INITIAL PROJECT REPORT

PROJECT SANTA CLAμS
R/V *Polar Duke*, CRUISE #94-12

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MARCH 1995

INITIAL CRUISE REPORT

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R/V *Polar Duke*, cruise #PD94-12

08 Dec - 27 Dec 1995

King George Island ---> Punta Arenas

D. Karl, Chief Scientist

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I. INTRODUCTION

As recently reviewed by Quetin and Ross (1992, "A Long-term Ecological Research Strategy for Polar Environmental Research," *Mar. Poll. Bull.* **25**: 233-238), the Long-Term Ecological Research (LTER) program recognizes that some ecological phenomena occur on time scales of decades or centuries, and that investigations on these time scales are not routinely supported by funding agencies. Without an understanding of interannual variability over the long term, interpretation of ecological experiments and distinguishing long-term trends from cyclic changes in natural ecosystems is difficult. The LTER Network, sponsored by the National Science Foundation, has grown during the last decade to a total of eighteen sites in ecosystems ranging from tall grass prairies to tundra. To facilitate comparisons and the ability to construct ecological generalities, all sites are required to set up research efforts in five core areas:

- pattern and control of primary production
- spatial and temporal distribution of populations representing trophic structures
- pattern and control of organic matter accumulation
- pattern of inorganic inputs and movements of nutrients
- pattern and frequency of disturbance to the research site

The Palmer LTER, established in the fall of 1990, focuses on the pelagic marine ecosystem in Antarctica, and the ecological processes that link the extent of annual pack ice to the biological dynamics of different trophic levels. Pack ice may be a major physical factor affecting the structure and function of polar biota. Interannual cycles and/or trends in the annual extent of pack ice are hypothesized to impact all levels of the food web, from total annual primary production to breeding success in seabirds. In the region around Palmer Station (64°40'S, 64°W) west of the Antarctic Peninsula, the maximum extent of pack ice varies from near shore to halfway across Drake Passage and appears to vary on a six- to eight-year cycle. Satellite data on the maximum extent of pack ice in the Weddell Sea sector show cold winters with heavy pack ice in 1973, and 1980 and 1981, and personal observations confirm that winters of 1980 and 1981, and 1986 and 1987 had heavy ice cover in the region around Palmer Station. The overall objectives of the Palmer LTER are:

- to document interannual variability in the development and extent of the annual pack ice and in life-history parameters of primary producers and populations of "key" species from different trophic levels
- to quantify the processes that underlie natural variation in these representative populations
- to construct models that link ecosystem processes to physical environmental variables and that simulate the spatial/temporal relationships between representative populations
- to employ such models to predict and validate the impacts of altered periodicities in the annual extent of pack ice on ecosystem dynamics

To achieve these program objectives, data will be obtained on a variety of spatial and temporal scales including, but not limited to, continuous remote sensing of a variety of environmental parameters at representative locations within the general study area, annual

cruises at approximately the same time each year to ascertain the interannual variabiltity and spatial gradients of key oceanographic and biological parameters and at least two process-oriented cruises.

In support of the "Microbiology and Carbon Flux" component of the Palmer LTER program (D. Karl, P.I., Project S-046) a special-focus microbiology process cruise was designed and organized to focus on the trophic coupling among various microbial assemblages including heterotrophic bacteria, archaeobacteria, phytoplankton, protozoans and viruses. This cruise was termed Project SANTA CLAμS (Studies in ANTarcticA: Coupled Linkages Among micro(μ)organismS).

II. PROJECT SANTA CLAμS: INITIAL CRUISE PROSPECTUS (dated 14 Nov 1994)

SANTA CLAμS will be a multi-disciplinary investigation of biological, chemical, optical and photochemical processes in coastal ecosystems of the Antarctic Peninsula. This relatively short cruise has several independent but related objectives, listed below. In addition to Project S-046 (Karl) scientists, Professors Ken Mopper (Washington State University) and Dave Kieber (SUNY at Syracuse) plus five other individuals representing Project S-002, Anthony Amos (University of Texas) and Dr. Langdon Quetin and Bruno Rowell representing Project S-028 will also be aboard. Collaboration among all four projects is anticipated.

The detailed sample collections and experiments will be discussed in the field when we are all together aboard the R/V *POLAR DUKE*. There is sufficient flexibility in our schedule that we can make changes as necessary to the following cruise prospectus. A daily schedule of events will be posted in the lab and group meetings will be conducted on a regular basis. The following events are in quasi chronological order.

1. Sediment Trap Recovery and Re-deployment

We currently have three sediment trap moorings deployed near Victor Hugo Island (2) and in Crystal Sound (1). All three moorings were deployed in Jan 1994. A major objective of SANTA CLAμS is to recover these moorings and their samples and to redeploy two of the three arrays (one will be redeployed near Hugo Island, one in Crystal Sound and the third will be used for the Paradise Harbour investigation).

2. Hugo Island AWS

As part of the Palmer LTER program, an automatic weather station (AWS) similar to the one deployed at Bonapart Point and on RACER Rocks, will be established in the Victor Hugo archipelago during SANTA CLAμS. Tony Amos is the resident expert and will oversee the installation of this station. For the most part, all materials are pre-fabricated but some assembly is necessary. Among other things, the station needs to be anchored in the rock and secured with cables. A shore party will deploy by zodiac and will spend most of the day on the island. This entire operation is weather dependent. Ideally the AWS installation will immediately follow the recovery of the two Victor Hugo sediment trap moorings.

3. LTER "600" Line Survey

We anticipate visiting at least several of the standard LTER hydrostations along the 600 line (especially the outermost station 600.200). This will provide an opportunity for Project S-002 participants to conduct experiments in oceanic waters and will provide Ricardo Letelier a "blue water" site for his optical work. It will also give the LTER investigators another time point for their long-term study of this region. Whenever we occupy a station, we will conduct a series of routine experiments and collect routine hydrographic, chemical and biological data. At most, I anticipate occupation of 5 stations on the 600 Line.

4. Crystal Sound

As mentioned in section 1, above, we have a sediment trap moored in Crystal Sound. We anticipate that the Sound will be ice-covered, especially considering the fact that this year was a "heavy ice" (i.e., extensive coverage) year. Consequently, it may be difficult to locate and recover the trap -- but we shall try! Project S-028 personnel will be prepared to enter the water to help locate the trap once it is acoustically released. Redeployment should not be limited by ice cover.

We plan to spend several days in the ice pack either in Crystal Sound or elsewhere. The objectives of this work are several-fold but include a thorough assessment of the ice associated microbial communities (the so-called "brown ice"). Again, Project S-028 personnel will be essential for obtaining under ice collections of water and carefully directed frazil and platelet ice collections for analysis. Our measurements will include all of those listed under the LTER 600 Line Survey and then some. However, we also expect to conduct selected experiments as listed in section II-8-B. I expect that everyone will be rather busy working together on these studies. Again, we will have daily meetings to plan our sampling strategy and the directions of our experiments. Our investigations to date point to these unusual ice communities as vital and unusually active components of the antarctic marine ecosystem.

5. Grandidier Channel Survey

Depending upon ice conditions, we may return to Palmer Station from Crystal Sound via the Grandidier Channel, the inside route. If so, we expect to take routine hydrographic stations and to collect water for various experiments. Langdon and Bruno (S-028) may also take a series of net tows in this region in support of the LTER program objectives. If the ice conditions are unfavorable, we may be forced to return on the "outside," in which case we should pray for calm weather!

6. Paradise Harbour (or alternate site)

This phase of SANTA CLAμS will focus on comprehensive ecosystem process studies among viruses, bacteria, algae, protozoans and their habitat. A bottom-moored sequencing sediment trap will be deployed at the beginning of this investigation and will remain in place for the duration of the study. CTD/hydrographic stations will be routinely conducted

(probably on 8 or 12 hr intervals). Numerous experiments (section II-8-B) will be conducted against this backdrop. Depending upon ice and or chl *a* concentrations, we may decide to relocate this regional experiment to Andvord Fjord or Dallman Bay. We would ideally want to catch the bloom in its early to middle phase.... a chl *a* concentration of 5-10 $\mu g\ l^{-1}$ -- thank you. Work assignments will be somewhat flexible and may change depending upon the initial field results.

7. Bransfield-Deception Island

As of 11/14/94 I have not yet received the coordinates of the probable hydrothermal mounds that our Spanish colleagues have previously mapped using Seabeam. If they arrive before or during the cruise we may spend approximately 1 day searching for antarctic hotsprings. If not, we will go to Deception Island to re-occupy several hydrographic stations that we established in Nov 1992 and to end our cruise with a Christmas eve banquet in one of the most unusual places on earth.

8. Measurements and Experiments (S-046)

A. Measurements

At most stations and in support of many of the experiments described below, we will routinely collect and process samples for the following measurements:

1. CTD/O_2/fluorescence/beam transmission profiling -- Tony Amos and Lance Fujieki will lead this effort but others may be "invited" to lend a hand on the console. Many of us will also be involved by providing deck support.
2. inorganic nutrients (NO_3, NO_2, PO_4, Si, NH_4) -- collected by all, measured by Terry Houlihan on board
3. organic nutrients (DOC, DON, DOP) -- collected by all and returned to UH for analysis
4. oxygen -- collected by all, analyzed on board by some (especially Albert Colman), data oversight and standardization by Dale Hebel and Albert Colman
5. dissolved inorganic carbon and alkalinity -- collected by all and returned to UH for analysis; some alkalinity titrations and perhaps spectrophotometric pH measurements will be done in the field by Chris Carrillo
6. bacterial numbers by flow cytometry -- collected by all and returned to UH for analysis by Hector Nolla
7. bacterial biomass by particulate lipopolysaccharide -- collected by all and returned to UH for analysis by Georgia Tien
8. primary production using ^{14}C and a light/temperature controlled deck incubator system
9. bacterial production using ^{3}H leucine and a temperature controlled deck incubator; experiments will also be conducted to examine effects of light (see below)
10. virus enumeration by transmission electron microscopy -- samples will be taken and sent to Dave Bird for analysis
11. particulate ATP -- Karin Bjorkman will prepare extracts in the field for analysis at UH
12. hydrogen peroxide -- Dave Pence will make these measurements on board
13. particulate C and N -- collected by all and returned to UH for analysis

14. particulate biogenic Si -- collected by Renate Scharek and returned to UH for analysis
15. particulate chlorophyll *a* by fluorometry -- Albert Colman and Karin Bjorkman will make these measurements on board
16. ectoenzymatic activity -- Jim Christian will make these measurements on board

B. Experiments

We plan to conduct many experiments during SANTA CLAμS and the following is simply a list of areas that I know will be explored. I have not extensively reviewed the independent work planned by Jim Christian, Renate Scharek or Chris Carrillo or those of the other science groups. I expect everyone to get involved in one or more of these studies and have made reference to key individuals and reponsibilities where appropriate.

1. ocean color drifter experiments -- Ricardo Letelier will be performing the first ever drifter-based measurements of ocean color. One experiment is planned for the 600 line and the other for Paradise Harbour. Ricardo will also be bringing a tethered spectral radiometer buoy that will be used to map radiance signals in the region. Samples will be collected for HPLC pigment analyses.

2. photorespiration studies -- Why do the phytoplankton blooms cease before the cells run out of light or nutrients? One possible mechanism is photorespiration. Under conditions of high light, low carbon dioxide and high oxygen concentrations, plants oxidize reduced carbon rather than reduce oxidized carbon. This inadvertent loss is called photorespiration (light-stimulated plant respiration). All three environmental conditions that favor photorespiration are known to exist during coastal blooms in Antarctica, yet this process has not been systematically investigated. Last year preliminary experiments were conducted to demonstrate that photorespiration did occur and this year we will determine actual rates both in the field and in laboratory perturbation experiments.

3. Viral lysis -- For the past two years we have counted virus particles in the LTER region. Viruses are ubiquitous and abundant, mostly in ice cover regions. We don't know if these are phytophage or bacteriophage but given the chl vs. bacterial distributions in these coastal regions I suspect the former.

4. Shipboard cultures -- Natural assemblages of phytoplankton will be collected and incubated to produce a shipboard "bloom" in 8-*l* bottles incubated in our surface water (light and temperature) incubator. This will allow us to follow the dissolved (nutrients, gases) and particulate constituents during the development of the bloom for the purpose of gaining information on reaction stoichiometries, bulk elemental ratios and microbial dynamics. These "ecosystems in bottles" approach will help us to gain closure with our work on the natural populations.

5. Extrapolation factors -- Many of our measurements of biomass and metabolic activities are indirect measurements that rely upon empirically-determined extrapolation factors to derive more meaningful estimates of carbon and energy flow. We have already conducted some field calibrations but more are required. These will be done as time

permits.

6. Archaea in Antarctica -- Professor Ed Delong (UCSB) has made an extremely interesting and potentially very important observation regarding the numerical dominance of archaea in surface waters of Arthur Harbor during a previous LTER cruise. This work needs to be repeated and extended to offshore waters and to ice communities. Water samples will be concentrated by vortex flow and the particulate materials will be collected and stored frozen for nucleic acid probing at UH and UCSB. This work will be continued by Craig Moyer on the LTER annual cruise.

7. Hydrogen peroxide dynamics -- We intend to complete our 2-year comprehensive investigation of H_2O_2 concentrations, sources and sinks by performing experiments to look primarily at dark decay processes and rates. We also plan to investigate the relationships between DOM molecular weight and H_2O_2 photoproduction and to investigate the coupling of the photoproducts to bacterial metabolism. To the extent possible, this work will be coordinated with the Mopper/Kieber team.

This list is not conclusive and it has been prepared by Karl over a holiday weekend in a relative vacuum and has included only project S-046 plans. I may have omitted some critical items but the bulk of the planned research activities are covered here. I'm looking forward to an exciting cruise.

III. SCIENCE PARTY AND AFFILIATIONS

Scientist	Affiliation	Project #
(12/08/94 to 12/27/94)		
David Karl (P.I. and Chief scientist)	Univ. of Hawaii	S-046 S-046
Dale Hebel	Univ. of Hawaii	S-046
Terrence Houlihan	Univ. of Hawaii	S-046
David Pence	Univ. of Hawaii	S-046
Renate Scharek	Univ. of Hawaii	S-046
Christopher Carrillo	Univ. of Hawaii	S-046
Lance Fujieki	Univ. of Hawaii	S-046
James Christian	Univ. of Hawaii	S-046
Karin Bjorkman	Univ. of Stockholm	S-046
Albert Colman	Harvard Univ.	S-046
Ricardo Letelier	Oregon State Univ.	S-046
David Jones	Rutgers Univ.	S-046
Anthony Amos (P.I.)	Univ. of Texas	S-201
David Kieber (P.I.)	SUNY-Syracuse	A-002
Brian Yocis	SUNY-Syracuse	A-002

Brian Brown	SUNY-Syracuse	A-002
Kenneth Mopper (P.I.)	Washington State Univ.	A-002
Ranjit Sarpal	Washington State Univ.	A-002
Zhiming Feng	Washington State Univ.	A-002
Jian-Guo Qian	Washington State Univ.	A-002
Ronald Harelstad	ASA-MPC	------
Glen Smith	ASA-Lab/Deck	------
David Asselin	ASA-ET	------

(12/09/94 to 12/17/94)

Langdon Quetin (P.I.)	U.C. Santa Barbara	S-028
Bruno Rowell	U.C. Santa Barbara	S-028

IV. R/V *POLAR DUKE* CREW

Individual	Responsibility
Karl Sander	Captain
Sven Fiskerstrand	Chief Engineer
Bjorn Almestad	Chief Officer
Arne Sandvik	First Officer
Olav Solberg	First Engineer
Jan Ludvig Larsen	Chief Steward
Angor Hansen	Bosun
Nils Emblem	Able Seaman
Alexis Sepulveda	Able Seaman
Asbjorn Olsen	Electrician
Sergio Salazar	Oiler
Mario Ojeda	Helper
Alfredo Gonzales	Helper

V. CRUISE TIMELINE, SAMPLING METHODS AND LOCATIONS

A. Timeline (Note: all dates/times are GMT)

12/08, 1300 hr: exchange personnel at King George Island
12/09, 1030 hr: depart Palmer Sta. to begin PD94-12
12/10, 0500 hr: begin AWS installation on SANTA CLAμS Island
12/10, 2100 hr: recover two bottom-moored sediment traps in Palmer Basin
12/11, 2330 hr: underway for Crystal Sound
12/11, 2000 hr: recover Crystal Sound sediment trap, begin sampling ops.
12/15, 2300 hr: ETD Crystal Sound
12/16, 1000 hr: deploy sediment traps Palmer Basin
12/16, 1500 hr: zodiac party on SANTA CLAμS Island for AWS tuning
12/17, 0300 hr: return S-028 personnel to Palmer Station
12/17, 1400 hr: arrive Paradise Harbor, begin water sampling and experiments
12/17, 1800 hr: deploy bottom-moored sediment trap
12/20, 0800 hr: underway for Andvord and Dallman Bays, sampling ops.
12/20, 0930 hr: recover sediment trap, depart for Palmer
12/23, 0100 hr: ETD Palmer
12/23, 1000 hr: visit RACER Rock for AWS repairs
12/24, 0700 hr: CTD ops in Deception Island caldera
12/24, 2100 hr: Christmas dinner!, underway for PA
12/25, 0100 hr: begin Drake Passage underway sampling program
12/26, 1158 hr: first line ashore, Punta Arenas

B. Sampling Methods

During Project SANTA CLAμS, data were collected by a variety of methods, some described subsequently in more detail (see Group Reports, section VII). Continuous underway measurements of selected surface ocean properties and local meteorology were obtained and logged. Continuous water column profiles of conductivity, temperature, beam transmission, PAR, fluorescence and light scatter were obtained using the CTD system. Discrete water samples were obtained using rosette-mounted Go-Flo bottles. Sinking particulate matter was collected at several sites using sequencing, bottom-moored sediment traps.

C. Sampling Locations

Figure 1 shows the approximate locations where research was conducted during Project SANTA CLAμS. More detailed information is presented in the Daily Science Logs (section IX).

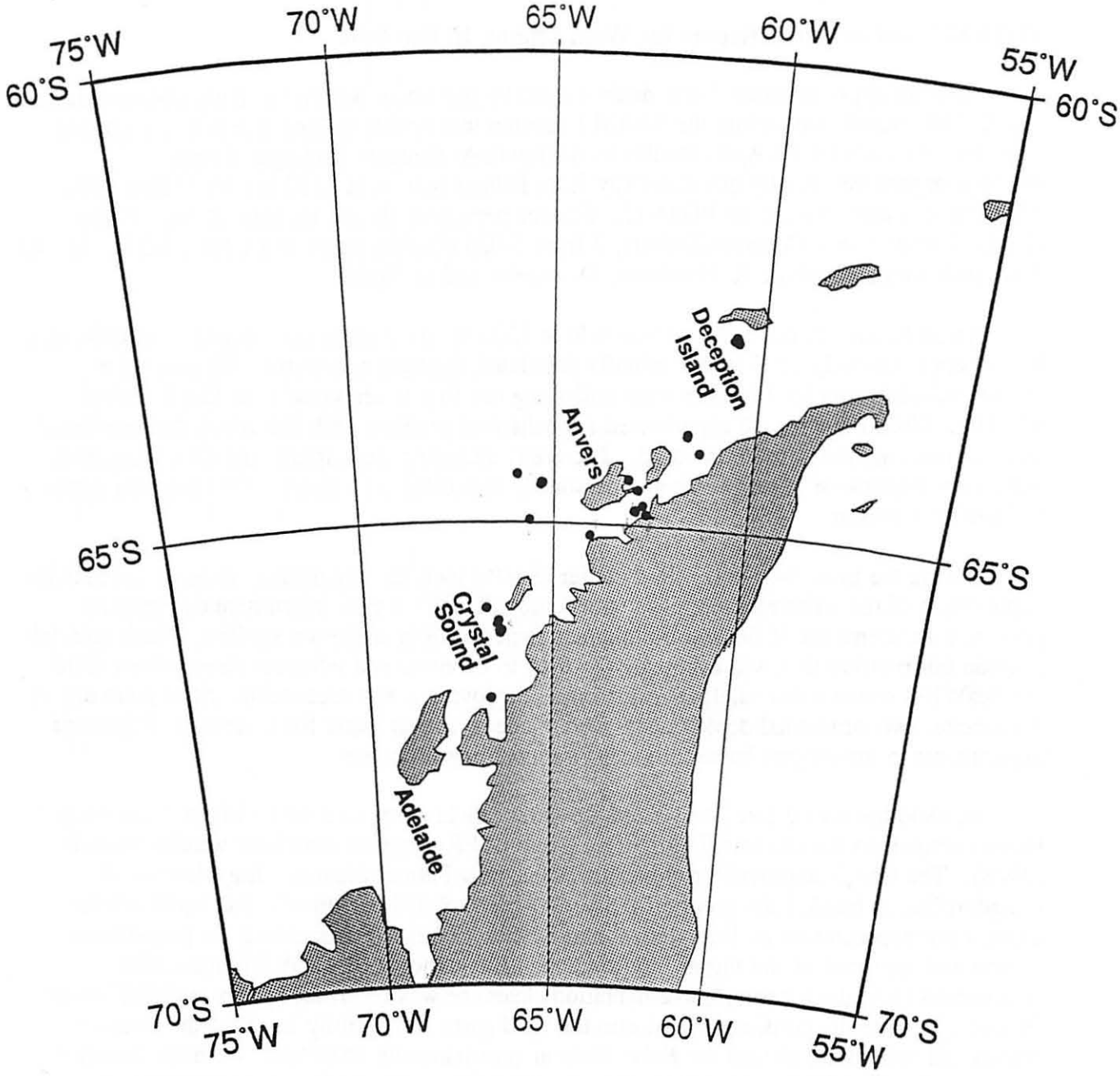

Figure 1: Map of Antarctic Peninsula region showing the locations where samples were collected during project SANTA CLAμS. Palmer Station is located on Anvers Island, shown in the center of the figure.

VI. WEEKLY CHIEF SCIENTIST REPORTS

PD94-12 Chief Scientist Report for Week Ending 10 Dec 1994

After an approximately 5-day delay caused by inclement weather at King George Island (the C-130 aircraft supporting the SAAM I mission was unable to land due to dense ground fog), Project SANTA CLAμS (Studies in ANTarcticA: Coupled Linkages Among micro(μ)organisms) finally got underway from Palmer Station at 1330 hrs on 09 Dec 1994. This cruise is also designated PD94-12. Science personnel aboard include 12 from S-046 (Karl), 7 from S-002 (Mopper/Kieber), 2 from S-028 (Quetin/Ross) and 1 from S-201 (Amos). ASA staff support include R. Harelstad, D. Asselin and G. Smith.

An all hands science meeting was held at 1500 hrs to reassess our objectives in light of a loss of approximately 25% of our initially scheduled shiptime allocation. We adopted a revised schedule and by 1700 hrs were collecting our first water samples at LTER station 600.100. Unfortunately we experienced a mechanical problem with the winch that prevented us from bringing the rosette on board. The crew, including the Captain and Chief Engineer, were very responsive to our needs and personally expedited the repairs. This problem appears to have been solved.

During the brief 1-hr delay, R. Letelier (S-046) took the opportunity to make the maiden deployment of the tethered spectral radiance buoy (TSRB), a new instrument designed to provide measurements of the spectral characteristics of light at the sea surface. These data will provide information that will eventually be used to calibrate and interpret observations from the SeaWIFS ocean color satellite. This initial deployment was successful. After recovery of the rosette, two additional deployments were made to collect water for a series of shipboard experiments to investigate bacterial-algal-viral coupling processes.

At 0800 hrs on 10 Dec, we landed a 6-person field party on a small island in the Victor Hugo archipelago for the installation of a second LTER program automatic weather station (AWS). The first is deployed on Bonapart Point, near Palmer Station. Tony Amos and Langdon Quetin headed the group of ASA, S-046 and S-028 personnel. We would like to express our appreciation to Terry Johnson and Erick Chiang for expediting the preparation, review and approval of the Initial Environmental Evaluation (IEE) and Environmental Assessment (EA) documents; implementation clearance was received, by fax, at 1618 hrs on 09 Dec. Despite the cold, snow and rain the field party successfully installed the weather station and were back aboard the *Polar Duke* at approximately 1530 hrs. We immediately got underway for the LTER sediment study area, 30 nmiles to the northeast, to recover two bottom-moored sequencing sediment traps deployed during PD94-01 in January 1994. By 2130 hrs both trap arrays were safely aboard. One contained a rich time-series record of particle sedimentation for the past year; the second (replicate) trap failed to operate for reasons that were not immediately apparent. We conducted one CTD cast to collect water for algal growth experiments before steaming back to station 600.100 to commence sampling for project S-002 personnel. That sampling got underway just before midnight.

The R/V *Polar Duke* is fully packed with laboratory vans, specialized instrumentation and deck

incubators. The underway data acquisition system is now fully operational and is recording weather (IMET package), navigation and position information, and surface ocean properties. The chief scientist would like to thank all ASA staff who assisted in cruise preparation, especially David Asselin and Glen Smith for their outstanding support. Weather has been generally calm but overcast, with favorable seas and open water.

PD94-12 Chief Scientist Report for Week Ending 17 Dec 1994

The past week has been very productive for scientists aboard the *Polar Duke*. There were no major equipment or logistical problems and we have continued to accomplish our stated cruise objectives.

We began the week at LTER Station 600.100 collecting water for various measurements and experiments. The Mopper-Kieber group deployed and recovered a 12-hr *in situ* photochemistry experiment, without incident. By the end of the day (12/11) we were underway for Crystal Sound to recover an experiment deployed in Jan 1994 and to begin our ice research. The last 20-25 miles was extremely difficult because of heavy pack ice (mostly 9/10ths) and poor visibility. We finally arrived on station at about 1300 hr and immediately established contact with the acoustic transponder. Unfortunately, the study area was completely covered by ice making recovery of the bottom moored array difficult to impossible. Our fallback position would be to recover the array during the Jan LTER cruise. We discussed the options and then decided to continue recovery ops. The Captain attempted to clear a "recovery area" by breaking up large floes. This was largely successful but the pack was already tight and could not be permanently cleared. On an impulse and with a prayer we released the array and hoped for the best. It was not to happen. The sediment trap was nowhere to be seen. By acoustic triangulation technique we eventually located the culprit floe and the bridge carefully honed it until the bright yellow floats of success emerged from the abyss. We lowered the MOB workboat to assist in recovery ops and by 2000 hrs the array and collected sample materials were safely aboard. It was a long, stressful but exciting day for science. My thanks go out to all who helped.

We then immediately began our water sampling and shipboard experimental programs. All CTD sensors, tethered spectral radiance buoy (TSRB) and profiling ultraviolet light (P-uv) meters worked flawlessly. On 12/13, we deployed another M-K *in situ* photochemistry experiment. As we prepared for our first scuba dive, the weather turned bad with sustained windspeed in excess of 30 kts. We went into a holding pattern. By 2300 hrs, the divers were in the water collecting the first of a set of ice algal community samples for shipboard experiments. We repeated the CTD, ocean optics measurements and shipboard experiments on 12/14. The divers also had the opportunity to collect a second set of ice algal samples. The passage of the low pressure zone over our study area had caused an already tight pack to become even tighter (mostly 10/10ths). Some new freezing was also evident. This made forward progress in the *Polar Duke* extremely difficult and slow. Between science ops we steamed north and by 12/15 we were in open water. We tucked back into the ice to collect a few additional samples before getting underway for points north.

On 12/16 we steamed back to the Victor Hugo mooring site at 64°29.8'S, 66°02.5'W and successfully redeployed the LTER long-term sediment trap array. It is now scheduled to be recovered in Jan 1996. A new dual acoustic release mechanism was incorporated into the design to further reduce the already low, but finite, probability of equipment failure.

We then landed a field party on SANTA CLAμS Island in the Victor Hugo archipelago to make final adjustments to the automatic weather station (AWS). We have already received reports from Wisconsin that last week's installation was successful and that the AWS was already sending excellent weather data. Our congratulations to Tony Amos and Langdon Quetin for a job well done. One final hydrostation was completed before we were underway for Hovgaard Island at the head of the Lemaire Channel. We had a most remarkable and pleasant passage and many rolls of film were consumed. We arrived back at Palmer Station in the early hours of 12/17 to return the S-028 personnel to their summer home and to collect a few items for science resupply.

By 1100 hrs we were in Paradise Harbor to begin the next phase of our expedition. The first hydrocast revealed that the spring bloom was in full swing with chl a values exceeding 15 mg per cubic meter. It was just what we had ordered! We immediately began our sampling and experiments, including the successful deployment of a short-term, time-series sediment trap that will be recovered just before we leave the study area, now scheduled for 0800 hrs on 12/22. An ambitious 5 days in Paradise is planned and we hope we can keep to our schedule.

PD94-12 Chief Scientist Report for Week Ending 24 Dec 1994

The past week has been a productive one for the phytoplankton in Paradise Harbor and for the scientists aboard the R/V *Polar Duke*. This phase of the SANTA CLAμS cruise was focused on a systematic and comprehensive study of the coastal phytoplankton bloom from gases and nutrients dissolved in the water to euphotic zone particle export rates. The intent of the intensive study was to determine the mechanisms controlling primary production and the rates and pathways of carbon and energy flow to higher trophic levels. Detailed experimental studies included analyses of phytoplankton, bacterioplankton, archaeoplankton, viroplankton and protozoa. Krill were studied, indirectly, by examination of fecal pellet fluxes. To track the progress of our experiments we held daily "all hands" science meetings at 1400 to review the most recent data and to plan experiments and sampling strategies for the next 24 hr period. The phytoplankton crop in Paradise Harbor was dominated by a small (5 μm) cryptomonads containing large amounts of the water soluble pigment phycoerythrin. In addition to our suite of *in situ* and *in vitro* experiments, we continued to collect continuous underway data and CTD (profile) data at selected sites. There were no major equipment failures during this observation period.

On Dec 20 we conducted a mesoscale regional survey to ascertain the extent of this unusual and massive ($>$15 mg chl a/m^3) phytoplankton bloom. We took hydrostations and collected full profile water samples in Andvord Bay to the east and Gerlache Strait and Fournier Bay to the north. The same organism, at nearly the same concentrations, was found in all locations. We had also observed this organism at LTER sta. 600.100 and in the Lemaire

Channel. In our daily communications with Palmer Station we learned that it was also the dominant organism in Arthur Harbor. Later in the day, while the *Duke* was at station in Dallmann Bay collecting glacial ice samples for Chris Carrillo's alkalinity determinations, Santa Claus himself (AKA Tony Amos in full dress) arrived by zodiac marking the official beginning of Christmas week aboard the ship.

We returned to Paradise Harbor and for nearly 16 hr out of the next 24 hr we kept the CTD (and associated sensors) deployed at a depth of approximately 5 m to determine the temporal variability in physical and optical characteristics of the water column. The resultant time series revealed numerous and coherent (e.g., high fluorescence associated with low light transmission, etc.) variations consistent with a physical control on biological variability.

Early in the morning of 22 Dec, we successfully recovered the bottom-moored sequencing sediment trap that had been deployed in conjunction with our coupled linkages among microorganisms study. We were pleasantly surprised to see the massive amounts of sedimented materials that were obtained during each of the 19 consecutive 6-hr collection periods. By visual inspection, the particulate matter appeared to be mostly krill fecal pellets suggesting that the krill are certainly capable of consuming this small cryptomonad. There do not appear to be enough diatoms in the water column to support the implied rates of export production at this site. The 6-hr resolution of the particulate flux measurements will also allow us to investigate diel and day-to-day variations in the grazing rates. We hope to collaborate with Ross/Quetin (S-028) on this aspect of the study.

We arrived at Palmer Station at 1030 hr on 22 Dec for cargo and personnel exchanges. As the final bow lines were being secured, Santa Claus emerged from the freezer van on the main deck -- he was well received by Station residents. By 2100 hr we were underway again for the northbound leg of our expedition and additional sample collections in Gerlache Strait, Deception Island and Drake Passage en route to Punta Arenas. We took a few hours out of this busy schedule to deploy a zodiac party onto RACER Rocks to inspect and, if possible, repair the automatic weather station (AWS) that was installed in 1989 during the RACER research program. Through the diligent efforts of Tony Amos, David Asselin (ASA) and Asbjorn Olsen (*Polar Duke*) this AWS is now back on line. By 1600 hr we were collecting water in the Two Hummock Island basin against a spectacular backdrop of giant icebergs, some grounded and others heading north in the Gerlache jet. We arrived at Deception Island at 0230 hr on 24 Dec and soon thereafter began our 5 station sampling program. I am preparing this report from our station in Fumarole Bay. We currently plan to complete our water sampling by 0900 hr, followed by a 8-10 hr holiday standdown so that scientists and crew members can have an opportunity to explore the local sites in Whalers Cove and the environs. It is a beautiful clear day at Deception so I expect the zodiacs to be full. Holiday festivities are planned to begin at 1700 hr and Santa is expected to appear (again)! We are scheduled to be underway for Punta Arenas by 1900 hr on 24 Dec and plan to spend Christmas and Boxing Day sampling waters of Drake Passage for a variety of biological and chemical properties.

PD94-12 Chief Scientist Report -- The Final Days

We completed our work in Deception Island at about 1000 on 24 Dec just in time to shuttle people ashore for some exploration, hiking and sampling of the hot springs. We obtained some incredible samples of the latter and the geothermal activity was greater than in previous years. Several scientists went swimming. At 1700 we were seated at a most impressive holiday dinner. After a few words of thanks and fellowship by the Captain (Karl) and the Chief Scientist (also Karl) we ate, drank and were generally merry until 1800 hr when the ship got underway for Drake Passage and beyond. Our holiday was extended a bit by calm seas, at least until after the present opening phase of the evening. We all received a very nice lead crystal "ice bird" from the Captain on behalf of Rieber shipping. At 2000 hrs all of S-046 headed for my cabin to discuss the Drake sampling plans and the Captain showed up with a case of Newcastle brown ale -- a gift from Faraday Station! By 2200 hr we were taking our first Drake Passage samples that continued at 3 hr intervals until a few hours ago. We are now madly getting the last of our gear packed or stored for the next leg. We are all still talking to each other -- a sign of a successful cruise. All in all it was a very productive and enjoyable trip. We are scheduled to arrive at the pier in Punta Arenas at 0600 hr on 27 Dec.

As this historic SANTA CLAμS cruise draws to a close, I would like to express my sincere appreciation to the Captain and Crew of the R/V *Polar Duke* for their outstanding support of our science programs, ASA staff aboard the ship, at Palmer Station and home in Denver for their service "above and beyond the call of duty" and to all the scientists aboard for making it happen. Planning is already underway for SANTA ClAμS-II!

David M. Karl
Chief Scientist, PD94-12

VII. CRUISE ACCOMPLISHMENTS AND END OF CRUISE PROJECT REPORTS

A. "Physical Oceanography Program," Anthony F. Amos, *University of Texas at Austin, Marine Science Institute*

B. "Photochemistry of Antarctic Waters in Response to Changing UV-B Fluxes," Kenneth Mopper, *Washington State University, Chemistry Department* and David Kieber, *SUNY-ESF, Chemistry Department*

C. "Bio-optics and OCM Drifter Program," Ricardo Letelier and Mark Abbott, *Oregon State University, College of Ocean and Atmospheric Sciences*

D. "In the Water and Under the Ice," Langdon Quetin, *UC Santa Barbara, Marine Science Institute*

E. "LTER Sediment Trap Experiment," David Karl and Terrence Houlihan, *University of Hawaii, SOEST, Department of Oceanography*

F. "Spatial Distribution of Viruses in the Palmer-LTER Region," David Bird and Roxane Maranger, *University of Quebec at Montreal, Department of Biology*

G. "Core Biogeochemical Measurements and Experimental Studies of the Microbial Loop," D. Karl, D. Hebel, T. Houlihan, D. Pence, R. Scharek, C. Carrillo, L. Fujieki, J. Christian, K. Björkman, A. Colman, R. Letelier, D. Jones, G. Tien and C. Moyer, *University of Hawaii, SOEST, Department of Oceanography*

H. "Measurement of Dissolved Oxygen," Dale Hebel *University of Hawaii, SOEST, Department of Oceanography* and Albert Colman, *Harvard University, Department of Earth Sciences*

I. "Hydrogen Peroxide: Distributions, Sources and Sinks," D. Karl, D. Pence and G. Tien, *University of Hawaii, SOEST, Department of Oceanography*

J. "Studies of Bacterial Ectoenzymes," James Christian and David Karl, *University of Hawaii, SOEST, Department of Oceanography*

K. "Antarctic Archaeoplankton," Edward DeLong, *UC Santa Barbara, Marine Science Institute*, David M. Karl and Craig L. Moyer, *University of Hawaii, SOEST, Department of Oceanography*

L. "Drake Passage Transect," Team S-046, David Karl et al., *University of Hawaii, SOEST, Department of Oceanography*

VII.-A
"Physical Oceanography Program"

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The physical oceanography program aboard R/V *Polar Duke* during the SANTA CLAμS cruise in December 1994 consisted of two parts; (1) vertical CTD/rosette profiles, and (2) continuous underway monitoring of ocean and atmospheric surface environmental conditions. This field report briefly describes the methodology used and preliminary results.

CTD/rosette program

A Sea-Bird Electronics model 9/11 Plus CTD with a General Oceanics 12-bottle rosette sampler was used to obtain continuous vertical density profiles of the water column, in most cases surface-to-bottom. Additional sensors provided dissolved oxygen, chlorophyll-a fluorescence, beam transmission, downwelling solar radiation (PAR), and light scattering profiles. Fifty-eight such profiles were obtained in the South Pacific, Crystal Sound, Lemaire Channel, Paradise Harbor and the Deception Island caldera. In addition, eleven rosette-mounted 12-liter "GO-FLO" sampling bottles were triggered on each station to collect water samples for the various researchers participating in SANTA CLAμS and for independent salinity and oxygen determinations. Dissolved oxygen was measured using a Sea-Bird (Beckman) oxygen sensor, fluorescence with a Chelsea fluorometer, beam transmission with a SeaTech 25-cm transmissometer, PAR with a Biospherical Instruments 4-pi sensor and light scatter with a SeaTech model LS6000.

The SANTA CLAμS underway system

The goal of this program was to acquire essential information on the surface environment while the ship was underway and on-station so that surface expressions of frontal and biological boundaries could be mapped.

The system acquires data from several different sensors and transducers which are part of the Polar Duke's IMET meteorological system and other instrumentation (GPS, gyro compass, bottom depth). With the able assistance of ET Dave Asselin, ASCII messages were provided from each of these systems which were acquired through a multi-port interface card. Real time data were displayed on the PC screen. The ship's LAN network was utilized to link computers and allow simultaneous recording of underway and CTD data on 150 MByte Bernoulli cartridges.

Control was governed by a program written with the Professional Development BASIC BC7 system which performs the following tasks:

- At one-minute intervals, writes data from the combined inputs to a hard disk file in ASCII format. The file is opened and closed each minute to minimized data loss

should there be a power failure. Updates the screen each minute with the data in a readable form. When not interrogating the data channels, the positional data on each GPS fix is displayed.

- Continuously updates the distance, time and course to the next station or other waypoint. Calculates the time of the next sun phenomenon (sunrise, local apparent noon and sunset) based on the current ship's position, speed and the time. When all three coincide, the display shows "The sun is setting now," for example. A check outside on those rare days when the sun could be seen in the area, verified the accuracy of these predictions which have been modified by the author from the standard Smithsonian formula.

- Allows operator interactive discourse with the program via softkeys. The most important of these is the entry of comments whenever an event occurs at any time during a cruise. For example, when a CTD station starts, the station number and a short comment can be entered. At this instant, the program collects data from the GPS and all the environmental sensors, keys it to the comment, and records a line in the data file. If standard codes or phrases are used for various events, station logs can easily be produced at the end of a cruise or other intervals.

- Allows review of the last several comments tagged with time and position.

- Certain activities such as bird or mammal observations can be automatically logged at a pre-selected start time and repetition rate. Event number is automatically incremented.

- Raw data values (e.g., DC volts) appearing on certain channels can be read directly enabling calibration at intervals of some instruments such as the transmissometer.

- A brief message can be left on the "message board" for the next watchstander or for general information.

At midnight GMT a new file opens for receipt of the next day's data and records the previous day's file and certain values to the LAN and/or a diskette. This way data can be acquired by other users without interruption to the program.

Two other processes are then initiated using a non-dedicated PC. First, a daily scientific log (see section VI) is printed showing all environmental parameters each hour of the day and whenever a comment was made. A daily summary sheet is printed showing the extremes and means of the major parameters, distance travelled, cumulative distance for cruise, and sun phenomena times. Finally, a daily plot of environmental parameters and ship's track is printed, similar to the real-time plotter output, but "cleaned up" and including times, positions, and designated numbers of all stations and other regular observations done on the cruise.

VII.-B

"Photochemistry of Antarctic Waters in Response to Changing UV-B Fluxes"

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Our primary objective on the PD94-12 cruise aboard the RV *Polar Duke* was to conduct several experiments designed to evaluate the photochemical properties of open oceanic and coastal Antarctic waters during summertime, non-ozone hole conditions. The cruise was generally very successful with some very interesting findings. There were also some unanticipated difficulties that were encountered, as will be discussed below.

Experiments conducted

1. *Buoy (drifter) deployments.* The objective of this experiment was to determine photoreactivity in the water column of biologically productive water (Paradise Harbor) and unproductive waters (Station 600.100 and Crystal Sound). Filtered seawater samples (0.2 μm) were placed in quartz tubes and irradiated under natural light conditions at various depths for about 12 hours. Photochemical production of H_2O_2, OH radical, formaldehyde, and α-keto acids were measured. Sample depths were usually surface, 2, 4, 6, 10, 15 and 20 m. The three buoys were successfully deployed and recovered. All photochemically formed species examined showed an exponential decrease in their production rates with depth, presumably due to the corresponding drop-off in UV. However, the rate of this drop-off varied for the different chemical species (fig. 1), and was consistent with differences that were observed in the action spectra measured in the lab.

   Last year, under ozone hole conditions, a similar depth dependency was observed for the OH radical (aldehydes and α-keto acids were not measured) but not for H_2O_2, which showed a subsurface maximum in photoproduction rate at 2-4 m. We suggest that this result was due to a greater flux of more energetic photons under ozone hole conditions. These more energetic photons may have altered photochemical production or destruction rate of H_2O_2 relative to non-ozone conditions.

2. *Ultrafiltration experiments.* We performed three on-deck irradiation experiments with seawater fractionated by ultrafiltration. The first two samples were taken from open ocean sites, while the third was taken from a productive coastal site (Paradise Harbor). The purpose of this experiment was to determine which size fraction(s) was primarily responsible for the photochemical reactivity that we measure in the unfractionated seawater. Parameters examined included: photoproduction of H_2O_2, OH radical,

formaldehyde and α-keto acids; photobleaching of humic fluorescence and absorbance; and concentrations of nitrate, nitrite, total dissolved protein and carbohydrates. Preliminary results indicate that H_2O_2 and α-keto acid photoproduction arise from dissolved organic matter of molecular weight of $<10{,}000$ dalton. Reasonably good mass balances on the photoproduction of these species, relative to unfractionated seawater, were obtained (within 20%). The preliminary results also indicated that OH photoproduction was dominated by a low molecular weight species, <1000 dalton (i.e., nitrate). This result is in contrast to our results for low latitude regions, where photoreactions involving DOM dominated OH production.

3. *Depth profiles*. We conducted detailed depth profiles to characterize the organic and photochemical properties of the water at the major stations that were occupied during PD94-12. Parameters measured were: flavins, aldehydes and ketones, α-keto acids, protein and humic fluorescence, and absorbance. Depth profile data have not been quantified to date.

4. *Dark incubations*. We determined the biological and/or abiotic removal of photochemically produced chemical species, flavins and hydrogen peroxide, at *in situ* temperatures. Filtered (0.2 μm) and unfiltered water from open ocean (Crystal Sound) and coastal (Paradise Harbor) sites were used. The samples, incubated in the dark, were analyzed daily. The results indicted that for hydrogen peroxide, open ocean seawater showed slow loss (turnover time ca. weeks) and coastal seawater showed fast loss (turnover time ca. hours). The data for the flavins in unfiltered seawater has not been analyzed yet. No loss or production was observed for hydrogen peroxide or the flavins in the filtered samples.

Problems encountered

Although the cruise was generally very successful, there were some problems that were encountered. In particular, we not able to make the high sensitivity absorption measurements as planned due to equipment failure of the Hewlett Packard spectrophotometer. We suspect that this was due to failure of one of the controller cards in the instrument due to problems with the ships electrical system. We also had a hard drive failure and failure of one of our HPLC absorbance detectors, both of which could be resolved by using backup equipment. We were also not able to conduct some collaborative experiments with Dave Karl, as we had hoped, to ascertain the coupling between the biological uptake of pyruvic acid and its photochemical production rate; both science groups were pressed for time in meeting their primary science objectives, as there was an untimely delay of the SAAM 1B flight. The third difficulty was due to electrical problems that we encountered when the Duke was navigating through the pack ice at Crystal Sound. Essentially, our whole scientific party had to shut down all scientific operations for a day due to the wildly fluctuating ship power, which caused complete failure of the UPS systems that were on-line. Another major problem was the wire and Go-Flo bottles. Rust dripping off the conducting wire may have ruined some of our first experiments and incubations. We were able to partially get around this problem by using water from the ships non-metallic seawater system for our later experiments. Some of our experiments, which involved looking at the photoreactivity of water from different depths, had

to be canceled because of the rusty wire problem. We were also plagued with non-functioning Go-Flo bottles. On nearly every cast, 3-4 bottles did not close or were leaking badly, despite efforts to clean the closing mechanisms and o-rings and tightening the elastic bands. Finally, it was difficult for us to find a place on the ship to work up the samples for trace organic analysis. We finally settled on the aquarium room since it appeared to be well ventilated. However, even there fumes from the stacks, incinerator, galley, and welding operations occasionally contaminated our samples when the wind was blowing from certain directions.

VII.-C
"Bio-optics and OCM Drifter Program"

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The objective of our participation in the PD94-12 cruise was (1) to characterize the passive fluorescence of chlorophyll at the sea surface (0.3 m) of Antarctic pelagic marine ecosystems and (2) to analyze this fluorescence signal in relation to other physiological and ambient parameters to understand its variability. Two main instruments were used during the cruise to measure the sub-surface upwelling spectral irradiance. A Tethered Spectral Radiometer Buoy (TSRB, Satlantic Inc., Halifax, NS, Canada) was routinely deployed between one and three times a day during 20 minutes to measure irradiance at 412, 443, 490, 510, 555, 670, 683 nm. The TSRB also measures sea surface temperature (SST) and surface radiance at 490 nm. Free drifting Ocean Colour Monitoring sensors (OCM, Satlantic Inc.) were deployed in the Gerlache Strait and Drake Passage to monitor temporal changes in the sub-surface ocean spectral irradiance during the austral summer. The OCM drifters measure the same parameters as the TSRB and relay the data through satellite linkage (ARGOS) to our shore-based facilities.

During this cruise we accomplished all of our main objectives. The TSRB was deployed in waters with chlorophyll a concentration ranging from <0.7 μg/l to >14 μg/l. Measurement of primary production experiments using radiocarbon uptake, *in vivo* induced fluorescence, nutrient concentrations, and algal pigments will provide a basis to analyze the variability in the chlorophyll natural fluorescence yield. Preliminary results indicate that, although natural fluorescence can be used as an estimator of chlorophyll concentration when looking at large changes, significant variations in fluorescence yield appear to correlate with salinity fluctuations in our Paradise Bay TSRB deployments. This correlation suggests that changes in the physiology and species composition of the algal assemblage may be taking place at small spatial scales round the Antarctic Peninsula.

The OCN drifter deployed in the Gerlache Strait has moved northeast into the Bransfield Strait where chlorophyll concentrations appear to be lower while fluorescence yield is higher. The OCM drifter deployed in the Drake Passage has moved north and was caught in an eddy field during January 1995 in which chlorophyll concentration increased. Both drifters were still transmitting data at the end of February 1995 and are providing a continuous Lagrangian record of the change in sub-surface spectral irradiance during the austral summer.

VII.-D
"In the Water and Under the Ice"

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As part of our continuing program of under ice zooplankton community processes, we joined the SANTA CLAμS cruise for the period 12/9 to 12/16 to (1) assist Karl and colleagues with under ice sample collections (2) collect krill and (2) assist in the installation of the AWS on Hugo Island. We joined the *Polar Duke* at Palmer Station, our temporary summer home.

During the approximately one week period on board, we successfully installed the weather station, completed two dives in Crystal Sound (12/13, 12/14) and conducted four targeted krill tows that yielded numerous animals that were transported live to Palmer Station for various experiments. The dives, although limited in number due to inclement weather, provided Team S-046 with invaluable collections of ice algal dominated communities for a variety of measurements and for shipboard experimentation.

