UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS COUNCIL MEETING

SUMMARY REPORT

July 15-16, 1992

Alton Jones Campus
University of Rhode Island
West Greenwich, Rhode Island

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The UNOLS Council met at 0830, 15 July 1992 at the Alton Jones Campus of the University of Rhode Island, West Greenwich, Rhode Island. The meeting was called by Garry Brass, Chair. Agenda items were followed except as altered herewith. Attached as Appendix I is a copy of the agenda.

ATTENDEES

UNOLS Council:
Garry Brass, Chair
Peter Betzer
Jeff Fox
Dennis Hayes
Rick Janke
Bob Knox
Mark Langseth
Chuck Nittrouer
Ken Palfrey

Participants/Observers
Jack Bash, UNOLS
Tom Cocke, Dept. of State
Mary D'Andrea, UNOLS
Annette DeSilva, UNOLS
Eric Hartwig, ONR
Don Heinrichs, NSF
Keith Kaulum, ONR
Dennis Nixon, UNOLS Risk Mgr
Barrie Walden, WHOI
Bill Stubblefield, NOAA

APPENDICES

I. UNOLS Council Meeting Agenda, 15-16 Jul '92
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III. Garry Brass letter to Hon. Barbara Mikulski dtd 14 July 92
IV. NSF Division of OCE Organization
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The minutes of the 26-28 February 1992 Council meeting were accepted as written.

RISK MANAGEMENT UPDATE

Don Heinrichs opened the discussion on Risk Management by indicating that the funding agencies have been strongly behind improving insurance coverage of the UNOLS fleet in a cost effective means.

Dennis Nixon, UNOLS Risk Manager, reviewed developments in the proposal to provide a group insurance policy for the UNOLS fleet. He explained that in 1989 the cost of insuring the fleet was $1.027 million and by 1991 this cost had risen to $1.4 million. Additionally, effective next year the carrier for Lamont has indicated that they could raise their rates by 100 percent. By forming a group policy, UNOLS would have the potential to better negotiate more cost effective policies and provide uniform coverage throughout the fleet. Dennis indicated that the goal of saving money is very realistic and the many variations in coverage and deductibles would be eliminated. Additionally, a group policy could offer higher levels of coverage than what is currently held by most of the vessels.

The idea of implementing a UNOLS group policy was recommended by studies in 1975 and again in 1986. Reports of these recommendations are available. Dennis idicated that a savings of as much as one quarter million dollars could be realized if the rates were to remain constant. This would be for pooled, uniform coverage and no hull insurance. Institutions interested can purchase their own hull insurance, but it would not be reimbursable. There would be no over-the-side or below-the-keel insurance since the premium rate to just break even would be unrealistically high. Dennis indicated that the insurance companies are attracted to the professionalism of the UNOLS Fleet. Members of the Council questioned some of the aspects of the proposed policy. They inquired if a cost comparison had been performed for individual policies offering uniform coverage and no hull insurance (no pooling).

The key issues in implementing a group policy can be summarized as follows:

- For most institutes, the group policy would represent an increase in coverage (only two have higher).
- NSF & ONR would be named coinsured with the institution.
- Higher deductibles are expected in most cases. The current planning suggests a $100K deductible for each $25M coverage for large ships and $50K deductible for $15M coverage for smaller ships.
- The policy would offer no hull insurance coverage.

To implement the group policy, a national broker would be selected and funding would be provided by the funding agencies through a management group. Institutions would no longer be reimbursed for their insurance costs and these expenses would be removed from the daily ship rates. A form of reimbursement for Non-NSF/non-ONR vessels would be devised. A risk management group would be formed to oversee the policy. The group would include NSF

and ONR Grants and Accounting personnel, a few institution risk managers, and Dennis Nixon. Dennis would serve as a liaison between UNOLS and the broker. Dennis hopes to begin negotiating with a broker by October and have the group policy in place by February 1993.

Garry Brass will request Dennis to go forth with the proposal for group policy on behalf of UNOLS. He will be asked to submit the policy on UNOLS letterhead. Jack Bash will be a co-PI on the proposal. Dennis indicated that URI fully supports the project. A letter to be signed by Don Heinrichs, NSF and Eric Hartwig, ONR will forward the proposal to each institute . They will have thirty days to respond.

COMMITTEE REPORTS

RESEARCH VESSEL OPERATORS COMMITTEE:

Jack Bash reported on the RVOC activities and the plans for the fall annual meeting.

The Council was asked to review the draft of the undated *Research Vessel Safety Standards* and provide any comments to Mike Prince as soon as possible. Mike and the subcommittee which worked on the update did an excellent job in preparing the draft. The Safety Standards are required to be reviewed and updated every three years. Vessels outside of the UNOLS fleet are known to use this document as a guide. Additionally, it is used as a legal standard. The draft will be circulated to all UNOLS members for comment. The updated standards will be presented at the UNOLS Annual Meeting in September for adoption.

The RVOC Annual Meeting will be held on October 20-22 in Lewes, Delaware.

ALVIN REVIEW COMMITTEE:

Appointment of ARC Chair - The UNOLS Council unanimously approved Garry Brass's appointment of Jeff Fox to the Chair the ALVIN Review Committee.

ALVIN Review Meeting Report - Jeff Fox provided the report of the ALVIN Review Meeting held at Woods Hole Oceanographic Institution on 9-11 June:

WHOI provided status reports of ALVIN operations for 1991 and 1992. The 1991 schedule was lean, but very successful. Of the 156 dives scheduled, 152 dives were successfully completed. The four lost dives were all due to weather. In 1992, only carryover projects were funded. The schedule was extremely light. ALVIN will return to WHOI in August for overhaul. The light schedule impacted ALVIN operations by resulting in the thinning out of the ALVIN group. This is a major concern of the ARC.

Operations of the past year were highlighted by implementing an engineering dive series. The dives provided time for crew training and various equipment improvements. These improvements included video and optical enhancements and hydraulic upgrading.

On other issues, WHOI has submitted a proposal to increase ALVIN's depth capability from 12,000 feet to 15,000 feet. This would consist only of a paper change decreasing ALVIN's factor of safety. The new factor of safety would be the same as that of SEA CLIFF. Additionally, it was reported that the ALVIN archivists have been waiting for some stabilization in the technology for methods of film preservation. This has proven to be a worthwhile delay, since the advances in this technology have shown to be less destructive in preservation than original methods. The group feels that they are close to preparing a proposal.

The ARC meeting included presentations by the Deep Submergence Laboratory group on their remotely operated vehicles. Deep submergence research can be enhanced by ALVIN combined with the use of ROVs. In time, it is perceived that ROVs will be able to take over operations. The ARC is working to integrate the two technologies.

Twenty five dive requests for operations in 1993 and beyond were received by the ARC, representing a total of over 300 dives. The ARC approved close to 300 dive days for 1993. WHOI schedules took logistical restraints into account and developed three tentative schedules. The actual schedule will be driven by the peer reviews to be held next month.

The ARC discussed the benefits and timing of the ATLANTIS II replacement by KNORR as an ALVIN support ship. The conversion would allow better integration of ROVs and ALVIN. Additionally, KNORR, as a general purpose vessel, would be more sellable than AII when not performing deep submergence operations. The ARC was aware, however, that the conversion would impact Physical and Chemical Oceanography programs in their access to KNORR. The ARC sees the ideal time frame for the conversion as 1996; this should provide sufficient time for an ALVIN expedition. Also, it would coincide with overhaul periods of ALVIN, AII and KNORR.

FLEET IMPROVEMENT COMMITTEE:

Marcus Langseth provided a summary of the Fleet Improvement Committee's activities. Overheads from his report are enclosed as Appendix II.

Ongoing Activities for 1992: FIC ongoing activities for 1992 include: (1) Revising the Fleet Improvement Plan of 1990, (2) Revising the science mission requirements for the Arctic research vessel, (3) Studying the coastal oceanography facility needs, (4) Assessing the accommodations and labs on UNOLS vessels and (5) Performing a quantitative comparison of multibeam sounding systems. The FIC has requested Alberto Malinverno and John Goff to submit a proposal to perform the multibeam system comparison.

Completed Activities: The SOONS report has been printed and distributed. The UNOLS office has received many requests for additional copies and as a result stocks are running low.

Glosten Marine and Worth Nowlin completed a study which estimated the value of the UNOLS Fleet. The findings revealed that the fleet is worth approximately what it originally was worth.

The FIC evaluated the potential of T-AGOS ships for oceanography by reviewing papers form the Naval Oceanography Command and NAVSEA. The general conclusion of both papers indicated that the ships are not suitable for performing the multipurpose oceanographic missions required of present and future oceanographic research ships. However, the T-AGOS could have use as special purpose platforms. NOAA has just received a T-AGOS and will install an intermediate range multibeam system. As part of the EEZ program, NOAA was directed to purchase a 50 to 600 meter depth capable multibeam system and test its performance.

Arctic Research Vessel: Marcus provided a paper summarizing the two day meeting held at Glosten Marine and an agenda of events for the Arctic Research Vessel (ARV) Subcommittee, see Appendix II. The meeting at Glosten Marine was held to discuss the science requirements for the Arctic Research Vessel and review the evaluations from the Russian ice vessel cruises.

On July 6-7, the ARV subcommittee met to draft revised Science Mission Requirements for the Arctic Vessel. In August, the subcommittee plans to meet in Washington, D.C. with funding agency representatives and experts of the field to complete the Science Mission Requirements and initiate a second conceptual design study by Glosten Marine. The new conceptual design and comparative hull form analysis is scheduled to be reviewed in November. A new set of directions for the preliminary design study will be developed.

The greatest response to the conceptual design was in regard to the vessel's ice capability. The general consensus was that more ice capability was needed. Definitions of the Ice Classes are provided in Appendix II. To meet the scientific needs, it is estimated that an Ice Class A3 vessel would be required. A vessel of less capabilities, such as a Class A2 could demand significant costs in escort expenses. The A3 Class would drive the ship's size up in excess of 270 feet. It was also recommended that the ship should also be large enough to accommodate a helicopter. By August, NSF needs a clearly defined science profile of the anticipated uses for the Arctic vessel. This would include time on open water, time for Arctic shelf research and time for the Central Arctic.

Marcus reported on the fact finding mission to evaluate the performance of the two Russian Ice Vessels. A purpose of the mission was to determine if the THYSSEN-WASS hull could provide Class A3 capabilities. The opinion of the review team was somewhat less than originally anticipated. The open water performance, along with the performance in ice of the CAPITAN SOROKIN were evaluated. On open water, the vessel experienced severe slamming with wave heights of 12 feet or greater. Also, a large amount of spray and icing on the bow were experienced in head seas. In ice, the performance was greatly improved. The

vessel made steady progress at 4 kts in level three to four foot thick ice. At small ridges, the vessel was stopped and two to six rams were required to break through. Backing and maneuvering in the ice were excellent. The vessel cuts a clean channel through the ice which fills with brash ice about one ship's length astern. It was noted that, floating ice tends to accumulate in front of the bow.

Plans for this summer include an HSVA study of THYSSEN/WASS hull forms that can reduce the propulsion requirements to meet Class A3 capability. Glosten Marine will provided a preliminary estimate of the vessel size to meet these requirements.

Garry Brass informed the Council that Laney Chouest has provided testimony to Congress which speaks poorly of UNOLS and proposes a PALMER clone for research in the Arctic. In response, Garry has written to Barbara Mikulski, Chair of the Subcommittee on VA, HUD, and Independent Agencies, defending UNOLS and our accomplishments, Appendix III. Discussion by the Council noted that in some instances commercial leasing is valid; such as for focussed science programs over defined time periods. This is the case with the Antarctic research programs using PALMER. For long-term research which is broadly defined by science mission requirements, commercial leasing is not suitable. This situation represents the research scenario of the Arctic work. Garry recommended that the Council draft a mandate stating the scientific community's position on an Arctic Vessel design.

Evaluation of Accommodations and Laboratories: Marcus Langseth, Terrie Chereskin and Bob Dinsmore are evaluating the accommodations and laboratory environments on UNOLS ships. The study is being performed to identify those features in staterooms or laboratories that impact convenience, comfort and efficiency. A questionnaire has been prepared to distribute to scientists who have been PI's on two or more ships in the recent past. Bob Dinsmore will perform on board inspection of ships as opportunities arise.

NATHANIEL PALMER User Group: Marcus reported that at the spring FIC meeting it was suggested that a scientific user group for NATHANIEL PALMER should be formed. No action has been taken to date. Dennis Hayes informed the Council that the Scientific Advisory Group, which oversaw the construction of the vessel, has completed their mission and has disbanded. The RFP for technical support of PALMER was advertised to the community, but for a number of reasons no institution was able to respond. EG&G was awarded a one year contract to provide technical support.

SHIP SCHEDULING COMMITTEE:

Ken Palfrey provided the Council with an update from the Scheduling Committee.

In 1992, 5,246 operating days for a total of $48.5 million will be funded. THOMAS WASHINGTON and RIDGELY WARFIELD will be officially retired from the UNOLS fleet.

A pair of meetings were held in Washington, D.C. on June 16 and 17 for scheduling of 1993 operations. The first day was for East and Gulf coast scheduling and the second day was devoted to West coast operations. The meetings were well attended by funding representatives and all went very smoothly. A total of approximately 5,400 days were scheduled requiring $53 million in support. A large portion of this proposed ship time is pending funding decisions. Don Heinrichs noted that there are potential problems in supporting 1993 operations. NSF is requesting $35.6 million (includes ODP) for 1993. If they are level funded, they will receive $31.7 million. NSF will be unable to make up any differences in funding this year. Level funding could present a big problem.

NOAA actively participated in the scheduling process. They are showing an increased dependency for UNOLS ship time. A subcommittee met with NOAA following the scheduling meetings to discuss their ship time needs. The subcommittee included schedulers from Scripps, University of Washington, University of Hawaii, USC, WHOI and L-DGO. They will assess NOAA's needs and determine if their ship schedules can accommodate NOAA.

Ken informed the Council of anticipated underutilization problems with intermediate ships in the Atlantic. Fortunately, ENDEAVOR and OCEANUS will be in their mid-life refits for portions of 1993 and 1994. As of the scheduling meeting, only 600 days had been scheduled for the four Atlantic intermediate vessels. The problems do not seem to be as bad in the Pacific. GYRE's ship-time use is rather unique and perhaps should not be grouped in with the Atlantic vessels. Garry appointed a subcommittee of Bob Knox, Ken Palfrey and one other representative from the West (University of Washington) to study the problem of underutilization of East and Gulf Coast ships and report back to the Council in September.

AGENCY REPORTS

NATIONAL SCIENCE FOUNDATION: Don Heinrichs presented the NSF report from a series of overheads and slides which are included in this report as Appendices IV through IX and are summarized below.

Don provided the NSF OCE organizational structure as updated July 1, 1992, Appendix IV. Larry Clark will be reassigned to a fifth program area for broader research technology programs. Lisa Rom will keep the marine technician and equipment support programs. The AMS center will most likely stay under Lisa Rom's direction. Dolly Dieter will stay with NSF for one additional year until March 1994.

Don provided a handout titled, "Academic Research Vessels 1985-1990," which summarized comments made to the Ocean Science Board in 1982, Appendix V. These comments remain relevant to today's fleet. He also distributed a summary of Academic Fleet Operations Support for the years 1990 to 1992, along with projected costs through 1998, Appendix VI. This summary reflects the support received from various agencies and how these funds were distributed by ship class. Cost projections through 1998 reflect the anticipated cost of the fleet

over this time period. In 1992, large ship operating costs based on a 265 day operating year per ship will total an estimated $4.1 million. Intermediate ship operating costs will be approximately $2.5 million for 254 annual operating days per ship. Operating costs for 1993 are estimated to be $57.1 million indicating that 533 more science days would be needed to fill ships. Don pointed out that it is unlikely that $57.1 M will be available in 1993. Additionally, Global Change field programs will decrease in 1993 and 1994, however, an increase of ship use by NOAA projects is expected.

Don summarized the NSF 1993 budget request, Appendix VII. The budget request includes a 17.6% increase overall with Ocean Sciences requesting a 15.4% increase or $206.4 million. FY93 will probably look similar to FY92.

NSF will issue an official policy paper by the end of the year stating that NSF will only support projects on ships that meet the Research Vessel Safety Standards of UNOLS. A draft is included as Appendix VIII.

NSF has issued a new UNOLS Ship Time Request Form, Appendix IX. The only change in this form is its revision number in the lower corner, "NSF Form 831 (7/92)."

UNOLS ISSUES

RESEARCH VESSEL TECHNICAL ENHANCEMENT COMMITTEE (RVTEC) PROPOSAL: Rich Findley from the University of Miami and Chair of the Technical Support Steering Group (TSSG), proposed to the Council the formation of a UNOLS standing committee to coordinate research vessel technical enhancement. In May, the TSSG met in Washington to discuss the need for a UNOLS technical enhancement committee and identify goals of such a group. By the end of June, a final draft of a proposal for formation of the committee was submitted to the UNOLS Chair. The purpose of the committee will be: "To promote scientific productivity of research programs that make use of major oceanographic facilities; primarily research vessels and to foster activities that will lead to enhanced technical support for sea-going scientific programs." The full proposal defining the organizational structure of the committee, along with a schedule of proposed events is included as Appendix X. Travel support for the Chair and Vice Chair will be requested (as is now provided to RVOC and Ship Scheduling). Rich indicated that the RVOC is supportive of the formation of this committee.

The steering committee proposes to hold an organizational meeting in October to coincide with the MTS Conference in Washington, D.C. A draft agenda is included in Appendix X.

The Council recommended that the RVTEC proposal be included on the Annual Meeting Agenda for endorsement by the UNOLS membership.

AGENCY REPORTS (continued)

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION: Captain Bill Stubblefield reported to the Council for NOAA. A copy of his overheads are included in Appendix XI. NOAA received $33 M from Congress in 1992 for their Fleet Modernization Program. Uses for these funds include critical maintenance of existing ships, preparation of technical specs, chartering support to meet short term needs, and procurement of a multibeam SWATH sonar system. NOAA's Fleet Modernization Plan has been in OMB for over a year and has not been released to date. In 1992 a T-AGOS 13, USNS ADVENTUROUS, was transferred to NOAA.

John Knauss has indicated that he is firmly committed to working with UNOLS. In 1992, NOAA chartered 862 days for a total of $6,369.5 K. This level of chartering is expected to continue in 1993 and 1994 for support of TOGA COARE, NECOP, MONITOR, NURP, WOCE and TOGA-TAO programs. Charting funds available for UNOLS time is estimated to be $2,100K for FY93 and $2,260K for FY94. A major source of these chartering funds is expected to come out of the Fleet Modernization budget which is $1,500K for 1993 and $4,000K for 1994. The $4,000K in FY94 could support roughly one large ship year, however, some of these funds will most likely go to fisheries programs.

Bill indicated that if OCEANOGRAPHER is not reactivated in 1994, there will be need for 240 Days at Sea (DAS) per year in FY95 and FY96 on UNOLS vessels. NOAA has requested that UNOLS inform them on whether or not they can support the 240 DAS per year for FY95 and FY96. They will also need to know the cost for this time.

NOAA invited UNOLS to their allocation meeting to be held in January.

DEPARTMENT OF STATE: Tom Cocke reported that things are running very smoothly in the State Department. Assistance from JOI has been very helpful. Denials of clearances are almost non-existent, but here are still some late requests. Mexico continues to be a problem. Delinquency of post cruise obligations is still a problem, but it seems to have stabilized and is easier to control. Clearances will be denied for repeat offenders.

Tom indicated that the Handbook for International Operations (Clearance Manual) is in need of some minor changes, but does not require a major update and reprinting. Marine operators keep their manuals up-to-date and clearances in line. Don Heinrichs agreed and stated that NSF has addressed clearance requirements in their letter dated 1 May 1992, Appendix XII.

UNOLS ISSUES

FOREIGN CLEARANCES FOR MULTI-PI CRUISES: Tom Cocke commented on the telemail message received by Garry Brass from Jim Murray in regard to satisfying foreign clearances for multi-PI cruises, Appendix XIII. Jim expressed concern as a project leader of the difficulties in the responsibility of fulfilling the foreign clearance requirements for all PI's

involved in large projects. The Council suggested that the principals should get together and resolve this problem. Garry Brass will respond to Jim Murray's telemail.

ARCTIC VESSEL DESIGN RESOLUTION: The UNOLS Council unanimously approved the following resolution regarding the design of an ARCTIC Research Vessel:

RESOLUTION

UNOLS strongly supports the continuation of the orderly process of marine science community participating in the design, construction and operation of an Arctic Research Vessel.

AGENCY REPORTS (continued)

OFFICE OF NAVAL RESEARCH: Eric Hartwig provided the ONR report by first announcing his departure from ONR in the fall for a new assignment as Director of the Applied Technical Division (ATD) of the Naval Research Laboratory (NRL). The UNOLS community will miss Eric and wish him well in his new assignment.

The ONR budget will be supported at its current level in spite of severe cuts in the overall Navy funding. This is a policy decision which reflects the Navy's commitment to research.

Eric provided a series of slides which are enclosed as Appendix XIV and summarized here. The information included the Ocean Science Division organization. Personnel changes provide a new air/sea interface meteorologist in the Ocean and Atmospheric Physics Division which should strengthen the oceanographic component of that discipline. The Ocean Technology section of the Ocean Engineering Division is one area that is growing. Initiatives are moving toward getting equipment operational rather than supporting major procurements. The Ocean Science Directorate research emphasis was outlined along with high priority research topics. A graphic of the ONR Fleet Plan reflects the additions of AGOR 24 and 25 to the academic fleet; AGOR-24 in late '95 and AGOR-25 in 1997. Eric noted that funding for AGOR-24 is secure in the 1993 budget and that AGOR-25 budgeting is on track. The Ocean Sciences Accelerated Research Initiatives were presented in some detail. The initiatives included research for environmental quality, the Arabian Sea, coastal atmospheric circulations, tropical cyclones, atmospheric optics and remote sensing, to name a few. Some of these initiatives are traditional while others are new, but all will need to be proven in the field. Major changes in the amount of field going science is not anticipated, but there will be a need for different types of platforms. Special platforms might include UUVs, blimps and oil rig platforms. The Navy has just built a coastal vessel of 220 feet for hydrography for use along foreign coasts.

UNOLS ISSUES (continued)

FLEET COORDINATION: Garry Brass has been active over the last several months in coordinating UNOLS fleet activity with JOI, FOFCC and NOAA. He also testified before a

congressional subcommittee, exchanged letters and attend various meetings as part of this coordination. Much of this effort was explained as part of the NOAA presentation above. The council was informed that Captain Marty Mulhurn will be replacing Captain David Yeager as the NOAA representative to the UNOLS scheduling, RVOC and possibly other UNOLS meetings. Copies of the coordination correspondence are included in Appendix XV.

COASTAL WORKSHOP: The FIC subcommittee on Coastal Oceanography under the chairmanship of Don Wright is preparing a proposal that will request funds for a workshop designed to define coastal science issues and the facilities necessary to address these issues. The workshop is to be broad in scope including national coastal needs and representing the many various coastal programs that constitute the coastal oceanographic community. Scientists and federal sponsors will be encouraged to attend. Williamsburg, Virginia will be the proposed site of the workshop which is tentatively planned for mid November of this year. Fifty participants are envisioned to attend. A steering committee of Don Wright, Tom Church, Bob Smith, Nancy Marcus, Mary Scranton, Clive Dorman and an ERF representative will help coordinate the workshop.

