UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

SUMMARY REPORT OF THE SEPTEMBER 15, 1989

UNOLS ANNUAL MEETING
AMERICAN SOCIETY OF ASSOCIATION EXECUTIVES BUILDING
1575 I STREET NW
WASHINGTON, DC

CONTENTS

APPENDICES

Summary Report of the UNOLS Annual Meeting
September 15, 1989

American Society of Association Executives Building
1575 I Street NW
Washington, DC

General: Issues and items are reported in the order in which they were addressed at the September, 1989 UNOLS Annual Meeting. Exceptions to the order in the published agenda (Appendix I) are noted.

A list of registered attendees has been compiled from forms submitted at the meeting (Appendix II). Information made available from the UNOLS Office included: **UNOLS Directory, UNOLS Fleet Ship Scheduling Contacts, UNOLS Fleet Marine Operations Contacts and Summary of UNOLS Research Vessel Fleet Operations - 1988 (Appendices III-VI).**

Introduction and Welcome: George Keller, UNOLS Chair, called the meeting together, welcomed attendees and presented the agenda.

Report from UNOLS Chair and Council: George Keller began his report by noting that UNOLS, under its **new Charter** (adopted provisionally in October, 1988, finally later in this meeting), has been shifting towards an advocacy for ocean researchers who use UNOLS ships relative to their traditional emphasis on ship operators and operations. The revised Charter also changed categories of institutional membership in UNOLS. All UNOLS institutions are Members, and vote in all elections and other matters before the membership. Those Member institutions who operate vessels or National Oceanographic Facilities designated by UNOLS were further classified as Operators.

The UNOLS Council has designated as UNOLS vessels the LONGHORN, operated by the University of Texas and, with provisions that they be inspected under the NSF/ABSTECH program, the SEWARD JOHNSON and the EDWIN LINK, operated by the Harbor Branch Oceanographic Institution. The UNOLS Council and UNOLS Chair have been concerned that the process and criteria whereby additional research vessels are designated UNOLS vessels should be re-examined. Criteria for designation, as outlined in the UNOLS Charter are sketchy. There has been concern that under the current process the UNOLS fleet could be open ended. This would complicate planning for fleet improvement, would make it difficult to justify direct acquisition of new ships by NSF and ONR and severely impact ability to manage the academic research fleet. **The UNOLS Chair has noted the common misconception that UNOLS designation assures a degree of funding by NSF or ONR for that vessel.** UNOLS as well as the funding agencies maintain their firm positions that funding for any vessel must be earned on the basis of its capability to support scientific research and on science program requirements for that support.

The year 1988-89 has been an exciting, busy time for UNOLS. New ship construction and acquisition, together with the major renovation of two large ships promises impressive capabilities for the UNOLS fleet.

Characteristics for the modified KNORR and MELVILLE are shown in Appendix VII.

Work on the KNORR was progressing, with the new 34-foot section in place. Machinery was being delivered and installed. Delivery date for the MELVILLE was to be March 30, 1990.

The MELVILLE was to arrive at the yard on September 15, 1989, and be lifted out of the water in November. Scripps had ordered multi-beam transducers from General Instruments for the MELVILLE. The MELVILLE was expected to re-enter service in about September, 1990.

The plan was that the BERNIER (to be renamed the MAURICE EWING) would complete conversion and begin operations in February, 1990. A National Oversight Committee for the conversion had been appointed and was to meet in mid-October. Bob Dinsmore represents UNOLS on the Committee.

The THOMAS G. THOMPSON, AGOR-23, continued under construction. It was expected that the ship would become operational in summer, 1991.

UNOLS has strongly supported acquisition of AGOR-24 to both ONR and the Office of the Oceanographer of the Navy. AGOR-24 has been included in various stages of the Navy budget and decision process, and was currently in the FY-1992 budget projection. The ship's status in the budget was under scrutiny, however, and a more rigorous justification was being sought. UNOLS recognized that AGOR-24 would, on acquisition, replace an existing large UNOLS research vessel. One preliminary candidate could be the ATLANTIS II, which remained highly used as the ALVIN support vessel, but was old and expensive to operate.

UNOLS had also urged that when AGOR-24 acquisition begins, alternatives to the THOMAS G. THOMPSON (AGOR-23) design be considered.

UNOLS had made a number of recommendations on issues of importance to the oceanographic community during the year:

A recommendation was made to the Oceanographer of the Navy, the Office of Naval Research and the National Science Foundation that all new large (blue water) UNOLS research vessels be equipped with modern multibeam bathymetric systems.

The need for and efforts to obtain ice-capable research vessels had become very active. UNOLS had participated in oversight and advisory committees for NSF/DPP's research vessel with icebreaking capability, and to help specify ocean research capability for new Coast Guard ice breakers. Efforts had begun through the Fleet Improvement Committee to develop mission requirements and concept for an ice-capable research vessel for the western Arctic. Discussions had been held with the Office of the Oceanographer concerning availability to the academic community for a new, Navy-operated ice-capable research vessel for the eastern Arctic.

At ONR's request UNOLS had polled the community to assess interest in and need for **Laboratory-Grade Facilities at Sea, Deep Sea Observatories and FLIP II, a successor to FLIP.** Results of the poll and a subsequent UNOLS report to ONR and NSF were that interest was limited in at-sea laboratory-grade facilities and observatories. **There was interest in and a demonstrated need for a FLIP II, and UNOLS recommended that the community and agencies proceed.**

A number of shipboard safety, operational and policy issues were addressed, through the UNOLS Council and the Research Vessel Operators Committee.

Procedures for the transportation and use of radioactive materials aboard UNOLS ships were addressed by a subcommittee of the UNOLS Council and adopted for inclusion in **UNOLS Research Vessel Safety Standards** by RVOC and the Council.

Cruise Assessments by UNOLS fleet users had been monitored by Bob Dinsmore, UNOLS Council. His report was that of all cruises on UNOLS research vessels, 84% were fully successful, 15% partially successful and 1% unsuccessful.

Personal use of alcohol aboard UNOLS vessels had become an issue, driven both by stringent Coast Guard regulations promulgated at the beginning of 1988 and by the need for an effective means of enforcing policy and regulations on science personnel from institutions other than the ship's. The UNOLS Council will collect statements on alcohol policy from all UNOLS institutions.

The Council recommends that all UNOLS institutions adopt and enforce consistently alcohol policies in full compliance with applicable Coast Guard regulations.

The Bureau of Customs' Zero Tolerance program and the Coast Guard's program for drug testing among marine personnel have raised the drug issue for UNOLS ships and operators. The second UNOLS ship seized (for discovery of a minute quantity of contraband drug in a crew-person's possession) remained under constructive seizure. The UNOLS Council recognizes that UNOLS institutions have little flexibility in implementing policies consistent with Zero Tolerance and Drug Testing programs.

The UNOLS Council and the Fleet Improvement Committee had accepted an NSF charge to develop means for improving capabilities of UNOLS vessels for **real-time reporting of selected meteorological variables.** The FIC had sponsored the report, **Meteorological Measurements from Research Ships (Appendix VIII).** The report includes recommendations and requirement specifications for a complete system to sense, display on board and transmit appropriate meteorological and ocean surface data. The Council forwarded the report to NSF, recommending that it be used to guide the outfitting of UNOLS ships to report in real time, various meteorological variables.

The use and disposal of plastics aboard UNOLS research vessels had become an issue. U.S. adoption of MARPOL international conventions virtually prohibits plastics disposal at sea. Further some foreign ports will not accept plastic garbage from visiting ships. Many plastic packing containers for instruments, etc., cannot be compacted. UNOLS will need to exert any leverage that it has to eliminate the use of plastics to package oceanographic expendables.

The UNOLS Ship Scheduling had mixed success during the year. A number of factors led to schedules for 1990 still somewhat tentative even in September, 1989: funding decisions for a larger than usual portion of scheduled projects were still pending; many large ships would be out of service for part or all of 1990; several projects were in need of SEA Marc II, and schedules had to be arranged so that the gear could be shifted from ship to ship. Because of these factors, some projects funded for 1990 would likely be deferred into 1991. Although an uneasy match was reached between available funding and estimated ship operations costs for 1991, the scheduling process lagged and stands improvement.

UNOLS, funding agencies and individual institutions continue to wrestle with the ship lay-up problem. The position paper developed by an RVOC working group (published in the October, 1987 Advisory Council meeting report) had considerable merit in terms of desirable timing for lay-up decisions, criteria for acceptable schedules and steps to ameliorate lay-up impacts. Both operating institutions and funding agencies have reservations about aspects of the suggested policy, and criteria are hard to put in place. Even so, institutions generally indicate willingness to accept lay-ups built around maintenance programs. Also, the formula-criteria for determining vulnerability to lay-up has been used informally through the last several scheduling cycles.

The UNOLS Chair appointed Mike Rawson, L-DGO as Ship Scheduling Committee Chair and George Shor, Scripps as Vice Chair for the year 1989-90.

The ALVIN Review Committee reported that a periodic maintenance and overhaul had been completed for ALVIN. During the overhaul, several improvements were made which will enhance utility for researchers using the submersible.

The ALVIN Review Committee had recommended a schedule for 1990 that includes fifteen projects for over 200 dives. The 1990 schedule would take ALVIN/ATLANTIS II to the eastern Pacific for most of the year. After 1989, when there were relatively few requests to use ALVIN and a very sparse program of ALVIN use, 1990 looks to be an improved year, with a much stronger ALVIN schedule.

1989 marked ALVIN's 25th anniversary. The operators, Woods Hole Oceanographic Institution, together with the funding agencies, NOAA, NSF and ONR, have celebrated the year with a variety of awards, and a **Silver Jubilee Symposium** was to be held in October, 1989.

The ARC recommended and the UNOLS Chair appointed Gary Taghon, Oregon State University, to the ALVIN Review Committee.

The UNOLS Fleet Replacement Committee had continued its outstanding job and impressive activity under Worth Nowlin, Chair. The FIC had been in the forefront of UNOLS activities, especially concerning advice and recommendations to Federal agencies on planning, management and ship acquisition for the academic fleet.

FIC had issued six publications during the year, including a preliminary design for a medium-endurance, general-purpose oceanographic research vessel, reports of workshops on renovations for intermediate and small ships and science mission requirements for an improved FLIP II and for an intermediate ice-capable research vessel.

Two members of the FIC, Dick Barber and Fred Spiess, had left the Committee as their terms expired. The UNOLS Chair had appointed Ken Johnson, MLML, and Tom Royer, University of Alaska, as new FIC members.

The UNOLS Chair announced that a competition would be held for host institution for the UNOLS Office and Executive Secretary, UNOLS. William Barbee, Executive Secretary at the UNOLS Office hosted by the University of Washington, would retire in 1991 when the Office would move. **Selection of a new host institution and Executive Secretary was to be in accordance with the UNOLS Charter, with solicitation and proposals during the remainder of 1989, UNOLS evaluation, selection and recommendations early in 1990, the selected institution's proposal to NSF in September, 1990 and establishment of the UNOLS Office in May, 1991.**

Later during the year it was expected that the updated **UNOLS Fleet Improvement Plan** would be published. The **Fleet Improvement Plan** has become a model research fleet planning and management document, and is valuable to all of the Federal agencies participating in the Federal Oceanographic Fleet Coordinating Council.

Ship scheduling, fleet management and planning for fleet improvement were expected to dominate UNOLS activities during the coming year.

COMMITTEE REPORTS

UNOLS activities during 1988-89 continued to be focused in the four UNOLS permanent committees. Reports from those four committees follow.

Research Vessel Operators Committee: Bruce Cornwall, RVOC Vice Chair, reported on activities during the year and reviewed the agenda for their meeting to be held October 3-5, 1989, in Miami, Florida.

RVOC activities during the year had emphasized safety in research vessel operations. An RVOC Safety Committee had overseen the writing of a **Safety Training Manual** for use on UNOLS ships and elsewhere. Revised **UNOLS Research Vessel Safety Standards** were to be published in

October, 1989. Work was also progressing on safety and training videos for use in the UNOLS fleet.

RVOC had begun to compile accident and injury statistics for the UNOLS fleet, both at sea and ashore. The statistics are comparable to those kept by the maritime industry, and indicate lower loss rates than for the industry in general.

The RVOC meeting was to be held October 3-5, 1989, in Miami, Florida. The very full agenda was to emphasize safety, new Federal regulations and policies, safety training aboard UNOLS ships and safety training aids.

A representative from the U.S. Coast Guard was scheduled to provide information on the Coast Guard's drug testing program and agency philosophy on the program.

Three representatives of the U.S. Customs Bureau, together with a Coast Guard representative, were to discuss the Zero Tolerance Policy and agency policies on searches at sea and on entry into the United States.

The effects on the UNOLS fleet and UNOLS operations of new or imminent regulations on pollution and use of plastics at sea, rules for admeasurement and lifesaving equipment were to be reviewed.

Progress reports were scheduled on the construction or conversion of the BERNIER (to be re-named EWING), OSPREY (to be re-named VICKERS), THOMPSON (AGOR-23) and WARFIELD.

The UNOLS Ship Scheduling meeting, held on September 14, 1989, was reported by George Shor. Cost estimates for 1990 provided by UNOLS institutions totaled more than the total of funds available for ship operations in 1990:

COST ESTIMATES	NSF Days	NSF $M	ONR Days	ONR $M	OTHER Days	OTHER $M	TOTAL Days	TOTAL $M
Sept. 1989 Est.	3,579	29.59	567	6.08	646	4.79	4,792	40.46
Antic. funds		*		6.08		4.79		*

* NSF budget was uncertain; no firm estimate was provided at the September 14 meeting.

During the meeting, NSF science program managers provided funding status information on most cruises whose funding status had not yet been determined.

The net effect was to reduce schedules markedly on a few ships. Further reductions to program/schedules proposed for NSF funding were anticipated; it was expected that several months' ship time for already-funded science programs would be deferred to 1991. This would accommodate both funding totals and the shortage of large ships in 1990.

Tentative schedules had most available ships operating at satisfactory levels. Because of replacement of CONRAD with BERNIER (EWING), renovation of KNORR and MELVILLE and THOMPSON under construction, there would be a shortage of large ships in 1991. Those available would be heavily scheduled. Schedules for most intermediate and small ships were satisfactory.

The report of the Ship Scheduling Committee meeting is Appendix IX.

Worth Nowlin, FIC Chair, reported on the Committee's 1989 activities and preliminary plans for 1990.

Current FIC membership was: Richard Barber, MBARI; Robertson Dinsmore, WHOI; Donn Gorsline, USC; Marcus Langseth, L-DGO; James Murray, UW; Worth Nowlin, TAMU; Bruce Robison, MBARI and Fred Spiess, Scripps. T. K. Treadwell has been executive secretary for FIC.

The Committee's objectives were to maintain a current UNOLS Fleet Improvement Plan, to continue to refine science mission requirements for all classes of vessels, to explore alternatives to new construction, to initiate design studies, to maintain awareness of novel vessel designs and applications and to serve as liaison and information resource for Federal agencies concerning the UNOLS fleet and ships.

A list of six FIC publications is Appendix X.

Committee activities in 1989 included:

- Complete science mission requirements for a manned spar buoy laboratory,
- Review and revision of science mission requirements for all vessel classes,
- Concept design for a small, general-purpose SWATH (in progress),
- Modifications to concept design for intermediate four-strut SWATH (in progress),
- Develop mission profiles for research submarine,
- Recommendations on mid-life refits for CAPE class vessels,
- Recommendations on mid-life refits for OCEANUS-class vessels,
- Science Mission Requirements for small to intermediate ice-capable research vessel for the western Arctic,
- Preliminary design for large, medium-endurance monohull research vessel,

- Review of Coast Guard plans for oceanographic improvements (including marine geology) for POLAR-class icebreakers,

- Completed draft 1989, revised Fleet Improvement Plan, and

- Worked with Federal funding agencies as appropriate.

During 1989-1990, the FIC planned to:

- Issue the revised UNOLS Fleet Improvement Plan,

- Monitor current construction and renovation of large research vessels,

- Produce a concept design for intermediate, ice-capable general-purpose research vessel for the western Arctic,

- Prepare a compendium on small (less that Class IV) research vessels,

- Produce a concept design for a small, general-purpose SWATH,

- Pursue mid-life refit stream for OCEANUS class (WHOI),

- Complete the four-strut SWATH concept,

- Develop science mission requirements for submersible support vessels, and

- Consider recommendations on a research submarine.

The FIC had considered rotation in its membership. Richard Barber and Fred Spiess had asked to step down. The FIC recommended as replacements Tom Royer, University of Alaska, and Ken Johnson, Moss Landing Marine Laboratories. Additionally, Worth Nowlin had asked to phase out as FIC Chair. The FIC recommendation was that Donn Gorsline and Worth Nowlin be co-Chairs for 1989-1990. UNOLS Chair George Keller appointed Tom Royer and Ken Johnson to the FIC, and Donn Gorsline and Worth Nowlin as co-Chairs.

Earlier, the UNOLS Council had accepted a charge from NSF to develop means for improving the real-time reporting of selected meteorological and oceanographic data. As a partial response, Worth Nowlin provided the FIC-sponsored report: Meteorological Measurements from UNOLS Research Ships (Appendix VIII). The report includes recommendations and requirement specifications for a complete system to sense, log, display on board and transmit appropriate meteorological and surface ocean data.

It was also reported that NOAA has no current plans to provide SEAS units (for reporting meteorological data) to UNOLS vessels.

Worth Nowlin initiated a Council discussion on AGOR-24, its status in the Navy budget process and appropriate UNOLS action. The best information was that AGOR-24 remained in the budget projection for FY-1992 but that it was under scrutiny, and a more rigorous justification was being sought. **A letter was to be sent to Admiral Pittenger, Oceanographer of the Navy, reiterating UNOLS justification for AGOR-24 to support academic oceanography and urging that the Navy pursue acquisition aggressively.**

The report of ALVIN Review Committee activities and ALVIN program status was delivered by Bill Barbee, in the absence of Feenan Jennings, ARC Chair. ALVIN had completed a six-months-duration overhaul and had been re-certified.

The Navy had restructured the inspection/certification process for ALVIN and there had been concern that the ALVIN Group might have difficulty in satisfying formal, highly-structured certification requirements. This turned out not to be a major problem, but because response time from the Navy inspection structure was longer than expected, the process delayed the first ALVIN project scheduled for 1989. **The ALVIN currently had a conditional certification.** Hull penetrators not replaced in the current overhaul were certified only after retesting.

During overhaul, 12 of 24 hull penetrators were replaced, the battery/power system was improved and rebuilt, a power system was provided onboard the ATLANTIS II, the hydraulic system was redesigned and reconstructed and modifications were made so that launch and retrieval will be ALVIN tail to AII's stern. These changes provide a basic 120-volt power system (converted to 28 volts where essential), onboard testing of ALVIN systems and components without reliance on the battery-power system, a simplified hydraulics system that includes a manifold to serve scientific equipment and increased safety and reliability in launching and retrieving.

Potential personnel problems within the ALVIN Group were brought to the ARC's attention by ALVIN users, from the ALVIN Group and by WHOI managers. Given that the ARC's role is limited to counseling, recommendations were made for ALVIN Group-WHOI management meetings. The first meeting appears to have resulted in solutions or progress on most issues.

The schedule of ALVIN operations for the remainder of 1989 was reviewed. (Only three ALVIN projects were scheduled for 1989, all in the northwest Atlantic.)

The ARC met in June, 1989, to review requests for ALVIN/ATLANTIS II use in 1990. Twenty-five requests were submitted for a total of 363 dives, mostly in the eastern Pacific. **The ARC recommended 15 requests for 205 dives.** Some uncertainty remains because of questions on the science funding related to several requests. **The tentative 1990 schedule would take up ALVIN operations in the Gulf of Mexico, following early-year ATLANTIS II shipyard overhaul. ALVIN operations would continue on the EPR north of the Equator, on the Gorda-Juan de**

Fuca Ridge system and, to finish the year, projects off the California coast.

The ALVIN 25th anniversary was marked in 1989. Woods Hole Oceanographic Institution had made awards to Bud Froelich, ALVIN designer; Charles Monson, ONR's Program Manager for ALVIN acquisition; Al Vine, for the ALVIN concept and to Ruth Fye for her husband, Paul's contribution.

NSF awarded their Distinguished Public Service Award for ALVIN.

A 25th Anniversary ALVIN Symposium was to be held on October 16-18, 1989, in Woods Hole. The Symposium would be convened by Fred Grassle, and sponsored by NSF, ONR and NOAA. Its theme was an assessment of 25 years of research using ALVIN, featuring review papers by ALVIN users.

The ARC had scheduled its annual ALVIN Planning Meeting for December 3, in San Francisco. The Committee expected advance discussion of projects requiring ALVIN dives during 1991 and after.