VII.-E
"The Palmer-LTER Sediment Trap Experiment"

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The continuous production of biogenic matter in the near surface waters of the world ocean ultimately sustains the downward flux of particles at all ocean depths. Particle flux measurements conducted in a variety of coastal, oceanic and ice edge habitats of the Southern Ocean have revealed tremendous seasonality and large interannual variability. For example, spring bloom exports of particulate carbon in coastal Antarctica may exceed 30 mmol C m^{-2} d^{-1} (Karl et al. 1991) compared to late winter fluxes of $< 1 \times 10^{-4}$ mmol C m^{-2} d^{-1} (Fischer et al. 1988). Furthermore, the variance in the magnitude of the spring-summer export peak can change by an order of magnitude over consecutive years (Wefer 1989). It is not known whether interannual variability is driven by changes in particle formation (i.e., primary production) or by uncoupling of production and exportation, or both. These production-export processes can exert a major influence on global carbon and associated cycles of bioelements. Consequently, the processes controlling particle production, particle export and *in situ* mineralization in Southern Ocean habitats are topics of great interest in contemporary oceanography.

As one component of the Palmer Long-Term Ecological Research (LTER) program, we established three sediment trap sites: two within the central portion of Palmer Basin near Victor Hugo Island (64°29.49'S, 65°59.14'W and 64°28.66'S, 65°57.44'W) and the third in Crystal Sound (66°10.045'S, 66°25.165'W). Each mooring array is constructed of 220 m of Dacron^R braid (0.5" diameter) with a single McLane Research Laboratories 21-cup sequencing sediment trap (PARFLUX model #MK-7) positioned 176 m above the seafloor and a single Benthos acoustic release (model #865) positioned 20 m above the seafloor. Buoyancy was controlled by 7 glass floats (17" diameter) and a 250 kg expendable concrete anchor. Moorings were set during the LTER annual cruise in Jan 1994 and were recovered, successfully, during SANTA CLAμS. For reasons that were not immediately obvious in the field, one of the replicate traps deployed in Palmer Basin failed to operate.

During Project SANTA CLAμS, we also successfully redeployed a single mooring, containing two traps and equipped with a dual acoustic release mechanism, in Palmer Basin (64°29.846'S, 66°02.541'W) and deployed and recovered a short-term mooring (17-22 Dec 1994) in Paradise Harbor (64°50.533'S, 62°53.823'W). The short term experiment was successful and showed large differences in flux over relatively short intervals of time (6-12 hrs). Whether this is the result of diel krill (and other zooplankton) grazing processes will be investigated once the samples are returned to our home institution. After receipt of sample materials, the formalin-preserved collections will be analyzed for total mass, particulate carbon, nitrogen, phosphorus and silica, and dissolved nutrients. Subsamples will also be analyzed for bacteria, phytoplankton and viruses.

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VII.-F
"Spatial Distribution of Viruses in the Palmer-LTER Region"

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Viruses have been identified as dynamic components in several aquatic environments including marine and fresh waters. High abundances and rapid changes in viral abundance along with rapid viral decay rates suggest that viruses may play an important role in controlling microbial populations. Viruses are also thought to be involved in carbon transfer within the microbial loop, however their quantitative role in carbon and nutrient cycling has not been fully established.

Viruses have previously been observed in the Southern Ocean and abundances have been reported for the Drake Passage (Smith et al. 1992) and for the coastal waters of Paradise Harbour (Bird et al. 1993). During cruise 94-01 of the R/V *Polar Duke* (Jan 94) we enumerated viruses from surface water samples taken at each station of the Palmer Long Term Ecosystem Research (PAL-LTER) transect lines 300, 400, 500 and 600 (Waters and Smith 1992). Our objective was to determine onshore-to-offshore gradients in viral abundance, and to compare these results with other physical, chemical and microbiological characteristics of the surface waters. Viruses were counted in different size classes by head capsid diameter (<30 nm, 30-60 nm, 60-80 nm, >80 nm), in order to determine changes in the viral community composition between sites. Depth profiles of virus samples were taken at the end point stations (nearest to and furthest from shore) of each transect line.

During Project SANTA CLAμS, our initial investigations of Antarctic coastal habitats were continued by *in abstentia* collections of water, ice and sediment trap particulate matter. Samples were also obtained from the "phytoplankton culture experiments" and across Drake Passage. Preserved materials have recently been transferred to the University of Quebec at Montreal and sample analysis is already underway.

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VII.-G

"Core Biogeochemical Measurements and Experimental Studies of the Microbial Loop"

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Our current models of the trophic organization of Antarctic marine ecosystems have evolved considerably during the past decade. Prior to 1980, energy flow in Southern Ocean habitats was thought to be dominated by relatively short and, therefore, efficient transfers from large (>20 μm) phytoplankton cells to krill and, subsequently, to apex predators. More recently, our concept of the marine food web has been expanded to reflect the potential roles of heterotrophic microorganisms including bacteria, protozoans and small (<150 μm) non-krill crustaceans.

Heterotrophic microorganism-based food webs, also referred to as microbial loops (Azam et al. 1983) are present in all aquatic environments including Antarctic habitats. These detritus driven systems are fueled by non-respiratory community carbon losses including dissolved and particulate organic matter release by excretion, predation and mortality. Because microbial loops require several trophic levels to transfer carbon and energy to apex predators, most detritus based food webs are inherently inefficient and sometimes constitute major energy sinks.

It is important to emphasize that comprehensive, quantitative ecosystem studies of energy and carbon flow through the Antarctic food web do not exist. At best, only order of magnitude estimates for a few selected regions are available. A major, unexpected result of the field studies conducted to date is the apparent uncoupling of algal and bacterial metabolic processes (Cota et al. 1990; Karl et al. 1991; Karl and Bird 1993). The reasons for this uncoupling are not well understood at present but the potential implications are profound. Consequently, we must view the microbial loop models as hypotheses that deserve a thorough, quantitative field evaluation.

One of the major obligations for Project S-046 personnel, in the overall context of the PALMER LTER program, is to make repeat measurements of a variety of "core" biogeochemical measurements, including: inorganic carbon system parameters (alkalinity, total carbon dioxide and derived estimates of partial pressure of CO_2), dissolved oxygen, inorganic and organic nutrients, hydrogen peroxide, dissolved organic carbon, particulate ATP, chl a, bacterial cell numbers, bacterial productivity, and total and dissolved lipopolysaccharide (LPS). Collectively, these measurements will help describe the magnitude and intensity of autotrophic and microheterotrophic processes within the LTER study region. All measurements are made using JGOFS program standardized protocols which will allow more meaningful comparisons to be made between antarctic habitats and other regions of the world ocean. During SANTA CLAμS, we collected profile samples at approximately 30 stations in the LTER grid, including 9 in Crystal Sound and one near Hovgaard Island, 19 in

Paradise Harbor, 2 in Andvord Fjord, 2 in Dallman Bay, 2 in Gerlache Strait and 7 at Deception Island. Inorganic nutrients (phosphate, nitrate+nitrite, nitrite and silicate), dissolved oxygen, chl a and hydrogen peroxide concentrations were measured at sea. All other samples were retrograded to the University of Hawaii for subsequent processing.

In addition to these sample collections and measurements, S-046 personnel conducted numerous experiments to evaluate and elucidate the carbon and energy pathways among microorganisms including, but not limited to, measurements and controls on rates of photosynthesis, photorespiration and dark respiration, seawater cultures to assess coupling between algae and bacteria, stoichiometric coupling between dissolved nutrients and dissolved biogenic gases. Comprehensive experiments on controls of primary production and particle export conducted under bloom conditions (chl a ≥ 15 $\mu g\ l^{-1}$) in Paradise Harbor should allow us to close the carbon cycle in at least one region of the Peninsula.

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VII.-H
"Measurement of Dissolved Oxygen"

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Dissolved oxygen was measured on approximately 600 samples with a high precision computer assisted potentiometric titration procedure developed at the University of Hawaii. Dissolved oxygen was measured on a broad range of samples from general hydrographic support of CTD profiling (i.e., oxygen sensor calibration and performance verification) to support of specific investigator experiments.

As on previous cruises dissolved oxygen was measured as one component of water mass identification. Dissolved oxygen levels were characterized on profiles from various water masses including outer shelf LTER 600 Line, offshore Gerlache Strait, Crystal Sound and Lemaire Channel, as well as inshore waters of Paradise Harbor and Andvord Bay. Experiments to assess specific biological properties were conducted which included dissolved oxygen primary production measurements, light-dark dissolved oxygen relationships from temporal *in vitro* incubations, photorespiration determinations as well as shipboard assessment of dissolved oxygen related sampling procedures and experimental treatments.

Initial results indicate that the CTD dissolved oxygen sensor performed properly although a relative offset was recognized. Diver collected samples of "brown" ice algae interface-water revealed only slightly elevated levels of dissolved oxygen relative to surrounding surface seawater, however, hand collection of whole ice "brown" algae communities exhibited extremely high levels of dissolved oxygen approaching 200% supersaturation. Dissolved oxygen based primary production experiments (light vs. dark bottle incubations) were performed in Paradise Harbor for comparison to the ^{14}C experiments. An areal transect of potential bloom sites also revealed relatively low levels of oxygen supersaturation suggesting either early or perhaps late stages of the Austral bloom cycle. Areal dissolved oxygen measured across the Drake Passage (see section VII.-L) decreased in step-like function reflecting the passage of different water masses with elevated temperature signatures along the south to north transect route.

VII.-I
"Hydrogen Peroxide: Distributions, Sources and Sinks"

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Our interest in studying hydrogen peroxide (H_2O_2) dynamics in the Southern Ocean was inspired by two potential ecological applications of these data. First, it has been suggested that H_2O_2 concentrations, when coupled with production and decay rates, can be used as a tracer for vertical advection in surface ocean waters (Johnson et al. 1989). To the extent that mixed-layer dynamics are critical to our understanding of microbial rate processes, especially net photosynthesis (see Mitchell and Holm-Hansen 1991) this information is fundamental to the objectives of the Palmer LTER program. Second, because H_2O_2 is a common intermediate or reaction product of photochemical reactions of oxygen with organic compounds (Zafiriou 1983), H_2O_2 fluxes may provide information on photochemical alteration of dissolved organic matter in seawater. Recent studies suggest that photochemical processes may plan a previously unrecognized role in the global carbon cycle (Mopper and Zhou 1990).

Previous research efforts in the LTER study region have documented regional and depth-dependent variability in H_2O_2 concentrations (Resing et al. 1993) and have identified several local H_2O_2 sources and sinks (Tien and Karl 1993), including photochemical interactions with dissolved organic matter (Karl and Resing 1993).

During PD94-12 and PD95-01 we had an opportunity to continue our regional surveys to provide data on interannual concentration variability and production rates following a "heavy" ice year (1994). During the SANTA CLAμS cruise, 15 depth profiles of H_2O_2 concentration were obtained as part of the "LTER Microbiology and Carbon Flux" core measurement program (see section VII.-G). In addition, numerous experiments were conducted including but not limited to: (1) dark H_2O_2 decay rates, (2) light-stimulated and uv light-stimulated H_2O_2 production rates and (3) organic addition perturbation studies. We also obtained data from diver (S-028) collected sea ice samples and from freshly fallen snow. At Paradise Harbor, we obtained measurements on H_2O_2 concentrations during a comprehensive 3-day diel variability experiment that included most of the other biogeochemical core measurements (VII.-G) that should provide invaluable data on coupled microbial rate processes. Finally, H_2O_2 concentrations were measured across Drake Passage (VII.-L) along with other ecosystem variables.

References

Johnson, K. S., S. W. Willason, D. A. Wiesenburg, S. E. Lohrenz and R. A. Arnone. 1989. Hydrogen peroxide in the western Mediterranean Sea: A tracer for vertical advection. *Deep-Sea Research* 36: 241-254.

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United States 28: 231-234.

Mitchell, B. G. and O. Holm-Hansen. 1991. Observations and modeling of the antarctic phytoplankton crop in relation to mixing depth. *Deep-Sea Research* 28: 981-1007.

Mopper, K. and X. Zhou. 1990. Hydroxyl radical photoproduction in the sea and its potential impact on marine processes. *Science* 250: 661-664.

Resing, J., G. Tien, R. Letelier, D. M. Karl and D. Jones. 1993. Palmer LTER: Hydrogen peroxide in the Palmer-LTER region: II. Water column distributions. *Antarctic Journal of the United States* 28: 227-229.

Tien, G. and D. Karl. 1993. Palmer LTER: Hydrogen peroxide in the Palmer-LTER region: III. Local sources and sinks. *Antarctic Journal of the United States* 28: 229-230.

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VII.-J
"Studies of Bacterial Ectoenzymes"

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Extensive studies of the bacterial ectoenzymes leucine aminopeptidase and α- and ß-glucosidase were undertaken on PD94-12 using the method of fluorimetric substrate analogues (4-methylumbelliferone (4MUF) and ß-naphthyamine derivatives) pioneered by Hoppe (1983). In addition to water column sampling in concert with other measurements made routinely on this cruise, we focused particularly on three areas:

1. Ectoenzyme activity associated with ice-algal communities: As on previous cruises, ectoenzyme activities associated with sea ice rich in microalgae ("brown ice") were enriched by several orders of magnitude over water column activities, and showed a greater ratio of proteolytic to glycolytic enzymes than in the water column. Under-ice samples collected by SCUBA divers (S-028 personnel) also showed elevated activities and were sampled for many other parameters such as chlorophyll and ATP so that the relationship of activity to algal biomass can be determined.

2. Regulation of ectoenzymes: The effects of various monomeric organic compounds (amino acids, sugars, nucleobases) as well as sterilized extracts of ice algae on ectoenzyme expression by bacterioplankton were examined on this cruise. It was found that aminopeptidase expression is repressed by certain amino acids normally found at low concentrations in seawater, particularly histidine. High concentrations of ammonium, as well as glycine and other relatively abundant amino acids, do not result in such repression, suggesting that nitrogen availability alone is a poor predictor of aminopeptidase expression.

3. Ectoenzyme specificity: In contrast to results obtained on previous cruises, on PD94-12 there appeared to be little specificity for α- and ß-anomers in the enzymes hydrolyzing 4MUF glucosides. An apparently nonspecific α/ß glucosidase was observed in the "bottle bloom" experiment (see section VII.-H) where rates of hydrolysis of 4MUF α- and ß-glucosides varied significantly but almost perfectly in concert (i.e. with little or no change in the α/ß ratio).

Reference

Hoppe, H.-G. 1983. Significance of exoenzymatic activities in the ecology of brackish water: measurements by means of methylumbelliferyl substrates. *Marine Ecology Progress Series* 11: 299-308.

VII.-K
"Antarctic Archaeoplankton"

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Archaebacteria are an evolutionarily distinct group of prokaryotes, as genetically distant from "common" eubacteria as they are from eukaryotes. Until very recently, archaebacteria were thought to thrive only in a few disparate niches, consisting of either very hot, very salty, or strictly anaerobic environments. Recent studies show that pelagic marine archaebacteria can constitute a major fraction (>30%) of Antarctic prokaryote biomass in coastal waters off Palmer Station, Antarctica (DeLong et al. 1994). Since surface waters off Palmer Station have yielded the highest biomass estimates of pelagic archaebacteria to date, this area is uniquely suited for studying these unusual microorganisms.

The main objectives of this component of Project SANTA CLAμS were: (1) to confirm the results obtained on a previous LTER expedition regarding the dominance of archaebacteria in the marine plankton near Palmer Station and (2) to describe the larger scale patterns of the "archaeoplankton phenomenon." To accomplish these goals, water samples were collected from a number of diverse locations including open water, coastal and hydrothermal habitats (Tables 1 and 2). Samples were also obtained on two separate Drake Passage crossings (at the end of the SANTA CLAμS and at the beginning of the LTER annual cruise in Jan 1995) to examine the relative changes in biomass across the Antarctic Convergence zone (see "Drake Passage Transect" report). Cells were concentrated onto 0.2 μm filters and frozen in a sucrose-based lysis buffer. The frozen samples will be shipped to Santa Barbara for subsequent analysis.

Reference

DeLong, E. F., K. Y. Wu, B. B. Prezelin and R. V. M. Jovine. 1994. High abundance of Archaea in Antarctic marine picoplankton. *Nature*, 371: 695-697.

I. Project SANTA CLAµS Archaeoplankton Sample Log, Dec 1994 (D. Karl)

SC sample #	date	depth (m)	vol. filtered	location/comments
1	12/15/95	5	8 L	Crystal Sound
2	12/15/95	125	8 L	Crystal Sound
3	12/15/95	0	meltwater	Crystal Sound
4	12/15/95	0	from ice	Crystal Sound
5	12/15/95	0	algal	Crystal Sound
6	12/15/95	0	community	(JC sample)
7	12/16/95	5	8 L	Hugo Island
8	12/16/95	200	8 L	Hugo Island
9	12/16/95	300	8 L	Hugo Island
10	12/16/95	5	8 L	Hovgaard Island
11	12/16/95	300	8 L	Hovgaard Island
12	12/16/95	470	8 L	Hovgaard Island
13	12/18/95	5	3.8 L	Paradise Harbor,
14	12/18/95	35	8 L	<5 µm samples
15	12/18/95	100	8 L	(4 a.m. cast)
16	12/19/95	50	8 L	Paradise Harbor,
17	12/19/95	100	8 L	<5 µm samples
18	12/19/95	225	8 L	(4 a.m. cast)
19	12/24/95	5	9 L	Deception Island Sta. #1
20	12/24/95	150	4.5 L	Deception Island Sta. #1
21	12/24/95	5	9 L	Deception Island Sta. #3
22	12/24/95	50	9 L	Deception Island Sta. #3
23	12/24/95	150	9 L	Deception Island Sta. #3
24	DP-1	3	9 L	Drake Passage
25	DP-2	3	9 L	transect #1
26	DP-3	3	?	(see attached notes
27	DP-4	3	9 L	on locations)
28	DP-5	3	9 L	
29	DP-6	3	9 L	
30	DP-7	3	9 L	
31	DP-8	3	9 L	
32	DP-9	3	9 L	
33	DP-10	3	9 L	
34	DP-11	3	9 L	
35	DP-12	3	4.5 L	
36	DP-13	3	4.5 L	

II. Project LTER Archaeoplankton Sample Log, Jan-Feb 1995 (C. Moyer)

Drake or LTER sample #	LTER station # or co-ordinates	depth (m)	vol. filtered
Drake-1	56°59.69'S, 62°36.85'W	3	18 L
Drake-2	58°00.00'S, 61°32.40'W	3	18 L
Drake-3	58°36.70'S, 60°49.12'W	3	18 L
Drake-4	59°09.54'S, 60°15.85'W	3	18 L
Drake-5	60°15.09'S, 59°03.25'W	3	18 L
Drake-6	61°19.40'S, 57°54.50'W	3	18 L
LTER-1	500-100	0	9 L
LTER-1	500-100	60	8.5 L
LTER-1	500-100	350	12.5 L
LTER-2	500-200	0	9 L
LTER-2	500-200	75	4 L
LTER-2	500-200	500	18 L
LTER-3	600-200	0	9 L
LTER-3	600-200	85	4 L
LTER-3	600-200	500	18 L
LTER-4	600-040	0	18 L
LTER-5	600-120	0	9 L
LTER-5	600-120	60	8 L
LTER-5	600-120	500	17 L
LTER-6	600-040	500	6 L
LTER-7	600-040	50	18 L
LTER-7	600-040	500	33 L
LTER-8	510-000	0	36 L
LTER-8	510-000	35	18 L
LTER-8	510-000	200	27 L
LTER-9	400-200	0	9 L
LTER-9	400-200	300	8 L
LTER-9	400-200	500	6 L
LTER-10	400-180	0	8.5 L
LTER-10	400-180	500	17.5 L
LTER-11	400-160	61	15 L
LTER-12	400-120	0	18 L
LTER-12	400-120	50	17 L
LTER-12	400-120	330	36 L
LTER-13	400-140	330	17 L
LTER-14	400-040	0	18 L

II. Project LTER Archaeoplankton Sample Log, Jan-Feb 1995 (C. Moyer)

LTER-15	300-120	0	17.5 L
LTER-15	300-120	75	18 L
LTER-15	300-120	450	36 L
LTER-16	300-040	0	18 L
LTER-17	300-200	0	18 L
LTER-17	300-200	75	18 L
LTER-17	300-200	500	36 L
LTER-18	200-200	0	18 L
LTER-18	200-200	60	18 L
LTER-18	200-200	500	36 L
LTER-19	200-160	0	18 L
LTER-19	200-160	90	18 L
LTER-19	200-160	400	36 L
LTER-20	200-000	0	18 L
LTER-20	200-000	120	18 L
LTER-20	200-000	500	36 L
LTER-21	380-010	0	18 L
LTER-21	380-010	70	18 L
LTER-21	380-010	500	36 L
LTER-22	Palmer E	0	18 L
LTER-22	Palmer E	35	9 L
LTER-22	Palmer E	145	18 L
LTER-23	Palmer B	0	18 L
LTER-23	Palmer B	60	22 L

VII.-L
"Drake Passage Transect"

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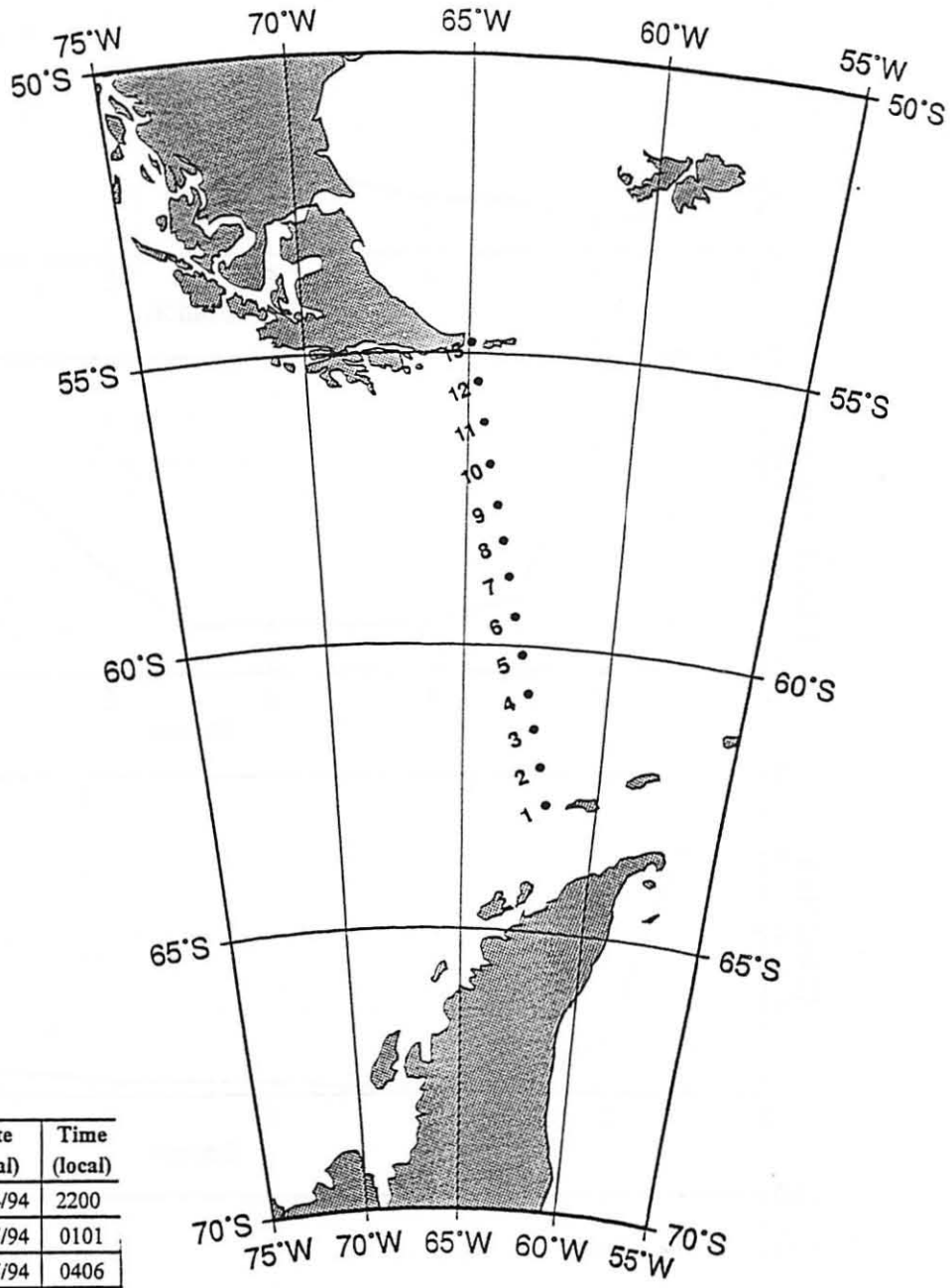
In 1989, we had an opportunity to collect underway water samples every two hours on a transect from the South Shetland Islands (62°S, 57°W) to the Beagle Channel (55°S, 70°W). Analyses of bacterial cell numbers and phycoerythrin-containing cyanobacteria documented a strong north-south gradient in cyanobacteria with maximum concentrations of 8.7×10^6 cells per liter near the mouth of the Beagle with a two-order of magnitude decrease in cell numbers south of the Antarctic Convergence (Letelier and Karl 1989). Although cyanobacterial abundance was positively correlated with temperature the relationship was not suggested as having a "cause-and-effect" basis.

On Polar Duke 94-12 we took the opportunity of having an experienced science team in place to attempt our second Drake Passage underway sampling survey (Figure 1). On approximately 3 hr intervals beginning late on Christmas Eve and terminating on 26 Dec at 1000 hrs (Table 1) we obtained a surface water sample that was processed for: (1) total dissolved inorganic carbon and total alkalinity, (2) dissolved oxygen, (3) archaeoplankton abundance, (4) hydrogen peroxide, (5) bacterial and cyanobacterial cell numbers by flow cytometry, (6) dissolved organic and inorganic nutrients, (7) chlorophyll and phaeopigments, (8) virus abundance and (9) eukaryotic phytoplankton cell number and taxonomic ID. Together, these ecological data should help describe the coupled linkages among microorganisms that we initially set out to investigate during Project SANTA CLAμS. Initial sample data are shown in Figure 2.

Reference

Letelier, R. M. and D. M. Karl. 1989. Phycoerythrin-containing cyanobacteria in surface waters of the Drake Passage during February 1987. *Antarctic Journal of the United States*, 24: 185-188.



Sample #	Co-ordinates	Date (local)	Time (local)
DP-1	62°44.94'S, 61°52.73'W	12/24/94	2200
DP-2	62°5.66'S, 62°10.49'W	12/25/94	0101
DP-3	61°26.19'S, 62°29.20'W	12/25/94	0406
DP-4	60°49.27'S, 62°45.98'W	12/25/94	0700
DP-5	60°9.63'S, 63°2.19'W	12/25/94	1000
DP-6	59°30.9'S, 63°19.81'W	12/25/94	1304
DP-7	58°49.97'S, 63°34.39'W	12/25/94	1610
DP-8	58°12.8'S, 63°48.0'W	12/25/94	1900
DP-9	57°36.64'S, 64°0.71'W	12/25/94	2200
DP-10	56°53.7'S, 64°17.32'W	12/26/94	0100
DP-11	56°10.17'S, 64°30.33'W	12/26/94	0400
DP-12	55°28.80'S, 64°42.87'W	12/26/94	0700
DP-13	54°48.78'S, 64°55.36'W	12/26/94	0955

Figure 1: Map showing the locations of the Drake Passage stations sampled during PD94-12.

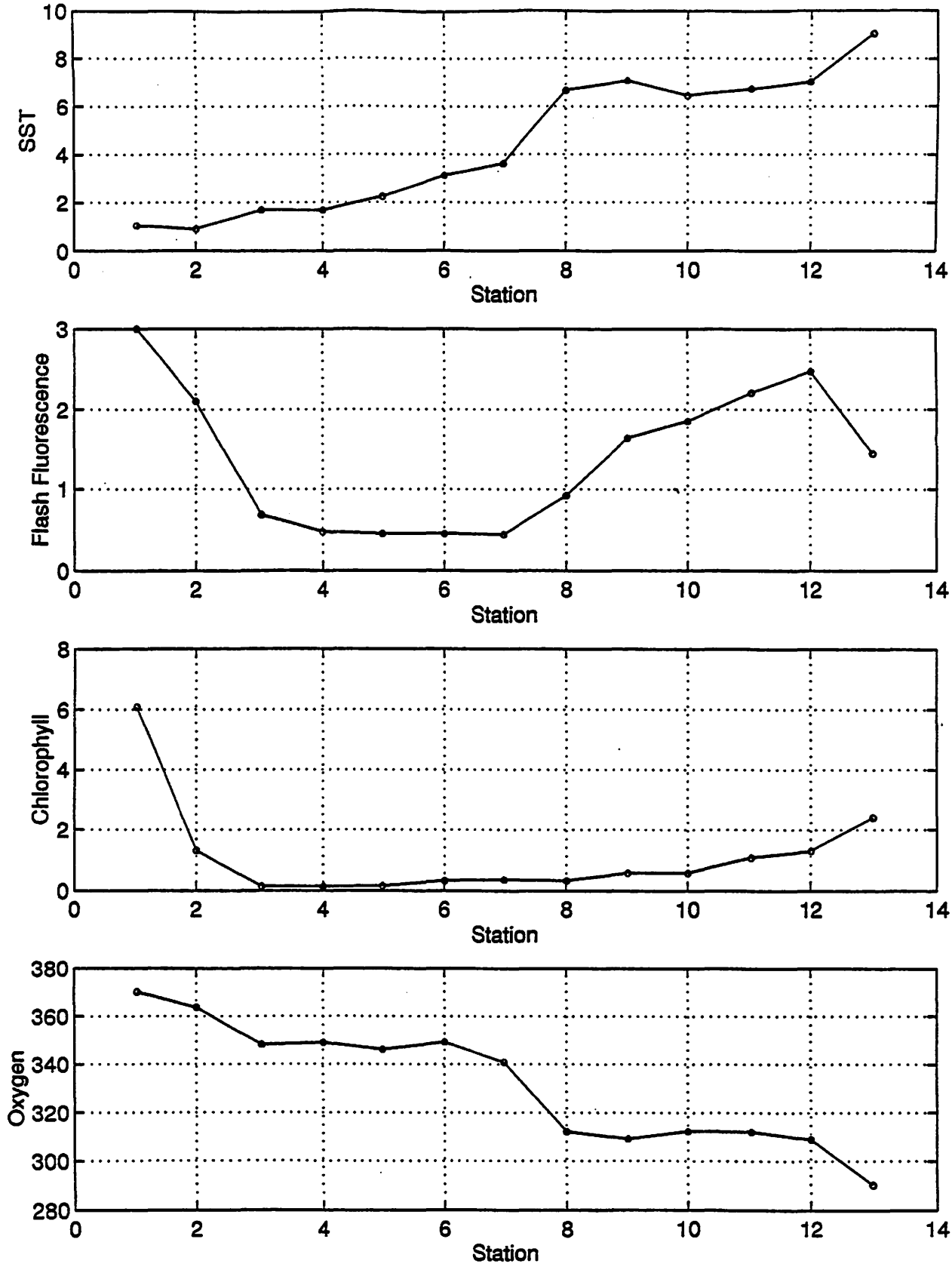


Figure 2: Physical, chemical and biological gradients observed on the transect across Drake Passage. Station positions are shown in the figure/table on pg. 35. The parameters are: SST (sea surface temperature) in °C, flash fluorescence (arbitrary units), extracted chlorophyll a concentration in mg m^{-3} and dissolved oxygen in mmoles m^{-3}.

VIII. DATA AVAILABILITY AND DATA DISTRIBUTION

Data collected during the SANTA CLAμS cruise will be made available as soon as possible after the analyses have been completed. In order to provide easy access to the common measurements (including CTD profiles, chl a, primary productivity, nutrients and dissolved oxygen) these data will reside on a workstation at the University of Hawaii and may be accessed using the anonymous file transfer protocol (ftp) via the world-wide Internet system. To maximize ease of access the data will be prepared as ASCII files with file names chosen so they may be copied to DOS machines without ambiguity.

The SANTA CLAμS data base will reside in a subdirectory called */pub/santa*. More information about the data base is given in several files called *Readme.**, at this level. The file *Readme.first* gives general information on the data base; we encourage readers to read it first. The following is an example of how to use ftp to obtain SANTA CLAμS data. The user's commands are denoted by underlined test. The workstation's Internet address is hahana.soest.hawaii.edu.

1. At the prompt >, type ftp 128.171.154.13 or ftp hahana.soest.hawaii.edu (either address should work).
2. When asked for your login name, type anonymous
3. When asked for a password, type your email address
4. To change to the SANTA CLAμS data base, type cd/pub/santa
5. To view files type ls. A directory of files and subdirectories will appear.
6. To obtain further information about the database type get Readme.first. This will transfer an ASCII file to your system. Use any text editor to view it.
7. To exit type bye.

The person in charge of the SANTA CLAμS data management system is Mr. Lance Fujieki. He can, and should, be reached by email (lfujieki@soest.hawaii.edu) if problems arise. Alternative contacts are: (phone) 808-956-3312, (fax) 808-956-9516.

IX. DAILY SCIENCE LOGS

The following section was prepared by Anthony Amos, using methods described in section VII-A. The Daily Science Log is a detailed chronology of cruise events including hour-to-hour science activities, weather conditions and ship position. As such they comprise an invaluable record of the major cruise events.

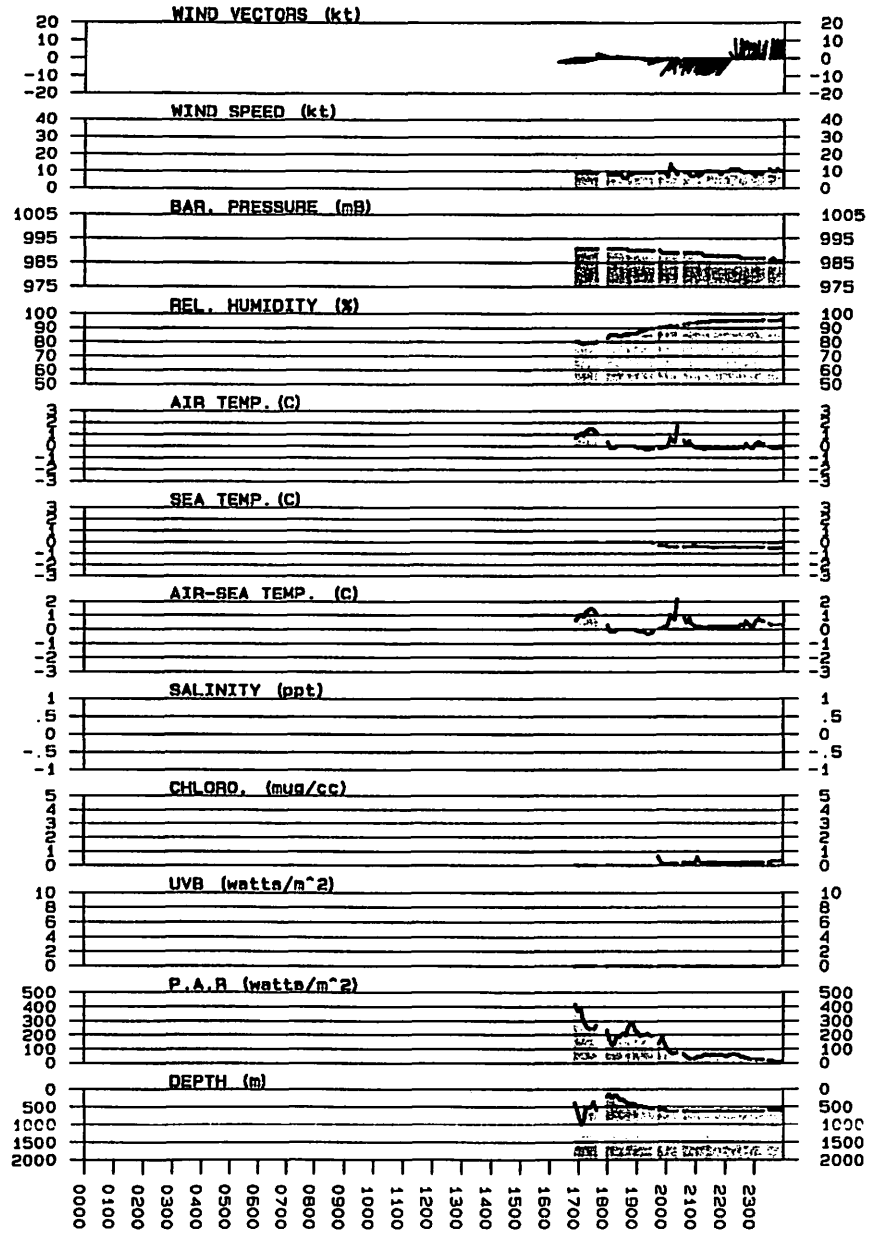
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 1 12-09-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1650	64 49.80S	64 5.10W	11.6	237	0.0	128	0.7	79.5	991.4	5.3	318	8.4	081	0.0	0.7	-----	06.00	0.0	-----	
1651	64 49.96S	64 5.67W	12.3	235	0.3	128	0.7	79.9	991.3	5.3	316	9.2	078	0.0	0.7	-----	63.70	0.0	-----	START CRUISE SANTA CLAUS
1701	64 51.07S	64 9.90W	11.8	240	2.1	128	1.1	79.3	991.3	4.4	319	8.9	078	0.0	1.1	-----	87.70	0.0	-----	
1740	64 53.85S	64 27.66W	12.9	257	8.1	626	0.9	80.3	991.3	3.8	004	9.1	075	0.0	0.9	-----	61.60	0.0	-----	OFF FOR SALINITY/FLUOROMETRY ADDITION
1800	64 51.84S	64 35.63W	13.3	307	4.0	196	-0.2	85.2	991.2	6.2	023	8.0	109	0.0	-0.2	-----	74.20	0.0	-----	
1900	64 43.64S	64 58.57W	12.2	313	12.8	490	-0.1	86.9	990.3	7.3	044	8.7	096	0.0	-0.1	-----	41.10	0.0	-----	
1937	64 38.59S	65 12.33W	12.4	313	7.8	581	-0.3	90.3	989.6	8.9	046	9.0	087	-0.32	0.4	-----	25.20	0.0	1.52	ADDED SALINITY; SST; FLUOROMETER
2000	64 35.18S	65 20.09W	12.5	324	4.8	612	-0.1	90.7	988.9	10.3	032	6.8	088	-0.39	0.2	-----	12.50	0.0	0.15	
2100	64 34.43S	65 20.59W	0.3	255	1.7	621	-0.2	93.5	988.8	8.8	135	9.0	032	-0.37	0.1	-----	39.80	0.0	0.21	
2104	64 34.48S	65 20.60W	0.4	220	0.1	621	-0.2	93.8	988.7	6.4	170	6.8	030	-0.37	0.1	-----	43.70	0.0	2.15	CTD GO-FLO BOTTLE TESTS
2200	64 35.40S	65 21.91W	1.3	279	1.4	0	-0.2	95.1	988.1	10.0	103	10.4	029	-0.41	0.2	-----	48.50	0.0	0.21	
2211	64 35.66S	65 22.26W	1.5	278	0.3	598	-0.2	95.1	987.7	10.5	110	11.1	036	-0.40	0.2	-----	67.50	0.0	0.20	CTD SC0101 START
2300	64 36.33S	65 22.56W	0.3	016	1.0	607	-0.2	95.4	987.2	5.9	171	6.2	188	-0.43	0.2	-----	27.00	0.0	0.25	
2319	64 36.57S	65 22.52W	1.2	357	0.3	605	0.5	95.6	986.6	8.1	188	9.3	184	-0.42	0.9	-----	21.10	0.0	0.25	CTD SC0101 STUCK AR SURFACE; WINCH PROBLE
2332	64 36.80S	65 22.50W	1.1	030	0.2	590	-0.2	95.5	986.7	9.7	155	10.7	188	-0.48	0.2	-----	20.00	0.0	0.27	TSRB #01 DEPLOYED
2353	64 37.15S	65 22.53W	1.3	060	0.4	593	-0.2	95.5	986.3	9.4	110	9.9	177	-0.56	0.3	-----	14.10	0.0	0.30	CTD SC0101 FINALLY ON DECK

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	45.6 nm								
TOTAL DISTANCE TRAVELLED	45.6 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	6.1	MAXIMUM=	13.7	AT 1913 HRS.	MINIMUM=	0.1	AT 2238 HRS.
AIR TEMPERATURE (C);		AVERAGE=	0.1	MAXIMUM=	2.2	AT 2007 HRS.	MINIMUM=	-0.3	AT 1915 HRS.
SEA TEMPERATURE (C);		AVERAGE=	-0.26	MAXIMUM=	0.00	AT 1650 HRS.	MINIMUM=	-0.56	AT 2353 HRS.
SALINITY (ppt);		AVERAGE=	0.00	MAXIMUM=	0.00	AT 0000 HRS.	MINIMUM=	0.00	AT 0000 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	989.0	MAXIMUM=	991.4	AT 1650 HRS.	MINIMUM=	985.7	AT 2358 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	90.4	MAXIMUM=	95.6	AT 2306 HRS.	MINIMUM=	77.9	AT 1706 HRS.
WIND SPEED (kts);		AVERAGE=	9.1	MAXIMUM=	16.3	AT 2006 HRS.	MINIMUM=	0.7	AT 2045 HRS.
MEAN DAILY WIND VELOCITY= 5.0 (kts) FROM 184 DEGREES TRUE									
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	122.53	MAXIMUM=	463.70	AT 1651 HRS.	MINIMUM=	11.30	AT 2359 HRS.
UVB (watts/m^2)		AVERAGE=	0.0	MAXIMUM=	0.0	AT 1650 HRS.	MINIMUM=	0.0	AT 1650 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	0.24	MAXIMUM=	2.15	AT 2104 HRS.	MINIMUM=	0.13	AT 1951 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-09-1994



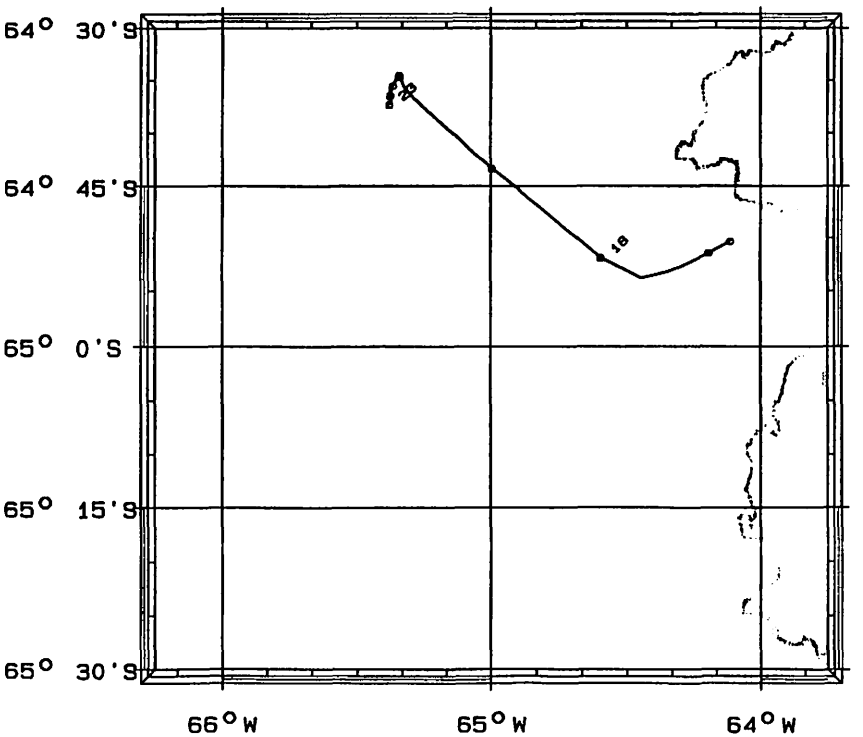
SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
2211	64 35.59S	65 22.18W	SC0101

OTHER INVESTIGATIONS and NOTES

SUN PHENOMENA



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 2 12-10-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 37.02S	65 22.78W	3.5	157	0.0	593	-0.2	95.6	985.8	11.9	034	9.2	204	-0.54	0.3	-----	10.20	0.0	0.28	
0101	64 34.34S	65 20.58W	1.5	134	2.9	619	-0.1	95.9	985.7	9.2	047	8.3	188	-0.65	0.5	-----	6.20	0.0	0.29	CTD SC0102 START
0229	64 34.66S	65 20.77W	1.3	064	0.3	621	-0.3	96.4	985.5	5.3	049	4.6	126	-0.50	0.2	33.36	1.60	0.0	0.27	
0246	64 34.84S	65 20.79W	0.6	349	0.3	621	-0.3	96.4	985.1	7.4	103	7.6	096	-0.49	0.1	33.36	0.60	0.0	0.26	SUNSET(23:46:34 LOCAL); FRIDAY; 12/09/94
0300	64 34.92S	65 20.58W	1.0	333	0.2	621	-0.3	96.4	985.2	7.8	116	8.3	095	-0.49	0.1	33.36	0.30	0.0	0.27	
0306	64 34.95S	65 20.49W	0.1	319	0.1	619	-0.3	96.3	985.3	7.5	135	7.6	095	-0.49	0.1	33.36	0.20	0.0	0.26	CTD SC0103 START
0327	64 34.97S	65 20.18W	0.2	308	0.3	614	-0.3	96.1	985.3	6.3	157	6.5	105	-0.51	0.2	33.37	0.0	0.0	0.28	CTD SC0103 ON DECK
0400	64 36.12S	65 21.02W	10.0	346	1.7	590	-0.4	95.4	985.0	4.8	077	10.1	138	-0.54	0.1	33.36	0.0	0.0	0.29	
0500	64 44.26S	65 27.56W	9.0	343	8.7	686	-0.6	93.7	984.2	6.7	080	10.3	123	-0.67	0.0	33.32	0.10	0.0	0.31	
0537	64 48.90S	65 31.40W	6.6	344	5.0	688	-0.8	92.9	983.9	6.6	077	8.2	112	-0.55	-0.2	33.39	0.90	0.0	0.33	SUNRISE (02:37:31 LOCAL); SATURDAY; 12/10
0600	64 51.22S	65 33.27W	6.2	344	2.5	640	-0.8	93.7	983.8	3.8	093	7.5	133	-0.51	-0.2	33.42	2.30	0.0	0.27	
0700	64 55.16S	65 39.96W	4.3	094	5.6	364	-0.6	94.1	983.2	6.4	046	4.6	182	-0.33	-0.2	33.69	4.10	0.0	0.37	
0800	64 53.47S	65 42.22W	2.1	016	2.3	343	-0.5	94.5	982.7	5.0	127	6.5	158	-0.57	0.0	33.64	6.50	0.0	0.32	
0900	64 55.67S	65 39.30W	2.9	144	3.1	402	-0.7	94.6	982.3	7.9	034	5.7	194	-0.27	-0.4	33.71	26.60	0.0	0.39	
1000	64 58.50S	65 40.66W	0.6	019	4.5	118	-0.7	95.1	981.9	8.0	138	8.5	160	-0.28	-0.4	33.66	60.20	0.0	0.34	
1017	64 58.47S	65 40.43W	1.4	018	0.3	117	-0.6	94.4	981.9	7.3	138	8.4	163	-0.25	-0.3	33.67	71.50	0.0	0.34	STOPPED NEAR HUGO ISLAND
1100	64 58.38S	65 39.88W	0.8	243	1.0	243	-0.1	89.9	981.5	8.4	279	8.3	157	-0.31	0.2	33.68	61.10	0.0	0.32	
1146	64 58.29S	65 39.47W	1.1	078	1.0	411	-0.6	92.2	981.2	9.4	078	9.2	163	-0.27	-0.3	33.68	88.00	0.0	0.32	HUGO ISLAND (SANTA CLAUS I.) OPS
1147	64 58.30S	65 39.54W	1.5	071	0.0	390	-0.6	92.3	981.3	9.4	078	9.2	158	-0.27	-0.3	33.68	87.40	0.0	0.32	ZODIAC AWAY
1158	64 58.34S	65 39.54W	0.5	312	0.1	406	-0.3	92.6	981.1	8.8	220	9.2	170	-0.25	-0.5	33.70	54.30	0.0	0.35	ZODIAC RETURNS
1200	64 58.38S	65 39.53W	1.1	301	0.0	410	-0.4	92.7	981.0	8.4	231	9.1	167	-0.25	-0.1	33.70	39.00	0.0	0.35	
1208	64 58.20S	65 39.58W	3.8	110	0.6	344	-0.8	93.0	980.8	10.3	039	7.7	167	-0.28	-0.5	33.69	74.30	0.0	0.33	ZODIAC AWAY
1300	64 58.33S	65 40.19W	1.3	323	1.3	88	0.0	92.8	980.7	9.0	213	10.1	172	-0.36	0.3	33.66	44.70	0.0	0.30	
1315	64 58.36S	65 39.89W	0.7	317	0.4	174	-0.3	93.2	980.4	9.4	217	10.0	171	-0.40	0.1	33.65	24.00	0.0	0.28	ZODIAC TO HUGO ISLAND
1400	64 58.29S	65 39.67W	2.2	015	1.1	128	-0.8	94.0	980.2	8.5	146	10.4	168	-0.29	-0.5	33.68	03.10	0.0	0.32	
1500	64 58.22S	65 39.23W	3.2	103	2.1	471	-0.7	94.9	979.6	8.4	058	7.3	183	-0.28	-0.4	33.70	94.50	0.0	0.30	
1600	64 58.28S	65 39.34W	3.7	028	2.6	410	-0.6	94.4	979.8	6.4	126	9.1	173	-0.29	-0.3	33.72	91.20	0.0	0.24	
1616	64 57.92S	65 38.96W	3.3	175	1.1	524	-0.4	94.7	979.5	9.5	356	6.2	169	-0.30	-0.1	33.72	41.40	0.0	0.24	L.A. NOON(13:16:03 LOCAL); SATURDAY; 12/1
1700	64 58.13S	65 39.41W	4.6	026	2.8	374	-0.6	94.9	979.4	4.9	132	8.7	181	-0.31	-0.2	33.73	05.50	0.0	0.22	
1716	64 57.77S	65 38.55W	3.7	176	1.2	640	-0.4	95.1	979.3	9.1	347	5.5	155	-0.30	-0.1	33.72	26.10	0.0	0.23	SANTA CLAUS AWS TURNED ON!
1721	64 57.88S	65 38.52W	2.4	020	0.2	621	-0.5	95.1	979.4	5.0	143	7.1	174	-0.29	-0.2	33.72	28.20	0.0	0.24	AWS LOCATION;64 57.8769S 65 40.1570W
1731	64 58.00S	65 38.51W	0.3	021	0.2	610	-0.5	95.2	979.4	5.9	161	6.2	183	-0.28	-0.2	33.72	29.30	0.0	0.24	BEARING TO AWS FROM SHIP;304 @ 0.6NM
1846	64 53.64S	65 41.27W	12.7	129	4.5	357	-0.2	95.0	979.2	10.9	006	2.2	276	-0.30	0.1	33.67	54.80	0.0	0.25	
1900	64 50.78S	65 43.38W	13.0	129	3.0	0	-0.2	94.8	979.3	10.6	003	2.5	294	-0.25	0.0	33.67	90.50	0.0	0.25	
2000	64 38.57S	65 53.14W	13.2	129	13.0	383	0.1	95.1	979.5	10.7	352	2.9	337	-0.21	0.3	33.65	05.70	0.0	0.18	

