22.1	-2.5	-2.8	-.8	1.2	070	2.1
81/2/27	20	58.492	172.572	970.6	066	23.7	-2.6	-3.0	-1.2	1.2	070	2.1
81/2/27	21	58.540	172.517	969.2	074	18.5	-2.2	-2.3	-1.3	1.2	070	1.8
81/2/27	22	58.567	172.518	968.2	087	15.4	.8	.2	-1.4	0.3	310	0.9

DATE (Y/M/D)	HR (GMT)	LAT (DEG N)	LONG (DEG W)	SEA LEVEL PRES (MB)	WIND DIR (DEG T)	WIND SPD (M/S)	AIR TEMP (DEG C)	WET BULB TEMP (DEG C)	SEA SURF TEMP (DEG C)	WAVE HT (M)	SWELL DIR (DEG T)	SWELL HT (M)
81/2/27	23	58.598	172.665	967.2	105	15.4	.8	.2	-1.0	0.6	145	0.9
81/2/28	0	58.547	172.748	967.8	109	18.5	1.5	.8	-.7	0.6	155	3.1
81/2/28	1	58.452	172.790	967.6	132	17.0	1.8	1.0	-.3	0.9	140	3.1
81/2/28	2	58.403	172.742	968.5	121	12.4	1.8	1.1	-.2	0.6	140	3.1
81/2/28	3	58.353	172.673	970.1	129	12.4	2.2	.8	-.2	0.6	140	3.1
81/2/28	4	58.308	172.618	970.0	135	13.9	1.9	.9	.4	0.6	140	3.1
81/2/28	5	58.258	172.570	970.0	130	12.9	1.1	.6	1.4	0.6	140	3.1
81/2/28	6	58.193	172.577	970.9	130	13.9	1.2	.8	.4	0.9	145	3.7
81/2/28	7	58.135	172.600	971.0	128	12.4	1.4	.9	.8	0.9	140	3.1
81/2/28	8	58.075	172.627	971.2	135	12.9	1.8	.7	.9	0.9	150	3.1
81/2/28	9	58.168	172.753	972.0	141	13.4	1.8	.5	.9	0.6	170	2.4
81/2/28	10	58.285	173.002	971.8	135	12.4	1.2	.7	1.0	0.6	180	2.4
81/2/28	11	58.353	173.182	971.3	115	9.8	.5	.2	1.1	0.6	180	2.1
81/2/28	12	58.432	173.283	970.8	112	12.9	1.2	.7	1.2	0.6	165	2.1
81/2/28	13	58.397	173.308	970.5	109	11.8	1.0	.5	1.3	0.6	165	2.1
81/2/28	14	58.360	173.327	969.3	095	9.8	.8	.3	1.3	0.6	165	2.1
81/2/28	15	58.307	173.310	969.0	127	11.3	2.2	1.0	1.3	0.6	160	2.1
81/2/28	16	58.243	173.283	969.0	095	12.4	2.2	1.4	1.4	0.6	160	2.1
81/2/28	17	58.208	173.288	968.5	100	12.9	1.7	.8	1.7	0.6	160	2.1
81/2/28	18	58.172	173.290	968.1	100	11.8	2.6	2.1	1.5	0.6	120	1.8
81/2/28	19	58.127	173.297	967.5	113	14.4	2.4	1.1	1.6	0.9	140	2.7
81/2/28	20	58.082	173.307	967.6	104	11.8	1.8	1.0	1.6	0.9	130	3.4
81/2/28	21	58.042	173.307	968.5	145	8.8	2.8	1.6	1.7	0.9	140	2.7
81/2/28	22	58.068	173.288	969.8	152	9.8	2.8	1.1	1.7	0.9	160	1.5
81/2/28	23	58.192	173.280	970.1	155	7.2	2.8	1.9	1.5	0.9	150	1.5
81/3/01	0	58.188	173.275	970.6	139	8.8	1.8	.8	1.5	0.9	150	1.5
81/3/01	1	58.180	173.287	970.4	147	7.7	3.3	2.7	1.5	0.9	155	1.5
81/3/01	2	58.190	173.312	970.5	150	7.2	3.3	.5	1.5	0.6	155	1.5
81/3/01	3	58.200	173.338	971.0	140	5.2	1.0	0.0	1.5	0.9	160	1.5
81/3/01	4	58.210	173.365	971.0	140	6.2	1.2	.2	1.5	0.6	160	1.5
81/3/01	5	58.220	173.403	971.0	140	6.2	.8	0.0	1.4	0.6	160	1.5
81/3/01	6	58.233	173.438	971.0	135	7.2	1.2	0.0	1.4	0.6	150	1.5
81/3/01	7	58.247	173.453	971.0	153	6.7	1.5	.7	1.4	0.6	150	1.5
81/3/01	8	58.267	173.263	971.0	144	7.7	1.3	.4	1.3	0.6	130	1.5
81/3/01	9	58.238	173.050	971.2	139	8.2	1.4	.6	1.2	0.3	135	1.5
81/3/01	10	58.332	172.947	971.6	135	7.7	1.2	.1	.9	0.6	150	1.2
81/3/01	11	58.387	172.848	971.9	120	7.2	3.3	1.1	.5	0.3	185	1.2
81/3/01	12	58.443	172.728	971.6	110	7.2	.8	-.3	0.0	0.3	185	1.2
81/3/01	13	58.482	172.672	971.4	105	8.2	.3	-.8	-.3	0.3	185	1.2
81/3/01	14	58.502	172.645	971.0	110	9.3	2.0	.8	-.4	0.3	185	1.2
81/3/01	15	58.517	172.620	970.9	110	7.7	1.8	.5	-.5	0.3	185	0.9

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/01	16	58.532	172.595	970.9	110	9.3	.9	.1	-.7	0.3	180	0.9
81/3/01	17	58.547	172.572	970.8	110	7.7	.8	0.0	-.8	0.3	180	0.9
81/3/01	18	58.603	172.472	970.5	112	7.7	.2	0.0	-1.1	0.3	135	1.2
81/3/01	19	58.695	172.308	971.2	132	7.7	1.6	.8	-1.5	0.3	160	1.2
81/3/01	20	58.780	172.173	971.5	140	6.2	0.0	-.4	-1.6	0.0	190	1.5
81/3/01	21	58.778	172.178	972.0	130	7.7	-.2	-.8	-1.6	0.0	165	1.8
81/3/01	22	58.783	172.210	971.8	125	7.2	1.4	0.0	-1.5	0.0	210	1.8
81/3/01	23	58.790	172.228	971.8	140	8.2	1.7	.6	-1.5	0.0	215	1.8
81/3/02	0	58.783	172.177	972.2	156	8.2	1.1	.3	-1.5	0.0	220	1.8
81/3/02	1	58.763	172.183	972.1	146	8.2	1.1	0.0	-1.5	0.3	200	1.8
81/3/02	2	58.747	172.215	972.0	150	9.3	.6	0.0	-1.5	0.3	200	1.8
81/3/02	3	58.700	172.285	972.5	165	9.3	1.0	0.0	-1.4	0.6	200	1.5
81/3/02	4	58.712	172.230	972.8	150	9.8	.6	-.1	-1.5	0.6	200	1.5
81/3/02	5	58.798	172.115	972.9	150	10.8	.3	-.4	-1.5	0.6	190	1.5
81/3/02	6	58.783	171.952	973.7	182	13.4	1.8	1.0	-1.6	0.6	175	1.5
81/3/02	7	58.782	171.937	974.9	182	11.3	1.7	1.1	-1.6	0.6	175	1.5
81/3/02	8	58.798	171.902	976.0	201	11.3	1.9	1.0	-1.6	0.6	180	1.5
81/3/02	9	58.798	171.885	977.0	196	13.4	1.5	.8	-1.5	0.6	185	1.8
81/3/02	10	58.788	171.882	977.9	185	14.9	1.1	0.0	-1.5	0.9	195	2.1
81/3/02	11	58.757	171.880	979.2	171	15.4	.3	-.1	-1.5	0.9	195	2.4
81/3/02	12	58.717	171.895	979.7	173	14.4	.6	0.0	-1.5	0.9	185	3.1
81/3/02	13	58.728	171.875	980.6	169	14.4	.6	-.4	-1.5	0.9	185	3.1
81/3/02	14	58.828	171.803	981.8	158	14.9	.8	0.0	-1.5	0.9	185	3.1
81/3/02	15	58.843	171.777	981.8	165	11.8	-.1	-1.0	-1.5	0.6	185	3.1
81/3/02	16	58.822	171.767	982.2	170	11.8	-.1	-1.0	-1.5	0.6	185	3.1
81/3/02	17	58.792	171.812	983.2	165	12.4	-.5	-1.2	-1.5	0.6	185	2.4
81/3/02	18	58.755	171.847	984.0	179	14.4	-.2	-.8	-1.5	0.9	200	3.7
81/3/02	19	58.865	171.832	984.9	180	13.4	-.4	-1.1	-1.5	0.9	205	3.7
81/3/02	20	59.068	171.810	985.5	168	16.5	.4	0.0	-1.6	0.6	200	3.7
81/3/02	21	59.138	171.703	986.5	185	13.4	-.1	-.7	-1.6	0.3	210	3.1
81/3/02	22	59.203	171.630	988.0	194	12.4	.3	-.5	-1.6	0.3	210	3.1
81/3/02	23	59.192	171.630	989.1	182	12.4	.5	-.5	-1.6	0.3	210	2.4
81/3/03	0	59.160	171.637	990.2	191	12.4	.1	-.5	-1.6	0.3	215	2.4
81/3/03	2	59.077	171.648	993.0	175	10.3	-.1	-1.0	-1.6	0.3	215	2.4
81/3/03	3	59.037	171.640	994.0	210	8.8	-1.0	-1.2	-1.5	0.3	215	2.4
81/3/03	4	59.015	171.635	994.5	165	8.2	-.5	-1.2	-1.5	0.3	215	2.4
81/3/03	5	58.985	171.657	995.3	180	8.8	-1.0	-1.3	-1.5	0.3	215	2.4
81/3/03	6	58.885	171.937	995.3	161	8.8	.5	-.8	-1.6	0.3	210	2.4
81/3/03	7	58.915	171.905	995.7	167	4.6	0.0	-.9	-1.5	0.3	200	1.8
81/3/03	8	59.088	171.617	996.1	149	7.7	-.1	-1.0	-1.6	0.3	185	1.8
81/3/03	9	59.132	171.525	997.3	158	7.2	0.0	-.7	-1.6	0.3	185	1.2