FLEET MODERNIZATION PLAN UPDATE: Marcus Langseth provided the Council with the FIC plans to update the Fleet Improvement Plan. The plan will be a completely new rewrite and not an update of the 1990 plan. It will project the fleet composition through 1997 and project the major science programs planned for that time frame. The plan will discuss the fleet operating costs and project these costs for five years including a forecast of funding sources. An outline for the Fleet Improvement Plan is included as Appendix XVI. Garry Brass suggested that an inventory of UNOLS ships and their capabilities should be included in the plan. A first draft will be presented at the FIC spring meeting.

CRUISE ASSESSMENT SUMMARIES: A compilation of data from the 1991 cruise assessments provided the UNOLS Office is included as Appendix XVII. These data are summarized in table and graphic form to reflect the statistics and comments from over 60% of the 1991 UNOLS cruises. Twenty percent more assessments were received than in 1990. Lost cruise days increased yet the percent of fully successful cruises remained about the same. A one year snap shot is hard to draw conclusions about a particular ship, however, several years of data sharpen the focus. The Council discussed the report and its value to the community.

MODES OF FLEET ACQUISITION AND OPERATION: Garry Brass advised the Council that the panel to study the Modes of Fleet Acquisition and Operation was slowly getting started and that he had requested cooperation from the FOFCC members to acquire the necessary information for this study.

RADIO OFFICER REQUIREMENT: Dick Pittenger is investigating the possibility of a revision of the law to bring the U.S. in line with international agreements concerning the need for radio officers aboard ships. Because this is an election year the chance of addressing the issue in Congress is near nil. Dick will keep us posted of his progress.

UNOLS REVIEW: Jack Bash presented the UNOLS Review report that had been prepared by Tom Johnson and his subcommittee. The report was accepted by the Council. The Council wanted time to study the report and make their comments. It is planned to distribute the report to the community under a UNOLS cover letter that will reflect the Council's perspective of the study. One comment the Council will include in the cover letter was in regard to Recommendation #2 of the review which addresses the UNOLS role in advising on matters of fleet size and composition. The Council indicated that it must be recognized that by the Charter, UNOLS does not exclude ships for programmatic reasons, though it may advise against. By the Charter, UNOLS only considers safety, graduate programs, etc. as criteria.

SHIP CONSTRUCTION/RENOVATION/REFIT: Bob Knox provided the Council with an update on MELVILLE. The ship is at sea operating and to date all is going well. The multibeam system has experienced some software problems, however, this appears to be corrected. The ship has not yet operated in heavy weather (as KNORR has) but is alert for possible stress conditions. Bob reported and Eric Hartwig confirmed that AGOR 24 will be built although a year has probably been lost. AGOR 25 is still in the Navy's budget.

Ken Palfrey reported on the progress of the OCEANUS class mid-life refit. ENDEAVOR is scheduled to go into the shipyard in the late fall for a 6 month, $2 million re-fit. OCEANUS will follow in the fall of 1993 and WECOMA in late fall 1993. All three ships are planning to remove the forward stacks, mast and pilot house replacing them with a stack, mast combination (MACK) and a raised pilot house. These changes plus the others planned are designed to improve the ships' science capability, increase storage and science space and increase the ships maintainability. Detailed engineering for the refit of all three ships was contracted through URI to Rodney Lay Associates. Individual contracts will be placed for construction of each ship.

APPLICATION FOR UNOLS MEMBERSHIP: The Council favorably reviewed the University of Southern Mississippi's application for membership in UNOLS, Appendix XVIII. The application will be presented for a vote at the Annual meeting.

SEA CLIFF/UNOLS: Garry Brass reported on the UNOLS review process of the NOAA/NAVY project to use 60 research days of SEA CLIFF. The science review of the proposals went very smoothly. The review panel gave NOAA a prioritized list of recommended SEA CLIFF dives and provided advice on the efficient use of the submersible using the Navy's AUV where and when it seemed most effective. This review process is

planned to be an annual event. A total of 42 dive days are planned for the fall of this year off Hawaii.

UNOLS MEMBERSHIP: The UNOLS Membership directory was reviewed by the Council as required by the Charter, Appendix XIX. Garry requested that any updates to the directory should be identified to the UNOLS Office.

UNOLS COUNCIL MEMBERSHIP: Terms are expiring for several Council members. They are:

Member	Position	Status
Garry Brass	Chair	Eligible for Re-election
Tom Johnson	Vice Chair	
Peter Betzer	Non-op Rep	Eligible for Re-election
Jeff Fox	At-large Rep	
F. Jennings	ARC, ex-officio	Appointed by Chair

Garry Brass appointed Jeff Fox to the ARC Chair. The Council concurred with this appointment. A nominating committee of Dennis Hayes (Chair), Jeff Fox and Chuck Nittrouer was named to develop the slate for the new Council members. This slate must be assembled and advertised to the members thirty days prior to voting at the Annual meeting scheduled for 17 September.

1992 ANNUAL MEETING KEYNOTE SPEAKER: The Council recommended that John Knauss be asked to be the keynote speaker at the Annual Meeting.

ALVIN MEMORANDUM OF AGREEMENT (MOA): ALVIN is operated under a Memorandum of Agreement between the three funding agencies, NSF, ONR and NOAA. This MOA is due for renewal in January 1993. The ALVIN Review Committee has prepared a paper that presents the user community and operator's recommendations as to the philosophy and content of the new MOA. These recommendations include rationale for the continued support of ALVIN, the establishment of a financial safety net for both ALVIN and the support ship and the integration of ROVs into the ALVIN operation. This paper is included as Appendix XX.

Don Heinrichs discussed NSF's intention to move the review process for deep submergence work to the December/January time frame. This will permit a longer lead time in determining those projects that are funded and therefore give the operating institution greater flexibility in scheduling the support ship. A change in the scheduling process is not anticipated for the upcoming year. Keith Kaulum expressed the ONR concern about linking the support ship and the submersible with respect to a funding safety net. These two federal agencies indicated

there was much work yet to do in agreeing to an MOA but that they would be working toward that end.

ARC'S NEW NAME AND MEMBERSHIP RECOMMENDATIONS: Jeff Fox reported on the changing role of the ALVIN Review Committee and the need to rewrite its terms of reference, membership makeup and even name change. The ARC has in the past spent the largest part of its time in reviewing ALVIN proposals and making recommendations to the funding agencies as to the applicability of the recommended science for using ALVIN. The various programs were then prioritized to aid both the funding agencies and the operating institution in their funding and scheduling decisions. Several changes seem to be occurring. First the number of proposals have dropped over the last several years. Secondly the funding agencies, in their review process, are more knowledgeable as to the applicability of the science for ALVIN. Last year NSF did not fund one of the programs recommended by the ARC. On the other hand there is a need for more science community input into the advances of technology for ALVIN. In addition, ROVs such as ARGO/JASON, are maturing to a point where they are about ready for integration into the ALVIN program. Woods Hole has been encouraged by ONR to merge their Deep Submergence Laboratory with the ALVIN group. This all suggests a need for oversight and community input into the evolution of these new tools and their integration with the manned submersibles. The composition of the ARC should include not only scientist users but those technically qualified to proceed into this new phase of operations. The following names of new ARC members were presented to the Chair for approval:

Jeff Fox, ARC Chair	Geology
Gary Taghon	Benthic Biology
Dan Fornari	Marine Geology/Towed Systems
Carl Wirsen	Technology
Hugh Milburn	Microbiology

The UNOLS Chair and Council approved the new ARC membership slate.

Jeff has recommended that the ALVIN Review Committee be renamed the Deep Submergence Science Committee (DSSC) to reflect the changing scope of the Committee's responsibilities. A new Terms of Reference will be drafted.

ALVIN FALL WORKSHOP: Jeff Fox reported on the need to hold a fall workshop in support of ALVIN. The workshop would encourage community wide support and focus on two specific areas, deep submergence technology and global deep submergence science. Jeff will propose a two day workshop in the DC area and invite talent that cross cuts disciplinary lines to provide a formal mechanism to codify the necessary elements of these two important topics. The forum will provide a proper linkage putting ALVIN and ROV users in the same room along with operators and technical support persons. As a community we will identify the important technology issues and develop plans to resolve these issues.

The second phase will be devoted to global expedition planning. Prior to the meeting "heros" will be identified who are willing to coordinate science problems in various global locations. These heros will gather projects that can be linked, then coordinate the proposal planning to provide funding agencies with a well balanced array of science. Representatives from the funding agencies should be in attendance to be in on the grass root part of the planning. Potential candidates for the global expeditionary areas would be: southern EPR-west coast of South America; far western Pacific region; Mediterranean-Black Sea-Red Sea-Indian Ocean. Other areas may also be identified. International interest has already been indicated and further foreign involvement will be encouraged. The meeting is presently scheduled for 13-14 October in Alexandria, Va.

MEETING/WORKSHOP SCHEDULE: The following is the schedule of UNOLS meetings for the remainder of the year. The dates for the Deep Submergence Science in the Next Decade Workshop (Ex-ALVIN Workshop) and the RVTEC Workshop were approved by the Council. A FIC Coastal Oceanography Workshop was discussed and approved for planning. This workshop is to be held in mid November at Williamsburg, Virginia.

MEETING	DATES	LOCATION
Scheduling	14 Sep	Washington, DC
Scheduling Review	15 Sep	Washington, DC
UNOLS Council	16 Sep	Washington, DC
UNOLS Annual	17 Sep	Washington, DC
FIC	7-8 Oct	La Jolla, CA
DSSC Workshop	13-14 Oct	Alexandria, VA
RVTEC Workshop	18-19 Oct	Washington, DC
RVOC	20-22 Oct	Lewes, DE
FIC Coastal Wshp	mid Nov	Williamsburg, VA
DSSC (ex ARC)	6 DEC	San Francisco, CA

The meeting adjourned at 1600, 16 July 1992.

APPENDIX I

UNOLS COUNCIL MEETING AGENDA
JULY 15-16, 1992
Alton Jones Campus, University of Rhode Island
West Greenwich, Rhode Island

Call the Meeting: Garry Brass, UNOLS Chair, will call the meeting to order at 8:30 a.m. on July 15, 1992.

Accept Minutes of February, 1992 Council Meeting.

COMMITTEE REPORTS

Research Vessel Operators Committee: Jack Bash will report on the progress of RVOC action items and on the upcoming RVOC meeting in Lewes, Delaware scheduled for 20-22 October. Action items include the update of the Research Vessel Safety Standards, Attachment 1.

ALVIN Review Committee: Jeff Fox, Chair will report on the ALVIN Review Committee meeting in Woods Hole. This includes the results of dive proposal reviews for 1993, new terms of reference, assessment of ALVIN comments, AII/KNORR conversion and ALVIN Archiving. The MOA update and fall workshop have been included as agenda items to be addressed in detail.

Fleet Improvement Committee: Marcus Langseth, Chair, will report on the progress of action items from the FIC February, 1992 meeting: Coastal Oceanography subcommittee progress, Arctic Research Subcommittee progress, science user group for PALMER, review of shipboard laboratory facilities and accommodations, and SOONS report. The Fleet Improvement Plan update will be addressed as a separate agenda item.

Ship Scheduling Committee: Ken Palfrey, Chair, will provide the Council with a report on the fleet's 1992 schedules and on the status of the fleet's schedule for 1993.

AGENCY REPORTS

Agency Reports: Reports for representatives of NSF (D. Heinrichs), ONR (E. Hartwig) and NOAA (W. Stubblefield) on funding outlooks and special projects. The State Department (T. Cocke) will provide an update on foreign clearance problems.

UNOLS ISSUES

Risk Management Update: Dennis Nixon will review developments in the proposal to provide a group insurance policy for the UNOLS Fleet.

Research Vessel's Technical Enhancement Committee (RVTEC) Proposal: Rich Findley will propose the formation of a UNOLS standing committee to coordinate research vessel technical enhancement (enclosure 1). He will also propose a two-day organizational meeting to be held in conjunction with the October MTS meeting in Washington DC.

Fleet Coordination: JOI, NOAA, FOFCC and UNOLS have been meeting to discuss ways of integrating portions of NOAA's ship time with the academic fleet, see correspondences and NOAA Testimony (enclosure 2). Garry Brass will review meeting events.

Fleet Improvement Plan Update: Marcus Langseth will discuss FIC's strategy for updating the Fleet Improvement Plan. This action was in response to the UNOLS Review suggesting a mandate to assess the UNOLS needs and matching these needs to facilities.

Coastal Workshop: Marcus Langseth will discuss the proposal to hold a workshop for the scientific community to identify coastal facility needs.

1991 Cruise Assessment Summaries: Summaries will be provided be Jack Bash (Attachment 2).

Foreign Clearances for multi-PI Cruises: Discussion on Jim Murray's letter regarding procedures for obtaining foreign clearances for multi-PI cruises (Attachment 3).

Modes of Fleet Acquisition and Operation: Progress on the study of Modes of Fleet Acquisition and Operation will be provided.

UNOLS Review: Jack Bash will provide the Council with the final report of the UNOLS Review, enclosure 4.

Radio Officer Requirement: Status of work to change the law concerning the radio officer position on vessels over 1600 gross tons.

Ship Construction/Renovation/Refit: An update of MELVILLE's refit will be provided. The construction status of AGOR 24 and 25 will be discussed. Ken Palfrey will provide an update of the mid-life refit for OCEANUS Class.

SEA CLIFF/UNOLS Agreement: Garry Brass will report on the SEA CLIFF proposal review held in Washington, D.C. on 18-19 May.

Application for UNOLS Membership: Review application for UNOLS membership from the University of Southern Mississippi, Enclosure 5.

UNOLS Membership: Review of the UNOLS Directory membership list, Enclosure 6.

UNOLS Council Membership: A nominating committee will be appointed by the UNOLS Chair to prepare a slate of candidates to replace those Council members completing terms. The nominating committee members will consist of three members, two from UNOLS operator institutions and one from an institution other than an operator. Enclosure 7 provides the duties of the nominating committee along with the list of committee positions to be filled. Five terms are expiring. Enclosure 8 lists all past UNOLS Council members and their years in service.

1992 Annual Meeting: Suggestions for keynote speaker and discussion topics.

ALVIN Memorandum of Agreement (MOA) Update: Jeff Fox will review ARC's philosophy and recommendations (enclosure 3) regarding the MOA. The recommendations are forwarded to the Council for endorsement. The endorsed recommendations will be sent to the NSF, ONR, and NOAA.

ARC New Name and Membership Recommendations: The ARC's revised Terms of Reference will include the additional responsibilities suggested by the Submersible Science Committee. Additionally the recommendations to the MOA will suggest a new scheduling process for ALVIN. As a result the "ALVIN Review Committee" name is no longer adequate to address the role of that committee. Jeff Fox will recommend a new name and identify candidates for the committee for approval by the UNOLS Chair. The UNOLS Chair will designate a new ARC Chair for Council approval.

ALVIN Fall Workshop: Jeff Fox will discuss plans to hold a two to three day workshop in October, 1992. One day of the workshop would be dedicated to ALVIN technology. The remaining day(s) would concentrate on coordination of efforts for an ALVIN global expedition.

Meeting/Workshop Schedule:

MEETING	DATES	LOCATION
Scheduling	14 Sep	Washington, DC
Scheduling Review	15 Sep	Washington, DC
UNOLS Council	16 Sep	Washington, DC
UNOLS Annual	17 Sep	Washington, DC
FIC	7-8 Oct	Scripps, La Jolla, CA
ALVIN Workshop	14-16 Oct *	Washington, DC
RVTEC Workshop	18-19 Oct *	Washington, DC
RVOC	20-22 Oct	Lewes, DE
ARC	6 Dec	San Francisco, CA

* Dates are tentative, Workshops are subject to approval of Council.

APPENDIX II

FLEET IMPROVEMENT COMMITTEE

ONGOING ACTIVITIES 1992

1. Revision of the 1990 Fleet Improvement Plan.

2. Revised Science Mission Requirements, new Conceptual Design Study and Preliminary Design Study for the Arctic Reseach Vessel.

3. Study of availablility and future needs of facilities for Coastal Oceanography.

4. Report on the status of accommodations and laboratory environments on UNOLS vessels.

5. Quantitative comparison of Multbeam Sounding systems.

COMPLETED ACTIVITIES:

1. SOONS report on oceanography that could be done from a nuclear submarine.

2. Estimated value of the UNOLS Fleet.

3. Evaluation of the potential of T-AGOS ships for oceanography.

Report on the the two day meeting at Glosten Marine Seattle WA, concerning the science requirements for the Arctic Research Vessel (ARV) and summary of reports on the evaluation cruise on two Russian Ice Breakers this past April.

Attendees-Knut Aagaard, Vera Alexander (2nd day), Tom Bringloe, Dirk Christensen, Dolly Dieter, Bob Dinsmore (1st day), Bob Elsner, Duane Laible, Mark Langseth, Tom Royer, John (?).

The modified plan for the conceptual and preliminary design study for the ARV:
In response to a proposal from the University of Alaska to carry out a preliminary design study for the ARV, NSF has requested the Univ. of Alaska not proceed with a preliminary design study at this time, but rather, during the coming year that the FIC/ARV subcommittee further review and modify the Science Mission Requirements (SMR) and conceptual design if necessary.

The FIC subcommittee for the ARV agrees that in view of uncertainties about the appropriate size and capabilities of an Arctic ship to meet science missions expressed by NSF and the Arctic community additional review is appropriate and consquently plans the following schedule of activities in the coming year:

1. Meeting of ARV Subcommittee to review reports from the Russian icebreaker evaluation cruise and prepare initial draft of the revised SMR (July 6-7, 1992 meeting). The draft SMR will be widely circulated in the community for comments and review.
2. A second meeting of the ARV subcommittee in August '92 to finish the SMR and review of implied dimensions and candidate hull forms for the second conceptual design study.
3. A third meeting of the ARV subcommittee in November '92 will review the conceptual design developed by Glosten Marine with broad community input, review the comparative hull form analysis and determine the directions of the ensuing preliminary design process.

The conceptual design study will include a study by the HSVA group in Germany of versions of the Thyssen/Waas concept that would meet the requirements of the Arctic RV, and also improve the ice capability to horsepower ratio.

Revised Science Mission Requirements:
At the Seattle meeting in July the subcommittee first considered those items in the SMR that would most influence the size of the ship. The requirement that has the largest impact on the size of the ship is the ability to work in areas of complete ice cover. Defining this requirement is a complex task, but in terms of new areas that become accessible with a given ice capability a chart prepared by ABS is useful. Parts of this table are abstracted on the following page.

TABLE 1: REGIONS AND PERIODS OF NAVIGATION IN ARCTIC ICE FOR SELECTED ICE CLASSES

Ice Class	Independent or escorted	Polar Waters with Multiyear Ice	
		Central Arctic	Arctic shelf
A4	Independently	July-November	Year around
A4,A3	Escorted by A5 Class vessel	Year around	year around
A4	Independently	July-November	Year around
A3, A2	Escorted by A4 or Higher Ice Class	July-November	Year around
A3	Independently	Short distance entries July-September	July-December
A2	Escorted by A3 or	Not Accessible	July-December
A2	Independently	Not Accessible	August-October

Central Arctic Basin means all the mult-year ice covered waters of the Arctic Ocean and Arctic Seas north from the boundary of the stable Arctic Ice Pack.

Arctic Shelf means Arctic waters within landfast and shear ice zones off the shore of continents archipelagoes and Greenland.

The consensus of the participants and a large number of reviewers is that the Arctic Research Vessel will require access to the Arctic defined for an A3 ice class ship. This vessel should be able to make progress through level ice 4-5' thick at 3 kts and broach ridges up to 6' sail height by ramming. Another critical requirement is high endurance (90 days). These two requirements alone dictate a ship that is at least 270' long, and possibly longer, in order to carry sufficient fuel to meet the propulsion requirements and to meet the Canadian safety and pollution regulations

According to the "book", a conventional icebreaker with A3 ice capability requires a propulsion system with 18 thousand horsepower!. It was further recognized that this ship would have to carry and service a heliocopter when on independent cruises deep into the ice. A ship with A3 ice capability can work year around on the shelf in much of the Arctic Ocean and 100 to 200 miles off the shelf from June to December. It can work deep into the Central Arctic Ocean if she is escorted by an A4 or A5 class icebreaker. A decision to aim for an A3 ice classification rather than A2 automatically requires a big increase in size.

The requirement for an A3 ice class vessel implicitly defines a large high endurance research ship according to the classification system used in the FIC Replacement and Improvement Plan documents. Consequently, the remainder of the science requirements largely follow those proposed in the SMR for UNOLS "large high endurance" ships, except for items directly related to operation in ice and extremely low temperatures.

Two activities this summer will be important with regard to these changes in requirements:
1. A study by the HSVA group on hull forms will be made in an effort to reduce the propulsion requirements to meet class A3 capability. At this point it does not seem likely that enough efficiency will be gained to reduce the size to 250' range and still have a ship with A3 ice class.

2. Glosten Marine will provide a preliminary estimate of the size of the vessel that the new requirements define.

Summary of reports from the team that went on the evaluation cruise on two Russian icebreakers.

The ship of principal interest was the CAPT. SOROKIN, which was retrofitted with a Thyssen Waas (T/W) type bow in 1990. It is a large ship LOA 130 m (426'), maximum beam is across the bow is 30.5 m (100'), and the propulsion power is 22,000 hp. The cruise on the SOROKIN went from Murmansk to Dikson (a small port on the mouth of the Yenesei River). The first day was in open water in the Barent sea where sea states of about 3 and half were encountered. The ship rode

easily with the sea and wind about 45 degrees off the starboard bow. After the first day the SOROKIN traversed a variety of ice conditions from thin first year ice and cakes to 10/10 cover up to 2 m thick with low ridges.

Open water performance: The open water performance was not thoroughly tested, but based on verbal reports of the Captain the roll characteristics of the SOROKIN were greatly improved by addition the T/W bow; however, for headings within 60 degrees of the sea, slamming becomes severe with wave heights of 12' or greater. In such conditions the SOROKIN has to tack to make progress into the wind. Head seas also produce a great deal of spray which can lead to icing in the bow.

The return from Dikson was on the NICOLAYEV which is a sister ship of the SOROKIN, but she was retrofitted with a conical bow. The bow angle on the NICOLAYEV is 18 degrees and reports are that she slams terribly in a head sea. Reportedly, she suffered serious damage due to slamming on one occasion.

Performance in the ice: In level 10/10 ice 3 to 4' thick the SOROKIN made steady progresss at 4 knots, but usually came to a smooth stop when ridges were encountered. The ridges, which appeared to be quite small required ramming 2 to 6 times to broach them. The passage from Yuforski Strait to Dikson took 3 days. There were no problems backing or maneuvering the ship in the ice. The majority opinion of participants on the cruise found that the ice breaking capability of the SOROKIN was below expectations, but superior to that of comparable icebreakers with a conventional bow form.