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GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
2100	64 29.59S	65 59.14W	0.7	292	9.7	360	-0.2	95.4	979.5	3.1	135	3.6	075	-0.29	0.4	33.57	51.40	0.0	0.24	
2128	64 29.65S	65 58.00W	3.8	249	2.1	368	-0.1	95.6	979.5	2.0	220	5.5	082	-0.27	0.1	33.57	43.90	0.0	0.24	MANOEUVERING FOR SEDIMENT TRAP RECOVERY
2140	64 29.66S	65 58.99W	4.8	040	0.6	362	-0.2	95.7	979.4	4.6	021	1.7	147	-0.27	0.5	33.57	44.60	0.0	0.25	SYSTEM DOWN FOR TESTS.
2151	64 29.59S	65 59.64W	0.7	264	0.3	358	-0.2	95.7	979.6	2.5	139	3.1	051	-0.27	0.5	33.57	42.20	0.0	0.26	SEDIMENT TRAP IN SIGHT
2200	64 29.66S	65 59.77W	0.6	343	0.1	357	-0.2	95.7	979.7	1.9	061	1.7	062	-0.27	0.5	33.57	34.70	0.0	0.26	
2208	64 29.79S	65 59.84W	0.9	333	0.1	358	-0.3	95.8	979.7	1.9	064	1.7	065	-0.26	-0.5	33.57	35.90	0.0	0.25	SEDIMENT TRAP 01 ABOARD
2237	64 28.66S	65 57.60W	1.1	269	2.1	363	-0.3	95.9	979.8	1.9	164	3.0	079	-0.24	-0.5	33.57	35.40	0.0	0.25	SEARCHING FOR SECOND SEDIMENT TRAP
2256	64 28.75S	65 57.69W	2.9	004	0.1	364	-0.3	96.0	979.8	4.4	031	2.4	073	-0.23	-0.5	33.57	33.90	0.0	0.27	SEDIMENT TRAP SURFACED
2300	64 28.79S	65 57.92W	1.1	029	0.1	364	-0.2	96.0	979.9	4.0	032	3.1	072	-0.23	0.0	33.57	35.90	0.0	0.26	
2321	64 29.04S	65 58.04W	1.2	339	0.3	365	-0.2	96.0	979.7	3.1	062	2.8	064	0.0	-0.2	-----	22.60	0.0	-----	SEDIMENT TRAP 02 ABOARD
2358	64 28.77S	65 58.60W	1.5	272	0.6	361	-0.3	96.0	980.0	4.1	127	5.2	052	-0.21	-0.5	33.57	23.40	0.0	0.29	CTD SC0104 START

DAILY SUMMARY

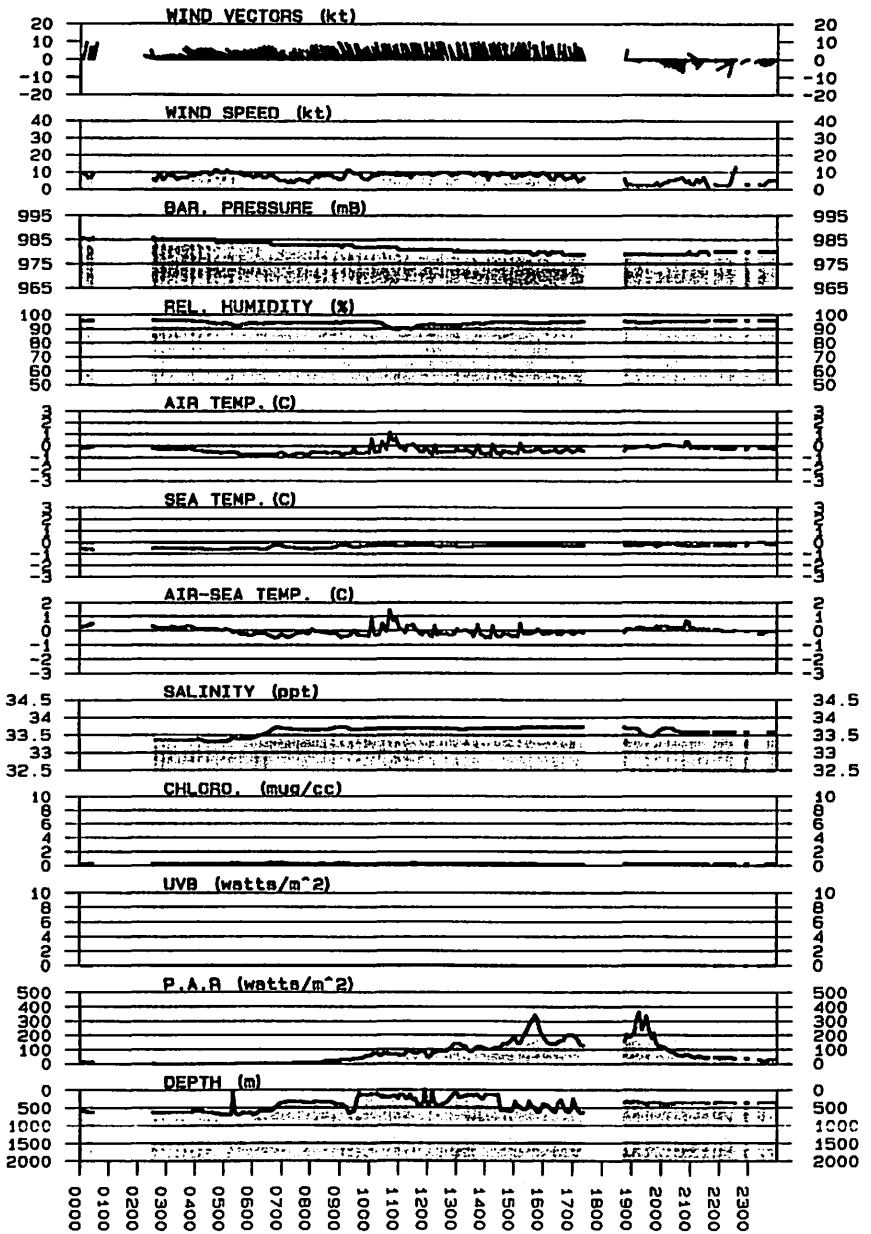
DISTANCE TRAVELLED TODAY 90.1 nm
TOTAL DISTANCE TRAVELLED 135.7 nm

SHIP'S SPEED (kts) ;	AVERAGE=	4.1	MAXIMUM=	13.8	AT 1904 HRS.	MINIMUM=	0.0	AT 1028 HRS.
AIR TEMPERATURE (C);	AVERAGE=	-0.4	MAXIMUM=	2.1	AT 1041 HRS.	MINIMUM=	-0.9	AT 0538 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-0.36	MAXIMUM=	0.00	AT 2319 HRS.	MINIMUM=	-0.68	AT 0438 HRS.
SALINITY (ppt);	AVERAGE=	33.60	MAXIMUM=	33.74	AT 1552 HRS.	MINIMUM=	33.30	AT 0428 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	981.6	MAXIMUM=	986.0	AT 0002 HRS.	MINIMUM=	978.9	AT 1911 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	94.4	MAXIMUM=	96.4	AT 0229 HRS.	MINIMUM=	88.2	AT 1122 HRS.
WIND SPEED (kts);	AVERAGE=	7.1	MAXIMUM=	37.6	AT 2231 HRS.	MINIMUM=	0.1	AT 1405 HRS.

MEAN DAILY WIND VELOCITY= 5.3 (kts) FROM 052 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	72.18	MAXIMUM=	384.70	AT 1923 HRS.	MINIMUM=	-0.20	AT 0424 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	0.30	MAXIMUM=	0.41	AT 0647 HRS.	MINIMUM=	0.17	AT 1921 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA: 12-10-1994

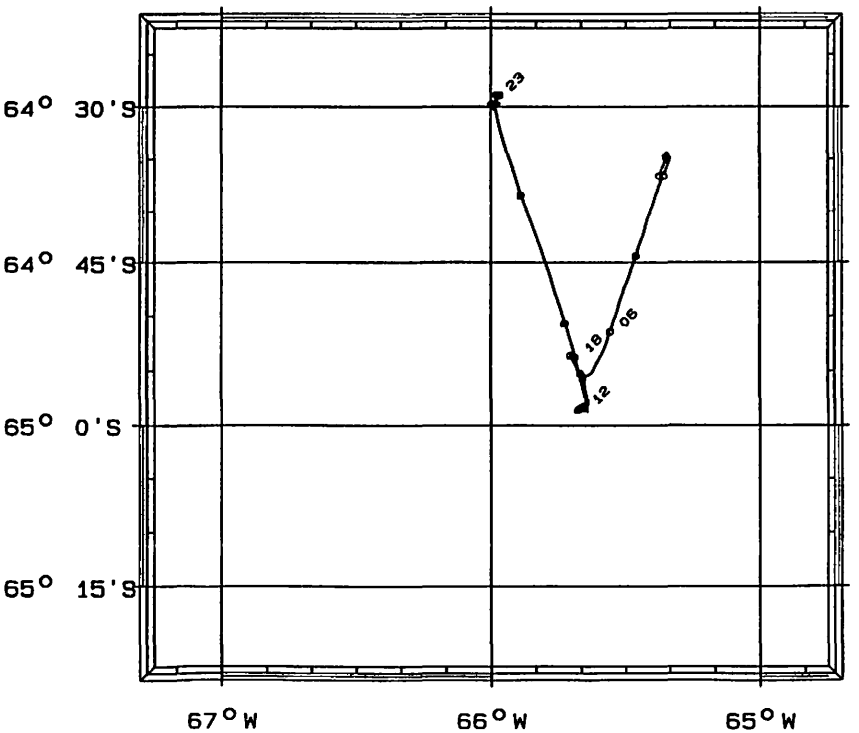


SCIENTIFIC ACTIVITIES THIS DAY:

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0101	64 34.63S	65 20.92W	SC0102
0306	64 34.86S	65 20.97W	SC0103
2358	64 28.89S	65 58.97W	SC0104

OTHER INVESTIGATIONS and NOTES
AUTOMATIC WEATHER STATION (AWS)
DEPLOYED ON SANTA CLAUS I.
ADJACENT TO HUGO ISLAND
SEDIMENT TRAPS RECOVERED
SUN PHENOMENA
SUNRISE (02:37:31 LOCAL): SATURDAY: 12/10/94
L.A. NOON (13:16:03 LOCAL): SATURDAY: 12/10/94
SUNSET (23:46:34 LOCAL): FRIDAY: 12/09/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 3 12-11-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0002	64 28.76S	65 58.71W	1.2	265	0.0	362	-0.3	96.0	980.0	4.1	134	5.0	049	-0.20	-0.1	33.57	23.10	0.0	0.28	
0008	64 28.75S	65 58.77W	0.4	259	0.2	361	-0.3	96.0	979.9	5.0	137	5.3	039	-0.20	-0.1	33.57	18.20	0.0	0.28	RESTART CTD SC0104
0033	64 28.68S	65 58.77W	0.5	275	0.2	362	-0.3	96.0	979.9	4.2	122	4.5	043	-0.22	-0.5	33.57	21.70	0.0	0.29	CTD SC0104 ON DECK
0100	64 30.17S	65 48.65W	9.0	251	4.6	424	-0.3	96.1	980.1	1.6	056	8.2	061	-0.28	-0.5	33.57	8.40	0.0	0.25	
0200	64 33.45S	65 26.56W	9.6	258	10.1	617	-0.3	96.2	980.4	2.3	357	7.3	078	-0.58	0.2	33.32	2.50	0.0	0.30	
0249	64 34.37S	65 20.90W	0.4	326	2.9	619	-0.4	96.2	980.7	0.7	086	0.8	083	-0.51	0.1	33.36	0.70	0.0	0.29	SUNSET(23:49:05 LOCAL); SATURDAY; 12/10/9
0300	64 34.38S	65 20.80W	0.6	325	0.2	620	-0.5	96.3	980.5	0.7	059	0.7	077	-0.50	0.0	33.35	0.80	0.0	0.29	
0317	64 34.37S	65 20.65W	0.4	333	0.2	620	-0.5	96.3	980.6	0.7	053	0.6	061	-0.56	0.5	33.35	0.40	0.0	0.29	CTD SC0105 START
0354	64 34.47S	65 20.36W	1.1	322	0.5	619	-0.6	96.3	980.7	0.8	078	1.2	102	-0.55	-0.5	33.35	0.10	0.0	0.30	CTD SC0105 ON DECK
0400	64 34.54S	65 20.30W	2.1	318	0.1	619	-0.6	96.3	980.6	0.8	115	2.5	121	-0.56	-0.5	33.35	0.0	0.0	0.30	
0500	64 35.96S	65 21.36W	4.2	159	3.1	594	-0.5	96.4	980.5	2.4	336	2.2	004	-0.56	0.5	33.30	0.10	0.0	0.31	
0541	64 34.04S	65 20.74W	4.5	347	2.8	617	-0.6	96.4	980.7	1.6	341	3.0	176	-0.52	-0.5	33.35	0.90	0.0	0.26	SUNRISE (02:41:24 LOCAL); SUNDAY; 12/11/9
0600	64 35.46S	65 21.45W	4.7	342	1.5	607	-0.6	96.4	980.9	1.0	332	3.8	168	-0.52	-0.5	33.30	1.60	0.0	0.29	
0700	64 32.95S	65 19.44W	4.9	160	4.3	611	-0.6	96.4	980.5	2.5	313	3.7	009	-0.55	-0.5	33.34	5.20	0.0	0.27	
0800	64 31.44S	65 14.37W	4.1	232	4.1	599	-0.5	96.4	980.9	0.8	253	4.4	062	-0.44	-0.5	33.38	11.90	0.0	0.29	
0900	64 33.15S	65 7.90W	3.9	214	3.5	550	-0.5	96.2	980.9	0.6	191	4.5	035	-0.39	-0.1	33.41	25.70	0.0	0.26	
1000	64 34.44S	65 19.90W	2.2	044	6.8	617	-0.7	96.1	981.0	2.7	021	1.0	116	-0.54	-0.1	33.30	46.50	0.0	0.23	
1100	64 34.46S	65 21.10W	1.2	265	1.9	619	-0.6	95.1	980.5	2.6	126	3.5	047	-0.57	-0.5	33.30	01.20	0.0	0.28	
1141	64 34.36S	65 20.79W	1.6	035	1.2	619	-0.4	94.4	980.4	2.5	000	0.9	036	-0.49	0.5	33.29	35.20	0.0	0.26	TSRB 02 START
1200	64 34.45S	65 20.28W	0.9	029	0.4	617	-0.4	94.1	980.5	1.7	045	1.2	105	-0.46	0.5	33.29	55.50	0.0	0.24	
1246	64 34.37S	65 19.76W	0.3	052	1.1	128	-0.2	93.0	980.4	2.1	336	1.8	024	-0.43	0.2	33.29	19.20	0.0	0.24	PUV 01 start
1255	64 34.46S	65 19.60W	0.4	207	0.2	612	0.2	92.7	980.2	1.8	218	2.1	059	-0.37	0.5	33.29	47.90	0.0	0.23	PUV 01 ON DECK
1306	64 34.33S	65 19.51W	1.1	326	0.1	612	-0.4	92.9	980.2	1.4	092	1.8	095	-0.37	-0.0	33.29	66.30	0.0	0.21	
1400	64 34.38S	65 20.68W	0.5	271	1.3	619	0.9	90.5	980.3	0.6	183	1.1	092	-0.34	1.2	33.30	07.70	0.0	0.22	
1500	64 34.44S	65 20.81W	1.1	209	1.2	619	0.7	85.6	979.9	2.4	284	2.4	107	-0.20	0.9	33.30	23.30	0.0	0.16	
1525	64 34.40S	65 20.16W	1.1	089	0.5	617	0.0	86.2	980.1	2.5	093	2.8	205	-0.22	0.2	33.29	83.90	0.0	0.17	PUV 02 START
1529	64 34.40S	65 20.05W	0.8	019	0.1	617	-0.4	86.4	980.1	2.5	137	3.1	166	-0.18	-0.2	33.29	94.20	0.0	0.16	PUV 02 ON DECK
1604	64 34.39S	65 19.94W	1.4	174	0.5	614	1.1	85.4	980.2	1.7	019	0.6	243	-0.07	1.1	33.29	44.10	0.0	0.15	
1615	64 34.66S	65 19.98W	2.5	179	0.3	617	1.4	83.9	980.0	2.1	355	0.4	019	-0.10	1.5	33.29	94.80	0.0	0.16	L.A. NOON(13:15:07 LOCAL); SUNDAY; 12/11/
1700	64 34.21S	65 20.47W	3.2	138	1.3	617	-0.1	86.1	979.8	4.8	034	2.8	212	0.0	-0.1	33.29	78.40	0.0	0.11	
1737	64 34.13S	65 19.85W	0.8	042	0.5	612	-0.1	85.8	979.9	4.6	145	5.3	192	0.10	-0.2	33.29	70.30	0.0	0.11	CTD SC0106 START (1728)
1800	64 34.31S	65 19.46W	1.1	005	0.3	610	2.1	82.5	979.9	3.5	183	4.6	187	0.11	1.9	33.29	69.70	0.0	0.11	
1824	64 34.41S	65 19.28W	0.2	343	0.3	610	2.1	81.4	979.8	3.6	181	3.8	164	-0.20	2.3	33.32	10.30	0.0	0.20	CTD CAST SC0106 ENDED AT 18:17 GMT TIME
1900	64 34.36S	65 18.70W	0.5	017	0.6	607	0.0	85.3	980.0	4.6	152	5.1	172	-0.13	0.1	33.30	98.70	0.0	0.17	
1953	64 34.58S	65 18.10W	0.4	039	0.9	595	0.1	85.8	979.8	4.5	128	4.8	171	-0.50	0.1	33.29	25.60	0.0	0.15	CTD SC0107 START

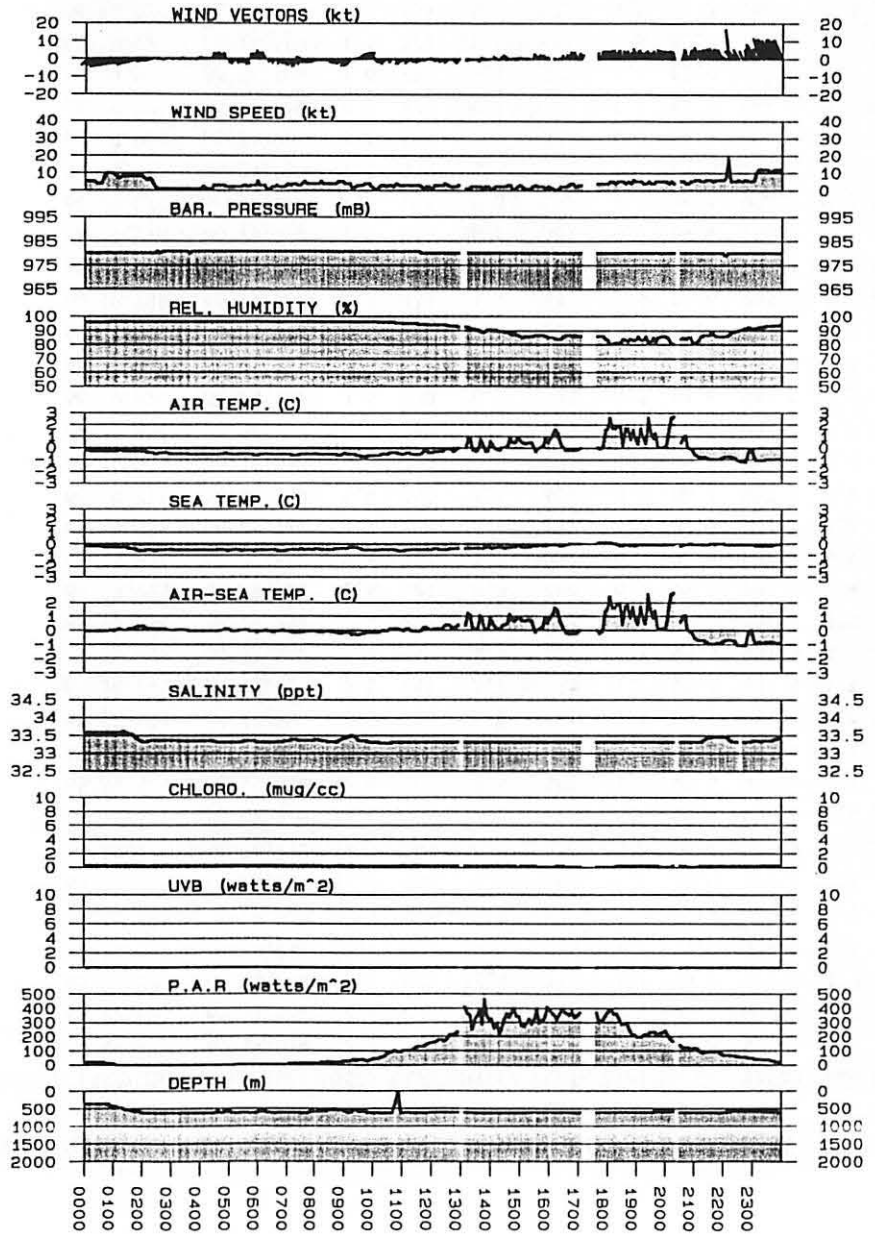
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 3 12-11-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
2000	64 34.61S	65 18.06W	0.5	009	0.1	593	0.2	85.8	980.1	3.8	162	4.3	173	-0.07	0.2	33.29	47.50	0.0	0.15	
2100	64 34.75S	65 18.87W	1.6	058	1.2	600	-0.6	79.8	979.9	6.5	091	6.7	162	-0.03	-0.5	33.29	18.70	0.0	0.16	
2200	64 34.74S	65 20.09W	5.9	205	1.5	614	-0.7	85.9	979.3	8.8	323	5.4	127	-0.01	-0.6	33.45	68.30	0.0	0.20	
2300	64 35.61S	65 18.27W	0.7	306	1.8	571	-0.7	91.1	979.5	4.5	230	5.0	170	-0.50	-0.6	33.34	43.70	0.0	0.23	RECOVER MOPPER BUOY

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	74.2 nm								
TOTAL DISTANCE TRAVELLED	209.9 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	3.0	MAXIMUM=	12.9	AT 2309 HRS.	MINIMUM=	0.1	AT 0030 HRS.
AIR TEMPERATURE (C);		AVERAGE=	-0.2	MAXIMUM=	2.9	AT 2016 HRS.	MINIMUM=	-1.3	AT 2246 HRS.
SEA TEMPERATURE (C);		AVERAGE=	-0.32	MAXIMUM=	0.15	AT 1749 HRS.	MINIMUM=	-0.61	AT 0153 HRS.
SALINITY (ppt);		AVERAGE=	33.35	MAXIMUM=	33.60	AT 0121 HRS.	MINIMUM=	33.29	AT 1016 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	980.3	MAXIMUM=	981.0	AT 0636 HRS.	MINIMUM=	979.3	AT 2200 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	91.9	MAXIMUM=	96.4	AT 0411 HRS.	MINIMUM=	78.7	AT 2053 HRS.
WIND SPEED (kts);		AVERAGE=	3.9	MAXIMUM=	63.6	AT 2205 HRS.	MINIMUM=	0.1	AT 1040 HRS.
MEAN DAILY WIND VELOCITY=	2.1 (kts) FROM 158 DEGREES TRUE								
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	118.98	MAXIMUM=	528.20	AT 1308 HRS.	MINIMUM=	0.00	AT 0400 HRS.
UVB (watts/m^2)		AVERAGE=	0.0	MAXIMUM=	0.0	AT 0002 HRS.	MINIMUM=	0.0	AT 0002 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	0.24	MAXIMUM=	0.37	AT 2354 HRS.	MINIMUM=	0.11	AT 1704 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-11-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0008	64 28.62S	65 58.89W	SC0104
0317	64 34.81S	65 20.81W	SC0105
1737	64 34.28S	65 19.75W	SC01061
1953	64 34.45S	65 18.66W	SC0107

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
1246	64 34.81S	65 19.56W	SC01
1255	64 34.04S	65 19.82W	SC01
1525	64 34.34S	65 20.21W	SC02
1529	64 34.34S	65 20.08W	SC02

TETHERED SPECTRAL RADIANCE BUOYS

TIME	LATITUDE	LONGITUDE	EVENT
1141	64 34.03S	65 20.49W	SC02

OTHER INVESTIGATIONS and NOTES

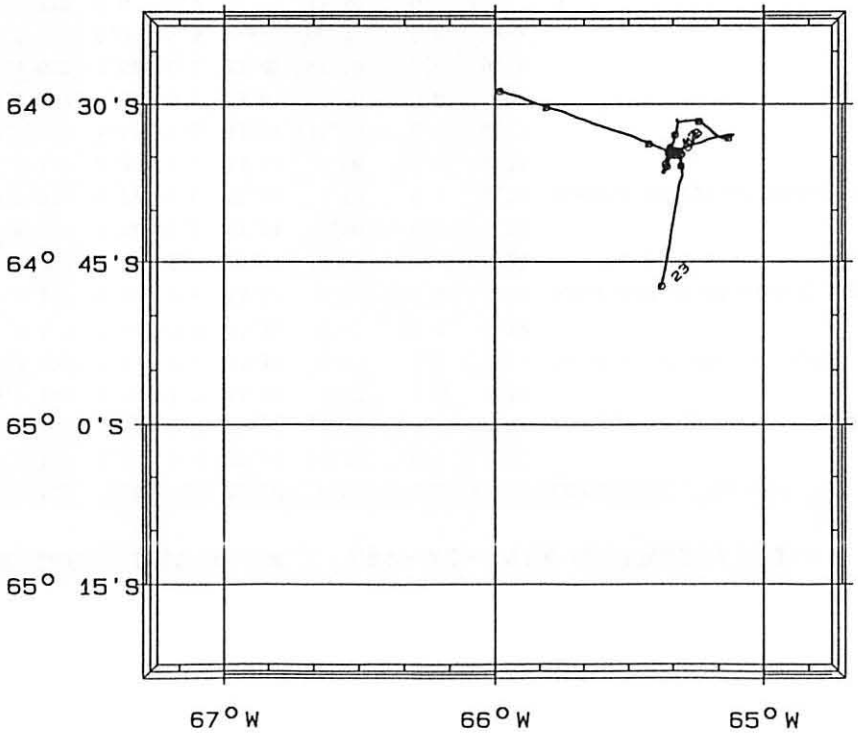
MOPPER/KIEBER BUOY DEPLOYED

SUN PHENOMENA

SUNRISE (02:41:24 LOCAL); SUNDAY; 12/11/94

L.A. NOON (13:15:07 LOCAL); SUNDAY; 12/11/94

SUNSET (23:49:05 LOCAL); SATURDAY; 12/10/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 4 12-12-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 47.47S	65 22.62W	12.8	339	0.0	612	-0.9	93.8	979.4	0.8	333	12.1	160	-0.03	-0.8	33.43	16.30	0.0	0.35	
0101	64 59.28S	65 31.88W	12.6	006	12.5	629	-1.0	93.6	979.8	1.8	338	10.9	189	-0.26	-0.7	33.47	8.20	0.0	0.44	
0200	65 8.88S	65 50.17W	12.6	005	12.5	143	-1.1	94.4	979.9	1.9	295	11.9	193	0.18	-1.2	33.70	2.60	0.0	0.39	
0250	65 16.90S	66 6.23W	13.5	005	10.5	545	-1.2	94.8	979.7	3.5	305	11.8	199	-0.31	-0.8	33.36	0.80	0.0	0.33	EN ROUTE TO CRYSTAL SOUND
0300	65 18.49S	66 9.57W	12.3	005	2.1	488	-1.2	94.9	979.6	2.9	295	11.3	198	-0.34	-0.8	33.34	0.40	0.0	0.39	
0321	65 21.75S	66 16.38W	13.0	006	4.3	402	-1.1	95.0	979.8	2.7	299	11.9	197	-0.44	-0.6	33.37	0.20	0.0	0.35	SUNSET(00:21:00 LOCAL); MONDAY; 12/12/94
0400	65 28.07S	66 28.76W	12.3	003	8.2	276	-1.2	95.2	979.7	6.0	295	11.1	212	-0.21	-0.9	33.57	0.50	0.0	0.24	
0500	65 38.13S	66 47.07W	13.0	000	12.7	240	-1.4	95.4	980.2	7.4	314	9.5	214	-0.74	-0.6	33.51	1.20	0.0	0.28	
0507	65 39.34S	66 49.03W	12.6	002	1.5	381	-1.4	95.4	980.2	7.3	314	9.2	216	-0.77	-0.6	33.49	1.30	0.0	0.28	SUNRISE (02:07:07 LOCAL); MONDAY; 12/12/9
0600	65 48.19S	66 54.42W	11.2	291	11.0	381	-1.3	95.5	980.4	10.3	336	4.6	177	-0.85	-0.4	33.48	6.50	0.0	0.23	
0700	65 52.15S	66 47.75W	3.5	286	4.9	181	-1.3	95.5	981.0	4.6	334	2.1	214	-1.62	0.3	33.01	11.50	0.0	0.43	
0800	65 54.94S	66 42.96W	3.5	285	3.7	133	-1.2	95.5	981.5	4.3	331	2.1	202	-1.59	0.3	33.01	26.20	0.0	0.42	
0900	65 56.46S	66 37.64W	4.1	250	3.1	164	-1.3	95.3	981.9	3.8	022	1.5	002	-1.58	0.2	33.02	43.50	0.0	0.28	
1034	65 59.25S	66 29.95W	0.4	272	4.3	477	-1.3	95.0	982.6	1.5	052	1.3	338	0.0	-1.3	-----	94.30	0.0	-----	
1100	65 59.90S	66 29.50W	2.6	327	0.8	369	-0.9	95.0	982.6	4.6	353	2.0	312	0.0	-0.9	-----	17.30	0.0	-----	
1202	66 3.01S	66 27.46W	5.6	331	3.7	1052	-0.8	94.6	982.7	5.9	335	2.4	235	0.0	-0.8	-----	66.70	0.0	-----	
1310	66 8.95S	66 28.32W	4.2	252	6.0	52	-1.0	87.3	983.3	2.6	046	3.1	033	-1.61	0.6	32.85	05.30	0.0	0.34	
1323	66 9.73S	66 25.38W	5.9	240	1.5	350	-0.9	86.3	983.3	3.9	029	3.2	022	0.0	-0.9	-----	21.60	0.0	-----	SALINITY OFF AND ON
1341	66 10.00S	66 25.01W	0.2	259	0.5	402	-0.8	85.6	983.3	2.3	082	2.3	346	0.0	-0.8	-----	51.20	0.0	-----	SENDING SIGNAL TO SEDIMENT TRAP
1349	66 9.80S	66 24.85W	4.2	180	0.3	421	-0.1	84.8	983.6	0.7	320	3.7	006	0.0	-0.1	-----	58.20	0.0	-----	SEDIMENT TRAP LOCATED ACOUSTICALLY
1400	66 9.52S	66 24.72W	1.4	070	0.5	393	-0.2	83.6	983.5	2.5	296	2.3	332	0.0	-0.2	-----	46.00	0.0	-----	
1500	66 9.93S	66 25.03W	2.6	147	3.1	395	0.9	78.2	983.8	0.9	233	3.2	340	-1.59	2.4	32.78	52.10	0.0	0.37	
1510	66 9.91S	66 25.04W	0.4	194	0.1	361	2.1	74.9	983.8	0.2	230	0.6	030	-1.60	3.7	33.09	67.20	0.0	0.22	TRYING TO LOCATE SUB-SURFACE BUOYS ON FIS
1600	66 10.18S	66 24.53W	2.3	038	1.1	532	1.3	81.6	983.8	0.6	209	2.8	223	-1.58	2.8	32.76	32.60	0.0	0.34	
1700	66 9.87S	66 25.03W	2.6	058	2.0	338	0.1	84.2	984.1	1.6	316	1.8	275	-1.60	1.7	33.09	99.40	0.0	0.20	
1711	66 9.87S	66 25.08W	1.4	011	0.5	339	0.2	84.4	984.0	0.7	288	1.3	220	-1.60	1.8	33.16	90.20	0.0	0.16	RELEASE COMMAND SENT TO SEDIMENT TRAP
1724	66 9.87S	66 24.77W	2.3	191	0.3	357	-0.7	84.1	984.2	0.9	057	2.0	348	-1.60	0.9	33.16	99.30	0.0	0.15	SED TRAP ARRAY SURFACED? BUT NO SIGHT
1750	66 10.07S	66 24.46W	1.3	000	0.6	23	1.7	81.8	984.1	0.9	285	1.4	219	-1.60	3.3	33.18	42.20	0.0	0.17	ARRAY AT 533m (HORIZONTALLY) UNDER THE IC
1800	66 9.95S	66 24.92W	3.1	164	0.4	368	0.9	81.2	984.2	1.7	010	1.5	331	-1.58	2.4	32.72	03.60	0.0	0.21	
1802	66 9.92S	66 24.90W	0.9	179	0.1	13	0.7	81.6	984.2	0.2	073	0.9	346	-1.58	2.2	32.74	98.20	0.0	0.20	ARRAY RANGE 345M
1806	66 9.92S	66 24.70W	1.6	251	0.1	376	1.0	82.9	984.2	0.5	358	1.1	071	-1.58	2.5	32.85	92.80	0.0	0.18	ARRAY RANGE 277
1810	66 9.92S	66 24.58W	1.1	275	0.1	454	1.6	82.7	984.2	0.6	354	0.5	101	-1.58	3.1	32.88	70.30	0.0	0.18	ARRAY RANGE 343-345
1814	66 10.02S	66 24.49W	1.8	351	0.1	32	1.5	81.7	984.2	0.0	317	1.8	171	-1.59	3.0	32.99	50.20	0.0	0.17	ARRAY RANGE 550
1819	66 10.07S	66 24.62W	1.3	061	0.1	468	0.8	81.8	984.3	0.8	325	0.8	276	-1.59	2.3	33.06	48.00	0.0	0.17	ARRAY RANGE 626
1831	66 9.92S	66 24.64W	0.3	359	0.6	400	0.9	85.1	984.3	0.5	304	0.4	266	-1.59	2.4	32.98	66.30	0.0	0.27	ARRAY RANGE 388;PORT SIDE

POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 4 12-12-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1832	66 9.92S	66 24.66W	0.4	001	0.0	402	0.9	85.1	984.1	0.5	291	0.5	246	-1.59	2.4	33.02	64.20	0.0	0.30	ARRAY RANGE 393-395; STARBOARD SIDE
1838	66 10.00S	66 24.76W	1.0	033	0.1	417	0.9	85.2	984.3	0.2	283	1.0	224	-1.58	2.4	32.88	72.30	0.0	0.32	ARRAY RANGE 491 PORT SIDE
1841	66 10.00S	66 24.80W	1.3	039	0.0	61	0.6	85.3	984.2	0.2	322	1.1	225	-1.57	2.1	32.72	76.10	0.0	0.32	ARRAY RANGE 507 PORT SIDE
1848	66 9.91S	66 24.80W	0.8	279	0.4	376	1.3	88.1	984.4	0.6	350	0.2	123	-1.57	2.8	32.64	54.90	0.0	0.28	ARRAY RANG 385 STARBOARD
1853	66 9.83S	66 24.54W	1.2	133	0.2	128	0.0	87.1	984.3	0.4	123	1.5	299	-1.57	1.5	32.70	61.80	0.0	0.26	ARRAY RANGE 354; STARBOARD
1855	66 9.83S	66 24.53W	0.3	142	0.0	425	-0.5	87.2	984.4	0.9	125	1.1	280	-1.57	1.0	32.79	65.50	0.0	0.25	ARRAY RANGE 352 PORT SIDE
1856	66 9.84S	66 24.53W	0.4	139	0.0	421	-0.6	87.3	984.3	1.5	141	1.8	288	-1.57	0.9	32.79	62.30	0.0	0.25	ARRAY RANGE 290 PORT;304 STARBOARD (1900)
1901	66 9.84S	66 24.86W	0.8	008	0.1	350	0.3	88.8	984.4	0.7	287	0.9	236	-1.58	1.8	33.01	40.90	0.0	0.21	
1904	66 9.90S	66 24.94W	1.2	024	0.1	346	0.2	88.6	984.2	1.0	263	1.7	240	-1.59	1.7	33.07	31.70	0.0	0.21	ARRAY RANGE 408 (STARBOARD)
1906	66 9.93S	66 24.92W	0.4	032	0.0	348	0.4	88.9	984.3	0.9	241	1.1	255	-1.59	1.9	33.11	25.30	0.0	0.20	ARRAY RANGE 420 (PORT)
1912	66 9.78S	66 24.88W	2.1	174	0.3	362	-0.3	87.9	984.3	0.9	066	1.9	328	-1.59	1.2	33.08	18.60	0.0	0.21	ARRAY RANGE 301 (PORT)
1914	66 9.74S	66 24.90W	0.6	164	0.0	362	-0.5	88.4	984.3	0.7	083	0.9	291	-1.58	1.0	32.99	22.00	0.0	0.22	ARRAY RANGE 294 (STARBOARD)
1917	66 9.66S	66 24.73W	2.1	199	0.1	0	-0.5	89.0	984.2	1.7	025	0.9	326	-1.58	1.0	32.96	29.90	0.0	0.21	ARRAY RANGE 240-241 (STBD)
1919	66 9.66S	66 24.76W	0.3	215	0.0	440	-0.7	89.3	984.3	1.0	040	0.8	269	-1.58	0.8	32.93	24.60	0.0	0.20	ARRAY RANGE 246 (PORT)
1923	66 9.67S	66 24.59W	0.5	281	0.1	429	0.0	90.3	984.3	0.9	332	0.5	226	-1.58	1.5	32.99	02.40	0.0	0.19	ARRAY RANGE 253 (PORT)
1924	66 9.66S	66 24.59W	0.3	282	0.0	427	0.0	90.4	984.4	1.0	330	0.8	240	-1.58	1.5	33.03	95.90	0.0	0.19	ARRAY RANGE 254 (STARBOARD)
1932	66 9.65S	66 24.90W	2.2	139	0.3	398	-0.3	90.3	984.3	0.8	059	1.9	298	-1.58	1.2	33.07	22.60	0.0	0.19	ARRAY RANGE 255 (STBD)
1935	66 9.68S	66 24.86W	0.2	166	0.0	392	-0.7	90.1	984.3	1.1	081	1.1	257	-1.58	0.8	32.99	29.00	0.0	0.17	ARRAY RANGE 259-261 PORT
1942	66 9.64S	66 24.72W	0.4	249	0.1	439	0.3	91.1	984.4	1.3	357	0.9	245	-1.58	1.8	33.07	21.30	0.0	0.16	ARRAY RANGE 260 PORT
1955	66 9.62S	66 24.54W	0.9	126	0.2	411	-0.7	90.2	984.4	0.9	120	1.6	276	-1.59	0.8	33.12	58.50	0.0	0.16	ARRAY RANGE 314 (STBD)
2000	66 9.69S	66 24.72W	1.7	229	0.1	430	-0.6	90.9	984.2	1.0	349	0.7	062	-1.59	0.9	33.17	56.20	0.0	0.14	
2003	66 9.72S	66 24.67W	0.3	305	0.1	429	-0.3	91.1	984.4	1.3	312	1.1	246	-1.59	1.2	33.18	66.20	0.0	0.15	ARRAY RANGE 238 STARBOARD
2005	66 9.71S	66 24.68W	0.3	329	0.0	427	0.0	91.4	984.4	1.1	269	1.1	223	-1.59	1.5	33.18	67.00	0.0	0.15	DECIDE TO "SMASH" ICE FLOE TO TRY & RELEA
2011	66 9.82S	66 24.83W	1.7	262	0.1	355	0.4	90.8	984.5	1.6	317	1.2	146	-1.59	1.9	33.10	19.50	0.0	0.14	SEDIMENT TRAP SIGHTED AT SURFACE!(2009)
2037	66 9.75S	66 24.91W	0.2	128	0.6	360	-0.6	90.2	984.5	1.1	103	1.2	241	-1.59	0.9	33.21	62.40	0.0	0.16	SEDIMENT TRAP 03 ABOARD
2100	66 9.68S	66 25.02W	1.0	050	0.2	367	0.2	91.8	984.6	1.5	203	2.5	244	-1.59	1.7	33.21	19.00	0.0	0.15	
2200	66 9.69S	66 25.06W	0.4	101	0.6	355	-0.6	93.4	984.1	4.5	110	4.7	216	-1.60	1.0	33.29	83.10	0.0	0.16	
2300	66 9.76S	66 25.26W	0.3	071	0.5	349	-0.6	94.0	983.8	6.7	137	6.9	210	-1.60	1.0	33.25	41.20	0.0	0.17	
2351	66 9.73S	66 25.98W	0.2	113	0.7	0	-0.2	94.2	983.1	8.8	067	8.7	181	-1.59	1.3	32.95	52.70	0.0	0.20	CTD SC0109 START

DAILY SUMMARY

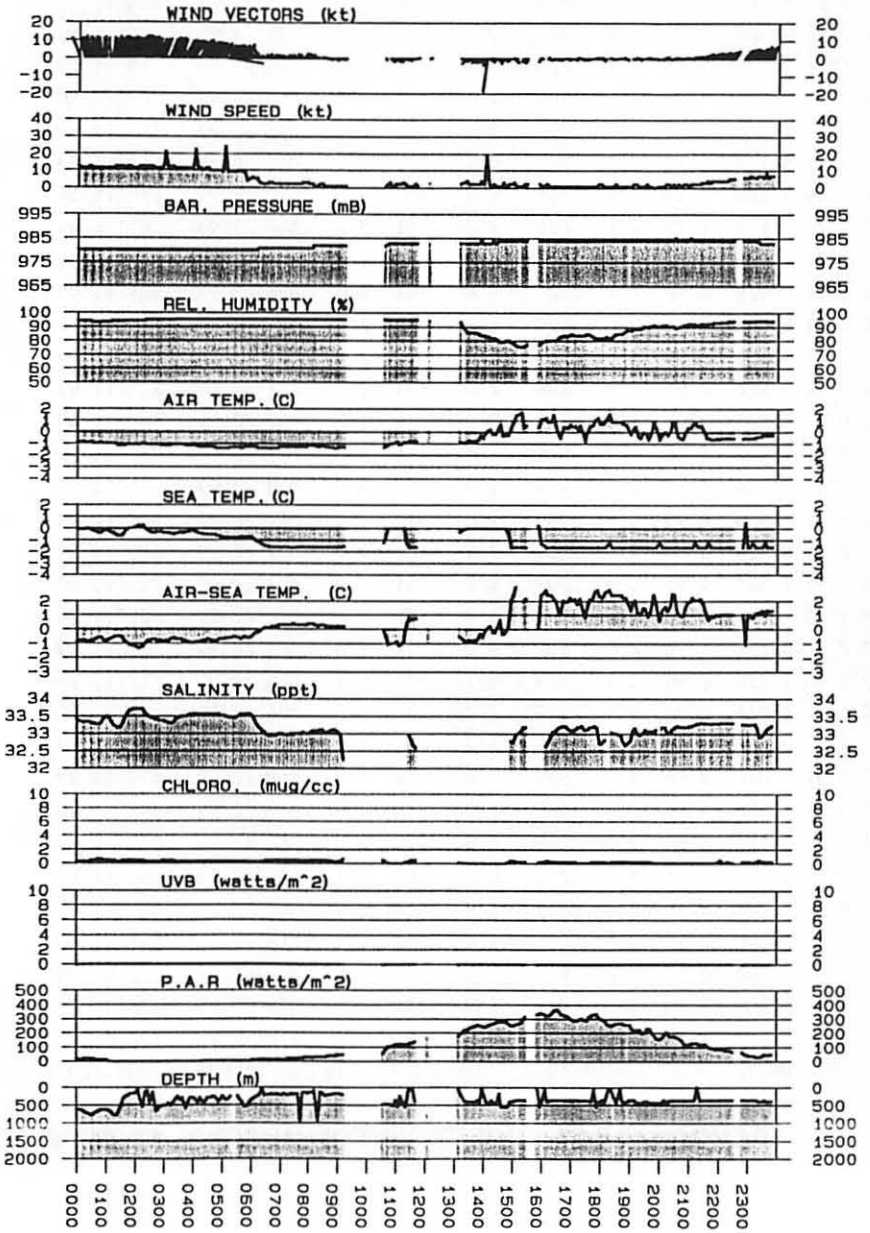
DISTANCE TRAVELLED TODAY 118.8 nm
TOTAL DISTANCE TRAVELLED 328.7 nm

SHIP'S SPEED (kts) ;	AVERAGE=	5.2	MAXIMUM=	14.6	AT 0127 HRS.	MINIMUM=	0.0	AT 1339 HRS.
AIR TEMPERATURE (C);	AVERAGE=	-0.6	MAXIMUM=	2.1	AT 1510 HRS.	MINIMUM=	-1.5	AT 0458 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-1.01	MAXIMUM=	9.00	AT 2254 HRS.	MINIMUM=	-1.68	AT 0728 HRS.
SALINITY (ppt);	AVERAGE=	33.20	MAXIMUM=	33.71	AT 0158 HRS.	MINIMUM=	32.03	AT 0910 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	982.2	MAXIMUM=	984.6	AT 2027 HRS.	MINIMUM=	979.4	AT 0000 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	91.1	MAXIMUM=	95.5	AT 0517 HRS.	MINIMUM=	74.9	AT 1510 HRS.
WIND SPEED (kts);	AVERAGE=	4.8	MAXIMUM=	65.1	AT 0358 HRS.	MINIMUM=	0.0	AT 0807 HRS.