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/03	10	59.213	171.375	998.1	143	6.7	-1.0	-1.5	-1.7	0.3	215	1.2
81/3/03	11	59.222	171.353	998.6	148	8.8	-1.2	-1.7	-1.6	0.3	215	1.5
81/3/03	12	59.177	171.407	998.5	130	8.2	-1.4	-2.0	-1.6	0.3	215	1.5
81/3/03	13	59.192	171.335	998.9	111	6.7	-1.5	-2.0	-1.6	0.3	215	1.2
81/3/03	14	59.182	171.297	999.1	105	4.1	-1.2	-1.5	-1.6	0.3	215	0.9
81/3/03	15	59.240	171.225	999.0	075	3.1	-1.5	-1.9	-1.6		190	0.6
81/3/03	16	59.218	171.232	999.0	085	2.1	-.2	-1.0	-1.6			
81/3/03	17	59.233	171.217	999.8	055	2.1	-.8	-1.6	-1.6		180	0.3
81/3/03	18	59.258	171.200	998.6			-1.8	-2.1	-1.6		200	1.2
81/3/03	19	59.285	171.247	998.5			-2.3	-2.5	-2.2		215	1.2
81/3/03	20	59.275	171.257	998.7			-.3	-.5	-1.7		218	1.2
81/3/03	21	59.278	171.270	998.5	205	2.1	-2.5	-2.7	-1.7		220	1.2
81/3/03	22	59.282	171.283	998.8			-2.5	-3.0	-1.7		215	1.2
81/3/03	23	59.270	171.310	998.5			-1.2	-1.7	-1.7		215	1.2
81/3/04	0	59.257	171.453	998.2	158	3.1	0.0	-1.0	-1.6		225	0.9
81/3/04	1	59.240	171.512	997.5	073	1.5	-1.2	-1.7	-1.6		235	0.9
81/3/04	2	59.243	171.570	997.0	040	1.0	-3.3	-3.9	-1.6		240	0.9
81/3/04	3	59.247	171.532	996.0	085	1.0	-3.3	-3.4	-1.6		240	0.9
81/3/04	4	59.213	171.533	995.8	080	1.5	-3.3	-3.9	-1.6		240	0.9
81/3/04	5	59.000	171.547	995.0	080	2.1	-3.9	-4.2	-1.6	0.3	220	0.9
81/3/04	6	58.787	171.497	994.4	072	9.3	-2.4	-2.7	-1.4	0.3	110	0.9
81/3/04	7	58.747	171.362	993.5	081	8.8	-1.4	-1.9	-1.5	0.3	110	1.2
81/3/04	8	58.673	171.003	992.5	079	9.3	-1.1	-1.3	-1.5	0.3	140	1.2
81/3/04	9	58.645	170.848	992.8	093	10.8	-1.0	-1.2	-1.6	0.3	130	1.2
81/3/04	10	58.578	170.507	993.0	084	8.2	-1.2	-1.5	-1.4	0.6	115	1.2
81/3/04	11	58.698	170.680	993.4	112	9.3	-1.2	-1.7	-1.6	0.6	115	1.2
81/3/04	12	58.813	170.837	993.5	100	8.2	-1.4	-2.0	-1.6	0.6	115	1.2
81/3/04	13	58.977	171.100	993.6	100	10.8	-2.3	-2.7	-1.6	0.6	115	1.2
81/3/04	14	59.143	171.358	994.0	095	9.3	-2.0	-2.2	-1.6	0.6	115	1.2
81/3/04	15	59.258	171.520	994.0	075	9.3	-1.4	-2.0	-1.6			
81/3/04	16	59.277	171.508	994.1	080	7.2	-.1	-1.1	-1.6			
81/3/04	17	59.290	171.495	994.0	050	7.2	-1.2	-1.5	-1.6			
81/3/04	18	59.303	171.487	994.0	081	10.3	-1.2	-1.3	-1.7		180	1.2
81/3/04	19	59.315	171.492	994.5	078	8.8	-1.5	-1.9	-1.6		175	1.2
81/3/04	20	59.323	171.512	994.8	071	9.3	-2.4	-3.0	-1.6		185	1.2
81/3/04	21	59.320	171.533	995.2	087	6.7	-2.2	-2.9	-1.7		185	1.2
81/3/04	22	59.325	171.557	995.5	056	6.2	-2.5	-3.0	-1.5		185	1.2
81/3/04	23	59.315	171.603	995.7	052	8.2	-2.5	-3.2	-1.7		185	1.2
81/3/05	0	59.308	171.630	995.8	066	7.2	-1.8	-3.5	-1.6		185	1.2
81/3/05	1	59.302	171.688	996.2	047	7.2	-3.2	-4.0	-1.6		180	1.2
81/3/05	2	59.277	171.698	995.8	035	6.2	-3.5	-4.2	-1.6		180	1.2

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/05	3	59.277	171.687	996.0	025	9.3	-3.8	-4.0	-1.6		180	1.2
81/3/05	4	59.283	171.697	996.2	040	10.3	-3.8	-4.0	-1.6		190	1.2
81/3/05	5	59.288	171.683	997.4	040	6.2	-4.0	-4.5	-1.6		180	0.9
81/3/05	6	59.245	171.695	997.3	027	10.3	-4.1	-4.7	-1.6		190	0.9
81/3/05	7	59.243	171.732	997.1	022	9.3	-4.8	-5.3	-1.6		190	0.9
81/3/05	8	59.220	171.717	997.1	029	11.3	-4.7	-5.2	-1.6		205	0.9
81/3/05	9	59.220	171.717	997.2	028	10.8	-5.2	-6.1	-1.6		210	0.9
81/3/05	10	59.190	171.777	998.2	024	9.8	-7.0	-7.3	-1.6		215	0.9
81/3/05	11	59.190	171.832	998.1	015	8.2	-7.5	-8.0	-1.6		200	0.9
81/3/05	12	59.177	171.842	998.1	020	9.3	-8.2	-8.5	-1.6		195	0.9
81/3/05	13	59.168	171.877	998.1	015	10.3	-8.2	-8.5	-1.6		195	0.9
81/3/05	14	59.160	171.877	998.6	030	9.3	-9.0	-9.0	-1.6		195	0.9
81/3/05	15	59.160	171.908	998.2	010	8.2	-7.3	-7.5	-1.6		195	0.9
81/3/05	16	59.158	171.945	998.5	010	10.3	-7.0	-7.2	-1.6		195	0.9
81/3/05	17	59.155	171.972	998.5	360	10.3	-8.0	-8.2	-1.6		195	0.9
81/3/05	18	59.163	171.920	998.5	008	12.4	-7.8	-8.2	-1.6	0.3	190	0.6
81/3/05	19	59.147	171.915	999.0	010	10.3	-8.1	-8.4	-1.6		195	0.3
81/3/05	20	59.147	171.917	998.9	355	11.3	-8.8	-9.2	-1.6		190	0.3
81/3/05	21	59.122	171.872	998.9	002	11.3	-8.7	-9.3	-1.5		185	0.3
81/3/05	22	59.130	171.872	999.0	357	9.3	-11.5	-11.8	-1.6		185	0.3
81/3/05	23	59.125	171.838	999.1	360	9.8	-11.6	-11.9	-1.6		185	0.3
81/3/06	0	59.125	171.868	999.0	356	10.3	-12.6	-12.9	-1.7		185	0.3
81/3/06	1	59.110	171.890	999.1	004	9.3	-12.6	-12.9	-1.7		185	0.3
81/3/06	2	59.057	171.890	999.2	360	8.8	-12.4	-12.9	-1.7			
81/3/06	3	59.030	172.022	999.2	345	8.2	-12.5	-12.9	-1.7			
81/3/06	4	59.022	171.998	999.2	360	10.3	-13.0	-13.2	-1.7			
81/3/06	5	59.003	172.005	999.5	360	9.3	-12.0	-12.0	-1.7			
81/3/06	6	58.988	172.047	999.5	358	9.3	-11.6	-12.1	-1.6		180	0.3
81/3/06	7	58.968	172.000	999.4	360	11.3	-11.8	-12.1	-1.7		180	0.3
81/3/06	8	58.958	172.042	999.3	353	8.8	-12.3	-12.7	-1.7			
81/3/06	9	58.932	172.020	999.3	355	8.2	-12.2	-12.5	-1.7			
81/3/06	10	58.918	172.057	999.6	360	6.7	-13.0	-13.3	-1.6		195	0.3
81/3/06	11	58.905	172.057	999.5	355	8.8	-14.2	-14.5	-1.6		195	0.3
81/3/06	12	58.892	172.085	999.4	010	8.8	-14.0	-14.4	-1.7			
81/3/06	13	58.880	172.100	999.1	345	6.7	-14.7	-15.0	-1.8			
81/3/06	14	58.878	172.132	999.0	360	6.7	-14.5	-14.5	-1.8			
81/3/06	15	58.900	172.125	998.9	350	7.7	-14.5	-14.5	-1.8			
81/3/06	16	58.892	172.112	998.8	360	8.2	-13.8	-14.0	-1.8			
81/3/06	17	58.877	172.100	998.5	360	6.2	-13.0	-13.2	-1.8			
81/3/06	18	58.867	172.082	998.2	006	7.2	-13.1	-13.4	-1.6			
81/3/06	19	58.848	172.065	998.1	356	7.7	-12.4	-12.7	-1.7			

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/06	20	58.912	172.033	997.9	360	9.8	-11.8	-12.1	-1.7			
81/3/06	21	58.917	172.030	998.0	009	7.2	-11.6	-11.9	-1.7			
81/3/06	22	58.910	172.077	998.0	360	6.2	-12.2	-12.6	-1.8			
81/3/06	23	58.880	172.165	998.1	033	6.2	-13.0	-13.2	-1.6		235	0.3
81/3/07	0	58.875	172.172	997.9	350	6.2	-11.8	-12.4	-1.6		235	0.3
81/3/07	1	58.858	172.120	997.6	006	8.2	-11.0	-11.2	-1.6			
81/3/07	2	58.865	172.150	997.2	020	6.2	-11.4	-11.4	-1.6			
81/3/07	3	58.823	172.082	997.0	020	6.2	-10.2	-11.0	-1.6			
81/3/07	4	58.852	172.110	997.0	010	7.2	-10.2	-10.5	-1.6			
81/3/07	5	58.825	172.103	997.0	010	8.8	-10.5	-11.0	-1.6			
81/3/07	6	58.752	172.215	997.1	026	6.2	-10.2	-10.7	-1.6			
81/3/07	7	58.598	172.322	997.2	029	6.2	-9.6	-9.8	-1.3		185	0.3
81/3/07	8	58.390	172.475	997.3	019	8.2	-7.3	-7.7	-.6	0.3	075	0.6
81/3/07	9	58.178	172.623	997.2	036	6.7	-6.0	-6.2	.7	0.3	075	0.6
81/3/07	10	57.965	172.772	997.2	029	7.7	-6.5	-7.0	1.1	0.3		
81/3/07	11	57.750	172.918	997.0	034	7.2	-6.2	-6.8	1.9			
81/3/07	12	57.598	173.053	996.7	355	5.2	-6.3	-6.8	2.2	0.3		
81/3/07	13	57.735	172.858	996.2	008	6.2	-6.4	-7.0	1.9	0.3	065	0.3
81/3/07	14	57.937	172.788	996.2	020	7.2	-5.8	-6.5	1.3	0.3	065	0.6
81/3/07	15	58.140	172.642	996.2	020	7.2	-8.0	-8.0	.8	0.3	065	0.6
81/3/07	16	58.337	172.507	996.8	020	8.2	-8.2	-8.5	-.5	0.3	065	0.6
81/3/07	17	58.540	172.365	997.2	015	8.8	-9.2	-9.5	-1.2	0.3	065	0.6
81/3/07	18	58.683	172.258	997.1	015	7.7	-8.8	-9.3	-1.5			
81/3/07	19	58.752	172.250	997.2	024	6.2	-8.9	-9.2	-1.6			
81/3/07	20	58.778	172.247	997.2	009	5.2	-8.8	-9.2	-1.7			
81/3/07	21	58.787	172.250	997.3	008	5.2	-7.2	-7.6	-1.6			
81/3/07	22	58.800	172.277	997.4	020	5.7	-8.0	-8.3	-1.6			
81/3/07	23	58.807	172.298	997.4	030	5.2	-7.0	-7.2	-1.6			
81/3/08	0	58.785	172.342	997.3	050	6.2	-6.8	-7.0	-1.6			
81/3/08	1	58.780	172.388	996.6	031	7.2	-6.2	-6.5	-1.6			
81/3/08	2	58.765	172.422	996.7	360	6.7	-6.8	-7.0	-1.6			
81/3/08	3	58.767	172.430	996.3	360	7.7	-6.5	-7.0	-1.6			
81/3/08	4	58.760	172.445	996.0	010	7.7	-5.5	-6.0	-1.6			
81/3/08	5	58.755	172.387	995.5	010	10.3	-4.2	-4.8	-1.6			
81/3/08	6	58.747	172.487	995.3	018	8.2	-4.1	-4.5	-1.6			
81/3/08	7	58.738	172.512	994.5	019	10.3	-4.4	-4.6	-1.6			
81/3/08	8	58.730	172.542	993.9	019	11.3	-4.2	-4.5	-1.5			
81/3/08	9	58.700	172.588	993.4	039	12.4	-4.0	-4.3	-1.4			
81/3/08	10	58.710	172.635	993.1	033	13.4	-2.4	-2.4	-1.4			
81/3/08	11	58.707	172.620	992.4	049	9.3	-1.5	-1.8	-1.4			
81/3/08	12	58.697	172.677	992.4	050	12.9	-1.5	-1.8	-1.3			