The SOROKIN cut a clean channel through the ice, but it filled with brash ice about one ship length astern. One disturbing tendency was that the bow caused the ship to turn into heavier ice when in flows, and thus there is a tendency to accummulate floating ice cakes in front of the bow. The bow area of the NICOLAYEV has been sheathed in stainless steel along the water line to decrease friction between the ice and hull. The behavior in ice of the NICOLAYEV is judged to be comparable to that of the SOROKIN, however because the crew on the NICOLAYEV was eager to get home from a 6 month stint at sea, she mainly followed the lead opened by the SOROKIN back to Murmansk and there was little chance to see how she performed in ice first hand .

During the cruise rendezvous were made with three of the Nuclear Ice Breakers which were impressive ships (Class A5).

Additional comments:
Both the SOROKIN and NICOLAYEV were specifically designed to keep river traffic flowing and thus not optimized for open ocean work.

The wide beam of the SOROKIN 30.5 m may have affected the efficiency of the T/W bow. Two clearing bodies inboard of the reamers had been added to depress the cut ice down near the centerline.

The HSVA people emphasized that the T/W bow is a concept and the exact configuration might vary according to the mission of the ship.

An attractive option:

During the course of the Seattle meeting there was growing concern that the ship being defined by the revised SMR would be too large and expensive for NSF's pocketbook both in terms of capital and operating costs. There was also concern that the ship would grow to a size comparable to that the Coast Guard is proposing for their "research ice breaker".

A possible solution to this potential problem could be to form a partnership with the Coast Guard and build two Arctic ships that would be designed and built to work together a large part of the time, and that the two ships together would be able to operate in any Arctic ocean area during the summer and fall. The proposed solution is for the Coast Guard to build a Class A4 or even A5 Arctic ice breaker and for NSF to build a research ship that is 250 to 270' long that would have Ice Class A2 capability based on her propulsion, but constructed with an A3 or A4 hull so that she could survive being beset.
Some of the advantages of such a partnership would be:

1. It would give the US a second-to-none research capability in the Arctic that would enhance the research capability of the academic community, Coast Guard, USGS, MMS and NOAA.
2. It is always prudent to send at least two ships on cruises that penetrate deep into solid multiyear ice.
3. Only one of the ships, the larger icebreaker, would have to carry an heliocopter. The smaller research ship would only need a landing pad for helo transfers.
4. The smaller research ship could probably be designed to be more seakindly in open sea transits and operations, and she could work independently in area of thin or patchy ice cover as well as open ocean less expensively than a ship with full A3 ice classification.

5. Deep ocean drilling in the Arctic Ocean is being planned. An A4 or A5 class icebreaker will be required to escort the drill ship to many sites in Arctic areas. The proposed Coast Guard ice breaker would be able to do this job.

Mark Langseth
July 1992

1. July 6-7- ARV Subcommittee meeting to draft revised Science Mission Requirements for ARV.

2. August '92 ARV Subcommittee meets to complete the Science Mission Requirements and initiate a second conceptual design study by Glosten Marine.

3. November '92- Review the new conceptual design and comparative hull form analysis and set directions for the preliminary design study.

Ice Class	Independent or escorted	Polar Waters with Multiyear Ice	
		Central Arctic	Arctic shelf
A4	Independently	July-November	Year around
A4,A3	Escorted by A5 Class vessel	Year around	year around
A4	Independently	July-November	Year around
A3, A2	Escorted by A4 or Higher Ice Class	July-November	Year around
A3	Independently	Short distance entries July-September	July-December
A2	Escorted by A3 or	Not Accessible	July-December
A2	Independently	Not Accessible	August-October

CAPITAN SOROKIN

Open water performance:

•According ot the Captain the roll characteristics of the SOROKIN were greatly improved by addition of the T/W bow.

•For headings within 60 degrees of the sea, slamming becomes severe with wave heights of 12' or greater.

•Head seas also produce lots of spray and icing on the bow.

Performance in the ice:

•Made steady progresss at 4 kts in level 10/10 ice 3 to 4' thick

•Stopped by small ridges that required ramming 2 to 6 times to break through.

Backing and maneuvering in the ice were excellent.

Cuts a clean channel through the ice which filled with brash ice about one ship length astern.

Tends to accummulate floating ice in front of the bow.

This summer:

1. HSVA study of Thyssen/Waas hull forms that can reduce the propulsion requirements to meet class A3 capability.

2. Glosten Marine will provide a preliminary estimate of the size of the vessel that the new requirements define.

Evaluation of Accommodations and Laboratory Environments on UNOLS ships

Emphasis is on those features in staterooms or laboratories that make a difference in convenience, comfort and efficiency.

1. Questionnaire has been prepared to distribute to scientists who have been PI's on two or more sips in the recent past.

2. On board inspection of ships as opportunities present themselves. (Dinsmore).

APPENDIX III

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

RSMAS-MGG, Univ. of Miami
4600 Rickenbacker Cswy
Miami, FL 33149

Hon. Barbara Mikulski, Chair
Subcommittee on VA, HUD, and
Independent Agencies
Committee on Appropriations
Room 320, Hart Senate Office Building
United States Senate
Washington, DC 20510-2003

14 July 1992

Dear Madam Chair:

I am writing to respond to a document which appears to be circulating on capitol hill regarding the efforts of the University-National Oceanographic Laboratory System (UNOLS) to plan for the construction of an ice-breaking arctic research vessel. This document prepared by Chouest Offshore personnel misrepresents our position and UNOLS feels called upon to comment. UNOLS is an association of 56 member oceanographic research institutions operating 27 research vessels for the purpose of supporting research at sea for the national oceanographic community. Since UNOLS has just celebrated its twentieth birthday, it represents approximately 500 years of ship operations experience. UNOLS operations are rated as among the safest and most cost effective in the world.

The first and most unfortunate claim in the Chouest memo is the statement that the UNOLS vessel Alpha Helix, operated by the University of Alaska, is operated in an unsafe manner. This is simply not true. UNOLS maintains a strict set of safety standards and Alpha Helix is regularly inspected for compliance with those standards. In addition, Principle Investigators (PIs) report to UNOLS on the conduct of every cruise, as do the PIs on every UNOLS vessel, including the conduct of the crew and the safety of the ship. We have had no reports of unsafe operation on Alpha Helix.

The University of Alaska in concert with the support of the UNOLS community and following the standard procedures of the UNOLS community in new ship design and acquisition has requested funds from the National Science Foundation (NSF) for preliminary design studies. Much community input has gone into this design already. The UNOLS Fleet Improvement Committee produced a set of scientific mission requirements, sponsored conceptual design studies from several builders, reported to the community on their deliberations and solicited substantial feedback from the community on the design. The Chouest memo implies that there is some sort of "cabal" organized to design this ship and they are more or less correct, that cabal is the marine science community. The Chouest memo seems to condemn the selection of a primary designer but this is the standard method of UNOLS ship design studies after the initial competition at the conceptual design stage.

The Chouest memo condemns a particular design, the Thyssen Waas bow, as inappropriate and unsuccessful. This opinion is based upon what appear to be represented as independent reports from Dr. A. Ierusalemsky and Mr. Henry Kennedy. Both of these individuals have a commercial connection with Chouest Offshore and are not independent authorities. In addition I have been informed that Dr. Ierusalemsky's report is contradicted by several sources including the Murmansk Shipping Company. Personnel from NSF, the UNOLS Fleet Improvements Committee Arctic Research Vessel Subcommittee, Glosten Associates Inc and the U.S. Coast Guard travelled to Russia and Germany to investigate innovative hull forms. The UNOLS sub-committee on Arctic Ship Design has reported to the Fleet Improvement Committee on their trip to Russia and their review of the Performance of the Thyssen Wass bow; their findings contradict the statements in the Chouest memo. Clearly it is in the interest of the Arctic Ocean science community to investigate new technologies which may make their work more efficient and effective. Chouest Offshore dislikes the Thyssen Wass bow design because they did not incorporate it in the design of the Nathaniel Palmer and would not be able to include it in an arctic research vessel if they were selected to build one.

The Chouest memo goes on to discuss UNOLS in relatively unflattering terms. As Chair, I take exception to these statements and I believe that the facts do not agree with the memo. The memo is indeed correct in its adverse comments on the difficulties of the conversion of the Research Vessels Knorr and Melville. Unfortunately, these conversions did over run their budgets and timetables. They were, however, not the result of any UNOLS process. The design and specifications for these conversions were dealt with exclusively by the operating institutions and the Department of the Navy, the ship owners. The comment on the construction of AGOR-23, now known as the RV Thomas Thompson, is simply incorrect, the ship was neither over budget nor late in delivery. In this case, UNOLS participated in the design of the vessel from start to finish and beyond. UNOLS supplied to the Navy our statement of scientific mission requirements for large, high-endurance oceanographic vessels and the five conceptual design studies commissioned by UNOLS. UNOLS supplied reviewers for the selection of the operating institution and the preliminary and final designs and commissioned a subcommittee of the FIC to look at the final plans and make recommendations for subsequent construction changes on AGORs 24 and 25. Tomas Thompson is now in operation and is considered to be the state of the art in large oceanographic vessels; she is considered a great success by the oceanographic community. UNOLS is both efficient and experienced in the design of research vessels, we are probably the most experienced group in the world as we bring to the process the expertise of 500 ship years of operations and several hundred scientists, technicians and students who have used and commented on UNOLS vessels.

The memo also make some self serving comments about the advantages of a commercial operator for ships which operate in remote areas. In spite of the comments in the memo there is no validity to this conclusion. I have just had the opportunity to be present at the return of the RV Atlantis II to the Woods Hole Oceanographic Institution after a deployment of 894 days away from her home port. Long deployments of Atlantis II and other UNOLS vessels are not uncommon and operations in distant parts of the world from exotic ports of call are the rule rather than the exception for the large UNOLS vessels. In fact, the NSF has studied the question of commercial lease options and included the results in a report to your committee. What the NSF study did show was that, under some circumstances, the charter of a

commercially operated vessel may be financially advantageous if the charter is for a length of time substantially shorter than the life of the ship. For a ship which will spend its working life on university based research, purchase and UNOLS operation were found to be superior. As this represents the hope of the community for any new arctic research vessel, clearly purchase is the superior option in this case. The financial terms of the Nathaniel Palmer arrangement do not appear to be particularly advantageous. After paying for the operation of the vessel for ten years and paying off Chouest's construction loan, the NSF will still have the option to buy the vessel from Chouest at the original construction price. This is like paying gas and oil bills and monthly car payments for four years only to find that at the end of that time you can buy the car at the original, new-car price. Its pretty hard for me as a tax payer to find the benefit in that. To make the same arrangement for the arctic will be unjustifiably costly.

Why has this intemperate memo been circulated by Chouest Offshore? Clearly, it has been prepared by a single commercial operator in hopes of destroying the community based effort to design and build a new, modern arctic research vessel which will meet community needs. It takes the patronizing view that the marine scientists in the 56 UNOLS institutions and their colleagues in other research centers around the United States are not competent to design, in concert with a reputable marine architect, an effective and efficient vessel. This is not only wrong, it is an insult to the researchers who will sail in the new vessel. There is no excuse for allowing commercial motives to overturn the community based planning process which is proceeding under the auspices of UNOLS and I hope that you and the members of your committee will disregard the Chouest memo and its false and misleading claims. It is even worse for a commercial operator to attempt to force the Congress into a pork-barrel attack on the NSF budget. This is perhaps the greatest danger in the entire process and I urge you to reject it as unsound in principle.

I regret that it has been necessary to communicate with you on this unpleasant matter. Please feel free to call on UNOLS at the addresses shown below with any questions you may have concerning this matter.

Sincerely,

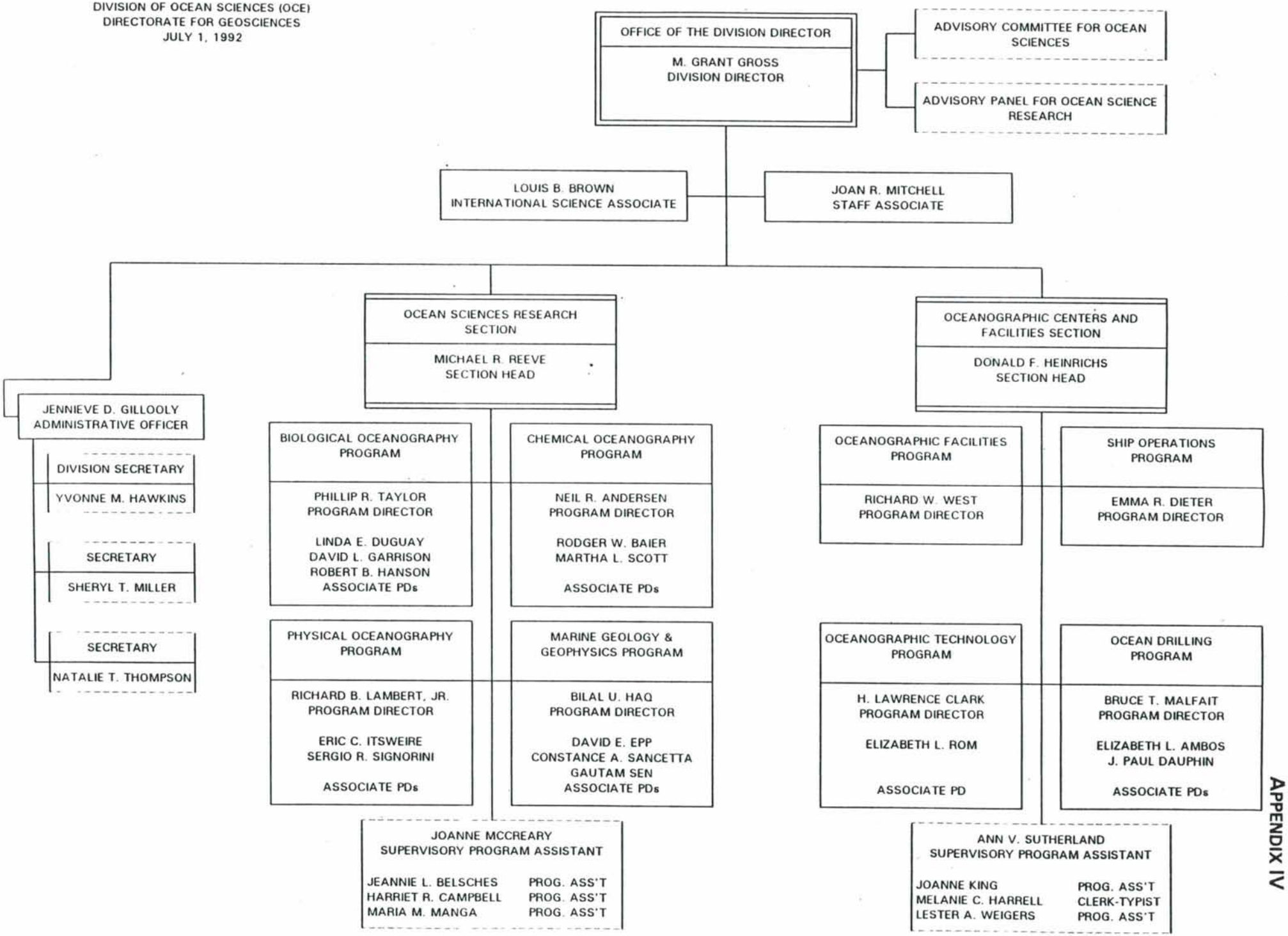
Garrett W. Brass
Chair, UNOLS

Dr. Garrett W. Brass, Chair
University-Oceanographic Laboratory System
Rosenstiel School of Marine and
Atmospheric Sciences
4600 Rickenbacker Causeway
Miami, Florida 33166

Mr. John F. Bash, Executive Secretary
University-Oceanographic Laboratory System
Post Office Box 392
Saunderstown, Rhode Island 02874

APPENDIX IV

DIVISION OF OCEAN SCIENCES (OCE)
DIRECTORATE FOR GEOSCIENCES
JULY 1, 1992



APPENDIX IV

APPENDIX V

ACADEMIC RESEARCH VESSELS 1985–1990
(OSB, 1982)

Findings

- Overview. Cardinal belief is that the U.S. style of doing deep water oceanography primarily through the academically operated research fleet is unquestionably the best in the world. Results largely because management of the fleet is in the hands of major academic and research institutions. Of prime importance to continue operations that do not separate the sea–going oceanographers from the responsibility for management of research vessels.

- Scientific needs. Research projections call for an academic fleet larger than present one. Funding projections indicate this larger fleet would be underfunded by almost 50 percent in late 1980s.

- Cost projections. If additional funds not forthcoming, UNOLS fleet of general purpose vessels must be reduced through layups, retirements, or diverting vessels to special purposes that may attract additional funds. Economic savings of consolidation of the academic fleet into fewer operating centers appear to be modest. Consolidation would have deleterious effect of further decoupling the scientific user from the vessel operations.

ACADEMIC RESEARCH VESSELS 1985–1990

Findings (cont.)

- Agency support. Use of ships can be reduced by insufficient funding for research as surely as by insufficient funding for ship operations per se. Balance must be readjusted as the state of science and national needs evolve. Ratio of ship operations to research is much higher in NSF/OCE than in ONR, both in recent past and as projected for future. NSF funds have consistently supported the operations of the UNOLS fleet to an extent that other agencies have been able to use these vessels selectively.

- General purpose ships. Present academic fleet is believed adequate for research requiring general purpose vessels during later part of decade. Smallest ships cannot conduct open ocean research but large ships can conduct most coastal research and are required in the case of large–scale cooperative programs.

- Special purpose ships. One or more vessels dedicated primarily to underway seismic profiling and to studies of the benthic boundary layer requiring deep towing and deployment/recovery of large bottom instruments are needed. 1000 to 2000 scientist days per year on ice–strengthened ships in each polar ocean could be used. Need for capability for large nets and trawls appears insufficient to warrant dedicated ship.

ACADEMIC RESEARCH VESSELS 1985–1990

Findings (cont.)

- Use of non–academic ships. Academic use of non–academic ships is increasing. This issue requires further study. Federal operation of the academic fleet is undesirable because federal research ships have higher operating costs than comparable UNOLS vessels and would further separate users of academic vessels from the management of them.

- Information base. Improved management requires the systematic collection and analysis of data necessary for making critical decisions. UNOLS group scheduling seems to be an effective way of enhancing the efficiency of ship use.

Selected Recommendations

- Maintain an academic research fleet.

- Predictive models of layup savings be used as guidelines for allocating funds and ship time during periods of funding shortfall.

- U.S. should begin at once the construction of a new polar research vessel.

- An improved communication system and information pool should be operated by UNOLS and financially supported by NSF and ONR.

- Requirements for and costs of requested ship time should be explicit in research proposals.

ACADEMIC RESEARCH VESSELS 1985–1990

Quotes without comment

"The most difficult task for the steering committee was to obtain complete and realistic projections for the future, both for the state of marine science and its financial support."

"ONR funded approximately 20 percent of the UNOLS ship time during 1970–1980. This contribution steadily decreased during this period from 34 percent in 1970 to 12 percent in 1980."

"...unlike NSF, one of whose goals has been to maintain a capability for U.S. sea–going research, ONR's goal usually has been to support only the specific amount of time needed for completion of specific research. The approach taken by ONR might not have been feasible without the commitment to 'basic' support of the fleet by NSF."

"Small savings could be realized by consolidating the fleet so that fewer institutions operate the vessels; the savings per ship increase in absolute amount with increasing size of ship, but the savings relative to the operating cost of a given size of vessel are independent of the vessels size. The savings are real, but may be economically trivial."

ACADEMIC RESEARCH VESSELS 1985-1990

Quotes (cont.)

"The total budget available for operation of the UNOLS fleet is currently about 90 percent of that required for full operation."

"At present, the average oceanographer requires, or at least is able to obtain, less ship time than did the statistical equivalent in earlier years."

"There are several arguments for maintaining some number of large vessels readily available to academic oceanographers. ...The U.S. Navy still has a worldwide, open-ocean mission which requires research... Increasing scientific and national interest in interactions between the ocean and atmosphere continues to require observations made under conditions where those interactions are hazardous for small vessels. ...academic scientists now frequently work together in large interdisciplinary projects which require enough space that researchers from several disciplines be able to work on the same ship at the same time."

"Another way of assessing future needs for research vessels is to examine recently planned or evolving scientific programs which are national (or international) in character... Often absent in such reports, however, is a philosophy of limited financial resources... Also absent, in most cases, are analyses of the ship time required to complete the programs."

"Academic scientists like to believe that great ideas and opportunities for research are just around the corner, and they are occasionally correct in this belief."