Jim Eckman, Skidaway, whose term on the ALVIN Review Committee expired, had chosen not to continue on the Committee. The ARC recommended Gary Taghon, OSU, as a new Committee member. The UNOLS Chair appointed Gary Taghon to a three-year term on the ALVIN Review Committee.

The report on the Vessel Inspection Program was cancelled.

REPORTS FROM FEDERAL AGENCIES

Bruce Malfait reported on NSF/OCE budget status for 1990, using the table (Appendix XI) published earlier in UNOLS News. In that 1990 request, the total NSF appropriation would have increased by 13.9% over 1988 while Geosciences would have increased by 10%. Later information from both the House Appropriation Bill and Senate appropriation mark indicated that the overall NSF increase would be about 9.8%. Both Congressional actions had increases of more than 10% for Science and Engineering Education and level funding for the Antarctic. Research activities would be increased about 6 1/2 - 8 1/2%.

Tentative projections were that ship operations should be able to support all funded science. Global geosciences would remain the focus in OCE.

Other news of interest: Grant Gross was to resume as Director, Ocean Sciences Division on October 1, 1989.

In response to queries, the current plan for NSF ship acquisitions was re-iterated. The first ship to be acquired according to the plan was a large, MG&G-friendly ship -- the BERNIER (EWING). Next would be an ice-capable, general-purpose intermediate ship, projected for within the 1990-1992 period. A second large ship had slipped at least into the late 1990's.

Al Sutherland, Ocean Projects Manager, Division of Polar Programs noted that it was difficult to project the DPP budget for 1990. Of the DPP budget of about $140 million, about half has normally been allocated to the Navy for Antarctic support and facilities. For 1990 the formula for funding and support would be changed and some of the changes were still being sorted.

DPP had two new initiatives, for environmental health and safety in the Antarctic and for construction/lease of a research vessel with ice-breaking capability (RVIB).

The Division of Polar Programs expected to let a contract to build and lease a research vessel with ice-breaking capability early in 1990. An earlier procurement action had been cancelled in August, 1988, due to changes in the terms of procurement. A new request for proposals had been issued in January, 1989, and the competitive process was well underway. The contract will be for construction of the vessel and then a 10-year charter to NSF.

The vessel was to be about 280 ft. L.O.A., displacing about 5,000 tons, have shaft horsepower of 11,000 and, generally, be to UNOLS Science Mission Requirements for a large, general-purpose, high-endurance research vessel with MCS capability. It was to be designed to break up to 3 feet of ice at 3 knots.

U.S. Coast Guard plans for a new icebreaker and for upgrading the oceanographic capabilities of existing POLAR-class icebreakers were outlined by Neal Thayer, Ice Operations Division, U.S. Coast Guard. A letter inviting comment on Coast Guard plans in support of oceanographic research, a description of **Scientific Support Capabilities on board Coast Guard Icebreakers** and a Fleet Improvement Committee letter report on improvements to the POLAR class are Appendix XII.

The Coast Guard has supported oceanographic research in polar regions for decades. During the 1970's, the Coast Guard operated seven icebreakers, and provided support to research projects in both the Arctic and Antarctic; in 1989 only two icebreakers, the POLAR STAR and the POLAR SEA, are in operation. These ships have minimal capability to support research operations. **The Coast Guard has $12 million over two years to enhance research support capability.** The first phase of renovation was essentially completed on the POLAR STAR, and had been inspected and endorsed by the UNOLS' Fleet Improvement Committee.

The Senate had just approved appropriations for two new Coast Guard icebreakers (to be part of the DOD budget). The first of these icebreakers was to be available in about 1996. These icebreakers would have research capabilities comparable to those in UNOLS Science Mission Requirements (see Appendix XII). **Support of science and research will continue to be an integral part of the Coast Guard mission and icebreaker operations.**

Interested potential investigators were invited to write to Coast Guard headquarters to arrange research time aboard icebreakers.

Pat Dennis described plans by the Office of the Oceanographer of the Navy to construct an ice-capable research vessel for use in the eastern Arctic. A feasibility study was to be issued within the month. The vessel would be operated by the Navy, and time on the ship would be available to researchers from the academic community. The vessel was in the Navy's preliminary budget for FY-1992, along with the AGOR-24 for the UNOLS fleet.

Rear Admiral Austin Yeager reported that NOAA's ship operations budget for FY-1990 would likely be level with that for FY-1989. Six ships were currently deactivated; unlike 1989, no two of the six would be reactivated in 1990. Current plans were to reactivate three in 1991 and to rehabilitate the OCEANOGRAPHER.

Tom Cocke, Department of State, reported on the process of clearances for research in foreign waters-related issues. Appendix XIII is a summary of research clearances for 1988.

The Department of State received 268 clearance requests to 57 foreign governments for work in 1988. Of these, about 20% resulted in problems. Twenty-nine were denied and, for 30 others, research was cancelled, delayed or otherwise disrupted. One in three requests encountered some problem.

The outlook was for more research activity in Soviet waters. For requests to Soviets or to other countries where problems might be anticipated, contact Tom Cocke as early as possible. Although requests for clearances were generally being submitted on time, there is rarely adequate allowance for non-routine problems.

UNOLS Charter: At their October, 1988 meeting, UNOLS Members adopted in principle a new Charter. A refined version, addressing various concerns was endorsed by the UNOLS Council in February, 1989 and distributed to UNOLS Members in April, 1989. That refined version was before the Membership for adoption. **The UNOLS Membership formally adopted the UNOLS Charter, as circulated in April, 1989.**

UNOLS Office: The announcement of an open competition for a new host institution for the UNOLS Office and for Executive Secretary had been made earlier in the UNOLS Chair's report.

UNOLS Elections: A slate of nominees for two positions on the UNOLS Council is Appendix XIV. **Peter Betzer, University of South Florida was elected to the Council from among designated representatives of UNOLS Member institutions (not operators). Worth Nowlin, Texas A&M University was elected to the Council as a member at large, affiliated with any Member institution.**

There being no further business, the meeting was adjourned at 1:45 p.m.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Annual Meeting Agenda
0830, Friday, September 15, 1989
Theater
American Society of Association Executives
The ASAE Building
1575 I Street, NW
Washington, DC

Introduction and Welcome: George H. Keller, UNOLS Chair

Report from UNOLS Chair and Council: George Keller, UNOLS and UNOLS Council Chair, will report on 1988-1989 activities, current issues and the agenda anticipated for 1989-1990. Council actions on designation of UNOLS ships and recommendations on membership will be reported.

Research Vessel Operators Committee: Jim Williams, Chair, will provide a report on RVOC activities and issues; preview agenda for Oct 3-6, 1989 RVOC meeting.

Ship Scheduling Committee: George Shor, Chair, will report on schedules for 1990, 1990 ship use, costs versus expected support and recommendations from the SSC.

Fleet Improvement Committee: Worth Nowlin, Jr. will report on 1988-1989 accomplishments, issues and plans for the coming year.

ALVIN Review Committee: Feenan Jennings, Chair, will provide a report on ARC activities, ALVIN program status and plans for 1989-1990.

Vessel Inspection Program: Robertson P. Dinsmore will report on both Navy INSURV and NSF ship inspection programs.

Remarks from Federal Funding Agencies: Information from Federal funding agencies (NSF, ONR, DOE, MMS, NOAA and USGS) on 1989 funding and forecasts for 1990 (and beyond), ship operations and science support. ONR report on progress on AGOR-23, KNORR, MELVILLE renovation and status of AGOR-24. NSF/DPP will provide status report on research vessel with ice-breaking capability. Other issues as agency representatives may wish to introduce.

Clearances for Research in Foreign Jurisdictions: Tom Cocke, Department of State, Office of Marine Science and Polar Affairs, will summarize the 1989 clearance experience, and note issues and problems.

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Issues before UNOLS: Several issues have arisen of interest to UNOLS Members. These issues (if already covered above) will be reported by the Chair for information and discussion.

- Liquor policies aboard UNOLS ships
- Plastics; shipboard use and disposal
- Institution response to CG drug testing program; Customs zero tolerance policies
- Application of RVOC lay-up criteria
- Laboratory-Grade Facility at Sea; UNOLS Council assessment

UNOLS BUSINESS

UNOLS Charter: At the October, 1988 meeting, UNOLS members adopted in principle a new Charter. A refined version, reflecting various member concerns, was endorsed by the UNOLS Council (Feb, 1989) and circulated to UNOLS members on April 20, 1989. That version of the Charter is before the membership for formal adoption.

UNOLS Office: The grant supporting the UNOLS Office expires in mid-1991. The incumbent Executive Secretary has announced that he will retire at that time. The UNOLS Chair and Council announce an open competition among UNOLS operator institutions for an institution to host the UNOLS Office and provide an Executive Secretary. Competition for the Office and Secretary will be in accordance with the Charter, paragraph 4g. The process will include letters of intent from interested institutions, an Evaluation Committee, UNOLS evaluation of proposals and a proposal to NSF, the grant administering agency (about September 1, 1990). The UNOLS Office should be established at the selected host institution in about July 1991.

UNOLS Elections:

Election of one UNOLS Council member from among designated representatives of Member institutions, not operators

Election of one UNOLS Council member, at-large, affiliated with any Member institution.

Slates of nominees have been distributed.

Appointments to UNOLS Committees: UNOLS Chair will announce new appointments to RVOC, FIC, SSC, ARC in accordance with the Charter.

Other Business: Other issues, actions or recommendations as might be introduced. The order of business might be rearranged to reach a hoped-for, mid-afternoon adjournment.

UNOLS ANNUAL MEETING
Washington, D.C./September 13-15, 1989

ATTENDEES:

Timothy M. Askew, Harbor Branch Oceanographic Institution

Mary Ataldo, National Science Founcation

William D. Barbee, UNOLS

Harry Barnes, Bermuda Biological Station

John F. Bash, University of Rhode Island

Douglas Biggs, Texas A&M University

Garrett W. Brass, University of Miami

Larry Clark, National Science Foundation

Joe Coburn, Woods Hole Oceanographic Institution

W. Thomas Cocke, U.S. Department of State

Bruce Cornwall, Johns Hopkins University/CBI

James W. Coste, University of Hawaii

Patrick Dennis, Joint Oceanographic Institutions, Inc.

E. R. Dieter, National Science Foundation

Robertson P. Dinsmore, Woods Hole Oceanographic Institution

William Erb, U.S. Department of State

Paul J. Fox, University of Rhode Island

Barbara Funke, UNOLS

Linda Goad, University of Michigan

Donn Gorsline, University of California, Los Angeles

George Grice, Woods Hole Oceanographic Institution

James Griffin, University of Rhode Island

Ron Hutchinson, University of Miami

K. William Jeffers, University of Washington

Feenan Jennings, Texas A&M University

George H. Keller, Oregon State University

Robert A. Knox, Scripps Institution of Oceanography

Ronald LaCount, National Science Foundation

Richard Lambert, National Science Foundation

Dean Letzring, Texas A&M University

Lisa Lynch, National Science Foundation

Bruce Malfait, National Science Foundation

Thomas Malone, University of Maryland

Stephen Manzo, National Oceanic & Atmospheric Administration

Arthur E. Maxwell, University of Texas, Austin

David Menzel, Skidaway Institution of Oceanography

Don Moller, Woods Hole Oceanographic Institution

Greg Mountain, National Science Foundation

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Worth Nowlin, Texas A&M University

Wadsworth Owen, University of Delaware

Theodore Packard, National Science Foundation

Kennard Palfrey, Oregon State University

Michael Prince, Moss Landing Marine Laboratories

Steve Rabalais, Louisiana Universities Marine Consortium

Michael Rawson, Lamont-Doherty Geological Observatory

H. Buck Redman, National Oceanic & Atmospheric Administration

Gilbert Rowe, Texas A&M University

Thomas Royer, University of Alaska

Judy Rubano, University of Hawaii

Ronald Schlitz, National Science Foundation

George G. Shor, Jr., Scripps Institution of Oceanography

Lee Stevens, Joint Oceanographic Institutions

Alexander Sutherland, National Science Foundation

Neal Thayer, U.S. Coast Guard

Carolyn Thoroughgood, University of Delaware

Joseph Ustach, Duke/UNC Oceanographic Consortium

Elizabeth White, National Oceanic & Atmospheric Administration

Terry Whitledge, University of Texas

James Williams, Scripps Institution of Oceanography

J. Austin Yeager, National Oceanic & Atmospheric Administration

UNOLS DIRECTORY

(with designated representatives)
Operator Institutions in **BOLD**

Rev. 8/89

UNIVERSITY OF ALABAMA
Dr. George F. Crozier

UNIVERSITY OF ALASKA
Dr. Thomas Royer

BERMUDA BIOLOGICAL STATION
Dr. Anthony K. Knapp

BIGELOW LABORATORY FOR OCEAN SCIENCES
Dr. Charles S. Yentsch

BROOKHAVEN NATIONAL LABORATORY

UNIVERSITY OF CALIFORNIA, SAN DIEGO, SCRIPPS INSTITUTION OF OCEANOGRAPHY
Dr. George G. Shor, Jr.

UNIVERSITY OF CALIFORNIA, SANTA BARBARA
Dr. James P. Kennett

CAPE FEAR TECHNICAL INSTITUTE
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THE JOHN HOPKINS UNIVERSITY
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Monterey Bay Aquarium Research Institute
Dr. Bruce Robison

MOSS LANDING MARINE LABORATORIES
Dr. John H. Martin

NAVAL POSTGRADUATE SCHOOL
Dr. Steven R. Ramp

UNIVERSITY OF NEW HAMPSHIRE
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NEW YORK STATE UNIVERSITY COLLEGE AT BUFFALO

NEW YORK STATE UNIVERSITY AT STONY BROOK
Dr. Charles A. Nittrouer

NORTH CAROLINA STATE UNIVERSITY

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UNIVERSITY OF SOUTH FLORIDA
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UNIVERSITY SYSTEM OF GEORGIA SKIDAWAY INSTITUTE OF OCEANOGRAPHY
Dr. David W. Menzel

UNIVERSITY OF TEXAS
Dr. Arthur E. Maxwell

TEXAS A & M UNIVERSITY
Dr. Gilbert Rowe

VIRGINIA INSTITUTE OF MARINE SCIENCE

WALLA WALLA COLLEGE
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Dr. Robert A. Ragotzkie

UNIVERSITY OF WISCONSIN AT MILWAUKEE
Dr. David E. Edgington

UNIVERSITY OF WISCONSIN AT SUPERIOR
Dr. Mary Balcer

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Dr. George Grice

SHIP SCHEDULING CONTACT

APPENDIX IV

THE UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
LIST OF RESEARCH VESSELS (>20M) OPERATED BY UNOLS INSTITUTIONS

Rev. (8/89)

OPERATOR	NAME	LOA (FT/M)	BUILT/ CONVERTED	NO. of SCI	OWNER	SHIP SCHEDULING CONTACT
University of Hawaii Marine Center #1 Sand Island Road Honolulu, HI 96819	MOANA WAVE	210/64	1973/1984	19	NAVY	Capt. J.W. Coste Marine Superintendent (808) 847-2661
University of Alaska Institute of Marine Science Fairbanks, AK 99701	ALPHA HELIX	133/41	1966	15	NSF	Dr. Thomas Royer Chair, Ship Committee (907) 474-7835
University of Washington School of Oceanography, WB-10 Seattle, WA 98195	C.A. BARNES	66/20	1966/1984	6	NSF	Dr. Arthur Nowell Director (206) 543-6487
Oregon State University College of Oceanography Newport, OR 97365	WECOMA	177/54	1975	16	NSF	Capt. Kennard M. Palfrey Marine Superintendent (503) 867-3011
Moss Landing Marine Laboratories PO Box 450 Moss Landing, CA 95039	POINT SUR	135/41	1981	12	NSF	Mr. Michael Prince Ship Schedulers (408) 633-3304
University of Southern California Hancock Institute for Marine Studies 820 South Seaside Avenue Terminal Island, CA 90731	OSPREY	220/67	1973/1989	25	USC	Mr. Don Newman, Mgr. Marine Support Facility (213) 743-6977 830-4570
University of California, San Diego Scripps Institutions of Oceanography La Jolla, CA 92093-0210	MELVILLE T. WASHINGTON NEW HORIZON R.G. SPROUL	245/75 209/64 170/52 125/38	1969 1965 1978 1981/1985	29 22 13 12	NAVY NAVY U.C U.C.	Dr. George Shor, Jr. Ship Scheduler Code A-010 (619) 534-2853
University of Michigan Ctr. for Great Lakes & Aquatic Studies 2200 Bonisteel Boulevard Ann Arbor, MI 48109	LAURENTIAN	80/24	1974	8	U.MI.	Dr. Linda Goad Marine Superintendent (313) 763-5393
Texas A&M University Department of Oceanogrpahy PO Box 1675 Galveston, TX 77553	GYRE	182/55	1973/80	20	NAVY	Capt. Dean Letzring Mngr. Marine Operations (409) 740-4469
The University of Texas Marine Science Institute Port Aranses, TX 78373	LONGHORN	105/32	1971/1986	12	U.T.	Mr. John Thompson Assoc. Director, Admin. (512) 749-6760
Louisiana Universities Marine Consortium Marine Research & Education Ctr. Star Route Box 541 (Cocodrie) Chauvin, LA 70344	PELICAN	105/32	1985	15	LUMCON	Mr. Steve Rabalais Marine Ops. Supervisor (504) 568-7027
Harbor Branch Oceanographic Institution 5600 Old Dixie Hwy. Ft. Pierce, FL 34946	SEWARD JOHNSON EDWIN LINK	176/54 168/51	1984 1982/1988	20 20	H.B. H.B.	Mr. Tim Askew Marine Operations (407) 465-2400
The University of Miami, RSMAS Marine Department 4600 Rickenbacker Causeway Miami, FL 33149	ISELIN CALANUS	170/52 64/20	1972 1971	16 6	U.M. U.M.	Mr. Ronald Hutchinson Marine Operations (305) 373-3830
University System of Georgia Skidaway Institute of Oceanography P.O. Box 13687 Savannah, GA 31416-0687	BLUE FIN	72/22	1972/1975	8	U.G.	Dr. David W. Menzel Director (912) 356-2480
Duke/UNC Oceaographic Consortium Duke University Marine Laboratory Beaufort, NC 28516	CAPE HATTERAS	135/41	1981	12	NSF	Capt. Eric B. Nelson Marine Superintendent (919) 728-3372
The Johns Hopkins University Chesapeake Bay Institute 4800 Atwell Road Shady Side, MD 20764	R. WARFIELD	106/32	1967	10	JHU	Mr. Bruce Cornwall Marine Superintendent (301) 867-7550, Ext. 246
University of Delaware College of Marine Studies 700 Pilottown Road Lewes, DE 19958	CAPE HENLOPEN	120/37	1976	12	U.D.	Mr. Wadsworth Owen Dir. of Marine Ops. (302) 645-4320
Lamont-Doherty Geo. Observatory Columbia University Palisades, NY 10964	BERNIER	239/73	1983/1990	32	L-DGO	Mr. Michael Rawson Marine Sci. Coordinator (914) 359-2900, Ext. 245
University of Rhode Island Graduate School of Oceanography Narragansett, RI 02881	ENDEAVOR	177/54	1976	16	NSF	Mr. John F. Bash Marine Superintendent (401) 792-6203
Woods Hole Oceanographic Inst. Woods Hole, MA 02543	KNORR ATLANTIS II OCEANUS DSRV ALVIN	279/85 210/64 177/54 25.8	1970/1989 1963 1975 1964	34 *29 12 2	NAVY WHOI NSF NAVY	Mr. Donald Moller Marine Ops. Admin. (508) 548-1400, Ex. 2277

*20 Scientists (includes one medic), plus 9 ALVIN group

MARINE OPERATIONS CONTACT

THE UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
LIST OF RESEARCH VESSELS (>20m) OPERATED BY UNOLS INSTITUTIONS

Rev. (8/89)