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/08	13	58.692	172.735	992.4	050	12.9	-1.1	-1.5	-1.4			
81/3/08	14	58.715	172.767	993.1	050	12.9	-.8	-1.0	-1.5			
81/3/08	15	58.707	172.810	992.9	040	12.9	-1.4	-1.9	-1.4			
81/3/08	16	58.707	172.827	993.6	040	18.0	-1.2	-1.9	-1.4			
81/3/08	17	58.727	172.863	993.5	040	16.5	-1.8	-2.2	-1.4			
81/3/08	18	58.752	172.885	994.0	048	15.4	-2.2	-2.6	-1.3	0.3	050	0.6
81/3/08	19	58.780	172.835	994.8	041	17.0	-3.1	-3.3	-1.4	0.3	052	0.6
81/3/08	20	58.753	172.895	995.7	055	13.9	-3.3	-3.7	-1.1	0.3	050	0.3
81/3/08	21	58.727	172.930	995.7	039	16.0	-4.2	-4.7	-1.1	0.3	065	0.3
81/3/08	22	58.685	172.923	995.7	025	12.4	-5.1	-5.4	-.8	0.6	130	0.6
81/3/08	23	58.678	172.948	995.8	021	16.0	-5.5	-5.7	-.7	0.6	130	0.6
81/3/09	0	58.638	173.003	995.8	023	13.4	-5.0	-5.2	-.4	0.6		
81/3/09	1	58.585	173.040	995.2	030	12.9	-5.2	-5.5	.2	0.9	045	0.9
81/3/09	2	58.635	173.088	994.9	025	16.5	-6.0	-6.5	.2	0.6	045	0.9
81/3/09	3	58.642	173.127	995.0	035	14.4	-6.0	-6.2	.6	0.3	045	0.6
81/3/09	4	58.627	173.212	995.0	035	14.4	-6.8	-7.0	.3	0.6	045	0.6
81/3/09	5	58.632	173.277	995.8	035	15.4	-6.1	-6.5	.5	0.6	045	0.9
81/3/09	6	58.633	173.333	995.8	028	10.3	-5.2	-5.2	.6	0.6	030	1.2
81/3/09	7	58.573	173.285	995.7	029	14.4	-5.6	-5.9	.5	0.6	040	1.2
81/3/09	8	58.585	173.343	995.5	022	14.4	-7.0	-7.3	.5	0.6	035	1.2
81/3/09	9	58.578	173.403	995.1	020	14.9	-6.8	-7.1	.8	0.6	040	1.2
81/3/09	10	58.543	173.328	995.2	020	14.4	-9.0	-9.3	.8	0.6	045	1.2
81/3/09	11	58.533	173.393	994.6	013	14.4	-9.5	-9.8	.8	0.6	045	0.6
81/3/09	12	58.523	173.457	994.6	022	13.4	-9.5	-10.0	.9	0.9	045	0.6
81/3/09	13	58.510	173.500	994.6	014	16.0	-9.6	-10.0	1.0	0.9	045	0.6
81/3/09	14	58.480	173.465	993.9	018	15.4	-9.0	-9.2	1.1	0.9	045	0.6
81/3/09	15	58.483	173.503	993.0	020	15.4	-9.0	-9.2	1.1	0.9	045	0.6
81/3/09	16	58.480	173.512	993.5	018	17.0	-9.1	-9.5	1.1	0.9	045	0.6
81/3/09	17	58.475	173.543	993.8	010	15.4	-8.8	-9.0	1.3	0.6	045	0.9
81/3/09	18	58.480	173.547	993.2	024	15.4	-7.8	-8.3	1.3	0.6	045	1.2
81/3/09	19	58.548	173.490	992.9	016	15.4	-6.8	-7.3	1.1	0.6	035	1.2
81/3/09	20	58.243	173.470	992.8	012	14.9	-7.1	-7.3	1.1	0.9	035	1.8
81/3/09	21	58.245	173.477	992.9	028	17.0	-7.4	-7.7	1.1	0.9	030	1.8
81/3/09	22	58.233	173.473	992.6	029	12.9	-8.0	-8.5	1.3	0.9	025	1.8
81/3/09	23	58.240	173.483	992.5	011	13.4	-7.5	-7.8	1.1	0.9	025	1.8
81/3/10	0	58.233	173.487	992.9	010	13.4	-8.0	-8.5	1.1	0.9	035	1.8
81/3/10	1	58.308	173.400	992.8	004	16.0	-8.2	-8.6	1.0	0.9	040	1.8
81/3/10	2	58.440	173.237	993.2	020	15.4	-7.5	-7.8	.6	0.9	040	1.5
81/3/10	3	58.562	173.192	994.0	020	18.0	-7.8	-8.0	0.0	0.9	040	0.9
81/3/10	4	58.650	173.048	994.3	010	11.3	-7.0	-7.5	-.6	0.0	030	0.6
81/3/10	5	58.670	173.052	994.5	360	10.3	-5.2	-6.0	-.8			

DATE	HR	LAT	LONG	SEA LEVEL PRES	WIND DIR	WIND SPD	AIR TEMP	WET BULB TEMP	SEA SURF TEMP	WAVE HT	SWELL DIR	SWELL HT
(Y/M/D)	(GMT)	(DEG N)	(DEG W)	(MB)	(DEG T)	(M/S)	(DEG C)	(DEG C)		(M)	(DEG T)	(M)
81/3/10	6	58.670	173.057	994.5	020	8.2	-5.4	-5.8	-.7			
81/3/10	7	58.670	173.067	994.5	032	9.3	-5.1	-5.4	-.6			
81/3/10	8	58.670	173.065	995.0	044	12.4	-5.1	-5.3	-.6			
81/3/10	9	58.670	173.062	995.8	052	11.3	-5.0	-5.1	-.6			
81/3/10	10	58.662	173.107	995.7	043	8.2	-4.3	-4.5	-.5			
81/3/10	11	58.655	173.125	997.5	048	10.8	-5.0	-5.2	-.4			
81/3/10	12	58.663	173.148	998.1	043	10.3	-5.4	-5.8	-.5			
81/3/10	13	58.508	173.182	998.4	050	9.3	-5.7	-6.0	-.5			
81/3/10	14	58.638	173.233	998.4	045	10.3	-5.4	-5.7	-.5			
81/3/10	15	58.628	173.278	1000.0	040	10.3	-5.7	-5.9	-.5			
81/3/10	16	58.625	173.323	1000.5	040	9.3	-7.0	-7.2	-.5			
81/3/10	17	58.623	173.367	1001.0	040	10.3	-7.0	-7.2	-.4			
81/3/10	18	58.625	173.405	1001.1	042	11.8	-6.7	-6.8	-.3			
81/3/10	19	58.595	173.328	1001.8	051	9.8	-6.6	-6.8	-.1			
81/3/10	20	58.568	173.338	1001.6	045	9.3	-6.2	-6.6	.2			
81/3/10	21	58.527	173.198	1001.8	038	9.8	-5.4	-5.5	.1	0.3	030	0.3
81/3/10	22	58.642	173.222	1002.7	044	12.9	-8.0	-8.3	-.6			
81/3/10	23	58.652	173.168	1002.9	036	9.3	-8.0	-8.2	-.6	0.3		
81/3/11	0	58.648	173.210	1003.1	045	9.3	-8.2	-8.5	-.7	0.3		
81/3/11	1	58.610	173.037	1003.1	049	10.8	-8.0	-8.2	-.8	0.3		
81/3/11	2	58.495	172.783	1003.5	040	11.3	-7.5	-8.0	-.7	0.3		
81/3/11	3	58.413	172.727	1002.5	045	8.2	-6.3	-6.8	-.8	0.3		
81/3/11	4	58.288	172.827	1002.2	050	9.3	-5.2	-5.8	-.3			
81/3/11	5	58.220	173.105	1002.0	054	9.3	-6.2	-6.5	-.6			
81/3/11	6	58.175	173.162	1002.0	049	11.8	-6.1	-6.3	.7	0.3	075	0.6
81/3/11	7	58.072	173.370	1001.3	047	9.3	-3.8	-4.2	1.2	0.6	070	0.9
81/3/11	8	57.953	173.573	1001.4	043	9.8	-2.4	-3.0	1.9	0.6	075	0.9
81/3/11	9	57.868	173.722	1000.3	054	10.8	-2.8	-3.1	2.4	0.6	075	0.9
81/3/11	10	57.767	173.433	999.4	043	10.3	-3.0	-3.2	2.8	0.6	075	0.9
81/3/11	11	57.648	173.102	998.6	047	9.8	-1.8	-2.2	2.3	0.6	075	0.9
81/3/11	12	57.528	172.777	997.9	045	9.3	-1.0	-1.4	2.0	0.6	075	0.9
81/3/11	13	57.410	172.295	996.8	033	7.7	0.0	-.8	2.0	0.9	075	1.2
81/3/11	14	57.293	172.143	995.9	040	9.3	-.5	-1.0	2.0	0.9	075	1.2
81/3/11	15	57.173	171.828	994.8	043	8.8	-.6	-1.0	2.6	0.6	075	0.9
81/3/11	16	57.057	171.527	994.1	040	10.3	-.5	-1.0	2.6	0.3	075	0.9
81/3/11	17	57.035	171.357	992.9	052	9.8	0.0	-.6	2.7	0.3	070	0.9
81/3/11	18	56.823	170.600	992.0	046	8.2	0.0	-.8	2.8	0.3	080	0.9
81/3/11	19	56.705	170.512	991.0	048	11.3	.8	.4	2.8	0.3	080	1.2
81/3/11	20	56.620	170.387	989.8	052	10.3	1.6	1.2	2.5	0.3	065	1.2
81/3/11	21	56.555	170.355	988.8	053	10.8	3.4	2.2	2.9	0.3	075	1.2
81/3/11	22	56.375	169.720	987.8	052	10.3	2.2	1.2	2.7	0.3	090	1.2