APPENDIX VI

ACADEMIC FLEET OPERATIONS SUPPORT*
(1990–1992)

UNOLS TOTAL	Actual 1990	Estimate 1991	Estimate 1992
NSF	21,188	27,151	35,835
NOAA	2,535	2,109	4,339
ONR	5,545	5,268	4,225
OTHER	2,514	2,990	3,015
INST	2,504	2,061	2,475
	$34,286	$39,579	$49,889
JOI INST			
NSF	16,484	21,111	30,095
NOAA	1,275	702	772
ONR	5,297	5,016	4,136
OTHER	1,405	1,431	941
INST	1,016	1,008	1,419
	$25,477	$29,268	$37,363
OTHERS			
NSF	4,704	6,040	5,740
NOAA	1,260	1,407	3,567
ONR	248	252	89
OTHER	1,109	1,559	2,074
INST	1,488	1,053	1,056
	$8,809	$10,311	$12,526

* Source: NSF Ship Operations Proposal (1992)/March 1992 versions

ANNUAL OPERATION COSTS BY SHIP CATEGORY (1992)
(HEINRICHS CLASSIFICATION)

LARGE SHIPS	
MEVILLE/WASHINGTON	$4.1 M
KNORR, THOMPSON	265 days
EWING, ATLANTIS II	
REGIONAL/OPEN OCEAN	
POINT SUR,ALPHA HELIX	$1.3 M
CAPE HATTERAS	178 days
LOCAL	
PELICAN, LONGHORN	$0.3 M
LAURENTIAN, BLUE FIN	107 days
BARNES, CALANUS	

INTERMEDIATE SHIPS*	
MOANA WAVE,VICKERS	$2.5 M
OCEANUS, WECOMA	254 days
ENDEAVOR, ISELIN	
NEW HORIZON, GYRE	
REGIONAL	
SPROUL, HENLOPEN	$0.9 M
WEATHERBIRD	201 days
JSL/ROV	
SEWARD JOHNSON	$1.4 M
EDWIN LINK	182 days

* GYRE excluded from intermediate ship average owing to short schedule

1992 ACADEMIC FLEET OPERATIONS SUPPORT *
(HEINRICHS CLASSIFICATION)

SPONSOR	LARGE SHIPS	INTERMEDIATE SHIPS	REGIONAL/OPEN OCEAN
NSF	17,930	11,943	4,811
NOAA	742	1,863	39
ONR	1,139	2,876	90
OTHER	167	730	1,621
INST	588	633	165
	$20,566	$18,045	$6,726

SPONSOR	LOCAL SHIPS	JSL/ROV SHIPS	ALVIN SUPPORT**	
NSF	714	437	~~889~~	1,040
NOAA	275	1,420	~~491~~	246
ONR	120	–	66	160
OTHER	132	366	–	155
INST	482	608	–	
	$1,723	$2,831	~~$1,446~~	1601

* Source: NSF Ship Operations Proposals (1992); March 1992 versions

** under negotiations

ACADEMIC FLEET COST PROJECTIONS
(1993–1998)

Adjustments for optional operations: 1992 base

• Large ships	270 days	$4.2 M
• Intermediate ships	260 days	$2.6 M
• Regional/open ocean	230 days	$1.7 M
• Regional ships	200 days	$0.9 M
• Local ships	140 days	$0.4 M
• JSL/ROV ships	180 days	$1.4 M

Assumptions: Conventional fleet model (NSF/ONR)

- 4% annual inflation adjustment 1993 to 1998
- Three new large ships

– AGOR – 24	1995 operations
– Arctic research vessel	1996 operations
– AGOR – 25	1997 operations

- Three ships retired

– ALPHA HELIX	no 1996 operations
– MOANA WAVE	no 1998 operations
– ATLANTIS II	no 1997 operations

ACADEMIC FLEET COST PROJECTION
(1993–1998)

Conventional fleet model (NSF/ONR): with 4% inflation (in millions of dollars)

SHIPS	1993	1994	1995	1996	1997	1998
Large	22.0	22.9	28.6	35.0	36.4	37.9
Intermediate	21.6	22.5	23.4	24.3	25.3	23.0
Regional/open ocean	5.4	5.6	5.8	4.0	4.2	4.4
Regional	2.7	2.8	2.9	3.0	3.1	3.2
Local	2.4	2.5	2.6	2.7	2.8	2.9
JSL/ROV	3.0	3.1	3.2	3.3	3.4	3.5
	$57.1	$59.4	$66.5	$72.3	$75.2	$74.9
Constant 1993 dollars	$57.1	$57.1	$61.5	$64.1	$64.1	$61.4

Research project increases required for operations

SHIPS	1993	1994	1995	1996	1997	1998
Large	25	–	270	270	–	–
Intermediate	161	–	–	–	–	(260)
Regional/open ocean	156	–	–	(230)	–	–
Regional	(3)	–	–	–	–	–
Local	198	–	–	–	–	–
JSL/ROV	(4)	–	–	–	–	–
	533 days	–	270 days	40 days	–	(260) days
Cumulative from 1992	533 days	533 days	803 days	843 days	843 days	583 days
Percent change from 1992 (5381 days)	9.9%	9.9%	14.9%	15.7%	15.7%	10.8%

ACADEMIC FLEET COST PROJECTIONS
(1993-1998)

Short term issues/items

- Operations funds in 1992 estimated at $49.9 million.
  Unlikely $57.1 M will be available in 1993.
  (NSF operations increase request is $3.8 M.
- NSF requirements for large ship time for global change programs decreases in 1993 and 1994, i.e., JGOFS Equatorial Pacific experiment uses one ship year in 1992. Next major experiment planned for 1994/95 in Indian Ocean; WOCE planning one year gap between Pacific hydrographic program and Indian Ocean.
- NOAA projects increased use of academic ships in 1993 and 1994.
- ALVIN/ATLANTIS II operations evolving. Replace ATLANTIS II with KNORR in 1993/94??

Long term issues/items

- Science capabilities, fleet profile, number of ships, geographic balance, etc., needed to meet funded research requirements.
- Capital funding for continued upgrade, modernization and replacement of research fleet in smaller size classes.

ACADEMIC FLEET COST PROJECTIONS
(1993–1998)

Alternate fleet model: submersible science

Premise

- Excess large ship capacity in 1993 – 1995 time frame.
- Science/operating budgets unable to fully use existing ships.
- Woods Hole proposal for AGOR – 24/AGOR – 25 accurate.

  - ATLANTIS II is mission obsolete and is approaching platform obsolescence. maintenance costs are becoming excessive. ATLANTIS II is 28 years old.
  - Retire ATLANTIX II and transfer its submersible support equipment to KNORR. Costs paid for by sale of ATLANTIS II.
  - Promptly achieves the numbers and mix of ships set forth in UNOLS and Federal Agencies Long Range Plans.
  - Contributes materially to an affordable fleet. Annual operating cost of ATLANTIS II estimated at $4.2. million.

Action

- Replace ATLANTIS II with KNORR in 1993–1994
- Revitalize NECOR. Institutional coordination (WHOI, LDGO, URI) of four ships--EWING, KNORR, ENDEAVOR and OCEANUS
- Phase–in AGOR – 25 in 1997 time frame.

ACADEMIC FLEET COST PROJECTIONS
(1993–1998)

Alternate fleet model: submersible science (cont.)

Issues

- WHOI proposes ATLANTIS II/KNORR transition coincident with AGOR – 25 acquisition. Impact of early change.
- EWING only large general purpose ship with home port in Atlantic from 1994 to 1997. Atlantic focus??
- ONR/NSF cooperation required.

Cost projections: transition last quarter 1993/first quarter 1994. Constant 1993 dollars.

	1993	1994	1995	1996	1997	1998
• Large ships	$20.9 M	$17.6 M	$22.0 M	$26.4 M	$30.8 M	$30.8 M
• Fleet total	$56.0 M	$52.7 M	$57.1 M	$59.7 M	$64.1 M	$61.4 M

- Cumulative saving 1993–1998––$14.3 Million

Comments

- Other models possible. NOAA role?
- Neither model addresses
  - no research vessel in Hawaii post–1997.
  - static view toward smaller (coastal) ships.
- Both models assume continued growth in support for field programs by UNOLS fleet. 14.5 percent by 1997.

APPENDIX VII

NSF FY 1993 BUDGET REQUEST

NSF

- Total Request is $3.027 Billion
- Increase of $453.5 Million or 17.6%

	Totals	Increases
Research and Related Activities	$2211.5 M	$336.5 M or 17.9%
U.S. Antarctic Program	163.0 M	75.0 M or 85.2%
Education and Human Resources	479.5 M	14.5 M or 3.1%
Academic Research Facilities & Inst.	33.0 M	no change
Critical Technologies Institute	1.0 M	new program
Salaries, Expenses, IG Office	139.0 M	26.5 M or 23.6%

- Major Research Initiatives

	Totals
Advanced Materials and Processing Program	$318.5 M
High Performance Computing and Communications	262.0 M
Biotechnology	205.6 M
U.S. Global Change Research Program	162.5 M
Multidisplinary Research on the Environment	118.0 M
Advanced Manufacturing	104.5 M

- Education and Human Resources

Precollege Programs	$286.0 M
Undergraduate Programs	146.0 M
Women, Minority, Other Programs	118.0 M
Expt. Program for Competitive Research	20.0 M

NSF FY 1993 BUDGET REQUEST

Geosciences (w/o Antarctic Program)

- Total Request is $472.4 million
- Increase of $68.0 million or 16.8%

	Total	Increases
Atmospheric Sciences	$151.9 M	$24.8 M or 19.5%
Earth Sciences	88.1 M	11.9 M or 15.6%
Ocean Sciences	206.4 M	27.6 M or 15.4%
Arctic Research Program	26.0 M	4.7 M or 22.0%

- Major Increase Categories

	Increases
Disciplinary Research	$40.2 M
Facilities	25.5 M
Education & Human Resources	2.3 M

- Major Program Increases

Global Change Programs	44.0 M
Biotechnology	1.9 M
High Performance Computing	1.7 M
Environmental Studies	5.3 M
Hydrological Science (EAR)	2.5 M

- Major Facility Increases

Research aircraft	2.8 M
Arctic research ship	2.8 M
Global seismic network	2.0 M

NSF FY 1993 BUDGET REQUEST

Ocean Sciences

- **Total Request is $206.4 million**
- **Increase of $27.6 million or 15.4%**

	Total	Increases
Ocean Science Research Support (OSRS)	$109.3 M	$18.5 M or 20.3%
Oceanographic Centers & Facilities (OCFS)	59.3 M	7.7 M or 14.9%
Ocean Drilling Program (ODP)	37.8 M	1.4 M or 3.9%

- **Budget Increase Highlights**

Global Change increase of $21.2 M to $64.1 M 49.4% increase with focus on research and facilities for WOCE, JGOFS, GLOBEC and TOGA-COARE.

Enhanced support for biotechnology research involving the establishment of two small marine biotechnology centers with other NSF divisions. ($1.6 M)

Enhanced support for interdisciplinary projects on ecosystems subject to environmental change. ($0.75 M)

Support for engineering design and initial construction contract for an ice-capable Arctic research vessel ($2.75 M)

All other activities ($1.3 M).

OCEAN SCIENCES DIVISION

	Actual FY 1990	Actual FY 1991	Estimated FY 1992	Requested FY 1993
Ocean Sciences Division	$147.4 M	$164.8 M	$178.8 M	$206.4 M
Ocean Sciences Research	72.9 M	82.1 M	90.8 M	109.3 M
Ocean Drilling Program	32.0 M	35.0 M	36.4 M	37.8 M
Oceanographic Facilities	42.5 M	47.7 M	51.6 M	59.3 M

OCEANOGRAPHIC FACILITIES DETAIL

Operations				
Ship Operations	$ 22.4 M*	$ 26.7 M*	$ 30.2 M*	$ 34.0 M*
ALVIN, Aircraft, etc.	1.4 M	1.8 M	1.3 M	1.5 M
Marine Techs	3.7 M	4.0 M	4.3 M	4.6 M
	27.5 M	32.5 M	35.8 M	40.1 M
Infrastructure				
Science Instruments	$ 1.8 M	$ 1.9 M	$ 4.0 M	$ 4.5 M
Shipboard Equipment	2.1 M	2.2 M		
Ships, Upgrades	3.4 M	3.7 M	3.3 M	6.1 M
UNOLS, Misc.	0.6 M	0.6 M	0.7 M	0.7 M
	7.9 M	8.4 M	8.0 M	11.3 M
Technology, Centers, Reserves				
Technology Development	$ 3.5 M	$ 4.2 M	$ 4.5 M	$ 5.0 M
AMS Center	1.8 M	1.7 M	1.5 M	1.1 M
Cross Directorate/Reserves	1.8 M	0.9 M	1.8 M	1.8 M
	7.1 M	6.8 M	7.8 M	7.9 M

* *Plus $1.0 M from ODP (1990), $1.6 M (1991 and 1992) , $1.5 M (1993)*

APPENDIX VIII

DRAFT

8 June 1992 (Rev 7)

POLICY ON OCE-SUPPORTED SHIP-BOARD ACTIVITIES

SUMMARY

Projects funded by the National Science Foundation's Division of Ocean Sciences (OCE) will be supported only on ships that meet the Research-Vessel Safety Standards* of the University-National Oceanographic Laboratory System (UNOLS).

INSPECTION PROCEDURES:

UNOLS vessels are inspected every two years through the NSF-funded Ship Inspection Program. Navy-owned ships are inspected by the U.S. Navy Board of Inspection and Survey (INSURV) and may be inspected by the NSF Ship Inspection Program, as mutually agreeable with the Office of Naval Research (ONR), in order to maintain parity with other UNOLS vessels. Based on the inspection process, the vessel will be found to be in compliance or not in compliance with UNOLS Research-Vessel Safety Standards. If not in compliance, the vessel will not be utilized to support NSF projects until the deficiencies contributing to the non-compliance have been corrected.

For non-UNOLS ships, OCE accepts the results of inspections carried out under the aegis of the U.S. Navy Board of Inspection and Survey (INSURV), the National Oceanic and Atmospheric Administration (NOAA), and U.S. Coast Guard Certificates of Inspection for Small Passenger Vessels (sub-Chapter T#) and Oceanographic Research Vessels (sub-Chapter U#). All UNOLS vessels over 300 gross tons must display a current U.S. Coast Guard Certificate of Inspection.

When OCE-supported projects require chartering of a non-UNOLS vessel, the marine superintendent (or designated qualified individual) of the ship-chartering institution will inspect the proposed vessel and certify in writing to OCE's Ship Operations Program that the vessel meets UNOLS Safety Standards.

Vessels operated by foreign government agencies may be used for NSF-supported projects, providing that NSF or the ship-chartering institution has determined that the vessels in question are operated and maintained in compliance with standards comparable to the UNOLS Safety Standards.

NSF-CONTRACTOR SHIP INSPECTIONS

Immediately following the NSF-supported inspection, a vessel-condition report is prepared which states whether the vessel meets UNOLS Research-Vessel Safety Standards. Deficiencies identified during inspections will be classified by the inspection team according to their importance for safety of operations.

The NSF contractor Inspection Team will provide an exit briefing (immediately following the inspection) summarizing inspection results to the ship-operating institution, including the vessel's status with respect to UNOLS Safety Standards. When a vessel is found to be out of compliance, the inspection team will indicate to the operating institution what must be done to bring the vessel into compliance and the cognizant NSF program officer(s) will be notified immediately.

NSF ACTION:

In cases where a vessel is found to be not in compliance with the UNOLS Research-Vessel Safety Standards, the ship-operating institution will be asked to report immediately in writing to the cognizant NSF program officer their plans and schedule for bringing the ship into compliance with UNOLS Research-Vessel Safety Standards.

The ship-operating institution should notify the cognizant NSF program officer when the deficiency has been corrected. NSF will then decide if and when the ship can be used in support of NSF-funded science projects.

REPORTS:

The Inspection Team will provide an initial exit briefing report of inspection to the ship-operating institution. This will address the vessel's status with respect to UNOLS Research-Vessel Safety Standards.

The Inspection Team will submit to NSF a full report of the inspection results within one month of completion of the inspection. The report will be forwarded by NSF to the ship-operating institution within two weeks following receipt of the report.

The ship-operating institution shall respond to the inspection report within six weeks after receipt of the report. The written response shall include plans and schedule to remedy all deficiencies.

Six weeks before the next scheduled NSF inspection, the ship-operating institution shall send a report on its responses to the previous ship inspection to NSF/OCE for use in the pending inspection.

REFERENCES

*UNOLS Research-Vessel Safety Standards are available from UNOLS, Box 392, Saunderstown, RI 02874

#Provide references to the document

APPENDIX IX

APPENDIX IX

Send a copy of this form to the ship operator

Addresses of ship operators and information on available vessels may be obtained from the UNOLS office or from NSF

Ship Operations
National Science Foundation
1800 G. St. NW
Washington, DC 20550
Tel: (202)357-7837
FAX: (202) 357-7621

UNOLS Office
University of Rhode Island
P.O. Box 392
Saunderstown, RI 02874
Tel: (401) 792-6825
FAX: (401) 792-6486

Sent to:
- ❑ NSF
- ❑ UNOLS Office
- ❑ Ship Operator

Special Instructions

Year:

Proposals requiring ship time must be received by the May 1 Target Date to be considered for scheduling in the following calendar year. Ship schedules for the calendar year are finalized by October of the *previous* year.

Clearances:

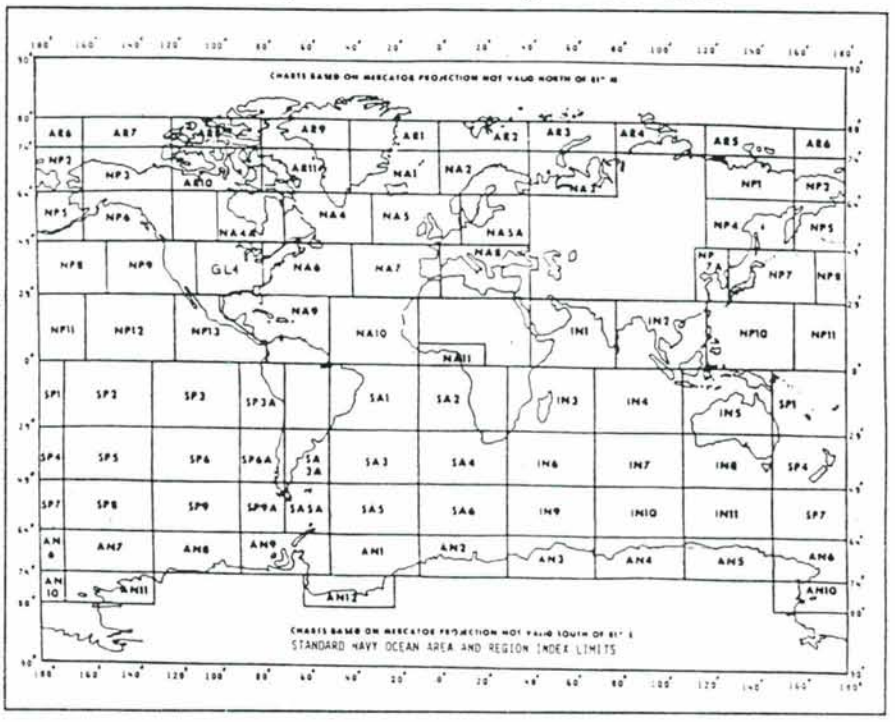
Clearances are required for ALL scientific work within any foreign nation's 200 mile Exclusive Economic Zone. Foreign clearance is often difficult to obtain, and in most cases, **requests should be submitted to the Department of State at least seven months prior to expected cruise date.** Requests for clearance may be submitted prior to final funding decisions. Contact ship operator or:

Research Vessel Clearance Officer
U.S. Department of State
OES/OA, Room 5801
Washington, D.C. 20520
Tel: (202) 647-0240

Track:

Attach cruise track.

Standard Navy Ocean Area and Region Index Limits



INFORMATION FOR OPERATORS

Installed Equipment to be used:

Winches:
Dredge/Trawl ___
Hydro ___
CTD ___
Capstans ___

Computer/peripherals ___
PC computers ___
SAIL System ___
Digital XBT ___
ADCP ___
Gravimeter ___

Wire:
Mechanical
9/16" ___ 1/2" ___ 1/4" ___
Conductor
0.680" ___ 0.322" ___ .225" ___
Single ___ Multi ___

12 kHz echosounder ___
3.5 kHz echosounder ___
Magnetometer ___
Multibeam sounder ___
Air compressor(s) ___
Uncontaminated seawater intake ___

Navigation:
GPS ___
Transit satellite ___
Loran ___
Other ___

Immarsat ___
ATS ___
FAX ___
Cellular ___

Available equipment to be used:

Pingers ___
Gravity Corers ___
Piston Corers ___
Box Corers ___
Rock Dredges ___

Chest Freezers ___
Refrigerators ___

CTD ___
Rosette Sys. ___

Vans:
Refrigerated ___
Magazine ___
Isotope Isolation ___
Lab ___
Storage ___
Berthing ___

Airgun/watergun system: ___
Explosive Handling Gear ___

Auto Analyzer ___
Salinometer ___

Nutrients ___
Oxygen titration ___

Nets:
Dip net ___
Plankton ___
Neuston ___
Bongo ___
Mid-water trawl ___
MOCNESS ___ (Size) ___

Work boats ___

Niskin bottles ___
Thermometers ___

Other Special Equipment; Comments:

NSF-UNOLS Ship Time Request [illegible]

Include in all NSF proposals and send copies to UNOLS office and ship operator(s)

APPENDIX IX

P.I. Name:
Institution Address:

Phone Number:
Fax Number: E-mail:

Will this project require use of a research vessel or special platform?
- ❑ No (Go to Signature)
- ❑ Yes
  - ❑ Ancillary Only
  - ❑ Principal Use of Ship

Large Program? (Ex. WOCE) _____

Name of Person Requesting Ship Time (Multi-P.I. Proposals):
Institution:
Phone Number:
Fax Number: E-mail:

Proposal Title:

Purpose of Ship Time:

Other Scientists Involved in Multi-P.I. Program:
Name Institution

❑ New Proposal?
Inst. Proposal # _____
NSF Proposal # _____
❑ Renewal Proposal
Grant # _____

Submitted to:
Agency _____
Division _____
Program _____

Amount Requested: _____
Start Date: _____ End Date: _____

Year	Ship(s) Requested Name or Size (Ex. Large, Medium)	# of Science Days Required	Optimum Dates Month/Day/Year	Alternate Dates Month/Day/Year

Estimated Ship Days Needed: | Transit: | Science: | Port:

Proposed Ports: | Start Port: | Intermediate: | End Port:

Area of Operations (Use codes from standard Naval Chart [on back] and brief description) Codes:

Number in Scientific Party:

Geographic Description (Latitude and Longitude):
Beginning:
Ending:

Technician Required: (CTD, SCS, MCS, SeaBeam, etc)

Special Equipment Required:

Is any part of the project within 200 miles of a Foreign Coast?
❑ No ❑ Yes (List countries' clearance required)

Special Requirements:
(List type, quantity, and disposal plans)

Radioactive?

Explosives?

Other?

Diving? ❑ No ❑ Yes
Number of Individual Dives: _____
Number Participating Divers: _____

Signature of P.I. or Chief Scientist: _____ Date: _____

NSF Form 831 (7/92) Include as Last Page of Proposal

OMB #3145-0058

APPENDIX X

Proposal to
University-National Oceanographic Laboratory System (UNOLS) Council
For Formation of
Research Vessel Technical Enhancement Committee (RVTEC)

Introduction:

A group of marine technical support personnel from various institutions met in Washington, D.C. on 20 May 1992 to discuss the formation of a technical support group similar to the Research Vessel Operators Council. The need for such a group was clearly identified based on the lack of any similar organization in the UNOLS group and the need for an efficient mechanism for the exchange of information and experiences relevant to technical activities that support sea-going scientific programs. At this meeting a Technical Support Steering Group (TSSG) was formed to implement the formation of a Research Vessel Technical Enhancement Committee (RVTEC).

This committee will provide a mechanism for developing programs that will increase the efficiency of technical support services with the ultimate goal of providing enhanced technical support for the marine sciences. For example, programs to develop documentation for commonly used scientific equipment can be developed. Technician exchange programs and training activities that take advantage of the skills and capabilities of unique technical support personnel and facilities can be coordinated through this group. Annual meetings devoted exclusively to topics relevant to marine technical support activities will provide the opportunity to exchange information and identify mechanisms for providing efficient technical support services at sea.

The mechanisms for providing these opportunities for marine technicians does not currently exist within UNOLS. Therefore, the TSSG proposes to The University National Oceanographic Laboratory System the formation of the RVTEC. A preliminary organizational framework for this group is outlined below.

Statement of Purpose:

To promote the scientific productivity of research programs that make use of major oceanographic facilities; primarily research vessels and to foster activities that will lead to enhanced technical support for sea-going scientific programs.

Organizational Structure:

RVTEC will operate under the UNOLS charter, with its bylaws to be modeled after the Research Vessel Operators Council (RVOC) bylaws. Membership will be extended to technical support groups at UNOLS member institutions. While each institution may send more than one participant, each participating institution will be limited to one vote.

A Chairman and Vice-Chairman will be appointed by the UNOLS Chair.

To follow are examples of some goals and objectives, a proposed schedule of events, and a draft agenda for an October organizational meeting, which were developed by TSSG.