MEAN DAILY WIND VELOCITY= 3.7 (kts) FROM 183 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	112.51	MAXIMUM=	375.00	AT 1630 HRS.	MINIMUM=	0.10	AT 0322 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	0.30	MAXIMUM=	1.64	AT 2202 HRS.	MINIMUM=	0.14	AT 2020 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-12-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

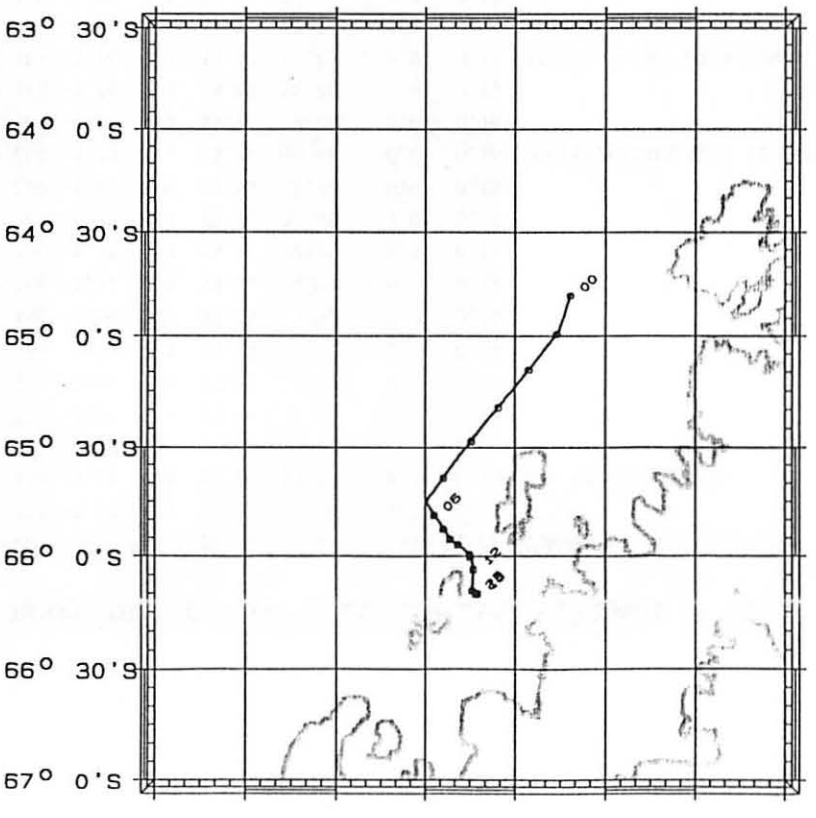
TIME	LATITUDE	LONGITUDE	EVENT
2351	66 09.57S	66 25.94W	SC0109

OTHER INVESTIGATIONS and NOTES

SEDIMENT TRAP SUCCESSFULLY RECOVERED
FROM UNDER THE ICE!

SUN PHENOMENA

SUNRISE (02: 07: 07 LOCAL); MONDAY; 12/12/94
SUNSET (00: 21: 00 LOCAL); MONDAY; 12/12/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 5 12-13-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	66 9.79S	66 26.11W	0.3	114	0.0	448	-0.2	94.2	983.2	7.6	069	7.5	185	-1.59	1.3	33.03	48.70	0.0	0.18	
0023	66 9.94S	66 26.33W	0.6	117	0.3	0	-0.2	94.1	982.9	7.7	065	7.5	186	-1.61	1.4	33.28	31.60	0.0	0.16	CTD SC0109 ON DECK
0100	66 10.70S	66 26.60W	3.4	295	1.2	128	-0.1	94.0	982.9	9.0	268	9.7	183	-1.58	----	32.67	19.10	0.0	0.60	
0220	66 11.14S	66 26.91W	0.8	302	0.7	752	-0.2	93.9	982.5	7.1	248	7.4	185	-1.61	1.4	33.26	4.30	0.0	0.16	
0300	66 11.25S	66 27.20W	1.2	304	0.5	717	-0.3	94.4	982.4	9.5	212	10.5	153	-1.59	1.2	33.29	2.20	0.0	0.15	
0400	66 11.26S	66 27.37W	1.5	305	0.8	662	-0.4	94.4	982.1	5.8	235	6.8	170	-1.55	1.1	33.33	1.20	0.0	0.14	
0500	66 11.31S	66 27.49W	0.0	303	0.9	650	-0.6	95.2	981.4	7.3	243	7.3	186	-1.50	0.9	33.33	1.50	0.0	0.14	
0600	66 11.25S	66 27.69W	0.2	296	0.7	629	-0.7	95.5	980.4	10.0	247	10.1	182	-1.52	0.8	33.34	4.00	0.0	0.14	
0700	66 11.24S	66 27.84W	0.2	274	0.6	605	-0.6	95.8	979.7	10.8	267	10.8	180	-1.51	0.9	33.31	12.60	0.0	0.14	
0800	66 11.28S	66 27.95W	0.5	269	0.7	598	-0.6	95.9	979.0	7.5	284	7.4	189	-1.50	0.9	33.30	20.40	0.0	0.15	
0901	66 11.29S	66 27.98W	0.6	270	0.7	598	-0.4	96.0	978.0	6.9	304	6.6	209	-1.48	1.0	33.35	45.70	0.0	0.15	
0958	66 11.21S	66 27.47W	3.3	145	1.5	638	-0.2	96.2	977.1	9.0	040	6.8	204	-1.28	1.0	33.14	60.60	0.0	0.16	MOPPER/KIEBER BUOY 02 DEPLOYED
1000	66 11.17S	66 27.49W	0.3	146	0.0	643	-0.2	96.2	977.0	9.2	041	9.0	189	-1.27	1.0	33.16	62.20	0.0	0.16	
1100	66 11.30S	66 27.73W	1.9	153	1.1	645	-0.3	96.1	976.0	10.8	033	9.3	193	-1.36	1.0	33.29	88.80	0.0	0.15	
1129	66 11.35S	66 27.70W	0.7	159	0.3	605	-0.2	96.1	975.3	14.1	023	13.5	183	-1.24	1.0	33.29	07.40	0.0	0.13	START DIVING OPERATIONS
1150	66 11.36S	66 27.68W	0.4	191	0.2	602	-0.1	96.0	975.8	13.2	333	12.8	163	-1.33	1.2	33.30	27.30	0.0	0.14	POSTPONE DIVING OPS
1200	66 11.36S	66 27.69W	0.2	214	0.1	598	-0.1	96.0	975.2	14.5	315	14.4	168	-1.39	1.2	33.31	35.50	0.0	0.14	
1232	66 11.41S	66 27.81W	0.5	195	0.5	588	0.2	95.9	975.4	10.5	335	10.0	169	-1.38	1.5	33.32	32.40	0.0	0.14	TSRB 03 START
1242	66 11.39S	66 27.73W	0.5	197	0.1	588	0.2	95.9	975.3	11.3	331	10.9	167	-1.41	1.6	33.33	50.00	0.0	0.14	TSRB 03 ON DECK
1300	66 11.38S	66 27.80W	0.1	198	0.2	581	0.3	96.0	975.3	9.0	335	8.9	173	-1.43	1.7	33.33	38.30	0.0	0.13	
1309	66 11.43S	66 27.78W	0.2	199	0.1	581	0.2	96.0	975.3	12.0	333	11.8	171	-1.43	1.6	33.33	62.50	0.0	0.14	CTD SC0110 START
1355	66 11.46S	66 27.89W	0.2	200	0.7	576	0.5	95.9	974.6	13.7	331	13.5	171	-1.42	1.9	33.35	81.40	0.0	0.13	CTD SC0110 ON DECK
1400	66 11.43S	66 27.91W	0.7	199	0.1	576	0.6	95.8	974.3	14.0	336	13.4	173	-1.42	2.0	33.35	87.70	0.0	0.13	
1500	66 11.48S	66 27.94W	0.5	199	0.6	579	1.2	94.9	974.2	11.5	323	11.1	161	-1.41	2.6	33.36	39.00	0.0	0.14	
1534	66 11.50S	66 27.93W	0.1	199	0.5	579	1.3	92.2	973.8	13.0	319	12.9	158	-1.42	2.7	33.36	99.50	0.0	0.14	CTD SC0111 START
1602	66 11.48S	66 27.89W	0.6	199	0.2	579	1.0	92.7	973.5	12.1	317	11.7	154	-1.42	2.4	33.36	73.80	0.0	0.14	
1615	66 11.47S	66 27.94W	0.5	199	0.2	579	1.2	91.2	973.4	12.4	315	12.0	153	-1.42	2.6	33.36	69.60	0.0	0.14	CTD SC0111 ON DECK
1619	66 11.49S	66 27.99W	0.3	199	0.0	579	1.2	91.1	973.5	11.6	318	11.4	156	-1.42	2.6	33.37	67.80	0.0	0.14	L.A. NOON(13:19:55 LOCAL); TUESDAY; 12/13
1700	66 11.48S	66 27.93W	0.3	199	0.4	0	1.2	92.5	973.3	11.5	320	11.3	158	-1.42	2.6	33.32	85.30	0.0	0.15	
1952	66 11.49S	66 27.95W	0.1	199	0.3	579	1.2	91.1	972.5	16.2	334	16.1	172	-1.27	2.4	33.38	63.30	0.0	0.13	
2002	66 11.48S	66 27.90W	0.3	199	0.1	579	1.4	90.6	972.1	31.1	339	30.8	178	-1.20	2.6	33.37	06.10	0.0	0.13	CHANGED WIND REPORTING TO KNOTS
2100	66 11.51S	66 27.88W	0.7	199	0.8	579	1.2	92.0	971.8	29.0	331	28.4	170	-1.30	2.5	33.37	29.10	0.0	0.13	
2144	66 11.50S	66 27.95W	0.5	200	0.4	579	1.2	91.5	971.2	28.8	331	28.4	171	-1.38	2.5	33.37	14.10	0.0	0.13	MOPPER/KIEBER BUOY 02 RECOVERED
2154	66 11.48S	66 27.93W	0.6	200	0.1	579	1.2	92.1	970.9	28.6	330	28.1	170	-1.38	2.5	33.37	16.60	0.0	0.13	SYSTEM DOWN FOR RE-ARRANGEMENTS
2309	66 11.60S	66 28.50W	0.4	031	0.3	600	0.9	92.8	970.2	26.4	140	26.7	171	0.0	0.9	-----	82.40	0.0	-----	

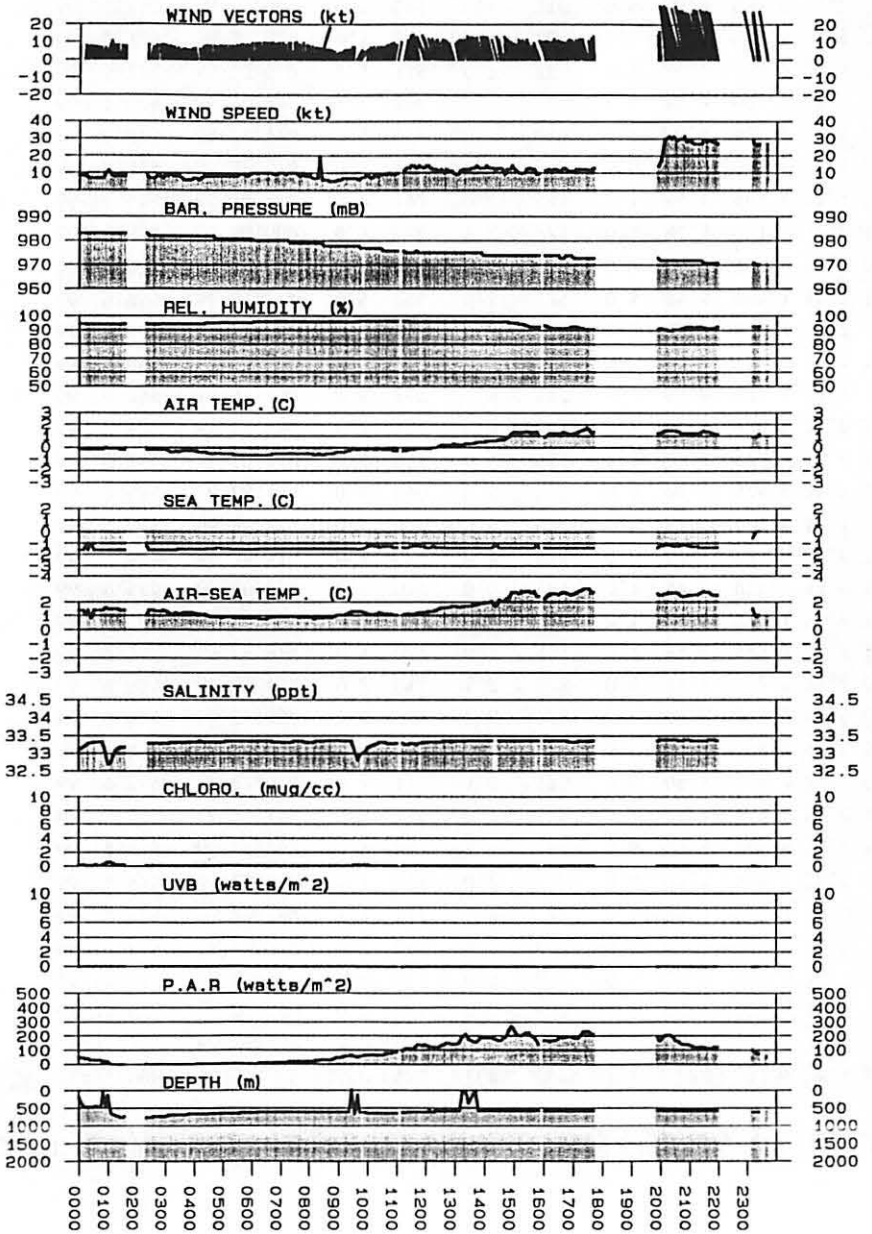
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 5 12-13-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
2314	66 11.62S	66 28.47W	0.2	031	0.0	602	0.9	92.9	970.5	27.2	142	27.4	173	0.0	0.9	-----	80.40	0.0	-----	PREPARING FOR DIVE OPS
2322	66 11.61S	66 28.48W	0.5	031	0.1	605	1.1	92.3	970.3	25.7	140	26.1	171	0.0	1.1	-----	75.30	0.0	-----	ZODIAC AT ICE EDGE
2343	66 11.61S	66 28.52W	0.2	043	0.1	602	0.8	92.5	970.0	26.6	128	26.7	171	0.0	0.8	-----	47.00	0.0	-----	TWO DIVERS IN WATER

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	16.0 nm							
TOTAL DISTANCE TRAVELLED	344.7 nm							
SHIP'S SPEED (kts) ;	AVERAGE=	0.6	MAXIMUM=	5.7	AT 0057 HRS.	MINIMUM=	0.0	AT 0247 HRS.
AIR TEMPERATURE (C);	AVERAGE=	0.2	MAXIMUM=	1.7	AT 1723 HRS.	MINIMUM=	-0.7	AT 0521 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-1.41	MAXIMUM=	1.40	AT 0024 HRS.	MINIMUM=	-1.61	AT 0012 HRS.
SALINITY (ppt);	AVERAGE=	33.31	MAXIMUM=	33.39	AT 2010 HRS.	MINIMUM=	32.67	AT 0100 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	977.3	MAXIMUM=	983.2	AT 0000 HRS.	MINIMUM=	970.0	AT 2337 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	94.4	MAXIMUM=	96.2	AT 0941 HRS.	MINIMUM=	89.9	AT 2015 HRS.
WIND SPEED (kts);	AVERAGE=	11.9	MAXIMUM=	67.2	AT 0820 HRS.	MINIMUM=	0.3	AT 0257 HRS.
MEAN DAILY WIND VELOCITY= 11.7 (kts) FROM 170 DEGREES TRUE								
SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	85.92	MAXIMUM=	271.10	AT 1455 HRS.	MINIMUM=	1.20	AT 0355 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	0.16	MAXIMUM=	0.78	AT 2358 HRS.	MINIMUM=	0.13	AT 2035 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-13-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
1309	66 11.11S	66 27.62W	SC0110
1534	66 11.78S	66 27.27W	SC0111

TETHERED SPECTRAL RADIANCE BUOYS

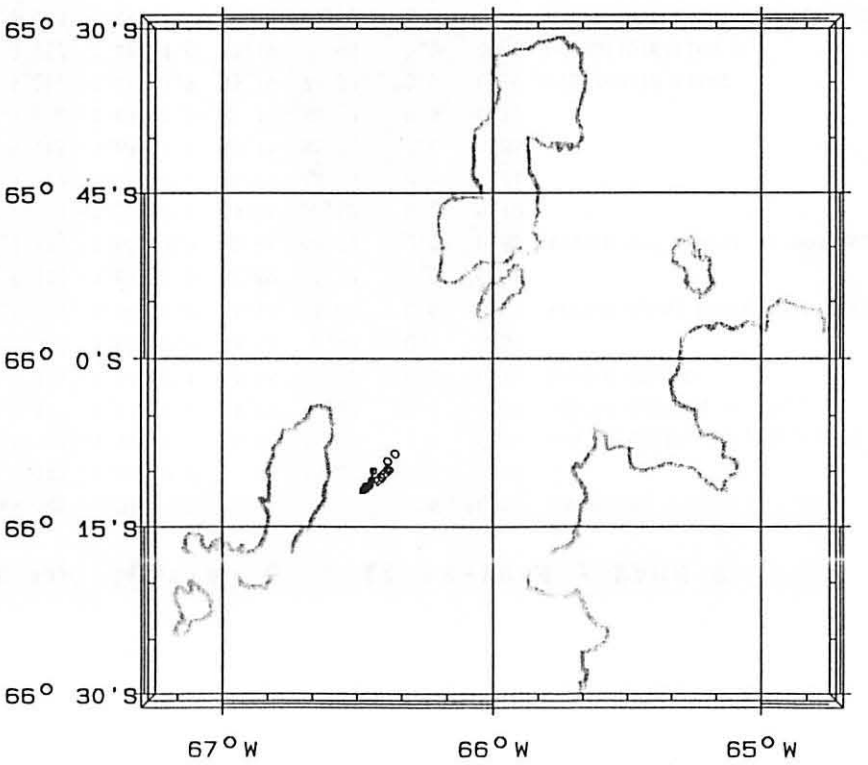
TIME	LATITUDE	LONGITUDE	EVENT
1232	66 11.83S	66 27.86W	SC03

OTHER INVESTIGATIONS and NOTES

MOPPER/KIEBER BUOY #2 DEPLOYED
AND RECOVERED
START DIVING OPERATIONS

SUN PHENOMENA

L.A. NOON (13: 19: 55 LOCAL); TUESDAY; 12/13/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 6 12-14-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	66 11.59S	66 28.57W	0.2	043	0.0	602	0.6	93.1	970.0	28.2	128	28.3	171	-1.60	2.2	33.13	35.40	0.0	0.78	
0003	66 11.59S	66 28.56W	0.2	043	0.0	602	0.7	93.1	970.0	27.8	129	27.9	172	-1.59	2.2	33.14	36.20	0.0	0.76	NOW RECORDING SST;SAL;FLUOR DIRECTLY FROM
0038	66 11.63S	66 28.50W	0.4	041	0.3	602	0.5	94.2	969.6	30.1	136	30.4	177	-1.53	2.0	33.15	23.60	0.0	0.77	DIVERS BACK IN ZODIAC
0044	66 11.60S	66 28.51W	0.5	041	0.0	602	0.6	94.2	969.4	30.3	132	30.6	176	-1.54	2.1	33.16	29.50	0.0	0.76	ZODIAC ABOARD
0308	66 9.95S	66 28.26W	1.1	137	1.7	21	0.4	95.1	968.3	27.8	050	27.1	189	-1.63	2.0	33.12	2.40	0.0	0.85	
0314	66 9.95S	66 28.31W	0.1	143	0.2	8	0.4	95.1	968.5	28.8	047	28.7	190	-1.64	2.0	33.13	1.60	0.0	0.81	SYSTEM DOWN; MYSTERIOUS FAILURE GTEK CHAN
1010	66 9.43S	66 27.20W	0.9	237	1.8	128	0.4	95.3	966.8	33.4	307	32.9	182	-1.62	2.0	32.89	71.50	0.0	0.84	
1016	66 9.40S	66 27.11W	0.6	219	0.1	128	0.4	95.3	967.7	34.0	326	33.5	184	-1.62	2.0	32.96	68.10	0.0	0.80	SYSTEM OFF ALMOST AS SOON AS OPERATOR WEN
1100	66 9.36S	66 27.01W	0.2	170	1.0	128	0.6	95.2	968.7	29.4	008	29.2	178	-1.62	2.2	33.01	04.40	0.0	0.90	
1200	66 9.45S	66 27.09W	1.0	101	1.0	128	0.4	94.9	969.8	17.5	075	17.3	179	-1.62	2.0	33.13	66.90	0.0	0.71	
1300	66 9.58S	66 28.46W	0.8	059	1.6	128	0.3	94.8	971.0	12.6	080	12.5	143	-1.63	1.9	33.11	56.80	0.0	0.83	
1400	66 9.59S	66 28.45W	0.2	054	1.2	128	0.0	91.2	972.2	11.7	026	11.5	080	-1.61	1.6	33.14	58.70	0.0	0.71	
1458	66 9.54S	66 28.67W	0.3	089	0.2	521	0.1	89.4	973.9	11.7	334	11.4	062	-1.48	1.5	33.19	71.30	0.0	0.59	CTD SC0112 START
1500	66 9.56S	66 28.65W	0.5	089	0.0	524	0.1	89.4	974.1	12.6	329	12.2	057	-1.48	1.5	33.19	75.90	0.0	0.61	ULTRAFILTRATION 2
1501	66 9.56S	66 28.63W	0.5	089	0.0	521	0.1	89.4	974.1	13.0	330	12.6	058	-1.47	1.5	33.18	79.50	0.0	0.59	BALLS ON ALL BOTTLES CLEANED IN ACETONITR
1517	66 9.52S	66 28.51W	0.8	089	0.1	526	0.0	87.5	974.6	15.6	329	14.9	057	-1.45	1.4	33.19	27.50	0.0	0.56	CTD SC0112 ON DECK
1600	66 9.46S	66 28.28W	0.3	090	0.4	574	0.2	87.9	975.8	10.1	348	9.8	078	-1.40	1.6	33.20	03.90	0.0	0.49	
1620	66 9.43S	66 28.13W	0.4	090	0.3	567	-0.3	90.0	976.4	10.5	018	10.1	109	-1.41	1.1	33.21	91.20	0.0	0.50	L.A. NOON(13:20:24 LOCAL); WEDNESDAY; 12/
1700	66 9.34S	66 28.14W	0.3	091	0.4	533	0.7	82.8	977.1	12.6	342	12.3	073	-1.48	2.1	33.21	09.60	0.0	0.53	
1800	66 7.52S	66 31.98W	6.2	187	6.0	202	0.2	85.5	978.8	13.0	310	10.2	109	-1.52	1.7	32.41	04.40	0.0	1.99	
1826	66 6.05S	66 31.40W	0.6	269	1.8	117	-0.2	84.8	979.4	8.4	159	9.0	070	-1.31	1.1	32.97	63.50	0.0	1.25	CTD SC0113 START
1827	66 6.05S	66 31.40W	0.1	271	0.0	118	-0.2	84.6	979.5	9.1	146	9.2	057	-1.30	1.1	33.04	69.90	0.0	1.13	ULTRAFILTRATION WATER 2
1846	66 6.03S	66 31.38W	0.9	331	0.3	126	-0.2	83.1	979.7	12.2	097	12.4	072	-1.24	1.0	33.25	70.00	0.0	0.98	CTD SC013 ON DECK
1900	66 5.93S	66 31.37W	0.5	294	0.3	125	-0.3	83.3	980.1	14.2	136	14.6	071	-1.29	0.9	32.96	57.40	0.0	0.81	
1927	66 5.82S	66 31.21W	0.1	335	0.4	155	-0.9	84.4	980.4	14.6	057	14.5	032	-1.33	0.4	33.15	51.00	0.0	0.78	PREPARING FOR DIVE OPS
1945	66 4.69S	66 30.60W	0.5	076	1.4	273	-0.4	84.3	981.1	7.8	320	7.4	033	-1.30	0.9	33.16	58.40	0.0	0.54	ZODIACS LAUNCHED FOR DIVE
2000	66 4.41S	66 30.25W	0.9	192	0.4	331	0.1	84.1	981.4	3.9	272	4.0	091	-1.28	1.3	33.15	43.90	0.0	0.50	
2007	66 4.31S	66 30.02W	0.5	174	0.1	318	0.0	83.7	981.6	3.3	296	3.1	102	-1.26	1.2	33.12	37.20	0.0	0.50	ZODIACS DISTANT BUT DIVERS APPARENTLY IN
2109	66 4.04S	66 29.92W	1.3	113	0.7	418	-0.4	86.9	982.2	5.1	025	4.0	146	-1.14	0.7	33.09	88.30	0.0	0.49	
2110	66 4.02S	66 29.94W	1.4	108	0.0	417	-0.4	86.9	981.9	5.6	030	4.4	147	-1.14	0.7	33.09	89.40	0.0	0.49	ZODIAC 2 BACK; DIVE OPS END
2140	66 3.77S	66 30.01W	0.5	336	0.7	370	-0.5	84.9	982.2	9.1	119	9.4	098	-1.10	0.6	33.10	84.50	0.0	0.51	CTD SC0114 START
2200	66 3.96S	66 30.06W	0.3	007	0.3	400	-0.5	86.1	982.3	9.3	094	9.3	103	-1.06	0.5	33.05	71.10	0.0	0.45	
2239	66 4.21S	66 30.09W	0.1	015	0.4	310	-0.5	86.6	982.9	1.9	098	1.9	116	-1.03	0.5	33.11	05.90	0.0	0.45	CTD SC0114 ON DECK
2300	66 3.10S	66 30.66W	1.9	143	1.2	319	-0.6	85.7	982.6	13.0	314	11.8	090	-1.10	0.5	33.14	67.30	0.0	0.50	

DAILY SUMMARY

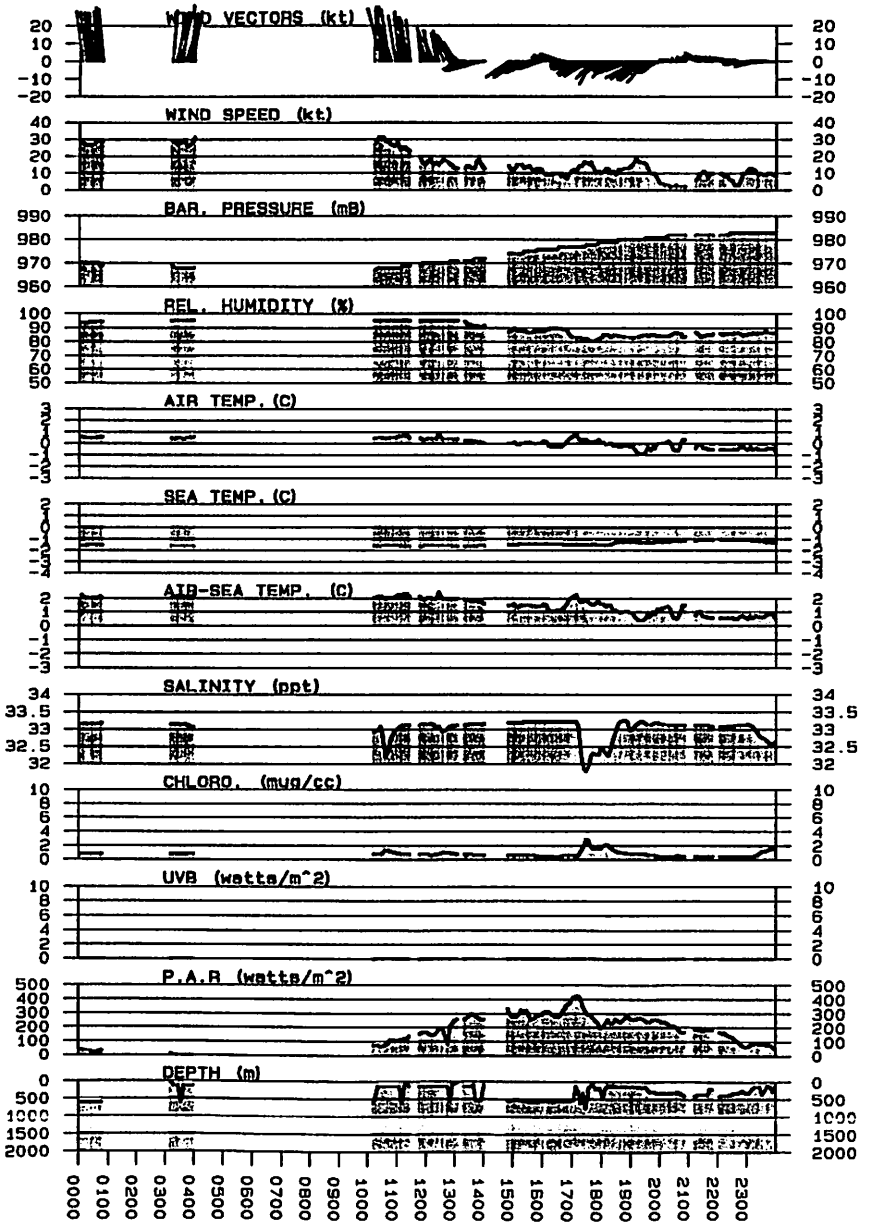
DISTANCE TRAVELLED TODAY 27.7 nm
TOTAL DISTANCE TRAVELLED 372.4 nm

SHIP'S SPEED (kts) ;	AVERAGE=	1.5	MAXIMUM=	11.0	AT 1732 HRS.	MINIMUM=	0.0	AT 0024 HRS.
AIR TEMPERATURE (C);	AVERAGE=	0.0	MAXIMUM=	1.2	AT 1223 HRS.	MINIMUM=	-1.0	AT 1925 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-1.41	MAXIMUM=	-1.03	AT 2229 HRS.	MINIMUM=	-1.64	AT 0310 HRS.
SALINITY (ppt);	AVERAGE=	33.02	MAXIMUM=	33.26	AT 1847 HRS.	MINIMUM=	31.68	AT 1728 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	976.0	MAXIMUM=	983.3	AT 2358 HRS.	MINIMUM=	966.8	AT 1010 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	88.7	MAXIMUM=	95.3	AT 0339 HRS.	MINIMUM=	80.0	AT 1740 HRS.
WIND SPEED (kts);	AVERAGE=	14.5	MAXIMUM=	36.4	AT 1013 HRS.	MINIMUM=	0.3	AT 1519 HRS.

MEAN DAILY WIND VELOCITY= 8.7 (kts) FROM 070 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	189.33	MAXIMUM=	436.50	AT 1712 HRS.	MINIMUM=	0.00	AT 1236 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0001 HRS.	MINIMUM=	0.0	AT 0001 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	0.82	MAXIMUM=	3.00	AT 1725 HRS.	MINIMUM=	0.42	AT 2211 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-14-1994

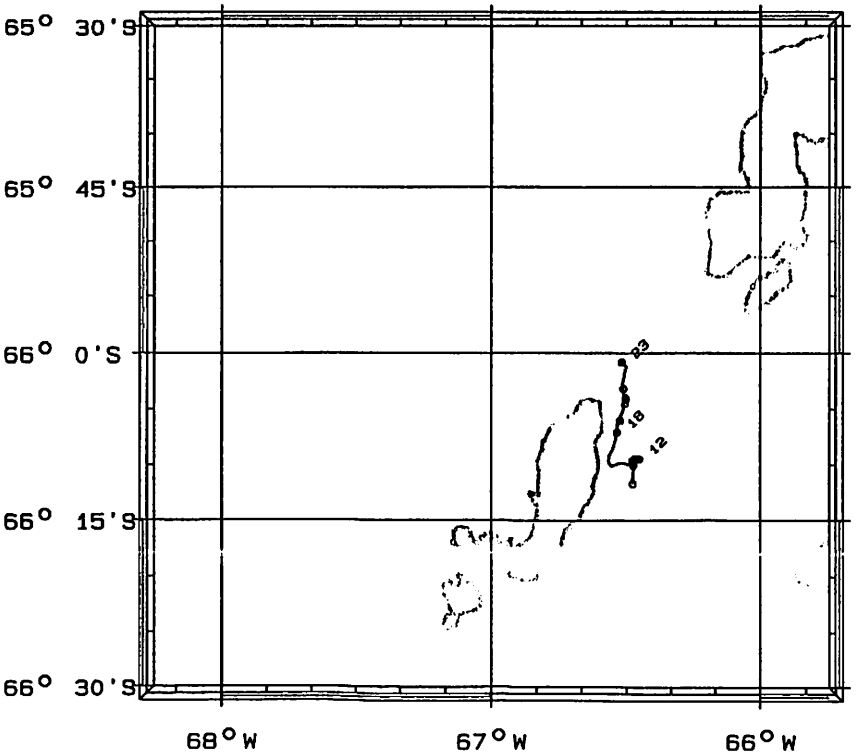


SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
1458	66 09.49S	66 28.77W	SC0112
1826	66 06.03S	66 31.03W	SC0113
2140	66 03.28S	66 30.06W	SC0114

OTHER INVESTIGATIONS and NOTES
DIVING OPERATIONS CONTINUE
ULTRAFILTRATION STATIONS
SUN PHENOMENA
L.A. NOON(13:20:24 LOCAL); WEDNESDAY; 12/14/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 7 12-15-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BARCM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	66 0.71S	66 30.95W	0.4	114	0.0	318	-0.8	87.1	983.0	10.7	333	10.3	086	-1.33	0.5	32.66	57.90	0.0	1.54	
0100	66 0.46S	66 31.16W	0.7	123	1.7	128	-1.4	88.4	983.5	9.3	343	8.6	104	-1.41	0.4	32.70	57.20	0.0	1.76	
0200	66 0.37S	66 31.07W	1.6	112	1.5	108	-2.5	91.2	983.8	7.8	043	6.7	165	-1.44	-1.0	32.72	21.60	0.0	2.28	
0301	66 0.36S	66 31.15W	0.6	100	1.6	181	-2.9	91.7	983.7	10.3	089	10.3	193	-1.48	-1.4	32.95	7.20	0.0	1.62	
0400	65 58.90S	66 32.38W	0.9	110	2.1	279	-2.6	89.4	983.8	12.2	087	12.2	202	-1.52	-1.0	32.92	3.80	0.0	1.28	
0500	65 57.64S	66 32.28W	0.6	111	3.1	128	-2.5	82.0	983.3	10.9	080	10.8	194	-1.53	-0.9	32.80	3.20	0.0	1.82	
0600	65 53.93S	66 33.06W	6.7	154	4.0	63	-1.8	81.5	983.0	18.3	027	12.7	195	-1.54	-0.2	32.73	7.90	0.0	2.14	
0700	65 53.00S	66 33.81W	0.5	132	2.1	320	-1.5	83.9	982.5	13.4	063	13.2	196	-1.55	0.4	32.94	12.70	0.0	2.10	
0800	65 53.29S	66 34.83W	1.0	132	0.9	358	-1.5	83.8	981.9	16.9	057	16.4	192	-1.54	0.4	32.99	18.50	0.0	1.83	
0900	65 53.03S	66 33.90W	0.7	195	1.2	340	-2.0	88.7	981.3	15.6	004	14.9	199	-1.54	-0.4	33.01	55.00	0.0	1.84	
1000	65 51.30S	66 35.90W	4.6	124	2.6	10	-1.7	86.5	979.3	25.9	051	23.3	184	-1.54	-0.1	33.02	60.00	0.0	2.00	
1100	65 53.09S	66 41.85W	2.8	349	4.4	135	-0.9	88.9	978.9	26.2	197	28.9	184	-1.48	0.5	33.03	84.50	0.0	1.83	
1200	65 53.70S	66 43.57W	0.7	058	1.6	154	-0.8	90.5	978.5	26.2	126	26.6	185	-1.52	0.7	33.02	21.60	0.0	1.70	
1244	65 53.92S	66 44.19W	0.8	051	0.8	169	-0.9	91.0	977.9	27.8	116	28.2	169	-1.52	0.6	33.02	31.60	0.0	1.60	CTD SC0115 START
1305	65 54.24S	66 44.91W	0.7	057	0.4	163	-0.6	91.5	978.1	23.3	114	23.6	173	-1.49	0.8	33.02	46.10	0.0	1.42	
1310	65 54.26S	66 45.00W	0.7	055	0.1	179	-0.6	90.6	978.0	25.9	115	26.2	171	-1.48	0.8	33.02	27.60	0.0	1.34	CTD SC0115 ON DECK
1343	65 54.48S	66 45.66W	0.9	047	0.6	166	-0.7	90.4	977.6	23.3	125	23.8	173	-1.47	0.7	33.03	12.10	0.0	1.37	TSRB 03 START
1400	65 54.58S	66 45.99W	0.6	046	0.3	145	-0.6	91.1	977.5	22.5	127	22.9	174	-1.47	0.8	33.03	84.30	0.0	1.23	
1500	65 54.71S	66 47.55W	0.3	212	2.0	0	-0.5	91.1	976.8	24.7	315	24.5	166	-1.49	0.9	33.04	31.20	0.0	1.34	
1600	65 54.91S	66 48.00W	0.8	171	1.0	37	-0.1	90.2	976.9	26.4	356	25.6	167	-1.51	1.4	33.04	19.40	0.0	1.23	
1622	65 55.02S	66 48.29W	0.4	169	0.3	190	-0.1	90.6	977.0	26.0	358	25.6	167	-1.50	1.4	33.04	97.30	0.0	1.20	L.A. NOON(13:22:13 LOCAL); THURSDAY; 12/1
1700	65 55.23S	66 48.81W	1.0	167	0.5	187	0.0	90.5	976.7	27.4	001	26.4	168	-1.49	1.4	33.04	14.00	0.0	1.17	
1721	65 55.24S	66 49.00W	0.2	166	0.3	152	-0.1	91.2	976.8	24.7	356	24.5	162	-1.49	1.3	33.05	97.50	0.0	1.14	BROWN ICE COLLECTING OPS
1800	65 55.39S	66 49.53W	0.9	188	0.6	116	0.3	90.3	976.9	26.2	328	25.4	155	-1.47	1.7	33.05	23.00	0.0	1.18	
1810	65 55.38S	66 49.66W	0.8	187	0.2	123	0.2	90.3	976.6	26.4	329	25.7	155	-1.46	1.6	33.05	10.80	0.0	1.08	END ZODIAC/BROWN ICE OPS
1900	65 55.30S	66 48.98W	0.4	129	1.4	162	-0.1	91.5	977.4	22.4	028	22.0	158	-1.47	1.3	33.06	99.60	0.0	1.27	
1922	65 55.36S	66 49.24W	0.6	142	0.2	127	0.1	91.6	977.8	18.5	021	17.9	164	-1.47	1.5	33.06	54.50	0.0	1.32	CTD SC0116 ABANDONNED; BOTTLES DID NOT OP
1951	65 55.39S	66 49.60W	0.8	160	0.3	144	0.3	92.6	978.1	16.5	005	15.7	165	-1.47	1.7	33.06	57.70	0.0	1.25	CTD SC0116 START
2206	65 56.02S	66 50.32W	0.8	155	0.7	168	-0.1	94.8	978.2	23.1	018	22.3	174	-1.45	1.3	33.11	81.30	0.0	1.41	ACOUSTIC RELEASE TESTS
2300	65 56.40S	66 51.55W	0.7	138	0.8	195	-0.2	94.3	977.8	21.6	040	21.1	179	-1.44	1.2	33.12	83.10	0.0	1.21	
2339	65 56.69S	66 52.48W	0.5	120	0.5	179	-0.1	94.7	977.5	20.0	052	19.7	173	-1.42	1.3	33.11	64.40	0.0	1.20	GYRO ERROR; HAS BEEN FOR A LONG TIME!

DAILY SUMMARY

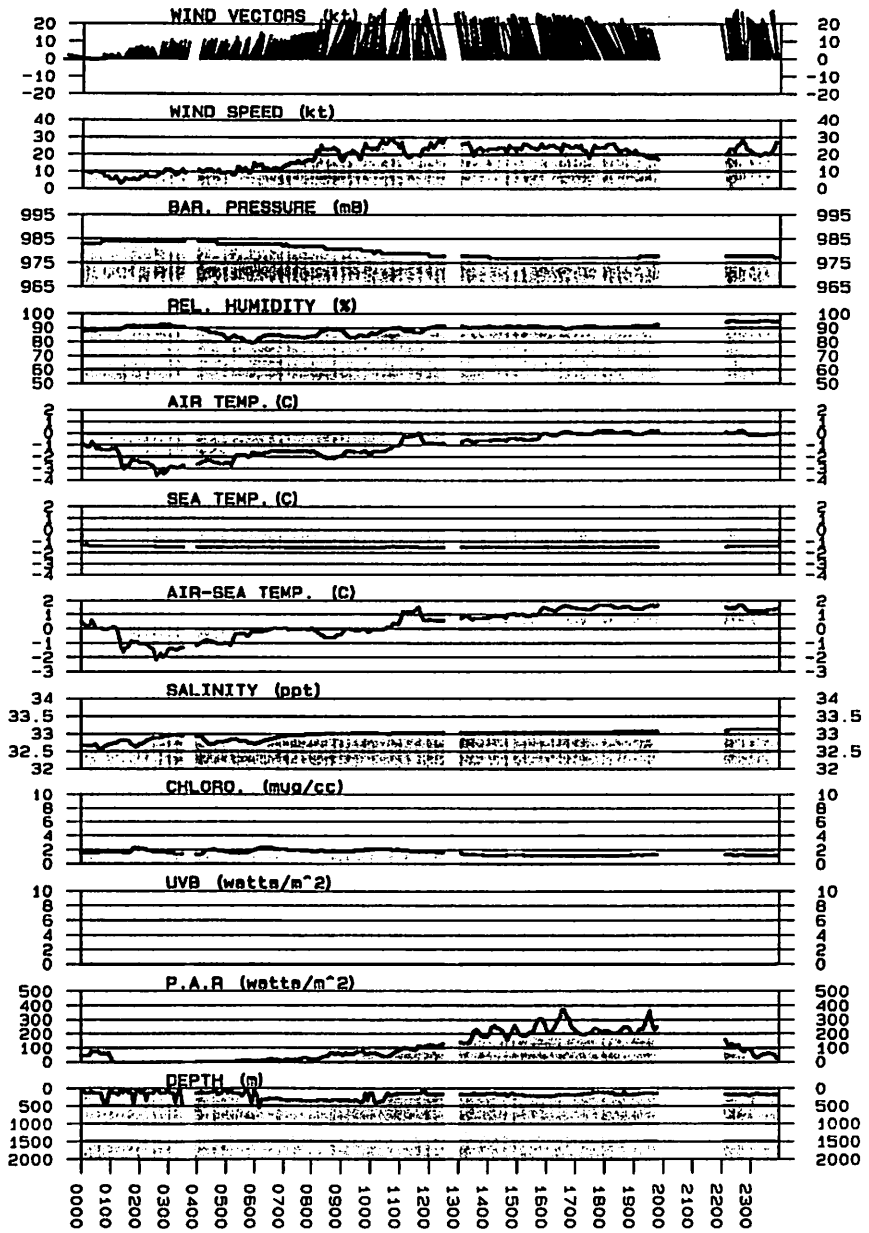
DISTANCE TRAVELLED TODAY 39.5 nm
TOTAL DISTANCE TRAVELLED 411.9 nm

SHIP'S SPEED (kts) ;	AVERAGE=	1.5	MAXIMUM=	10.5	AT 1037 HRS.	MINIMUM=	0.0	AT 0633 HRS.
AIR TEMPERATURE (C);	AVERAGE=	-1.1	MAXIMUM=	0.4	AT 1138 HRS.	MINIMUM=	-4.1	AT 0233 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-1.49	MAXIMUM=	-1.33	AT 0000 HRS.	MINIMUM=	-1.55	AT 0602 HRS.
SALINITY (ppt);	AVERAGE=	32.96	MAXIMUM=	33.13	AT 2349 HRS.	MINIMUM=	32.55	AT 0036 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	980.0	MAXIMUM=	984.0	AT 0223 HRS.	MINIMUM=	976.4	AT 1515 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	89.0	MAXIMUM=	94.8	AT 2206 HRS.	MINIMUM=	78.5	AT 0551 HRS.
WIND SPEED (kts);	AVERAGE=	18.3	MAXIMUM=	31.7	AT 1037 HRS.	MINIMUM=	0.2	AT 0150 HRS.