DATE (Y/M/D)	HR (GMT)	LAT (DEG N)	LONG (DEG W)	SEA LEVEL PRES (MB)	WIND DIR (DEG T)	WIND SPD (M/S)	AIR TEMP (DEG C)	WET BULB TEMP (DEG C)	SEA SURF TEMP (DEG C)	WAVE HT (M)	SWELL DIR (DEG T)	SWELL HT (M)
81/3/11	23	56.265	169.432	986.8	056	11.3	2.2	1.2	2.9	0.3	085	1.2
81/3/12	0	56.153	169.147	984.8	058	11.3	2.2	.8	3.0	0.3	085	1.2
81/3/12	1	56.048	168.902	984.4	059	12.9	2.5	1.2	3.3	0.3	085	1.2
81/3/12	2	55.957	168.642	983.0	060	11.3	2.2	.6	3.2	0.3	085	1.2
81/3/12	3	55.880	168.453	982.0	078	10.3	2.2	.6	3.5	0.3	085	1.2
81/3/12	4	55.747	168.117	981.5	075	10.3	1.9	0.0	4.1	0.3	085	1.2
81/3/12	5	55.657	167.898	981.0	080	10.8	1.9	0.0	3.6	0.3	085	1.2
81/3/12	6	55.563	167.672	980.6	072	11.8	3.4	3.2	2.9	0.3	090	1.2
81/3/12	7	55.468	167.440	979.6	076	16.0	3.2	2.8	3.0	0.3	075	1.2
81/3/12	8	55.377	167.222	979.0	061	11.8	3.3	3.0	3.2	0.3	080	1.2
81/3/12	9	55.307	166.987	978.5	071	11.3	2.2	1.2	3.1	0.3	075	1.2
81/3/12	10	55.237	166.750	977.5	068	11.8	2.2	1.5	3.1	0.3	080	1.2
81/3/12	11	55.170	166.523	976.9	071	13.9	2.2	1.0	3.1	0.6	080	1.2
81/3/12	12	55.107	166.305	974.5	072	15.4	2.5	1.2	3.1	0.6	080	1.5
81/3/12	13	55.040	166.098	974.2	061	16.5	2.2	1.2	3.1	0.6	080	1.8
81/3/12	14	54.987	165.913	971.0	070	18.0	2.8	.6	3.1	0.6	080	1.8
81/3/12	15	54.922	165.688	969.5	053	17.5	2.8	1.8	3.3	0.6	080	1.8
81/3/12	16	54.847	165.440	966.9	034	17.5	2.5	2.0	2.8	0.9	080	1.8
81/3/12	17	54.715	165.218	964.5	030	20.6	2.5	2.0	2.9	0.9	060	2.1
81/3/12	18	54.575	165.157	963.5	039	20.6	2.3	1.1	2.6	0.9	060	2.4
81/3/12	19	54.428	165.013	959.0	023	23.7	2.1	.7	2.2	1.2	030	3.1
81/3/12	20	54.345	164.798	956.1	056	24.2	2.3	.5	2.2	1.2	060	3.7
81/3/12	21	54.335	165.600	955.8	052	23.7	2.3	.7	2.2	1.2	075	3.7
81/3/12	22	54.357	164.383	957.0	080	13.9	3.0	1.2	2.6	1.2	095	3.7
81/3/12	23	54.418	164.118	958.8	107	10.8	3.0	2.2	3.3	0.9	135	1.8
81/3/13	0	54.477	163.830	959.7	101	13.4	3.2	2.0	3.3	0.9	125	2.4
81/3/13	1	54.532	163.552	960.5	090	13.9	2.0	1.5	2.6	0.9	095	1.8
81/3/13	2	54.595	163.250	960.5	075	12.9	3.3	1.7	2.8	0.6	095	1.8
81/3/13	3	54.655	162.977	959.9	078	13.9	2.2	.6	2.8	0.6	105	2.4
81/3/13	4	54.797	162.775	960.0	084	15.4	2.2	1.1	2.8	0.6	110	2.4
81/3/13	5	54.908	162.492	960.2	080	18.5	2.2	1.1	2.8	0.6	110	2.4
81/3/13	6	55.005	162.287	960.1	085	19.1	2.2	1.1	2.2	0.6	080	2.1
81/3/13	7	55.025	161.957	962.3	109	12.9	2.2	1.1	2.2	0.6	092	1.8
81/3/13	8	55.192	161.900	962.6	068	14.4	2.6	1.3	2.2	0.6	125	1.2
81/3/13	9	55.287	161.613	963.2	088	13.4	2.4	1.3	2.2	0.6	090	1.2
81/3/13	10	55.297	161.252	963.5	076	12.4	2.4	1.2	3.3	0.6	115	1.2

APPENDIX C

Profiles of Wind Speed and Temperature Over an Ice Floe

DATE (YY/MM/DD)	TIME (GMT)	AIR TEMPERATURE (DEG C) AT HEIGHT (M) 5.96	.71	WIND SPEED (M/S) AT HEIGHT (M) 6.28	3.28	1.78	1.03	WIND DIR (DEG T) AT HT 6.28
81/03/07	0412	-13.07	-12.98	6.38	5.56	5.30	5.10	80.4
81/03/07	0512	-13.09	-12.94	6.42	5.86	5.46	4.91	15.6
81/03/07	0542	-13.14	-12.99	6.99	6.39	5.92	5.32	9.3
81/03/07	0612	-12.80	-12.67	6.80	6.24	5.80	5.17	13.5
81/03/07	0642	-12.68	-12.52	6.57	6.01	5.61	5.02	15.6
81/03/07	0712	-12.65	-12.52	6.72	6.20	5.77	5.13	15.6
81/03/07	0742	-12.76	-12.66	6.57	6.01	5.57	4.98	15.6
81/03/07	0812	-12.80	-12.65	6.80	6.27	5.84	5.21	17.7
81/03/07	0842	-12.74	-12.62	6.27	5.71	5.30	4.72	17.7
81/03/07	0912	-12.96	-12.80	6.46	5.90	5.53	4.95	17.7
81/03/07	0942	-13.15	-12.95	6.72	6.16	5.73	5.10	17.7
81/03/07	1012	-13.06	-12.88	6.76	6.27	5.80	5.17	15.6
81/03/07	1042	-13.29	-13.10	6.84	6.27	5.84	5.25	17.7
81/03/07	1112	-13.29	-13.12	6.15	5.56	5.15	4.57	11.4
81/03/07	1142	-13.21	-13.06	6.15	5.60	5.23	4.65	7.2
81/03/07	1212	-13.09	-12.93	5.77	5.19	4.80	4.27	11.4
81/03/07	1242	-13.00	-12.89	5.62	5.00	4.61	4.08	13.5
81/03/07	1312	-13.01	-12.91	5.54	4.93	4.50	3.97	3.0
81/03/07	1342	-12.97	-12.85	5.50	4.93	4.50	3.97	9.3
81/03/07	1412	-12.93	-12.81	5.77	5.26	4.84	4.27	9.3
81/03/07	1442	-12.87	-12.77	5.23	4.85	4.53	4.01	13.5
81/03/07	1512	-12.86	-12.75	5.77	5.34	5.00	4.42	17.7
81/03/07	1542	-12.86	-12.74	5.58	5.08	4.69	4.19	9.3
81/03/07	1612	-12.66	-12.57	5.27	4.70	4.30	3.86	5.1
81/03/07	1642	-12.42	-12.30	4.51	4.03	3.69	3.25	.9
81/03/07	1712	-12.11	-11.99	4.24	3.84	3.57	3.14	5.2
81/03/07	1742	-11.81	-11.70	4.01	3.62	3.34	2.92	3.1
81/03/07	1812	-11.47	-11.38	3.13	2.84	2.65	2.24	11.6
81/03/07	1842	-10.92	-10.83	3.06	2.76	2.57	2.20	9.4
81/03/07	1912	-10.74	-10.60	2.33	2.20	2.11	1.79	11.6
81/03/07	1942	-10.35	-10.14	2.06	1.94	1.80	1.52	348.4
81/03/07	2012	-10.13	-9.86	2.14	2.01	1.88	1.64	350.5
81/03/07	2042	-9.51	-9.14	2.44	2.31	2.15	1.90	335.8
81/03/07	2112	-8.79	-8.38	1.95	1.83	1.69	1.45	356.8
81/03/07	2142	-8.00	-7.42	1.79	1.79	1.69	1.49	17.9
81/03/07	2212	-7.32	-6.64	1.76	1.75	1.65	1.49	44.9
81/03/07	2242	-7.34	-6.76	2.41	2.31	2.27	2.09	72.3
81/03/07	2312	-7.49	-6.96	2.86	2.84	2.80	2.61	82.8
81/03/07	2342	-7.03	-6.22	3.21	3.21	3.04	2.69	51.2
81/03/08	0012	-6.55	-5.67	3.78	3.62	3.38	3.03	42.7

DATE (YY/MM/DD)	TIME (GMT)	AIR TEMPERATURE (DEG C) AT HEIGHT (M) 5.96	.71	WIND SPEED (M/S) AT HEIGHT (M) 6.28	3.28	1.78	1.03	WIND DIR (DEG T) AT HT 6.28
81/03/08	0042	-6.38	-5.47	4.32	3.96	3.69	3.25	25.8
81/03/08	0112	-6.33	-5.70	5.04	4.63	4.30	3.86	23.4
81/03/08	0142	-6.43	-5.91	5.27	4.85	4.53	4.01	31.4
81/03/08	0212	-6.31	-5.86	6.99	6.39	5.92	5.28	27.5
81/03/08	0242	-6.17	-5.81	6.99	6.42	5.92	5.32	33.9
81/03/08	0312	-5.55	-5.22	7.03	6.42	5.88	5.25	36.1
81/03/08	0342	-5.82	-5.71	7.68	6.98	6.38	5.62	27.6
81/03/08	0412	-5.94	-5.82	7.11	6.46	5.88	5.17	26.0
81/03/08	0442	-5.87	-5.81	6.92	6.27	5.69	4.95	20.1
81/03/08	0512	-5.63	-5.66	7.76	7.13	6.53	5.85	21.9
81/03/08	0542	-5.04	-5.02	8.94	8.11	7.27	6.37	32.6
81/03/08	0612	-4.70	-4.70	8.98	8.14	7.30	6.41	28.8
81/03/08	0642	-4.13	-4.16	10.13	9.11	8.23	7.31	33.3
81/03/08	0712	-3.93	-3.97	10.32	9.34	8.38	7.54	41.7
81/03/08	0742	-3.73	-3.79	11.31	10.27	9.23	8.22	37.8
81/03/08	0812	-3.62	-3.65	11.23	10.16	9.27	8.18	42.2
81/03/08	0842	-3.38	-3.44	11.16	10.09	9.19	8.10	44.5
81/03/08	0912	-3.04	-3.10	11.08	9.97	9.07	8.07	38.3
81/03/08	0942	-2.82	-2.91	11.01	9.94	9.07	8.03	44.6
81/03/08	1012	-2.45	-2.53	11.58	10.46	9.57	8.52	50.9
81/03/08	1042	-2.29	-2.37	11.54	10.46	9.57	8.56	48.8
81/03/08	1412	-3.27	-3.32	13.60	12.40	11.26	10.10	43.0
81/03/08	1442	-3.55	-3.57	13.18	12.07	10.92	9.76	51.1
81/03/08	1512	-3.80	-3.80	12.65	11.54	10.46	9.38	51.1
81/03/08	1542	-3.97	-3.94	12.84	11.69	10.57	9.53	53.0
81/03/08	1612	-4.29	-4.25	12.53	11.39	10.38	9.35	48.8
81/03/08	1642	-4.72	-4.65	12.27	11.09	10.07	9.08	46.9
81/03/08	2312	-6.82	-6.50	12.38	11.13	10.00	8.74	36.5
81/03/08	2342	-6.67	-6.30	11.96	10.72	9.57	8.41	32.3
81/03/09	0012	-6.74	-6.39	11.77	10.53	9.42	8.37	34.4
81/03/09	0042	-6.80	-6.49	11.66	10.46	9.27	8.29	30.0
81/03/09	0112	-7.06	-6.75	12.61	11.36	10.11	8.97	36.3
81/03/09	0142	-7.04	-6.76	12.65	11.36	10.03	8.86	30.2
81/03/09	0512	-10.17	-10.06	13.22	12.03	10.65	9.53	26.1
81/03/09	0542	-10.87	-10.82	13.38	12.03	10.61	9.46	34.4
81/03/09	0612	-11.27	-11.22	12.80	11.66	10.23	9.16	30.2
81/03/09	0642	-11.71	-11.65	13.49	12.25	10.69	9.65	30.2
81/03/09	0712	-11.71	-11.58	13.41	12.10	10.57	9.53	30.2
81/03/09	0742	-11.90	-11.76	13.26	11.95	10.42	9.46	36.5
81/03/09	0812	-11.95	-11.82	12.76	11.54	10.11	9.19	32.3