1992 Proposal

For Formation of

RESEARCH VESSEL TECHNICAL ENHANCEMENT COMMITTEE (RVTEC)

To

University-National Oceanographic Laboratory System (UNOLS)

Point of Contact:

For the UNOLS Technical Support Steering Group
Representing the University of Miami,
Rosenstiel School of Marine and Atmospheric
Science

Richard J. Findley, TSSG Chairman and
U of M, RSMAS Scientific Liaison
4600 Rickenbacker Causeway
Miami, FL 33149
(305) 361-4175

RVTEC

Schedule of Events

26 June	Final draft of proposal for formation submitted to the Chairman of the UNOLS Council.
15-16 July	Chairman of Technical Support Steering Group proposes formation of Research Vessel Technical Enhancement Committee to the UNOLS Council.
22 July	Distribute proposal for formation; schedule of events and draft agenda to technical groups at UNOLS institutions.
16-17 September	Assuming UNOLS Council approves; Chairman of TSSG presents proposal to full UNOLS membership.
18-19 October	Organizational meeting of full membership; the initial meeting is proposed to be held in conjunction with MTS 92 (October 19-21) conference.

(1-2 meetings yearly are anticipated to be held in conjunction with MTS, other oceanographic meetings.)

RVTEC

Goals and Objectives

Goal:

Promote collaboration and exchange of information concerning technical support for research at sea.

Objective: Maintain a list of technicians and skills available at each member institution.

Objective: Establish a method of providing coordinated and cost effective exchange of equipment and personnel needed in support of research at sea.

Objective: Establish a system for the interchange of ideas between technical support groups and scientific users.

Objective: Develop common documentation for equipment commonly used on UNOLS vessels.

Objective: Provide a forum for the exchange of information concerning both commonly used and newly developed equipment and techniques.

Goal:

Enhance technical skills of available research vessel support personnel.

Objective: Organize training sessions and other suitable forms of educational opportunities for sea-going technical personnel.

Objective: Promote cruise-based exchange of technical personnel between vessel operators for educational and cross-training purposes.

RVTEC

October Organizational Meeting

Draft Agenda

Discussion of organizational structure and purpose.

Establishment of bylaws for approval by UNOLS Council.

Discuss and develop action plans as required for the following initiatives:

Development of a technician exchange program.

Development common documentation for commonly used equipment (eg., ADCP).

Design of a newsletter for sharing information.

Development of distribution lists and catalogs of specialized available services and equipment.

Evolution of new technologies and their applications for use on research vessels and their impact on technical requirements.

Collection of data to be used in developing database listing: technician skills; standard and optional equipment available on each vessel; and services available from technical groups when operating on vessels other than their home institution's ship(s).

APPENDIX XI

NOAA-CHARTERED UNOLS VESSELS

FY 1992

VESSEL	PROJECT	DAYS	$K
CAPE HATTERAS	S. ATLANTIC BIGHT RECRUITMENT	7	23.1
VICKERS	GLOBAL CHANGE	91	1203.0
PELICAN / LONGHORN	NECOP	60	246.0
OCEANUS	DWD-106 BOX CORING	9	98.4
MISCELLANEOUS	NOAA UNDERSEA RESEARCH PROGRAM (SUBMERSIBLE SUPPORT)	*625	*4500.0
ALASKA	BOTTOM TRAWL SURVEY	70	299.0
	TOTAL	862	6369.5

*ESTIMATES ONLY

SUPPLEMENTAL SUPPORT

	FY 93	FY 94	FY 95	FY96
OCEANOGRAPHER	N.O.	RTE (?)	240	240
DISCOVERER	221	205	RTE	240
MALCOLM BALDRIGE	171	180	180	RTE
CHARTER DAS				
UNOLS	258	189	240?	240?
COMM. MAPPING	250	200	?	?
COMM. FISHING	30	108	?	?
CHARTER $ AVAILABLE				
UNOLS	$2,100K	$2,260K	?	?
COMM. MAPPING	$4,000K	$500K	?	?
COMM. FISHING	$600K	$1,140K	?	?
OTHERS	$0K	$600K	?	?
SOURCE OF FUNDS				
C & GC	$600K	$500K	?	?
FLEET MOD. *	$1,500K	$4,000K	$4,000K	$4,000K
CONGRESS. INTENT	$4,000K	$0K	$0K	$0K
FY 92 CARRY OVER	$600K	$0K	$0K	$0K

* Subject to Budget & Allocation (FY 94-96)

VARIABLES

FY 1993:

FLEET MODERNIZATION

$2M Critical Maintenance

OPERATIONS

- $1M Maintenance

- $1M Ship time

FY 1994: (???)

FUTURE UNOLS CHARTERING

FY 1993

VESSEL	PROJECT	DAS	$K
VICKERS	TOGA COARE	115	1,380
PELICAN/OTHERS	NECOP	120	498
TBD	MONITOR	23	222
VARIOUS	NURP	625	4,500

FY 1994

VESSEL	PROJECT	DAS	$K
VICKERS	WOCE	80	960
TBD	TOGA TAO	109	1,300
VARIOUS	NURP	625	4,500

* NURP (SUBMERSIBLE SUPPORT) DATA IS ESTIMATED

SUPPLEMENTAL SUPPORT

	FY 93	FY 94	FY 95	FY96
OCEANOGRAPHER	N.O.	RTE (?)	240	240
DISCOVERER	210	210	RTE	240
MALCOLM BALDRIGE	180	180	180	RTE
CHARTER DAS				
UNOLS	258	189	240?	240?
COMM. MAPPING	250	200	?	?
COMM. FISHING	30	108	?	?
CHARTER $ AVAILABLE				
UNOLS	$2,100K	$2,260K	?	?
COMM. MAPPING	$4,000K	$500K	?	?
COMM. FISHING	$600K	$1,140K	?	?
OTHERS	$0K	$600K	?	?
SOURCE OF FUNDS				
C & GC	$600K	$500K	?	?
FLEET MOD. *	$1,500K	$4,000K	$4,000K	$4,000K
CONGRESS. INTENT	$4,000K	$0K	$0K	$0K
FY 92 CARRY OVER	$600K	$0K	$0K	$0K

* Subject to Budget & Allocation (FY 94-96)

NOAA FLEET REPLACEMENT AND MODERNIZATION

STATUS REPORT

- o $33.2M APPROPRIATED IN FY 92
  - CRITICAL MAINTENANCE OF EXISTING SHIPS
  - IDENTIFICATION OF DETAILED REPAIR, CONVERSION, CONSTRUCTION AND MISSION EQUIPMENT REQUIREMENTS
  - PREPARATION OF TECHNICAL SPECIFICATIONS
  - CHARTERING TO MEET SHORT TERM NEEDS
  - PURCHASE OF MULTIBEAM SWATH SONAR SYSTEM
- o USNS ADVENTUROUS (T-AGOS 13) TRANSFERRED TO NOAA
  - ARRIVES AMC, NORFOLK, VIRGINIA, JULY 10
  - WILL UNDERGO T&E FOR CHARTING AND MAPPING SUPPORT

APPENDIX XII

If you have questions about data submission, please contact your program officer (202/357-9639) or the appropriate data archive. If you have questions about data reporting or sample sharing connected with research-vessel clearances, please contact the scheduling office of the research-vessel operator or the Research Vessel Clearance Office, Department of State (202/647-0239).

Sincerely,

M. Grant Gross
Division Director

Enclosures: NSF Important Notice 106, dated 17 April 1989
OCE Data Policy, dated 1 October 1988

NATIONAL SCIENCE FOUNDATION
1800 G STREET, N.W.
WASHINGTON, D.C. 20550

DIVISION OF OCEAN SCIENCES

1 May 1992

Dear Colleague:

The National Science Foundation (NSF) assigns a high priority to open and rapid exchanges of data and research results for projects it supports, as described in Important Notice 106 on Conduct of Research (attached). The Division of Ocean Sciences (OCE) has also adopted a data policy for ocean sciences (attached). The OCE policy requires investigators to submit data and other materials to appropriate archives (e.g., the National Oceanographic Data Center and the National Geophysical Data Center) in a timely manner. Several OCE programs support separate data archives (e.g., JGOFS, WOCE, TOGA and RIDGE) to which data and materials may also be submitted.

Principal Investigators and research-conducting institutions are reminded that timely submission of data and supporting materials is routinely considered along with project productivity in deciding on funding of new projects or renewals.

In addition, U.S. investigators must generally obtain consent for research cruises in waters under foreign jurisdiction. Normally, coastal-state consent is required for marine-scientific research activities within Exclusive Economic Zones. Principal Investigators, their home institutions and ship-operating institutions all incur post-cruise obligations as part of the research vessel clearance process. Coastal states have the right to deny U.S. requests for clearances until reporting obligations for previous cruises have been satisfied, even if the individuals or institutions involved are different.

Failure to complete post-cruise obligations (e.g. submission of cruise reports, data inventories, data and research results) to foreign coastal states will be considered in the proposal review process and can result in delay of new or renewal proposals until existing international obligations are met.

NATIONAL SCIENCE FOUNDATION
DIVISION OF OCEAN SCIENCES

Policy for In Situ Ocean Data

Purpose

This statement establishes a policy and guidelines to assure timely submission of appropriate real-time and archival quality *in situ* oceanographic data to national centers, while recognizing needs of principal investigators to protect their intellectual investment and encouraging their continued efforts to collect useful oceanographic data.

Policy

Ocean data collected under Federal sponsorship are to be made available for these secondary purposes in a reasonable time as described below.

Implementation

Data sets likely to be of high utility for other purposes are to be submitted to and archived by designated national centers. These data sets should be accompanied by a brief description of the methods and techniques used for their collection and processing. Data needed for forecasting are to be submitted in real time through the WMO/IOC Integrated Global Ocean Services System (IGOSS).

National centers receiving data sets will assure that: inventories of data received are distributed to funding agencies; archived data and related information are accessible and available to other users in a timely and efficient manner, either on the basis of exchange or in accordance with applicable cost recovery policies; and these data are preserved and properly managed to assure their quality.

Funding agencies are responsible for assuring that data and related information likely to be of high utility for secondary use are archived in designated national centers. These agencies, with assistance from NOAA's National Environmental Satellite, Data, and Information Service (NESDIS), will identify such data and related information and will require their principal investigators to submit these data and related information to the designated center.

NATIONAL SCIENCE FOUNDATION

Office of the Director

WASHINGTON, D.C. 20550

Notice No.106 April 17, 1989

IMPORTANT NOTICE TO PRESIDENTS OF COLLEGES AND UNIVERSITIES AND HEADS OF OTHER NATIONAL SCIENCE FOUNDATION GRANTEE ORGANIZATIONS

SUBJECT: RESPONSIBILITIES OF INSTITUTIONS AND INVESTIGATORS IN THE CONDUCT OF RESEARCH

This Important Notice implements the major findings and recommendations contained in the National Science Board report "Openness of Scientific Communication" (NSB 88-215) approved in December 1988. The purposes of this Notice are: (1) to reaffirm NSF's commitment to open, rapid dissemination of research performed under its sponsorship, and (2) to strengthen policies and procedures to assure maximum openness of scientific and technical communication.

1. Open Scientific and Engineering Communication

The NSF advocates and encourages open scientific communication. The NSF expects significant findings from research it supports to be submitted promptly for publication, with authorship that reflects accurately the contributions of those involved. It expects investigators to share with other researchers, at no more than incremental cost and within a reasonable time, the primary data, samples, physical collections, and other supporting materials created or gathered in the course of the research. It also encourages awardees to share software and inventions or otherwise act to make such items or products derived from them widely useful and usable.

NSF will implement these policies in ways appropriate to the field of science and circumstances of research through the proposal review process; through award negotiations and conditions; and through appropriate support and incentives for data cleanup, documentation, dissemination, storage, and the like. Adjustments and, where essential, exceptions may be allowed to accommodate the legitimate interests of investigators and to safeguard the rights of individuals and subjects, the validity of results, and the integrity of collections.

2. Policies for Openness

Appropriate commercialization of the results of research will continue to receive encouragement by permitting grantee institutions to keep principal rights to intellectual property conceived under NSF sponsorship. The Foundation emphasizes, however, that retention of such rights does not reduce the responsibility of researchers and institutions to make research results and supporting materials openly accessible.

The Foundation strongly recommends that all NSF grantee institutions develop, implement, and publicize comprehensive policies for dealing with potential restrictions on openness arising from concurrent private sector support. Such policies and related procedures should preserve the prime function of academic institutions as creators and transmitters of knowledge, while safeguarding the independence of the faculty and the interests of the students.

3. Policies for alleged fraud and misconduct

Open scientific communication demands and encourages responsible, ethical behavior on the part of those who conduct, manage, and sponsor research. Everyone in science and engineering must guard against fraud and misconduct.

Federal agencies which engage in and/or fund data collection will promote quality control of ocean data which they and their contractors and grantees collect.

Each national center will:

- upon archival of a submitted data set, send to the principal investigator a copy of the data set as archived;

- monitor submitted data to assure that they are submitted in accordance with these guidelines and in appropriate formats; and

- report regularly to principal investigators and Federal agencies on the rates of data submission, archiving and usage.

Effective: 1 October 1988

Guidelines

Ocean data which are needed for real-time and/or archival purposes are to be submitted in accordance with the guidelines listed below.

Real-time and Delayed Real-time Data

Surface and mixed-layer temperature and salinity data are to be submitted in real time along with standard surface meteorological observations. These data should be transmitted at regular intervals in accordance with procedures specified by IGOSS. Marine weather observations are requested in the SHIP code within one hour of the observation as prescribed by the WMO, whereas BATHY and TESAC messages may be accumulated up to 48 hours after the time of observation before transmission to national centers. NOAA will make all relevant instructions and forms available to research vessel operators and will provide updates and changes as they are promulgated by the responsible international bodies.

Submission of data through IGOSS does not substitute for later submission of archival-quality data.

Navigational and related information, such as soundings of previously uncharted shoals, are to be reported in accordance with the "Guide to Marine Observing and Reporting, Publication 606 of the Defense Mapping Agency Hydrographic/Topographic Center", a copy of which should be available aboard every research vessel.

Archival Data

The following centers have been designated to receive data for archival: the National Oceanographic Data Center (NODC); the National Climate Data Center (NCDC); the National Geophysical Data Center (NGDC); and the National Snow & Ice Data Center (NSIDC).

Types of data which are to be archived are:

Ocean physical data - temperature, salinity, light transmission or attenuation, currents, waves, pressure, sea level, sound speed (NODC);

APPENDIX XIII

Posted: Fri, Jul 10, 1992 12:56 PM PDT Msg: EGJC-5304-4649
From: J.MURRAY
To: G.Brass
CC: us.jgofs.exec, eqpac.chiefs, R.Anderson.ldgo, S.Smith.Sharon, N.Andersen
Subj: Satisfying Foreign Clearance

Dear Gary,

There is a problem that I think is in the domain of the UNOLS Advisory Council and should be discussed there. It has to do with satisfying the requirements of foreign clearance for cruises of multi-PI projects like the US JGOFS process study EqPac.

US JGOFS has a data management office located at Woods Hole and operated by George Heimerdinger of NODC. US JGOFS has a data policy that is consistent with that of NSF. I can fax you a copy of this data policy but it basically says that data will be sent to Heimerdinger's office where it will ultimately be made available. Core data will be sent to the Data Office within 6 months of the cruise. Non-core measurements will be sent as completed but no later than one year of the cruise date. Data requiring long analytical times are exempted. The chief-scientist will provide a detailed event log for every sampling operation. The PI's will provide a sampling inventory.

Core measurements are made available to all project investigators without restriction after submission to the Data office. Non-Core data will be held in proprietory status for two years from date of collection. As required by NSF all data will be made available two years after the cruise.

I was chief-scientist of the first EqPac cruise and requested foreign clearance for all five cruises as one of the project organizers. 20 PI's were represented on my cruise alone. About 55 are participating the whole project. I will see very little of the data from the individual PI's until it is available from NODC. Hard copy data reports will not be routinely available. I will have even less contact with the data from the 4 other cruises.

Tom Cocke at the State Department has sent me the usual request to provide time schedule for all data reports to his office to satisfy the requirements of the foreign clearance request. I can do that for the data I am personally responsible for but not easily for the other 19 (or 55) PI's. I recommended that those data requirements be satisfied through the US JGOFS Data Office. George Heimerdinger is agreeable to playing a role here but Tom Cocke seems reluctant to go this route. This is why I think it needs to be discussed by the Advisory Council.

Please contact me or Otis Brown for more input.

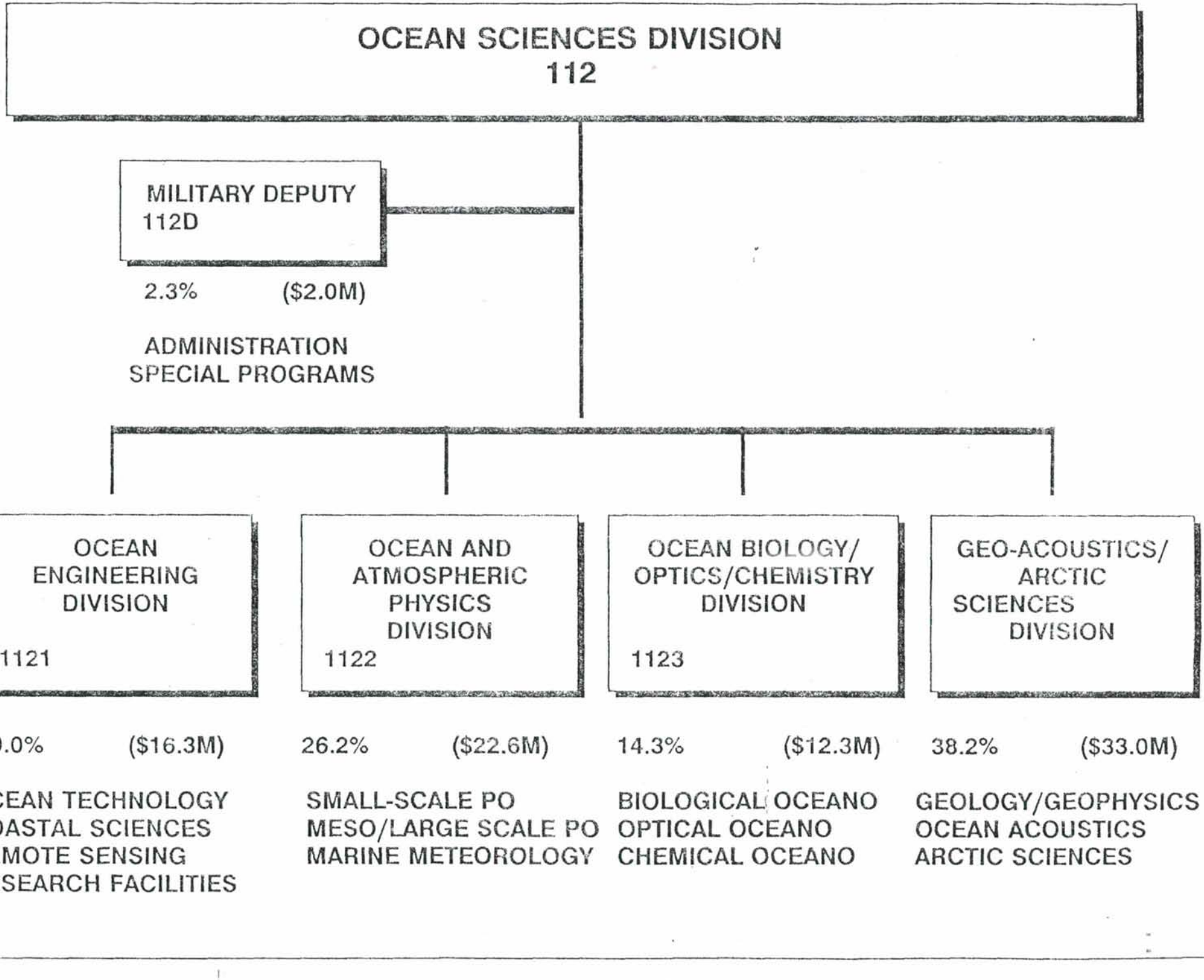
Best wishes, Jim Murray (206-543-4730)

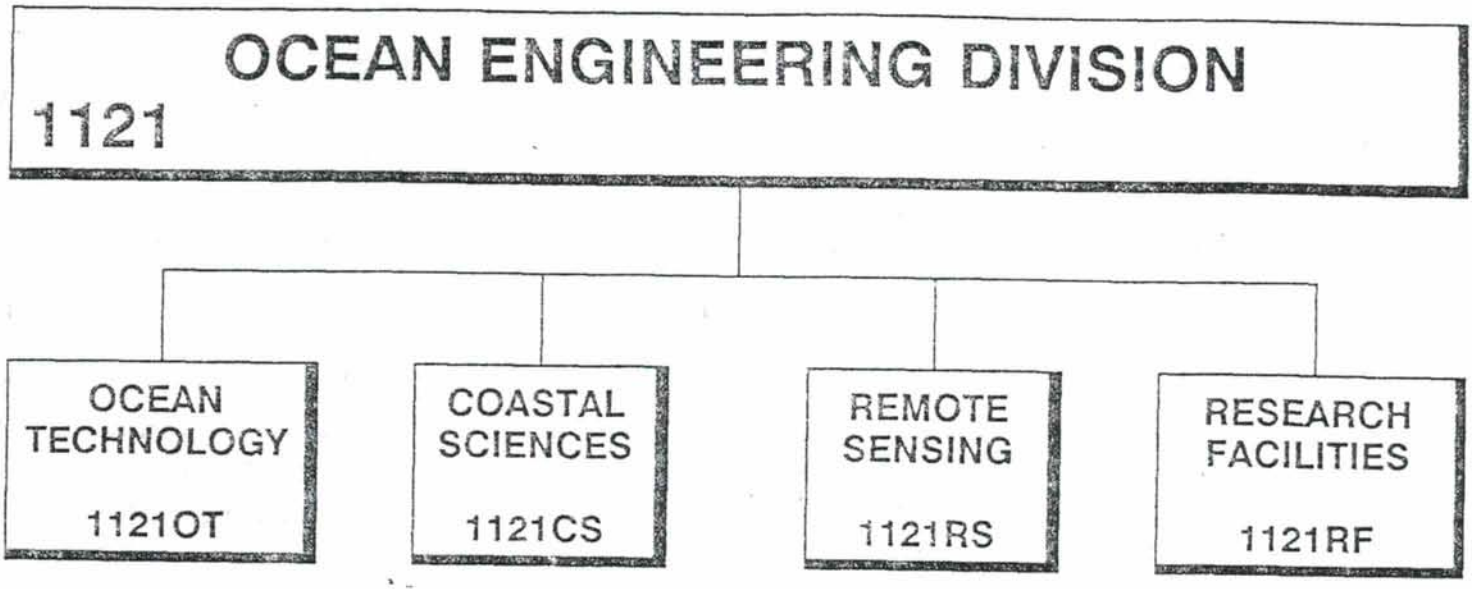
APPENDIX XIV

OCEAN SCIENCES DIRECTORATE

OBJECTIVES

- Support the best scientists, students, post-docs and ocean science infrastructure
- Enable timely responses to new scientific directions which can quickly impact Navy
- Transition basic research to more applied sponsors, other agencies, and industry
- Initiate new scientific efforts and 2-4 major field experiments a year within existing or new programmatic thrusts


OCEAN SCIENCES DIVISION
112
MILITARY DEPUTY
112D
2.3%
($2.0M)
ADMINISTRATION
SPECIAL PROGRAMS
OCEAN ENGINEERING DIVISION
1121
19.0%
($16.3M)
OCEAN TECHNOLOGY
COASTAL SCIENCES
REMOTE SENSING
RESEARCH FACILITIES
OCEAN AND ATMOSPHERIC PHYSICS DIVISION
1122
26.2%
($22.6M)
SMALL-SCALE PO
MESO/LARGE SCALE PO
MARINE METEOROLOGY
OCEAN BIOLOGY/ OPTICS/CHEMISTRY DIVISION
1123
14.3%
($12.3M)
BIOLOGICAL OCEANO
OPTICAL OCEANO
CHEMICAL OCEANO
GEO-ACOUSTICS/ ARCTIC SCIENCES DIVISION
38.2%
($33.0M)
GEOLOGY/GEOPHYSICS
OCEAN ACOUSTICS
ARCTIC SCIENCES



OCEAN TECHNOLOGY DIVISION

Focus on the Interactions Between Man-Made Structures & Sensors, and Ocean Forces & Processes

OCEAN TECHNOLOGY -

Basic Research to Provide Fundamental Knowledge Necessary for the Development of Design and Operational Criteria for Dealing with Engineering Works and Operations On, Under, and in the Sea.