MEAN DAILY WIND VELOCITY= 17.3 (kts) FROM 028 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	104.07	MAXIMUM=	396.60	AT 1633 HRS.	MINIMUM=	2.70	AT 0443 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.59	MAXIMUM=	2.69	AT 0148 HRS.	MINIMUM=	1.07	AT 1739 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-15-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
1244	65 53.14S	66 44.61W	SC0115
1951	65 55.09S	66 49.82W	SC0116

TETHERED SPECTRAL RADIANCE BUOYS

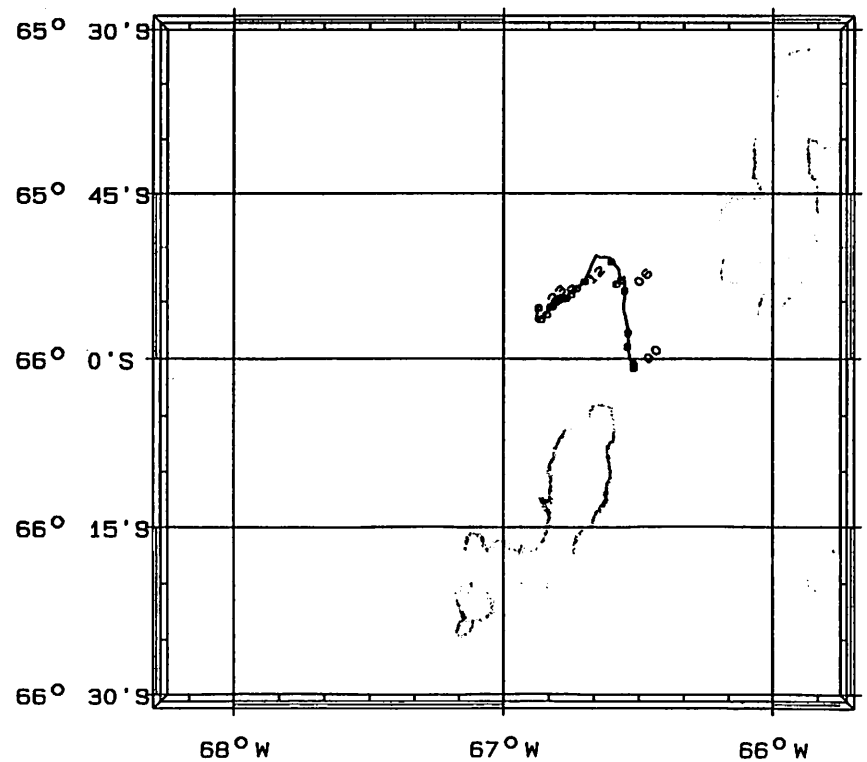
TIME	LATITUDE	LONGITUDE	EVENT
1343	65 54.79S	66 45.52W	SC03

OTHER INVESTIGATIONS and NOTES

BROWN ICE COLLECTING EXPEDITION

SUN PHENOMENA

L.A. NOON (13:22:13 LOCAL); THURSDAY; 12/15/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 8 12-16-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	65 54.76S	66 51.69W	9.8	020	0.0	171	0.0	94.5	976.9	34.8	005	25.1	028	-1.40	1.4	33.10	18.50	0.0	1.25	
0030	65 50.01S	66 49.11W	10.3	018	4.9	202	0.0	95.1	977.3	31.7	010	21.6	032	-1.24	1.2	33.09	6.30	0.0	1.20	GYRO CORRECTED; LOST ANOTHER SEVERAL MINU
0100	65 45.39S	66 46.27W	9.0	018	4.8	491	0.1	95.5	977.7	31.1	006	22.2	027	-1.02	1.1	33.09	9.50	0.0	1.29	
0117	65 42.77S	66 44.50W	9.4	021	2.7	0	0.1	95.6	977.8	30.1	234	36.4	243	-0.96	1.0	33.10	8.00	0.0	1.43	ADJUSTED WIND DIRECTION BY -133
0200	65 35.97S	66 40.21W	9.7	019	7.1	210	0.3	95.7	978.5	29.2	231	36.1	237	-0.79	1.0	33.10	2.60	0.0	1.49	
0257	65 26.87S	66 34.36W	11.5	017	9.5	570	0.3	95.5	979.5	27.0	231	35.3	233	-0.56	0.8	33.42	1.90	0.0	1.61	OFF AGAIN; THIS TIME SBE 9/11 STOPPED TRA
0300	65 26.39S	66 33.99W	10.7	017	0.5	489	0.2	95.5	979.4	25.7	233	33.2	235	-0.55	0.7	33.42	1.60	0.0	1.67	
0322	65 23.15S	66 32.39W	9.3	016	3.3	473	0.2	95.6	979.7	23.3	230	30.1	232	-0.54	0.7	33.46	0.10	0.0	1.72	IF THIS IS STILL RUNNING WHEN I GET UP ..
0400	65 17.58S	66 29.38W	9.3	014	5.7	551	0.1	95.8	979.9	22.5	236	28.7	234	-0.55	0.6	33.45	0.10	0.0	1.79	
0500	65 8.37S	66 24.76W	11.2	015	9.5	468	0.3	96.2	980.8	23.3	199	34.1	208	-0.54	0.8	33.43	0.40	0.0	1.68	
0521	65 5.01S	66 22.75W	9.9	015	3.5	513	0.3	96.3	980.9	21.4	199	30.9	208	-0.39	0.6	33.47	0.60	0.0	1.88	SUNRISE (02:21:39 LOCAL); FRIDAY; 12/16/9
0600	64 58.79S	66 19.19W	10.7	016	6.4	377	0.5	96.4	981.8	20.2	174	30.9	192	-0.16	0.6	33.55	0.90	0.0	1.91	
0700	64 49.20S	66 13.83W	9.5	015	9.9	380	0.1	96.3	983.7	20.4	134	27.9	163	-0.05	0.1	33.61	3.60	0.0	1.85	
0800	64 39.59S	66 7.36W	10.0	014	10.1	320	0.0	92.8	985.8	24.9	135	32.8	161	-0.02	0.0	33.62	26.20	0.0	1.73	
0900	64 30.07S	66 1.65W	6.7	324	9.9	349	-0.3	88.9	987.8	34.6	196	41.1	157	-0.04	-0.2	33.58	50.30	0.0	1.67	
0903	64 30.10S	66 2.23W	4.9	266	0.3	346	-0.3	89.0	987.7	34.0	213	38.2	115	-0.04	-0.2	33.58	46.10	0.0	1.67	SLOWING FOR STATION
1000	64 30.31S	66 5.73W	4.4	084	4.0	339	0.3	85.6	990.0	9.1	037	6.2	147	-0.08	0.3	33.56	29.40	0.0	1.57	
1020	64 30.15S	66 1.53W	1.4	309	2.0	346	-0.4	85.6	990.4	19.8	187	21.2	135	-0.06	-0.3	33.55	47.60	0.0	1.70	BEGIN SEDIMENT TRAP DEPLOYMENT
1035	64 29.97S	66 1.94W	0.8	271	0.3	346	0.1	84.4	991.0	18.9	194	19.7	104	-0.05	0.1	33.55	58.20	0.0	1.75	SEDIMENT TRAP OVER THE SIDE
1056	64 29.88S	66 2.60W	0.7	286	0.4	344	0.3	85.3	991.0	22.9	195	23.6	120	-0.04	0.3	33.55	98.20	0.0	1.65	SEDIMENT TRAPS DEPLOYED
1100	64 30.17S	66 2.79W	3.6	204	0.3	344	0.1	86.2	991.2	15.9	275	16.0	106	-0.04	0.1	33.55	98.90	0.0	1.56	
1117	64 32.44S	65 59.55W	11.5	149	2.7	185	0.2	86.0	991.7	14.4	286	15.7	030	-0.05	0.2	33.56	20.10	0.0	1.59	BLACK-BROWED ALBATROSS
1200	64 39.78S	65 50.94W	11.0	158	8.3	385	0.4	85.6	992.5	14.4	289	15.0	043	-0.08	0.4	33.56	54.20	0.0	1.60	
1300	64 50.51S	65 41.58W	11.8	160	11.5	407	0.2	83.3	993.5	12.8	276	16.5	030	-0.18	0.3	33.56	04.60	0.0	1.36	
1338	64 57.40S	65 38.31W	10.1	190	7.1	658	0.4	81.8	994.0	15.4	271	18.2	067	-0.14	0.5	33.60	40.90	0.0	1.40	APPROACHING HUGO ISLAND
1356	64 58.21S	65 39.51W	1.3	264	1.3	398	1.0	79.0	994.5	9.7	260	10.0	156	-0.14	1.1	33.62	76.40	0.0	1.36	ZODIAC ALONGSIDE
1400	64 58.18S	65 39.46W	0.8	209	0.1	456	0.7	80.9	994.8	9.7	314	9.2	160	-0.14	0.8	33.62	55.40	0.0	1.35	
1500	64 58.22S	65 40.06W	2.0	009	1.9	118	1.7	79.5	995.8	6.0	139	7.6	158	-0.14	1.8	33.65	09.10	0.0	1.14	
1600	64 58.10S	65 39.30W	0.9	347	1.9	496	0.5	84.5	996.6	7.2	282	7.1	262	-0.12	0.6	33.68	97.60	0.0	1.07	
1614	64 58.11S	65 39.63W	1.5	135	0.3	308	1.4	84.9	996.9	6.8	106	7.4	252	-0.13	1.5	33.69	58.40	0.0	1.05	ZODIAC & AWS PARTY RETURN FROM HUGO I.
1618	64 58.10S	65 39.34W	2.8	088	0.1	500	0.9	84.7	996.9	9.3	154	11.9	248	-0.13	1.0	33.69	19.50	0.0	1.09	L.A. NOON(13:18:37 LOCAL); FRIDAY; 12/16/
1648	64 58.11S	65 39.48W	0.9	184	0.7	369	2.5	82.2	997.1	9.3	056	8.8	245	-0.13	2.6	33.68	33.50	0.0	1.08	CTD SC0117 START
1738	64 57.97S	65 38.36W	10.0	098	0.5	128	0.8	85.2	997.4	18.1	181	28.1	278	-0.07	0.8	33.66	77.50	0.0	1.04	
1739	64 58.00S	65 37.94W	12.1	098	0.2	128	0.8	85.3	997.8	17.7	180	29.8	278	-0.06	0.8	33.66	75.00	0.0	1.03	UNDERWAY FROM HUGO I. (PUV 05 1725)
1800	64 58.61S	65 32.34W	4.4	332	3.4	6	0.7	86.7	997.9	17.9	200	22.1	168	-0.01	0.7	33.61	77.30	0.0	1.06	

POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 8 12-16-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1900	65 0.31S	65 17.38W	3.9	215	7.9	5	0.6	87.5	998.8	5.8	011	2.1	248	0.08	0.5	33.50	01.40	0.0	1.21	
1909	65 0.28S	65 17.15W	1.0	026	0.4	22	0.9	87.6	998.9	9.5	212	10.4	235	0.07	0.8	33.49	78.10	0.0	1.25	TARGET TRAWL SC01 START
1922	65 0.26S	65 16.55W	1.7	089	0.3	5	0.9	87.3	998.9	8.4	139	9.8	235	0.07	0.8	33.48	77.60	0.0	1.21	TARGET TOW SC01 ON DECK
1932	65 0.21S	65 16.74W	3.0	246	0.4	5	0.5	88.2	998.9	6.2	359	3.2	244	0.07	0.4	33.47	74.10	0.0	1.20	TARGET TOW SC02 START
1943	65 0.37S	65 17.16W	1.3	284	0.3	128	0.5	88.9	999.1	8.0	305	7.3	221	0.06	0.4	33.46	79.00	0.0	1.16	TARGET TOW SC02 ON DECK
1959	65 0.93S	65 12.62W	2.5	008	2.3	5	0.8	87.8	999.0	14.6	226	16.4	228	0.07	0.7	33.45	83.00	0.0	1.19	TARGET TOW SC03 START
2000	65 0.91S	65 12.52W	3.5	033	0.0	5	0.9	87.6	999.0	14.0	208	17.2	236	0.07	0.8	33.45	78.90	0.0	1.22	
2033	65 1.31S	65 10.41W	1.8	330	2.4	7	0.6	87.5	999.3	10.9	313	9.8	275	0.03	0.5	33.44	54.30	0.0	1.47	TARGET TOW SC04 START
2042	65 1.37S	65 10.31W	0.6	015	0.2	14	0.9	86.5	999.0	13.4	242	13.7	255	0.03	0.8	33.44	46.30	0.0	1.50	TARGET TOW SC04 ON DECK
2100	65 2.47S	65 5.45W	12.2	110	2.6	300	0.6	87.9	999.1	17.5	172	29.6	285	0.03	0.5	33.44	76.10	0.0	1.54	

DAILY SUMMARY

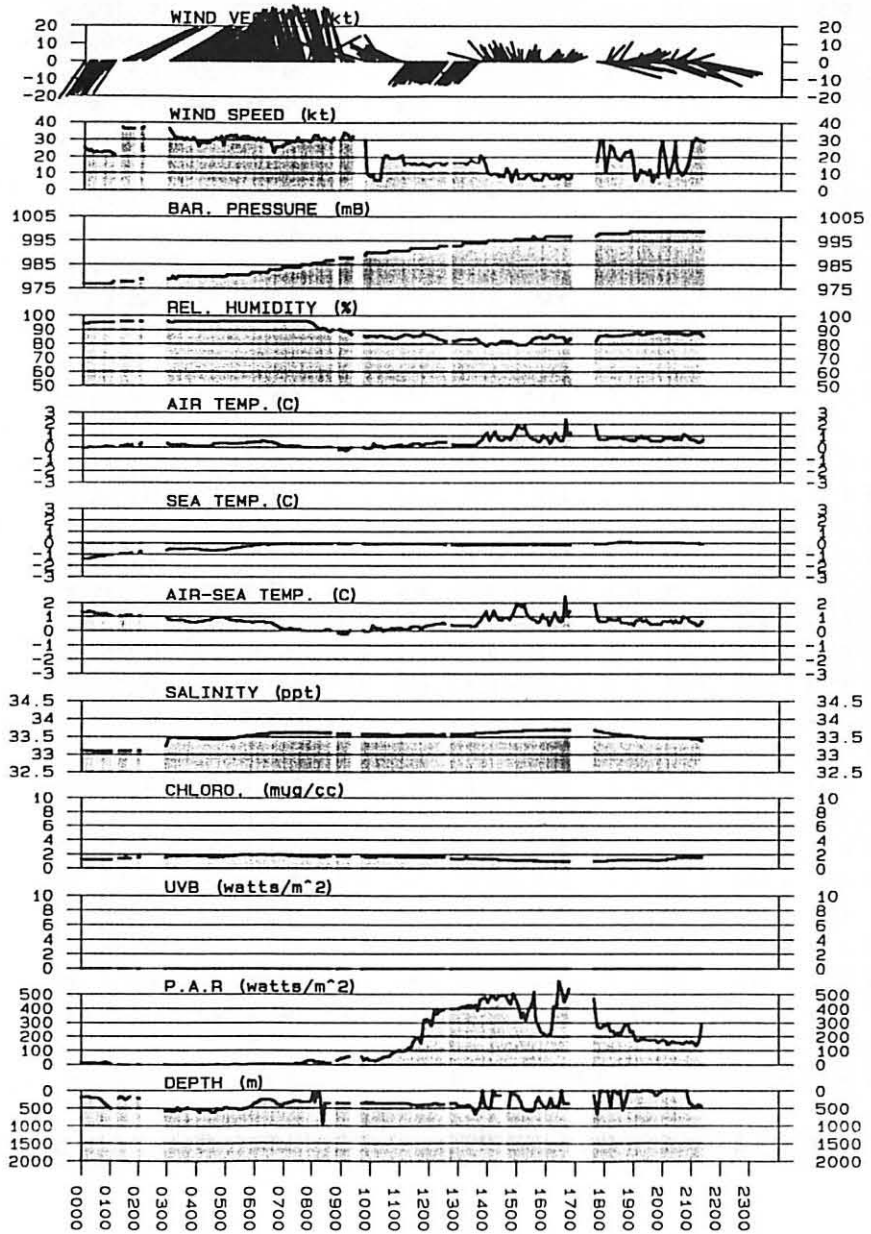
DISTANCE TRAVELLED TODAY 156.3 nm
TOTAL DISTANCE TRAVELLED 568.2 nm

SHIP'S SPEED (kts) ;	AVERAGE=	7.3	MAXIMUM=	13.6	AT 0258 HRS.	MINIMUM=	0.0	AT 1631 HRS.
AIR TEMPERATURE (C);	AVERAGE=	0.4	MAXIMUM=	2.9	AT 1635 HRS.	MINIMUM=	-0.4	AT 1020 HRS.
SEA TEMPERATURE (C);	AVERAGE=	-0.22	MAXIMUM=	0.12	AT 1832 HRS.	MINIMUM=	-1.40	AT 0000 HRS.
SALINITY (ppt);	AVERAGE=	33.51	MAXIMUM=	33.70	AT 1614 HRS.	MINIMUM=	33.08	AT 0035 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	989.6	MAXIMUM=	999.6	AT 2117 HRS.	MINIMUM=	976.9	AT 0000 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	89.1	MAXIMUM=	96.4	AT 0546 HRS.	MINIMUM=	77.9	AT 1353 HRS.
WIND SPEED (kts);	AVERAGE=	21.1	MAXIMUM=	41.1	AT 0900 HRS.	MINIMUM=	0.0	AT 0627 HRS.

MEAN DAILY WIND VELOCITY= 8.7 (kts) FROM 290 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	160.41	MAXIMUM=	659.50	AT 1625 HRS.	MINIMUM=	0.00	AT 0328 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.49	MAXIMUM=	2.05	AT 0645 HRS.	MINIMUM=	1.02	AT 1744 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-16-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
1648	64 58.38S	65 39.79W	SC0117

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
1739	64 58.02S	65 37.98W	SC05172

OTHER INVESTIGATIONS and NOTES

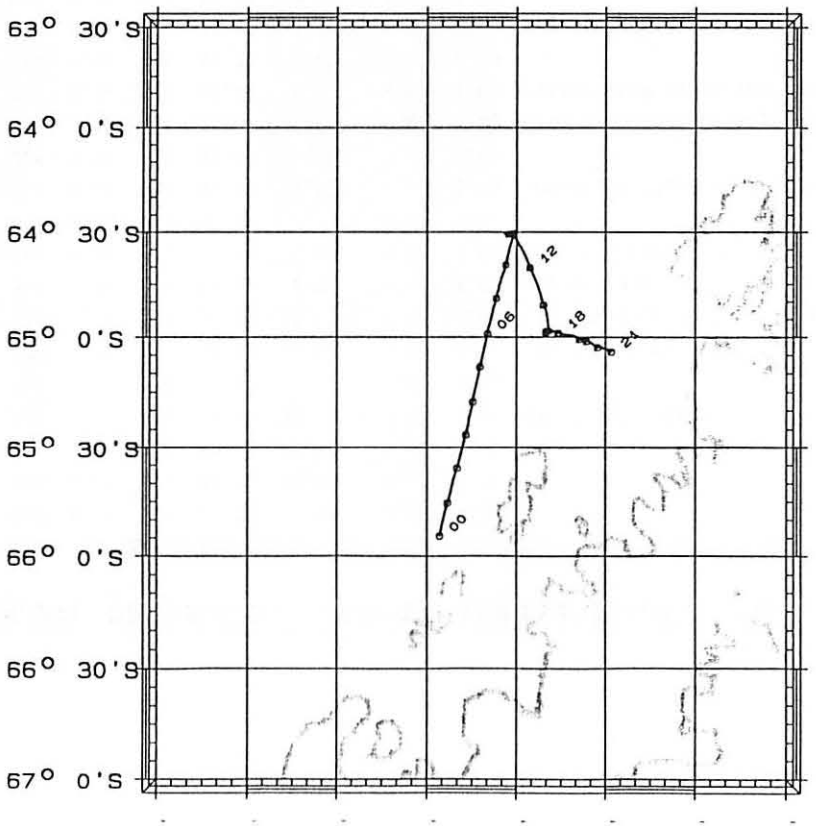
SEDIMENT TRAP DEPLOYMENT

HUGO I. AWS SURVEY OPS

SUN PHENOMENA

SUNRISE (02:21:39 LOCAL); FRIDAY; 12/16/94

L.A. NOON (13:18:37 LOCAL); FRIDAY; 12/16/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 9 12-17-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 58.54S	64 13.09W	12.0	081	0.0	484	0.5	83.3	1000.1	27.4	116	34.4	215	-0.65	1.1	32.96	54.50	0.0	2.28	
0100	65 1.55S	63 53.13W	7.4	192	9.9	298	0.8	79.8	999.8	14.0	053	11.3	277	-0.42	1.2	33.06	30.00	0.0	2.89	
0139	65 7.24S	64 1.51W	7.3	230	6.8	498	2.2	69.4	999.5	4.1	331	4.2	077	-0.36	2.5	32.98	17.20	0.0	3.00	STOPPING FOR CTD STATION IN THE LEMAIRE
0155	65 7.27S	64 1.60W	0.0	241	0.2	498	1.5	70.9	999.6	4.7	283	4.7	164	-0.37	1.8	32.91	10.50	0.0	3.00	CTD SC0118 START
0200	65 7.27S	64 1.58W	0.6	233	0.1	498	1.5	69.6	999.7	1.4	303	1.1	150	-0.38	1.8	32.90	9.00	0.0	3.00	
0228	65 7.24S	64 1.75W	0.6	292	0.3	495	2.1	69.6	999.5	9.7	241	10.0	170	-0.39	2.4	32.83	6.60	0.0	3.00	CTD SC0118 ON DECK
0236	65 7.29S	64 1.89W	0.3	066	0.1	494	2.4	68.1	999.4	10.7	118	10.8	185	-0.39	2.7	32.82	7.40	0.0	3.00	CTD COMES UP COVERED IN A MASS OF TENTACL
0237	65 7.28S	64 1.89W	0.7	072	0.0	494	2.6	66.1	999.3	11.1	107	11.3	182	-0.39	2.9	32.82	7.80	0.0	3.00	PUV 05 START
0252	65 7.41S	64 1.98W	0.9	233	0.2	493	2.1	67.6	998.8	12.2	298	11.8	167	-0.38	2.4	32.80	4.00	0.0	3.00	TSRB 05 START
0300	65 7.08S	64 1.24W	10.3	058	0.6	331	2.0	68.0	998.3	29.0	128	36.3	199	-0.38	2.3	32.79	2.70	0.0	3.00	
0313	65 4.93S	63 57.60W	12.1	024	2.7	415	2.4	64.2	998.1	31.5	112	37.8	153	-0.40	2.8	32.83	1.80	0.0	3.00	SUNSET(00:13:42 LOCAL); SATURDAY; 12/17/9
0400	64 57.33S	63 42.93W	12.6	049	9.9	233	0.7	74.7	998.1	27.6	173	40.1	224	-0.33	1.0	33.05	0.50	0.0	3.00	
0404	64 56.70S	63 41.58W	12.8	048	0.9	327	1.1	73.2	997.9	34.0	160	46.3	213	-0.32	1.4	33.07	0.50	0.0	3.00	WIND DIRECTION ERROR; -133 DEG
0430	64 52.85S	63 44.74W	13.2	301	5.2	574	1.2	72.1	998.1	15.9	083	19.5	066	-0.34	1.5	33.15	0.0	0.0	3.00	PLEASE KEEP RECORDING WHILE I GO TO BED
0500	64 49.96S	63 58.22W	12.5	301	6.4	500	3.0	60.2	997.4	7.6	041	8.4	084	-0.36	3.3	33.19	0.70	0.0	2.80	
0521	64 47.25S	64 4.24W	9.7	349	4.0	50	4.1	60.3	996.0	20.2	043	14.7	058	-0.32	4.4	33.11	1.30	0.0	3.00	SUNRISE (02:21:53 LOCAL); SATURDAY; 12/17
0600	64 46.31S	64 3.57W	0.4	262	1.4	30	4.0	70.7	995.8	12.4	163	12.8	065	-0.18	4.1	33.00	0.70	0.0	3.00	
0701	64 50.01S	63 58.10W	11.7	122	5.5	371	3.2	66.1	994.0	29.7	314	23.2	055	-0.18	3.3	33.02	1.80	0.0	3.00	
1148	64 51.04S	62 53.80W	3.5	269	28.7	306	3.0	79.6	994.4	11.9	144	14.8	061	0.31	2.6	33.33	76.80	0.0	3.00	
1149	64 51.02S	62 53.80W	1.0	272	0.0	0	3.1	79.7	994.4	12.6	144	13.5	058	0.31	2.7	33.33	81.10	0.0	3.00	TSRB 06 START
1200	64 50.90S	62 53.62W	0.3	228	0.5	319	3.2	82.1	994.4	5.1	264	5.1	128	0.32	2.8	33.32	79.10	0.0	3.00	
1224	64 50.94S	62 53.75W	0.6	278	0.3	318	3.1	81.4	993.9	11.3	098	11.4	019	0.37	2.7	33.31	14.50	0.0	3.00	CTD SC0119 START
1300	64 51.09S	62 54.38W	1.5	241	0.5	300	4.0	79.7	993.7	5.1	237	6.0	106	0.42	3.5	33.30	32.50	0.0	3.00	
1302	64 51.18S	62 54.41W	2.8	195	0.1	294	3.9	79.4	993.5	7.8	304	6.6	119	0.42	3.4	33.30	24.80	0.0	3.00	CTD SC0119 ON DECK
1400	64 51.46S	62 54.24W	1.0	099	1.2	295	4.4	77.5	993.6	2.9	091	3.1	209	0.52	3.8	33.19	66.40	0.0	3.00	
1500	64 51.86S	62 53.54W	1.4	125	1.0	304	5.3	77.3	993.2	6.2	250	6.8	004	0.43	4.8	33.28	02.20	0.0	3.00	
1635	64 50.97S	62 53.55W	0.6	220	1.4	320	5.2	79.8	992.4	14.2	201	14.8	060	0.48	4.7	33.32	48.20	0.0	3.00	
1657	64 50.93S	62 53.47W	0.6	255	0.2	318	4.3	77.8	992.4	15.6	158	16.1	053	0.55	3.7	33.30	53.50	0.0	3.00	CTD SC0120 ON DECK
1700	64 50.95S	62 53.50W	0.7	323	0.0	319	4.8	77.2	992.5	18.9	085	18.8	050	0.56	4.2	33.29	59.50	0.0	3.00	
1728	64 50.31S	62 53.59W	5.5	272	0.7	262	5.0	77.4	991.9	11.7	173	17.1	087	0.61	4.3	33.26	65.50	0.0	3.00	OFF FOR P/M ON DATA WORLD
1800	64 50.46S	62 54.11W	0.7	096	0.9	256	5.5	76.7	992.0	12.4	316	11.9	050	0.63	4.8	33.27	87.70	0.0	3.00	
1803	64 50.49S	62 54.02W	0.9	097	0.0	249	5.1	79.1	992.0	6.2	301	5.8	031	0.64	4.4	33.26	84.10	0.0	3.00	SEDIMENT TRAP PB 01 DEPLOYED
1811	64 50.54S	62 53.86W	0.7	082	0.1	252	5.3	77.6	992.0	15.4	338	14.7	059	0.64	4.6	33.26	87.70	0.0	3.00	WEIGHTS AWAY!
1859	64 50.96S	62 53.57W	0.2	250	1.3	321	5.3	75.7	992.0	15.0	151	15.1	041	0.64	4.6	33.28	65.10	0.0	3.00	CAST SC0121 STARTED
1900	64 50.94S	62 53.56W	0.7	252	0.0	320	5.7	74.8	992.0	10.7	159	11.4	052	0.63	5.0	33.28	62.70	0.0	3.00	

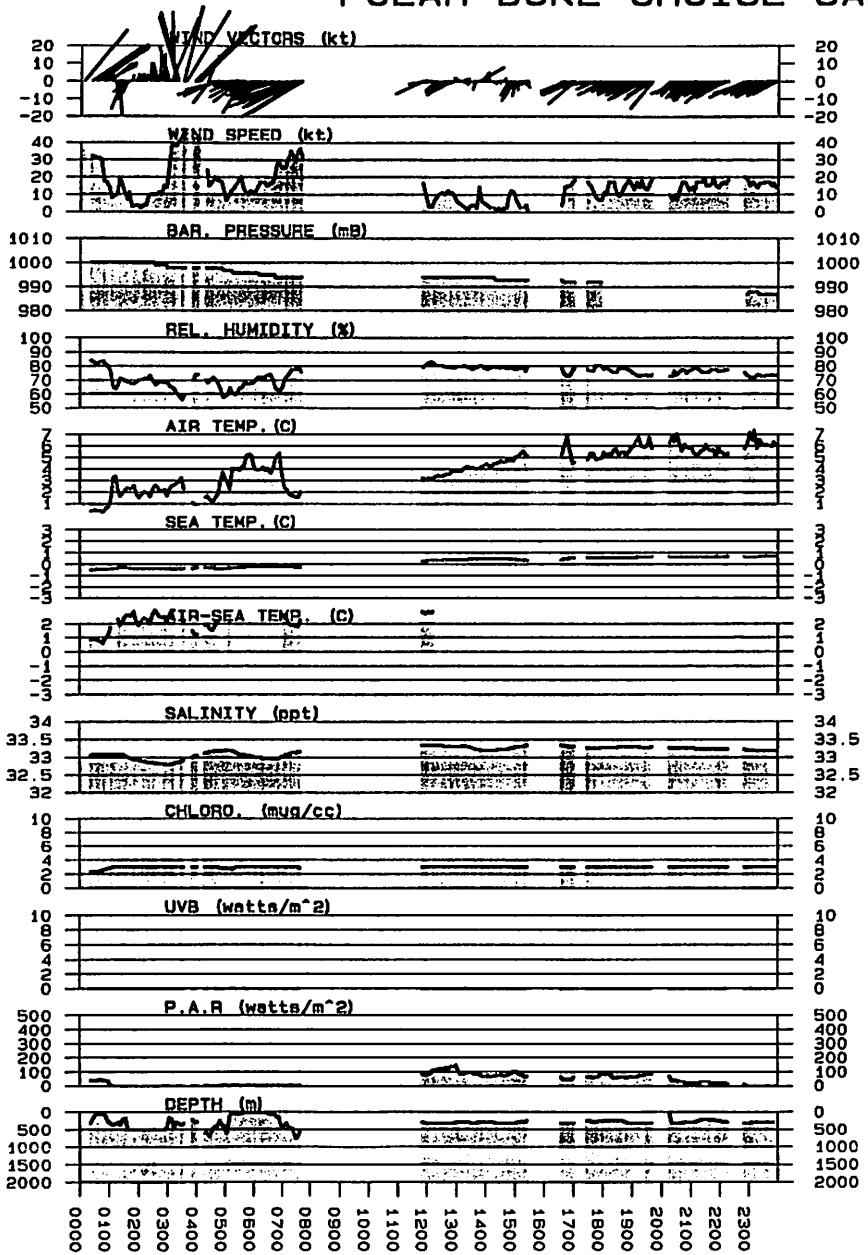
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 9 12-17-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1926	64 50.94S	62 53.49W	0.3	256	0.2	320	5.9	74.9	992.0	10.1	165	10.4	061	0.67	5.2	33.27	83.40	0.0	3.00	CTD SC0121 ON DECK
1934	64 50.99S	62 53.51W	1.0	209	0.1	321	7.2	73.3	992.0	15.9	193	16.9	041	0.67	6.5	33.27	83.40	0.0	3.00	PUV 06 START
1937	64 50.96S	62 53.52W	0.4	253	0.0	320	5.9	73.4	992.0	20.0	138	20.3	032	0.67	5.2	33.27	82.90	0.0	3.00	PUV 06 ON DECK
2005	64 50.87S	62 53.50W	0.9	200	0.3	15	6.7	72.1	992.0	6.0	170	6.9	012	0.68	6.0	33.26	36.10	0.0	3.00	CTD SC0122 START
2036	64 50.89S	62 53.51W	1.1	217	0.3	317	5.8	76.7	992.0	17.3	206	18.3	062	0.68	5.1	33.26	29.50	0.0	3.00	CTD SC0122 ON DECK
2100	64 50.90S	62 54.70W	1.3	302	0.6	299	5.6	77.3	992.0	14.4	084	14.3	032	0.70	4.9	33.24	18.20	0.0	3.00	
2200	64 51.09S	62 55.47W	1.0	263	1.1	260	5.6	77.2	992.0	12.8	174	13.8	078	0.67	4.9	33.23	19.60	0.0	3.00	
2204	64 51.11S	62 55.34W	1.2	256	0.1	267	5.1	77.2	992.0	15.6	157	16.7	055	0.67	4.4	33.22	19.60	0.0	3.00	CTD SC23 START
2300	64 50.91S	62 53.02W	0.8	241	1.2	308	7.7	71.2	992.0	15.2	188	16.0	069	0.67	7.0	33.19	0.0	0.0	3.00	

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	95.9 nm								
TOTAL DISTANCE TRAVELLED	664.1 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	3.7	MAXIMUM=	13.6	AT 0318 HRS.	MINIMUM=	0.0	AT 0150 HRS.
AIR TEMPERATURE (C);		AVERAGE=	4.1	MAXIMUM=	8.5	AT 2027 HRS.	MINIMUM=	0.1	AT 0047 HRS.
SEA TEMPERATURE (C);		AVERAGE=	0.20	MAXIMUM=	0.74	AT 2345 HRS.	MINIMUM=	-0.65	AT 0000 HRS.
SALINITY (ppt);		AVERAGE=	33.16	MAXIMUM=	33.34	AT 1530 HRS.	MINIMUM=	32.79	AT 0302 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	994.6	MAXIMUM=	1000.2	AT 0019 HRS.	MINIMUM=	991.7	AT 1731 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	74.0	MAXIMUM=	84.2	AT 0019 HRS.	MINIMUM=	54.5	AT 0329 HRS.
WIND SPEED (kts);		AVERAGE=	14.8	MAXIMUM=	57.4	AT 1345 HRS.	MINIMUM=	0.3	AT 1322 HRS.
MEAN DAILY WIND VELOCITY= 7.5 (kts) FROM 078 DEGREES TRUE									
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	37.88	MAXIMUM=	159.70	AT 1258 HRS.	MINIMUM=	0.00	AT 0353 HRS.
UVB (watts/m^2)		AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	2.97	MAXIMUM=	3.00	AT 0103 HRS.	MINIMUM=	2.23	AT 0027 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-17-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0155	65 07.37S	64 01.29W	SC0118
1224	64 50.14S	62 53.27W	SC0119
2005	64 50.25S	62 53.47W	SC0122
2204	64 51.07S	62 55.59W	SC23

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
0237	65 07.46S	64 01.62W	SC05
1934	64 50.66S	62 53.56W	SC06
1937	64 50.42S	62 53.75W	SC06

TETHERED SPECTRAL RADIANCE BUOYS

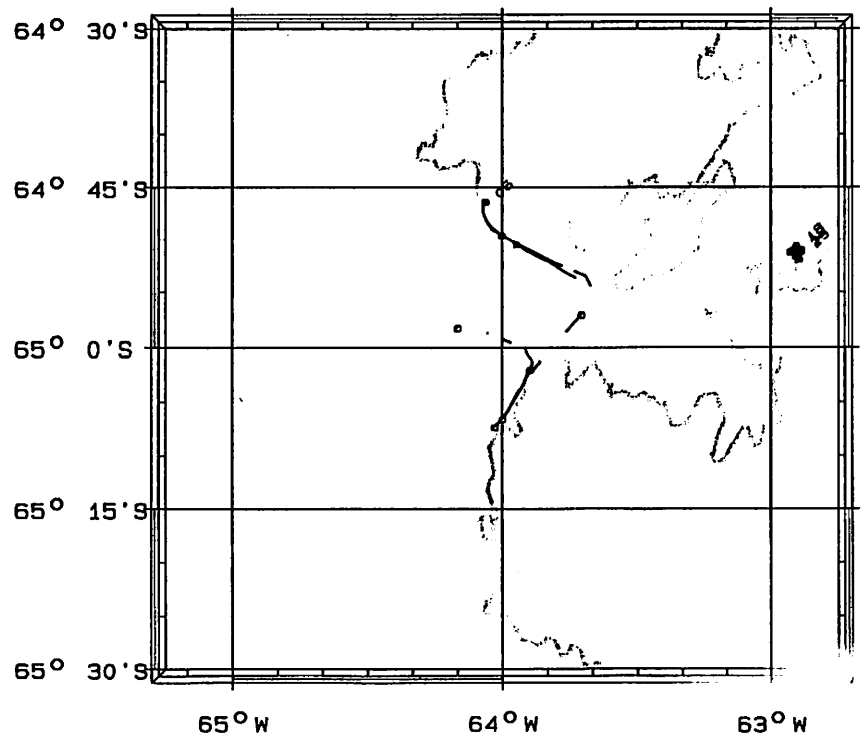
TIME	LATITUDE	LONGITUDE	EVENT
0252	65 07.06S	64 01.79W	SC05
1149	64 51.09S	62 53.88W	SC06

OTHER INVESTIGATIONS and NOTES

CTD STATION IN THE LEMAIRE CHANNEL
SEDIMENT TRAP DEPLOPYED
IN PARADISE HARBOR

SUN PHENOMENA

SUNRISE (02:21:53 LOCAL): SATURDAY: 12/17/94
SUNSET (00:13:42 LOCAL): SATURDAY: 12/17/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 10 12-18-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BARCM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	64 51.07S	62 52.91W	0.8	216	0.0	293	6.5	74.7	987.4	11.1	195	11.9	050	0.73	5.7	33.18	5.40	0.0	3.00	
0100	64 50.93S	62 53.60W	0.6	247	1.6	324	5.3	78.0	987.7	8.9	173	9.5	060	0.73	4.5	33.19	1.90	0.0	3.00	
0105	64 51.01S	62 53.53W	0.7	259	0.1	318	4.9	78.3	987.9	13.2	151	13.8	051	0.72	4.1	33.20	1.70	0.0	3.00	CTD SS0123 START
0133	64 51.27S	62 53.57W	0.5	283	0.4	300	4.4	78.6	986.9	20.2	138	20.6	062	0.70	3.7	33.23	1.60	0.0	3.00	CTD SC0123 ON DECK
0200	64 51.08S	62 54.03W	5.9	147	1.1	302	6.0	73.7	985.6	27.2	310	23.8	086	0.73	5.2	33.23	2.10	0.0	3.00	
0300	64 51.24S	62 52.40W	0.2	282	1.7	287	6.9	64.7	985.8	9.7	149	9.9	072	0.65	6.2	33.31	0.20	0.0	3.00	
0302	64 51.24S	62 52.44W	0.8	284	0.0	286	6.7	69.6	985.8	5.2	169	6.0	095	0.64	6.0	33.31	-0.50	0.0	3.00	SUNSET(00:02:28 LOCAL); SUNDAY; 12/18/94
0400	64 51.02S	62 51.74W	2.4	281	1.1	277	4.8	78.3	986.1	3.9	058	3.3	017	0.68	4.1	33.24	0.50	0.0	3.00	
0500	64 50.64S	62 54.90W	1.0	343	1.7	300	5.8	70.2	985.3	12.2	036	11.5	022	0.69	5.1	33.22	0.90	0.0	3.00	
0514	64 50.57S	62 55.38W	1.6	294	0.3	298	5.5	73.2	985.2	15.0	059	14.2	359	0.70	4.8	33.19	0.40	0.0	3.00	SUNRISE (02:14:46 LOCAL); SUNDAY; 12/18/9
0600	64 50.76S	62 57.34W	1.5	150	1.2	275	4.5	79.2	984.9	11.3	339	9.9	126	0.62	3.8	33.24	0.60	0.0	3.00	
0700	64 50.86S	62 53.45W	1.1	245	2.3	317	5.7	67.9	984.1	13.2	165	14.3	051	0.61	5.0	33.21	7.80	0.0	3.00	
0811	64 51.09S	62 53.30W	0.2	243	0.4	310	10.1	55.5	983.5	13.4	188	13.6	070	0.65	9.4	33.23	6.20	0.0	3.00	
0812	64 51.09S	62 53.31W	0.4	242	0.0	311	9.1	56.8	983.4	12.6	195	13.0	076	0.65	8.4	33.23	6.60	0.0	3.00	CTD SC0124 ON DECK
0900	64 50.38S	62 53.77W	0.9	354	1.3	243	5.6	71.4	983.0	7.0	044	6.4	044	0.63	4.9	33.24	20.00	0.0	3.00	
0951	64 50.94S	62 53.35W	0.5	218	1.1	318	3.3	83.4	982.6	16.3	147	16.8	006	0.61	2.6	33.24	96.20	0.0	3.00	TSRB 08 START
1000	64 51.05S	62 53.29W	0.4	227	0.1	311	3.7	81.6	982.5	15.2	132	15.4	000	0.61	3.0	33.24	72.60	0.0	3.00	
1018	64 51.20S	62 52.92W	0.7	202	0.2	292	3.6	81.9	982.1	13.8	166	14.5	009	0.61	2.9	33.23	85.80	0.0	3.00	PUV 06 START
1023	64 51.27S	62 52.88W	0.9	200	0.1	279	3.6	81.5	982.2	9.9	169	10.8	009	0.61	2.9	33.23	08.60	0.0	3.00	PUV 06 ON DECK
1100	64 50.75S	62 53.41W	1.6	240	1.4	268	3.9	77.9	981.4	13.0	125	14.0	010	0.60	3.3	33.25	67.00	0.0	3.00	
1210	64 49.76S	62 51.84W	0.9	214	1.5	181	2.2	87.9	980.9	11.1	167	12.0	022	0.58	1.6	33.25	39.90	0.0	3.00	
1300	64 50.94S	62 53.68W	0.7	224	2.1	321	2.0	86.8	980.3	19.8	155	20.5	020	0.57	1.4	33.26	25.80	0.0	3.00	
1342	64 51.07S	62 53.52W	1.0	203	0.8	310	2.5	82.7	980.2	14.0	174	15.0	017	0.55	1.9	33.27	05.40	0.0	3.00	CTD SC0125 START (1321)
1354	64 51.11S	62 53.17W	0.9	222	0.2	308	1.8	85.9	980.4	17.7	148	18.5	011	0.56	1.2	33.28	71.30	0.0	3.00	CTD SC0125 ON DECK
1400	64 51.17S	62 52.99W	1.7	218	0.2	306	1.9	87.0	980.7	15.0	161	16.6	020	0.56	1.3	33.28	58.30	0.0	3.00	
1500	64 50.75S	62 53.57W	1.8	010	3.3	299	1.5	89.1	980.7	24.3	005	22.5	015	0.57	0.9	33.28	55.10	0.0	3.00	
1600	64 50.33S	62 53.86W	1.1	019	0.8	245	1.6	89.1	981.4	15.0	357	13.9	016	0.48	1.1	33.34	84.30	0.0	3.00	
1700	64 50.35S	62 57.43W	2.0	269	1.9	313	1.5	88.6	981.8	6.0	052	5.0	339	0.39	1.1	33.39	69.00	0.0	3.00	
1809	64 50.80S	62 53.70W	1.6	249	2.9	304	2.5	89.1	981.6	4.5	227	5.7	104	0.54	1.9	33.28	81.80	0.1	3.00	
1813	64 50.74S	62 53.68W	0.4	251	0.1	304	2.8	87.0	981.7	3.1	238	3.3	123	0.56	2.2	33.28	08.20	0.0	3.00	CTD SC0126 START
1846	64 50.86S	62 54.17W	2.6	295	0.7	299	1.4	87.7	981.0	20.8	056	19.5	357	0.61	0.7	33.26	10.10	0.0	3.00	CTD SC0126 ON DECK
1900	64 50.09S	62 53.30W	4.1	062	0.9	207	1.7	88.2	981.3	19.2	322	16.2	015	0.60	1.1	33.27	70.70	0.0	3.00	
1939	64 50.38S	62 53.11W	3.1	141	0.8	282	2.1	85.3	980.9	14.8	251	16.0	022	0.63	1.4	33.28	79.50	2.0	3.00	MULTIPLIED UVB BY 10000 (w/m^2)
2002	64 50.92S	62 53.68W	0.2	200	0.8	318	1.6	87.4	981.0	14.4	159	14.6	359	0.64	0.9	33.27	06.80	0.6	3.00	
2010	64 50.90S	62 53.67W	0.4	202	0.0	318	1.6	89.3	981.2	12.4	165	12.8	008	0.64	0.9	33.27	15.10	0.2	3.00	CTD SC0127 START (1956)

POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 10 12-18-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
2100	64 50.87S	62 53.26W	0.5	265	0.5	311	2.6	87.9	981.7	5.4	180	5.9	085	0.66	1.9	33.25	01.20	0.0	3.00	
2108	64 50.92S	62 53.24W	1.7	287	0.2	317	1.8	89.1	981.4	14.0	084	13.9	018	0.66	1.1	33.25	57.20	0.0	3.00	CTD SC0127 ON DECK AT 20:22
2200	64 51.28S	62 54.40W	1.0	280	1.0	295	1.6	89.0	981.0	16.3	109	16.7	032	0.69	0.9	33.25	23.30	0.1	3.00	
2300	64 51.02S	62 53.43W	0.8	220	1.5	318	1.7	86.2	981.0	16.7	147	17.4	008	0.71	0.9	33.27	76.30	0.1	3.00	

DAILY SUMMARY

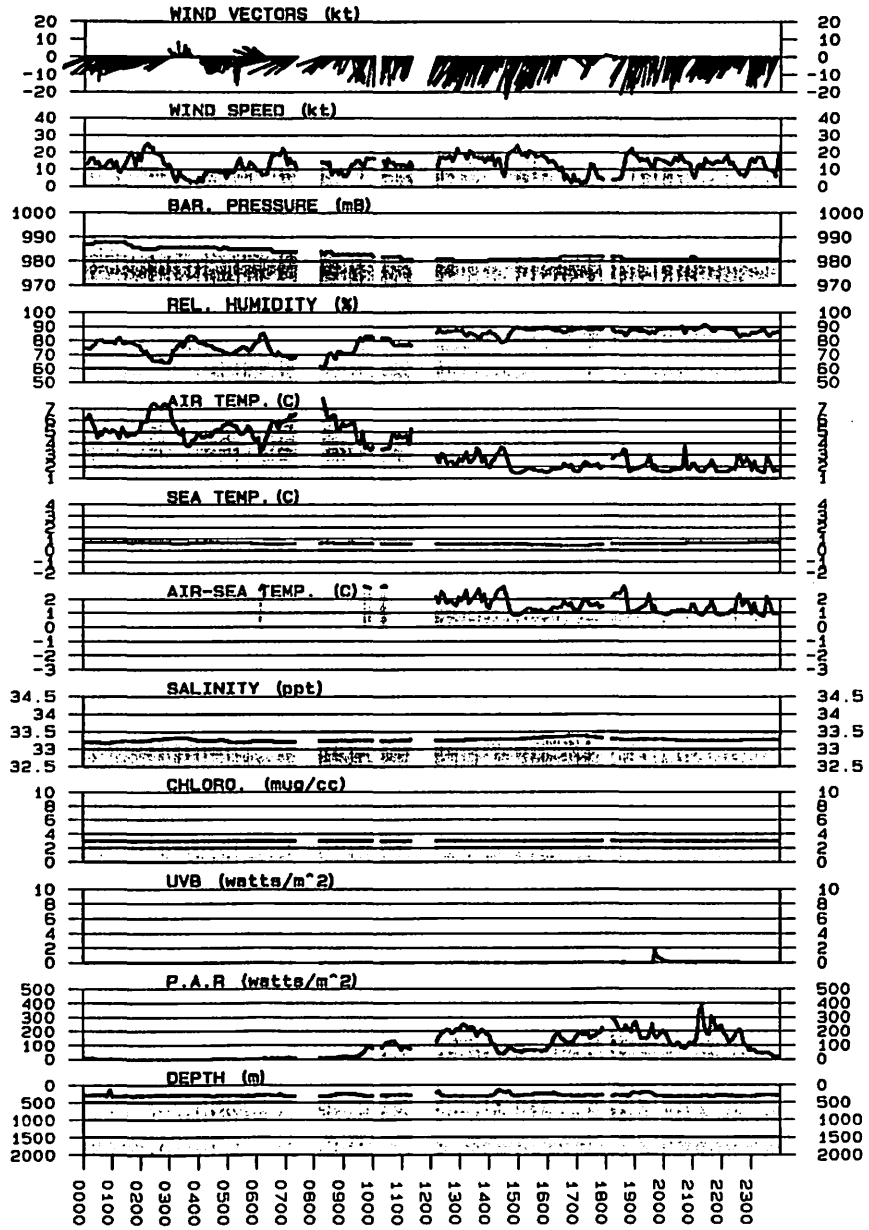
DISTANCE TRAVELLED TODAY 37.1 nm
TOTAL DISTANCE TRAVELLED 701.2 nm

SHIP'S SPEED (kts) ;	AVERAGE=	1.5	MAXIMUM=	7.5	AT 1029 HRS.	MINIMUM=	0.0	AT 0116 HRS.
AIR TEMPERATURE (C);	AVERAGE=	3.6	MAXIMUM=	10.1	AT 0811 HRS.	MINIMUM=	1.4	AT 1447 HRS.
SEA TEMPERATURE (C);	AVERAGE=	0.62	MAXIMUM=	0.74	AT 0057 HRS.	MINIMUM=	0.38	AT 1649 HRS.
SALINITY (ppt);	AVERAGE=	33.27	MAXIMUM=	33.39	AT 1659 HRS.	MINIMUM=	33.17	AT 0043 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	982.9	MAXIMUM=	988.0	AT 0102 HRS.	MINIMUM=	980.1	AT 1340 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	81.2	MAXIMUM=	91.2	AT 2123 HRS.	MINIMUM=	55.5	AT 0811 HRS.
WIND SPEED (kts);	AVERAGE=	13.1	MAXIMUM=	28.8	AT 0215 HRS.	MINIMUM=	0.9	AT 0309 HRS.