DATE (YY/MM/DD)	TIME (GMT)	AIR TEMPERATURE (DEG C) AT HEIGHT (M) 5.96	.71	WIND SPEED (M/S) AT HEIGHT (M) 6.28	3.28	1.78	1.03	WIND DIR (DEG T) AT HT 6.28
81/03/09	0842	-12.06	-11.94	13.15	11.95	10.38	9.46	30.2
81/03/09	0912	-12.17	-12.04	13.45	12.33	10.69	9.68	30.2
81/03/09	0942	-12.18	-12.03	12.57	11.43	10.00	9.04	28.1
81/03/09	1012	-12.14	-12.00	13.30	12.14	10.57	9.61	30.2
81/03/09	1042	-12.06	-11.92	13.22	12.03	10.42	9.42	34.4
81/03/09	1112	-11.87	-11.75	12.84	11.66	10.11	9.31	30.3
81/03/09	1142	-11.96	-11.88	12.76	11.66	10.11	9.27	34.5
81/03/09	1212	-11.90	-11.78	12.65	11.54	10.00	9.12	30.3
81/03/09	1242	-12.14	-12.00	12.19	11.21	9.76	8.97	21.9
81/03/09	1312	-12.29	-12.15	12.27	11.13	9.69	8.89	26.1
81/03/09	1342	-12.49	-12.37	12.31	11.21	9.73	8.82	28.2
81/03/09	1412	-12.58	-12.47	12.92	11.88	10.26	9.31	26.1
81/03/09	1442	-12.62	-12.52	12.57	11.54	9.92	9.12	24.0
81/03/09	1512	-12.64	-12.54	12.73	11.69	10.07	9.27	21.9
81/03/09	1542	-12.46	-12.39	13.15	12.07	10.38	9.57	26.1
81/03/09	1612	-12.38	-12.30	13.15	12.07	10.34	9.38	28.2
81/03/09	1642	-12.46	-12.36	13.41	12.37	10.57	9.57	28.2
81/03/09	1712	-12.32	-12.23	13.22	12.14	10.42	9.42	26.1
81/03/09	1742	-12.21	-12.14	12.76	11.69	10.07	9.08	26.1
81/03/09	1812	-12.39	-12.34	13.18	12.03	10.30	9.46	32.4
81/03/09	1842	-12.42	-12.36	12.53	11.43	9.76	8.89	30.3
81/03/09	1912	-12.23	-12.13	13.30	12.14	10.34	9.42	26.1
81/03/09	1942	-12.09	-11.97	12.80	11.62	10.00	9.16	26.1
81/03/09	2012	-11.79	-11.62	11.69	10.61	9.27	8.52	32.4
81/03/09	2042	-11.49	-11.25	12.50	11.36	9.80	8.97	32.4
81/03/09	2112	-11.15	-10.95	11.88	10.80	9.46	8.67	26.3
81/03/09	2142	-10.78	-10.42	12.73	11.54	10.07	9.19	30.5
81/03/09	2212	-10.89	-10.60	12.76	11.66	10.03	9.04	26.3
81/03/09	2242	-10.72	-10.40	13.07	11.92	10.26	9.16	24.2
81/03/09	2312	-10.49	-10.08	12.76	11.66	10.07	9.04	26.3
81/03/09	2342	-9.88	-9.45	12.80	11.58	10.11	9.12	28.4
81/03/10	0012	-10.29	-10.00	11.50	10.46	9.15	8.25	24.2
81/03/10	0042	-9.57	-9.27	11.77	10.72	9.34	8.41	22.1
81/03/10	0112	-9.61	-9.27	11.85	10.87	9.42	8.52	17.8
81/03/10	0142	-9.44	-9.16	12.15	11.02	9.53	8.59	20.0
81/03/10	0212	-9.33	-9.20	11.69	10.53	9.15	8.14	20.1
81/03/10	0242	-9.06	-8.95	11.04	10.01	8.80	7.88	22.2
81/03/10	0312	-8.55	-8.43	10.81	9.86	8.69	7.84	15.9
81/03/10	0342	-8.35	-8.21	10.20	9.34	8.27	7.54	20.1
81/03/10	0412	-8.00	-7.94	10.43	9.53	8.38	7.62	18.0

DATE (YY/MM/DD)	TIME (GMT)	AIR TEMPERATURE (DEG C) AT HEIGHT (M) 5.96	.71	WIND SPEED (M/S) AT HEIGHT (M) 6.28	3.28	1.78	1.03	WIND DIR (DEG T) AT HT 6.28
81/03/10	0442	-7.86	-7.80	9.55	8.70	7.69	6.98	15.9
81/03/10	0512	-6.70	-6.71	9.71	8.78	7.92	7.24	22.2
81/03/10	0542	-5.99	-6.00	9.48	8.48	7.73	7.05	30.6
81/03/10	0612	-5.11	-5.16	9.74	8.89	8.19	7.62	37.1
81/03/10	0642	-4.60	-4.62	9.82	8.96	8.19	7.58	39.2
81/03/10	0712	-4.37	-4.40	11.92	10.98	9.92	9.19	45.5
81/03/10	0742	-4.51	-4.52	11.16	10.16	9.19	8.48	47.6
81/03/10	0812	-4.81	-4.81	10.16	9.26	8.46	7.77	49.7
81/03/10	0842	-4.87	-4.86	9.86	8.96	8.19	7.50	43.4
81/03/10	0912	-5.17	-5.14	10.74	9.79	8.88	8.14	45.5
81/03/10	0942	-5.68	-5.65	10.70	9.79	8.84	7.99	41.5
81/03/10	1012	-6.06	-6.01	10.93	9.94	9.00	8.14	37.2
81/03/10	1042	-6.32	-6.24	10.05	9.19	8.38	7.65	35.1
81/03/10	1112	-6.83	-6.75	9.74	8.85	8.11	7.47	37.2
81/03/10	1142	-7.34	-7.24	10.16	9.30	8.42	7.73	37.2
81/03/10	1212	-7.47	-7.38	9.36	8.52	7.84	7.20	30.9
81/03/10	1242	-7.82	-7.74	9.74	8.78	8.07	7.43	33.0
81/03/10	1312	-7.91	-7.82	9.59	8.70	7.92	7.24	35.1
81/03/10	1342	-8.30	-8.17	9.02	8.07	7.38	6.75	30.9
81/03/10	1412	-8.37	-8.25	9.36	8.48	7.65	6.98	32.9
81/03/10	1442	-8.71	-8.60	9.63	8.70	7.92	7.16	37.2
81/03/10	1512	-8.94	-8.84	9.74	8.82	8.03	7.31	35.1
81/03/10	1542	-9.16	-9.06	9.59	8.70	7.96	7.13	35.1
81/03/10	1612	-9.28	-9.17	10.16	9.34	8.46	7.54	37.2
81/03/10	1642	-9.32	-9.20	10.32	9.38	8.46	7.58	35.1
81/03/10	1712	-9.45	-9.34	10.36	9.49	8.57	7.73	43.6
81/03/10	1742	-9.61	-9.46	9.17	8.29	7.57	6.83	37.2
81/03/10	1812	-9.28	-9.19	9.40	8.55	7.80	7.05	45.7
81/03/10	1842	-9.31	-9.20	9.63	8.78	7.92	7.20	39.4
81/03/10	1912	-9.02	-8.90	9.94	9.04	8.15	7.50	37.4
81/03/10	1942	-9.15	-9.00	10.36	9.41	8.42	7.69	37.4
81/03/10	2012	-9.10	-8.97	9.82	8.96	8.07	7.39	41.6

APPENDIX D

Relative currents and temperatures for two current meters under the ice floe. Interpolated data are indicated by an asterisk, chiefly some of the compass data from the 1.1 m deep current meter. Julian day 67 is equivalent to 8 March.

NUMBER OF POINTS 410, DEPTH(M) 1.1

YR	JD	HR	MN	REC	U(CM/S)	V(CM/S)	S(CM/S)	(DEG T)	SST(C)
81	67	1	58	1436	2.43	6.52	6.96	20.47	-1.66
81	67	2	8	1437	4.08	7.46	8.50	28.69*	-1.66
81	67	2	18	1438	4.31	5.73	7.17	36.91	-1.66
81	67	2	28	1439	2.61	6.53	7.03	21.84	-1.69
81	67	2	38	1440	2.38	8.89	9.20	14.99	-1.69
81	67	2	48	1441	7.15	5.45	8.99	52.67	-1.66
81	67	2	58	1442	6.23	5.98	8.64	46.16	-1.69
81	67	3	8	1443	5.29	6.66	8.50	38.45*	-1.69
81	67	3	18	1444	4.32	7.27	8.46	30.74	-1.69
81	67	3	28	1445	2.13	8.16	8.43	14.64	-1.69
81	67	3	38	1446	4.09	5.80	7.10	35.20	-1.69
81	67	3	48	1447	2.89	5.94	6.61	25.95	-1.69
81	67	3	58	1448	3.07	6.32	7.03*	25.88*	-1.69*
81	67	4	8	1449	3.24	6.71	7.45*	25.81*	-1.69*
81	67	4	18	1450	3.42	7.09	7.87*	25.74*	-1.71*
81	67	4	28	1451	3.59	7.47	8.29	25.67*	-1.71*
81	67	4	38	1452	3.40	7.10	7.87	25.61	-1.71
81	67	4	48	1453	2.98	6.13	6.82	25.95*	-1.71
81	67	4	58	1454	2.93	5.93	6.61	26.29	-1.69
81	67	5	8	1455	2.80	6.53	7.10	23.21*	-1.69
81	67	5	18	1456	2.85	7.78	8.29	20.12*	-1.71
81	67	5	28	1457	2.39	7.79	8.15	17.04	-1.69
81	67	5	38	1458	3.38	7.26	8.01	24.92	-1.69
81	67	5	48	1459	2.85	8.38	8.85	18.75	-1.71
81	67	5	58	1460	3.06	8.23	8.78*	20.40*	-1.71*
81	67	6	8	1461	3.27	8.07	8.71*	22.04*	-1.71*
81	67	6	18	1462	3.47	7.91	8.64*	23.69*	-1.71*
81	67	6	28	1463	3.67	7.75	8.57	25.33*	-1.71*
81	67	6	38	1464	5.09	10.01	11.23	26.98	-1.71
81	67	6	48	1465	6.98	9.41	11.72	36.57	-1.71
81	67	6	58	1466	7.28	8.37	11.09	41.02	-1.71
81	67	7	8	1467	7.56	8.49	11.37	41.71	-1.71
81	67	7	18	1468	4.82	9.20	10.39	27.66	-1.69
81	67	7	28	1469	6.50	10.09	12.00	32.80	-1.71
81	67	7	38	1470	7.24	7.93	10.74	42.39	-1.71
81	67	7	48	1471	4.44	9.70	10.67	24.58	-1.71
81	67	7	58	1472	9.34	9.99	13.68	43.08	-1.71
81	67	8	8	1473	9.59	7.78	12.35	50.96	-1.71
81	67	8	18	1474	9.81	12.89	16.20	37.25	-1.71
81	67	8	28	1475	7.06	11.88	13.82	30.74	-1.71
81	67	8	38	1476	7.56	9.58	12.21	38.28	-1.71
81	67	8	48	1477	6.87	11.09	13.05	31.77	-1.73
81	67	8	58	1478	9.24	12.00	15.15	37.60	-1.71
81	67	9	8	1479	12.07	8.32	14.66	55.41	-1.71
81	67	9	18	1480	8.22	10.04	12.98	39.31	-1.69
81	67	9	28	1481	8.49	9.64	12.84	41.37	-1.71
81	67	9	38	1482	9.11	8.54	12.49	46.85	-1.69
81	67	9	48	1483	10.44	9.79	14.31	46.85	-1.71
81	67	9	58	1484	10.31	8.56	13.40	50.27	-1.71