COASTAL SCIENCES -

Interdisciplinary Basic Research Providing the Fundamental Understanding of the Boundary Limiting Conditions Required for Developing Predictive Capabilities for the Coastal Environment.

REMOTE SENSING -

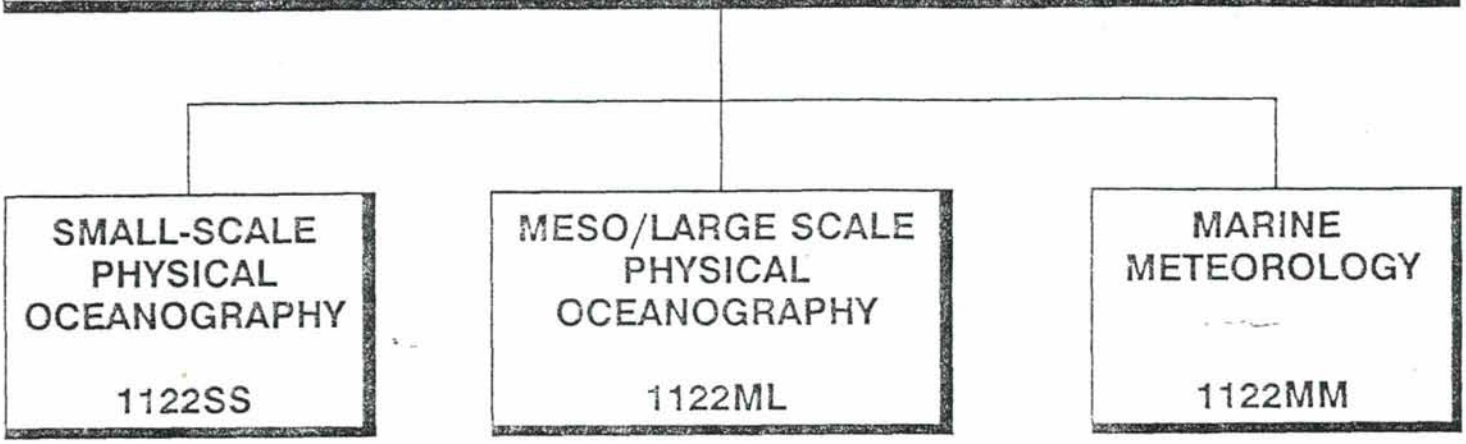
Basic Research Directed Toward Improved Understanding of How Oceanographic Phenomena and Processes are Sensed by Apparatus Not Directly In Contact with the Observed Medium.

RESEARCH FACILITIES -

Management of Special Oceanographic Facilities Including Research Ships, Submersibles & Other Unique Platforms.

OCEAN & ATMOSPHERIC PHYSICS DIVISION

1122



OCEAN & ATMOSPHERIC PHYSICS DIVISION
Focus on Physical Processes & Modeling of the Ocean and Marine Atmosphere, with Emphasis on Upper Ocean Processes & Interactions Between Scales and Across the Air/Sea Interface

SMALL-SCALE PHYSICAL OCEANOGRAPHY -

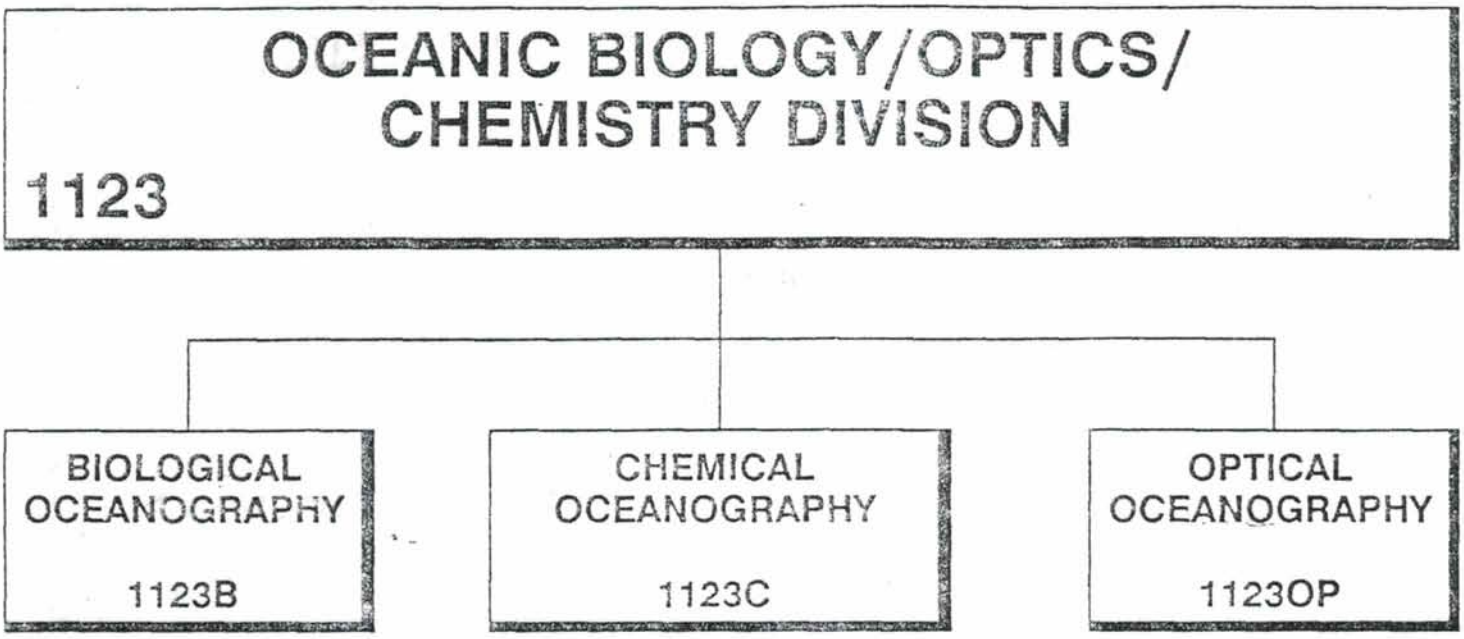
Basic Research on Upper Ocean Energetic Physical Processes, Including Air-Sea Interaction, Frontal Processes, Mixing and Internal Wave Dynamics.

MESO & LARGE SCALE PHYSICAL OCEANOGRAPHY -

Basic Research on the Dynamics and Modeling of Ocean Circulation, Emphasizing Mesoscale Phenomena (e.g. Eddies & Boundary Currents) and their Interaction with Large (e.g. Basins & Global) and Small Scale Phenomena.

MARINE METEOROLOGY -

Basic Research on Atmospheric Processes at Sea Ranging from Tropical and Midlatitude Cyclones, to the Marine Planetary Boundary Layer (Including Air-Sea Interaction).



OCEANIC BIOLOGY/OPTICS/CHEMISTRY DIVISION
Focus on Small to Mesoscale Biological, Optical, &
Chemical Processes and Their Interaction with
Their Physical Environment

BIOLOGICAL OCEANOGRAPHY -

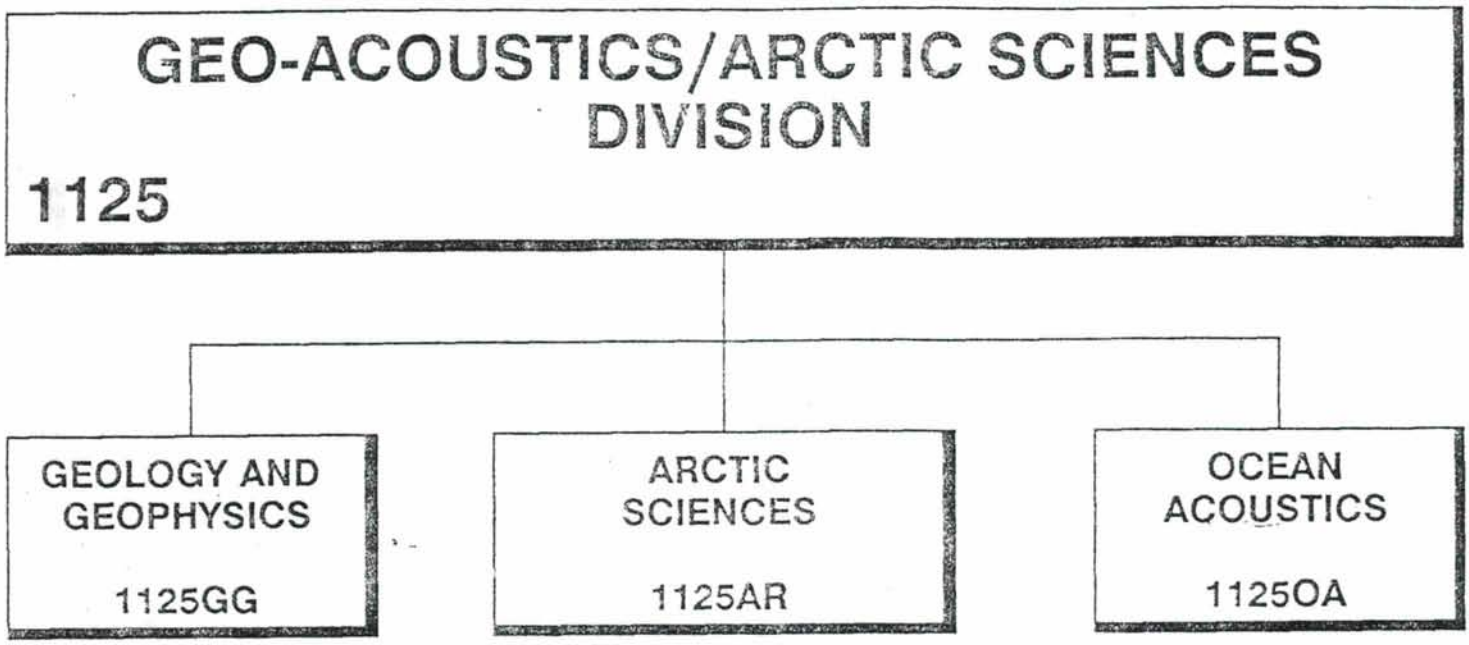
Basic Research on Biological Processes and Phenomena In the Ocean with Emphasis on Bio-Physical Modelling, Particle Dynamics, Bioacoustics, Bioluminescence & Biodeterioration.

CHEMICAL OCEANOGRAPHY -

Basic Research on Chemical Processes and Phenomena In the Ocean with Emphasis on Trace Constituents, Real-Time Sampling at Sea, and Numerical Modelling.

OPTICAL OCEANOGRAPHY -

Provide the Fundamental Understanding of the Propagation, Absorption, and Scattering of Light in the Ocean.



GEO-ACOUSTICS/ARCTIC SCIENCES DIVISION
Focus on Acoustic and Geophysical Processes
In the Marine and Arctic Environment

GEOLOGY/GEOPHYSICS -

Basic Research Leading to the Fundamental Understanding of the Geological/Geophysical Processes Controlling the Propagation and Scattering of Acoustic Energy by the Ocean Bottom and Sub-bottom.

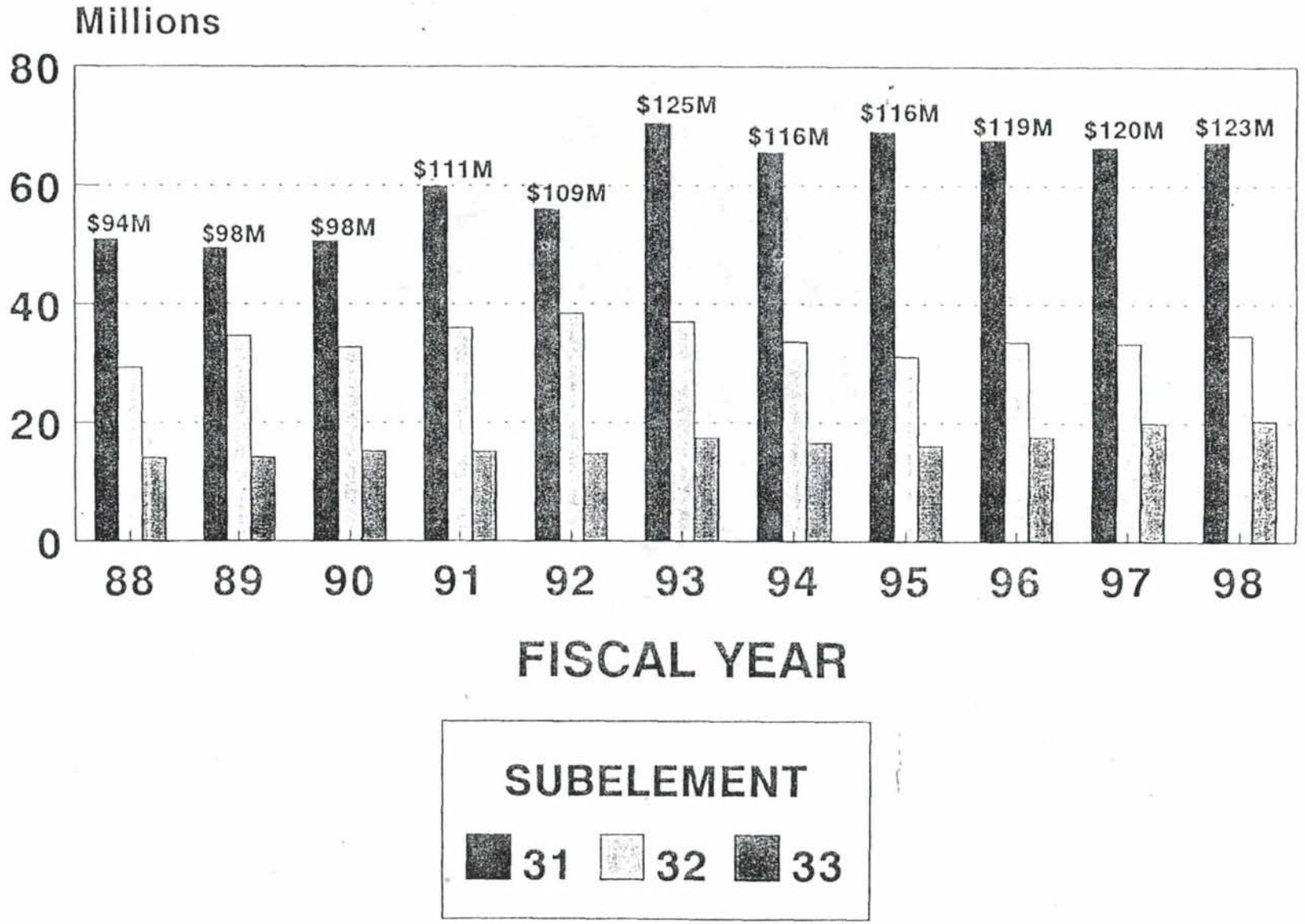
ARCTIC SCIENCES -

Interdisciplinary Basic Research Directed at Providing the Understanding Required for Developing Predictive Capabilities to Describe the Oceanographic, Acoustic, Atmospheric, Ice, and Seafloor Environment.

OCEAN ACOUSTICS -

Provide the Fundamental Understanding of the Generation, Transmission, Interactions, Reception and Processing of Acoustic Energy in the Ocean Volume.

OCEAN SCIENCES
DEFENSE RESEARCH SCIENCES



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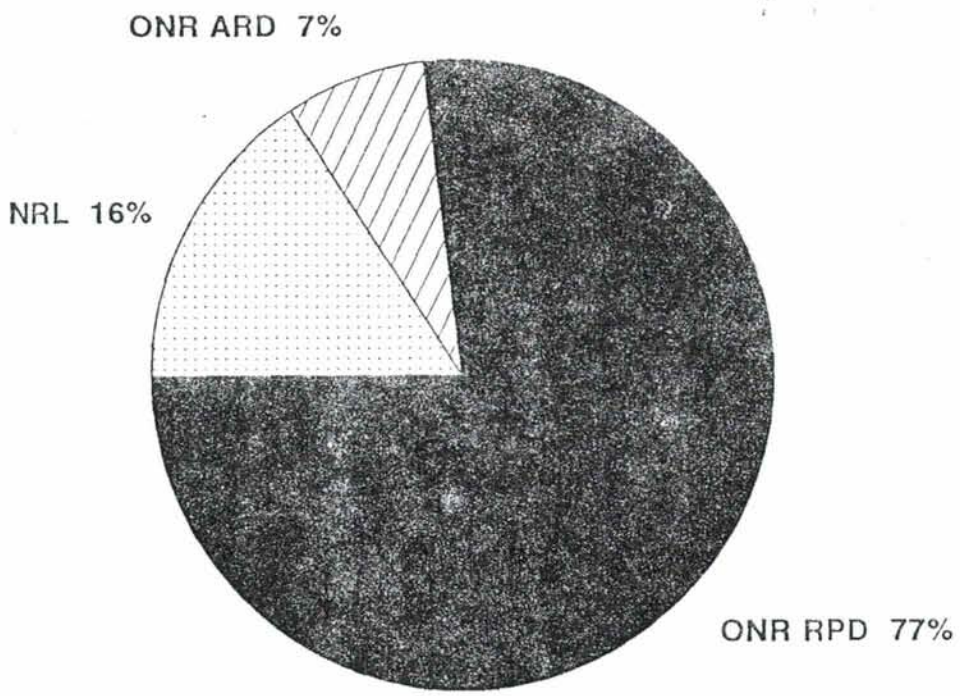
OCEAN SCIENCES FUNDING BY CLAIMAINT



FY1992 = $109M

OCEAN SCIENCES DIRECTORATE

RESEARCH APPROACH

- Initiate field experiments critically testing theories, ideas and concepts for understanding the ocean system
- Support theoretical/analytical studies, plus numerical/ laboratory experimentation to understand complex environmental interactions and assist in design and analysis of field experiments
- Create opportunities for innovative technological concepts critical to our understanding the ocean system

OCEAN SCIENCES DIRECTORATE

RESEARCH EMPHASIS

EMPHASIS: Higher competitive priority

RESEARCH: Maintain balanced, broad scientific scope

- Understand boundary influence (land/ocean; bottom/water; ocean/air; particulate/water, etc) on oceanic and atmospheric processes and phenomena at seasonal and shorter time scales
- Understand environmental processes and interactions influencing our capability to observe the environment and utilize the data obtained to make nowcasts and forecasts

OCEAN SCIENCES DIRECTORATE

HIGH PRIORITY RESEARCH TOPICS

- Interactive processes impacting acoustic and/or non-acoustic properties of shallow water regions (air/ocean)
- Ocean and atmospheric dynamics enhancing our ability to model local to regional ocean and atmospheric properties
- Air/sea boundary processes altering the interfacial and/or the immediate subsurface acoustic and above surface EM/EO properties
- Ocean observing, computation and visualization strategies and technologies maximizing real-time ocean/ atmosphere data assimilation into models for nowcasting and forcasting of ocean and atmosphere properties

OCEAN SCIENCES DIRECTORATE

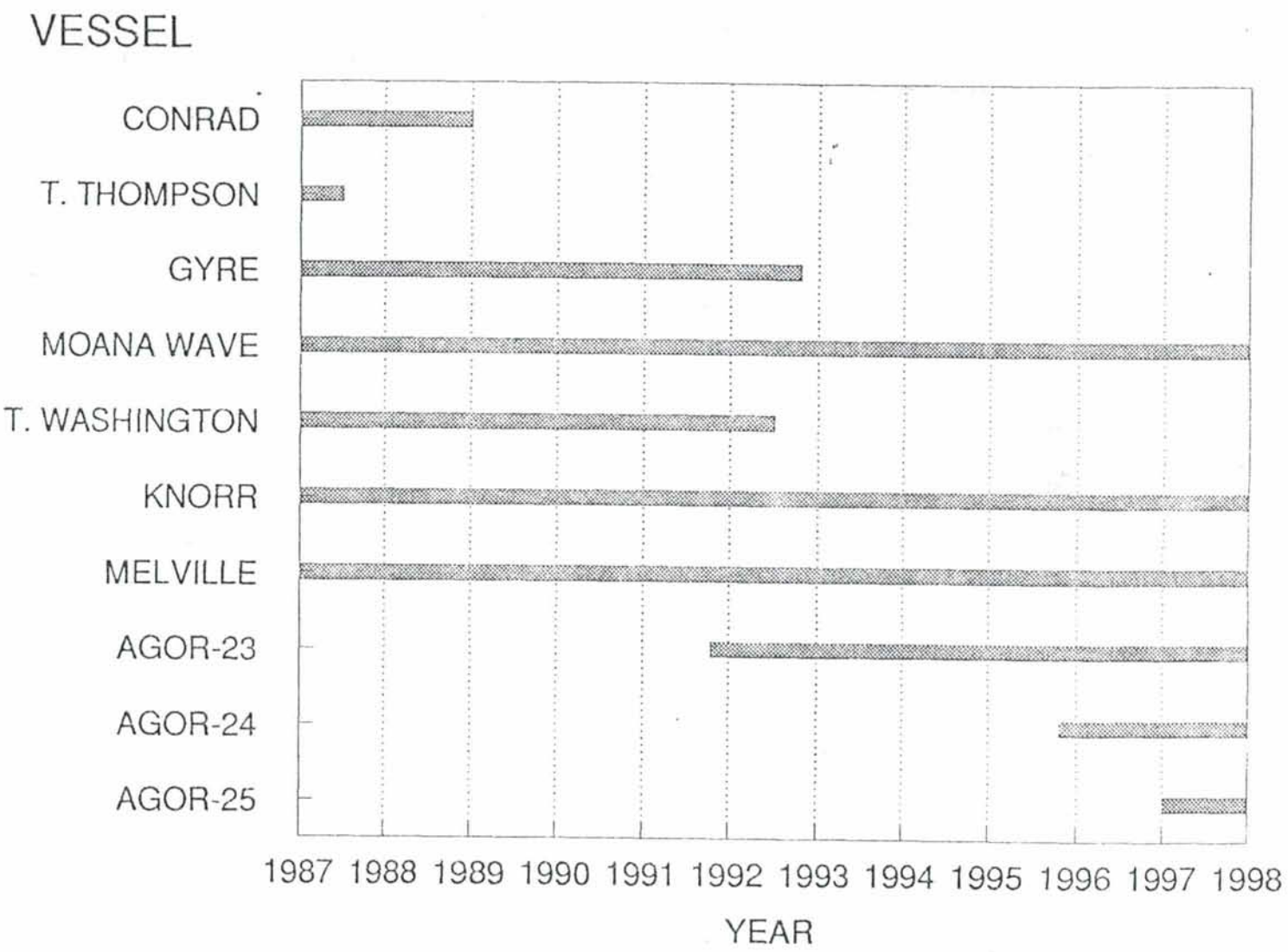
HIGH PRIORITY RESEARCH TOPICS continued

- Trophodynamic and other coupled biological/ environmental theory and associated numerics providing mechanistic understanding and models of local to regional environmental changes and/or impact