MEAN DAILY WIND VELOCITY= 11.7 (kts) FROM 021 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	85.79	MAXIMUM=	460.10	AT 2117 HRS.	MINIMUM=	-1.00	AT 0311 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	2.0	AT 1938 HRS.	MINIMUM=	0.0	AT 0001 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	3.00	MAXIMUM=	3.00	AT 0001 HRS.	MINIMUM=	3.00	AT 0001 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-18-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0105	64 51.03S	62 53.82W	SC0123
1342	64 51.04S	62 53.75W	SC01251
1813	64 50.75S	62 53.58W	SC0126
2010	64 50.71S	62 53.39W	SC01271

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
1018	64 51.01S	62 52.82W	SC06
1023	64 51.89S	62 52.28W	SC06

TETHERED SPECTRAL RADIANCE BUOYS

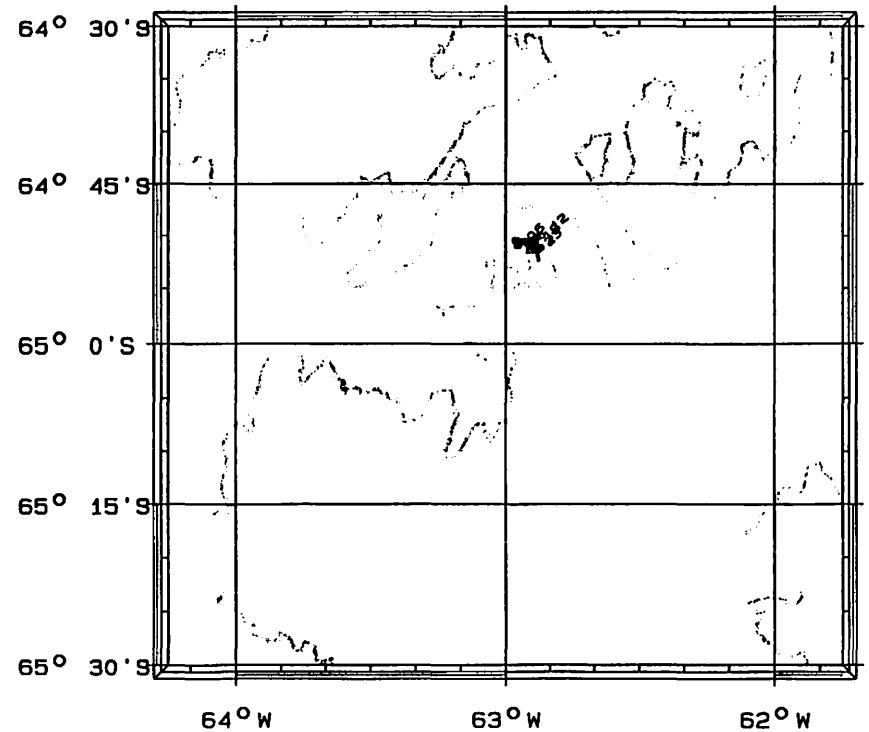
TIME	LATITUDE	LONGITUDE	EVENT
0951	64 50.14S	62 53.82W	SC08

OTHER INVESTIGATIONS and NOTES

START RECORDING UVB

SUN PHENOMENA

SUNRISE (02: 14: 46 LOCAL); SUNDAY; 12/18/94
SUNSET (00: 02: 28 LOCAL); SUNDAY; 12/18/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 11 12-19-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 51.25S	62 53.18W	0.6	020	0.0	290	1.7	87.7	980.9	21.6	002	21.0	023	0.70	1.0	33.27	21.60	0.0	3.00	
0102	64 51.14S	62 53.58W	1.1	215	2.9	307	1.6	86.1	980.3	17.3	165	18.4	021	0.58	1.0	33.27	11.40	0.0	3.00	CTD SC0128 START
0127	64 51.42S	62 53.11W	1.1	228	0.4	283	1.6	89.8	980.4	23.5	149	24.5	018	0.59	1.0	33.28	9.00	0.0	3.00	CTD SC0128 on DECK
0200	64 51.68S	62 52.83W	5.0	010	2.6	230	1.3	91.5	980.7	23.5	006	18.6	018	0.57	0.7	33.28	2.70	0.0	3.00	
0300	64 50.44S	62 52.94W	0.3	021	1.6	277	1.3	91.8	981.2	18.9	004	18.6	025	0.47	0.8	33.29	1.60	0.0	3.00	
0303	64 50.42S	62 52.85W	0.5	025	0.0	277	1.3	91.6	981.5	17.5	000	17.0	025	0.47	0.8	33.28	1.50	0.0	3.00	SUNSET(00:03:17 LOCAL); MONDAY; 12/19/94
0400	64 50.18S	62 53.01W	0.6	023	0.7	217	1.4	90.5	981.4	15.2	020	14.6	043	0.48	0.9	33.27	0.90	0.0	3.00	
0500	64 50.51S	62 58.26W	3.1	115	2.7	298	2.2	82.1	981.7	7.6	315	5.8	048	0.42	1.7	33.34	0.80	0.0	3.00	
0514	64 50.60S	62 56.66W	2.5	089	0.7	300	1.3	87.6	981.6	12.8	330	10.7	052	0.41	0.8	33.34	0.20	0.0	3.00	SUNRISE (02:14:25 LOCAL); MONDAY; 12/19/9
0600	64 50.55S	62 54.55W	3.1	279	2.0	302	1.1	90.7	981.4	11.9	086	12.1	020	0.42	0.6	33.36	3.50	0.0	3.00	
0700	64 50.86S	62 53.57W	0.9	193	2.7	320	1.1	90.0	982.0	3.7	278	3.7	097	0.42	0.6	33.37	1.30	0.0	3.00	
0709	64 50.95S	62 53.63W	0.8	316	0.2	324	1.1	90.7	982.1	0.2	016	0.6	130	0.41	0.6	33.37	2.60	0.0	3.00	CTD SC0129 START
0738	64 50.90S	62 53.98W	0.2	074	0.3	293	1.6	88.6	982.2	8.4	316	8.2	029	0.45	1.1	33.36	12.00	0.0	3.00	CTD SC0129 ON DECK
0800	64 50.78S	62 53.97W	1.3	256	0.4	296	0.9	92.0	982.3	4.3	258	4.7	138	0.43	0.4	33.36	23.80	0.0	3.00	
0900	64 50.69S	62 55.30W	1.1	306	0.9	299	1.4	90.0	981.9	2.9	172	4.0	120	0.50	0.9	33.36	49.20	0.0	3.00	
0955	64 51.12S	62 53.04W	0.9	001	2.2	307	1.1	90.8	981.6	1.9	054	1.6	082	0.54	0.5	33.27	59.30	0.3	3.00	MOPPER/KIEBER BUOY DEPLOYED
1001	64 51.03S	62 53.07W	0.2	328	0.1	306	1.5	89.4	981.5	3.5	111	3.6	082	0.56	0.9	33.25	62.90	0.6	3.00	
1010	64 51.05S	62 53.13W	0.5	294	0.0	306	1.5	88.5	981.4	3.9	131	4.2	070	0.56	0.9	33.25	76.00	0.9	3.00	PUV 08 START
1015	64 51.09S	62 53.06W	0.5	252	0.1	304	2.0	88.7	981.3	2.9	224	3.3	110	0.57	1.4	33.22	89.60	0.5	3.00	TSRB 09 START
1032	64 51.15S	62 53.18W	0.2	120	0.2	304	2.1	87.0	981.2	3.1	316	3.0	073	0.63	1.4	33.20	96.50	0.0	3.00	TSRB 09 ON DECK
1100	64 51.22S	62 53.51W	0.9	222	0.4	304	1.5	88.0	981.2	7.6	150	8.4	015	0.63	0.8	33.21	44.10	1.1	3.00	
1200	64 51.32S	62 53.46W	0.6	293	1.2	295	1.3	88.5	981.0	9.7	085	9.7	022	0.72	0.5	33.16	29.30	2.0	3.00	
1229	64 51.10S	62 53.71W	7.2	022	0.9	318	2.5	86.1	980.9	11.3	335	5.6	324	0.80	1.7	33.14	19.80	3.0	3.00	SALINITY;SST & CHLORO OFF FOR TESTS
1241	64 50.90S	62 53.76W	0.7	349	0.3	298	3.3	83.6	980.9	2.3	335	1.7	315	0.0	3.3	-----	73.80	6.0	-----	PUV 09 START
1246	64 50.87S	62 53.79W	0.3	323	0.0	295	2.8	83.2	980.7	3.9	320	3.7	280	0.0	2.8	-----	82.50	3.0	-----	TSRB 10 START; BRIGHT SUNLIGHT!
1259	64 50.90S	62 53.81W	0.5	254	0.1	295	2.5	82.3	980.7	5.1	106	5.2	005	0.0	2.5	-----	82.30	4.0	-----	TSRB 10 ON DECK
1300	64 50.90S	62 53.84W	0.6	263	0.0	294	2.5	82.4	980.7	5.1	090	5.1	360	0.0	2.5	-----	59.20	4.0	-----	
1309	64 51.00S	62 53.81W	1.8	253	0.2	314	1.7	86.4	980.9	5.8	091	6.1	001	0.0	1.7	-----	66.00	4.0	-----	CTD SC0130 START
1341	64 51.18S	62 53.95W	0.1	041	0.5	0	4.2	79.8	980.7	2.7	345	2.6	025	0.0	4.2	-----	80.80	3.0	-----	CTD SC0130 ON DECK
1400	64 51.00S	62 53.61W	1.7	328	1.8	319	2.2	86.0	980.6	5.4	178	7.1	146	0.0	2.2	-----	98.50	3.0	-----	
1410	64 50.94S	62 53.68W	0.3	024	0.2	313	1.1	89.8	980.4	9.3	144	9.6	169	0.0	1.1	-----	46.30	3.0	-----	TSRB 11 ON DECK
1500	64 50.81S	62 53.13W	1.8	148	0.9	292	2.5	85.8	980.3	4.3	329	2.9	098	0.0	2.5	-----	93.90	6.0	-----	
1600	64 50.81S	62 54.23W	1.0	071	0.9	298	1.5	88.6	980.2	4.9	081	4.8	164	0.0	1.5	-----	28.00	2.0	-----	
1617	64 50.74S	62 53.80W	1.4	144	0.4	294	1.7	89.4	980.1	7.8	005	6.4	150	1.25	0.4	33.21	03.30	3.0	1.88	CHLORO BACK; HAD SATURATED FOR PAST 2 DAY
1700	64 50.82S	62 53.55W	0.3	226	0.9	307	1.8	88.6	980.2	3.3	261	3.4	122	1.06	0.7	33.23	11.40	1.0	3.85	

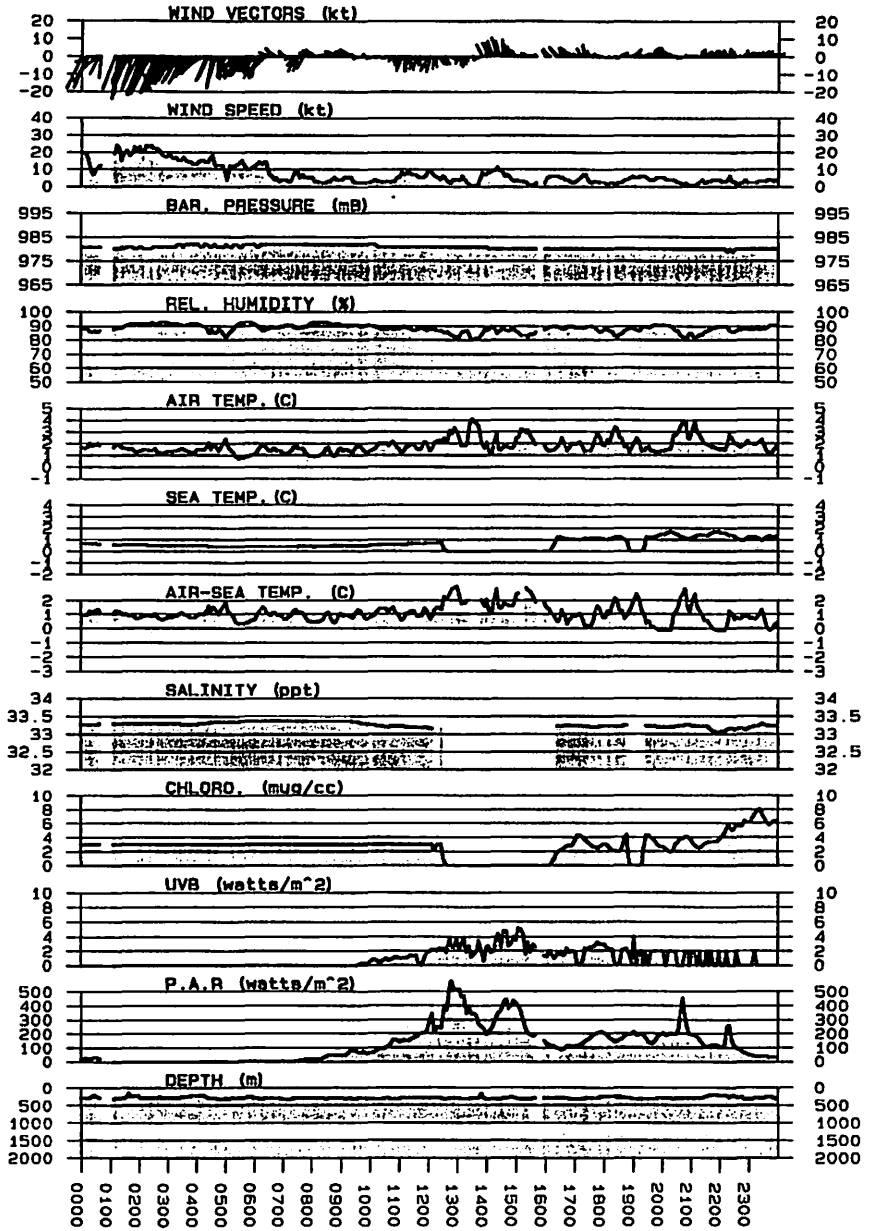
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 11 12-19-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1800	64 50.59S	62 53.44W	1.0	318	1.1	265	1.8	87.3	980.2	1.4	097	1.8	089	1.07	0.7	33.22	02.30	3.0	3.09	
1900	64 51.00S	62 53.83W	0.3	086	1.9	314	2.0	87.0	980.1	4.7	181	5.0	267	0.0	2.0	-----	10.80	0.0	-----	
1914	64 50.95S	62 53.55W	0.6	118	0.2	321	1.4	88.6	980.1	6.2	134	6.7	256	0.0	1.4	-----	93.50	0.0	-----	CTD SC0131 START
1923	64 50.88S	62 53.50W	0.6	108	0.1	317	1.4	89.6	980.0	5.4	145	5.9	256	1.26	0.1	33.21	73.90	0.0	4.09	FLOUROMETER SCALE CHANGED TO 2
1943	64 50.79S	62 53.61W	0.3	053	0.2	306	1.3	90.7	980.0	3.3	150	3.6	206	1.28	0.4	33.21	47.00	0.0	3.51	CTD SC0131 ON DECK
1948	64 50.78S	62 53.63W	0.6	035	0.1	304	1.2	90.5	979.9	4.9	131	5.3	171	1.36	-0.1	33.19	79.00	0.0	3.08	PUV 10 START
1953	64 50.75S	62 53.61W	0.4	059	0.0	296	1.3	90.6	980.0	4.1	099	4.2	164	1.45	-0.1	33.19	87.30	0.0	2.71	TSRB 11 START
2000	64 50.76S	62 53.71W	0.9	050	0.1	298	1.3	90.6	980.0	4.3	112	4.7	172	1.44	-0.1	33.19	01.70	0.0	2.67	
2011	64 50.75S	62 53.89W	0.8	040	0.2	286	1.5	90.3	979.8	3.9	089	4.0	140	1.69	-0.1	33.18	99.20	0.0	2.04	TSRB 11 ON DECK
2100	64 50.86S	62 54.14W	1.6	052	1.2	292	3.0	84.9	979.8	0.0	345	1.6	232	1.24	1.7	33.23	93.60	10.0	3.37	
2200	64 50.17S	62 52.16W	1.5	111	1.7	225	1.6	89.6	979.5	3.7	046	2.9	180	1.68	-0.4	33.05	05.10	0.0	3.93	
2250	64 51.12S	62 53.25W	7.8	311	4.9	321	2.0	87.8	979.6	7.2	336	3.1	198	1.15	0.8	33.12	61.50	0.0	6.44	MOPPER/KIEBER BUOY RECOVERED
2300	64 50.91S	62 53.54W	0.5	332	0.3	319	1.9	87.1	979.7	2.3	252	2.5	213	1.29	0.6	33.16	50.00	0.0	6.07	
2302	64 50.88S	62 53.56W	0.8	311	0.0	319	1.9	87.4	979.7	2.1	262	2.4	194	1.25	0.6	33.18	46.00	0.0	6.44	CTD SC0132 START
2344	64 50.72S	62 53.34W	0.2	112	0.5	262	1.2	90.6	979.8	3.5	133	3.6	247	1.22	-0.4	33.24	33.00	0.0	5.95	CTD SC0132 ON DECK

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	42.2 nm								
TOTAL DISTANCE TRAVELLED	743.4 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	1.6	MAXIMUM=	11.0	AT 2225 HRS.	MINIMUM=	0.1	AT 0227 HRS.
AIR TEMPERATURE (C);		AVERAGE=	1.8	MAXIMUM=	4.6	AT 1325 HRS.	MINIMUM=	0.7	AT 0524 HRS.
SEA TEMPERATURE (C);		AVERAGE=	0.66	MAXIMUM=	1.77	AT 2147 HRS.	MINIMUM=	0.00	AT 1230 HRS.
SALINITY (ppt);		AVERAGE=	33.25	MAXIMUM=	33.38	AT 0637 HRS.	MINIMUM=	15.99	AT 1218 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	980.7	MAXIMUM=	982.3	AT 0800 HRS.	MINIMUM=	979.3	AT 2210 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	88.2	MAXIMUM=	92.7	AT 0547 HRS.	MINIMUM=	79.1	AT 1326 HRS.
WIND SPEED (kts);		AVERAGE=	7.1	MAXIMUM=	26.7	AT 0147 HRS.	MINIMUM=	0.2	AT 1326 HRS.
MEAN DAILY WIND VELOCITY=	3.7 (kts) FROM 234 DEGREES TRUE								
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	122.93	MAXIMUM=	582.50	AT 1246 HRS.	MINIMUM=	0.10	AT 0515 HRS.
UVB (watts/m^2)		AVERAGE=	1.0	MAXIMUM=	10.0	AT 1858 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	3.35	MAXIMUM=	11.65	AT 1922 HRS.	MINIMUM=	0.60	AT 1210 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA: 12-19-1994



SCIENTIFIC ACTIVITIES THIS DAY:

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0102	64 51.31S	62 53.34W	SC0128
0709	64 50.33S	62 53.97W	SC0129
1309	64 50.84S	62 53.97W	SC0130
1914	64 50.33S	62 53.99W	SC0131
2302	64 50.44S	62 53.17W	SC0132

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
1010	64 51.03S	62 53.17W	SC08
1241	64 50.71S	62 53.45W	SC09
1948	64 50.31S	62 53.97W	SC10

TETHERED SPECTRAL RADIANCE BUOYS

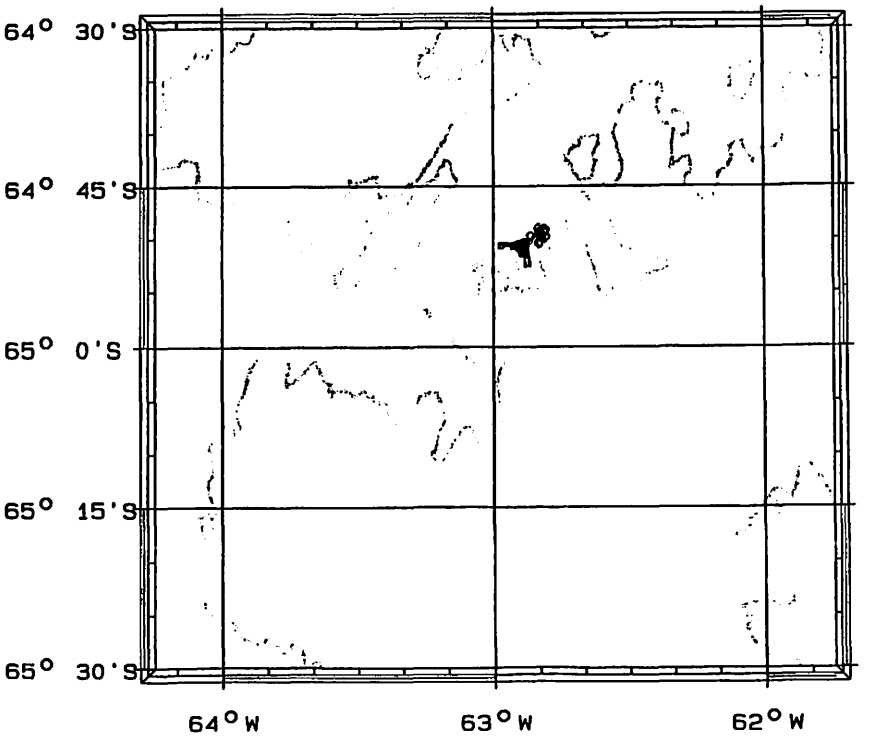
TIME	LATITUDE	LONGITUDE	EVENT
1015	64 51.09S	62 53.02W	SC09
1246	64 50.25S	62 53.78W	SC10
1953	64 50.84S	62 53.69W	SC11

OTHER INVESTIGATIONS and NOTES

SUN PHENOMENA

SUNRISE (02: 14: 25 LOCAL): MONDAY: 12/19/94

SUNSET (00: 03: 17 LOCAL): MONDAY: 12/19/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 12 12-20-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 50.82S	62 53.73W	0.6	009	0.0	299	1.7	89.2	979.7	2.5	000	2.8	248	1.42	0.2	33.21	30.90	0.0	6.77	
0100	64 50.81S	62 53.90W	0.1	214	0.9	295	1.2	92.2	979.8	0.0	143	0.1	034	1.05	0.1	33.26	25.20	0.0	8.17	
0107	64 50.84S	62 53.88W	0.7	173	0.1	0	1.3	92.1	979.8	0.0	136	0.7	353	1.04	0.2	33.26	26.40	0.0	8.46	CTD SC0133 START
0134	64 50.86S	62 53.66W	0.5	098	0.3	314	1.4	90.9	979.9	1.6	187	2.1	283	1.29	0.1	33.23	22.60	0.0	9.59	CTD SC0133 ON DECK
0200	64 50.85S	62 53.31W	0.2	126	0.3	312	1.7	90.4	980.0	0.0	016	0.2	306	1.25	0.4	33.23	13.00	0.0	9.61	
0300	64 50.91S	62 53.49W	0.8	175	1.1	318	1.4	90.9	980.1	2.3	316	1.8	114	1.01	0.3	33.28	1.50	0.0	9.39	
0304	64 50.90S	62 53.44W	0.6	220	0.0	318	1.4	90.9	980.0	1.6	000	1.8	097	1.00	0.4	33.28	1.30	0.0	9.53	SUNSET(00:04:37 LOCAL); TUESDAY; 12/20/94
0400	64 50.75S	62 53.93W	0.3	188	0.6	286	0.9	92.4	980.2	2.3	074	2.3	269	0.97	-0.5	33.29	1.50	0.0	9.50	
0500	64 50.71S	62 53.31W	0.5	326	0.8	270	1.1	91.6	980.3	1.0	134	1.4	115	0.84	0.2	33.33	2.80	0.0	8.46	
0513	64 50.69S	62 53.30W	0.5	322	0.2	261	1.5	91.0	980.4	0.0	189	0.5	142	0.91	0.5	33.31	3.10	0.0	9.41	SUNRISE (02:13:59 LOCAL); TUESDAY; 12/20/
0600	64 50.62S	62 53.51W	1.1	332	0.6	271	1.3	91.3	980.6	2.7	268	3.0	218	1.10	0.2	33.27	4.30	0.0	10.00	
0700	64 50.87S	62 53.65W	3.9	223	1.3	305	1.1	92.1	980.6	4.1	329	2.1	122	0.96	0.1	33.27	10.10	0.0	10.00	
0713	64 50.96S	62 53.77W	0.2	161	0.2	310	1.0	91.9	981.0	1.4	311	1.2	105	0.72	0.2	33.31	14.30	0.0	6.98	CTD SC0134 START
0738	64 50.95S	62 53.76W	0.4	316	0.2	318	1.3	89.8	980.8	2.7	173	3.1	130	0.68	0.6	33.31	23.40	0.0	4.87	CTD SC0134 ON DECK
0800	64 50.93S	62 53.76W	0.5	335	0.3	307	1.3	90.4	981.1	0.0	191	0.5	155	0.74	0.5	33.29	30.40	0.0	5.54	
0813	64 50.82S	62 53.72W	0.2	052	0.2	306	1.3	90.2	981.0	1.9	000	2.0	298	0.82	0.4	33.28	39.10	0.0	7.34	UNDERWAY FOR ANDVORD BAY
0900	64 48.16S	62 46.20W	5.7	121	5.1	205	1.4	87.7	981.4	5.2	013	1.4	236	0.70	0.7	33.10	53.90	0.0	5.55	
1000	64 52.12S	62 38.30W	4.9	149	5.6	110	1.3	89.3	981.6	3.7	327	2.6	016	0.47	0.8	32.98	23.90	0.0	4.95	
1033	64 52.91S	62 36.30W	0.2	171	1.4	229	0.9	87.8	981.7	1.6	048	1.4	225	0.68	0.2	33.08	30.60	0.0	6.10	CTD SC0135 START
1106	64 53.03S	62 36.03W	0.6	309	0.2	227	1.4	87.6	981.9	0.0	081	0.6	129	0.68	0.7	33.08	10.00	0.0	6.09	CTD SC0135 ON DECK
1135	64 53.21S	62 35.83W	0.3	335	0.4	206	0.9	90.2	982.1	3.5	213	3.8	186	0.70	0.2	33.02	67.20	1.6	8.67	NET TOW ON DECK
1200	64 53.23S	62 35.82W	0.4	016	0.2	192	1.3	89.3	982.2	2.9	152	3.3	171	0.69	0.6	32.98	83.60	1.7	7.16	
1302	64 47.32S	62 42.93W	2.5	217	7.1	450	1.3	84.3	982.2	16.7	068	16.0	294	0.79	0.5	33.14	16.90	0.0	4.47	
1321	64 47.23S	62 43.59W	0.5	085	0.3	475	2.6	79.5	982.3	11.7	168	12.2	254	0.76	1.8	33.19	95.40	3.0	6.02	CTD SC0136 START
1349	64 47.03S	62 44.02W	1.4	099	0.5	502	1.9	85.0	982.5	12.6	149	13.9	251	0.75	1.1	33.23	47.50	3.0	6.10	CTD SC0136 ON DECK
1400	64 46.98S	62 44.03W	0.5	055	0.1	538	3.0	81.6	982.6	11.5	169	12.0	224	0.73	2.2	33.23	53.10	4.0	6.59	
1500	64 42.91S	62 55.74W	13.6	350	7.3	374	1.6	85.1	983.1	11.3	275	16.8	211	0.42	1.1	33.42	27.10	0.0	2.21	
1542	64 37.51S	62 50.75W	1.9	038	6.7	74	1.4	84.9	983.0	9.1	173	11.0	212	0.16	1.2	33.46	56.10	3.0	1.45	CTD SC0137 START
1600	64 37.30S	62 51.10W	0.8	031	0.4	0	1.1	85.4	983.4	14.8	185	15.6	215	0.16	0.9	33.46	09.80	5.0	1.56	
1631	64 37.34S	62 51.19W	0.2	020	0.4	633	1.6	84.7	983.5	10.9	174	11.1	194	0.17	1.4	33.48	36.50	5.0	1.09	CTD SC0137 ON DECK
1636	64 37.36S	62 51.25W	0.5	033	0.1	629	1.0	85.7	983.6	11.9	167	12.3	201	0.15	0.8	33.49	49.70	4.0	1.05	TSRB 12 START
1646	64 37.37S	62 51.39W	0.3	029	0.1	626	2.5	86.4	983.6	10.9	177	11.2	206	0.13	2.3	33.50	90.70	3.0	0.97	TSRB 12 ON DECK
1647	64 37.37S	62 51.39W	0.5	023	0.0	633	2.5	83.3	983.6	12.2	183	12.7	206	0.13	2.3	33.50	03.90	3.0	0.98	PUV 11 START
1653	64 37.35S	62 51.39W	0.7	038	0.1	602	1.3	86.4	983.7	9.1	174	9.8	213	0.12	1.1	33.50	64.10	2.0	0.99	PUV 11 ON DECK
1700	64 37.21S	62 51.27W	1.3	048	0.2	583	0.8	85.7	983.8	12.1	153	13.2	204	0.11	0.6	33.51	73.50	3.0	1.11	

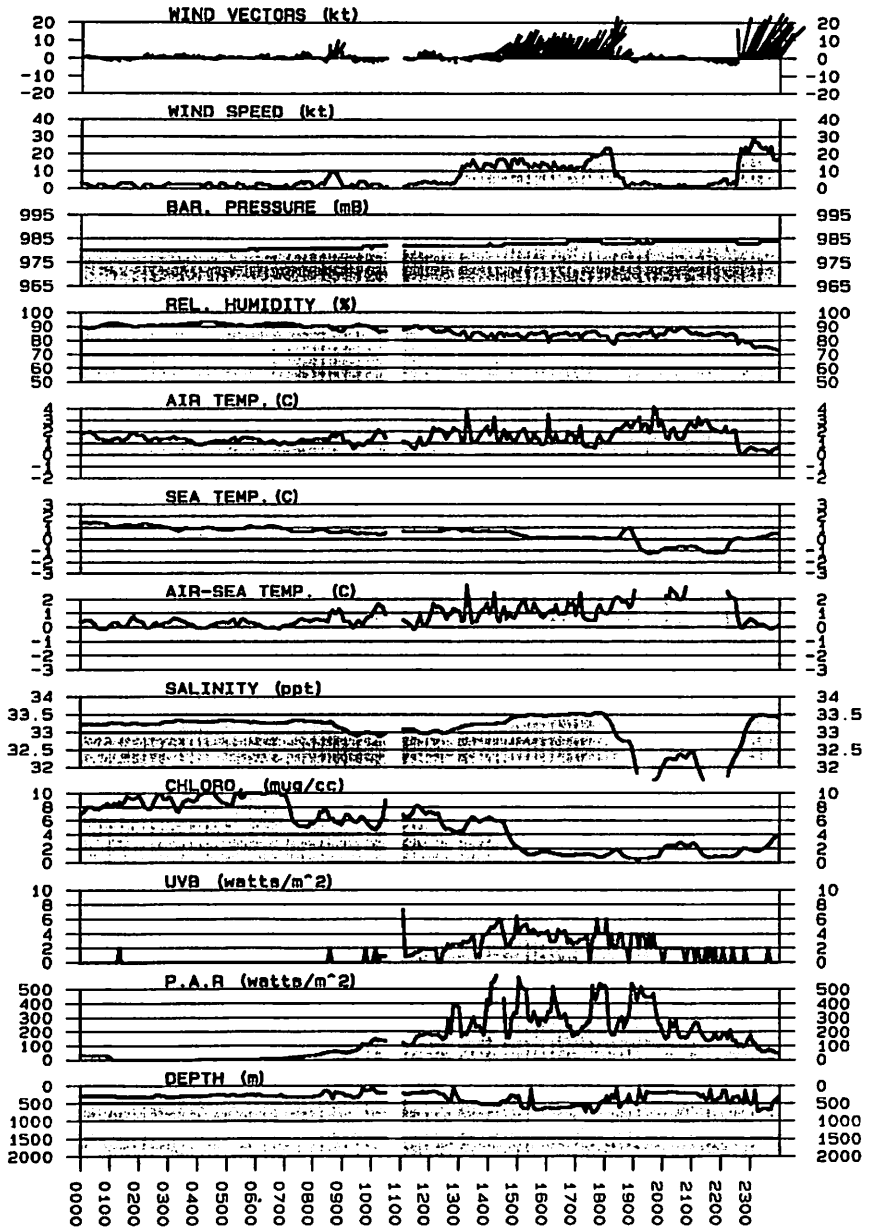
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 12 12-20-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1800	64 31.63S	62 41.87W	11.4	288	9.8	371	1.0	83.9	982.9	25.5	294	23.2	196	0.10	0.9	33.46	22.90	0.0	1.00	
1900	64 28.00S	63 2.94W	7.2	235	11.4	465	2.7	85.4	983.5	7.4	014	1.8	326	0.32	2.3	32.30	24.60	0.0	0.52	
1952	64 30.98S	63 5.97W	0.7	313	3.5	206	2.3	85.3	983.6	1.9	275	2.0	208	-1.05	3.3	31.78	86.70	0.0	1.06	CTD SC0138 START
2000	64 30.96S	63 5.89W	0.8	037	0.1	202	2.8	84.0	983.6	0.0	058	0.8	217	-0.84	3.6	32.05	87.50	0.0	1.77	
2011	64 31.00S	63 5.92W	0.5	137	0.1	196	1.4	88.9	983.6	1.6	030	1.1	179	-0.72	2.1	32.25	66.70	0.0	2.40	CTD SC0138 ON DECK
2016	64 31.01S	63 5.95W	0.7	059	0.1	195	2.1	88.6	983.7	0.0	132	0.7	239	-0.70	2.8	32.27	83.20	10.0	2.40	ZODIAC OUT FOR ICE COLLECTING
2100	64 30.99S	63 6.03W	0.9	222	0.5	208	3.0	84.0	983.8	0.0	289	0.9	042	-0.58	3.5	32.41	41.10	0.0	2.74	ZODIAC RETURNS WITH SANTA CLAUS HIMSELF!
2200	64 27.91S	62 59.44W	7.2	089	5.0	363	1.8	85.2	983.8	5.2	332	3.5	312	-1.22	3.0	31.36	45.40	0.0	0.93	
2300	64 34.25S	62 42.16W	11.6	227	11.6	520	0.7	78.0	983.4	36.7	342	25.9	202	0.07	0.6	33.35	63.30	0.0	1.84	

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	97.1 nm								
TOTAL DISTANCE TRAVELLED	840.5 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	4.0	MAXIMUM=	14.0	AT 1519 HRS.	MINIMUM=	0.0	AT 0732 HRS.
AIR TEMPERATURE (C);		AVERAGE=	1.5	MAXIMUM=	4.9	AT 1318 HRS.	MINIMUM=	-0.1	AT 2244 HRS.
SEA TEMPERATURE (C);		AVERAGE=	0.47	MAXIMUM=	1.48	AT 0028 HRS.	MINIMUM=	-1.25	AT 1932 HRS.
SALINITY (ppt);		AVERAGE=	33.03	MAXIMUM=	33.56	AT 1742 HRS.	MINIMUM=	31.35	AT 2159 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	982.0	MAXIMUM=	984.3	AT 2351 HRS.	MINIMUM=	979.6	AT 0048 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	87.1	MAXIMUM=	93.1	AT 0419 HRS.	MINIMUM=	71.5	AT 2357 HRS.
WIND SPEED (kts);		AVERAGE=	6.3	MAXIMUM=	30.7	AT 2304 HRS.	MINIMUM=	0.1	AT 0100 HRS.
MEAN DAILY WIND VELOCITY= 5.0 (kts) FROM 214 DEGREES TRUE									
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	156.53	MAXIMUM=	711.80	AT 1613 HRS.	MINIMUM=	0.80	AT 0325 HRS.
UVB (watts/m^2)		AVERAGE=	1.4	MAXIMUM=	35.5	AT 1108 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	5.19	MAXIMUM=	10.00	AT 0238 HRS.	MINIMUM=	0.50	AT 1910 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-20-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0107	64 50.01S	62 53.86W	SC0133
0713	64 50.42S	62 53.64W	SC0134
1033	64 52.74S	62 36.25W	SC0135
1321	64 47.57S	62 43.79W	SC0136
1542	64 37.19S	62 50.95W	SC0137
1952	64 30.32S	63 05.49W	SC0138

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
1647	64 37.41S	62 51.31W	SC11
1653	64 37.35S	62 51.31W	SC11

TETHERED SPECTRAL RADIANCE BUOYS

TIME	LATITUDE	LONGITUDE	EVENT
1636	64 37.31S	62 51.73W	SC12

OTHER INVESTIGATIONS and NOTES

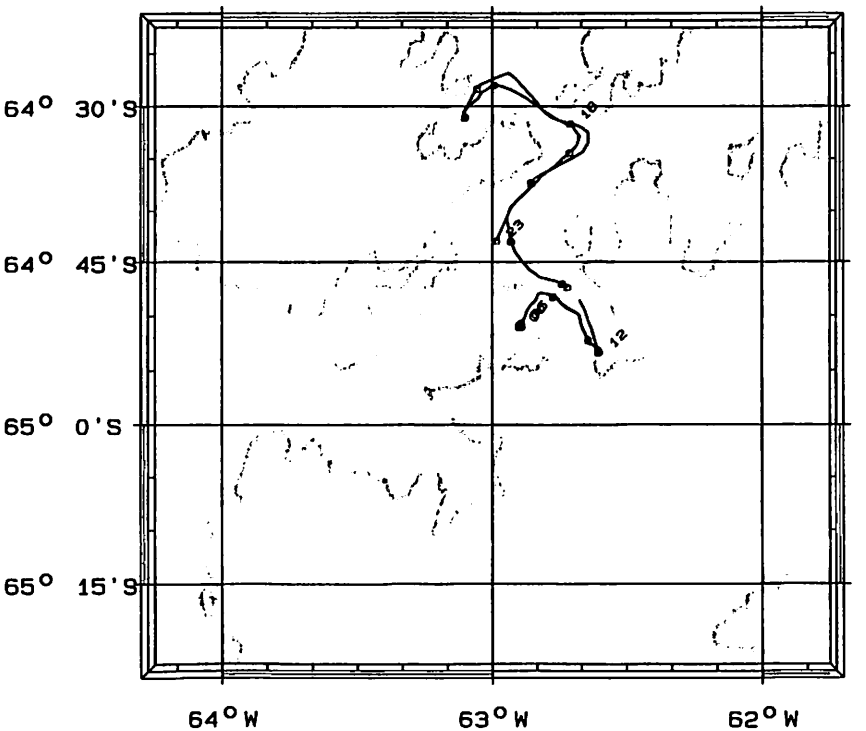
ICE-COLLECTING OPS

SANTA CLAUS RETURNS ON THE ZODIAC

SUN PHENOMENA

SUNRISE (02:13:59 LOCAL); TUESDAY; 12/20/94

SUNSET (00:04:37 LOCAL); TUESDAY; 12/20/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 13 12-21-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 43.30S	62 59.33W	12.4	201	0.0	362	0.6	72.0	983.6	33.2	008	21.0	214	0.47	0.1	33.41	49.10	0.0	3.94	
0100	64 50.82S	62 54.15W	4.0	115	10.1	292	-0.1	75.7	984.9	8.2	074	8.1	218	0.71	-0.8	33.25	7.10	0.0	10.00	
0200	64 51.07S	62 54.18W	0.4	048	0.9	305	0.8	71.3	984.6	7.4	171	7.8	219	0.73	0.0	33.23	3.10	0.0	9.16	
0616	64 50.59S	62 54.41W	0.2	042	1.0	299	0.6	75.1	984.7	10.9	202	11.1	244	0.66	-0.5	33.26	1.20	0.0	6.62	
0617	64 50.59S	62 54.42W	0.2	048	0.0	299	0.6	76.7	984.6	10.3	194	10.5	241	0.66	-0.5	33.26	1.20	0.0	5.93	SYSTEM DOWN FOR 3 HOURS - NOBODY CARES!
0700	64 50.65S	62 54.59W	0.2	064	0.5	298	2.6	74.1	984.6	9.7	186	9.9	250	0.56	2.0	33.30	4.30	0.0	4.86	
0800	64 50.62S	62 54.67W	0.7	064	0.6	298	0.3	73.0	984.7	10.1	169	10.8	234	0.53	-0.2	33.31	9.30	0.0	4.51	
0858	64 50.62S	62 54.82W	0.3	048	0.7	299	0.4	72.4	984.4	15.2	200	15.4	247	0.53	-0.1	33.28	17.90	0.0	5.86	CTD SC0139T2 ON DECK
0900	64 50.65S	62 54.75W	1.0	048	0.0	299	1.0	72.8	984.4	9.3	178	10.3	227	0.53	0.4	33.28	19.00	0.0	5.53	
0926	64 50.62S	62 54.88W	0.9	072	0.3	300	0.5	72.9	984.6	8.0	175	8.9	247	0.49	0.4	33.29	35.10	0.0	4.88	CTD SC0140 START
0957	64 50.43S	62 54.75W	0.2	134	0.4	294	0.0	74.5	984.6	10.3	107	10.4	242	0.48	-0.4	33.29	49.20	0.0	4.68	CTD SC0140 OIN DECK
1000	64 50.44S	62 54.67W	1.5	140	0.0	299	0.0	74.3	984.5	8.9	100	9.3	249	0.48	-0.4	33.29	51.00	0.0	5.29	
1059	64 50.88S	62 53.90W	0.8	239	1.7	295	0.1	74.3	984.2	11.3	023	10.5	264	0.34	-0.2	33.31	64.30	0.0	6.87	CTD SC0141 START
1100	64 50.89S	62 53.83W	1.2	236	0.0	296	0.0	74.6	984.3	10.5	038	9.6	278	0.34	-0.3	33.31	64.90	0.0	6.97	
1125	64 50.82S	62 53.92W	1.3	056	0.7	295	1.6	71.3	984.0	8.7	187	10.0	242	0.29	1.3	33.32	93.30	0.0	6.52	CTD SC0141(2) START
1152	64 50.73S	62 53.76W	0.3	124	0.4	294	0.1	73.8	984.0	9.9	106	10.0	232	0.27	-0.1	33.32	83.20	10.0	6.37	CTD SC0141(2) ON DECK
1200	64 50.77S	62 53.50W	0.6	142	0.1	288	0.1	75.0	984.2	9.5	096	9.6	242	0.25	-0.1	33.33	79.10	0.0	6.23	
1258	64 50.86S	62 53.81W	0.1	061	0.9	295	0.7	73.1	984.1	5.6	175	5.7	236	0.27	0.4	33.35	94.10	0.0	5.25	CTD SC0142 START (TIME SERIES)
1301	64 50.86S	62 53.79W	0.3	066	0.0	296	0.3	73.6	984.1	5.8	171	6.1	237	0.27	0.0	33.35	99.70	0.0	5.21	
1329	64 50.78S	62 53.31W	1.5	204	0.3	293	0.3	75.8	984.1	11.1	014	9.6	220	0.24	0.5	33.36	34.60	3.1	4.31	BOW THRUSTERS ACTIVITY
1400	64 50.96S	62 53.45W	0.4	216	0.6	321	0.5	74.6	984.0	10.9	007	10.5	224	0.19	0.3	33.38	89.50	2.4	3.66	
1521	64 50.86S	62 54.03W	0.4	044	0.8	290	1.9	73.5	984.0	9.5	189	9.9	232	0.23	1.6	33.39	46.00	0.0	3.45	
1522	64 50.86S	62 54.04W	0.5	044	0.0	290	2.4	72.4	983.8	7.8	182	8.3	226	0.22	2.1	33.39	49.40	2.0	3.54	CTD SC0143 START (1500)
1524	64 50.85S	62 54.00W	0.4	048	0.0	292	2.8	72.1	984.0	8.9	185	9.3	232	0.22	2.5	33.39	67.30	5.0	3.57	CTD SC0143 ON DECK
1600	64 50.90S	62 53.70W	0.2	062	0.6	305	2.4	77.7	983.9	9.9	173	10.1	235	0.26	2.1	33.38	68.40	4.0	2.79	
1737	64 50.79S	62 54.29W	0.7	103	0.7	299	0.2	74.3	984.0	8.9	142	9.5	248	0.34	-0.1	33.37	85.20	0.0	4.18	
1800	64 50.67S	62 54.31W	0.5	060	0.3	301	0.6	73.0	983.9	9.1	165	9.6	225	0.32	0.2	33.37	19.80	0.0	4.19	
2119	64 53.61S	62 52.40W	0.8	044	4.2	135	-0.1	69.7	984.0	15.7	202	16.5	245	0.08	-0.1	33.43	34.40	0.0	2.89	
2131	64 53.67S	62 52.43W	0.9	023	0.2	233	-0.1	68.4	984.0	14.0	216	14.7	237	0.50	-0.1	33.46	29.30	0.0	2.59	ZODIAC RETURNS FROM ALMIRANTE BROWN BASE
2200	64 51.13S	62 53.64W	2.2	333	2.7	306	-0.2	62.1	983.8	13.4	254	14.2	219	0.06	-0.2	33.48	49.50	0.0	2.69	
2300	64 51.02S	62 54.60W	0.8	072	1.0	299	-0.2	60.9	983.6	7.4	115	7.8	192	0.19	-0.3	33.42	42.00	0.0	3.03	
2302	64 50.99S	62 54.54W	0.8	059	0.0	299	-0.3	62.7	983.8	8.2	100	8.3	164	0.19	-0.4	33.42	42.90	0.0	3.08	CTD SC0146 START - TIME SERIES

DAILY SUMMARY

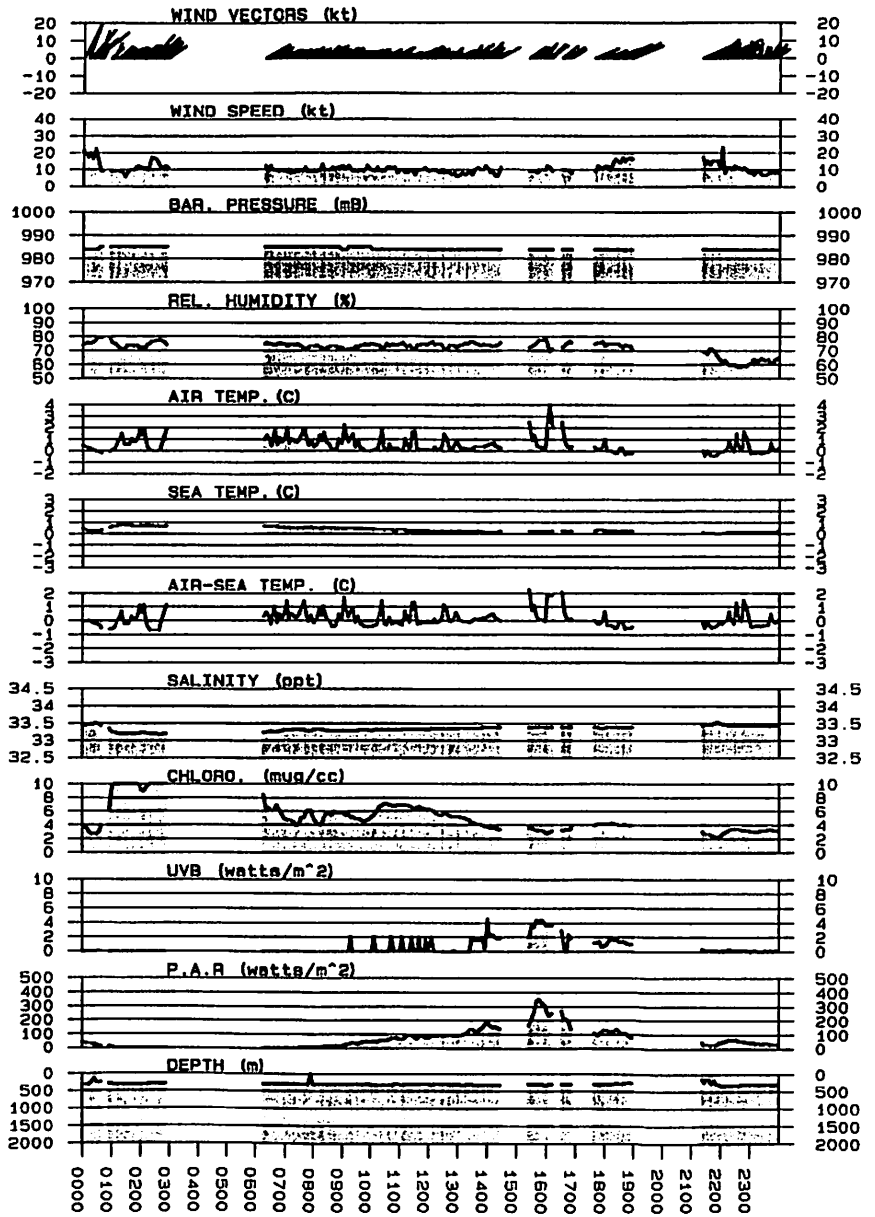
DISTANCE TRAVELLED TODAY 30.6 nm
TOTAL DISTANCE TRAVELLED 871.1 nm

SHIP'S SPEED (kts) ;	AVERAGE=	1.4	MAXIMUM=	12.7	AT 0002 HRS.	MINIMUM=	0.0	AT 0629 HRS.
AIR TEMPERATURE (C);	AVERAGE=	0.5	MAXIMUM=	4.1	AT 1604 HRS.	MINIMUM=	-0.6	AT 2124 HRS.
SEA TEMPERATURE (C);	AVERAGE=	0.37	MAXIMUM=	0.83	AT 0120 HRS.	MINIMUM=	0.00	AT 2148 HRS.
SALINITY (ppt);	AVERAGE=	33.34	MAXIMUM=	33.52	AT 2149 HRS.	MINIMUM=	33.18	AT 0240 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	984.2	MAXIMUM=	985.1	AT 0040 HRS.	MINIMUM=	983.4	AT 2354 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	72.2	MAXIMUM=	80.5	AT 0042 HRS.	MINIMUM=	55.7	AT 2248 HRS.
WIND SPEED (kts);	AVERAGE=	10.6	MAXIMUM=	60.2	AT 2202 HRS.	MINIMUM=	4.3	AT 0127 HRS.