81	67	10	8	1485	6.85	9.59	11.79	35.54	-1.69
81	67	10	18	1486	5.98	11.75	13.19	26.98	-1.69
81	67	10	28	1487	8.96	9.58	13.12	43.08	-1.69
81	67	10	38	1488	7.80	9.76	12.49	38.62	-1.69
81	67	10	48	1489	9.07	9.48	13.12	43.76	-1.69
81	67	10	58	1490	9.99	11.48	15.22	41.02	-1.69
81	67	11	8	1491	9.71	10.89	14.59	41.71	-1.69
81	67	11	18	1492	10.74	9.14	14.10	49.59	-1.69
81	67	11	28	1493	11.55	10.44	15.57	47.87	-1.66
81	67	11	38	1494	13.03	8.53	15.57	56.78	-1.66
81	67	11	48	1495	13.32	10.29	16.83	52.33	-1.69
81	67	11	58	1496	12.84	12.04	17.60	46.85	-1.69
81	67	12	8	1497	16.60	7.86	18.37	64.66	-1.66
81	67	12	18	1498	13.83	8.03	15.99	59.87	-1.66
81	67	12	28	1499	14.17	10.67	17.74	53.01	-1.69
81	67	12	38	1500	11.72	11.39	16.34	45.82	-1.69
81	67	12	48	1501	13.61	6.65	15.15	63.98	-1.66
81	67	12	58	1502	15.13	9.53	17.88	57.81	-1.66
81	67	13	8	1503	12.92	10.23	16.48	51.64	-1.66
81	67	13	18	1504	11.56	12.52	17.04	42.74	-1.66
81	67	13	28	1505	10.38	11.23	15.29	42.74	-1.66
81	67	13	38	1506	14.10	8.53	16.48	58.84	-1.66
81	67	13	48	1507	15.21	7.20	16.83	64.66	-1.66
81	67	13	58	1508	13.63	13.73	19.35	44.79	-1.66
81	67	14	8	1509	11.66	12.62	17.18	42.74	-1.66
81	67	14	18	1510	11.81	14.25	18.51	39.65	-1.69
81	67	14	28	1511	15.93	14.58	21.59	47.53	-1.69
81	67	14	38	1512	18.03	12.75	22.08	54.73	-1.69
81	67	14	48	1513	12.79	15.62	20.19	39.31	-1.69
81	67	14	58	1514	14.05	13.81	19.70	45.48	-1.69
81	67	15	8	1515	14.82	11.44	18.72	52.33	-1.64
81	67	15	18	1516	13.88	12.25	18.51	48.56	-1.66
81	67	15	28	1517	10.73	12.79	16.69	40.00	-1.66
81	67	15	38	1518	17.31	9.10	19.56	62.26	-1.66
81	67	15	48	1519	16.78	12.33	20.82	53.70	-1.66
81	67	15	58	1520	12.56	11.92	17.32	46.50	-1.66
81	67	16	8	1521	14.58	14.17	20.33	45.82	-1.66
81	67	16	18	1522	16.16	8.87	18.44	61.24	-1.71
81	67	16	28	1523	14.92	6.31	16.20	67.06	-1.66
81	67	16	38	1524	10.40	15.31	18.51	34.17	-1.71
81	67	16	48	1525	14.13	11.74	18.37	50.27	-1.69
81	67	16	58	1526	15.17	14.05	20.68	47.19	-1.66
81	67	17	8	1527	14.59	10.58	18.02	54.04	-1.66
81	67	17	18	1528	11.24	13.90	17.88	38.97	-1.71
81	67	17	28	1529	11.36	16.52	20.05	34.51	-1.69
81	67	17	38	1530	10.07	14.09	17.32	35.54	-1.69
81	67	17	48	1531	10.37	12.98	16.62	38.62	-1.69
81	67	17	58	1532	13.48	13.10	18.79	45.82	-1.66
81	67	18	8	1533	9.81	13.06	16.34	36.91	-1.69
81	67	18	18	1534	14.75	11.53	18.72	51.99	-1.66
81	67	18	28	1535	12.08	12.31	17.25	44.45	-1.66
81	67	18	38	1536	6.88	16.58	17.95	22.52	-1.69
81	67	18	48	1537	10.78	7.72	13.26	54.38	-1.66
81	67	18	58	1538	6.98	11.27	13.26	31.77	-1.69
81	67	19	8	1539	12.33	10.50	16.20	49.59	-1.69
81	67	19	18	1540	14.19	9.05	16.83	57.47	-1.66
81	67	19	28	1541	12.12	11.78	16.90	45.82	-1.64
81	67	19	38	1542	13.45	13.22	18.86	45.48	-1.64
81	67	19	48	1543	14.12	12.92	19.14	47.53	-1.66
81	67	19	58	1544	14.94	14.70	20.96	45.48	-1.64

81	67	20	8	1545	13.30	11.74	17.74	48.56	-1.66
81	67	20	18	1546	9.37	12.96	15.99	35.88	-1.64
81	67	20	28	1547	14.03	14.13	19.91	44.79	-1.66
81	67	20	38	1548	12.17	14.50	18.93	40.00	-1.64
81	67	20	48	1549	13.24	13.82	19.14	43.76	-1.64
81	67	20	58	1550	11.67	15.35	19.28	37.25	-1.64
81	67	21	8	1551	10.40	12.70	16.41	39.31	-1.64
81	67	21	18	1552	8.48	17.16	19.14	26.29	-1.64
81	67	21	28	1553	14.76	14.18	20.47	46.16	-1.64
81	67	21	38	1554	9.82	12.44	15.85	38.28	-1.64
81	67	21	48	1555	11.55	14.28	18.37	38.97	-1.64
81	67	21	58	1556	11.72	14.14	18.37	39.65	-1.64
81	67	22	8	1557	5.95	15.37	16.48	21.15	-1.64
81	67	22	18	1558	4.66	17.41	18.02	14.99	-1.64
81	67	22	28	1559	13.20	11.10	17.25	49.93	-1.64
81	67	22	38	1560	6.49	16.21	17.46	21.84	-1.66
81	67	22	48	1561	13.45	12.92	18.65	46.16	-1.66
81	67	22	58	1562	11.00	11.21	15.71	44.45	-1.66
81	67	23	8	1563	9.46	12.28	15.50	37.60	-1.66
81	67	23	18	1564	12.70	13.75	18.72	42.74	-1.66
81	67	23	28	1565	11.98	11.92	16.90	45.13	-1.69
81	67	23	38	1566	9.39	12.51	15.64	36.91	-1.69
81	67	23	48	1567	6.77	14.56	16.06	24.92	-1.69
81	67	23	58	1568	10.46	9.46	14.10	47.87	-1.69
81	68	0	8	1569	11.87	11.13	16.27	46.85	-1.69
81	68	0	18	1570	10.26	10.27	14.52	44.96*	-1.69
81	68	0	28	1571	10.97	11.73	16.06	43.08	-1.69
81	68	0	38	1572	10.43	10.89	15.08	43.76	-1.69
81	68	0	48	1573	8.02	11.51	14.03	34.86	-1.71
81	68	0	58	1574	9.02	13.63	16.34	33.49	-1.69
81	68	1	8	1575	7.50	12.27	14.38	31.43	-1.69
81	68	1	18	1576	6.92	11.64	13.54	30.74	-1.71
81	68	1	28	1577	7.11	8.69	11.23	39.31	-1.69
81	68	1	38	1578	9.50	13.13	16.20	35.88	-1.69
81	68	1	48	1579	12.05	13.68	18.23	41.37	-1.69
81	68	1	58	1580	6.81	12.98	14.66	27.66	-1.69
81	68	2	8	1581	8.45	10.58	13.54	38.62	-1.69
81	68	2	18	1582	8.94	12.83	15.64	34.86	-1.69
81	68	2	28	1583	10.41	9.19	13.89	48.56	-1.69
81	68	2	38	1584	10.12	15.91	18.86	32.46	-1.69
81	68	2	48	1585	13.77	12.16	18.37	48.56	-1.69
81	68	2	58	1586	12.05	12.44	17.32	44.11	-1.69
81	68	3	8	1587	11.20	11.41	15.99	44.45	-1.66
81	68	3	18	1588	7.12	15.33	16.90	24.92	-1.69
81	68	3	28	1589	7.92	16.27	18.09	25.95	-1.69
81	68	3	38	1590	6.28	13.94	15.29	24.24	-1.69
81	68	3	48	1591	6.26	12.48	13.96	26.63*	-1.66*
81	68	3	58	1592	8.91	16.06	18.37	29.03	-1.66
81	68	4	8	1593	10.11	15.09	18.16	33.83	-1.69
81	68	4	18	1594	6.38	14.89	16.20	23.21	-1.69
81	68	4	28	1595	13.93	11.43	18.02	50.62	-1.69
81	68	4	38	1596	7.40	16.43	18.02	24.24	-1.69
81	68	4	48	1597	8.26	13.69	15.99	31.09	-1.66
81	68	4	58	1598	10.07	14.09	17.32	35.54	-1.69
81	68	5	8	1599	5.61	14.00	15.08	21.84	-1.69
81	68	5	18	1600	9.66	13.52	16.62	35.54	-1.69
81	68	5	28	1601	10.57	17.53	20.47	31.09	-1.66
81	68	5	38	1602	10.78	15.48	18.86	34.86*	-1.69
81	68	5	48	1603	10.51	13.15	16.83	38.62	-1.69
81	68	5	58	1604	9.55	14.62	17.46	33.14	-1.69

81	68	6	8	1605	6.63	16.83	18.09	21.49	-1.66
81	68	6	18	1606	12.20	13.36	18.09	42.39	-1.69
81	68	6	28	1607	5.36	14.91	15.85	19.78	-1.69
81	68	6	38	1608	10.99	14.28	18.02	37.60	-1.69
81	68	6	48	1609	7.27	15.41	17.04	25.26	-1.69
81	68	6	58	1610	7.26	15.88	17.46	24.58	-1.69
81	68	7	8	1611	9.03	17.74	19.91	26.98	-1.69
81	68	7	18	1612	9.93	17.90	20.47	29.03	-1.69
81	68	7	28	1613	6.96	17.98	19.28	21.15	-1.69
81	68	7	38	1614	5.64	20.11	20.89	15.67	-1.69
81	68	7	48	1615	7.18	16.75	18.23	23.21	-1.69
81	68	7	58	1616	7.38	16.13	17.74	24.58	-1.69
81	68	8	8	1617	9.87	9.37	13.61	46.50	-1.69
81	68	8	18	1618	10.78	15.48	18.86	34.86	-1.66
81	68	8	28	1619	9.04	19.76	21.73	24.58	-1.66
81	68	8	38	1620	8.92	17.01	19.21	27.66	-1.69
81	68	8	48	1621	9.03	15.19	17.67	30.74	-1.66
81	68	8	58	1622	7.69	20.99	22.36	20.12	-1.66
81	68	9	8	1623	5.57	17.43	18.30	17.73	-1.66
81	68	9	18	1624	6.67	17.87	19.07	20.47	-1.66
81	68	9	28	1625	9.35	18.37	20.61	26.98	-1.66
81	68	9	38	1626	8.69	15.22	17.53	29.72	-1.66
81	68	9	48	1627	7.47	16.86	18.44	23.89	-1.66
81	68	9	58	1628	7.71	17.13	18.79	24.24	-1.69
81	68	10	8	1629	8.69	15.22	17.53	29.72	-1.66
81	68	10	18	1630	10.15	17.54	20.26	30.06	-1.66
81	68	10	28	1631	8.89	16.48	18.72	28.35	-1.69
81	68	10	38	1632	6.96	14.08	15.71	26.29	-1.66
81	68	10	48	1633	6.34	12.83	14.31	26.29	-1.69
81	68	10	58	1634	7.65	17.55	19.14	23.55	-1.69
81	68	11	8	1635	8.62	14.29	16.69	31.09	-1.66
81	68	11	18	1636	11.42	11.78	16.41	44.11	-1.71
81	68	11	28	1637	11.30	16.65	20.12	34.17	-1.66
81	68	11	38	1638	5.06	16.49	17.25	17.04	-1.69
81	68	11	48	1639	10.25	15.91	18.93	32.80	-1.69
81	68	11	58	1640	5.37	18.30	19.07	16.36	-1.71
81	68	12	8	1641	11.19	15.87	19.42	35.20	-1.69
81	68	12	18	1642	10.86	18.01	21.03	31.09	-1.69
81	68	12	28	1643	14.51	12.05	18.86	50.27	-1.71
81	68	12	38	1644	11.46	14.17	18.23	38.97	-1.69
81	68	12	48	1645	10.48	16.93	19.91	31.77	-1.71
81	68	12	58	1646	9.53	16.03	18.65	30.74	-1.71
81	68	13	8	1647	9.23	15.72	18.23	30.40	-1.69
81	68	13	18	1648	9.59	17.29	19.77	29.03	-1.71
81	68	13	28	1649	11.65	12.91	17.39	42.05	-1.71
81	68	13	38	1650	12.54	16.09	20.40	37.94	-1.71
81	68	13	48	1651	15.24	17.31	23.06	41.37	-1.69
81	68	13	58	1652	6.79	15.32	16.76	23.89	-1.69
81	68	14	8	1653	7.66	17.01	18.65	24.24	-1.69
81	68	14	18	1654	7.31	16.24	17.81	24.24	-1.71
81	68	14	28	1655	11.38	14.78	18.65	37.60	-1.71
81	68	14	38	1656	8.28	22.19	23.69	20.47	-1.69
81	68	14	48	1657	7.75	17.50	19.14	23.89	-1.69
81	68	14	58	1658	7.59	15.72	17.46	25.78*	-1.71
81	68	15	8	1659	7.00	13.36	15.08	27.66	-1.71
81	68	15	18	1660	12.03	17.50	21.24	34.51	-1.71
81	68	15	28	1661	6.37	18.05	19.14	19.44	-1.69
81	68	15	38	1662	7.06	14.97	16.55	25.26	-1.69
81	68	15	48	1663	10.46	16.03	19.14	33.14	-1.69
81	68	15	58	1664	9.18	17.27	19.56	28.00	-1.69