- Geophysical mechanics and dynamics and geochemical processes altering the seismic/acoustic and/or the magnetic properties of the ocean crust and sediment

- Dynamics of man made structures and systems in the ocean in response to ocean forces enabling our ability to operate in, observe and otherwise understand the ocean environment

ONR Fleet Plan



1121RF 7/13/92

6.1 OCEAN SCIENCES

ACCELERATED RESEARCH INITIATIVES

FY89

ACOUSTIC REVERBERATION
MARINE LIGHT MIXED LAYER
TOPOGRAPHIC INTERACTIONS
ULF/VLF INVESTIGATIONS

FY90

ARCTIC LEADS
CONVECTION & SUBDUCTION
METAL ION BIOSENSORS
STRATO-CUMULUS TRANSITION
VORTEX SHEDDING/WAKES

FY91

BUBBLY FLOWS
HI-RES REMOTE SENSING
KUROSHIO EXTENSION
MARINE AGGREGATE DYNAMICS
MARINE SYMBIOSIS
RANDOM FIELDS

FY92

MARINE AEROSOLS
NONLINEAR OCEAN WAVES
NONLINEAR REGIMES
SEA ICE MECHANICS
FLARES AT SOLAR MAX
SUBBOTTOM SWATH MAPPING
APPLIED SURFACE REVERBERATION

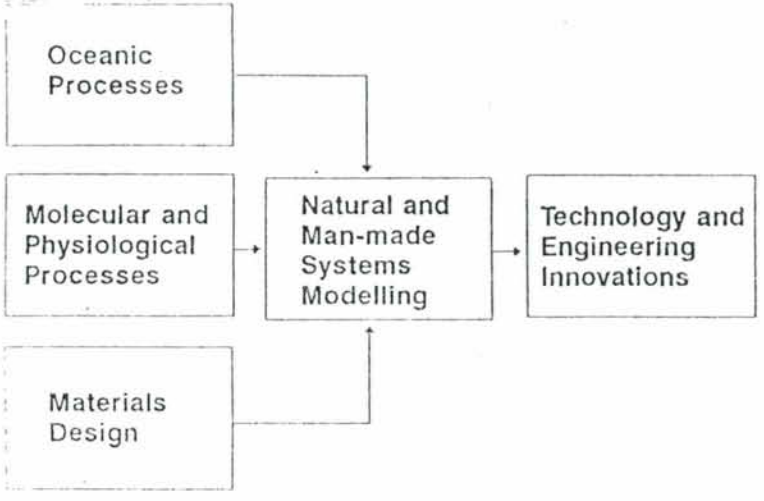
FY93

SEA ICE EM/EO
MASSIVE PARALLELISM
MBL SPECTRAL SIMILARITY
SHIP WAKE EVOLUTION
OCEANIC TURBULENCE
GLOBAL CHANGE IN MIDDLE ATMOSPHERE

FY94

FORCED UPPER OCEAN DYNAMICS
COASTAL ATMOSPHERIC CIRCULATIONS
NONEQUILIBRIUM TURBULENCE
ATMOSPHERIC MESOSCALE DYNAMICS

ENVIRONMENTAL QUALITY



Approach

- Existing programs
  - Molecular Biology
  - Ocean Sciences
  - Chemistry
- Special Research Programs
  - harbor environmental quality (fate and effects of toxic substances)
  - "zero discharge" ships (materials and chemistry)
  - others
- Education programs (K-12)

Objective

To define and examine the basic research issues which underlie the environmental issues with which the Navy is concerned

Payoff

- Improved technology for environmental compliance
- Future capability for prediction of effects on the environment of changing Navy operations

6.1 OCEAN SCIENCES
FY94 INITIATIVES

FORCED UPPER OCEAN DYNAMICS

Understand the linkages between large-scale pulsed atmospheric forcing, mesoscale oceanic circulation patterns, and episodic biological blooms that control the optical and acoustic signature of the mixed layer portion of the water column

COASTAL ATMOSPHERIC CIRCULATIONS

Understand the origin and genesis of the propagation of coastally-trapped marine atmospheric waves when the marine boundary layer is shoaler than coastal topography

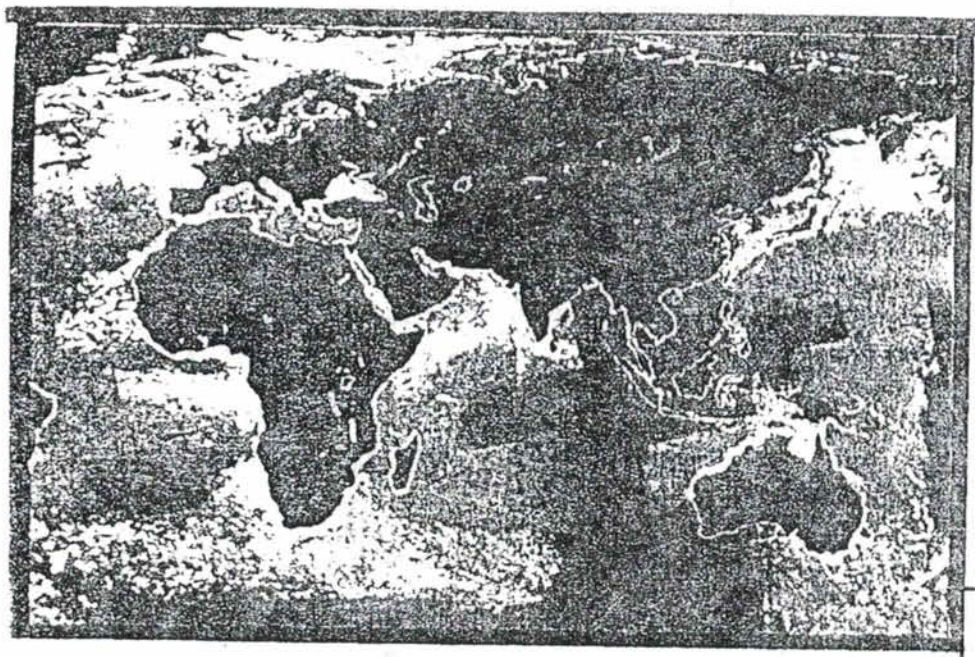
NONEQUILIBRIUM TURBULENCE

Determine the forces and energy distribution when turbulent flows are disturbed by complicated geometries, interacting shear layers, and other complex flow situations, which result in a redistribution of the turbulent equilibrium

ATMOSPHERIC MESOSCALE DYNAMICS

Understand the air-sea-land interaction processes associated with mesoscale atmospheric circulations in coastal regions, particularly the US East Coast. Determine the modes of formation, maintenance, and dissipation of clouds associated with varying scales of motion

FORCED UPPER OCEAN DYNAMICS



OBJECTIVES:

- DEFINE THE 3-D PHYSICAL RESPONSE OF UPPER OCEAN TO ATMOSPHERIC FORCING
- ELUCIDATE THE COUPLING BETWEEN NUTRIENT AND BIOLOGICAL PRODUCTION
- DEFINE ROLE OF PHYSICAL FORCING IN TROPHO-DYNAMICS AND POPULATION DYNAMICS
- MODEL REFINEMENT AND VALIDATION

APPROACH:

- EXISTING NUMERICAL MODELS WILL BE USED TO DESIGN AND DEFINE FIELD PROGRAM
- EXPLOIT NEW TECHNOLOGIES TO DEFINE PHYSICAL PARAMETERS ON APPROPRIATE SPATIAL AND TEMPORAL SCALES
- IN SITU CHEMICAL AND BIOLOGICAL REAL-TIME ASSESSMENT
- EXPLOIT NEW COMPUTATIONAL CAPABILITIES FOR MODELING

PAYOFFS:

SCIENCE

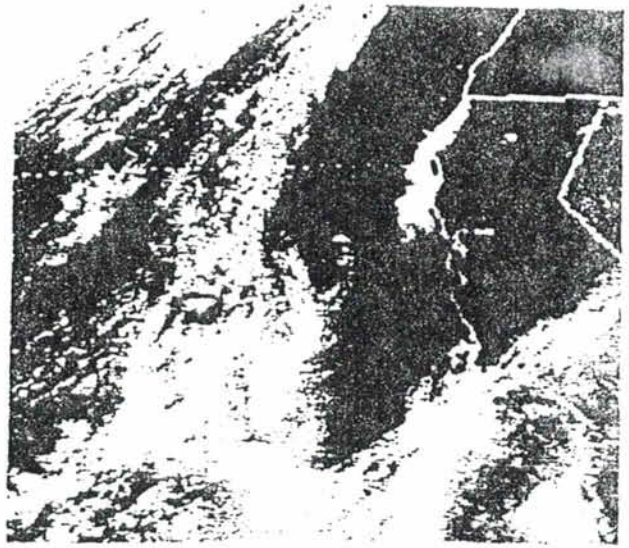
- PHYSICAL FORCING CONTROLS ON BIOLOGICAL PRODUCTION
- ATMOSPHERIC FORCING CONTROLS ON BASIN SCALE & MESOSCALE PROCESSES
- INTERACTION OF PULSED PHYSICAL/CHEMICAL FIELDS ON POPULATION DYNAMICS

NAVY

- NEW GENERATION OF REGIONAL PREDICTIVE MODELS
  - AIR-SEA INTERACTION
  - NONACOUSTIC AND ACOUSTIC ASW

COASTAL ATMOSPHERIC CIRCULATIONS

19 Feb 1992



NOAA VISUAL IMAGERY

08OCT91

PROGRAM OBJECTIVE

Understand the processes and governing genesis, propagation, and decay dynamics responsible for marine atmospheric circulations adjacent to mountainous coastlines.

0 Interaction between Kelvin waves, gravity currents, sea breezes,and irregular topography.

TECHNICAL APPROACH

Theory/numerics: Determine the appropriate mix of governing dynamics, including irregular topography and sea breezes.

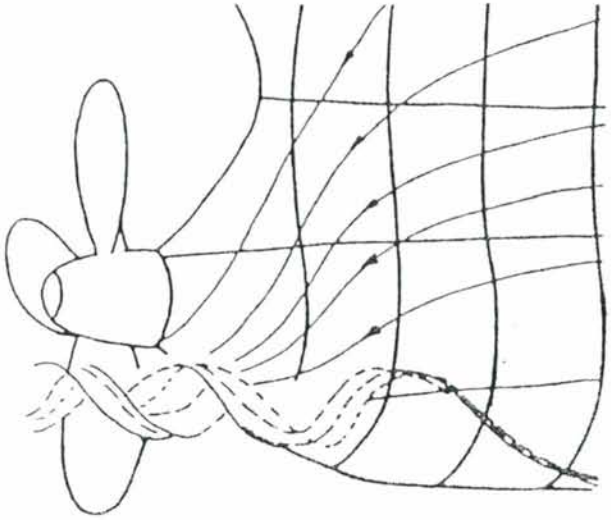
Experimental: Examine the onset of the disturbance, its dynamical structure, and decay using combined Eulerian and Lagrangian data sets and new remote sensing and in-situ technologies.

PAYOFF

FOR SCIENCE: Can obtain a new understanding of multiple process interactions in coastal atmospheric circulations.

FOR THE NAVY: Needed to predict circulation, fog and stratus, propagation, and coastal meteorology.

NONEQUILIBRIUM TURBULENCE



OBJECTIVES:

- DETERMINE FUNDAMENTAL NATURE OF TURBULENCE STRUCTURE IN NONEQUILIBRIUM CONDITIONS
- DETERMINE PROPER REPRESENTATION OF SURFACE PRESSURE FLUCTUATIONS IN NONEQUILIBRIUM BOUNDARY LAYERS
- RELATE MIXING IN STRATIFIED FLOW WITH LARGE SCALE CONDITIONS AND INSTABILITIES

APPROACH:

- DEVELOP AND UTILIZE NEW METHODS OF TURBULENCE SIMULATION, ESPECIALLY LARGE EDDY SIMULATION
- EXTEND AND EMPLOY ADVANCED MULTIDIMENSIONAL VELOCITY FIELD INSTRUMENTATION SUCH AS PARTICLE IMAGE VELOCIMETRY
- MEASURE SURFACE PRESSURES BENEATH NONEQUILIBRIUM BOUNDARY LAYERS IN NEW LOW NOISE FACILITIES
- EXTEND BOTH SIMULATION AND MULTIDIMENSIONAL INSTRUMENTATION TO STRATIFIED FLOW

PAYOFF:

- ADVANCED SIMULATION AND MODELING CAPABILITIES FOR COMPLEX TURBULENT FLOWS
- DETAILED DESCRIPTION OF FLUCTUATING SURFACE PRESSURE IN NONEQUILIBRIUM BOUNDARY LAYERS AS SOURCE OF STRUCTURAL ACOUSTIC NOISE
- NEW PREDICTION AND ANALYSIS TECHNIQUES FOR NATURAL AND VEHICULAR TURBULENCE IN THE OCEAN ENVIRONMENT

6.1 OCEAN SCIENCES
FY94 CORE/BASE ENHANCEMENTS

TROPICAL CYCLONE STRUCTURE

Advance the understanding of the evolution and behavior of tropical cyclones and other effects on the ocean to enhance forecasting skills

SURFACTANCE PROCESSES/REMOTE SENSING

Understand how marine surfactants affect air-water interfacial processes leading to remotely observable ocean signatures

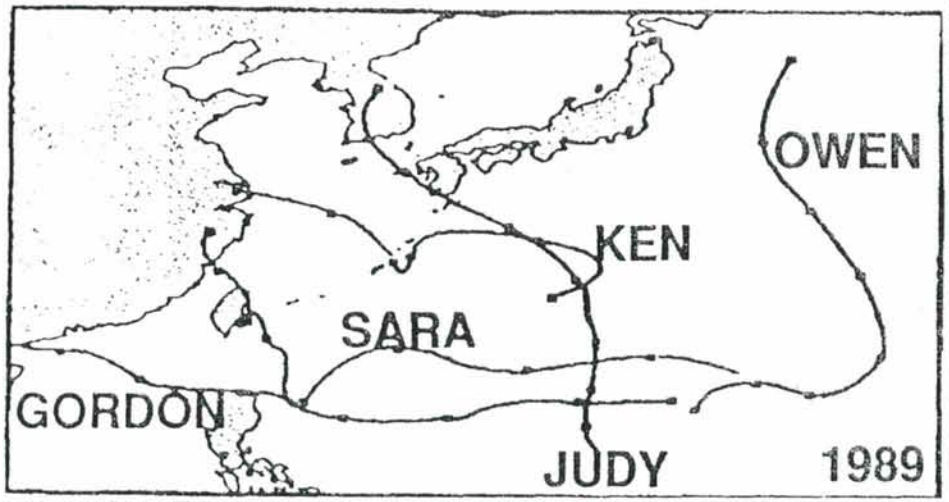
MARINE ATMOSPHERIC OPTICS

Determine, quantify, and model the effects of aerosol scattering and absorption, and of atmospheric refractive inhomogeneities on radiant transfer in the marine atmosphere

ATMOSPHERIC AND IONOSPHERIC THEORY AND DATA ANALYSIS

To understand the chemical, dynamical, and radiative processes in the upper atmosphere, ionosphere, and plasmasphere that determine the physical state of the near-space environment or space weather

TROPICAL CYCLONES



OBJECTIVE:

Advance understanding of
- Evolution & behavior
- Effect on ocean

Provide scientific basis for improved forecasts

APPROACH:

Theoretical concepts

Observational studies

Numerical models
- Integrators of observational data sets
- Demonstrators of physical understanding

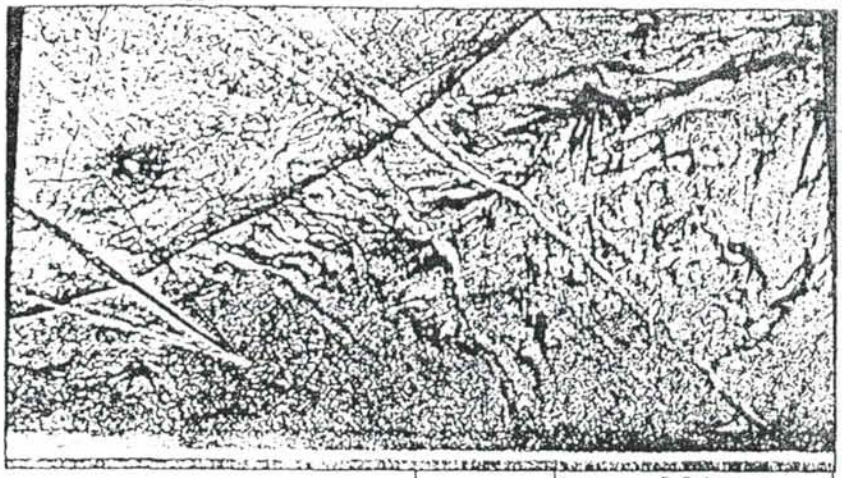
PAYOFF:

Improve accuracy of WESTPAC tropical cyclone forecasts

Reduce losses
- Injuries & lives
- Structural damage

Minimize operational disruptions
- Communications
- Sensors
- Weapons systems

SURFACTANT PROCESSES / REMOTE SENSING



L-VV Band Image - Saxon - CLT

Objectives:

- Understand how marine surfactants affect air/water interfacial processes leading to remotely observable ocean signatures
  - Determine short wave energy balance
  - Produce multicomponent elasticity models
  - Determine bulk/interface exchange mechanics

Approach:

- Laboratory studies:
  - Capillary wave energy balance
  - Chemical composition/interactions of multicomponent surfactant mixtures
- Theoretical studies:
  - Multicomponent interactions for miscible mixtures
  - Application of polymer scaling laws
  - Interfacial exchange processes

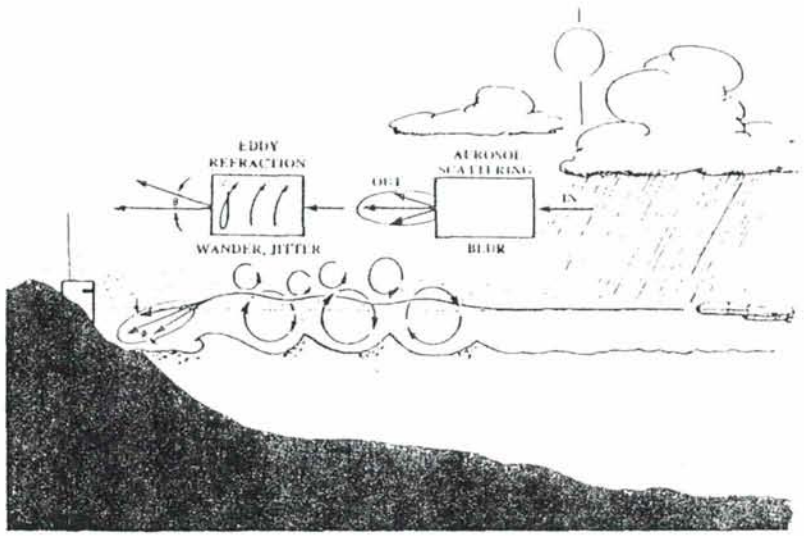
Payoff:

- Improved, physically based models to describe radar sea clutter for ocean surveillance
- Improve satellite scatterometer models at low windspeed

30 March 1992

Marine Atmospheric Optics

Core Enhancement - Code 1123OP



Objective

To define, measure, and model the effects of aerosol scattering and absorption, and of atmospheric refractive inhomogeneities on radiant transfer in the marine atmosphere.