OPERATOR	NAME	LOA (FT/M)	BUILT/ CONVERTED	CREW	NO. of SCI	OWNER	MARINE OPS CONTACT
University of Hawaii Marine Center #1 Sand Island Road Honolulu, HI 96819	MOANA WAVE	210/64	1973/1984	16	19	NAVY	Capt. J.W. Coste Marine Superintendent (808) 847-2661
University of Alaska Institute of Marine Science Fairbanks, Alaska 99701	ALPHA HELIX	133/41	1966	9	15	NSF	Mr. Thomas Smith Marine Superintendent (907) 224-5261
University of Washington School of Oceanography, WB-10 Seattle, Washington 98195	C.A. BARNES	66/20	1966/1984	2	6	NSF	Capt. William Jeffers Marine Superintendent (206) 543-5062
Oregon State University College of Oceanography Newport, Oregon 97365	WECOMA	177/54	1975	12	16	NSF	Capt. Kennard M. Palfrey Marine Superintendent (503) 867-3011
Moss Landing Marine Laboratories PO Box 450 Moss Landing, California 95039	POINT SUR	135/41	1981	9	12	NSF	Mr. Michael Prince Marine Superintendent (408) 633-3534
University of Southern California Hancock Institute for Marine Studies 820 South Seaside Avenue Terminal Island, California 90731	OSPREY	220/68	1973/1989	14	25	USC	Mr. Don Newman, Manager Marine Support Facility (213) 743-6977
University of California, San Diego Scripps Institution of Oceanography La Jolla, California 92093-0210	MELVILLE T. WASHINGTON NEW HORIZON R.G. SPROUL	245/75 209/64 170/52 125/38	1969 1965 1978 1981/1985	23 23 12 5	29 22 13 12	NAVY NAVY U.C U.C.	Capt. Jim Williams Marine Facilities Code P-005 (619) 225-9600
University of Michigan Ctr. for Great Lakes & Aquatic Studies 2200 Bonisteel Boulevard Ann Arbor, Michigan 48109	LAURENTIAN	80/24	1974	6	8	U.MI.	Dr. Linda Goad Marine Superintendent (313) 763-5393
Texas A&M University Department of Oceanogrpahy PO Box 1675 Galveston, Texas 77553	GYRE	182/55	1973/1980	10	20	NAVY	Capt. Dean Letzring Manager, Marine Ops. (409) 740-4469
The University of Texas Marine Science Institute Port Aranses, TX 78373	LONGHORN	105/32	1971/1986	4	12	U.T.	Mr. John Thompson Assoc. Director, Admin. (512) 749-6760
Louisiana Universities Marine Consortium Marine Research & Education Center Star Route Box 541 (Cocodrie) Chauvin, LA 70344	PELICAN	105/32	1985	5	15	LUMCON	Mr. Steve Rabalais Marine Ops. Supervisor (504) 568-7027
Harbor Branch Oceanographic Institution 5600 Old Dixie Hwy Ft. Pierce, FL 34946	SEWARD JOHNSON EDWIN LINK	176/54 168/51	1984 1982/1988	10 10	20 20	H.B. H.B.	Mr. Tim Askew Marine Operations (407) 465-2400
The University of Miami, RSMAS School of Mar. & Atmos. Sciences Marine Department 4600 Rickenbacker Causeway Miami, Florida 33149	ISELIN CALANUS	170/52 64/20	1972 1971	12 2	16 6	U.M. U.M.	Mr. Ronald Hutchinson Marine Operations (305) 361-2549 573-3830
University System of Georgia Skidaway Institute of Oceanography P.O. Box 13687 Savannah, Georgia 31416-0687	BLUE FIN	72/22	1972/1975	5	8	U.G.	Dr. David W. Menzel Director (912) 356-2480
Duke/UNC Oceanographic Consortium Duke University Marine Laboratory Beaufort, North Carolina 28516	CAPE HATTERAS	135/41	1981	10	12	NSF	Capt. Eric B. Nelson Marine Superintendent (919) 728-1372
The Johns Hopkins University Chesapeake Bay Institute 4800 Atwell Road Shady Side, Maryland 20764	R. WARFIELD	106/32	1967	11	10	JHU	Mr. Bruce Cornwall Marine Superintendent (301) 867-7550, Ext. 24[illegible]
University of Delaware College of Marine Studies 700 Pilottown Road Lewes, Delaware 19958	CAPE HENLOPEN	120/37	1976	7	12	U.D.	Mr. Wadsworth Owen Director, Marine Ops. (302) 645-4320
Lamont-Doherty Geo. Observatory Columbia University Palisades, New York 10964	BERNIER	239/73	1983/1990	18	32	L-DGO	Capt. Louis Hannigan Marine Superintendent (914) 359-2900, Ext. [illegible]
University of Rhode Island Graduate School of Oceanography Narragansett, Rhode Island 02882	ENDEAVOR	177/54	1976	12	16	NSF	Mr. John F. Bash Marine Superintendent (401) 792-6203
Woods Hole Oceanographic Inst. Woods Hole, Massachusetts 02543	KNORR ATLANTIS II OCEANUS DSRV ALVIN	279/85 210/64 177/54 25.8	1970/1989 1963 1975 1964	25 27 12	34 *29 12 2	NAVY WHOI NSF NAVY	Capt. Joe Coburn Manager, Marine Ops (508) 548-1400, Ex.22[illegible]

*20 Scientists (includes one medic), plus 9 ALVIN group

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UNOLS OFFICE

11/29/89

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

CRUISE DAYS PROFILES

AGENCY	PHYS OCEAN	ACCOU STICS	CHEM OCEAN	BIOL OCEAN	ENVIR ECOL	FISH INVST	CLIM METEO	GEOLO GEOPH	MAP CHRTG	OCEAN ENGRG	TRAIN ING	TRANS NONSCI	TOTAL
NATL SCIENCE FNDTN	365.5	.00	590.00	1131.83	27.00	.00	47.00	919.00	.00	83.00	1.00	230.00	3394.41
OFF. NAVAL RESEARCH	258.1	30.00	50.00	55.25	2.00	.00	6.00	147.00	.00	36.00	.00	27.00	611.39
U.S. GEOL. SURVEY	.0	.00	.00	.00	.00	.00	.00	2.00	.00	.00	.00	.00	2.00
MINERALS MNGT. SER.	.0	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NATL OCEAN/ATMOSPH	6.0	.00	.00	7.00	.00	.00	.00	2.00	.00	4.00	.00	.00	19.00
DEPT. OF ENERGY	27.0	.00	43.00	25.75	.00	.00	.00	.00	.00	.00	.00	.00	95.75
OTHER FEDERAL	.0	.00	.00	.00	.00	.00	.00	5.00	.00	2.00	.00	.00	7.00
STATE/MUNICIPAL	69.0	4.00	2.00	35.00	.00	1.00	2.00	61.00	.00	4.00	17.00	.00	195.00
OTHER/PRIVATE	12.0	.00	.00	4.00	.00	.00	.00	104.00	.00	.00	3.00	1.00	124.00
TOTALS	737.72	34.00	685.00	1258.83	29.00	1.00	55.00	1240.00	.00	129.00	21.00	258.00	4448.55
PERCENT	16.58	.76	15.40	28.30	.65	.02	1.24	27.87	.00	2.90	.47	5.80	100.00

11/29/89

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

CRUISE DAYS PROFILES

INSTITUTION	PHYS OCEAN	ACCOU STICS	CHEM OCEAN	BIOL OCEAN	ENVIR ECOL	FISH INVST	CLIM METEO	GEOLO GEOPH	MAP CHRTG	OCEAN ENGRG	TRAIN ING	TRANS NONSCI	TOTAL -----
UNIV. HAWAII	81.00	.00	.00	25.00	.00	.00	.00	148.00	.00	.00	.00	46.00	300.00
UNIV. ALASKA	60.00	.00	30.00	108.00	.00	.00	.00	.00	.00	.00	.00	.00	198.00
UNIV. WASHINGTON	33.72	.00	31.00	118.83	4.00	.00	.00	2.00	.00	2.00	15.00	1.00	207.55
OREGON STATE UNIV.	82.00	.00	28.00	82.00	.00	.00	.00	34.00	.00	.00	.00	5.00	231.00
SCRIPPS INST. OCEAN	177.00	33.00	57.00	183.00	23.00	.00	6.00	331.00	.00	53.00	1.00	42.00	906.00
TEXAS A&M UNIV.	.00	.00	.00	10.00	.00	.00	.00	123.00	.00	.00	.00	.00	133.00
UNIV. TEXAS	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	32.00	32.00
UNIV. MIAMI, RSMAS	20.00	.00	92.00	234.00	.00	.00	6.00	.00	.00	.00	1.00	1.00	354.00
UNIV GA., SKIDAWAY	7.00	.00	22.00	42.00	.00	.00	.00	.00	.00	.00	.00	2.00	73.00
DUKE UNIV/UNC	12.00	.00	.00	109.00	.00	.00	.00	77.00	.00	.00	.00	.00	198.00
JOHNS HOPKINS UNIV.	1.00	.00	34.00	72.00	.00	.00	.00	.00	.00	.00	3.00	.00	110.00
UNIV. DELAWARE	13.00	.00	26.00	3.00	.00	.00	.00	15.00	.00	.00	.00	.00	57.00
LAMONT-DOHERTY GEOL	.00	.00	.00	.00	.00	.00	41.00	286.00	.00	.00	.00	24.00	351.00
UNIV. RHODE ISLAND	43.00	.00	62.00	82.00	.00	.00	.00	5.00	.00	10.00	.00	21.00	223.00
WOODS HOLE OCEAN	137.00	.00	278.00	131.00	2.00	.00	.00	197.00	.00	58.00	.00	73.00	876.00
UNIV. MICHIGAN	.00	.00	.00	24.00	.00	1.00	2.00	14.00	.00	6.00	.00	11.00	58.00
MOSS LANDING MAR LAB	71.00	1.00	25.00	35.00	.00	.00	.00	8.00	.00	.00	1.00	.00	141.00
TOTALS	737.72	34.00	685.00	1258.83	29.00	1.00	55.00	1240.00	.00	129.00	21.00	258.00	4448.55
PERCENT	16.58	.76	15.40	28.30	.65	.02	1.24	27.87	.00	2.90	.47	5.80	100.00

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

CRUISE DAYS PROFILES

11/29/89

VESSEL	PHYS OCEAN	ACCOU STICS	CHEM OCEAN	BIOL OCEAN	ENVIR ECOL	FISH INVST	CLIM METEO	GEOLO GEOPH	MAP CHRTG	OCEAN ENGRG	TRAIN ING	TRANS NONSCI	TOTAL -----
MELVILLE	29.00	27.00	.00	84.00	.00	.00	.00	58.00	.00	.00	.00	10.00	208.00
KNORR	.00	.00	161.00	21.00	.00	.00	.00	39.00	.00	51.00	.00	31.00	303.00
ATLANTIS II	.00	.00	86.00	110.00	2.00	.00	.00	103.00	.00	.00	.00	42.00	343.00
CONRAD	.00	.00	.00	.00	.00	.00	41.00	286.00	.00	.00	.00	24.00	351.00
T.G. THOMPSON	33.72	.00	.00	93.83	.00	.00	.00	.00	.00	.00	.00	.00	127.55
T. WASHINGTON	24.00	.00	.00	33.00	23.00	.00	.00	219.00	.00	.00	.00	32.00	331.00
ENDEAVOR	43.00	.00	62.00	82.00	.00	.00	.00	5.00	.00	10.00	.00	21.00	223.00
OCEANUS	137.00	.00	31.00	.00	.00	.00	.00	55.00	.00	7.00	.00	.00	230.00
WECOMA	82.00	.00	28.00	82.00	.00	.00	.00	34.00	.00	.00	.00	5.00	231.00
GYRE	.00	.00	.00	10.00	.00	.00	.00	123.00	.00	.00	.00	.00	133.00
MOANA WAVE	81.00	.00	.00	25.00	.00	.00	.00	148.00	.00	.00	.00	46.00	300.00
ISELIN	7.00	.00	84.00	118.00	.00	.00	6.00	.00	.00	.00	1.00	1.00	217.00
NEW HORIZON	86.00	.00	31.00	11.00	.00	.00	6.00	24.00	.00	48.00	.00	.00	206.00
FRED H. MOORE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	32.00	32.00
POINT SUR	71.00	1.00	25.00	35.00	.00	.00	.00	8.00	.00	.00	1.00	.00	141.00
CAPE HATTERAS	12.00	.00	.00	109.00	.00	.00	.00	77.00	.00	.00	.00	.00	198.00
ALPHA HELIX	60.00	.00	30.00	108.00	.00	.00	.00	.00	.00	.00	.00	.00	198.00
ROBERT G. SPROUL	38.00	6.00	26.00	55.00	.00	.00	.00	30.00	.00	5.00	1.00	.00	161.00
CAPE HENLOPEN	13.00	.00	26.00	3.00	.00	.00	.00	15.00	.00	.00	.00	.00	57.00
WARFIELD	1.00	.00	34.00	72.00	.00	.00	.00	.00	.00	.00	3.00	.00	110.00
BLUE FIN	7.00	.00	22.00	42.00	.00	.00	.00	.00	.00	.00	.00	2.00	73.00
CLIFFORD BARNES	.00	.00	31.00	25.00	4.00	.00	.00	2.00	.00	2.00	15.00	1.00	80.00
CALANUS	13.00	.00	8.00	116.00	.00	.00	.00	.00	.00	.00	.00	.00	137.00
LAURENTIAN	.00	.00	.00	24.00	.00	1.00	2.00	14.00	.00	6.00	.00	11.00	58.00
TOTALS	737.72	34.00	685.00	1258.83	29.00	1.00	55.00	1240.00	.00	129.00	21.00	258.00	4448.55
PERCENT	16.58	.76	15.40	28.30	.65	.02	1.24	27.87	.00	2.90	.47	5.80	100.00

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

OPERATIONAL DAYS CHARGED BY SPONSOR

11/29/89

INSTITUTION	NATL SCI. FNDTN	OFF. NAVAL RES.	U.S. GEOL SURV.	MNRSL MNGMT SERV.	NATL OCEAN ATMOS	DEPT OF ENRGY	OTHER FEDER FUNDS	STATE OR MUNIC	PRIV/ FORGN FUNDS	TOTALS
UNIV. HAWAII	281.00	.00	.00	.00	.00	.00	.00	.00	19.00	300.00
UNIV. ALASKA	197.00	.00	.00	.00	.00	.00	.00	1.00	.00	198.00
UNIV. WASHINGTON	180.41	8.14	2.00	.00	2.00	.00	.00	16.00	.00	207.55
OREGON STATE UNIV.	172.00	59.00	.00	.00	.00	.00	.00	.00	.00	231.00
SCRIPPS INST. OCEAN	670.00	114.00	.00	.00	2.00	20.00	.00	97.00	3.00	906.00
TEXAS A&M UNIV.	10.00	.00	.00	.00	.00	.00	.00	45.00	78.00	133.00
UNIV. TEXAS	32.00	.00	.00	.00	.00	.00	.00	.00	.00	32.00
UNIV. MIAMI, RSMAS	286.00	62.00	.00	.00	5.00	.00	.00	.00	1.00	354.00
UNIV GA., SKIDAWAY	52.00	.00	.00	.00	.00	21.00	.00	.00	.00	73.00
DUKE UNIV/UNC	129.00	47.00	.00	.00	.00	12.00	.00	10.00	.00	198.00
JOHNS HOPKINS UNIV.	106.00	.00	.00	.00	1.00	.00	.00	.00	3.00	110.00
UNIV. DELAWARE	30.00	15.00	.00	.00	.00	.00	.00	.00	12.00	57.00
LAMONT-DOHERTY GEOL	278.00	69.00	.00	.00	.00	.00	.00	.00	4.00	351.00
UNIV. RHODE ISLAND	144.00	31.25	.00	.00	.00	42.75	5.00	.00	.00	223.00
WOODS HOLE OCEAN	741.00	122.00	.00	.00	9.00	.00	.00	.00	4.00	876.00
UNIV. MICHIGAN	45.00	.00	.00	.00	.00	.00	2.00	11.00	.00	58.00
MOSS LANDING MAR LAB	41.00	84.00	.00	.00	.00	.00	.00	16.00	.00	141.00
TOTALS	3394.41	611.39	2.00	.00	19.00	95.75	7.00	196.00	124.00	4448.55
PERCENT	76.3	13.7	.0	.0	.4	2.2	.2	4.4	2.8	100.0

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

OPERATIONAL DAYS CHARGED BY SPONSOR

VESSEL	LOA	NATL SCI. FNDTN	OFF. NAVAL RES.	U.S. GEOL SURV.	MNRSL MNGMT SERV.	NATL OCEAN ATMOS	DEPT OF ENRGY	OTHER FEDER FUNDS	STATE OR MUNIC	PRIV/ FORGN FUNDS	TOTALS
MELVILLE	245FT	146.00	49.00	.00	.00	.00	.00	.00	10.00	3.00	208.00
KNORR	245FT	280.00	23.00	.00	.00	.00	.00	.00	.00	.00	303.00
ATLANTIS II	210FT	308.00	22.00	.00	.00	9.00	.00	.00	.00	4.00	343.00
CONRAD	209FT	278.00	69.00	.00	.00	.00	.00	.00	.00	4.00	351.00
T.G. THOMPSON	209FT	120.41	7.14	.00	.00	.00	.00	.00	.00	.00	127.55
T. WASHINGTON	209FT	302.00	26.00	.00	.00	.00	.00	.00	3.00	.00	331.00
ENDEAVOR	177FT	144.00	31.25	.00	.00	.00	42.75	5.00	.00	.00	223.00
OCEANUS	177FT	153.00	77.00	.00	.00	.00	.00	.00	.00	.00	230.00
WECOMA	177FT	172.00	59.00	.00	.00	.00	.00	.00	.00	.00	231.00
GYRE	174FT	10.00	.00	.00	.00	.00	.00	.00	45.00	78.00	133.00
MOANA WAVE	210FT	281.00	.00	.00	.00	.00	.00	.00	.00	19.00	300.00
ISELIN	170FT	170.00	46.00	.00	.00	.00	.00	.00	.00	1.00	217.00
NEW HORIZON	170FT	105.00	15.00	.00	.00	2.00	15.00	.00	69.00	.00	206.00
FRED H. MOORE	165FT	32.00	.00	.00	.00	.00	.00	.00	.00	.00	32.00
POINT SUR	135FT	41.00	84.00	.00	.00	.00	.00	.00	16.00	.00	141.00
CAPE HATTERAS	135FT	129.00	47.00	.00	.00	.00	12.00	.00	10.00	.00	198.00
ALPHA HELIX	133FT	197.00	.00	.00	.00	.00	.00	.00	1.00	.00	198.00
ROBERT G. SPROUL	125FT	117.00	24.00	.00	.00	.00	5.00	.00	15.00	.00	161.00
CAPE HENLOPEN	120FT	30.00	15.00	.00	.00	.00	.00	.00	.00	12.00	57.00
WARFIELD	106FT	106.00	.00	.00	.00	1.00	.00	.00	.00	3.00	110.00
BLUE FIN	72FT	52.00	.00	.00	.00	.00	21.00	.00	.00	.00	73.00
CLIFFORD BARNES	65FT	60.00	1.00	2.00	.00	2.00	.00	.00	15.00	.00	80.00
CALANUS	64FT	116.00	16.00	.00	.00	5.00	.00	.00	.00	.00	137.00
LAURENTIAN	80FT	45.00	.00	.00	.00	.00	.00	2.00	11.00	.00	58.00
TOTALS		3394.41	611.39	2.00	.00	19.00	95.75	7.00	195.00	124.00	4448.55
PERCENT		76.3	13.7	.0	.0	.4	2.2	.2	4.4	2.8	100.0

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

PROJECT PERSON-DAYS AT SEA BY SPONSOR

11/29/89

VESSEL	LOA	TOTAL DAYS CHRGD	NATL SCI. FNDTN	OFF. NAVAL RES.	U.S. GEOL. SURV.	MNRLS MNGMT SERV.	NATL OCEAN ATMOS	DEPT. OF ENRGY	OTHER FEDER FUNDS	STATE OR MUNIC	PRIV/ FORGN FUNDS	TOTALS ------
MELVILLE	246	208.00	3561.00	865.00	.00	.00	.00	.00	.00	188.00	54.00	4668.00
KNORR	245	303.00	5204.00	307.00	.00	.00	.00	.00	.00	.00	.00	5511.00
ATLANTIS II	210	343.00	6797.00	487.00	.00	.00	372.00	.00	.00	.00	176.00	7832.00
CONRAD	209	351.00	3772.00	798.00	.00	.00	.00	.00	.00	.00	56.00	4626.00
T.G. THOMPSON	209	127.56	2587.44	49.98	.00	.00	.00	.00	.00	.00	.00	2637.42
T. WASHINGTON	209	331.00	4767.00	310.00	.00	.00	.00	.00	.00	42.00	.00	5119.00
ENDEAVOR	177	223.00	2033.00	365.00	.00	.00	.00	828.00	.00	.00	.00	3226.00
OCEANUS	177	230.00	1497.00	735.00	.00	.00	.00	.00	.00	.00	.00	2232.00
WECOMA	177	231.00	2251.00	884.00	.00	.00	.00	.00	.00	.00	.00	3135.00
GYRE	174	133.00	60.00	.00	.00	.00	.00	.00	.00	707.00	1482.00	2249.00
MOANA WAVE	210	300.00	4140.00	.00	.00	.00	.00	.00	.00	.00	342.00	4482.00
ISELIN	170	217.00	3444.00	824.00	.00	.00	.00	.00	.00	.00	22.00	4290.00
NEW HORIZON	170	208.00	1119.00	24.00	.00	.00	24.00	159.00	.00	1194.00	.00	2520.00
POINT SUR	135	141.00	390.00	760.00	.00	.00	.00	.00	.00	420.00	.00	1570.00
CAPE HATTERAS	135	198.00	1495.00	456.00	.00	.00	.00	144.00	.00	120.00	.00	2215.00
ALPHA HELIX	133	198.00	2293.00	.00	.00	.00	.00	.00	.00	15.00	.00	2308.00
ROBERT G. SPROUL	125	161.00	1408.00	56.00	.00	.00	.00	50.00	.00	47.00	.00	1561.00
CAPE HENLOPEN	120	57.00	353.00	135.00	.00	.00	.00	.00	.00	.00	68.00	556.00
WARFIELD	106	110.00	529.00	.00	.00	.00	7.00	.00	.00	.00	81.00	617.00
BLUE FIN	072	73.00	137.00	.00	.00	.00	.00	74.00	.00	.00	.00	211.00
CLIFFORD BARNES	065	80.00	314.00	2.00	4.00	.00	12.00	.00	.00	553.00	.00	885.00
CALANUS	064	137.00	698.00	98.00	.00	.00	105.00	.00	.00	.00	.00	901.00
LAURENTIAN	080	58.00	197.00	.00	.00	.00	.00	.00	8.00	72.00	.00	277.00
TOTALS		4448.55	49046.44	7175.98	4.00	.00	520.00	1255.00	8.00	3338.00	2281.00	63628.42
PERCENT			77.1	11.3	.0	.0	.8	2.0	.0	5.2	3.6	100.0