MEAN DAILY WIND VELOCITY= 10.8 (kts) FROM 222 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	67.49	MAXIMUM=	369.80	AT 1545 HRS.	MINIMUM=	1.10	AT 0238 HRS.
UVB (watts/m^2)	AVERAGE=	0.6	MAXIMUM=	13.0	AT 1357 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	5.21	MAXIMUM=	10.00	AT 0059 HRS.	MINIMUM=	2.11	AT 2150 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-21-1994



SCIENTIFIC ACTIVITIES THIS DAY;

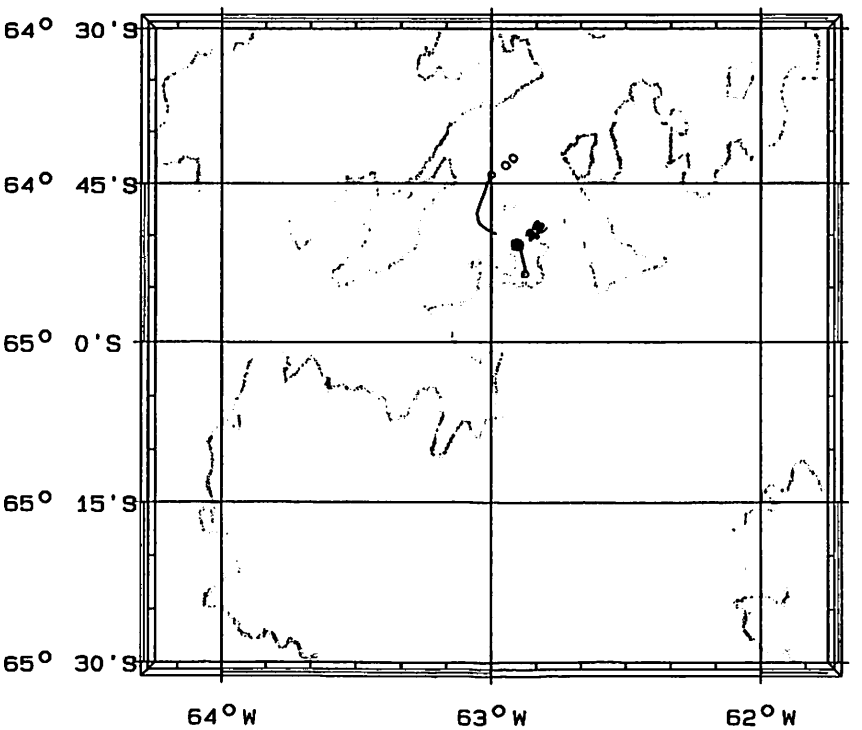
CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0926	64 50.57S	62 54.33W	SC0140
1059	64 50.44S	62 53.03W	SC0141
1125	64 50.73S	62 53.28W	SC01412
1258	64 50.16S	62 53.97W	SC0142
1522	64 50.16S	62 54.03W	SC01431
2302	64 50.66S	62 54.38W	SC0146

OTHER INVESTIGATIONS and NOTES

VISIT TO ALMIRANTE BROWN BASE

SUN PHENOMENA



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 14 12-22-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 50.93S	62 54.52W	0.6	005	0.0	296	0.4	64.4	983.7	9.9	204	10.5	208	0.24	0.1	33.42	30.50	0.0	3.26	
0100	64 50.92S	62 55.15W	1.2	060	0.7	287	0.5	69.6	983.5	11.9	170	13.0	231	0.19	0.3	33.43	15.40	0.0	3.12	
0200	64 50.98S	62 55.46W	0.4	091	0.9	0	-0.4	67.9	983.6	13.2	143	13.5	235	0.21	-0.6	33.41	4.90	0.0	3.17	
0300	64 50.97S	62 55.98W	0.4	044	0.7	204	1.7	70.5	983.6	11.1	189	11.5	233	0.21	1.4	33.41	1.70	0.0	2.96	
0305	64 50.98S	62 56.06W	0.6	093	0.0	214	-0.5	69.4	983.6	8.6	132	9.0	227	0.20	-0.7	33.41	0.70	0.0	2.90	SUNSET(00:05:59 LOCAL); THURSDAY; 12/22/9
0400	64 51.14S	62 54.03W	1.0	134	1.2	302	-0.5	73.4	983.6	7.0	087	7.0	229	0.13	-0.6	33.44	0.20	0.0	3.14	
0500	64 50.97S	62 54.44W	0.7	037	1.0	298	0.2	69.6	983.4	7.4	189	8.1	226	0.14	0.5	33.44	0.80	0.0	2.94	
0514	64 50.94S	62 54.65W	0.7	069	0.2	299	-0.1	72.2	983.3	7.0	166	7.7	236	0.14	-0.2	33.44	0.70	0.0	2.72	SUNRISE (02:14:28 LOCAL); THURSDAY; 12/22
0600	64 50.83S	62 55.04W	0.4	027	0.7	296	0.3	70.0	983.1	13.2	219	13.5	245	0.14	0.1	33.44	3.10	0.0	2.62	
0700	64 50.52S	62 55.31W	0.4	045	0.8	298	1.8	68.1	983.3	10.3	189	10.7	234	0.14	1.6	33.43	10.30	0.0	2.60	
0800	64 50.85S	62 53.77W	1.7	027	1.5	300	-0.2	74.8	983.3	9.3	210	10.8	233	0.08	-0.2	33.47	18.90	0.0	2.66	
0821	64 50.90S	62 54.02W	0.8	230	0.4	292	-0.4	72.1	983.3	10.1	165	10.9	036	0.07	-0.4	33.48	26.20	0.0	2.76	CTD SC0148 START
0851	64 50.86S	62 54.14W	0.3	221	0.3	293	-0.2	72.5	983.5	7.4	169	7.7	030	0.07	-0.2	33.48	64.40	0.0	2.71	CTD SC0148 ON DECK
0900	64 50.84S	62 54.29W	0.6	228	0.1	296	-0.6	75.7	983.5	6.0	172	6.6	040	0.05	-0.6	33.48	65.10	1.0	2.69	
0906	64 50.82S	62 54.41W	0.5	208	0.1	298	1.2	70.9	983.4	7.6	184	8.1	032	0.04	1.1	33.48	76.00	0.0	2.57	TSRB 13 START
0918	64 50.80S	62 54.39W	0.7	297	0.2	300	-0.6	76.1	983.5	9.9	107	10.1	047	0.05	-0.6	33.48	82.40	0.0	2.47	TSRB 13 ON DECK
0922	64 50.76S	62 54.46W	0.6	269	0.1	300	-0.6	74.4	983.5	8.4	135	8.8	047	0.08	-0.6	33.48	84.20	1.0	2.41	PUV 12 START
0931	64 50.67S	62 54.68W	0.8	244	0.1	298	-0.1	75.2	983.3	5.4	180	6.2	064	0.06	-0.1	33.48	84.10	0.0	2.37	PUV 12 ON DECK
0942	64 50.59S	62 53.75W	1.4	232	0.5	268	0.0	75.4	983.2	6.0	183	7.4	054	0.05	-0.0	33.47	93.90	0.0	2.25	ON SITE FOR SEDIMENT TRAP SEARCH
0946	64 50.56S	62 53.87W	1.5	260	0.1	258	-0.6	75.5	983.3	8.2	148	9.5	053	0.04	-0.6	33.47	00.10	0.0	2.26	SEDIMENT TRAP RELEASED
0947	64 50.55S	62 53.95W	1.7	277	0.0	261	-0.6	75.4	983.4	8.6	132	9.8	056	0.04	-0.6	33.47	00.10	1.0	2.18	SEDIMENT TRAP ON SURFACE
0955	64 50.53S	62 54.02W	1.1	070	0.2	263	-0.3	76.4	983.4	8.7	347	7.7	056	0.04	-0.3	33.46	99.00	1.0	2.11	FLOATS ABOARD
1000	64 50.59S	62 54.23W	1.4	092	0.1	293	-0.4	76.0	983.3	7.8	304	7.1	027	0.05	-0.4	33.46	98.90	1.0	2.16	
1003	64 50.54S	62 54.41W	1.7	099	0.1	0	-0.4	75.6	983.5	6.2	311	5.2	036	0.05	-0.4	33.44	00.10	0.0	2.18	SEDIMENT TRAP ABOARD
1009	64 50.46S	62 54.84W	2.1	090	0.2	296	-0.4	76.5	983.2	7.8	319	6.3	037	0.06	-0.4	33.43	98.90	1.0	2.08	RELEASE ABOARD; END SEDIMENT TRAP OPS
1100	64 51.99S	63 12.40W	11.4	026	9.9	348	-0.8	81.6	982.7	27.4	003	16.0	031	-0.02	-0.7	33.43	06.50	1.0	1.75	
1200	64 56.30S	63 33.05W	11.9	113	11.9	493	-1.1	83.1	983.2	26.4	341	15.6	080	-0.04	-1.0	33.36	72.80	1.0	1.83	
1300	64 50.01S	63 58.43W	11.8	113	12.5	457	-0.7	74.5	984.0	17.7	327	9.9	041	-0.10	-0.6	33.34	30.80	2.0	0.99	
1330	64 46.48S	64 3.60W	0.9	139	4.8	38	-0.2	73.4	984.2	2.7	294	2.5	054	-0.06	-0.1	32.82	03.80	3.0	0.78	ARRIVE AT PALMER STATION
1400	64 46.46S	64 3.31W	0.7	100	0.3	6	0.5	72.2	984.2	2.1	324	1.6	050	0.39	0.1	32.91	95.00	3.0	0.91	
1412	64 46.46S	64 3.26W	0.4	100	0.1	7	0.7	72.6	984.2	3.3	337	2.9	074	0.40	0.3	32.94	72.90	7.0	0.98	SANTA DEBARKS AT PALMER STATION
1500	64 46.47S	64 3.30W	0.4	100	0.4	6	1.2	69.1	984.2	3.9	328	3.6	065	0.67	0.5	33.05	64.10	0.0	1.04	
1600	64 46.45S	64 3.33W	0.8	100	0.7	6	0.5	70.3	984.2	4.3	319	3.7	051	0.59	-0.4	33.07	48.80	10.0	1.04	
1614	64 46.47S	64 3.28W	0.2	100	0.1	6	3.3	65.3	984.0	2.3	350	2.1	089	0.73	2.5	33.07	66.70	0.0	1.05	L.A. NOON(13:14:45 LOCAL); THURSDAY; 12/2
1700	64 46.49S	64 3.35W	0.1	100	0.3	6	3.1	62.7	984.1	2.3	328	2.2	067	0.76	2.3	33.07	37.80	0.0	1.04	

POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 14 12-22-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SSI	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1800	64 46.46S	64 3.34W	1.6	100	0.5	6	-0.2	69.7	984.2	2.9	308	2.3	015	0.48	-0.6	33.17	74.40	0.0	1.02	
1900	64 46.48S	64 3.30W	0.6	100	0.7	6	0.1	72.2	984.2	1.4	285	1.3	359	0.85	-0.7	33.04	50.00	0.0	1.06	
2213	64 46.48S	64 3.31W	0.2	100	0.5	6	-0.4	74.2	983.8	1.9	295	1.9	030	0.44	-0.8	33.07	71.60	0.0	1.03	
2300	64 46.48S	64 3.30W	0.4	100	0.4	6	-0.6	78.1	983.8	3.9	296	3.7	031	-0.01	-0.5	33.02	53.30	0.0	0.96	
2352	64 46.47S	64 3.31W	0.3	100	0.6	6	-0.8	79.1	983.9	3.3	322	3.1	058	0.25	-1.0	33.05	36.10	0.0	1.04	PREPARING TO LEAVE PALMER

DAILY SUMMARY

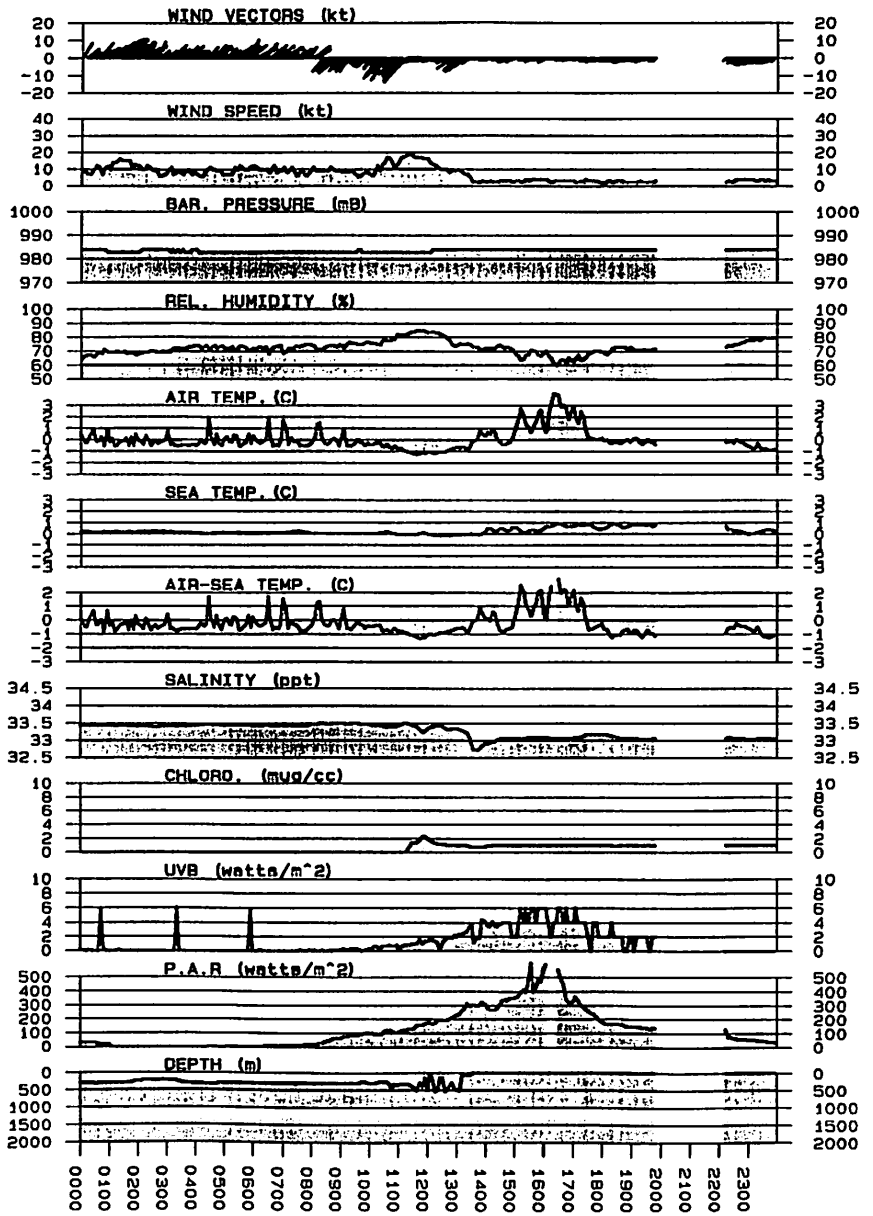
DISTANCE TRAVELLED TODAY 54.1 nm
TOTAL DISTANCE TRAVELLED 925.2 nm

SHIP'S SPEED (kts) ;	AVERAGE=	2.3	MAXIMUM=	13.5	AT 1255 HRS.	MINIMUM=	0.0	AT 0008 HRS.
AIR TEMPERATURE (C);	AVERAGE=	0.0	MAXIMUM=	4.7	AT 1621 HRS.	MINIMUM=	-1.3	AT 1132 HRS.
SEA TEMPERATURE (C);	AVERAGE=	0.25	MAXIMUM=	0.98	AT 1819 HRS.	MINIMUM=	-0.17	AT 1225 HRS.
SALINITY (ppt);	AVERAGE=	33.28	MAXIMUM=	33.52	AT 1112 HRS.	MINIMUM=	32.68	AT 1338 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	983.6	MAXIMUM=	984.4	AT 1335 HRS.	MINIMUM=	982.5	AT 1044 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	72.6	MAXIMUM=	84.8	AT 1135 HRS.	MINIMUM=	59.2	AT 1622 HRS.
WIND SPEED (kts);	AVERAGE=	7.4	MAXIMUM=	21.1	AT 0129 HRS.	MINIMUM=	0.5	AT 1902 HRS.

MEAN DAILY WIND VELOCITY= 0.4 (kts) FROM 050 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	130.15	MAXIMUM=	775.50	AT 1607 HRS.	MINIMUM=	-0.10	AT 0434 HRS.
UVB (watts/m^2)	AVERAGE=	1.3	MAXIMUM=	30.0	AT 0318 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.96	MAXIMUM=	3.37	AT 0009 HRS.	MINIMUM=	0.76	AT 1335 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-22-1994



SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0821	64 50.71S	62 54.04W	SC014B

PUV PROFILES

TIME	LATITUDE	LONGITUDE	EVENT
0922	64 50.03S	62 54.51W	SC12
0931	64 50.08S	62 54.96W	SC12

TETHERED SPECTRAL RADIANCE BUOYS

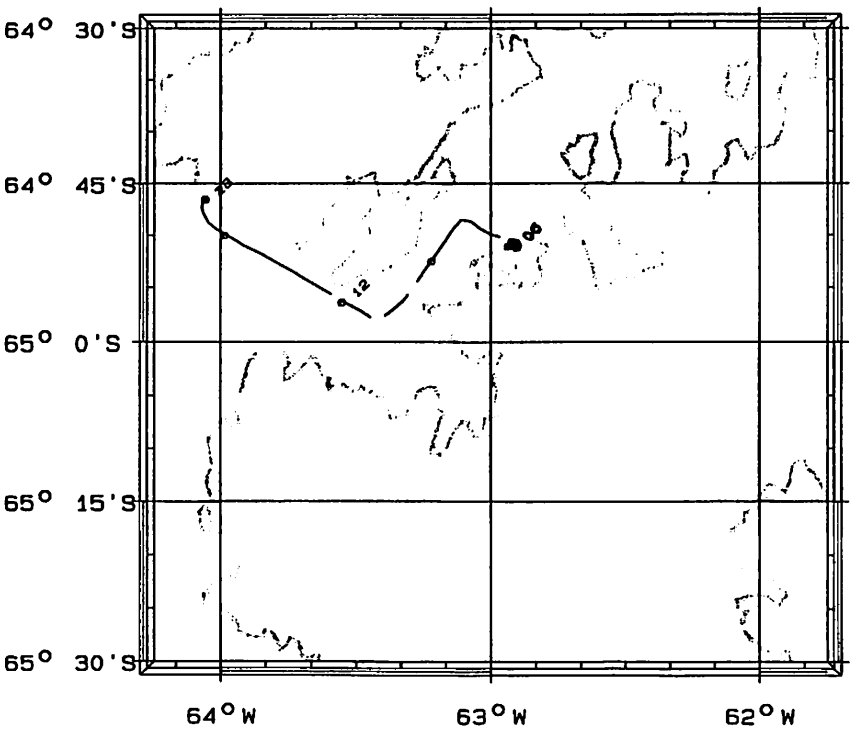
TIME	LATITUDE	LONGITUDE	EVENT
0906	64 50.73S	62 54.59W	SC13

OTHER INVESTIGATIONS and NOTES

SEDIMENT TRAP RECOVERY
(PARADISE BAY)
VISIT TO PALMER STATION
SANTA FIRST DOWN GANGWAY

SUN PHENOMENA

SUNRISE (02:14:28 LOCAL); THURSDAY; 12/22/94
L.A. NOON (13:14:45 LOCAL); THURSDAY; 12/22/94
SUNSET (00:05:59 LOCAL); THURSDAY; 12/22/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 15 12-23-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0000	64 46.49S	64 3.32W	0.3	101	0.0	6	-0.9	79.7	984.0	2.9	315	2.7	051	0.12	-1.0	33.03	34.30	0.0	0.98	
0003	64 46.48S	64 3.41W	1.4	086	0.1	28	-0.8	79.8	983.8	4.7	317	3.7	029	0.16	-0.9	32.96	32.90	0.0	1.04	LEAVE PALMER; HEADING HOME!
0116	64 52.96S	63 43.59W	6.5	288	11.9	645	-0.8	80.5	983.9	1.0	026	5.7	103	0.02	-0.8	33.34	18.10	0.0	2.20	
0155	64 50.80S	63 38.07W	12.7	212	4.5	319	-0.9	76.4	983.7	12.4	323	7.8	102	-0.05	-0.8	33.30	15.20	0.0	2.01	HUMPBACKS AND ORCAS!
0207	64 48.69S	63 34.27W	12.9	215	2.7	289	-0.6	73.7	983.9	14.2	346	3.5	140	-0.06	-0.5	33.31	9.90	0.0	2.14	
0300	64 42.97S	63 13.83W	12.8	216	11.1	310	-0.8	78.0	983.8	4.1	333	9.3	047	-0.02	-0.7	33.46	1.50	0.0	2.01	
0302	64 42.64S	63 13.23W	12.7	212	0.4	371	-0.8	76.6	983.9	5.1	321	9.3	051	-0.02	-0.7	33.47	1.50	0.0	1.92	SUNSET(00:02:32 LOCAL); FRIDAY; 12/23/94
0400	64 36.91S	62 48.99W	13.5	213	12.5	733	-0.6	79.4	983.5	4.5	032	10.0	019	0.04	-0.6	33.49	0.30	0.0	2.81	
0500	64 29.37S	62 22.57W	13.8	225	13.7	612	-0.5	80.8	983.0	7.2	272	15.3	073	0.13	-0.6	33.55	0.60	0.0	2.02	
0525	64 25.79S	62 12.51W	13.1	209	5.7	507	-0.3	80.2	982.8	0.0	067	13.1	029	0.07	-0.3	33.56	1.00	0.0	1.78	SUNRISE (02:25:45 LOCAL); FRIDAY; 12/23/9
0600	64 21.61S	61 58.01W	13.0	211	7.6	998	-0.2	82.1	982.8	4.9	072	12.4	009	0.28	-0.4	33.34	4.10	0.0	2.77	
0700	64 14.17S	61 32.49W	12.1	215	13.4	367	0.1	83.7	982.8	7.0	047	8.9	000	0.87	-0.7	33.30	20.70	0.0	2.07	
0756	64 11.37S	61 20.92W	0.6	219	6.1	471	0.8	79.0	982.7	5.8	143	6.3	006	1.20	-0.4	33.07	71.80	0.0	2.14	CTD SC0149 START (STATION "A")
0800	64 11.35S	61 20.82W	1.1	219	0.1	457	0.6	79.4	982.7	5.6	145	6.6	009	1.14	-0.5	33.11	54.30	0.0	2.39	
0834	64 11.19S	61 20.94W	0.5	190	0.4	421	0.8	79.5	982.7	4.1	175	4.6	005	1.23	-0.4	33.06	96.60	0.0	1.82	CTD SC0149 ON DECK
0900	64 11.15S	61 20.68W	1.3	151	0.4	408	2.9	75.2	982.5	8.4	232	9.2	017	1.19	1.7	33.11	23.20	0.0	1.83	
0910	64 11.06S	61 20.51W	0.5	187	0.2	420	1.5	74.1	982.7	10.3	156	10.8	344	1.20	0.3	33.11	12.60	10.0	1.77	TSRB 14 START
0926	64 10.96S	61 20.31W	0.7	222	0.2	404	0.6	80.2	982.5	14.4	143	14.9	006	1.15	-0.5	33.12	92.10	0.0	1.84	TSRB 14 ON DECK
0930	64 10.78S	61 20.24W	5.9	162	0.2	371	1.0	78.7	982.7	15.6	291	14.5	070	1.17	-0.1	33.11	26.50	0.0	1.73	OCM DRIFTER 01 DEPLOYED
1000	64 6.89S	61 29.85W	13.4	107	5.8	431	0.5	78.5	982.5	16.5	291	17.1	351	1.04	-0.5	33.15	93.70	0.0	2.01	
1022	64 4.46S	61 34.57W	4.1	101	3.2	94	1.3	77.3	982.9	8.4	271	9.2	346	1.00	0.3	33.22	72.30	0.0	2.37	STOPPING AT RACER ROCK
1032	64 4.40S	61 34.71W	1.6	153	0.3	5	3.0	72.4	982.9	6.8	200	8.3	349	0.98	2.0	33.22	84.50	0.0	2.68	ZODIAC AWAY
1100	64 4.43S	61 34.51W	0.5	339	0.5	78	1.2	78.0	983.1	0.0	096	0.5	159	0.99	0.2	33.22	80.00	0.0	2.67	
1200	64 4.56S	61 34.15W	0.8	033	1.5	96	1.5	74.3	983.3	0.4	069	0.8	184	1.30	0.2	33.24	14.20	0.0	1.53	
1300	64 4.25S	61 35.29W	0.4	260	1.5	77	2.5	74.9	983.7	2.9	265	3.0	158	1.17	1.3	33.24	57.00	0.0	1.79	
1307	64 4.31S	61 35.10W	0.8	302	0.2	71	2.9	71.6	983.8	2.1	179	2.9	121	1.15	1.7	33.25	99.80	0.0	2.00	ZODIAC RETURNS; BUILD NEW AWS CHARGING BO
1401	64 4.44S	61 34.38W	0.8	077	1.0	74	1.3	75.2	984.2	2.1	063	1.9	162	1.38	-0.5	33.25	66.30	0.0	1.41	
1643	64 4.40S	61 34.70W	0.6	024	0.4	80	3.7	59.7	984.1	1.0	041	0.7	102	1.54	2.1	33.20	51.30	0.0	1.24	
1644	64 4.40S	61 34.72W	0.5	326	0.0	90	3.1	61.2	984.1	1.6	044	1.2	026	1.54	1.5	33.20	47.10	0.0	1.24	ZODIAC RETURNS FROM RACER ROCK
1700	64 4.14S	61 31.31W	8.2	189	1.7	293	3.2	69.2	984.1	9.5	332	4.5	101	1.66	1.5	33.20	72.80	0.0	1.00	
1800	64 1.09S	61 41.52W	0.9	006	7.6	1214	1.5	76.1	984.1	2.9	118	3.4	137	2.08	-0.5	33.05	68.80	0.0	0.72	
1813	64 1.14S	61 41.49W	0.1	332	0.1	1212	1.7	74.1	985.2	2.3	122	2.4	096	1.84	-0.1	33.07	73.20	0.0	0.90	CTD SC0150 START
1900	64 0.97S	61 41.71W	0.9	195	0.6	1207	3.4	64.2	985.5	0.8	270	1.2	055	2.22	1.1	33.05	29.50	0.0	0.89	
1935	64 1.10S	61 41.72W	0.4	116	0.4	1212	3.1	66.4	985.7	0.0	039	0.4	296	2.34	0.7	33.02	16.70	0.0	0.74	CTD SC0150 ON DECK
1939	64 1.15S	61 41.67W	0.6	140	0.1	1214	2.9	67.1	985.6	0.0	241	0.6	320	2.17	0.7	33.05	98.00	0.0	0.99	TSRB 15 START

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1954	64 1.27S	61 41.45W	0.5	024	0.2	1217	3.1	65.9	985.7	0.0	099	0.5	204	2.20	0.9	33.03	06.90	0.0	0.90	TSRB 15 END
2000	64 1.29S	61 41.38W	0.3	055	0.1	1217	3.1	65.5	985.6	1.2	032	0.9	097	2.27	0.8	33.02	87.70	0.0	0.79	
2100	64 0.75S	61 41.94W	0.4	170	1.0	1188	3.3	61.2	986.1	1.7	254	1.9	052	2.40	0.9	33.03	85.10	0.0	0.93	
2200	63 59.99S	61 40.81W	1.8	179	1.8	1186	3.3	68.6	986.4	3.9	211	5.5	020	2.31	0.9	33.05	12.50	0.0	0.71	
2215	63 59.78S	61 40.76W	0.7	224	0.3	1193	2.2	67.8	986.6	5.1	133	5.6	003	2.19	0.4	33.13	28.70	0.0	0.81	CTD SC0151 START
2303	63 59.00S	61 39.67W	8.9	179	1.1	128	2.6	57.3	986.8	3.9	311	6.9	023	2.20	0.4	33.31	52.30	38.3	0.78	

DAILY SUMMARY

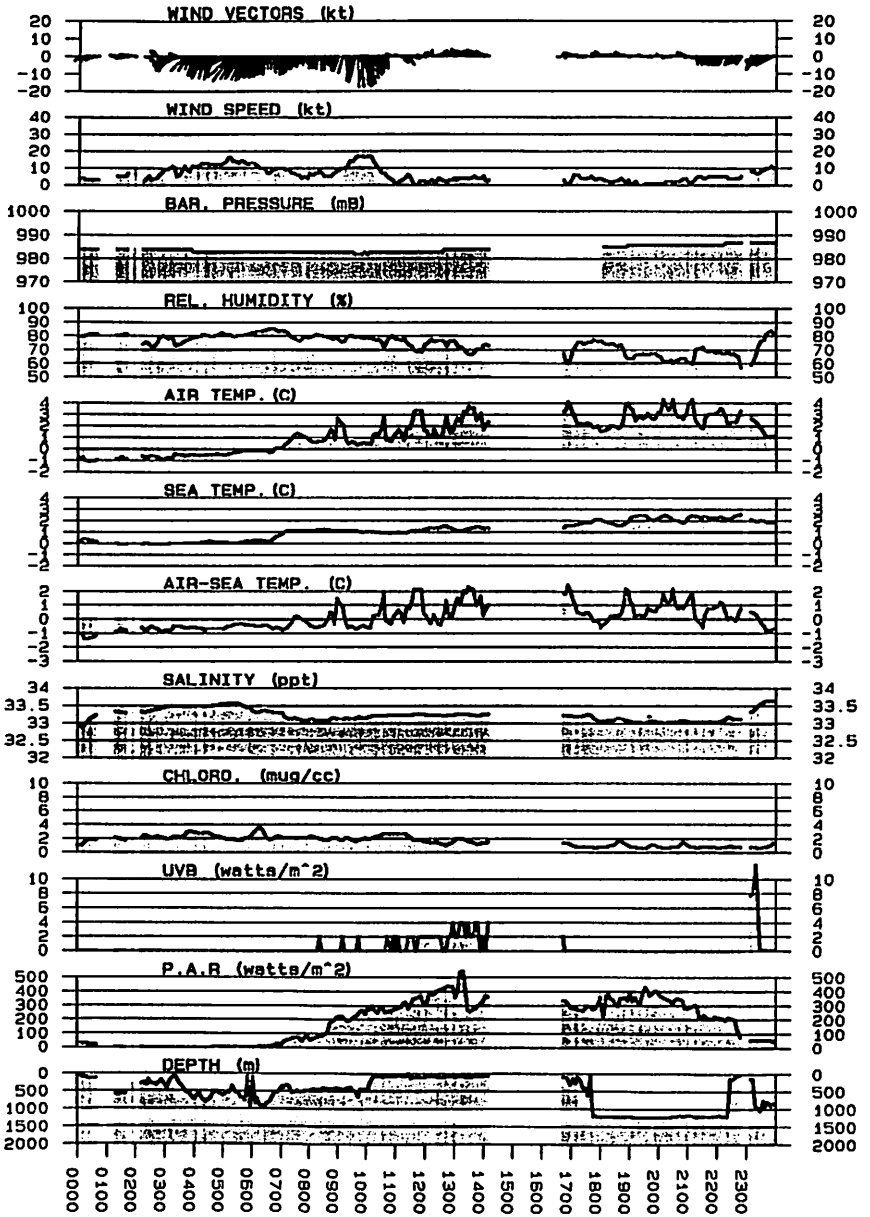
DISTANCE TRAVELLED TODAY 132.0 nm
TOTAL DISTANCE TRAVELLED 1057.2 nm

SHIP'S SPEED (kts) ;	AVERAGE=	5.9	MAXIMUM=	14.8	AT 0408 HRS.	MINIMUM=	0.0	AT 0806 HRS.
AIR TEMPERATURE (C);	AVERAGE=	1.3	MAXIMUM=	4.8	AT 2027 HRS.	MINIMUM=	-1.1	AT 0012 HRS.
SEA TEMPERATURE (C);	AVERAGE=	1.18	MAXIMUM=	2.57	AT 2245 HRS.	MINIMUM=	-0.08	AT 0140 HRS.
SALINITY (ppt);	AVERAGE=	33.23	MAXIMUM=	33.64	AT 2339 HRS.	MINIMUM=	32.87	AT 0007 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	984.1	MAXIMUM=	987.0	AT 2330 HRS.	MINIMUM=	982.2	AT 0932 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	74.7	MAXIMUM=	85.3	AT 0634 HRS.	MINIMUM=	56.6	AT 2246 HRS.
WIND SPEED (kts);	AVERAGE=	6.2	MAXIMUM=	18.6	AT 0508 HRS.	MINIMUM=	0.1	AT 1916 HRS.

MEAN DAILY WIND VELOCITY= 4.5 (kts) FROM 072 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	184.44	MAXIMUM=	602.20	AT 1318 HRS.	MINIMUM=	0.00	AT 1801 HRS.
UVB (watts/m^2)	AVERAGE=	0.5	MAXIMUM=	40.1	AT 2320 HRS.	MINIMUM=	0.0	AT 0000 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.67	MAXIMUM=	3.60	AT 0613 HRS.	MINIMUM=	0.62	AT 1930 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-23-1994



SCIENTIFIC ACTIVITIES THIS DAY:

CTD CASTS

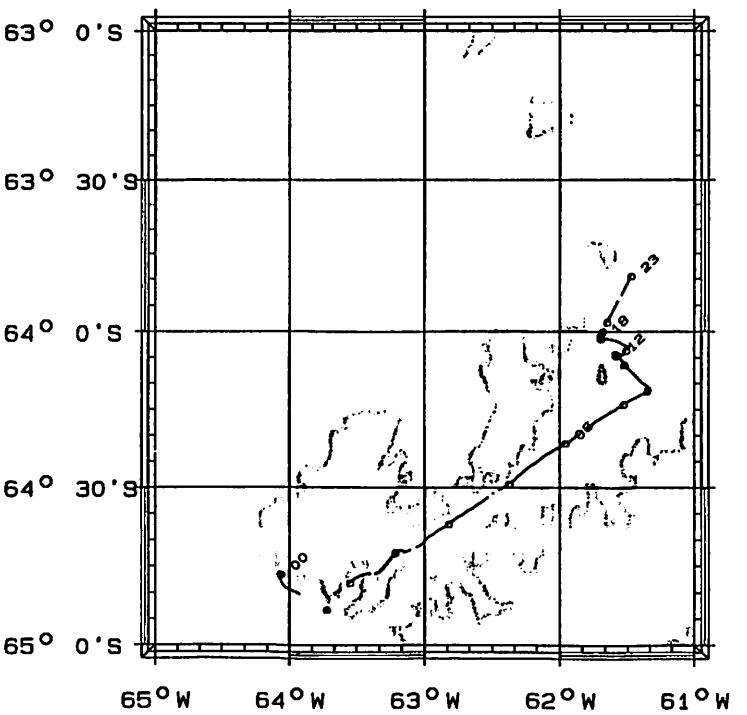
TIME	LATITUDE	LONGITUDE	EVENT
0756	64 11.41S	61 20.86W	SC0149
1813	64 01.15S	61 41.97W	SC0150
2215	63 59.46S	61 40.41W	SC0151

TETHERED SPECTRAL RADIANCE BUOYS

TIME	LATITUDE	LONGITUDE	EVENT
0910	64 11.02S	61 20.14W	SC14
1939	64 01.12S	61 41.82W	SC15

OTHER INVESTIGATIONS and NOTES

LEAVE PALMER STATION
REVISIT RACER STATION "A"
REPAIR AWS ON RACER ROCK
SUN PHENOMENA
SUNRISE (02: 25: 45 LOCAL): FRIDAY; 12/23/94
SUNSET (00: 02: 32 LOCAL): FRIDAY; 12/23/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 16 12-24-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	63 48.24S	61 26.58W	12.9	186	0.0	874	1.5	75.2	987.0	11.5	327	6.9	068	2.02	-0.5	33.64	43.20	0.1	2.07	
0100	63 37.08S	61 13.15W	12.5	003	12.7	352	0.9	86.9	987.5	11.3	337	4.9	247	0.92	-0.5	34.02	11.50	0.0	1.78	
0200	63 26.28S	60 58.87W	13.0	356	12.6	200	0.5	89.6	987.8	9.3	339	5.3	213	0.42	0.5	34.01	2.60	0.0	1.80	
0219	63 22.56S	60 54.59W	13.3	358	4.2	320	0.4	90.5	988.1	11.9	356	1.6	203	0.61	-0.2	34.03	1.50	0.0	1.63	SUNSET(01:19:30 LOCAL); FRIDAY; 12/23/94
0300	63 14.83S	60 45.71W	13.6	352	8.7	526	0.2	90.3	988.2	9.7	336	6.1	211	0.81	-0.6	33.97	0.20	0.0	2.08	
0400	63 3.41S	60 31.19W	13.1	001	13.3	463	0.1	89.1	988.4	15.2	327	8.2	268	0.40	-0.3	33.86	0.10	0.0	1.92	
0500	62 58.25S	60 36.60W	5.2	303	7.3	144	0.1	83.4	988.8	7.2	328	3.9	226	1.44	-1.3	33.71	0.20	0.0	3.83	
0553	62 57.54S	60 37.43W	2.7	343	1.6	153	0.2	84.9	989.2	3.7	323	2.2	259	1.53	-1.3	33.73	2.40	0.0	5.20	SUNRISE (02:53:37 LOCAL); SATURDAY; 12/24
0600	62 57.47S	60 37.42W	0.3	326	0.1	152	0.2	85.0	989.3	2.7	291	2.6	251	1.55	-1.3	33.73	2.60	0.0	5.04	
0608	62 57.47S	60 37.39W	0.7	355	0.1	153	0.2	85.6	989.3	1.7	261	2.0	235	1.71	-1.5	33.72	3.10	0.0	4.79	CTD SC0152 START
0630	62 57.47S	60 37.48W	0.4	006	0.3	154	0.2	85.4	989.5	3.3	354	2.9	359	1.64	-1.4	33.73	7.10	0.0	4.80	CTD SC0152 ON DECK
0652	62 57.44S	60 37.57W	0.4	327	0.3	157	0.5	84.9	989.5	3.3	349	2.9	314	1.60	-1.1	33.73	22.80	0.0	4.64	CTD SC0153 START
0701	62 57.45S	60 37.63W	0.4	302	0.1	158	0.5	84.2	989.5	2.9	355	2.5	296	1.68	-1.1	33.73	21.30	0.0	4.39	
0718	62 57.58S	60 37.65W	1.6	197	0.3	158	0.3	83.6	989.6	2.1	117	3.2	340	1.57	-1.2	33.72	30.90	0.0	4.72	CTD SC0153 ON DECK
0800	62 56.06S	60 38.93W	0.4	289	1.8	153	0.4	81.6	989.8	1.6	056	1.4	359	1.92	-1.5	33.64	91.50	0.1	6.00	
0808	62 56.07S	60 38.97W	0.2	282	0.1	153	0.5	81.4	989.8	0.8	008	0.6	293	1.85	-1.3	33.66	52.10	0.0	5.77	CTD SC0154 START
0836	62 56.03S	60 38.90W	0.5	277	0.3	152	0.8	80.1	989.9	0.6	031	0.3	007	2.07	-1.2	33.63	84.00	0.2	6.37	CTD SC0154 ON DECK
0900	62 57.88S	60 41.11W	4.4	187	2.2	112	0.9	81.6	990.0	2.7	324	2.7	043	1.86	-0.9	33.68	69.90	0.2	4.09	
0923	62 58.01S	60 41.45W	0.1	265	0.4	108	0.8	80.9	990.0	3.5	020	3.4	285	1.73	-0.9	33.73	82.40	0.3	2.96	CTD SC0155 START
0950	62 58.01S	60 41.49W	0.6	311	0.3	107	1.3	79.0	990.0	2.7	068	2.6	032	1.70	-0.4	33.73	82.40	0.5	3.30	CTD SC155 ON DECK
1000	62 58.04S	60 40.33W	1.4	295	0.5	114	1.8	77.3	990.2	0.6	306	1.2	139	1.68	0.1	33.73	09.00	0.5	2.49	
1033	62 58.00S	60 41.53W	0.6	115	0.8	108	0.7	79.0	990.2	3.7	153	4.2	272	1.61	-0.9	33.74	09.80	0.8	2.79	CTD SC0156 START
1100	62 57.86S	60 41.24W	1.2	144	0.4	113	0.7	78.0	990.1	5.2	141	6.2	292	1.55	-0.8	33.72	88.30	0.0	2.13	CTD SC0156 ON DECK
1200	62 57.99S	60 38.90W	2.6	105	2.0	146	2.8	74.2	990.2	3.9	263	4.9	336	2.00	0.8	33.72	56.40	1.0	2.52	
1208	62 57.98S	60 38.91W	0.2	119	0.1	144	3.0	72.2	990.3	4.5	222	4.6	339	1.89	1.1	33.73	66.80	2.0	3.09	CTD SC0157 START
1300	62 59.40S	60 35.63W	3.8	097	2.4	108	3.4	72.1	990.5	2.1	245	5.1	299	1.86	1.5	33.72	27.20	3.0	1.29	
1313	62 59.51S	60 35.49W	0.6	100	0.3	64	3.4	70.8	990.4	5.2	220	5.7	316	1.45	1.9	33.72	43.40	3.0	1.13	CTD SC0158 START
1337	62 59.59S	60 35.21W	1.4	160	0.5	68	1.7	75.9	990.6	2.3	230	3.4	012	1.19	0.5	33.75	64.80	0.0	1.43	CTD SC0158 ON DECK
1357	62 58.89S	60 33.76W	0.3	238	1.1	57	3.0	73.3	990.6	3.5	270	3.5	143	2.06	0.9	33.62	99.70	3.0	1.53	ANCHORED IN WHALER'S BAY
1358	62 58.88S	60 33.78W	0.3	231	0.0	53	3.1	72.8	990.6	3.1	281	3.1	147	2.10	1.0	33.62	73.10	5.0	1.50	SHORE PARTIES TO DECEPTION I.
1400	62 58.86S	60 33.78W	0.3	225	0.0	50	2.8	73.0	990.8	3.9	283	3.8	144	2.15	0.6	33.62	35.90	3.0	1.51	
1529	62 58.84S	60 33.84W	0.4	159	0.1	36	2.4	71.2	990.8	5.6	314	5.4	110	1.72	0.6	33.71	82.30	0.0	3.00	
1600	62 58.85S	60 33.84W	0.3	131	0.3	41	2.0	65.0	990.9	9.1	086	9.1	219	1.95	0.4	33.66	40.80	0.0	2.38	
1601	62 58.85S	60 33.83W	0.2	134	0.0	42	2.0	65.2	990.9	8.0	087	8.0	223	1.96	0.4	33.66	39.40	0.0	2.39	L.A. NOON(13:01:43 LOCAL); SATURDAY; 12/2
1700	62 58.87S	60 33.72W	0.3	235	0.5	56	2.8	67.4	991.2	12.1	001	11.8	236	1.77	1.0	33.70	40.80	0.0	2.55	

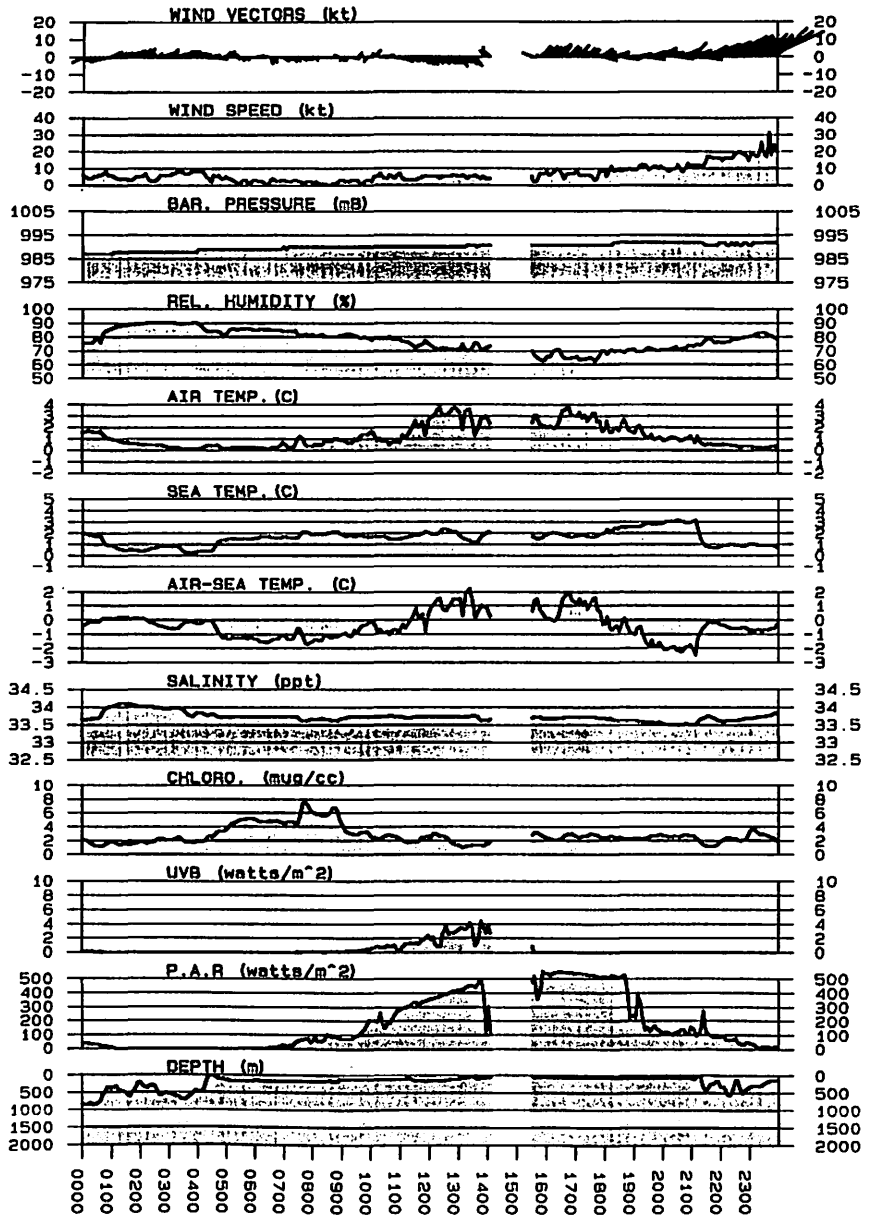
POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 16 12-24-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1800	62 58.89S	60 33.74W	0.3	228	0.9	61	2.2	69.1	991.4	10.7	005	10.4	233	2.18	0.4	33.67	17.50	0.0	2.46	
1900	62 58.92S	60 33.72W	0.6	288	0.6	69	1.4	70.7	991.7	7.8	317	7.3	242	2.53	-1.1	33.60	71.10	0.0	2.32	
2000	62 58.89S	60 33.78W	0.1	237	0.4	65	0.8	71.0	991.8	11.3	013	11.2	250	2.95	-2.1	33.51	14.20	0.0	2.67	
2100	62 58.93S	60 33.77W	0.8	065	0.7	79	1.6	71.1	992.0	10.1	162	10.9	228	2.98	-1.3	33.50	63.50	0.0	2.71	
2101	62 58.95S	60 33.78W	0.7	088	0.0	79	1.0	73.2	991.9	11.3	099	11.4	190	3.02	-2.0	33.50	36.90	0.0	2.76	LEAVE DECEPTION ISLAND
2102	62 58.99S	60 33.72W	2.3	133	0.1	87	0.7	73.8	991.7	15.4	040	13.7	179	3.04	-2.3	33.50	42.50	0.0	2.78	UNDERWAY FOR P.A!
2200	63 3.33S	60 42.90W	13.1	259	10.4	317	0.5	75.6	991.5	26.6	347	14.2	234	0.87	-0.3	33.59	03.60	0.0	1.95	
2230	63 4.02S	60 57.24W	13.0	269	6.6	133	0.4	78.0	991.5	29.9	339	18.3	234	0.94	-0.5	33.62	71.10	0.0	2.29	SANTA CLAUS ARRIVES ABOARD
2300	63 0.89S	61 10.58W	13.6	300	6.9	305	0.3	80.8	991.4	26.4	319	18.3	231	1.07	-0.7	33.67	37.00	0.0	3.48	
0000	62 53.61S	61 34.11W	12.3	305	13.0	115	0.3	78.7	991.8	28.8	305	23.8	225	0.74	-0.4	33.84	20.80	0.0	1.71	

DAILY SUMMARY

DISTANCE TRAVELLED TODAY	115.4 nm								
TOTAL DISTANCE TRAVELLED	1172.6 nm								
SHIP'S SPEED (kts) ;		AVERAGE=	5.0	MAXIMUM=	14.2	AT 0013 HRS.	MINIMUM=	0.0	AT 0526 HRS.
AIR TEMPERATURE (C);		AVERAGE=	1.2	MAXIMUM=	3.8	AT 1219 HRS.	MINIMUM=	0.0	AT 0351 HRS.
SEA TEMPERATURE (C);		AVERAGE=	1.60	MAXIMUM=	3.21	AT 2030 HRS.	MINIMUM=	0.24	AT 0350 HRS.
SALINITY (ppt);		AVERAGE=	33.73	MAXIMUM=	34.10	AT 0123 HRS.	MINIMUM=	33.48	AT 2107 HRS.
BAROMETRIC PRESSURE (mb);		AVERAGE=	990.1	MAXIMUM=	992.1	AT 2003 HRS.	MINIMUM=	987.0	AT 0001 HRS.
RELATIVE HUMIDITY (%);		AVERAGE=	78.1	MAXIMUM=	90.5	AT 0219 HRS.	MINIMUM=	61.2	AT 1554 HRS.
WIND SPEED (kts);		AVERAGE=	7.0	MAXIMUM=	57.7	AT 2350 HRS.	MINIMUM=	0.1	AT 0810 HRS.
MEAN DAILY WIND VELOCITY= 5.7 (kts) FROM 225 DEGREES TRUE									
SOLAR RADIATION-PAR (watts/m^2);		AVERAGE=	173.18	MAXIMUM=	567.30	AT 1538 HRS.	MINIMUM=	-0.20	AT 0424 HRS.
UVB (watts/m^2)		AVERAGE=	0.4	MAXIMUM=	8.0	AT 1343 HRS.	MINIMUM=	0.0	AT 0002 HRS.
FLUORESCENCE (mg/m^3);		AVERAGE=	2.80	MAXIMUM=	7.85	AT 0738 HRS.	MINIMUM=	1.05	AT 1310 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-24-1994

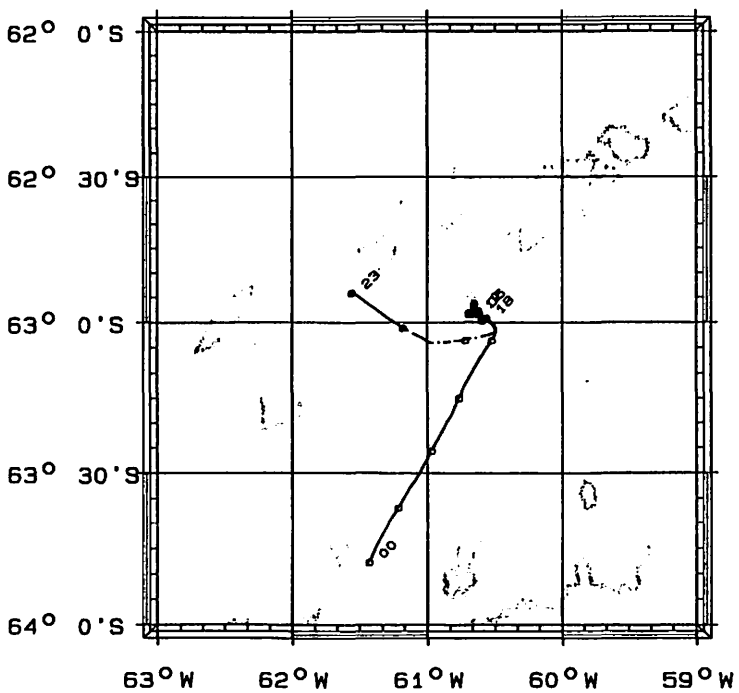


SCIENTIFIC ACTIVITIES THIS DAY;