81	68	16	8	1665	7.99	17.47	19.21	24.58	-1.69
81	68	16	18	1666	5.07	16.19	16.97	17.38	-1.69
81	68	16	28	1667	11.79	13.07	17.60	42.05	-1.69
81	68	16	38	1668	9.17	12.84	15.78	35.54	-1.69
81	68	16	48	1669	11.81	14.07	18.37	40.00	-1.69
81	68	16	58	1670	12.18	17.06	20.96	35.54*	-1.69
81	68	17	8	1671	11.76	19.51	22.78	31.09	-1.69
81	68	17	18	1672	11.85	13.95	18.30	40.34	-1.71
81	68	17	28	1673	6.42	14.49	15.85	23.89	-1.71
81	68	17	38	1674	11.89	18.69	22.15	32.46	-1.69
81	68	17	48	1675	11.85	13.95	18.30	40.34	-1.69
81	68	17	58	1676	7.73	15.65	17.46	26.29	-1.69
81	68	18	8	1677	6.41	13.80	15.22	24.92	-1.71
81	68	18	18	1678	9.53	17.16	19.63	29.03	-1.69
81	68	18	28	1679	10.35	19.19	21.80	28.35	-1.71
81	68	18	38	1680	8.74	15.52	17.81	29.37	-1.69
81	68	18	48	1681	10.22	19.49	22.01	27.66	-1.69
81	68	18	58	1682	9.06	20.13	22.08	24.24	-1.71
81	68	19	8	1683	8.66	17.54	19.56	26.29	-1.69
81	68	19	18	1684	12.50	12.29	17.53	45.48	-1.69
81	68	19	28	1685	4.74	15.79	16.48	16.70	-1.71
81	68	19	38	1686	10.90	21.11	23.76	27.32	-1.69
81	68	19	48	1687	9.70	14.85	17.74	33.14	-1.69
81	68	19	58	1688	10.40	11.96	15.85	41.02	-1.69
81	68	20	8	1689	7.45	16.56	18.16	24.24	-1.69
81	68	20	18	1690	8.95	17.08	19.28	27.66*	-1.69
81	68	20	28	1691	8.40	13.93	16.27	31.09	-1.69
81	68	20	38	1692	8.12	15.06	17.11	28.35	-1.69
81	68	20	48	1693	11.85	15.39	19.42	37.60	-1.69
81	68	20	58	1694	8.90	13.28	15.99	33.83	-1.66
81	68	21	8	1695	11.55	13.28	17.60	41.02	-1.66
81	68	21	18	1696	5.26	18.33	19.07	16.01	-1.66
81	68	21	28	1697	7.76	14.38	16.34	28.35	-1.69
81	68	21	38	1698	13.25	15.05	20.05	41.37	-1.69
81	68	21	48	1699	7.20	16.52	18.02	23.55	-1.69
81	68	21	58	1700	9.32	16.80	19.21	29.03	-1.69
81	68	22	8	1701	9.65	12.84	16.06	36.91	-1.69
81	68	22	18	1702	6.82	15.39	16.83	23.89	-1.69
81	68	22	28	1703	7.64	12.18	14.38	32.12	-1.71
81	68	22	38	1704	8.00	14.01	16.13	29.72	-1.71
81	68	22	48	1705	7.55	15.51	17.25	25.95	-1.71
81	68	22	58	1706	7.76	15.48	17.32	26.63	-1.71
81	68	23	8	1707	9.26	19.04	21.17	25.95	-1.71
81	68	23	18	1708	6.07	14.64	15.85	22.52	-1.71
81	68	23	28	1709	7.06	16.73	18.16	22.87	-1.71
81	68	23	38	1710	8.85	16.89	19.07	27.66	-1.71
81	68	23	48	1711	9.08	10.69	14.03	40.34	-1.71
81	68	23	58	1712	9.54	15.20	17.95	32.12	-1.73
81	69	0	8	1713	8.33	15.66	17.74	28.00	-1.71
81	69	0	18	1714	8.69	16.11	18.30	28.35	-1.71
81	69	0	28	1715	7.89	15.73	17.60	26.63	-1.71
81	69	0	38	1716	8.18	17.61	19.42	24.92	-1.71
81	69	0	48	1717	7.98	14.58	16.62	28.69	-1.71
81	69	0	58	1718	7.79	15.08	16.97	27.32	-1.71
81	69	1	8	1719	10.73	16.44	19.63	33.14	-1.71
81	69	1	18	1720	8.33	13.73	16.06	31.26*	-1.71
81	69	1	28	1721	8.84	15.70	18.02	29.37	-1.71
81	69	1	38	1722	8.34	15.02	17.18	29.03	-1.69
81	69	1	48	1723	8.22	16.90	18.79	25.95	-1.71
81	69	1	58	1724	9.37	17.88	20.19	27.66	-1.71

81	69	2	8	1725	12.26	19.53	23.06	32.12	-1.69
81	69	2	18	1726	6.94	17.61	18.93	21.49	-1.69
81	69	2	28	1727	7.73	15.89	17.67	25.95	-1.69
81	69	2	38	1728	8.62	15.75	17.95	28.69	-1.71
81	69	2	48	1729	8.49	15.74	17.88	28.35	-1.69
81	69	2	58	1730	5.76	18.03	18.93	17.73	-1.69
81	69	3	8	1731	4.80	18.38	19.00	14.64	-1.69
81	69	3	18	1732	6.41	13.80	15.22	24.92	-1.71
81	69	3	28	1733	4.41	16.89	17.46	14.64	-1.69
81	69	3	38	1734	11.33	15.86	19.49	35.54	-1.69
81	69	3	48	1735	6.68	17.56	18.79	20.81	-1.69
81	69	3	58	1736	6.55	16.94	18.16	21.15	-1.71
81	69	4	8	1737	8.51	18.62	20.47	24.58	-1.69
81	69	4	18	1738	11.30	16.65	20.12	34.17	-1.69
81	69	4	28	1739	4.57	17.50	18.09	14.64	-1.69
81	69	4	38	1740	4.72	16.81	17.46	15.67	-1.71
81	69	4	48	1741	5.37	15.66	16.55	18.93*	-1.69
81	69	4	58	1742	6.80	16.69	18.02	22.18	-1.69
81	69	5	8	1743	5.25	15.18	16.06	19.10	-1.69
81	69	5	18	1744	9.25	16.20	18.65	29.72	-1.66
81	69	5	28	1745	5.08	15.90	16.69	17.73	-1.69
81	69	5	38	1746	5.96	15.14	16.27	21.49	-1.66
81	69	5	48	1747	6.38	12.18	13.75	27.66	-1.71
81	69	5	58	1748	5.59	13.25	14.38	22.87	-1.71
81	69	6	8	1749	4.88	12.85	13.75	20.81	-1.69
81	69	6	18	1750	6.03	11.26	12.77	28.18*	-1.69
81	69	6	28	1751	7.30	10.22	12.56	35.54	-1.69
81	69	6	38	1752	7.14	8.94	11.44	38.62	-1.66
81	69	6	48	1753	6.85	12.17	13.96	29.37	-1.66
81	69	6	58	1754	8.13	12.45	14.87	33.14	-1.66
81	69	7	8	1755	11.64	9.91	15.29	49.59	-1.64
81	69	7	18	1756	8.03	10.82	13.47	36.57	-1.66
81	69	7	28	1757	11.04	10.98	15.57	45.13	-1.64
81	69	7	38	1758	11.68	10.19	15.50	48.90	-1.62
81	69	7	48	1759	12.72	9.46	15.85	53.36	-1.62
81	69	7	58	1760	14.44	13.70	19.91	46.50	-1.62
81	69	8	8	1761	12.47	12.71	17.81	44.45	-1.64
81	69	8	18	1762	14.06	8.73	16.55	58.15	-1.60
81	69	8	28	1763	9.31	11.51	14.80	38.97	-1.62
81	69	8	38	1764	13.26	8.02	15.50	58.84	-1.60
81	69	8	48	1765	10.87	11.63	15.92	43.08	-1.60
81	69	8	58	1766	14.28	7.95	16.34	60.89	-1.62
81	69	9	8	1767	13.12	11.73	17.60	48.22	-1.62
81	69	9	18	1768	15.31	9.64	18.09	57.81	-1.62
81	69	9	28	1769	12.33	11.15	16.62	47.87	-1.64
81	69	9	38	1770	11.97	9.95	15.57	50.27	-1.64
81	69	9	48	1771	11.49	9.55	14.94	50.27	-1.64
81	69	9	58	1772	10.21	11.19	15.15	42.39	-1.66
81	69	10	8	1773	11.14	10.57	15.36	46.50	-1.71
81	69	10	18	1774	11.94	9.33	15.15	51.99	-1.66
81	69	10	28	1775	9.41	11.78	15.08	38.62	-1.66
81	69	10	38	1776	11.39	7.46	13.61	56.78	-1.69
81	69	10	48	1777	7.72	12.13	14.38	32.46	-1.69
81	69	10	58	1778	8.76	10.32	13.54	40.34	-1.69
81	69	11	8	1779	9.24	11.56	14.80	38.62	-1.69
81	69	11	18	1780	9.14	13.46	16.27	34.17	-1.69
81	69	11	28	1781	13.27	12.90	18.51	45.82	-1.71
81	69	11	38	1782	9.65	13.01	16.20	36.57	-1.69
81	69	11	48	1783	5.54	11.74	12.98	25.26	-1.69
81	69	11	58	1784	8.57	13.83	16.27	31.77	-1.69