UNOLS RESEARCH VESSELS FLEET OPERATIONS - 1988 -

UNOLS CRUISE PARTICIPANTS AND AFFILIATIONS

SHIP	SCI	TECH	GRAD	STU/OBS	TOTAL	ASSOC	NON-UNOLS	FED	FRGN	TOTAL
MOANA WAVE	40	86	41	17	184	0	0	0	4	4
ALPHA HELIX	47	19	33	37	136	0	0	0	0	0
T.G. THOMPSON	30	28	29	5	92	0	0	0	0	0
CLIFFORD BARNES	40	47	52	200	339	0	0	0	0	0
WECOMA	80	98	48	21	247	0	0	0	4	4
MELVILLE	101	94	53	24	272	0	0	0	0	0
ROBERT G. SPROUL	62	62	38	22	184	0	0	0	0	0
NEW HORIZON	60	75	32	13	180	0	0	0	0	0
T. WASHINGTON	83	85	58	19	245	0	0	0	0	0
GYRE	7	50	14	2	73	0	0	0	0	0
FRED H. MOORE	0	0	0	0	0	0	0	0	0	0
ISELIN	129	103	59	46	337	0	0	0	4	4
CALANUS	44	32	31	7	114	2	19	9	0	30
BLUE FIN	34	62	2	12	110	0	0	0	0	0
CAPE HATTERAS	58	25	39	10	132	0	0	0	0	0
WARFIELD	90	115	64	91	360	0	0	0	0	0
CAPE HENLOPEN	36	35	51	22	144	0	0	0	0	0
CONRAD	41	70	22	9	142	0	0	0	7	7
ENDEAVOR	95	147	40	16	298	0	0	0	0	0
ATLANTIS II	229	280	84	43	636	0	0	0	0	0
KNORR	109	123	21	27	280	0	0	0	0	0
OCEANUS	55	103	18	5	181	0	0	0	4	4
LAURENTIAN	37	13	36	23	109	0	0	0	0	0
POINT SUR	115	53	78	360	606	0	0	0	0	0
TOTALS	1622	1805	943	1031	5401	2	19	9	23	53
PERCENT	30.0	33.4	17.5	19.1	100.0	.0	.4	.2	.4	1.0

9/1/89

PRINCIPAL CHARACTERISTICS AND CAPACITIES OF THE MODIFIED R/V MELVILLE & R/V KNORR

Length Overall (LOA)	278'-10"
Length Between Perpendiculars (LBP)	254'-0"
Beam, molded	46'-0"
Depth, Main Deck at Side	25'-0"
Depth, Main Deck at Centerline	25'-6"
Draft, Design Draft, molded	15'-6"
Draft, Loadline Draft, molded	16'-6"
Displacement, at Design Draft	2685 LT
Displacement, at Loadline Draft	29[illegible] LT
Lightship Weight (est.)	1866 LT
Diesel Oil Capacity, Total	[illegible]60,500 Gal
Diesel Oil Capacity, Burnable	141,000 Gal
Segregated Ballast Capacity	365 LT
Lube Oil Capacity	6,530 Gal
Potable Water Holding Capacity	15,900 Gal
Potable Water Generating Capacity	6,000 GPD
Treated Sewage Holding Capacity	8,220 Gal
Science Stores and Equipment Capacity	242 LT
Sewage Treatment Capacity	3,600 gal/day
Incinerator Capacity	1,500 lbs/day
Speed, Maximum	14.0 knots
Speed, Minimum	0.1 knots
Cruising Speed	12.0 knots
Fuel Consumption per day, cruising (12 knots)	3,400 GPD
Range, Cruising	11,900 n.m.
Economical Speed	10.0 knots
Fuel Consumption per day, economical (10 knots)	2,400 GPD
Range, Economical	14,100 n.m.
Endurance: Limited by Stores	45 days; may be extended to 60 days under exceptional circumstances
Type of Machinery	Diesel-Electric AC/SCR/DC
Propulsion Units	Twin Azimuthing Thrusters
Horsepower, Max. Continuous SHP per shaft	1500 HP
Bow Thruster	900 HP, Retractable
Electrical Generating Capacity (3 x 1090) + (1 x 560)	3830 kW
Power Required for Propulsion, Max	2050 kW
Available Electric Power, Min	1780 kW
In-Port Electric Load	414 kW

Shore Power Connection..............................2 x 400 Amps

Accommodations: Crew/Scientists............................24/34

Laboratory Space...............................3,680 sq. ft.
Scientific Storage.............................1,320 sq. ft.
Main Deck Working Area.........................3,764 sq. ft.
Main Deck Clear Length...............................126 ft.

Gross tonnaage (Approx.)................................2,200

jjk

METEOROLOGICAL MEASUREMENTS FROM UNOLS RESEARCH SHIPS

R. Weller, WHOI
P. K. Taylor, IOS

September 5, 1989

Meteorological Measurements from UNOLS Research Ships

I. Introduction

Observations of the basic meteorological variables at sea are extremely valuable, not only because they add to the data needed to understand air-sea coupling but also because they fulfill the immediate need for the data required to develop accurate weather forecasts. The ships of the UNOLS fleet have the potential of being especially attractive platforms from which to make accurate *in situ* measurements of the basic observables -- sea surface temperature, air temperature, wind velocity, barometric pressure, solar and longwave radiation, humidity, and precipitation -- and from which to make accurate estimates of the air-sea fluxes. They are attractive because: 1) They often travel paths through data sparse regions; 2) They are manned by crews, technicians and science parties with an interest in obtaining good meteorological data; and 3) Their operating schedules permit their sensors and electronics to be returned periodically for calibration.

This document will briefly discuss the uses of, and implied accuracy requirements for, meteorological data from the UNOLS fleet. On the basis of a review of three types of meteorological instrumentation packages developed in the U.K. and in the U.S. recommendations are made for equipping the UNOLS ships with meteorological systems. These systems comprise meteorological sensors, on board display and data recording software and hardware, and on board hardware and software for automated telemetry via Service ARGOS of averaged data. For this discussion, the UNOLS fleet is considered to consist of Large (greater than 200 ft and capable of global operation), Medium (150-200 ft, working near home port and not at high latitude), and Small vessels (local and coastal operation). Finally, some areas of concern that must be dealt with during the implementation are listed.

II. Meteorological Instrumentation for Ships

II.1 Accuracy Requirements

Meteorological data from the UNOLS ships would be of value for:

(a) initialization of atmospheric models;
(b) as a source of accurate estimates of the basic meteorological variables (air temperature, humidity, etc.); e.g. for comparison to values from ships of opportunity, output from atmospheric forecast models, or for satellite validation.
(c) to estimate the air-sea fluxes; e.g. to verify climatology or model derived flux values.

These uses, and the implications for measurement precision etc. have been discussed in more detail in Taylor (1989). The greatest demand, in terms of the variables to be measured and the accuracy sought, is for the definition of the surface fluxes. Data adequate for that purpose will also be adequate for model initialization provided it is rapidly made available over GTS (Global Telecommunication System).

For routine measurement from ships the surface flux values will be obtained, using bulk formulae, from the basic meteorological observables. These are the sea surface temperature (T_s), air temperature (T_a), wind speed (U_w), wind direction (ϕ), barometric pressure (p_a), humidity (q_a) or dew point temperature (T_D) or wet bulb temperature (T_W), short wave radiation (SW), long wave radiation (LW), and precipitation rate (p_o). There should be care taken to minimize errors in the measurement of these basic observables, particularly systematic errors or biases that cannot be suppressed by averaging. The following accuracies should be sought:

Table of Accuracies

Observable	Target Accuracy
Wind speed, U_w	larger of 2 percent or .2 m s^{-1}
Wind direction, ϕ	2.8°
Air-sea temp. diff	0.5°C
air temp, T_a	0.25°C
sea surface temp, T_s	0.25°C
Humidity	
specific humidity, q	0.25 g kg^{-1}
relative humidity, RH	1.7 percent
dew point temp., T_D	0.3°C
Net shortwave, SW↑↓	10 W m^{-2}
Net longwave, LW↑↓	10 W m^{-2}
Barometric pressure	1 mb
Precipitation	1 cm $month^{-1}$

II.2 System Definition

Accurate shipboard meteorological measurements have been attempted by many investigators over the years. Some instrumentation systems are now in use, and other packages and sensor sets are now under development. The functional definition of a suitable system should include:

(a) A suite of calibrated, properly exposed meteorological sensors. This normally requires the use of two or three sensors for each variable to ensure good exposure for any relative wind direction. Calibration is required at frequent intervals (typically one to three months). The organization of a routine system for sensor maintenance and calibration should be an important part of the installation specifications.

(b) A link to the ship's navigation system. The direction of the ship's head, and the ship's velocity through the water, are required to correct wind velocities.

(c) Signal conditioning and transmission to the logging system. A particular problem for shipboard installations is to avoid interference from radio transmissions.

(d) Sampling, time stamping, filtering and averaging of the data. Typically data may be sampled once per second or faster, and the processed values averaged over one or more minutes.

(e) Conversion of the data to geophysical units. This may be performed either before recoding or on replay for data display. The correct calibration must be correctly associated with each sensor despite, for example, the replacement of a sensor due to failure in the middle of a cruise.

(f) Data recording. This must be reliable despite possible power supply fluctuations, etc.

(g) Data display. Normally the scientific party on the ship requires a display of present data and also to be able to recover previously recorded data. This must be possible without compromising the data recording.

(h) Transmission of the data to shore for system monitoring. If required this is normally accomplished through an ARGOS link.

(i) Transmission of the data on the GTS for use by Meteorological Agencies. This requires that the data be quality controlled and that a correctly coded message be assembled.

II.3 Examples of Meteorological Systems

To illustrate what is possible, SEAS, a basic system for preparing GTS reports and two systems which have been developed for use in WOCE are briefly summarized. These last two are "MultiMet" developed by IOSDL (Institute of Oceanographic Sciences Deacon Laboratory) in the U.K. and IMET, a new system of sensors and data loggers being developed in the U. S. Both the latter systems are capable of providing measurements for estimating the surface fluxes.

II.3.1 The NOAA SEAS System

The SEAS system is aimed at the preparation and transmission of a coded meteorological observation report over the GTS. In the basic implementation, the ship's officer manually reads wet and dry bulb thermometers situated in a screen or hand held psychrometer, reads the relative wind from an anemometer dial, and then enters these and other observations into a computer as prompted by the SEAS software. The computer codes the message and transmits it via GOES satellite to the GTS.

II.3.2 The IOSDL MultiMet System

Taylor (1987) and Birch and Pascal (1987) have described the hardware and software developed by the U.K. Institute of Oceanographic Sciences Deacon Laboratory for use on research ships, ships of opportunity, and moored buoys. MultiMet is an RCA 1802 microprocessor based data logger able to accept various inputs, sampling rates, and averaging intervals for various channels. Typically, analog, digital or frequency data can be accepted at 1 Hz for 50 seconds on up to 48 channels; data is recorded once per minute. Wind velocities are not vector-averaged. The time base is provided by a real time clock. Data is recorded on a Seadata cassette recorder or EPROM logger in engineering units (frequency counts, volts, etc.).

MultiMet is used with commercially available meteorological sensors. To minimize interference, signal conditioning is done as close to the meteorological sensors as possible. The sensor set is summarized in a table in the Appendix. Good sensor exposure is achieved by using multiple sensors, and if necessary, by use of a 10 meter mast designed to be mounted in the bow of the ship. A platform carries the sensors and can be raised and lowered on the mast, permitting easy servicing.

Data display on board the ship is provided by a software package, MetMan (METeorological MANagement), running on a BBC microcomputer system. Communciation between MultiMet and the BBC micro is RS423 link. Communciation of the raw data to shore can be achieved via an ARGOS link inserted in the MultiMet logger.

The system has been used on several research ships, and since 1987, on a continuous trial on the Ocean Weather Ship Cumulus.

II.3.3 The WHOI IMET System

The IMET (Improved METeorological measurements; WOCE long-lead time development underway at WHOI) ship data logger/controller is an NEC APC-IV personal computer with optical disks (WORM) for on board storage of all data, an ARGOS PTT for automatic data reporting, and flexible sampling/logging software. The sensor set will provide measurement of wind velocity, air temperature, sea temperature, barometric pressure, relative humidity, incoming shortwave radiation, incoming longwave radiation, and precipitation. Each sensor will be mated to a microprocessor based module that will perform some sampling tasks, convert the raw sensor output to engineering units, and send the data digitally over RS-485 link to the APC-IV data logger/controller. Each module will have stored in EPROM the calibration of the sensor; sensors will remain with the same module for their entire life. Air-sea fluxes will be computed on board (using Large and Pond stability dependent algorithms for momentum, sensible, and latent heat and computing net shortwave using an albedo look-up table and net longwave by estimating outgoing longwave with an improved graybody algorithm being developed by Dickey at USC). Raw data and original sampling rate (as fast as every minute for 1 year) fluxes will be stored on the optical disk; several-hour averaged surface variables and fluxes will be telemetered via ARGOS. ARGOS data should be monitored (and quality checked so it will qualify for distribution via GTS) and archived at an accessible (dial-up and/or Ethernet) data base; such a land-based data acquisition and archiving system is in operation at WHOI.

Prototype IMET ship data loggers are complete. Test deployments began in November 1988, and test ship installations will be in operation in 1989. Sensors for all variables, including precipitation, are under test on land. Testing of the most promising of these will be continued on ship installations beginning in 1989. Special efforts are being made to develop relative humidity and precipitation sensors, to reduce errors in sea surface and air temperatures, reduce errors in short and long-wave radiation measurements associated with platform motion, and to develop a reliable system for use on ships and buoys.

Precipitation sensors under test include the R. M. Young 50202 Capacitive-siphon gauge, the Scientific Technology ORG-705 Optical Rain Gage, and, for comparison, tipping bucket and standard collector gauges. The ORG-705 and R.M. Young 50202 are both being considered for use on ships and buoys; NDBC has done limited testing of them.

Wind sensors under test include R. M. Young cups (aluminum and plastic) and the R. M. Young 5103 Wind Monitor. Given the well-documented nature of cup anemometer overspeeding, more emphasis is being placed on use of the propeller-vane type of wind sensor. Tests are planned (in conjunction with Carl Friehe, U. C. Irvine) to further investigate platform motion-induced errors in wind velocity measurements. Some consideration must also be given to the error associated with the disturbance of the wind field by the ship itself.

Barometric pressure sensors under test include the Paroscientific 760-15A, the AIR AIR-DB-1A, the Setra Systems 270, the Aanderaa 2810, the Vaisala DPA-21, the Paroscientific 215AT, the Rosemount 1201F1B, the Heise 623, the Nova NPI-19B-101-AR, and the Omega PX93. Drift in these sensors is a problem being investigated. In addition, performance as a function of cost for various sensors is being studied. Improved pressure ports are being sought.

Solar radiation sensors under test include the Hollis MR-5 silicon cell, the Eppley 8-48, and the Eppley PSP. Longwave sensors (Eppley PIR) are being modified in cooperation with Dickey at USC and Eppley to improve their performance. Improvement is being sought by reducing platform motion-related errors. Prototype gimbal mounts for both short- and longwave sensors have been fabricated and will be tested on RV Endeavor in fall 1989.

Humidity sensors under test include the EG&G Dewtrak Dewpointer, the Rotronic MP-100F, the Vaisala HMP-35A, the General Eastern 850, the Hy-Cal Engineering CT-827-D, the Thunder Scientific PC-2101, the Phys-Chem Scientific CP-101-11 and CP-101-55, the Analite RHT-20C, the Sensor Instruments HT9-3, the General Eastern Dew-10 dewpointer, the Ophir IR-1000 optical infrared absorption hygrometer, the WHOI D10IQ dewpointer. The goal is to find a sensor that exhibits long term stability and the desired accuracy.

Improvements to T_a are being sought largely through better radiation shields. Shields under test include the R. M. Young 41002 Gill multi-plate, the R. M. Young 43408 Gill aspirated, the Met One 071A vane aspirated, the Met One 076 fan aspirated, WHOI vane aspirated, WHOI multiplate, and WHOI multiplate with solar powered fan.

The difficulty in measuring T_s is not in the accuracy of the sensor, but in dealing with near-surface temperature stratification. Sampling strategies to improve T_s on board a ship need to be considered. The best solution to date is the buoyant line trailed off to the side of the ship from a small boom (thus out of the wake) developed in the UK.

Based on tests to date, a basic IMET sensor set has been chosen:

Shortwave radiation	Eppley PSP
Longwave radiation	Eppley PIR, with USC/Foot modifications to thermopile, amplifier as above, extra channels of A/D to record dome and other temperatures
Wind	R.M. Young wind monitor with 9 bit direction encoder attached to shaft instead of potentiometer; 12 bit compass in module, which does vector-averaging
Air temperature	Thermistor or platinum RTD in multiplate shield
Sea temperature	Thermistor or platinum RTD; trailed as buoyant line
Relative humidity	Rotronics sensor in multiplate shield. Rotronics air temperature also logged
Barometric pressure	AIR sensor with Gill port.
Precipitation	R. M. Young self-siphoning gauge.

II.3.4 Comparison of SEAS, MultiMet, and IMET

The SEAS system is aimed only at preparing GTS messages. The disadvantage of using manually read sensors is that they must be safely accessible by the ship's officer under all weather conditions. This may result in poor instrument exposure. For use on the UNOLS fleet, particularly the Large and Medium ships, remotely read instruments with good exposure are desirable. These should include air temperature, humidity, sea temperature, and wind velocity averaged over a suitable interval (e.g. 10 minutes); air pressure also is required. Thus, the system would have to be incremented so that it would become similar to but more limited in sensing capability than the IMET system for Small UNOLS ships, described below, but running the SEAS software for message coding.

The IOSDL MultiMet and the WHOI IMET systems have many similarities. Both use multiple sensors, and/or bow mast systems to ensure good exposure. Both use a dual processor system to ensure that sampling and recording continues uninterrupted on one system while the servicing of requests to display and process data initiated by the scientific crew is performed by the other system. For this the IOSDL system uses the MultiMet logger and a BBC computer; the WHOI system uses two NEC microcomputers, thus allowing some redundancy should one machine fail.

Many of the differences between IMET and MultiMet are due to the earlier design of the latter system. A new MultiMet system, now under development, is based on IBM PC/AT type microcomputers and will be more similar to IMET. It is also likely that the sensor suites will converge on a small number of sensor choices. Eventually the systems will require intercalibration to ensure a single homogeneous data set is collected during and after WOCE.

One fundamental difference between MultiMet and IMET concerns the conversion to geophysical quantities. The IOSDL system includes minimal signal conditioning at the sensors, performs the averaging etc. in the MultiMet logger, and records the uncalibrated data. This has the advantage for research use that different types of sensors can easily be attached to the MulitMet logger. However, a disadvantage for the use envisaged on the UNOLS ships is that calibration information is stored separately from the data, that is, within the MetMan display system. Experience has shown that maintenance of several systems on different ships has necessitated great care to ensure correct calibrations are used for each sensor. To this end it has been necessary to invest significant effort in a database of sensor histories and calibrations.