CTD CASTS

TIME	LATITUDE	LONGITUDE	EVENT
0608	62 57.91S	60 37.78W	SC0152
0652	62 57.67S	60 37.78W	SC0153
0808	62 56.08S	60 38.08W	SC0154
0923	62 58.02S	60 41.28W	SC0155
1033	62 58.04S	60 41.24W	SC0156
1208	62 57.79S	60 38.21W	SC0157
1313	62 59.41S	60 35.97W	SC0158

OTHER INVESTIGATIONS and NOTES
DECEPTION ISLAND VISIT
STAND DOWN FROM WORK
FOR CHRISTMAS CELEBRATIONS
SUN PHENOMENA
SUNRISE (02:53:37 LOCAL); SATURDAY; 12/24/94
L.A. NOON (13:01:43 LOCAL); SATURDAY; 12/24/94
SUNSET (01:19:30 LOCAL); FRIDAY; 12/23/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 17 12-25-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	62 53.50S	61 34.50W	12.5	304	0.0	114	0.3	78.5	991.8	17.5	307	14.0	206	0.74	-0.4	33.84	21.20	0.0	1.69	
0100	62 44.94S	61 52.73W	13.1	351	12.8	179	0.4	74.0	992.0	23.3	306	18.7	263	1.06	-0.6	33.85	22.40	0.0	3.00	
0200	62 31.63S	61 58.38W	13.0	143	13.6	179	0.4	74.1	992.7	19.6	295	18.3	038	0.95	-0.5	33.89	2.30	0.0	4.17	
0207	62 30.26S	61 58.83W	13.7	136	1.4	217	0.4	73.5	992.7	19.6	298	17.7	032	0.97	-0.5	33.89	1.60	0.0	4.51	SUNSET(01:07:45 LOCAL); SATURDAY; 12/24/9
0300	62 18.54S	62 4.85W	13.6	348	12.1	1562	0.6	79.5	992.8	19.6	319	12.8	264	1.05	-0.4	33.64	0.0	0.0	2.56	
0400	62 5.30S	62 10.59W	13.2	350	13.6	0	1.1	80.9	993.1	23.1	322	15.0	280	0.91	0.1	33.62	-0.10	0.0	2.10	
0436	61 58.27S	62 14.25W	12.2	348	7.5	0	1.1	79.8	992.7	24.5	325	16.1	287	1.15	-0.4	33.62	-0.20	0.0	1.03	OCM DRIFTER #02 DEPLOYED
0500	61 53.08S	62 16.60W	13.0	349	5.3	0	1.0	79.4	992.9	23.3	325	14.6	284	1.48	-0.4	33.63	-0.20	0.0	1.20	
0600	61 40.07S	62 22.57W	14.4	350	13.4	0	1.2	76.9	993.0	28.4	329	17.7	294	1.71	-0.5	33.62	0.80	0.0	1.61	
0623	61 35.07S	62 24.91W	13.6	348	5.1	0	1.0	80.3	993.2	26.2	331	15.7	294	1.73	-0.7	33.62	2.00	0.0	0.73	SUNRISE (03:23:54 LOCAL); SUNDAY; 12/25/9
0700	61 27.14S	62 28.64W	13.5	348	8.2	0	0.9	84.2	993.1	23.3	338	11.8	302	1.70	-0.8	33.62	11.20	0.0	0.68	
0800	61 14.20S	62 35.05W	13.1	351	13.4	0	1.0	89.0	992.9	22.7	356	9.7	342	1.76	-0.7	33.62	39.70	0.0	0.65	
0900	61 1.21S	62 40.92W	13.3	347	13.3	0	1.3	87.1	992.8	21.2	000	7.9	349	1.89	-0.5	33.60	38.00	0.0	0.44	
1000	60 48.27S	62 46.46W	13.4	347	13.3	0	1.6	92.9	992.5	23.5	007	10.4	004	1.69	-0.5	33.61	69.00	0.0	0.47	
1100	60 34.91S	62 53.01W	13.6	352	13.8	0	2.3	94.0	991.3	23.1	007	9.8	009	2.05	0.2	33.60	24.50	0.0	0.44	
1140	60 26.08S	62 56.38W	15.5	350	9.0	0	2.6	94.5	991.4	24.1	004	8.8	003	2.43	0.1	33.62	73.00	0.0	0.46	BIRD OBS 0 START
1150	60 24.10S	62 57.19W	12.3	351	2.0	0	2.6	94.6	991.2	24.7	002	12.4	356	2.40	0.2	33.62	90.60	0.0	0.45	BIRD OBS 1 START
1200	60 21.94S	62 57.99W	14.0	351	2.2	0	2.7	94.5	991.0	25.1	001	11.1	355	2.34	0.3	33.62	25.00	0.0	0.42	BIRD OBS 2 START
1300	60 9.05S	63 2.34W	12.7	353	13.1	0	3.0	94.7	990.4	25.9	345	14.0	324	2.25	0.7	33.61	24.10	0.0	0.45	
1330	60 2.47S	63 4.99W	13.7	346	6.7	0	3.2	94.0	990.4	25.3	338	13.6	301	2.24	0.9	33.60	52.30	0.0	0.36	BIRD OBS 3 START
1340	60 0.36S	63 5.87W	12.8	348	2.2	0	3.3	94.1	990.3	25.1	337	14.1	305	2.41	0.8	33.60	15.70	0.0	0.35	BIRD OBS 4 START
1350	59 58.26S	63 6.65W	13.1	347	2.1	0	3.4	94.0	990.1	24.3	334	13.8	296	2.50	0.9	33.59	01.40	0.0	0.34	BIRD OBS 5 START
1400	59 56.13S	63 7.53W	12.2	346	2.2	0	3.4	94.0	990.3	23.7	332	14.0	295	2.53	0.8	33.58	70.40	0.0	0.37	BIRD OBS 6 START
1410	59 53.99S	63 8.44W	13.6	348	2.2	0	3.6	93.5	990.5	23.5	329	13.7	286	2.54	1.0	33.58	81.00	0.0	0.38	BIRD OBS 7 START
1420	59 52.11S	63 9.36W	12.8	350	1.9	0	3.6	93.0	990.2	0.0	328	---	316	2.54	1.0	33.57	05.00	0.0	0.39	BIRD OBS 8 START
1500	59 43.54S	63 13.45W	12.5	347	8.8	0	3.6	92.0	990.1	21.0	324	13.1	277	2.79	0.8	33.59	07.90	0.0	0.34	
1540	59 35.21S	63 17.72W	13.8	348	8.6	0	3.6	92.0	990.4	18.7	319	12.2	259	2.87	0.7	33.56	77.80	0.0	0.38	BIRD OBS 9 START
1550	59 33.13S	63 18.69W	12.7	346	2.1	0	3.6	91.9	990.5	18.5	318	12.2	261	3.01	0.5	33.56	63.50	0.0	0.37	BIRD OBS 10 START
1558	59 31.43S	63 19.56W	13.1	347	1.8	0	3.4	92.3	990.3	18.5	317	12.6	258	3.11	0.2	33.56	44.10	0.0	0.42	MINKE WHALE
1600	59 31.01S	63 19.76W	13.0	347	0.4	0	3.4	92.3	990.3	18.7	316	13.0	258	3.12	0.2	33.56	07.30	0.0	0.42	BIRD OBS 11 START
1601	59 30.79S	63 19.87W	13.1	348	0.2	0	3.4	92.3	990.3	18.3	314	12.9	257	3.12	0.2	33.56	56.70	0.0	0.45	MINKE WHALE
1610	59 29.01S	63 20.68W	13.8	348	1.8	0	3.3	92.6	990.5	18.5	314	13.2	254	3.07	0.2	33.56	35.50	0.0	0.44	BIRD OBS 12 START
1613	59 28.35S	63 21.00W	13.5	349	0.7	0	3.3	92.8	990.3	18.3	313	13.2	255	3.04	0.2	33.57	25.80	0.0	0.45	L.A. NOON(13:13:22 LOCAL); SUNDAY; 12/25/
1620	59 26.67S	63 21.74W	13.5	351	1.7	0	3.3	92.9	990.2	17.7	313	12.9	255	3.06	0.2	33.57	80.80	0.0	0.42	BIRD OBS 13 START
1630	59 24.49S	63 22.70W	14.2	349	2.2	0	3.3	92.8	990.4	17.1	315	12.3	249	2.91	0.3	33.58	95.80	0.0	0.36	BIRD OBS 14 START

POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 17 12-25-1994 ; PAGE # 2

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
1640	59 22.34S	63 23.72W	13.5	350	2.2	0	3.3	92.8	990.5	16.7	313	12.2	250	2.91	0.3	33.56	63.30	0.0	0.33	BIRD OBS 15 START
1700	59 18.04S	63 25.42W	13.0	352	4.4	0	3.3	92.4	990.4	16.1	315	11.5	254	2.73	0.5	33.60	78.60	0.0	0.40	
1750	59 7.14S	63 29.47W	13.2	350	11.1	0	3.8	91.5	990.7	14.8	321	9.4	249	2.98	0.8	33.56	27.00	0.0	0.38	BIRD OBS 17 START
1800	59 4.92S	63 30.27W	13.3	350	2.3	0	3.8	91.8	990.3	15.4	322	9.4	253	2.95	0.8	33.56	91.40	0.0	0.40	BIRD OBS 18 START
1810	59 2.64S	63 31.05W	13.7	351	2.3	0	3.8	92.2	990.5	14.2	319	9.7	243	2.93	0.8	33.54	07.20	0.0	0.40	BIRD OBS 19 START
1820	59 0.49S	63 31.73W	14.1	350	2.2	0	3.9	92.3	990.5	13.2	321	9.1	235	2.94	0.9	33.53	91.50	0.0	0.39	BIRD OBS 20 START
1830	58 58.26S	63 32.31W	13.1	350	2.3	0	3.8	92.6	990.7	13.4	323	8.2	244	2.96	0.8	33.51	51.00	0.0	0.36	BIRD OBS 21 START
1840	58 56.05S	63 32.88W	13.5	351	2.2	0	3.6	93.0	990.8	14.4	319	9.6	245	3.00	0.6	33.49	39.40	0.0	0.37	BIRD OBS 22 START
1900	58 51.62S	63 33.92W	13.3	351	4.5	0	3.7	93.6	990.7	11.9	316	9.4	231	3.26	0.4	33.46	48.80	0.0	0.40	
1911	58 49.18S	63 34.57W	13.2	350	2.5	0	3.8	93.3	990.9	12.6	313	10.3	233	3.62	0.1	33.48	36.10	0.0	0.44	SCDP-7
1930	58 44.95S	63 35.80W	13.4	346	4.3	0	4.0	92.6	991.0	12.8	307	11.7	227	4.68	-0.6	33.64	36.10	0.0	0.41	BIRD OBS 22 START
1940	58 42.89S	63 36.54W	13.4	348	2.1	0	4.2	91.1	991.1	12.6	304	12.2	226	5.11	-0.9	33.74	82.20	0.0	0.41	BIRD OBS 23 START
1950	58 40.71S	63 37.37W	13.4	346	2.2	0	4.3	90.3	991.0	12.6	304	12.1	225	5.17	-0.8	33.74	00.40	0.0	0.40	BIRD OBS 24 START
2000	58 38.53S	63 38.19W	13.3	349	2.2	0	4.4	90.0	991.2	12.4	302	12.5	226	5.18	-0.7	33.73	70.30	0.0	0.37	BIRD OBS 25 START
2010	58 36.33S	63 39.12W	13.2	350	2.3	0	4.5	89.0	991.2	11.3	301	12.1	222	5.18	-0.6	33.69	18.40	0.0	0.37	BIRD OBS 26 START
2020	58 34.17S	63 40.06W	13.3	349	2.2	0	4.6	88.4	991.0	12.8	306	11.7	230	5.07	-0.4	33.67	75.70	0.0	0.36	BIRD OBS 27 START
2100	58 25.55S	63 43.32W	13.2	347	8.8	0	4.4	92.1	991.0	12.8	302	12.5	226	4.99	-0.5	33.64	62.60	0.0	0.37	
2140	58 16.93S	63 46.28W	13.2	348	8.8	0	4.9	90.0	991.3	13.6	295	14.2	227	6.62	-1.7	33.96	15.60	0.0	1.01	BIRD OBS 27 START
2150	58 14.81S	63 47.19W	13.1	349	2.2	0	5.2	88.5	991.0	15.9	286	17.5	229	6.75	-1.5	33.98	70.90	0.0	1.04	BIRD OBS 28 START
2200	58 12.63S	63 48.11W	13.4	347	2.2	0	5.2	87.3	991.5	12.6	289	15.1	219	6.68	-1.4	34.00	42.10	0.0	0.92	SCDP 8
2210	58 10.49S	63 48.98W	13.3	348	2.2	0	5.5	86.8	991.4	11.5	294	13.5	218	6.59	-1.0	33.96	83.70	0.0	0.90	BIRD OBS 30 START
2220	58 8.19S	63 49.93W	13.2	350	2.4	0	5.4	87.4	991.5	11.5	292	13.8	220	6.78	-1.3	34.01	02.90	0.0	1.89	BIRD OBS 31 START
2230	58 6.05S	63 50.83W	13.1	346	2.2	0	5.5	87.6	991.6	13.2	291	14.8	222	6.78	-1.2	34.01	46.10	0.0	2.11	BIRD OBS 32 START
2240	58 3.87S	63 51.49W	13.4	352	2.2	0	5.3	89.2	991.4	12.8	287	15.5	224	6.81	-1.5	34.02	61.10	0.0	2.20	BIRD OBS 33 START
2300	57 59.72S	63 52.83W	13.2	350	4.2	0	5.3	90.8	991.7	13.4	289	15.4	225	6.85	-1.5	34.02	55.90	0.0	2.05	
2340	57 51.06S	63 55.72W	13.7	349	8.8	0	6.2	85.5	991.3	15.9	283	18.5	226	6.81	-0.6	34.01	74.10	0.0	2.03	BIRD OBS 33 START
2350	57 48.95S	63 56.47W	14.8	349	2.2	0	5.9	87.4	991.9	18.1	270	23.2	220	6.86	-0.9	34.02	16.80	0.0	2.17	BIRD OBS 34 START
0000	57 46.74S	63 57.23W	13.6	353	2.3	0	6.0	86.4	992.0	13.2	270	19.0	217	6.94	-0.9	34.02	17.60	0.0	2.01	BIRD OBS 35 START

DAILY SUMMARY

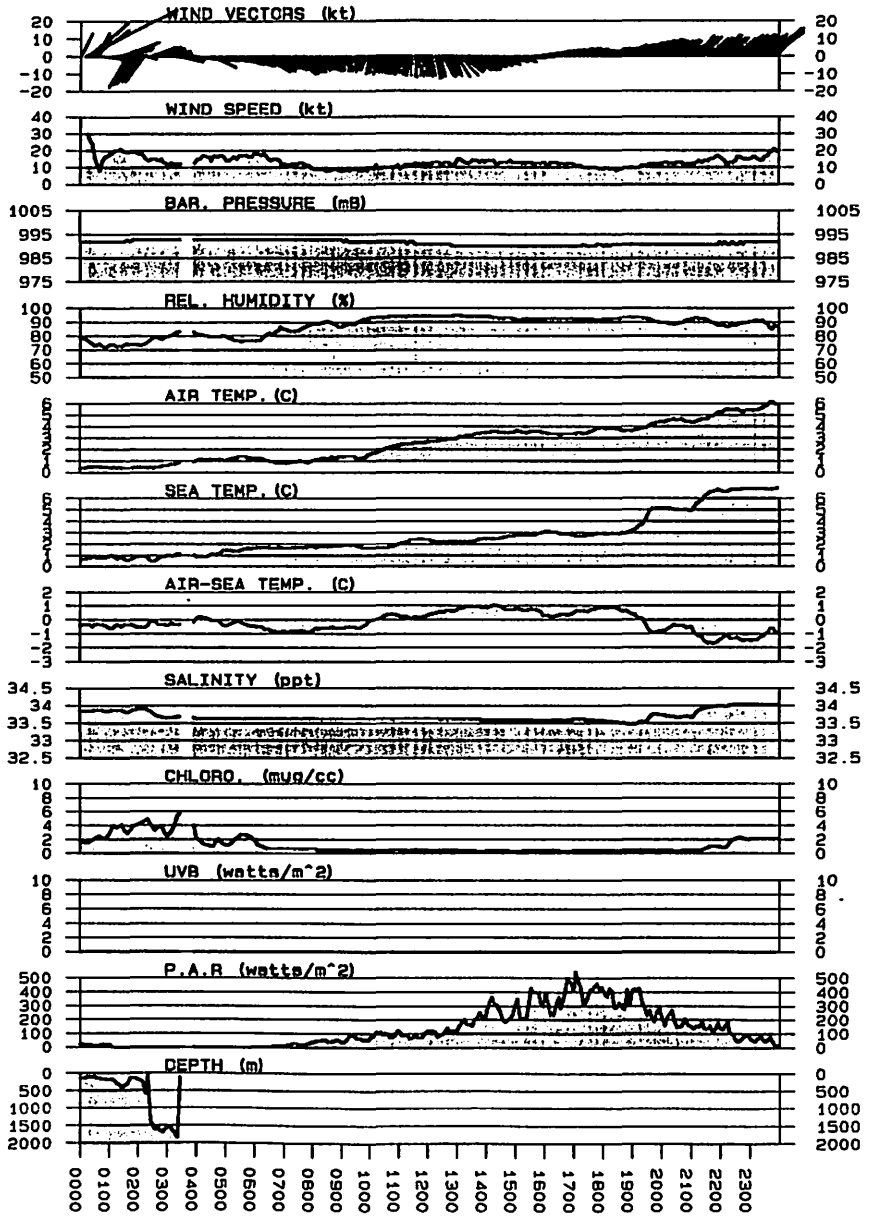
DISTANCE TRAVELLED TODAY 318.7 nm
TOTAL DISTANCE TRAVELLED 1491.3 nm

SHIP'S SPEED (kts) ;	AVERAGE=	13.3	MAXIMUM=	15.7	AT 0553 HRS.	MINIMUM=	4.1	AT 0432 HRS.
AIR TEMPERATURE (C);	AVERAGE=	2.6	MAXIMUM=	6.2	AT 2340 HRS.	MINIMUM=	0.0	AT 0008 HRS.
SEA TEMPERATURE (C);	AVERAGE=	2.76	MAXIMUM=	6.94	AT 2358 HRS.	MINIMUM=	0.45	AT 0227 HRS.
SALINITY (ppt);	AVERAGE=	33.68	MAXIMUM=	34.03	AT 2305 HRS.	MINIMUM=	33.45	AT 1852 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	991.7	MAXIMUM=	993.5	AT 0318 HRS.	MINIMUM=	990.1	AT 1329 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	87.5	MAXIMUM=	94.8	AT 1301 HRS.	MINIMUM=	70.5	AT 0046 HRS.
WIND SPEED (kts);	AVERAGE=	13.2	MAXIMUM=	62.6	AT 0006 HRS.	MINIMUM=	6.4	AT 0038 HRS.

MEAN DAILY WIND VELOCITY= 9.0 (kts) FROM 217 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	132.96	MAXIMUM=	571.40	AT 1706 HRS.	MINIMUM=	-0.50	AT 0430 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0001 HRS.	MINIMUM=	0.0	AT 0001 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.14	MAXIMUM=	5.72	AT 0324 HRS.	MINIMUM=	0.31	AT 1650 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA: 12-25-1994



SCIENTIFIC ACTIVITIES THIS DAY:

BIRD OBS

TIME	LATITUDE	LONGITUDE	EVENT
1140	60 26.03S	62 56.48W	S SC0
1330	60 02.38S	63 04.28W	S SC3
1410	59 53.08S	63 08.76W	S SC7
1600	59 31.05S	63 19.56W	S SC11
1640	59 22.17S	63 23.91W	S SC15
1820	59 00.59S	63 31.79W	S SC20
1940	58 42.73S	63 36.96W	S SC23
2020	58 34.82S	63 40.07W	S SC27
2220	58 08.87S	63 49.58W	S SC31
2350	57 48.28S	63 56.54W	S SC34

OTHER INVESTIGATIONS and NOTES

OCM DRIFTER 02 DEPLOYED

SCDP (DRAKE PASSAGE) SAMPLES COLLECTED

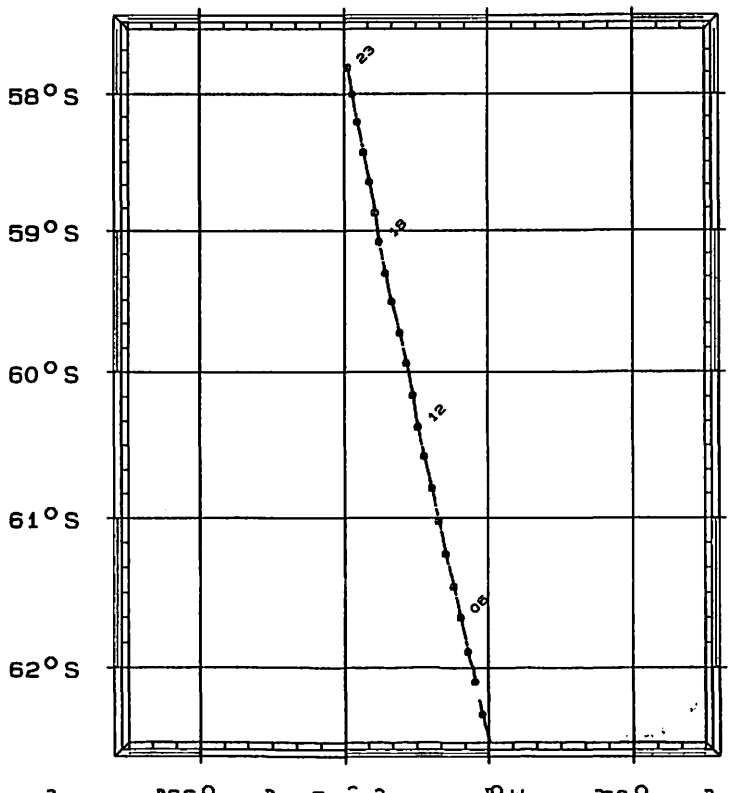
CHRISTMAS BIRD COUNT

SUN PHENOMENA

SUNRISE (03:23:54 LOCAL); SUNDAY; 12/25/94

L.A. NOON (13:13:22 LOCAL); SUNDAY; 12/25/94

SUNSET (01:07:45 LOCAL); SATURDAY; 12/24/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 18 12-26-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	57 46.52S	63 57.30W	13.5	352	0.0	0	6.0	85.9	991.9	15.0	272	19.7	221	6.95	-0.9	34.02	19.20	0.0	2.04	
0010	57 44.52S	63 57.87W	13.5	353	2.0	0	6.0	84.4	992.1	11.5	270	17.7	213	7.06	-1.0	33.99	8.40	0.0	2.17	BIRD OBS 36 START
0020	57 42.34S	63 58.58W	13.6	351	2.2	0	6.0	87.9	992.3	16.7	273	20.8	224	7.23	-1.2	33.95	11.30	0.0	3.02	BIRD OBS 37 START
0100	57 33.10S	64 2.01W	13.9	351	9.5	0	5.8	82.1	992.9	16.7	267	22.3	219	7.09	-1.2	34.01	3.80	0.0	1.64	
0116	57 29.44S	64 3.50W	14.1	351	3.8	0	6.0	82.6	993.2	16.3	264	22.6	217	7.01	-1.0	34.00	1.60	0.0	1.81	SUNSET(01:16:52 LOCAL); SUNDAY; 12/25/94
0200	57 19.59S	64 7.35W	14.2	351	10.1	0	5.9	88.9	993.3	14.8	289	16.8	227	6.78	-0.8	33.99	-0.30	0.0	2.42	
0559	56 23.68S	64 26.86W	15.5	352	57.1	0	5.7	82.2	994.2	11.9	256	21.6	204	6.11	-0.4	33.95	-0.40	0.0	1.28	
0600	56 23.59S	64 26.89W	15.3	354	0.1	0	5.8	82.4	994.2	12.2	260	21.1	209	6.11	-0.3	33.95	-0.30	0.0	1.28	
0700	56 9.34S	64 30.50W	13.9	352	14.4	0	6.0	81.0	994.2	13.2	258	21.0	210	6.75	-0.7	33.97	-0.10	0.0	2.21	
0701	56 9.09S	64 30.53W	14.2	353	0.3	0	6.0	81.2	994.2	13.0	257	21.3	209	6.82	-0.8	33.98	0.0	0.0	2.40	SCDP-11
0730	56 2.44S	64 32.28W	14.1	349	6.7	0	6.0	80.6	994.2	11.5	260	19.6	204	6.90	-0.9	33.98	2.20	0.0	2.18	SUNRISE (04:30:18 LOCAL); MONDAY; 12/26/9
0800	55 55.76S	64 33.96W	13.4	350	6.8	0	6.0	81.2	994.2	10.1	253	19.0	200	6.94	-0.9	33.98	19.20	0.0	2.13	
0900	55 42.16S	64 38.23W	14.1	350	13.9	0	6.2	79.1	994.2	8.0	269	16.2	199	6.92	-0.7	33.96	60.10	0.0	2.49	
0959	55 28.43S	64 43.01W	14.2	353	14.0	0	6.4	80.2	994.2	12.2	278	17.3	217	7.04	-0.6	33.92	32.30	0.0	2.48	SCDP-12
1000	55 28.19S	64 43.11W	14.4	349	0.2	0	6.4	79.3	994.2	12.1	275	17.9	211	7.04	-0.6	33.92	01.90	0.0	2.48	
1100	55 15.01S	64 47.45W	12.8	351	13.4	0	6.5	82.0	994.2	5.6	252	15.4	191	7.45	-0.9	33.96	56.30	0.0	1.81	
1200	55 2.20S	64 50.01W	13.3	343	13.0	0	6.9	78.3	994.2	9.7	267	16.8	198	8.25	-1.3	33.66	68.90	0.0	1.02	
1250	54 49.72S	64 54.88W	16.7	339	12.8	86	7.7	72.8	994.2	10.3	286	17.0	194	9.03	-1.3	32.69	95.10	0.0	1.40	BIRD OBS 38 START
1256	54 48.07S	64 55.71W	17.1	338	1.7	82	7.8	74.4	994.2	11.7	275	19.8	193	9.04	-1.2	32.71	64.40	0.0	1.45	SCDP-13
1300	54 46.95S	64 56.23W	17.3	342	1.2	98	7.8	73.8	994.2	7.8	273	18.6	186	9.05	-1.2	32.71	19.70	0.0	1.50	BIRD OBS 39 START
1310	54 44.25S	64 57.22W	16.5	346	2.8	126	7.3	74.7	994.2	8.0	259	19.6	189	9.07	-1.7	32.66	07.40	0.0	1.65	BIRD OBS 40 START
1320	54 41.49S	64 58.28W	17.0	338	2.8	76	7.5	75.1	994.2	5.6	269	18.0	176	9.15	-1.6	32.49	60.80	0.0	1.55	BIRD OBS 41 START
1400	54 33.55S	65 11.20W	16.4	303	11.3	88	7.6	73.8	994.2	20.4	289	21.6	186	9.23	-1.6	32.48	74.90	0.0	1.41	
1500	54 23.13S	65 29.41W	15.4	319	14.9	87	8.2	74.9	994.2	15.6	285	18.8	191	9.23	-1.0	32.52	80.50	0.0	0.63	
1600	54 12.73S	65 46.95W	14.8	316	14.6	83	8.3	77.0	994.2	3.5	296	13.6	149	9.28	-0.9	32.64	64.00	0.0	0.74	
1624	54 8.42S	65 54.35W	15.2	316	6.1	84	8.6	77.3	994.2	6.4	003	8.8	133	9.44	-0.8	32.63	00.10	0.0	0.87	L.A. NOON(13:24:06 LOCAL); MONDAY; 12/26/
1700	54 2.12S	66 4.72W	14.8	318	8.8	0	9.3	68.5	994.2	10.7	355	4.3	150	9.33	-0.4	32.74	38.00	0.0	0.62	
1800	53 51.86S	66 21.54W	13.6	319	14.3	0	10.2	56.1	994.2	20.8	357	7.2	312	9.64	0.5	32.85	96.50	0.0	0.78	
1900	53 42.22S	66 37.15W	13.2	320	13.4	0	9.9	76.6	994.2	22.2	359	9.0	318	9.20	0.7	33.08	15.20	0.0	0.92	
2000	53 32.65S	66 52.01W	12.4	319	13.1	0	9.4	77.1	994.2	25.9	012	14.0	341	9.37	0.4	32.94	36.50	0.0	1.18	
2011	53 30.89S	66 54.71W	13.1	317	2.4	0	9.4	76.8	994.2	25.7	015	13.5	347	9.18	0.2	32.91	14.20	0.0	0.90	WINDROWS OF WHITE PLASTIC TRASH
2100	53 23.45S	67 6.68W	12.4	316	10.3	0	9.7	79.6	994.2	24.7	016	13.2	347	9.42	0.2	32.78	35.70	0.0	0.90	
2200	53 14.86S	67 20.79W	11.8	317	12.1	0	9.6	81.8	994.2	23.9	016	13.0	348	9.36	0.2	32.74	33.90	0.0	1.32	
2300	53 6.04S	67 34.96W	12.1	317	12.3	0	10.1	78.5	994.2	28.2	013	16.7	340	9.26	0.8	32.65	33.20	0.0	2.17	

DAILY SUMMARY

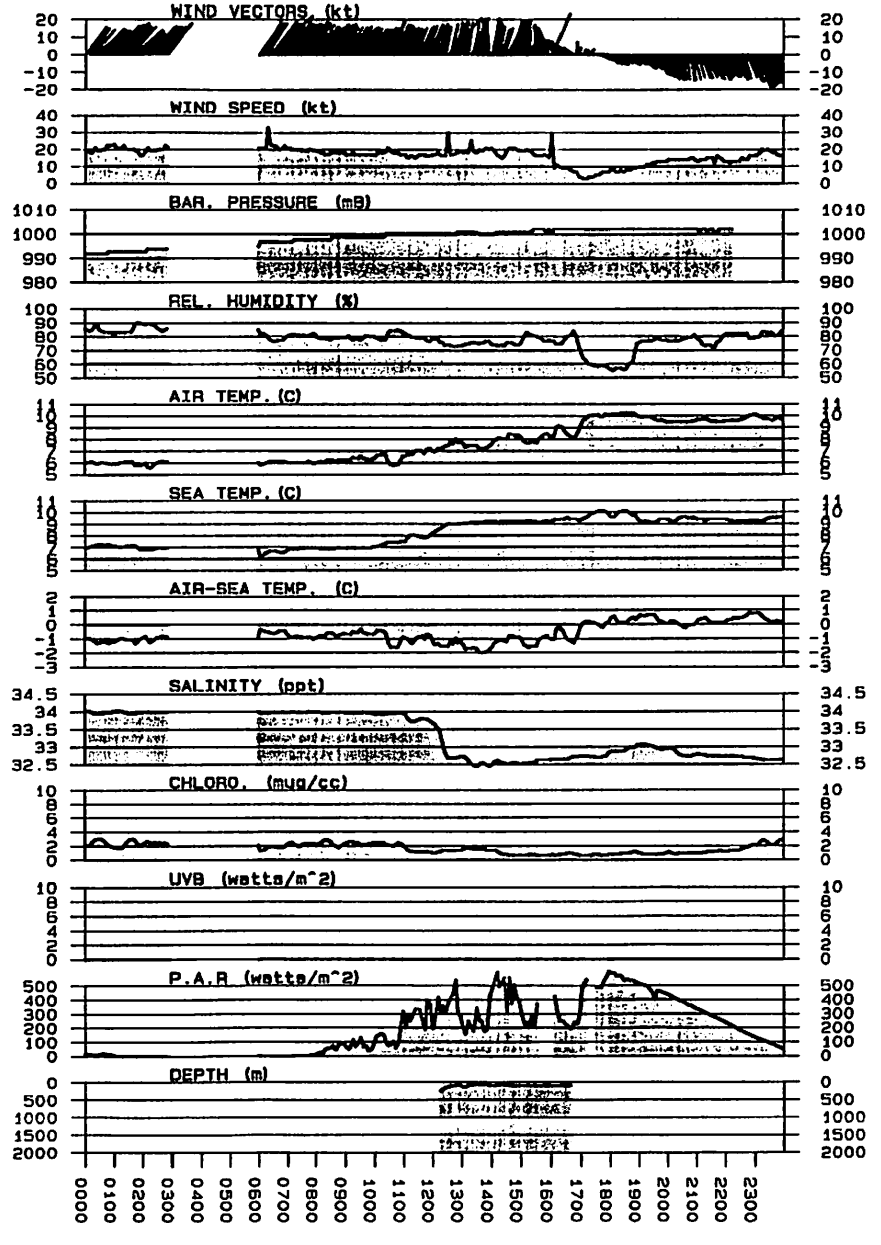
DISTANCE TRAVELLED TODAY 334.1 nm
TOTAL DISTANCE TRAVELLED 1825.4 nm

SHIP'S SPEED (kts) ;	AVERAGE=	13.9	MAXIMUM=	17.6	AT 1326 HRS.	MINIMUM=	11.5	AT 2328 HRS.
AIR TEMPERATURE (C);	AVERAGE=	7.8	MAXIMUM=	10.3	AT 1824 HRS.	MINIMUM=	5.5	AT 0212 HRS.
SEA TEMPERATURE (C);	AVERAGE=	8.37	MAXIMUM=	10.19	AT 1828 HRS.	MINIMUM=	6.11	AT 0559 HRS.
SALINITY (ppt);	AVERAGE=	33.26	MAXIMUM=	34.03	AT 0001 HRS.	MINIMUM=	32.41	AT 1329 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	994.0	MAXIMUM=	994.4	AT 0252 HRS.	MINIMUM=	991.8	AT 0012 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	77.7	MAXIMUM=	90.3	AT 0147 HRS.	MINIMUM=	54.7	AT 1829 HRS.
WIND SPEED (kts);	AVERAGE=	16.2	MAXIMUM=	71.4	AT 0616 HRS.	MINIMUM=	2.0	AT 1711 HRS.

MEAN DAILY WIND VELOCITY= 9.3 (kts) FROM 359 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	234.91	MAXIMUM=	768.40	AT 1424 HRS.	MINIMUM=	-0.60	AT 0211 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0001 HRS.	MINIMUM=	0.0	AT 0001 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	1.59	MAXIMUM=	3.23	AT 0022 HRS.	MINIMUM=	0.56	AT 1713 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-26-1994

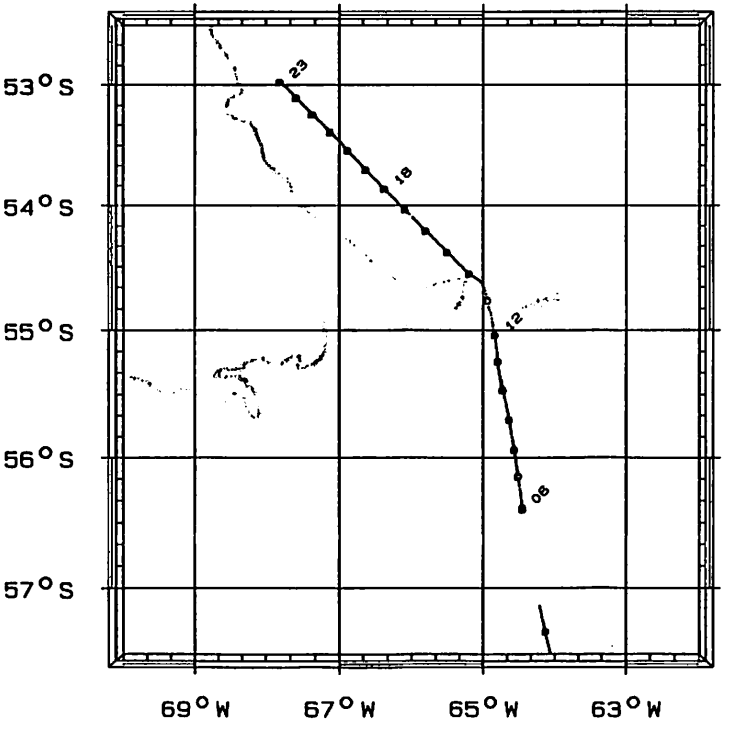


SCIENTIFIC ACTIVITIES THIS DAY;

BIRD OBS

TIME	LATITUDE	LONGITUDE	EVENT
0010	57 44.48S	63 57.56W	S SC36
1300	54 46.32S	64 56.72W	S SC39

OTHER INVESTIGATIONS and NOTES
CROSSING THE DRAKE
IN FINE FORM!
SUN PHENOMENA
SUNRISE (04:30:18 LOCAL); MONDAY; 12/26/94
L.A. NOON (13:24:06 LOCAL); MONDAY; 12/26/94
SUNSET (22:16:52 LOCAL); SUNDAY; 12/25/94



POLAR DUKE CRUISE SANTA CLAUS 1994 - DAILY SCIENCE LOG; DAY # 19 12-27-1994 ; PAGE # 1

GMT	LATITUDE	LONGITUDE	SSPD	CRSE	MILES	DEPTH	AIRT	RH	BAROM	AWS	AWD	TWS	TWD	SST	A-SEA	SALIN	PAR	UVB	FLUOR	COMMENTS
0001	52 57.70S	67 49.17W	11.8	312	0.0	0	9.6	84.6	------	26.6	026	16.9	356	9.52	0.4	32.63	45.10	0.0	2.97	
0059	52 49.28S	68 3.25W	12.4	315	12.0	0	10.6	78.1	------	18.5	349	6.7	283	9.63	0.9	32.66	3.40	0.0	1.83	SUNSET(21:59:16 LOCAL); MONDAY; 12/26/94
0100	52 49.14S	68 3.49W	12.5	315	0.2	0	10.7	78.1	------	18.9	347	7.2	280	9.64	1.0	32.66	3.20	0.0	1.81	
0200	52 39.65S	68 18.32W	13.5	315	13.1	0	10.8	67.5	------	18.3	320	11.7	227	9.31	1.4	32.69	-0.40	0.0	3.16	
0300	52 30.98S	68 35.42W	14.0	302	13.6	0	9.5	82.8	------	23.9	324	15.0	233	8.91	0.5	32.54	-0.40	0.0	1.98	
0400	52 23.76S	68 55.77W	14.0	300	14.4	0	10.0	68.7	------	28.4	322	19.2	236	10.57	-0.5	31.36	-0.30	0.0	1.57	
0500	52 21.23S	69 16.94W	12.8	268	13.5	0	8.6	66.7	------	28.4	321	20.0	205	10.58	-1.9	31.16	-0.50	0.0	1.76	
0600	52 28.61S	69 31.90W	14.7	228	12.0	0	7.7	72.9	------	29.5	353	15.1	214	10.43	-2.7	31.06	-0.40	0.0	1.68	
0700	52 38.10S	69 50.31W	14.7	242	15.0	0	7.1	73.4	------	28.0	331	16.6	188	10.07	-2.9	30.79	-0.30	0.0	1.61	
0800	52 42.02S	70 13.53W	15.6	254	14.7	0	6.3	85.1	------	23.7	008	8.6	277	9.22	-2.9	30.73	0.30	0.0	1.80	
0816	52 43.18S	70 20.47W	17.1	255	4.4	0	5.7	87.1	------	24.1	016	9.1	303	9.13	-3.4	30.71	2.50	0.0	1.79	SUNRISE (05:16:52 LOCAL); TUESDAY; 12/27/
0900	52 52.55S	70 29.10W	15.3	170	12.3	0	7.3	72.8	------	25.9	356	10.6	162	8.99	-1.6	30.71	25.70	0.0	1.69	
1000	53 4.48S	70 40.09W	13.1	221	14.4	0	7.1	70.1	------	23.7	338	12.6	176	8.98	-1.8	30.61	93.60	0.0	2.93	
1013	53 6.74S	70 43.12W	13.6	219	2.9	0	6.8	73.5	------	21.6	344	9.2	180	8.92	-2.1	30.59	14.20	0.0	2.56	A SWALLOW IS FOLLOWING THE SHIP
1100	53 10.70S	70 53.68W	1.2	007	8.3	0	7.4	65.8	------	2.9	164	4.1	175	8.96	-1.5	30.55	40.80	0.0	2.62	
1119	53 10.68S	70 53.61W	0.6	259	0.3	0	7.6	63.4	------	4.1	273	4.1	164	8.97	-1.3	30.57	80.60	0.0	2.79	AT ANCHOR IN PUNTA ARENAS
1124	53 10.66S	70 53.65W	0.2	229	0.0	0	7.4	63.9	------	4.5	283	4.4	150	9.02	-1.6	30.56	34.00	0.0	2.86	WIND DIRECTION ALIGNMENT TESTS
1125	53 10.68S	70 53.63W	0.6	225	0.0	0	7.3	64.2	------	3.3	317	2.9	173	9.03	-1.7	30.56	16.80	0.0	2.81	ALIGNED WITH BOW (000)
1127	53 10.69S	70 53.61W	0.3	212	0.0	0	7.1	64.1	------	4.1	083	4.1	299	9.06	-1.9	30.55	34.10	0.0	2.82	ALIGNED 090
1130	53 10.69S	70 53.65W	0.5	209	0.0	0	7.2	65.1	------	3.5	109	3.7	325	9.09	-1.8	30.55	39.50	0.0	2.78	ALIGNED 180
1132	53 10.68S	70 53.64W	0.2	206	0.0	0	7.0	64.5	------	2.9	232	3.0	075	9.12	-2.1	30.55	42.80	0.0	2.76	ALIGNED 270
1135	53 10.74S	70 53.68W	1.5	199	0.1	0	7.2	64.3	------	2.9	323	1.9	134	9.13	-1.9	30.55	47.90	0.0	2.73	ALIGNED 000
1138	53 10.75S	70 53.74W	0.8	205	0.0	0	7.3	66.2	------	1.7	347	1.0	181	9.16	-1.8	30.55	53.40	0.0	2.82	END WIND TEST
1158	53 10.10S	70 54.40W	4.9	002	0.9	0	7.6	64.7	------	1.7	227	6.2	193	9.18	-1.5	30.57	23.70	0.0	2.23	FIRST LINE ASHORE
1158	53 10.10S	70 54.40W	4.9	002	0.0	0	7.6	64.7	------	1.7	227	6.2	193	9.18	-1.5	30.57	23.70	0.0	2.23	END CRUISE SANTA CLAUSE 01

DAILY SUMMARY

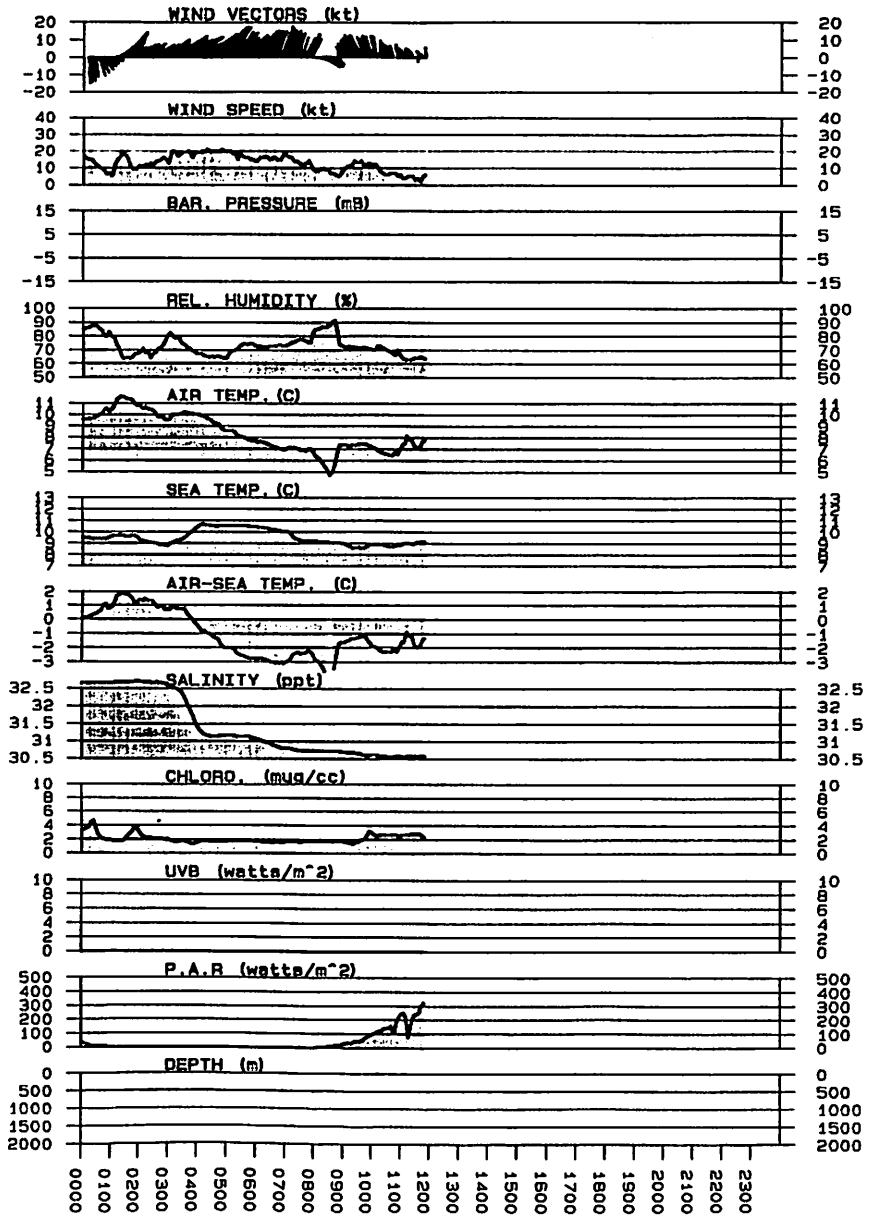
DISTANCE TRAVELLED TODAY 152.2 nm
TOTAL DISTANCE TRAVELLED 1977.6 nm

SHIP'S SPEED (kts) ;	AVERAGE=	12.8	MAXIMUM=	18.2	AT 0833 HRS.	MINIMUM=	0.0	AT 1110 HRS.
AIR TEMPERATURE (C);	AVERAGE=	8.4	MAXIMUM=	11.7	AT 0110 HRS.	MINIMUM=	4.5	AT 0831 HRS.
SEA TEMPERATURE (C);	AVERAGE=	9.53	MAXIMUM=	10.69	AT 0410 HRS.	MINIMUM=	8.61	AT 0940 HRS.
SALINITY (ppt);	AVERAGE=	31.39	MAXIMUM=	32.72	AT 0155 HRS.	MINIMUM=	30.55	AT 1037 HRS.
BAROMETRIC PRESSURE (mb);	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0000 HRS.	MINIMUM=	0.0	AT 0000 HRS.
RELATIVE HUMIDITY (%);	AVERAGE=	73.1	MAXIMUM=	91.4	AT 0842 HRS.	MINIMUM=	62.2	AT 1111 HRS.
WIND SPEED (kts);	AVERAGE=	13.0	MAXIMUM=	22.0	AT 0525 HRS.	MINIMUM=	1.0	AT 1138 HRS.

MEAN DAILY WIND VELOCITY= 10.0 (kts) FROM 193 DEGREES TRUE

SOLAR RADIATION-PAR (watts/m^2);	AVERAGE=	34.92	MAXIMUM=	324.20	AT 1149 HRS.	MINIMUM=	-0.80	AT 0234 HRS.
UVB (watts/m^2)	AVERAGE=	0.0	MAXIMUM=	0.0	AT 0001 HRS.	MINIMUM=	0.0	AT 0001 HRS.
FLUORESCENCE (mg/m^3);	AVERAGE=	2.08	MAXIMUM=	4.80	AT 0022 HRS.	MINIMUM=	1.40	AT 0352 HRS.

POLAR DUKE CRUISE SANTA CLAUS 1994 UNDERWAY DATA; 12-27-1994



SCIENTIFIC ACTIVITIES THIS DAY;

OTHER INVESTIGATIONS and NOTES
END CRUISE SANTA CLAUS 01
SUN PHENOMENA
SUNRISE (05: 16: 52 LOCAL): TUESDAY: 12/27/94
SUNSET (21: 59: 16 LOCAL): MONDAY: 12/26/94