81	69	12	8	1785	9.00	15.13	17.60	30.74	-1.69
81	69	12	18	1786	10.10	14.50	17.67	34.86	-1.71
81	69	12	28	1787	10.45	12.01	15.92	41.02	-1.69
81	69	12	38	1788	9.69	15.44	18.23	32.12	-1.69
81	69	12	48	1789	9.53	14.98	17.76*	32.46*	-1.69*
81	69	12	58	1790	9.36	14.53	17.29*	32.80*	-1.69*
81	69	13	8	1791	9.19	14.08	16.81*	33.14*	-1.69*
81	69	13	18	1792	9.02	13.63	16.34	33.49*	-1.69*
81	69	13	28	1793	8.78	13.11	15.78	33.83	-1.69
81	69	13	38	1794	9.67	15.21	18.02	32.46	-1.69
81	69	13	48	1795	7.11	14.17	15.85	26.63	-1.69
81	69	13	58	1796	8.15	17.55	19.35	24.92	-1.69
81	69	14	8	1797	9.57	14.10	17.04	34.17	-1.71
81	69	14	18	1798	9.44	12.56	15.71	36.91	-1.69
81	69	14	28	1799	9.33	15.90	18.44	30.40	-1.69
81	69	14	38	1800	10.29	12.42	16.13	39.65	-1.71
81	69	14	48	1801	11.51	10.79	15.78	46.85	-1.69
81	69	14	58	1802	11.29	14.84	18.65	37.25	-1.69
81	69	15	8	1803	11.30	15.10	18.86	36.80*	-1.66
81	69	15	18	1804	12.84	17.45	21.66	36.34*	-1.69*
81	69	15	28	1805	7.32	10.12	12.49	35.88*	-1.69*
81	69	15	38	1806	10.38	14.59	17.90	35.43*	-1.69*
81	69	15	48	1807	10.33	14.77	18.02	34.97*	-1.69*
81	69	15	58	1808	10.09	14.68	17.81	34.51	-1.69
81	69	16	8	1809	10.44	14.43	17.81	35.88	-1.69
81	69	16	18	1810	10.62	15.84	19.07	33.83	-1.69
81	69	16	28	1811	7.45	15.09	16.83	26.29	-1.69
81	69	16	38	1812	12.48	13.19	18.16	43.42	-1.69
81	69	16	48	1813	9.65	15.38	18.16	32.12	-1.71
81	69	16	58	1814	10.25	15.50	18.58	33.49	-1.69
81	69	17	8	1815	8.01	16.22	18.09	26.29	-1.69
81	69	17	18	1816	9.08	15.48	17.95	30.40	-1.69
81	69	17	28	1817	10.27	13.51	16.97	37.25	-1.69
81	69	17	38	1818	8.85	11.07	14.17	38.62	-1.69
81	69	17	48	1819	13.34	9.68	16.48	54.04	-1.69
81	69	17	58	1820	11.95	11.75	16.76	45.48	-1.69
81	69	18	8	1821	11.47	11.83	16.48	44.11	-1.69
81	69	18	18	1822	9.69	12.90	16.13	36.91	-1.66
81	69	18	28	1823	10.12	15.50	18.51	33.14	-1.66
81	69	18	38	1824	9.09	13.92	16.62	33.14	-1.66
81	69	18	48	1825	10.46	15.02	18.30	34.86	-1.66
81	69	18	58	1826	9.49	10.52	14.17	42.05	-1.69
81	69	19	8	1827	10.06	11.42	15.22	41.37	-1.69
81	69	19	18	1828	8.86	11.94	14.87	36.57	-1.66
81	69	19	28	1829	11.17	9.17	14.45	50.62	-1.66
81	69	19	38	1830	9.71	8.07	12.63	50.27	-1.69
81	69	19	48	1831	10.93	11.28	15.71	44.11	-1.66
81	69	19	58	1832	7.60	14.94	16.76	26.98	-1.66
81	69	20	8	1833	6.66	10.90	12.77	31.43	-1.66
81	69	20	18	1834	11.70	11.51	16.41	45.48	-1.66
81	69	20	28	1835	11.13	11.48	15.99	44.11	-1.66
81	69	20	38	1836	9.41	13.87	16.76	34.17	-1.66
81	69	20	48	1837	11.66	11.75	16.55	44.79	-1.66
81	69	20	58	1838	8.24	12.79	15.22	32.80	-1.66
81	69	21	8	1839	12.62	12.56	17.81	45.13	-1.64
81	69	21	18	1840	9.39	12.51	15.64	36.91	-1.66
81	69	21	28	1841	8.54	13.43	15.92	32.46	-1.66*
81	69	21	38	1842	9.62	11.89	15.29	38.97	-1.66
81	69	21	48	1843	10.73	9.36	14.24	48.90	-1.66
81	69	21	58	1844	10.84	9.23	14.24	49.59	-1.66
81	69	22	8	1845	9.26	11.45	14.73	38.97	-1.66

NUMBER OF POINTS 87, DEPTH(M) 5.1

YR	JD	HR	MN	REC	U(CM/S)	V(CM/S)	S(CM/S)	(DEG T)	SST(C)
81	67	1	54	1427	4.15	9.52	10.39	23.55	-1.69
81	67	2	4	1428	3.39	11.15	11.65	16.93	-1.69
81	67	2	14	1429	5.83	11.60	12.98	26.68	-1.69
81	67	2	24	1430	8.73	12.29	15.08	35.39	-1.69
81	67	2	34	1431	9.51	10.69	14.31	41.67	-1.69
81	67	2	44	1432	6.32	11.02	12.70	29.82	-1.69
81	67	2	54	1433	8.19	10.16	13.05	38.88	-1.69
81	67	3	4	1434	8.48	9.64	12.84	41.32	-1.69
81	67	3	14	1435	7.62	9.00	11.79	40.27	-1.69
81	67	3	24	1436	6.52	8.71	10.88	36.79	-1.69
81	67	3	34	1437	7.39	9.63	12.14	37.48	-1.69
81	67	3	44	1438	7.58	11.39	13.68	33.65	-1.69
81	67	3	54	1439	8.55	11.73	14.52	36.09	-1.69
81	67	4	4	1440	8.76	8.00	11.86	47.59	-1.71
81	67	4	14	1441	5.41	7.61	9.34	35.39	-1.69
81	67	4	24	1442	5.54	11.19	12.49	26.34	-1.69
81	67	4	34	1443	6.53	10.48	12.35	31.91	-1.69
81	67	4	44	1444	4.41	9.33	10.32	25.29	-1.69
81	67	4	54	1445	6.35	11.56	13.19	28.77	-1.69
81	67	5	4	1446	8.47	11.62	14.38	36.09	-1.69
81	67	5	14	1447	6.34	12.43	13.96	27.03	-1.71
81	67	5	24	1448	9.32	12.47	15.57	36.79	-1.69
81	67	5	34	1449	9.87	13.20	16.48	36.79	-1.71
81	67	5	44	1450	8.59	13.98	16.41	31.56	-1.71
81	67	5	54	1451	10.31	12.95	16.55	38.53	-1.71
81	67	6	4	1452	13.37	9.15	16.20	55.60	-1.71
81	67	6	14	1453	13.37	11.34	17.53	49.68	-1.71
81	67	6	24	1454	11.49	12.00	16.62	43.76	-1.71
81	67	6	34	1455	10.92	13.54	17.39	38.88	-1.71
81	67	6	44	1456	13.78	14.75	20.19	43.06	-1.71
81	67	6	54	1457	12.92	11.95	17.60	47.24	-1.71
81	67	7	4	1458	15.87	11.44	19.56	54.21	-1.71
81	67	7	14	1459	15.71	13.66	20.82	48.98	-1.71
81	67	7	24	1460	13.09	15.64	20.40	39.92	-1.71
81	67	7	34	1461	15.88	11.89	19.84	53.16	-1.71
81	67	7	44	1462	16.28	8.96	18.58	61.18	-1.71
81	67	7	54	1463	14.31	15.31	20.96	43.06	-1.71
81	67	8	4	1464	14.20	11.32	18.16	51.42	-1.71
81	67	8	14	1465	16.12	11.92	20.05	53.51	-1.71
81	67	8	24	1466	15.51	11.33	19.21	53.86	-1.71
81	67	8	34	1467	11.83	14.14	18.44	39.92	-1.71
81	67	8	44	1468	16.17	10.37	19.21	57.34	-1.69
81	67	8	54	1469	14.63	12.57	19.29	49.33	-1.71
81	67	9	4	1470	11.81	15.59	19.56	37.14	-1.69
81	67	9	14	1471	10.71	13.61	17.32	38.18	-1.69
81	67	9	24	1472	13.66	12.18	18.30	48.29	-1.69
81	67	9	34	1473	14.70	12.48	19.28	49.68	-1.69
81	67	9	44	1474	13.38	15.03	20.12	41.67	-1.69
81	67	9	54	1475	15.23	14.09	20.75	47.24	-1.69
81	67	10	4	1476	15.75	11.95	19.77	52.81	-1.69
81	67	10	14	1477	16.20	10.80	19.47	56.30	-1.69

81	67	10	24	1478	19.03	16.35	25.09	49.33	-1.66
81	67	10	34	1479	17.45	13.41	22.01	52.47	-1.66
81	67	10	44	1480	16.77	13.38	21.45	51.42	-1.66
81	67	10	54	1481	18.64	13.10	22.78	54.90	-1.66
81	67	11	4	1482	17.65	16.32	24.04	47.24	-1.66
81	67	11	14	1483	18.67	13.29	22.92	54.56	-1.66
81	67	11	24	1484	19.21	13.50	23.48	54.90	-1.66
81	67	11	34	1485	17.48	15.78	23.55	47.94	-1.66
81	67	11	44	1486	20.97	10.09	23.27	64.31	-1.66
81	67	11	54	1487	21.24	15.71	26.42	53.51	-1.66
81	67	12	4	1488	18.37	16.78	24.88	47.59	-1.66
81	67	12	14	1489	18.99	17.14	25.58	47.94	-1.66
81	67	12	24	1490	16.42	15.18	22.36	47.24	-1.64
81	67	12	34	1491	21.03	21.18	29.85	44.80	-1.66
81	67	12	44	1492	21.91	12.23	25.09	60.83	-1.64
81	67	12	54	1493	19.67	18.87	27.26	46.19	-1.64
81	67	13	4	1494	14.80	17.68	23.06	39.92	-1.64
81	67	13	14	1495	16.31	18.79	24.88	40.97	-1.64
81	67	13	24	1496	11.86	23.61	26.42	26.68	-1.64
81	67	13	34	1497	16.89	14.33	22.15	49.68	-1.64
81	67	13	44	1498	16.75	19.05	25.37	41.32	-1.64
81	67	13	54	1499	17.57	15.47	23.41	48.63	-1.64
81	67	14	4	1500	17.20	16.50	23.83	46.19	-1.64
81	67	14	14	1501	16.84	15.76	23.06	46.89	-1.66
81	67	14	24	1502	16.00	16.71	23.13	43.76	-1.66
81	67	14	34	1503	20.76	14.59	25.37	54.90	-1.66
81	67	14	44	1504	16.00	17.76	23.90	42.01	-1.66
81	67	14	54	1505	16.62	15.37	22.64	47.24	-1.69
81	67	15	4	1506	17.96	16.61	24.46	47.24	-1.69
81	67	15	14	1507	18.54	14.97	23.83	51.07	-1.69
81	67	15	24	1508	16.53	20.25	26.14	39.23	-1.69
81	67	15	34	1509	14.68	19.39	24.32	37.14	-1.69
81	67	15	44	1510	13.11	16.26	20.89	38.88	-1.69
81	67	15	54	1511	9.09	18.65	20.75	25.99	-1.69
81	67	16	4	1512	17.95	16.20	24.18	47.94	-1.69
81	67	16	14	1513	12.59	15.42	19.91	39.23	-1.69