In contrast the IMET system uses modules attached to each sensor to individually calibrate, partially process, and perform signal conditioning. This ensures the use of the correct calibration and also minimizes the risk of corruption due to radio interference in transmitting the data to the logger. It is considered that, for installation on the UNOLS ships, the IMET type of system is likely to be more suitable than the MultiMet design.

III. Implementation

III.1 Recommended Installations

The recommended installation on the Large U. S. Research Vessels would include three sensor installations (port, starboard, and bow mast) and a sensor suite designed to provide the best possible measurements of the surface variables. Two NEC APC-IV's would be used to provide redundancy and real-time access for the science party to the meteorological data. One APC-IV would carry on ARGOS telemetry and data logging at the standard rate and in the format to be provided by the other ships and buoys; the second APC-IV would be menu-driven and available to the science party and/or resident technician. The optical disks would be returned after one or more legs to be quality-checked and read into the data base. Also available for use on these ships would be a sensor suite designed for the best possible estimates of the air-sea fluxes (including towed SST sensor, infrared hygrometer and other relative humidity sensors, optical rain gauge, sonic anemometer). This additional sensor suite would be mounted for specific cruises where air-sea flux data would be of particular value, where intercomparisons would be run with the other sensors on board or where sensor development was being carried out.

The Medium ships would carry two sensor sets (port and starboard), though on some ships good exposure might only be ensured through adding a third sensor set on a bow mast. One APC-IV, providing real time displays, data logging, and data telemetry via ARGOS would be used. The second APC-IV for redundancy and use by the science party would not be standard equipment; the Medium ships would typically be closer to home port than the Large ships, permitting easier replacement of failed equipment and making it easier for the science party to board their own APC-IV for their own data display purposes.

The Small ships would have reduced sensor sets (two wind, humidity, and air temperature sensors as those are most sensitive to flow disturbance and heat contamination, but one of each of the other sensors) and one APC-IV for real time display, data logging, and data telemetry via ARGOS. Their areas of operation would presumably not be characterized by being data sparse.

III.2 Cost Estimates

Work at WHOI is far enough along now to define some of the costs associated with implementation of the use of the Improved METeorological (IMET) or similar hardware on ships. The ship's home institution should anticipate start up and support costs; it should also be seriously committed to maintenance and calibration.

II.2.1 Start up costs:

This is one-time cost for equipment and training.

LABOR		
	Electro/Mechanical technician	2 man months
	Engineering support	2 man months
	Electronics technician	2 man months

PERMANENT EQUIPMENT

Laptop computer	$3,100
NEC 5300 printer	895
Utility software	1,295
Optical disk with controller	4,000
Oscilloscope	4,765
Voltage calibration standard	2,065
Multimeter	1,395
Basicon Prom controller/programmer	855
Power supplies	1,150
Tools etc.	675
	20,195

III.2.2 Engineering support

Maintenance as well as upgrades and improvements to the system should be anticipated. Engineering support would require $12,000 for labor and $3,000 for materials per year.

III.2.3 Fabrication of IMET Large Ship Package

These are the costs for fabrication of an IMET ship package with ARGOS telemetry, short wave radiation, long wave radiation, barometric pressure, sea surface temperature, air temperature, relative humidity, precipitation, wind speed and direction, optical rain gauge, infrared hygrometer, sonic anemometer, and interface to ships navigation. The package will consist of the power system, data logger, three sets of sensors with digital data modules (except two radiation sensors, one precipitation sensor), mounting brackets, and weathertight housings. The compass may in some cases be replaced with the Note that some special sensors only have one sensor. Not included is the installation on the ship.

		Quan 1
LABOR (Man Months)		
Elect/Mech Technician		8
Engineering Support		2
MATERIALS		
Uninterruptible Power Supply	2@ 1,500	$3,000
Data Logger System		19,800
APC IV, printer, mem.	2@ 6,100	
PTT	2@ 1,000	
Optical Disk	2@ 1,800	
Standard Time Clock	2@ 1,000	
Sensors		87,000
Wind Velocity/Dir	3@ 1,000	
Short Wave Radiat	2@ 1,800	

Long Wave Radiat	2@ 2,400	
Air Temperature	3@ 400	
Sea Surface Temp	3@ 3,200	
Relative Humidity	3@ 800	
Barometric Press	3@ 1,000	
Precipitation	1@ 800	
Compass/Interface	3@ 1,000	
Optical Rain Gauge	1@ 4,500	
Infrared Hygrometer	1@ 14,500	
Sonic Anemometer	1@ 36,000	
Digital Data Modules		31,500
Wind/Compass	3@ 1,500	
Short Wave Rad	2@ 1,500	
Long Wave Rad	2@ 1,500	
AirTmp,RHum,Press	3@ 1,500	
Sea Surface Temp	3@ 1,500	
Precipitation	1@ 1,500	
Optical Rain Gauge	1@ 1,500	
Infrared Hygrometer	1@ 1,500	
Sonic Anemometer	1@ 1,500	
Navigation Interface	1@ 4,500	
Bow Mast (optional, need depends on exposure)		11,000
TOTAL		152,300

SPARE PARTS KITS FOR FIELD SUPPORT	
Data Logger Spare Parts Set	7,200
Sensor Spare Parts Set	12,800
Digital Data Module Spare Parts	7,200
	27,200/Kit

III.2.4 Fabrication of IMET Medium Ship Package

These are the costs for fabrication of an IMET ship package with ARGOS telemetry, short wave radiation, long wave radiation, barometric pressure, sea surface temperature, air temperature, relative humidity, precipitation, wind speed and direction. The package will consist of the power system, data logger, sensors with digital data modules, mounting brackets, and weathertight housings. If a bow mast is needed to obtain good exposure additional sensors may be needed to equip port, starboard, and bow mast locations. The compass interface could be replaced with an interface to the ship's navigation. Not included is the installation on the ship.

	Quan 1	Quan 10
LABOR (Man Months)		
Elect/Mech Technician	6	50
Engineering Support	1	2

MATERIALS			
Uninterruptible Power Supply		$1,500	13,500
Data Logger System		9,900	89,100
APC IV, printer, mem.	6,100		
PTT	1,000		
Optical Disk	1,800		
Standard Time Clock	1,000		
Sensors		23,800	214,200
Wind Velocity/Dir	2@ 1,000		
Short Wave Radiat	2@ 1,800		
Long Wave Radiat	2@ 2,400		
Air Temperature	2@ 400		
Sea Surface Temp (one spare)	2@ 3,200		
Relative Humidity	2@ 800		
Barometric Press	1@ 1,000		
Precipitation	2@ 800		
Compass/Interface	2@ 1,000		
Digital Data Modules		16,500	148,500
Wind/Compass	2@ 1,500		
Short Wave Rad	2@ 1,500		
Long Wave Rad	2@ 1,500		
AirTmp,RHum,Press	2@ 1,500		
Sea Surface Temp	1@ 1,500		
Precipitation	2@ 1,500		
Bow Mast (optional)		11,000	99,000
		62,700	564,300
Cost per System		62,700	56,430

SPARE PARTS KITS FOR FIELD SUPPORT	
Data Logger Spare Parts Set	3,600
Sensor Spare Parts Set	6,400
Digital Data Module Spare Parts	3,600
	13,600/Kit

Suggested spares support level would be 1 kit for 1 IMET System, and 2 kits for 10 IMET Systems.

III.3.5 Fabrication of IMET Small Ship Package

These are the costs for fabrication of an IMET ship package with ARGOS telemetry, short wave radiation , long wave radiation, barometric pressure, sea surfac mperature, air temperature (two sensors), relative humidity (two sensors), precipitation, wind and direction (two sensors). The package will consist of the power system, data logger, sensors with digital data modules, mounting brackets, and weathertight housings. Not included is the installation on the ship.

			Quan 1	Quan 10	Quan 25
LABOR	(Man Months)				
	Elect/Mech Technician		3.5	25	50
	Engineering Support		1	1	2
MATERIALS					
	Uninterruptible Power Supply		$1,500	13,500	30,000
	Data Logger System		9,900	89,100	198,000
	NEC APC-IV	6,100			
	PTT	1,000			
	Optical Disk	1,800			
	Standard Time Clock	1,000			
	Sensors		14,600	131,400	292,000
	Wind Velocity/Dir (2)	2,000			
	Short Wave Radiation	1,800			
	Long Wave Radiation	2,400			
	Air Temperature (2)	800			
	Sea Surface Temp	3,200			
	Relative Humidity (2)	1,600			
	Barometric Pressure	1,000			
	Precipitation	800			
	Compass and interface	1,000			
	Digital Data Modules		12,000	96,000	168,750
	Wind/Compass	3,000			
	Short Wave Radiation	1,500			
	Long Wave Radiation	1,500			
	Air Temp, Rel Hum, Press	3,000			
	Sea Surface Temp	1,500			
	Precipitation	1,500			
			38,000	330,000	688,750
	Cost per System		38,000	33,000	27,550

SPARE PARTS KITS FOR FIELD SUPPORT

Data Logger Spare Parts Set	1,800
Sensor Spare Parts Set	3,200
Digital Data Module Spare Parts	1,800
	6,800/ Kit

Suggested spares support level would be 1 kit for 1 IMET System, 2 kits for 10 IMET Systems, and 5 kits for 25 IMET Systems.

II.3 Concerns

The following are important concerns with regard to the implementation:

1. Integration of shipboard meteorological data acquisition with ship's navigation is necessary. Good ship velocities are needed to convert relative wind to absolute wind vectors.

2. Flow disturbance by the ship itself as well as heat and smoke from the ship will degrade the meteorological data; care in sensor placement is equally as important as sensor choice.

3. Quality control by ship's resident technician, science parties, and those on shore checking the data so that it can be passed via GTS to the forecast centers is essential. A serious committment to operational support of the system by the marine operations department at tyhe ships' home institutions is also essential.

4. Calibration of the sensors should be standardized and carried out regularly. Comparison of IMET and MultiMet systems at sea is recommended at an early stage as a test of the validity of data from installations on UNOLS ships.

IV. References

Birch, K. G. and R. W. Pascal, 1987. A meteorological system for research applications - MultiMet. Fifth International Conference on Electronics for Ocean Technology, Edinburgh, 24-26 March 1987. London, IERE, pp. 7-12.

Foot, J. S., 1986. A new pyrgeometer. *Journal of Atmospheric and Oceanic Technology*, 3, 363-370.

Taylor, P. K., 1987. MultiMet and MetMan: The IOS Meteorological Instrumentation System General Description. Inst. of Oceanographic Sciences, Deacon Lab, Wormley, U. K.

Taylor, P. K. (Ed.), 1989. WOCE Surface Flux determinations - a strategy for *in situ* measurements, Rep. Working Group on in situ measurements for fluxes. To be published in WCRP Report Series, WMO, Geneva.

V. Appendix

MultiMet Sensors

Wet and dry bulb air temperature

Sensor Type	Electrically aspirated psychrometer using ceramic coated platinum resistance elements
Manufacturers	Vector Instruments Ltd., Rhyl, Clwyd. UK.

Sea surface temperature

Sensor Type	platinum resistance thermometer mounted either in a streamlined "fish" or in a trailed cable.
Manufacturer	IOS designed and built

Wind speed (average)

Sensor Type	"Porton" light-weight cup anemometer
Manufacturer	Vector Instruments Ltd., Rhyl, Clwyd., UK.

Wind direction (average)

Sensor Type	"Porton" light-weight wind vane
Manufacturer	Vector Instruments Ltd., Rhyl, Clwyd., UK.

Wind speed and direction (fluctuations)

Sensor Type	Propeller-vane anemometer.
Manufacturer	R.M.Young Company, Michigan, USA

Downward long-wave radiation

Sensor Type	Thermopile pyrgeometer.
Manufacturer	The Eppley Laboratory Inc., Rhode Island, USA

Downward shortwave radiation

Sensor Type	Class 1 Pyranometer (thermocouple type)
Manufacturer	Kipp and Zonen, Delft, Holland.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS Ship Scheduling Committee
Report of Meeting
September 14, 1989

Theater
American Society of Association Executives
The ASAE Building
1575 I Street
Washington, D.C.

UNOLS Ship Scheduling Committee Meeting
Report of Meeting
September 14, 1989
Theater
The ASAE Building
1575 I Street
Washington, DC

The UNOLS Ship Scheduling Committee met at 8:30 a.m. in the Theater, ASAE Building, Washington, DC. The meeting was called by **George Shor, Committee Chair.** A list of attendees is Appendix I.

Notification of the meeting, agenda and requests for schedules, operating and cost information were by UNOLS Office letter dated September 5, 1989. (Appendix II).

Since operators had provided information beforehand via telemail on costs and days of operation, fleet summaries were available for the meeting. These summaries were relatively uncertain, because many of the submissions by individual operators included projects not firmly funded.

Schedules for 1990. Individual operators presented scheduling, cost and operating information for 1990 as summarized in Appendix III. **The summaries included herein (dated 1 November 1989) reflect much of the funding information exchanged during the meeting; in most cases ship days and operating costs were taken from Ship Operations Proposals for 1990.** During presentations by individual operators, NSF program managers provided information on the science proposal funding for most ship cruises whose funding status had not yet been determined (i.e. cruises marked proposed). The net effect was to reduce schedules, markedly on a few ships. **The schedules are characterized for individual ships:**

ALPHA HELIX: As in 1989, the traditional schedule funded mainly by NSF will be augmented by work in Prince William Sound related to the EXXON VALDEZ oil spill. A schedule of 169 days has been proposed: Resurrection Bay, Prince William Sound and southeast Alaska (February-June), Bering Ice Edge and Skan Bay (June-July), Prince William Sound and Kodiak (July-August), Commander Islands (September), and Prince William Sound and Resurrection Bay (October-November). DPP portion from NSF (52 days) is proposed.

ATLANTIS II: Schedule for 292 days presented (NSF 174, Navy 66, NOAA 53 and Other 26), 39 days proposed. After a project on the MAR, ship will enter Curacao Shipyard (February-March), followed by two ALVIN projects in the Gulf of Mexico (March-April). After transit through the Canal, ALVIN projects off Guatemala (May), EPR and Gulf of Cortez (June), then non-ALVIN in Gulf of Cortez (July). Transit to Gorda-Juan de Fuca-Oregon continental margin for four ALVIN projects (July-September). Return for three ALVIN projects on Fieberling Guyot and Monterey Canyon (October-December), and end year in San Diego.

BERNIER: The BERNIER would enter shipyard for conversion and modification late in 1989. L-DGO plans were to finish conversion and shakedown to begin operations mid-January, 1990. There remained uncertainties as to when conversion would be completed, and schedule is constrained by SEAMARC availability. A likely schedule would begin with G&G work off Venezuela (April-May), and continue working north in the northwest Atlantic to near Iceland (May-September), followed by G&G in the South Atlantic (September-December). Not all of the proposed work (NSF, Navy and industry) was yet funded.

BARNES: At least 145 days, in inland waters, Washington and British Columbia, mostly funded by NSF.

BLUE FIN: Regional schedule advanced for 100 days, half NSF, half DOE.

CALANUS: Scheduled for 148 days in Bahamas, Florida Keys. All funded by NSF, NOAA.

CAPE HATTERAS: Scheduled for about 220 days, off south Atlantic coast (January-March), Georges Bank and Gulf of Maine (April-May), Caribbean (May-June), western Atlantic, Gulf of Maine (June-August), Sargasso, Bahamas, southeastern United States shelf (August-December). 158 days funded by NSF, ONR, DOE and State. Pending work all NSF.

CAPE HENLOPEN: Schedule advanced for 118 days, but only 43 funded. Work in Delaware Bay (June) Mid-Atlantic continental shelf (September-December). Funding by NSF, ONR, NASA, DOE.

ENDEAVOR: Modest schedule advanced for 223 days, 59 still unfunded. NSF and ONR work in Gulf of Maine (January), Sargasso and northwest Atlantic (January-April), Barbados, Bermuda, Florida Straits (April-June), northwest Atlantic, Gulf Stream, Georges Bank (June-September). Open late in year.

GYRE: Schedule advanced for 153 days, funded by NSF and State. Work begins in Gulf of Mexico (February-March), off Bermuda (March-April), Gulf of Mexico (April, May, July, October), Bahamas (October), and Cocos, Galapagos (November). Openings in May, June, August, September and December.

ISELIN: Scheduled for 242 days, funded by NSF (215) and ONR (26). Work in eastern Caribbean (January, April), Amazon Fan (February-April and May-June), the Caribbean (July), Bahamas (September, October), and off North Carolina (October, November).

SEWARD JOHNSON: Enters fleet in 1990. Scheduled for 182 days, funded by NOAA, Navy and Harbor Branch. Shakedown (March), Gulf of Maine and Great Lakes (June-September).

KNORR: Continues renovation/conversion (January-June), after return to Woods Hole, work in Sargasso (July), south of Iceland (August, September), then transit to WOCE work in southeast Pacific (September-December). NSF, Navy and NOAA funding for 153 days.

EDWIN LINK: Enters fleet in 1990. Scheduled for 205 days, funded by NOAA, Navy, other agencies and Harbor Branch. Work off Florida (January, February, July, September), Caribbean (January, July), and off North Carolina (August).

LAURENTIAN: Scheduled 75 days, all in Lake Michigan, under NSF and State funding. Working season is April-October.

LONGHORN: Re-enters fleet in 1990. Anticipate 50 days regional work under State funding.

MELVILLE: Under conversion/renovation January-November. Shakedown (November, December). Schedule advanced for 82 days, in northwest Atlantic/Caribbean, may not be realized.

MOANA WAVE: Scheduled for about 280 days, funded by NSF and commercial contract. Work in Hawaiian waters (January), transact Hawaii - Pago Pago - New Zealand - Guam (January-April), G&G off Taiwan and Subuyan Sea (April-June), in Hawaiian waters (July-December).

NEW HORIZON: Scheduled for 268 days, funded by NSF, ONR, DOE, NOAA, NASA and UC. Work in California Basins (January, February, March, June-November), Fieberling Guyot (February), off Oregon (May, June) and near Mazatlan (April).

OCEANUS: Schedule advanced for 261 days, with funding decisions for large portion still pending. Portion with firm funding includes work south of and local to Woods Hole (March, April), vicinity of Bermuda (April), off northeast coast and mid-Atlantic Bight (July-September), and Sargasso Sea (September, October, November).

OSPREY: Would enter shipyard, November 1989-January 1990, and complete conversion after shipyard. Sea trials and scientific operations in April.

PELICAN: Scheduled for 102 days, funded by NSF, MMS, NOAA, DOE. All work in northwest Gulf of Mexico.

POINT SUR: Scheduled for 199 days, funded by NSF, CNOC and State. Work off central and northern California and Monterey Bay (January-March), off Oregon (March) and, again, off northern and central California, Monterey Bay (April-December).

ROBERT G. SPROUL: Schedule advanced for 162 days. One project off Columbia River with two trips and 82 days from NSF still pending. Remaining work (January-May, July-August and October-December) is off southern California, funded by NSF, ONR, DOE, UC and JPL.

RIDGELY WARFIELD: Scheduled for 106 days in Chesapeake Bay, all funded by NSF.

THOMAS WASHINGTON: Schedule advanced for 354 days, including work in western Pacific. Agreed-to schedule, 268 days funded by NSF and ONR, begins with G&G near Galapagos and Panama Basin (January, February), Mid-Atlantic Ridge and south Atlantic (March-May), off Venezuela (June), and EPR in north and south Pacific (July-December).

WECOMA: Scheduled for 235 days funded by NSF and ONR. Work begins in western equatorial Pacific (January-March), central equatorial Pacific (March-July), and work off Washington, Oregon and northern California coasts (August-November).

WEATHERBIRD: Newly converted ship will work out of Bermuda for entire year. 259 days funded by NSF.

Detailed schedules for all UNOLS ships can be found on the Omnet electronic bulletin board SHIP.SCHED90.

Discussion of 1990 Schedules and Costs. At the July, 1989 Ship Scheduling Committee meeting, the shortfall projected between estimated 1990 fleet costs and anticipated funding had been approximately $1 million (see Appendix IV). That projected shortfall was somewhat uncertain, because NSF/OCFS did not have solid estimates of their 1990 funding and schedule/cost information was preliminary.

During the September 1989 meeting, summaries of ship use days and costs were as follows:

	NSF		NAVY		OTHER		TOTAL	
	days	**$M**	**days**	**$M**	**days**	**$M**	**days**	**$M**
Sept. 1989 estimates	3,554	28.6	586	6.2	610	4.4	4,750	39.2

This represents a July-September reduction in NSF costs of about $1.6 million, no change in costs to Navy and Other, and a reduction in total fleet costs of $1.6 million. Two factors, however, have impacted the favorable balance indicated at the September meeting: The ship costs projected by UNOLS operating institutions in their October 1, 1989 Ship Operations proposals increased over those reported in September to NSF, $29.6 million, ONR $6.1 million, Other $4.8 million and Total $40.5 million. Further, NSF reported that they would be allocated significantly less than $28 million for ship operations. **Thus, the summary of 1990 Ship Costs and Use (Appendix IV), which is based on October 1 estimates included a sizable but uncertain deficit in NSF-funded and total ship operations.** Further adjustments to individual ship schedules and operating budgets for 1990 must be expected. Schedules based on science funding decisions not yet final are especially vulnerable.

Based on the apparent match between operations budgets and anticipated funding (in September), the Ship Scheduling Committee had no recommendations to advance to UNOLS.

Information from Funding Agency Representatives. NSF, with representatives from both facilities and science programs, was the only agency providing information at the meeting.

Dolly Dieter reiterated instructions and schedule for the submission of Ship Operations proposals. She also discussed with the Committee revision of UNOLS Ship Time Requests and of NSF Form 831, Shiptime Requests. NSF is revising Form 831 to include more information and to be more useful. It is expected that one form will serve both UNOLS and NSF.

Mike Rawson, L-DGO was nominated as Scheduling Committee Chair, and George Shor, Scripps was nominated Vice Chair. (They were later confirmed in those positions by George Keller, UNOLS Chair.)

SHIP SCHEDULING MEETING
Washington, D.C./September 14, 1989

<u>ATTENDEES</u>:

Timothy M. Askew, Harbor Branch Oceanographic Institution
Mary Ataldo, National Science Foundation
William D. Barbee, UNOLS
Harry Barnes, Bermuda Biological Station
John F. Bash, University of Rhode Island
Douglas Biggs, Texas A&M University
Garrett W. Brass, University of Miami
Larry Clark, National Science Foundation
Joe Coburn, Woods Hole Oceanographic Institution
Bruce Cornwall, Johns Hopkins University/CBI
James W. Coste, University of Hawaii
E. R. Dieter, National Science Foundation
Paul J. Fox, University of Rhode Island
Barbara Funke, UNOLS
Linda Goad, University of Michigan
Donn Gorsline, University of California, Los Angeles
George Grice, Woods Hole Oceanographic Institution
James Griffin, University of Rhode Island
Ron Hutchinson, University of Miami
K. William Jeffers, University of Washington
Richard B. Lambert, National Science Foundation
Dean Letzring, Texas A&M University
Lisa Lynch, National Science Foundation
Bruce Malfait, National Science Foundation
David Menzel, Skidaway Institution of Oceanography
Don Moller, Woods Hole Oceanographic Institution
Greg Mountain, National Science Foundation
Donald Newman, University of Southern California
Wadsworth Owen, University of Delaware
Theodore Packard, National Science Foundation
Kennard Palfrey, Oregon State University
Michael Prince, Moss Landing Marine Laboratories
Steve Rabalais, Louisiana Universities Marine Consortium
Michael Rawson, Lamont-Doherty Geological Observatory
Gilbert Rowe, Texas A&M University

Thomas Royer, University of Alaska

Judy Rubano, University of Hawaii

Ronald Schlitz, National Science Foundation

George G. Shor, Jr., Scripps Institution of Oceanography

Alexander Sutherland, National Science Foundation

Joseph Ustach, Duke/UNC Oceanographic Consortium

Terry E. Whitledge, University of Texas

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of institutions
for the coordination and support
of university oceanographic facilities

UNOLS Office, WB 15
School of Oceanography
University of Washington
Seattle, Washington 98195
(206) 543-2203

September 5, 1989

TO: East Coast Scheduling Group
West Coast Scheduling Group

FROM: William D. Barbee
Executive Secretary, UNOLS

SUBJECT: Schedule Meeting, September 14, 1989

The final 1989 meeting of the UNOLS Ship Scheduling Group has been called:

Theater
American Society of Association Executives
The ASAE Building
1575 I Street N.W.
Washington, D.C.
September 14, 1989
8:30 a.m. - 5:00 p.m.

The objectives of the meeting are: 1) quickly review operations, schedules and costs for 1989 to reveal changes, surprises, problems; 2) examine and summarize costs and schedules projected for 1990. Costs and schedules for both 1989 and 1990 will have been provided by UNOLS operating institutions (via SCHEDULERS.EAST.GULF or SCHEDULERS.WEST) and appropriate information is on SHIP.SCHED90 or SHIP.SCHED89. Summaries of cost information will be provided (in format similar to attachments to this letter) along with a comparison of fleet totals with NSF and ONR ship operations funding for 1990; 3) develop Scheduling Group recommendations for 1990 and a viable 1990 operating plan for the UNOLS fleet; and 4) elect a Scheduling Committee Chair and Vice Chair.

Materials for the Meeting

1. Cost Information for 1989 and 1990. Send your cost information, via telemail to SCHEDULERS.EAST.GULF or SCHEDULERS.WEST not later than 8 September, 1989. The format/information is:

1989:	NSF	NAVY	OTHER	TOTAL
Ship Days				
Cost $K				

1990:	NSF	NAVY	OTHER	TOTAL
Ship Days				
Cost $K				

The UNOLS Office will summarize the costs received from all UNOLS members for both 1989 and 1990 as on the summaries attached here (dated November 15, 1988). Copies will be provided at the September 14 meeting; you needn't bring extras if you have responded by telemail before September 8.

2. Schedules for 1989 and 1990. Please provide your latest/best schedule for both 1989 and 1990 not later than 8 September to SCHEDULERS.WEST or SCHEDULERS.EAST.GULF. The UNOLS office will enter them on SHIP.SCHED89 or SHIP.SCHED90. (Please examine your ship's schedules as they currently appear on SHIP.SCHED89 and SHIP.SCHED90 and submit corrected schedules as necessary.) If everyone complies by providing schedules via telemail, they needn't bring multiple copies to the meeting.

3. Summary of Unfilled 1990 Shiptime Request. There shouldn't be any, but bring 10 copies of a summary of any 1990 ship time request that you are not certain has been filled. If you don't know it's filled, list it.

4. You may want to bring vu-graphs (overhead projections) to help explain/present your 1989 and 1990 schedules. Whatever's fair.

Agenda and 1989 (old) and 1990 cost summaries from the July, 1989 meeting are attached.

WDB/cml
Enclosures

AGENDA
UNOLS Ship Scheduling Meeting
Theater
American Society of Association Executives
The ASAE Building
1575 I Street N.W.
Washington, D.C.
8:30 a.m.
Thursday, September 14, 1989

The Scheduling Groups will be called into session by Chairs George Shor and Mike Rawson. Emphasis will be on matching projected funding to costs and ship schedules for 1990.

1. **Projection of Fleet Schedules and Costs for 1990.** Based on cost and operating information provided earlier via telemail, George Shor/Mike Rawson will present an overview for 1990. Potential problems will be identified. Any funding/schedule problems remaining from 1989 can, hopefully, be resolved.

2. **Information from Funding Agency Representatives.** From NSF, ONR, and other agencies as desired, on 1990 funding available, total ship days required by science programs, science decisions available. Recap of 1989 schedule/funding problems as necessary.

3. **Schedules for 1990.** Individual presentations by institutions of their tentative schedules for 1990 and projected costs. (Should be as you submitted via telemail). Identify problems: unfunded projects, multiple bookings, schedule inefficiencies, etc. Explicit list of unfilled 1990 shiptime request. Recap 1989 problems as necessary. **(Institution reps need only bring vu-graphs for their presentations and summary of unfilled requests.)**

4. **1990 Schedule Improvement: Chairs will provide direc-tion** and moderate discussion on schedule problems (eliminate multiple bookings, accommodate unmet requests, address funding mismatch, improve schedule efficiencies).

Recommendations. Discuss and adopt as appropriate, recommendation to go to UNOLS Council **(September 15).**

5. **Nomination of Chair, Vice Chair:** In accordance with the Charter, a Chair and Vice Chair will be nominated for the coming year. See George Shor's August 13 telemail for a suggested protocol for nominating Scheduling Committee Chair and Vice Chair.

July 31, 1989

Summary of Fleet Use and Costs
Year: 1989

SHIP/CLASS		FUNDING							
		NSF		ONR		OTHER		TOTAL	
		Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
MELVILLE	b.	153	1839	74	889	1	12	228	2740
KNORR		0	0	0	0	0	0	0	0
ATLANTIS II		202	3151	16	250	23	359	241	3760
CONRAD		58	737	42	534	3	38	103	1309
T. WASHINGTON	c.	230	2557	23	256	8	88	261	2901
MOANA WAVE		248	2335	6	57	4	38	258	2430
CLASS II TOTAL		891	10619	161	1986	39	535	1091	13140
AVE: (5)		178	2124	32	397	8	107	218	2628
ENDEAVOR		193	1500	40	310	23	178	256	1988
OCEANUS		222	1887	24	204	0	0	246	2091
GYRE		90	501	0	0	53	281	143	780
ISELIN		175	1468	52	436	0	0	227	1905
NEW HORIZON	d.	66	582	70	617	46	406	182	1605
OSPREY		30	300	0	0	0	0	30	300
WECOMA		154	1309	65	553	0	0	219	1862
CLASS III TOTAL		930	7547	251	2120	122	865	1303	10531
AVE: (7)		133	1078	36	303	17	124	186	1504
PELICAN		17	74	0	0	71	331	88	405
POINT SUR	f.	56	347	89	552	21	130	166	1029
CAPE HATTERAS		195	1260	0	0	13	81	208	1341
ALPHA HELIX		115	1265	0	0	46	506	161	1771
R. SPROUL	e.	86	400	17	79	14	65	117	544
CAPE HENLOPEN		87	574	19	125	25	165	131	865
R. WARFIELD		121	670	0	0	0	0	121	670
CLASS IV TOTAL		677	4590	125	756	190	1278	992	6625
AVE: (7)		96	656	21	126	27	183	142	946
BLUE FIN		46	114	0	0	31	76	77	190
LAURENTIAN		55	220	0	0	11	44	66	264
BARNES		80	161	2	1	20	30	102	192
CALANUS	a.	99	229	20	46	45	104	164	379
WEATHERBIRD/NEW		203	511	6	14	10	24	219	549
< CLASS IV TOTAL		483	1235	28	61	117	278	628	1574
AVE: (5)		97	247	6	12	23	56	126	315
FLEET TOTAL		2981	23991	565	4923	468	2956	4014	31870
AVE: (24)		124	1000	24	205	20	123	167	1328

a. NOAA 45 days, $104K
b. JOI 1 day, $12K
c. UC 4 days, $44K, JOI 4 days, $44K
d. UC 46 days, $406K
e. UC 14 days, $65K
f. ONR includes NPS (CNOC) 75 days, $465K

July 31, 1989

Summary of Ship Use and Costs
Year: 1990

SHIP/CLASS		FUNDING							
		NSF		ONR		OTHER		TOTAL	
		Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
MELVILLE		35	447	62	793	0	0	97	1240
KNORR		149	1952	28	367	35	459	212	2778
ATLANTIS II	a.	197	2704	77	1057	39	535	313	4296
BERNIER		217	2930	117	1580	0	0	334	4510
T. WASHINGTON		344	3914	0	0	0	0	344	3914
MOANA WAVE	f.	178	1669	0	0	102	957	280	2626
CLASS II TOTAL		1120	13616	284	3797	176	1951	1580	19364
AVE: (6)		187	2269	47	633	29	325	263	3227
ENDEAVOR		158	1343	54	459	0	0	212	1802
OCEANUS		217	1595	48	353	6	44	271	1992
GYRE		107	696	0	0	23	150	130	846
ISELIN		216	1815	26	219	0	0	242	2033
NEW HORIZON	b.	180	1404	22	172	98	766	300	2342
OSPREY		52	624	0	0	0	0	52	624
WECOMA		206	1854	69	621	0	0	275	2475
CLASS III TOTAL		1136	9331	219	1824	127	960	1482	12114
AVE: (7)		162	1333	31	260	18	137	212	1730
PELICAN		26	120	0	0	35	161	61	281
POINT SUR	d.	95	599	65	410	15	95	175	1103
CAPE HATTERAS		205	1223	10	60	32	191	247	1474
ALPHA HELIX		171	1881	0	0	56	616	227	2497
R. SPROUL	c.	133	580	4	17	8	35	145	632
CAPE HENLOPEN		56	370	0	0	29	191	85	561
R. WARFIELD		124	657	0	0	0	0	124	657
CLASS IV TOTAL		810	5430	79	487	175	1289	1064	7205
AVE: (7)		116	776	11	70	25	184	152	1029
BLUE FIN		50	100	0	0	50	100	100	200
LAURENTIAN		39	156	16	64	30	120	85	340
BARNES		123	259	4	6	18	34	145	299
CALANUS	e.	128	282	0	0	45	99	173	381
NEW SHIP		250	950	0	0	0	0	250	950
< CLASS IV TOTAL		590	1747	20	70	143	353	753	2170
AVE: (5)		118	349	4	14	29	71	151	434
FLEET TOTAL		3656	30124	602	6178	621	4553	4879	40853
AVE: (25)		146	1205	24	247	25	182	195	1634

a. NOAA 39 days, $535K
b. UC 32 days, $250K, DOE 32 days, $250K, NOAA 17 days, $133K, NASA 7 days, $55K, JOI 10 days, $78K
c. DOE 8 days, $35K
d. ONR includes NPS (CNOC) 60 days, $378K
e. NOAA 45 days, $99K
f. SSI (private) 102 days, $933K

November 1, 1989

Summary of Ship Use and Costs
Year: 1989

SHIP/CLASS		FUNDING						
	NSF		ONR		OTHER		TOTAL	
	Day	Dollars	Day	Dollars	Day	Dollars	Day	Dollars
MELVILLE	148	1,752	70	829	6	71	224	2,652
KNORR	0	(260)	0	(14,805)	0	0	0	-
ATLANTIS II	192	3,267	16	272	14	238	222	3,777
CONRAD 4.	58	749	42	534	3	38	103	1,321
T.G. THOMPSON 3.	0	72	0	100	0	3	0	175
T. WASHINGTON	230	2,565	23	256	8	90	261	2,910
MOANA WAVE	285	2,544	0	0	10	90	295	2,634
CLASS II TOTAL	913	10,949	151	1,991	41	530	1,105	13,469
AVE: (5)	183	2,190	30	398	8	106	221	2,693
ENDEAVOR	193	1,500	40	310	23	178	256	1,988
OCEANUS	228	1,801	24	190	0	0	252	1,991
GYRE	91	506	0	0	56	291	147	797
ISELIN	175	1,468	52	436	0	0	227	1,904
NEW HORIZON	68	606	63	561	41	365	172	1,532
OSPREY	0	350	0	0	0	0		350
WECOMA 2.	158	1,382	62	542	0	0	220	1,924
CLASS III TOTAL	913	7,613	241	2,039	120	834	1,274	10,486
AVE: (6)	152	1,269	40	340	20	139	212	1,748
PELICAN	19	74	0	0	62	372	81	446
POINT SUR 1.	61	373	86	525	16	98	163	996
CAPE HATTERAS	187	1,167	0	0	12	75	199	1,241
ALPHA HELIX	115	1,133	0	0	38	374	153	1,508
R. SPROUL	83	404	17	83	16	78	116	565
CAPE HENLOPEN	83	548	19	125	28	185	130	858
R. WARFIELD	114	670	0	0	1	6	115	676
CLASS IV TOTAL	662	4,369	122	733	173	1,188	957	6,290
AVE: (7)	95	624	17	105	25	170	137	899
BLUE FIN	44	77	0	0	56	98	100	175
LAURENTIAN	54	216	0	0	2	8	56	224
BARNES	70	148	2	1	30	47	102	197
CALANUS	88	204	20	46	45	104	153	354
WEATHERBIRD	218	512	4	9	15	35	237	556
< CLASS IV TOTAL	474	1,157	26	56	148	292	648	1,506
AVE: (5)	95	231	5	11	30	58	130	301
FLEET TOTAL	2,962	24,088	540	4,819	482	2,844	3,984	31,751
AVE: (23)	129	1,047	23	209	21	124	173	1,380

1. Navy includes NPS (CNOC) 75 days, $458K
2. Navy includes NORDA 22 days, $192
3. Funding to sustain shore support, UW
4. Other is JOI (Ocean Drilling Program?)

November 1, 1989

Summary of Ship Use and Costs
Year: 1990

SHIP/CLASS	FUNDING							
	NSF		ONR		OTHER		TOTAL	
	Day	Dollars	Day	Dollars	Day	Dollars	Day	Dollars
MELVILLE	65	732	17	192	0	0	82	924
KNORR	148	2,573	33	574	0	0	181	3,147
ATLANTIS II	146	2,177	86	1,282	76	1,133	308	4,592
CONRAD	210	2,835	115	1,552	0	0	325	4,388
T.G. THOMPSON 2.	0	83	0	83	0	0	0	166
T. WASHINGTON	354	4,238	0	0	0	0	354	4,238
MOANA WAVE	190	1,758	0	0	96	889	286	2,647
CLASS II TOTAL	1,113	14,396	251	3,683	172	2,022	1,536	20,102
AVE: (6)	186	2,399	42	614	29	337	256	3,350
ENDEAVOR	140	1,233	66	581	0	0	206	1,814
OCEANUS	207	1,633	48	379	6	47	261	2,059
GYRE	120	780	0	0	33	215	153	995
ISELIN	215	1,897	26	229	0	0	241	2,126
NEW HORIZON	110	888	39	315	104	840	253	2,042
OSPREY	30	350	0	0	0	0	30	350
WECOMA	220	1,930	37	325	0	0	257	2,255
CLASS III TOTAL	1,042	8,711	216	1,829	143	1,102	1,401	11,641
AVE: (7)	149	1,244	31	261	20	157	200	1,806
PELICAN	58	231	0	0	54	216	112	447
POINT SUR 1.	108	611	76	430	15	85	199	1,126
CAPE HATTERAS	175	1,158	10	66	31	205	216	1,429
ALPHA HELIX	99	922	0	0	70	652	169	1,575
R. SPROUL	149	619	0	0	13	54	162	673
CAPE HENLOPEN	86	568	10	66	22	145	118	779
R. WARFIELD	124	646	0	0	2	10	126	656
CLASS IV TOTAL	799	4,755	96	562	207	1,367	1,102	6,685
AVE: (7)	114	679	14	80	30	195	157	955
BLUE FIN	62	126	0	0	34	70	96	196
LAURENTIAN	45	180	0	0	30	120	75	300
BARNES	156	242	4	2	15	15	175	259
CALANUS	103	219	0	0	45	96	148	314
WEATHERBIRD (NEW)	259	965	0	0	0	0	259	965
< CLASS IV TOTAL	625	1,732	4	2	124	301	753	2,034
AVE: (5)	125	346	1	0	25	60	151	407
FLEET TOTAL	3,579	29,594	567	6,076	646	4,792	4,792	40,462
AVE: (25)	143	1,183	23	243	26	192	192	1,618

1. Navy includes NPS (CNOC) 72 days, $402K
2. Funding to sustain shore support, UW

PROFILES OF FUNDING CYCLES $ MILLION

	OP DAYS	NSF	ONR	OTHER	TOTAL	SHORT FALL
1987	4,649	28.0	5.7	4.0	37.8	-
1988	4,731	28.7	6.0	4.2	39.0	-

1989 Cost Projections

	NSF		ONR		OTHER		TOTAL	
	Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
July 1988	3,798	29.55	426	3.44	358	1.90	4,582	34.89
(Anticipated)		26.8		4.3		1.9		33.4
Proj. Shortfall		(2.7)		0.9		-		(1.8)
October 1988	3,333	26.17	486	3.68	388	2.80	4,207	32.65
(Anticipated)		24.-26.		3.68		2.80		30.5-32.5
Proj. Shortfall		?		-		-		?
July 1989	2,981	23.99	565	4.92	468	2.96	4,014	31.87
(Anticipated)		24.*		4.9		3.0		31.9
Proj. Shortfall		-		-		-		-
Sept. 1989	2,962	24.01	540	4.82	482	2.84	3,984	31.75
(Anticipated)		24.*		4.8		2.84		31.8
Proj. Shortfall		-		-		-		-

*provides deficit cancellation

SHIP OPERATIONS
SUMMARY OF 1990 PROJECTIONS
$ MILLION

	NSF		ONR		OTHER		TOTAL	
	Days	Dollars	Days	Dollars	Days	Dollars	Days	Dollars
July 1989	3,656	30.12	602	6.18	621	4.55	4,879	40.85
(Anticipated)		28-29?		6.2		4.6		38.8-29.8
Proj. Shortfall		(1M-2M)		-		-		(1M-2M)
Sept. 1989**	3,579	29.59	567	6.08	646	4.79	4,792	40.46
(Anticipated)		?***		6.08		4.79		?
Proj. Shortfall		?		-		-		?

** Projections for use, costs are from Ship Operations Proposals dated October 1989

*** NSF budget was uncertain and no firm estimate was provided at the September, 1989 meeting.

UNOLS FLEET IMPROVEMENT COMMITTEE

Dr. Richard Barber	Duke University Marine Lab.
Capt. R. P. Dinsmore	Woods Hole Ocean. Inst.
Dr. Donn Gorsline	University of Southern Cal.
Dr. Marcus Langseth	Lamont-Doherty Geol. Obsv.
Dr. James Murray	University of Washington
Dr. Worth Nowlin (Chair)	Texas A&M University
Dr. Bruce H. Robison	Univ. of Calif., Santa Barbara
Dr. Fred Spiess	Univ. of Calif., San Diego
Capt. T. K. Treadwell (Exec. Secr.)	Texas A&M University

September 1989

UNOLS FLEET IMPROVEMENT COMMITTEE

Objectives:

- Maintain a current UNOLS Fleet Improvement Plan.
- Continue to refine scientific mission requirements for all classes of UNOLS vessels.
- Consider alternatives to new construction for meeting scientific mission requirements.
- Initiate and carry through concept design studies.
- Maintain awareness of novel vessel designs and consider such vessels for UNOLS applications.
- Carry concept designs for selected vessels into more detailed design phases.
- Serve as liaison activity and information source for Federal agency representatives working on matters of planning or funding for new construction and upgrading of UNOLS vessels.

September 1989

UNOLS FIC Reports

September 1988 - September 1989

Barber, Richard and T. K. Treadwell, Report of a Workshop on Mid-Life Refits and Improvements of Intermediate-Size Ships, UNOLS Fleet Improvement Committee Report, 19 pp., UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1989.

Fisher, F.H., and F.N. Spiess, Draft Science Support Requirements for a Manned Spar Buoy Laboratory, UNOLS Fleet Improvement Committee Letter Report, 6 pp., UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1989.

The Glosten Associates, Inc., Preliminary Design for Medium Endurance General Purpose Oceanographic Research Vessel, Final Report, File No. 8808, for the UNOLS Fleet Improvement Committee, 130 pp + 3 Appendices, UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1989.

Johnson, Thomas C., Report on a Workshop on Improvement to the CAPE-Class Research Vessels, UNOLS Fleet Improvement Committee Report, 23 pp., UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1989.

Royer, Thomas, *et al.*, Scientific Mission for an Intermediate Ice-Capable Research Vessel, UNOLS Fleet Improvement Committee Report, 17 pp., UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1989.

UNOLS Fleet Improvement Committee, Scientific Mission Requirements for Oceanographic Research Vessels, UNOLS Fleet Improvement Committee Report, 36 pp., UNOLS Fleet Improvement Committee Office, Texas A&M University, College Station, TX 77843-3146, 1988.

September 1989

Specific FIC Activities

September 1988 - September 1989

- Complete scientific mission requirements for a manned spar buoy laboratory.
- Review and revise scientific mission requirements for all vessel classes.
- Initiate concept design for small, general-purpose SWATH research ship
- Initiate modifications of concept design for intermediate, four-strut SWATH research ship to improve station keeping performance.
- Consider a series of mission profiles for a research submarine.
- Recommend regarding mid-life refits for CAPE-class vessels.
- Recommend regarding mid-life refits to OCEANUS-class vessels.
- Complete scientific mission requirements for small to intermediate ice-capable research ship for the western Arctic.

Specific FIC Activities

September 1988 - September 1989

- Complete preliminary design of large, medium-endurance monohull research ship.

- Review U. S. Coast Guard POLAR-class ice-breaking improvements for oceanography and marine geology.

- Prepare new draft of Fleet Improvement Plan.

- Work with Federal funding agencies as appropriate.

Specific FIC Activities

Planned for Next Year

Issue revised UNOLS Fleet Improvement Plan

Monitor present construction and conversion of large vessels

Concept design for intermediate ice-capable general purpose research ship for Western Arctic (U. Alaska)

Prepare a "compendium on small (<100 ft) research vessels"

Complete concept design of small, general-purpose SWATH ship

Study of designs and costs for selected mid-life improvements to OCEANUS-class vessels (WHOI)

Complete modifications to concept design for four-strut intermediate SWATH research ship

Formulate scientific mission requirements for submersible-support vessel

Recommend next steps in consideration of research submarine

Rotation of committee members

FIC is flexible

September 1989

NATIONAL SCIENCE FOUNDATION

THE FY 1989 AND 1990 NSF BUDGET

	88-89 Increase	FY-1990 Request $ Thous.	89-90 Incr.
RESEARCH AND RELATED			
Math & Physical Sci.	6.6%	$553.5	+10.0%
Engineering	8.7%	$211.2	+12.8%
Bio., Behavioral, Soc.	6.0%	$314.5	+11.7%
GEOSCIENCES	6.9%	$341.3	+10.0%
Comp. & Inform. Sci.	23.6%	$191.2	+25.7%
Sci., Tech. & Int.	16.0%		+15.4%
U.S. ANTARCTIC PROGRAM	5.6%		+18.9%
SCI. AND ENGINEERING ED.	23.9%		+11.1%
TOTAL FOUNDATION	9.8%		+13.9%

In GEOSCIENCES (Earth, Atmospheric, Ocean, Arctic Sciences)			
Requested Increase	$30M (10.0%)	$ 31.0M	(10%)
Actual Increase	$19.6M (6.9%)		

In OCEAN SCIENCES (MG&G, Bio, Phys, Chem, Facilities, ODP)			
Requested Increase	$11.1M (8.2%)	$ 6.7M	(4.1%)
Actual Increase	$11.1M (8.2%)		

OCEAN SCIENCES DIVISION DETAIL

	FY 1988	FY 1989	FY 1990
OCEAN SCIENCES DIVISION	$ 135.3 M	146.2 M	152.9 M
Ocean Sciences Research	67.2 M	71.2 M	74.7 M
Ocean Drilling Program	30.9 M	31.4 M	32.9 M
Oceanographic Facilities	37.2 M	43.6 M	45.3 M
Facilities Detail			
Operations			
Ship Operations	24.9 M*	26.5 M*	27.5 M*
Alvin, Aircraft, etc.	2.0 M	1.3 M	2.0 M
Marine Techs	3.5 M	3.4 M	3.4 M
Acquisition and Development			
Science Instruments	1.8 M	1.6 M	1.6 M
Shipboard Equipment	1.0 M	.9 M	.9 M
Technology Development	2.8 M	4.8 M	4.8 M
AMS Center	0 M	1.8 M	1.8 M
UNOLS, ACQ, MISC	1.2 M	3.3 M**	3.3 M

* Additional $1.5M provided by Ocean Drilling Program

** For acquisition of BERNIER

U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

Washington, D.C. 20593-0001
Staff Symbol: G-NIO
Phone: (202) 267-1450

5420/9

Dear Polar Researcher:

The U.S. polar icebreaker fleet now consists of two vessels. Over the next four years, each icebreaker will be out of service at various times for science facility upgrades, mid-life renewal and routine maintenance. Given this, there will be essentially only one ship in service at any given time. Operation of a single-ship fleet to meet missions in both polar regions will require long-range planning to ensure maximum efficiency of utilization. To accomplish this planning, the Coast Guard needs to ascertain all possible use requirements, no matter how tentative, for the years 1990 through 1994.

During the next five years, icebreaker time will be available for research projects, both in conjunction with regular logistics missions and as dedicated missions. The periods and amount of time available are indefinite, but there will probably be 30-60 ship-days available per year. The only way to achieve maximum utilization of that time is through close coordination to assure that we take full advantage of schedule opportunities. Short-range planning based on annual budgets has proven inefficient and ineffective, and results in under-utilization of the ships and missed opportunities for your valuable projects.

I intend to develop a five-year plan for icebreaker usage based on your input. At present, I have no alternative but to develop that plan within the framework of the existing reimbursement scheme. I would appreciate your comments in that regard. I ask your assistance in developing a system that will assure that I can efficiently operate these valuable resources. For example, the practice of the past two years sending an icebreaker to the Antarctic for the sole purpose of McMurdo resupply operations is inefficient. In the long term, I cannot justify maintaining such an expensive resource, only to have it be so under-utilized and dedicated to a single task.

Your input and opinions in this matter would be greatly appreciated

Sincerely,

G. F. Martin
Captain, U.S. Coast Guard
Chief, Ice Operations Division
By direction of the Commandant

SCIENTIFIC SUPPORT CAPABILITIES ON BOARD COAST GUARD ICEBREAKERS

Historically, the Coast Guard has provided scientific support to embarked scientific parties on board its icebreakers, carrying researchers in a wide variety of fields into the ice of both polar regions. In response to the stated needs of the icebreaker user community, the Coast Guard has undertaken a concerted effort to upgrade the science support capability of the two existing POLAR-class vessels and to design a substantial science support capability into its Polar Icebreaker Replacement (PIR) vessel. In both cases, on board systems have been designed with ongoing consultation with the polar research community. The result is support capabilities on these vessels comparable to large open-water research vessels.

POLAR-CLASS UPGRADE

The retirement in recent years of the Coast Guard Cutter GLACIER and the last two WIND-class icebreakers has left the Coast Guard with just two icebreakers to support research in the Arctic and Antarctic. It became clear to the Coast Guard in recent years that the research community needed enhanced scientific facilities available on board its icebreakers, including the relatively new (1972) POLAR vessels.

In response to these user needs, the Coast Guard has undertaken a twelve million dollar upgrade of the scientific facilities on the POLAR STAR and POLAR SEA. As an initial step in the design process for this upgrade, the Coast Guard conducted a user survey of the icebreaker user community to identify specific needs to be met. Consultation with members of the user community has continued throughout the design process. Wherever possible, the upgrades have been tailored to meet the high latitude research vessel standards of the University National Oceanographic Laboratory System (UNOLS).

The upgrade is divided into two phases, a geological upgrade and a more general oceanographic upgrade. Work began on POLAR STAR with the geological upgrade, completed in 1988 and will be completed on both ships with the geological upgrade on POLAR SEA in 1991. The elements of the two phases are shown in Table 1.

With these additions and improvements to the existing facilities on board the POLAR STAR and POLAR SEA, these vessels will be able to support parties of up to twenty scientists. In addition to the conventional scientific support facilities shown above these vessels have helicopters and small boats to meet the need of parties on the ice or on shore.

This upgrade program has already paid off. With new geological sampling gear on board in September 1988, the POLAR STAR was able to take USGS geologists to conduct research in parts of the

Arctic basin previously unsampled. This success was repeated again in August 1989, when the geologists were able to make another visit to the region during the vessel's return trip to Seattle from Greenland via the Northwest Passage.

POLAR ICEBREAKER REPLACEMENT (PIR) VESSEL

The PIR vessel, presently under congressional consideration for funding in fiscal year 1990 with a planned completion date of 1996, will have impressive science facilities and systems on board. The research support capability of this vessel is an integral part of its design. Even fundamental vessel characteristics such as size, fuel economy and icebreaking ability have been designed to meet the stated needs of the user community.

CONCLUSIONS

The same laws and executive directives that identify conduct of polar research as a major element of U.S. policy in both polar regions mandate that the U.S. Coast Guard provide icebreaking support to U.S. polar interests. A major part of that support is to provide scientific facilities to embarked scientists on board Coast Guard icebreakers. With that responsibility in mind, the Coast Guard has undertaken a major effort to upgrade the scientific research support capabilities on board its existing icebreakers and to design its new icebreaker around the scientific mission. A crucial part of both the upgrades and the new design has been ongoing consultation with individual researchers and user agencies. This consultation will continue, providing the icebreaker user community vessels well-suited for its needs.

Table 1 - Scientific equipment upgrades (POLAR-class)

PHASE I - GEOLOGY UPGRADE

Coring-trawling winch

Stern-mounted J-frame

3.5 kHz bathymetric sounding system

Enlarged deck space on fantail

Science van tiedowns, total van capacity: 6 vans

INMARSAT

APT Upgrade

PHASE II - GENERAL OCEANOGRAPHIC UPGRADE

Lab expansions.

Two oceanographic winches with winch control/data acquisition system.

Construction of oceanographic J-frame.

Uncontaminated seawater system

Van services

Table 2. PIR Scientific Facilities

Laboratories	5 labs (2800 sq. ft.) - 2 wet labs, vestibule, instrumentation lab, computer/nav lab, electronics lab, environmentally controlled, uncontaminated seawater, distilled water, fume hood, walk-in freezer, overhead monorail
Van Stowage	Accommodation of 4 8x20 vans on the main deck with power, fresh and seawater, drains, HVAC, compressed air and voice/data communications supplied; room for two additional vans in a cargo hold
Hydrographic Winches	Two hydrographic winches with capacity for 10,000 m of 1/4" to 3/8" wire, winch control and data acquisition system with remote readouts in various locations
Coring/Trawling Winch	10,000 m 1/2" to 3/4" wire and EM cable; power supply for EM cable
Bow Boom	Able to put sensor beyond ship's wake,100 sq. ft. instrumentation compartment below deck in the forecastle
Science Conning Stations	Three stations (port, starboard and aft) for conning the ship during scientific work
Shipboard Computer System	Main frame computer with peripherals and remote work stations
Internal Communications	High quality voice and data networks throughout the ship; a ship's data video display system, showing pertinent navigational, environmental and scientific data at several locations; installation of fiber optic cable for future network
External Communications	Satellite voice and data communications with remotes at various locations; underwater communications
Accommodations	Staterooms for 30 scientists, scientific library and conference room
Acoustic Systems	Acoustic Doppler current profiler, swath-mapping echosounder, 3.5 and 12 kHz echosounders, quiet-ship capability
Small Submersible/ ROV Handling	Power, weight handling equipment, underwater communications

Table 3. COAST GUARD ICEBREAKER SCIENCE SUPPORT FACILITIES

	POLAR	PIR
Laboratories		
Number	4	5
Area (sq ft)	1200	2800
Winches		
Hydrographic	2	2
Coring/trawling	1	1
Winch Control/Data Acquisition System	Yes	Yes
Over-the-Side Wire Handling	J-frame	Cranes
Van Support	6 Topside	4 Topside 2 in Cargo Holds
Uncontaminated Seawater	Yes	Yes
INMARSAT	Yes	Yes
Echosounders	3.5, 12 kHz	3.5, 12 kHz
Acoustic Doppler Current Profiler	No	Yes
Swath-Mapping Echosounder	No	No
Internal Data Communications	SAIL(?)	Fiber Optics
External Satellite Communications	Voice	Voice/Data
Bow Boom	No	Yes
Satellite Remote Sensing	APT	TESS(?)
Scientific Party Size	20	30
Science Conning Stations	No	Yes
Small Submersible/ ROV Support	No	Yes
Dedicated Scientific Computer	No	Yes
Conference Room/Library	No	Yes

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

FLEET IMPROVEMENT COMMITTEE

Department of Oceanography
Texas A&M University
College Station, Tx. 77843
9 March 1989

Captain G. F. Martin
Ice Operations Division (G-NIO)
U. S. Coast Guard
Washington, D.C. 20593-0001

Dear Captain Martin:

You requested of UNOLS that the Fleet Improvement Committee review the Coast Guard plans for improving oceanographic support capabilities on POLAR-class icebreakers. The committee studied the plans you provided, and, in January, I sent you a preliminary, positive assessment of the proposed science upgrade for oceanography. I noted that detailed comments regarding the likely improvement were not possible at that time because committee members did not have first hand knowledge of the present layout and oceanographic capability of the vessels. At your invitation, in an effort to gain further knowledge, Captain William Barbee (UNOLS Executive Secretary) and Dr. James Murray visited the POLAR STAR on February 9, 1989. They examined first hand: (1) modifications already made as part of phase I — the geology upgrade, and (2) spaces and layout that would be modified for phase II — the oceanography upgrade.

The POLAR STAR was represented by the executive officer, CDR Carl C. Swedberg and several ship's officers and chiefs. Mr. Neal Thayer, civilian science liaison in the USCG's Ice Operations Division, and a warrant officer responsible for design of the modifications represented Coast Guard Headquarters.

The general impression of the upgrade is that a serious attempt is being made to improve science support capabilities on the POLAR-class breakers. The modifications should provide adequate lab space and equipment for over-the-side gear handling. Based on the quality and redundancy of equipment, it appears that the budget is adequate for these modifications, and there is evidence that all involved desire to do the job well.

Two areas will be expanded for oceanographic operations.

a) One area in the waist of the ship is being modified for hydrography and water sampling. The existing winch space on the main deck is being enlarged into a main lab of about 800 ft2. Just aft of this space will be constructed a new outer lab (200 ft2) that will function as a rosette room. A roll up door will open aft onto a CTD/rosette deployment deck. A new, large J-frame will be used for deployment. An overhead trolley system will be used to move the rosette under cover. A new winch room will be constructed on the 01 deck immediately over the main lab. There will be space for two large winches (plans are for two DESH-6 winches), each with a spare reel of wire and the capability for changing reels at sea.

This area is will be a very good facility for traditional over-the-side sampling and probably is located in the best place on the ship for such operations. CTDs, bottle casts, vertical net hauls, and short cores could all be undertaken here. The deck-to-water distance is about 10-12 feet. The lab space planned will be convenient, well arranged, and flexible. An existing dry lab is nearby with another 200 ft2. Also planned is a computer lab (100 ft2) at the location of the existing meteorological lab on the 01 level. It appeared to Murray and Barbee that this will be a better CTD-handling facility than on most existing UNOLS ships.

b) The stern area of the main deck has been modified for geological work. The helicopter pad has been shortened by as much as 60 ft to provide some uncovered space. There is a new J-frame on the stern for handling corers and other large samplers. Unfortunately, the deck space is badly broken up and obstructed with a capstan, the winch control and stanchions, etc. I appears that it will be difficult to lay down anything large, although one probably could take and recover cores up to 10 m in length. A small wet lab with 220 ft2 will be constructed for handling cores and other samples. A USGS sponsored project used these facilities in 1988, but the committee has not been in touch with them for an evaluation.

The ship will have a clean seawater sampling system constructed with titanium pipes and valves. Adequate HVAC is available to all lab spaces. Navigation and ship's speed readouts are available in the labs but not ship's meteorological information. Moreover, there are no plans for a SAIL system. The vessel hopes to get INMARSAT communications. At present, both 3.5 and 12 kHz echo sounding systems are installed, but there are no plans to obtain an acoustic Doppler profiling current system. No inquiry was made regarding scientific freezer space. Three new van tie-downs will be provided so that a total of 7 vans could be accommodated.

The POLAR STAR currently advertises 20 science berths. A new chief scientist room is planned. Phase II would add bunks for another 10 members in the scientific party. Based on the plans, these new accommodations appear very cramped, consisting of a 6-man and a 4-man room. The ship's representatives feel that 30 scientists will be a strain on messing and other services that are not expected to be changed.

In summary, it seems that adequate lab and deck space will be provided for reasonable sampling and analytical requirements, although the deck is not clear of obstructions which may prevent handling of large systems. Furthermore, the gear-handling equipment (winches, lab equipment, J-frames, etc) should be first rate. New bunking accommodations may not be of desirable standards. It is our impression that science priorities will be greatly enhanced by these new additions.

Yours truly,

Worth D. Nowlin, Jr.

Worth D. Nowlin, Jr.
Chairman, UNOLS
Fleet Improvement Committee

xc: UNOLS FIC
G. Keller, UNOLS
W. Barbee, UNOLS
R. West, NSF
K. Kaulum, ONR

1988 RESEARCH CLEARANCE SUMMARY

87-38	MOANA WAVE	Indonesia 1/	Jan 88 - Oct 89
87-67	CONRAD	Chile	1 Jan - 5 Feb
87-132	Marine Mammal Research (Cole)	Mauritania 2/	1 Jan - 1 Mar
87-118	DELAWARE II	Canada	5 Jan - 10 Feb
87-123	MILLER FREEMAN	Canada	6-31 Jan
87-120	GYRE 3/	Costa Rica Panama Ecuador	20 Jan - 14 Mar
87-93	ATLANTIS II/ALVIN	Mexico 4/	20 Jan - 28 Feb
87-15	Collection Permit (Schultz)	Mexico 5/	Feb 88 - Aug 89
87-106	Marine Mammal Research (Cole)	Mexico	1-19 Feb
87-12?	Collection Permit (Turner)	Mexico 6/	1 Feb - 1 Aug
87-63	WESTWARD	Bahamas UK (Turks & Caicos, Cayman Is.) Haiti Jamaica Belize Colombia 7/ Honduras 7/ Mexico 8/	8 Feb - 17 Mar
87-130	STARELLA	Dominican Republic 9/	10 Feb - 31 Mar
87-108	CONRAD	Chile Argentina	14 Feb - 29 Mar
87-140	ALBATROSS IV 10/	Canada	16-26 Feb
87-105	DE STEIGUER	Mexico 11/	19 Feb - 25 Mar
87-141	DELAWARE II 12/	Canada	22-26 Feb
87-127	WHITING	Bahamas St. Vincent Barbados 13/ France (Fr. Guiana) 14	24 Feb - 24 Mar

87-121	COLUMBUS ISELIN	Bahamas Dominican Republic France (Martinique & Guadeloupe) Grenada Haiti[15] St. Kitts/Nevis[15] Dominica[15] St. Lucia[15] St. Vincent[15] UK (Turks & Caicos, Montserrat) Jamaica	25 Feb - 15 Mar
87-74	MSR (Spieler)	Mexico[16]	Mar-Apr
87-112	GYRE[17]	Honduras Panama Colombia Haiti Dominican Republic Jamaica Venezuela	1-21 Mar
87-143	CONRAD[18]	Argentina (Malvinas) UK (Falklands)	3-13 Mar
88-02	CONRAD	Argentina	3-13 Mar
87-142	ALBATROSS IV	Canada	4 Mar - 29 Apr
87-109	THOMAS WASHINGTON	Mexico[19]	13-21 Mar
88-07	DELAWARE II[20]	Canada	21-31 Mar
88-03	PACIFIC QUEEN (Charter)	Mexico[21]	27-30 Mar
87-126	KNORR	Spain[22] Greece	29 Mar - 10 Apr
87-131	MOANA WAVE	Philippines[23]	31 Mar - 19 Apr
87-36	Collection Permit (Rasch)	Mexico[24]	Apr - Jul
87-115	CAPE HATTERAS	Colombia[25] Honduras[26] Jamaica	1-28 Apr

87-110	CONRAD	Brazil UK (Ascension Is.)	2 Apr - 24 May
88-08	DELAWARE II[27/]	Canada	4-15 Apr
87-128	COLUMBUS ISELIN	Venezuela	6 Apr - 8 May
87-135	OCEANOGRAPHER	Kiribati[28/] Tokelau Cook Is.[29/]	6 Apr - 5 May
88-38	OCEANUS	Bermuda	6-12 Apr
88-01	WESTWARD	Bahamas Bermuda UK (Turks & Caicos)[30/]	7 Apr - 14 May
88-32	OCEANUS	Bermuda	14-24 Apr
87-114	KNORR	Turkey[31/]	15 Apr - 5 Aug
88-41	XIANGYANGHONG No. 14 (PRC)[32/]	Nauru Solomon Is. Palau FSM Marshall Is. Philippines PNG	15 Apr - 20 May
88-19	Collection Permit (Hogue)	Mexico[33/]	16 Apr - 7 May
88-11	DELAWARE II[34/]	Canada	18-28 Apr
87-119	Collection Permit (Emberton)	Mexico[35/]	21 Apr - 14 May
88-13	MOANA WAVE	Marshall Is.	23 Apr - 29 May
88-12	SEA DIVER	Colombia [36/] Venezuela[36/]	1 May - 16 June
87-113	CAPE HATTERAS	Colombia[37/] Honduras Jamaica	2-28 May
88-15	DELAWARE II	Canada[38/]	2 May - 8 June
87-136	OCEANOGRAPHER	Kiribati[39/] Tokelau	9 May - 4 June

88-25	POWELL (Charter)	Bahamas 40/	13-21 May
88-26	ALBATROSS IV	Canada 41/	16-27 May
88-44	SILAS BENT	Canada	18 May - 1 Jun
88-30	CORWITH CRAMER	Bermuda Canada	20 May - 27 Jun
88-45	ENDEAVOR	Bermuda	21 May - 3 Jun
88-28	NOS Hydrographic Surveys	Canada	23 May - 7 Oct
87-117	CONRAD 42/	Brazil	31 May - 22 Jun
88-36	MELVILLE	Canada	31 May - 15 Jun
88-34	LAURENTIAN	Canada	5-25 Jun
88-46	ALBATROSS IV 43/	Canada	6-17 Jun
87-53	MOANA WAVE	Indonesia 44/ PNG Philippines Rep. of Palau	12 Jun - 25 Jul
88-21	OCEANOGRAPHER	France (Clipperton Is.)	15 Jun - 9 Jul
87-129	WHITING 45/	Bahamas UK (Turks & Caicos) 46/ St. Vincent 46/ Barbados 47/ Guyana France (Fr. Guiana) 48/ Brazil	16 Jun - 18 Jul
88-51	SEWARD JOHNSON	Canada	26 Jun - 2 Aug
88-17	OSPREY (Charter)	Bahamas	27 Jun - 12 Aug
88-48	CONRAD	France (Martinique, Guadeloupe) Barbados	27 Jun - 27 Jul
88-06	THOMPSON	USSR 49/	30 Jun - 25 Jul
88-52	LYNCH/BARTLETT	Bahamas	Jul 88 - Jul 90

88-37	CAPE HATTERAS	Bermuda UK (British Virgin Is., Anguilla) Dominican Republic Bahamas	2 Jul - 12 Aug
88-14	SEDCO (ODP)	Australia	3 Jul - 11 Nov
87-138	SPROUL	Mexico[50/]	6 Jul - 6 Aug
88-29	CORWITH CRAMER	Canada France (St. Pierre and Miquelon)	6 Jul - 8 Aug
88-57	ATLANTIS II/ALVIN	Canada	6-28 Jul
88-31	KANE	Norway	7-21 Jul
87-133	OCEANUS	Iceland	11 Jul - 9 Aug
88-50	COLUMBUS ISELIN	Bermuda	11-31 Jul
87-134	MT. MITCHELL[51/]	Bermuda Canada Denmark (Greenland) Iceland Ireland[52/] Barbados	15 Jul - 4 Sep
87-139	ENDEAVOR	Denmark (Greenland) Norway	21 Jul - 20 Aug
88-49	Collection Permit (Emberton)	Mexico[53/]	21 Jul - 16 Aug
88-70	NEREID (Charter)	Canada	26 Jul - 26 Oct
88-09	JORDAN MCARTHUR	Mexico[54/] Guatemala Costa Rica Panama[55/] Colombia Ecuador Peru France (Clipperton Is.)	28 Jul - 6 Dec
88-16	CHAUVENET	Kenya	1 Aug 88 - 31 Jul 9
88-40	NOAA Aircraft	Mexico[56/]	1 Aug - 31 Oct

88-59	Collection Permit (Fox)	Mexico[57]	1-22 Aug
88-84	ALBATROSS IV	Canada	1-14 Aug
87-137	MOANA WAVE	Philippines	3-26 Aug
87-125	THOMAS WASHINGTON	USSR[58]	5 Aug - 8 Sep
88-82	LUCKY 7 (Charter)	Canada	10 Aug - 24 Sep
88-20	JOHN ISAACS	Canada	15 Aug - 25 Sep
88-35	YELLOWFIN (Charter)	Mexico[59]	15 Aug - 31 Oct
88-60	SILAS BENT	Canada	16-27 Aug
88-80	GLORIA MICHELLE	Canada	20-26 Aug
88-68	ARGO MAINE	Canada	21 Aug - 2 Sep
88-90	ENDEAVOR	Norway	21-29 Aug
88-04	KNORR	Spain	22-26 Aug
88-23	NEW HORIZON	Mexico[60]	23 Aug - 28 Sep
88-58	ATLANTIS II/ALVIN	Canada	28 Aug - 13 Sep
88-10	OCEANUS	Spain Portugal Morocco	3-28 Sep
88-18	KNORR	Norway Denmark	6 Sep - 6 Oct
88-22	THOMAS WASHINGTON	USSR[61]	8-29 Sep
87-129	MT. MITCHELL[62]	Bahamas UK (Turks & Caicos) St. Vincent Barbados Guyana France (Fr. Guiana)[63] Brazil Barbuda	12 Sep - 8 Oct
88-24	Collection Permit (O'Sullivan)	Mexico[64]	12 Sep - 31 Oct
88-71	ALBATROSS IV	Canada	12 Sep - 4 Nov

88-98	ATLANTIS II/ALVIN	Canada[65]	13 Sep
87-128	COLUMBUS ISELIN	Venezuela[66]	14 Sep - 20 Oct
88-72	DELAWARE II	Canada	19 Sep - 28 Oct
88-25	POWELL (Charter)	Bahamas	25 Sep - 10 Oct
88-110	XIANGYANGHONG No. 14 (PRC)[67]	Philippines	Oct - Nov
88-86	ATLANTIS II/ALVIN	Canada	6-16 Oct
88-105	KNORR	Norway	6-10 Oct
88-78	OCEANOGRAPHER	France (Clipperton Is., Marqueses Is.)	12 Oct - 15 Dec
88-43	CORWITH CRAMER	Bermuda Antigua France (Guadeloupe, Martinique) Dominica St. Lucia St. Vincent Grenada	13 Oct - 23 Nov
88-42	WESTWARD	Bermuda St. Kitts/Nevis France (Guadeloupe, Martinique) UK (Montserrat) Dominica St. Lucia St. Vincent Barbados	14 Oct - 23 Nov
88-109	OCEANUS	Canada	15-28 oct
88-53	MELVILLE	Chile[68]	26 Oct - 30 Nov
88-91	DELAWARE II	Canada	31 Oct - 10 Nov
88-76	CONRAD	Algeria[69] Spain	2-29 Nov
88-96	NUSC Ranger (Charter)	Barbados[70]	2 Nov - 5 Dec
88-83	CAPE HATTERAS	Bermuda	3-13 Nov

88-55	COLUMBUS ISELIN[71]	Bahamas Haiti Jamaica Colombia Honduras Costa Rica	4-23 Nov
88-97	MOANA WAVE	Kiribati	5-30 Nov
88-05	SEDCO (ODP)	Indonesia[72] Philippines	6 Nov 88 - 13 Feb 89
88-63	THOMAS WASHINGTON	Japan Marshall Is. FSM	9 Nov - 28 Dec
88-111	OCEANUS	Bahamas	12-28 Nov
88-75	DELAWARE II[73]	UK (British Virgin Is.)	14 Nov - 20 Dec
88-54	CONRAD	Spain Morocco	23 Nov - 5 Dec
88-107	ALBATROSS IV	Canada	28 Nov - 10 Dec
88-65	WESTWARD[74]	France (Martinique, Guadeloupe) Dominica St. Lucia St. Vincent Grenada Netherlands Antilles Dominican Republic Haiti Jamaica UK (Cayman Is.) Mexico	1 Dec 88 - 10 Jan 89
88-66	CORWITH CRAMER[75]	France (Martinique, Guadeloupe) Dominica St. Lucia St. Vincent Venezuela Netherlands Antilles Dominican Republic Haiti Jamaica Colombia Honduras Mexico	1 Dec 88 - 11 Jan 89

88-100	Collection Permit (Weinberg)76/	Mexico France	1 Dec 88 - 30 Nov 90
88-112	OCEANUS	Bahamas	2-21 Dec
88-79	MELVILLE	Argentina77/ UK (Falklands)77/ So. Africa	4 Dec 88 - 12 Jan 89
88-103	SURVEYOR	UK (So. Georgia Is.) Argentina78/ Chile79/	4 Dec 88 - 10 Apr 89
88-116	CAPE HENLOPEN	Bermuda80/	16 Dec 88 - 16 Apr 89
88-73	THOMAS WASHINGTON	FSM Marshall Is.	28 Dec 88 - 7 Jan 89

1. Clearance not granted. Possibly due to GOI misunderstanding of U.S. intentions. GOI insisted that umbrella S&T agreement must be in place prior to approval of individual research clearance requests.

2. Approval received too late. Research cancelled.

3. Cancelled due to lack of funding.

4. Approved two days late. Research conducted on revised schedule.

5. Not approved despite repeated requests; initial request 1 year in advance.

6. Mexico asked researcher to reschedule in September. Research cancelled.

7. No response from Colombia and Honduras, despite repeated requests.

8. Approved one month in advance!

9. Research cancelled 2 weeks before scheduled start of surveys when response was not received.

10. Research cancelled due to ship problems during yard period.

11. Approval received one week late, however, research in Mexican waters was conducted on revised schedule.

12. Research cancelled due to budget cuts.

13. Barbados approval received one week after ship's departure, the day before ship was scheduled to begin research in Barbados waters.

14. Request denied by France owing to conflict with military exercises off French Guiana.

15. No response received from Haiti, St. Kitts/Nevis, Dominica, St. Lucia, and St. Vincent.

16. Approved one month late. Research cancelled.

17. Research cancelled due to lack of funding.

18. Research cancelled due to lack of funding.

19. Request denied owing to late changes in research and schedule. Mexico requires six-month notice for revisions!!

20. Research cancelled due to budget cuts.

21. Request not approved owing to short notice.

22. Request denied by Spain owing to insufficient notice.

23. Approved one day before ship departure.

24. Request made to Mexico one year in advance. Approved 5 months late. Research cancelled.

25. Request denied by Colombia for political reasons.

26. When Colombia denied request, Dept made late request to Honduras, which was approved.

27. Research cancelled due to budget cuts.

28. No response from Kiribati despite repeated requests.

29. Cancelled due to schedule change.

30. Turks & Caicos not approved despite repeated requests.

31. Start of research delayed 4 days at Turkey's request.

32. NOAA requested Dept. of State assist in obtaining clearances for PRC vessel conducting TOGA cruise.

33. Mexico asked Hogue (Sept 88) to reschedule. He had already cancelled research.

34. Research cancelled due to budget cuts.

35. Not approved by Mexico. Research rescheduled for July 1988. Rescheduled research not approved until September 1988. Research cancelled.

36. Both approvals were received several days late, however, research was conducted on schedule because of long transit to operating area.

37. Research was initially denied by Colombia, however, owing to extraordinary efforts by the U.S. Embassy, the denial was reversed in time for the research to be conducted on a revised schedule.

38. Research cancelled due to budget cuts.

39. No response received from Kiribati despite repeated requests.

40. Ship was required by Bahamaian authorities to enter port and explain presence in Bimini despite prior approval.

41. Research cancelled due to budget cuts.

42. Approved on a timely basis even though initially submitted for R/V GYRE and the schedule changed 4 times.

43. Research cancelled due to budget cuts.

44. No response from Indonesia despite repeated requests. Research conducted outside Indonesian waters.

45. Major clearance problem evolved from replacing RESEARCHER with WHITING for Jun-Jul STACS cruise and with MT. MITCHELL for Sep-Oct STACS cruise, particularly with France and Barbados.

46. Clearances not received owing to problems involving revisions to STACS cruises.

47. Approval not received until ship arrived in area. Research conducted on slightly delayed schedule.

48. French denied request owing to conflict with French Navy activities off French Guiana. Research conducted on revised schedule.

49. Dept. of State did not submit request because it was not in compliance with USSR 6-month prior notice requirement, nor was sufficient explanation provided to warrant seeking special consideration.

50. Mexican approval received day of ship's departure.

51. MT MITCHELL replaced RESEARCHER for this Global Change cruise.

52. Ireland stations were dropped when cruise revised to substitute MT MITCHELL for RESEARCHER.

53. Mexico, after requesting researcher to postpone initial request from April until July, did not approve until October. Research was cancelled.

54. Not approved until too late to conduct research. Research cancelled.

55. Panama request was not approved for political reasons.

56. Aircraft landing clearances only. No research in Mexico.

57. Approved by Mexico one month late. Research cancelled.

58. First Soviet approval of U.S. research in USSR waters in 10 years.

59. Approved one month late; research cancelled.

60. Approved one week late; research conducted on a revised schedule.

61. Approved. Soviets requested R/V THOMAS WASHINGTON pickup Soviet participating scientists at Provideniya, in Siberia.

62. See footnote no. 45.

63. Clearance problem with France owing to conflict with French Navy activities off French Guiana. Research conducted on a revised schedule.

64. Request approved by Mexico 2 weeks late. Researcher was detained by Mexican officials for starting research early (on date proposed). U.S. Embassy facilitated his release.

65. Canadians requested ALVIN to search for lost equipment.

66. Several problems developed when revisions were requested after commencing research. These were solved when Venezuelan participant went aboard during later part of survey.

67. NOAA requested Dept. of State to assist in obtaining clearance for PRC vessel conducting TOGA Research.

68. Approval not received from Chile until 2 weeks after start of research cruise, however, research in Chilean waters was conducted on revised schedule.

69. Research was approved initially by Algeria, however, Dept. of State was advised at last minute that Algeria would not allow vessel inside territorial waters.

70. Research was delayed several days awaiting special conditions of approval for research proposed in reef areas.

71. Several clearances were received late, partially due to reversal of cruise track just before departure.

72. No approval received from Indonesia despite frequent requests, supplying all information required and trip to Jakarta by ODP officials.

73. Research cancelled due to budget cuts.

74. Clearances were received late for Dominica, France and Dominican Republic; research cancelled in those areas. Mexico did not approve research.

75. Clearances were received late for Dominican Republic, Jamaica and Honduras; research cancelled in those areas. Venezuela did not approve research. Colombia approved at last minute and wanted to put a scientist aboard. SEA said it was too late; research in Colombia was cancelled.

76. Neither Mexico nor France approved owing to late request.

77. Research cancelled in Argentine waters and in disputed area near Falklands owing to late response from UK and Argentina.

78. Argentina approval given day of ship's departure.

79. No response from Chile despite repeated requests.

80. Late response from Bermuda owing to late request. Research delayed.

Canada - 35

Mexico 23
Honduras - 6
Costa Rica - 3
Panama - 3
Belize - 1
Guatemala - 1

Colombia - 8
Argentina - 5
Venezuela - 5
Brazil - 4
Chile - 4
Ecuador - 2
Guyana - 2
Peru - 1

Bahamas - 14
Bermuda - 12
Jamaica - 8
St. Vincent - 8
Barbados - 7
Dominican Republic - 6
Haiti - 6
Dominica - 5
St. Lucia - 5
Grenada - 3
Antigua & Barbuda - 2
Netherlands Antilles - 2
St. Kitts/Nevis - 2

France - 14
UK - 13
Norway - 5
Spain - 5
Denmark - 3
USSR - 3
Iceland - 2
Greece - 1
Ireland - 1
Portugal - 1
Turkey - 1

Morocco - 2
Algeria - 1
Kenya - 1
Mauritania - 1
So. Africa - 1

Philippines - 6
Marshal Is. - 4
FSM - 3
Indonesia - 3
Kiribati - 3
Palau - 2
PNG - 2
Tokelau - 2
Australia - 1
Cook Is - 1
Japan - 1
Nauru - 1
Solomon Is. - 1

The Dept. of State received a total of 132 research clearance requests during 1987-88 which were proposed or conducted during calendar year 1988. They represent 268 clearance requests to 57 foreign governments for U.S. research during 1988.

Twenty-nine clearance requests were denied or otherwise not approved. Research was cancelled, delayed or otherwise disrupted in 30 others, owing to untimely approvals or onerous requirements.

In addition, 33 requests were received from 6 foreign governments for research conducted in U.S. waters during 1988. All were approved.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

September 1989

UNOLS Nominating Committee

The UNOLS Nominating Committee has assembled the following slate of candidates for the UNOLS Council positions to be filled at the September 1989 Annual Meeting.

The Slate

For UNOLS Council - from among designated representatives of Member institutions, not operators:

Peter Betzer	University of South Florida
Bobb Carson	Lehigh University
Charles Nittrouer	SUNY, Stony Brook

For UNOLS Council, at-large, individuals affiliated with any UNOLS Member institution:

Douglas Hammond	University of Southern California
David Karl	University of Hawaii
Worth Nowlin	Texas A&M University

VITAE

Peter Betzer, Geochemistry, Analytical Chemistry
Professor and Chair, Department of Marine Science
University of South Florida
Particle flesh solute interactions, sedimentology, atmospheric transport, phytoplankton, mineralogy

Bobb Carson, Geological Oceanography
Professor and Chair, Department of Geological Sciences
Lehigh University
Sedimentation and fluids in subduction zones

Charles Nittrouer, Geological Oceanography
Professor and Associate Director for Research
Marine Sciences Research Center
SUNY, Stony Brook
Geological oceanography, continental margin, sedimentology

Douglas Hammond, Marine Chemistry
Professor of Geological Sciences, Department of Geological Sciences
University of Southern California
Sediment diagenesis, nutrient recycling

David Karl, Biological Oceanography
Professor of Oceanography, Department of Oceanography
Chair, Oceanic Biology in Hawaii Institute of Geophysics
University of Hawaii
Marine microbiological ecology, particle-bacterial interactions, deep-sea hydrothermal vents

Worth Nowlin, Physical Oceanography
Distinguished Professor of Oceanography,
Associate Dean of Geosciences,
Director, Division of Atmospheric and Marine Sciences
Texas A&M University
Circulation of Southern Ocean and exchanges with world oceans