Approach

- Define sources of optical variability
  - particulate sphericity
  - particulate composition
  - humidity
- Modeling
  - multiple scattering
  - time dependence
  - refractive propagation
- Field validation

Payoff

- Line of Sight Improvement
  - MIW
  - ASW
  - COMM
  - STW
  - ASuW
  - IFF
  - Flight Ops
- Surface ocean heating prediction
- General navigation

6.1 OCEAN SCIENCES
FY93 INITIATIVES

SEA ICE EM/EO

Achieve mechanistic understanding of relation between electromagnetic/electro-optical and physical/biological/morphological properties of sea ice. ASW; Arctic Ops; C3I

MASSIVE PARALLELISM

Solve basic research problems in Navy-critical science domains using massively parallel processing. Ocean/Atm Forecasting; STW/AAW

MARINE BOUNDARY LAYER SPECTRAL SIMILARITY

Understand the roles of intermittent ocean surface layer processes and their directional attributes in determining the air-sea fluxes. AAW/ASUW/ADI; Ocean Surveillance

SHIP WAKE EVOLUTION

Determine the effects of surface ships on surface wakes and cloud nucleation by melding recent advances in air/sea interaction and surface ship hydrodynamics. Ocean Surveillance; ASUW

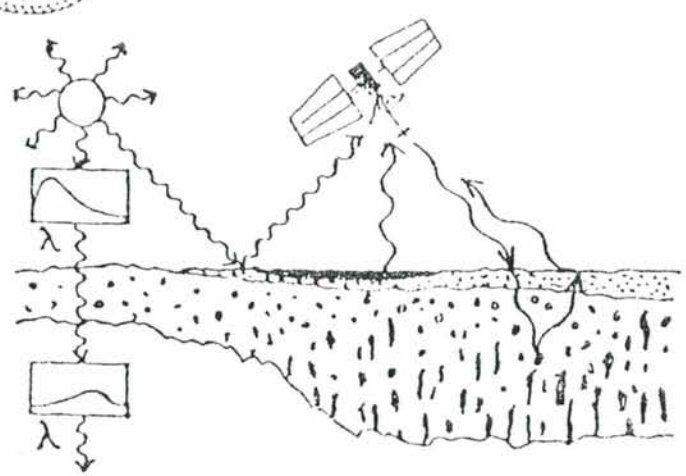
OCEANIC TURBULENCE

Quantify relations between turbulent dissipation rate, oceanic mixing, internal wave energy and intermediate scale shear. ASW; Torpedo/Torpedo Defense; Ocean Forecasting

GLOBAL CHANGE IN THE MIDDLE ATMOSPHERE

Combines ultraviolet and millimeter-wave spectroscopy experiments to make measurements of key gases in the middle atmosphere and uses these data to improve and extend one- and two-dimensional photochemically/dynamical atmospheric models. Atmospheric Surveillance

SEA ICE ELECTROMAGNETICS



OBJECTIVES:

- Achieve MECHANISTIC UNDERSTANDING of relation between electromagnetic (EM) & physical/morphological properties of sea ice
- Develop UNIFIED THEORY of EM interactions with sea ice at visible to microwave frequencies

APPROACH:

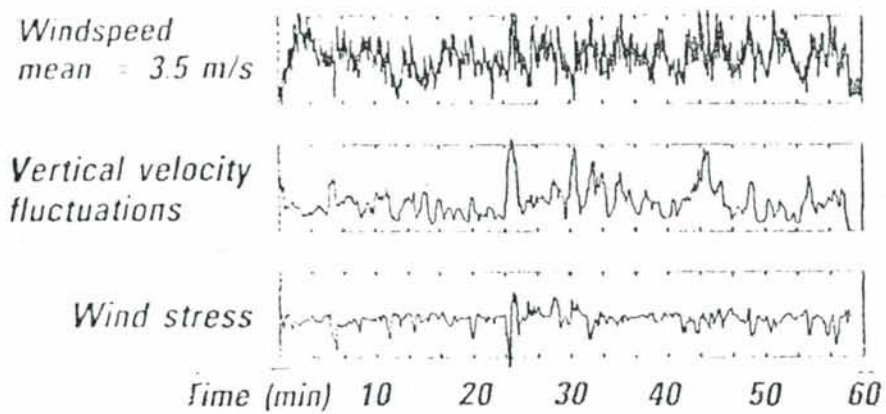
- MODEL DEVELOPMENT
  - radiative transfer models for prediction of EM radiation-sea ice interactions
  - inverse scattering methods for interpretation of remotely sensed EM signatures
- OBSERVATION
  - lab studies of EM signatures along with ice physics measurements
  - field studies in conjunction with Sea Ice Mechanics ARI arctic experiment in 1994

PAYOFF:

- IMPROVED INTERPRETATION of remotely sensed EM signatures from sea ice
  - retrieval of geophysical data relevant to polar operations
- IMPROVED PREDICTION of radiative transfer in sea ice, for modeling of
  - environmental effects on sensors
  - sea ice thermodynamics
  - polar ocean biological productivity

MARINE BOUNDARY LAYER SIMILIARITY

HOUR RECORD OF FLUXES OFF DENMARK



Mikkelsen, et al. (1987)

OBJECTIVES:

- TO UNDERSTAND THE ROLES OF INTERMITTENT OCEAN SURFACE LAYER PROCESSES AND THEIR DIRECTIONAL ATTRIBUTES IN DETERMINING THE AIR-SEA FLUXES
- TO UNDERSTAND THE MECHANISMS BY WHICH THE OCEAN/ATMOSPHERIC BOUNDARY LAYERS MODULATE THE SURFACE LAYER FLUXES

APPROACH:

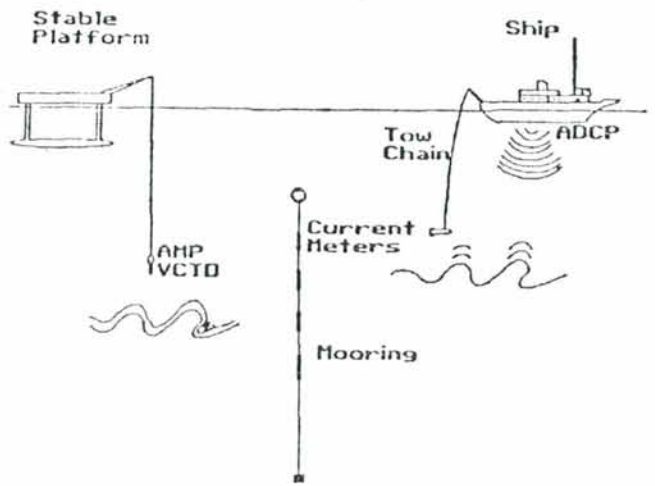
- THEORETICAL/NUMERICAL IMPROVEMENTS IN SUBGRID CLOSURE SCHEMES FOR LARGE EDDY SIMULATION (LES) MODELS
- JOINT ATMOSPHERIC/OCEANIC FIELD EXPERIMENTS TO DETERMINE EVENT-BASED FLUX PROFILES AND TURBULENT ENERGY BUDGETS FOR COMPARISONS TO NUMERICAL SIMULATIONS

PAYOFF:

- ALLOW RADAR AND ACOUSTIC SCATTERING TO BE CORRELATED WITH SHORT SPATIAL/ TEMPORAL CHANGES IN WIND STRESS
- THUS REDUCING ENVIRONMENTAL "CLUTTER-LIMITS" OF RADAR AND ACOUSTIC SENSORS FOR HIGH RESOLUTION SURVEILLANCE OF THE UPPER OCEAN

30 APR 91

TURBULENCE AND FINESCALE STRUCTURES



OBJECTIVES

Improve methods for observing ϵ & K_ρ

Test validity of the

- Osborne/Cox relation between ϵ and K_ρ
- Gregg/HWF relation between IWE & ϵ
- Gregg/GM relation between S_{10} & IWE

APPROACH

Plan and conduct a multiplatform, multisensor experiment in the open ocean to determine the spatial and temporal characteristics of transitional structures and turbulent mixing in and away from regions of strong geostrophic shear.

FY93	FY94	FY95	FY96	FY97
500K	600K	550K	500K	450K

PAYOFFS

- New knowledge of turbulence generation
- Improved circulation models
- Improved simulation models
- Predictive models of mixing
- Improved biological activity models
- Increased knowledge of heat transport
- Improved global climate models

6.1 OCEAN SCIENCES

FY93 CORE/BASE ENHANCEMENTS

SCATTER OF ACOUSTIC WAVES

Theoretical prediction and experimental verification of spatial and temporal properties of scattered acoustic fields as a function of environmental scaling parameters. ASW; Ocean Surveillance

LOW GRAZING ANGLE RADAR SCATTER

Understand those ocean surface processes which affect radar backscatter at low grazing angles. Ocean Surveillance; ASW/ASUW

OCEAN OBSERVING STRATEGIES

Determine efficient strategies for ocean observation that is tied to specific phenomena to be forecast. Utilize emerging new observation platforms and sensors. Ocean Forecasting; ASW

COASTAL OCEANOGRAPHY

Understand interactive oceanographic (physical, biological) and atmospheric mechanisms generating shelf water buoyancy, enhances biological processes and front/plume instabilities.
ASW/MIW/AMW/ADI

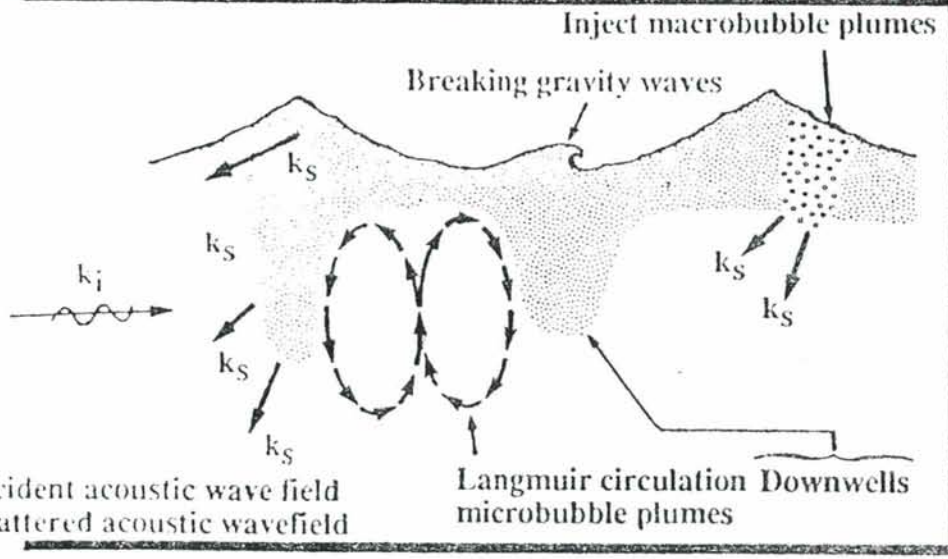
FRACTAL ACOUSTICS

Determine if the rough penetrable sea floor is 'fractal-like' in its acoustic response and quantify the limits of this differential seafloor roughness. ASW/MIW

HIGH SPECTRAL RESOLUTION STUDIES OF UPPER ATMOSPHERIC WEATHER

Explore the use of very high spectral resolution measurements of the Earth's ultraviolet airglow for remotely sensing ionospheric and upper atmospheric conditions ("Space Weather"). Atmospheric Surveillance

Scatter Of Acoustic Wavefields From The Ocean Air/Sea Boundary Zone



PHYSICS

Rough Surface Scatter

Scatter from Volumetric Variability of the Index of Refraction

Microbubble/Macrobubble Plumes

Resonance Scatter

Individual Bubbles
Bubble Clouds

Initial Focus Blue Water, 10-800 Hz, Low Angle of Incidence

OBJECTIVE

Theoretical Prediction/Experimental Verification

Spatial, Spectral and Temporal Properties of Scattered Acoustic Field as a Function of Environmental Scaling Parameters, e.g. Wave Directional Spectrum, Wind Friction (u_*) Reynolds Number

Present Conjecture - Dominant Scattering Processes

10-200 Hz Rough Surface Dominates (all u_*)

200$\simeq$1500 Hz Macro/Microbubble Plume Scatter ($u_* > 5\ ms^{-1}$)

$\gtrsim$1500 Hz Resonant Microbubble Scatter ($u_* > 5 ms^{-1}$)

NAVAL RELEVANCE

Emerging Active USW System Design and Strategies Require Understanding of Air/Sea Boundary Zone Scattering Physics

LOW GRAZING ANGLE SCATTERING

HYPOTHESIZED SCATTERING MECHANISMS:

A. *SPECULAR FACETS*

Effective < 20deg

B. *MULTIPLE SCATTERING*

Corner reflector

C. *WEDGES*

Typical wave geometry

D. *BRAGG WAVES*

Near unstable waves

OBJECTIVE:

- UNDERSTAND THOSE OCEAN SURFACE PROCESSES WHICH AFFECT RADAR BACKSCATTER AT LOW GRAZING ANGLES

APPROACH:

- LABORATORY STUDIES TO IDENTIFY SCATTERING MECHANISMS RESPONSIBLE FOR "SEA SPIKES"

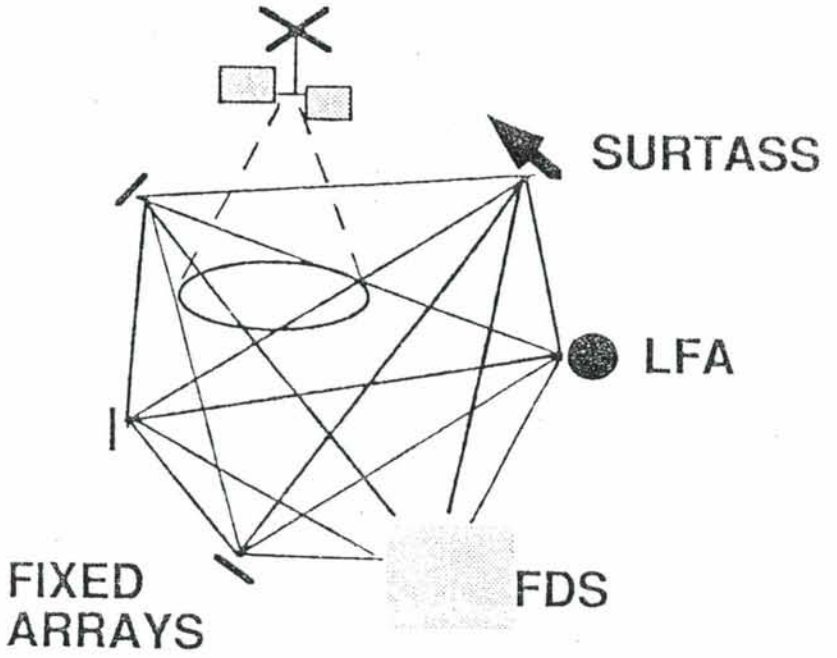
- DEVELOPMENT OF SCATTERING MODELS BASED UPON NON-LINEAR GEOMETRIES OF OCEAN SURFACE
  - -BREAKING WAVES
  - -WEDGE SHAPED WAVES

PAYOFF:

- IMPROVED RADAR CLUTTER MODELS FOR SEA-SKIMMING MISSILES AND AIRBORNE IMAGING SURVEILLANCE SENSORS

- NEW, SHIPBASED, SCIENCE TOOLS FOR AIR-SEA PROCESSES

OCEAN OBSERVING STRATEGIES



OBJECTIVE:

Develop and implement the methodologies needed to design a system capable of observing the ocean in a manner suitable for providing data to Navy ocean prediction models andor monitoring global change

APPROACH

Explore design methodologies

- Observing System Simulations
- Inverse methods
- Control theory techniques

Implement a testbed system

- Acoustic tomography
- Data telemetry

PAYOFF:

New science from new observations

System design for supplying data to numerical forecast models

Integration of multiple distributed sensor systems

Provide testbed for new sensor evaluation

6.1 OCEAN SCIENCES
FY92 INITIATIVES

MESOSCALE INTERACTIONS IN WEAKLY NONLINEAR REGIMES

Understand formation, evolution and dissipation of ocean physical and biological structures found predominately on eastern sides of oceans. ASW/ADI; Ocean Forecasting

SEA ICE MECHANICS

Microscale to structural scale (km) constitutive behavior of sea ice including fracture mechanics of inhomogeneous, high temperature materials. ASW; Ocean Surveillance/Logistics/Arctic Ops

NONLINEAR OCEAN WAVES

Nonlinear dynamical systems (chaos) approach to surface wave interactions and stability. ASW/ASUW; Logistics/Ocean Surveillance

TRANSFORMATION DYNAMICS OF MARINE AEROSOLS

Understand and model marine aerosol dynamics (gas to particle transformation) and resultant electro-optical propagation. ASUW/AAW/C3I/STW

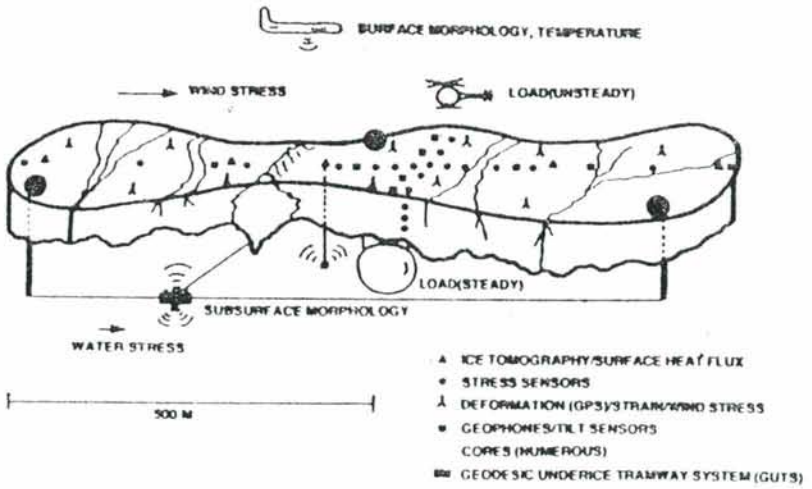
SUBBOTTOM PHYSICAL PARAMETERS - SWATH TECHNIQUES

3-D geologic structure and geoacoustic properties on spatial scale required for LFA and VLF systems. ASW/MIW

APPLIED SURFACE REVERBERATION

Exploit and extend the ONR Special Research Program work on Acoustic Surface Reverberation, with concentration on bubbles; work with the Critical Sea Test program. ASW/Ocean Surveillance

SEA ICE MECHANICS



OBJECTIVES

- UNDERSTAND THE STRESS-STRAIN RELATIONSHIP OF SEA ICE ON SCALES FROM 1 CM TO 1 KM AND ESTABLISH CONSTITUTIVE LAWS GOVERNING OBSERVED CONTINUUM BEHAVIOR
- UNDERSTAND THE FRACTURE MECHANICS OF SEA ICE AND DEVELOP HIERARCHICAL RELATIONS TO PREDICT MACROSCALE BEHAVIOR FROM MICROSCALE STRUCTURE
- UNDERSTAND THE THE ROLE OF THE MACROSCALE STRESS FIELD IN CONDITIONING FAILURE MODE EVOLUTION AS THE BASIS FOR PREDICTION AND CONTROL OF PEAK LOADS ON STRUCTURES.

TECHNICAL APPROACH

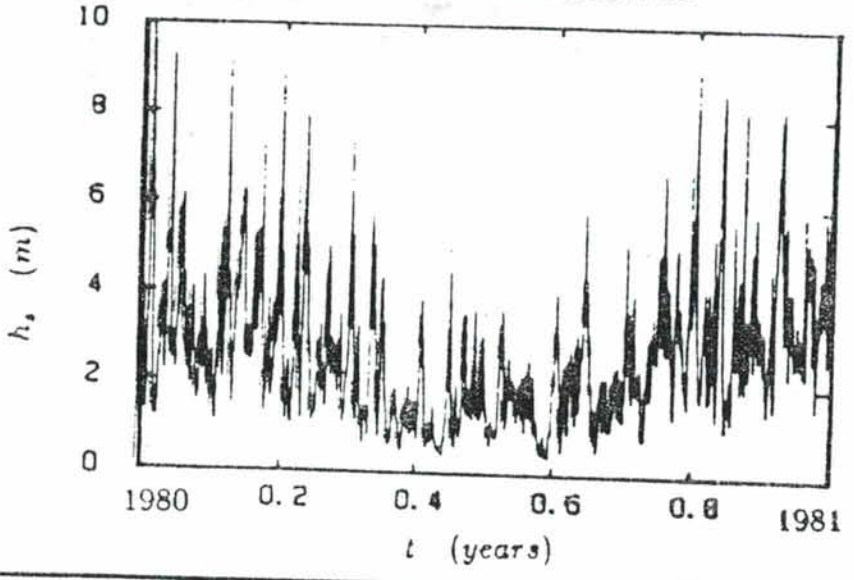
	THEORY	LABORATORY	FIELD
CONSTITUTIVE	CONTINUUM LIMITS RECRYSTALLIZATION	3-D DEFORMATION	PLATE DYNAMICS LOADING MECHANISMS
	NONLINEAR MODELS HOMOGENIZATION LOCALIZATION	TRI-AXIAL TESTING	3-D STRESS-STRAIN FIELD STRESS-STRAIN COHERENCE UNDER GEOPHYSICAL AND CONTROLLED LOADING
FRACTURE/ FAILURE	FRACTURE CRITERIA STRESS CONCENTRATION	NUCLEATION-PROPAGATION STRESS CONCENTRATION	3-D FLAW DISTRIBUTION
	INELASTIC MODELS STOCHASTIC MODELS	SPECKLE INTERFEROMETRY MOIRE INTERFEROMETRY COMPLEX STRESS STATES	TOMOGRAPHIC IMAGING NATURAL FLAW COHERENCE INDUCED FRACTURE, FAILURE

NAVAL RELEVANCE

- MODELS FOR PREDICTION OF ICE CONCENTRATION AND THICKNESS
- SUBMARINE AND SENSOR PENETRATION THROUGH ICE
- ICE LOADING ON VESSELS AND STRUCTURES
- AVIATION AND ENGINEERING OPERATIONS ON/UNDER ICE
- ACOUSTIC AMBIENT NOISE, DIRECTION AND AMPLITUDE
- ACOUSTIC PROPAGATION, PARTICULARLY AT LOW FREQUENCIES
- ELECTROMAGNETIC PASSIVE SIGNATURES, ACTIVE ATTENUATION

NONLINEAR OCEAN WAVES

WAVE-HEIGHT STATISTICS



OBJECTIVES:

- UNDERSTAND THE NONLINEAR DYNAMICS OF OCEAN WAVES, E.G., WAVE-WAVE, WAVE-CURRENT, WAVE-WIND INTERACTIONS
- DETERMINE THE MECHANISMS FOR WAVE GROUP DYNAMICS
- MODEL AND CALCULATE EVOLUTION OF NEARLY BREAKING AND BREAKING WAVES

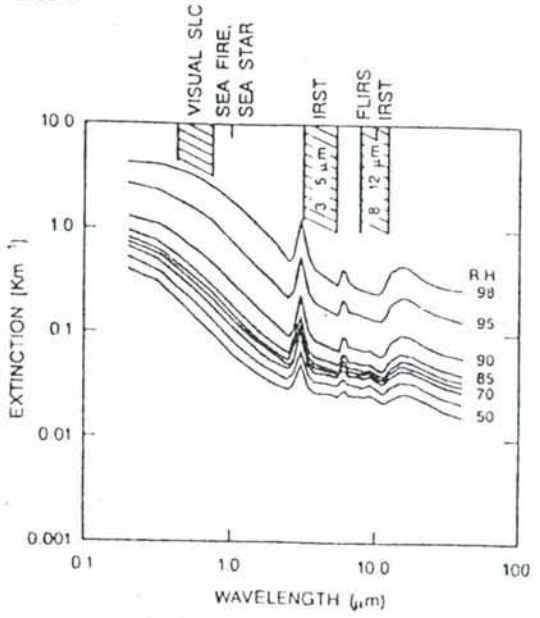
APPROACH:

- THEORETICAL FOCUS ON NONLINEAR DYNAMICAL ASPECTS (E.G. CHAOS, MODE-LOCKING) OF OCEAN SURFACE WAVES
- WAVE TANK EXPERIMENTS FOR WAVE GENERATION, INTERACTIONS WITH WIND, CURRENT, TOPOGRAPHY AND OTHER WAVES
- ANALYSIS OF FIELD EXPERIMENTS

PAYOFF:

- IMPROVED MODELS FOR SHIPWAKE AND SIGNAL DETECTION IN THE OCEAN
- WAVE CLIMATE FORCASTING AND IMPROVED ANALYSIS OF OBSERVATIONS
- PREDICTORS OF EXTREME EVENTS

TRANSFORMATION DYNAMICS OF MARINE AEROSOLS



OBJECTIVE:

MECHANISTIC UNDERSTANDING

- UNDERSTAND THE PHYSICAL AND CHEMICAL MECHANISMS DETERMINING THE SIZE DISTRIBUTION AND CHEMICAL COMPOSITION OF MARINE AEROSOLS

PREDICTIVE CAPABILITIES

- EXPLOIT THEORETICAL MODELS AND EMPIRICAL EVIDENCE TO PREDICT AEROSOL SIZE DISTRIBUTIONS IN RELATION TO METEOROLOGICAL AND OCEANOGRAPHIC CONDITIONS

APPROACH:

MODELING

- PREDICTIVE CAPABILITIES AND CROSS-CHECK. ARE ALL THE ZEROTH ORDER PROCESSES IN HAND?

LABORATORY

- COMPOSITION AND REACTION KINETICS

FIELDWORK

- SAMPLING, DATABASE, AND PROCESS EVALUATION

PAYOFF

E-O EXTINCTION

- PERFORMANCE OF PLATFORMS AND SYSTEMS

6.1 OCEAN SCIENCES

FY92 CORE/BASE ENHANCEMENTS

NEARSHORE PROCESSES

Understand the cascade of wave energy to short (turbulent) length scales and the consequences of both fluid momentum and sediment transport processes. AMW/MIW; Logistics

INTERNAL WAVES

Improve existing IW models (Garrett & Munk Model) to include 3-D effects. ASW; Ocean Forecasting

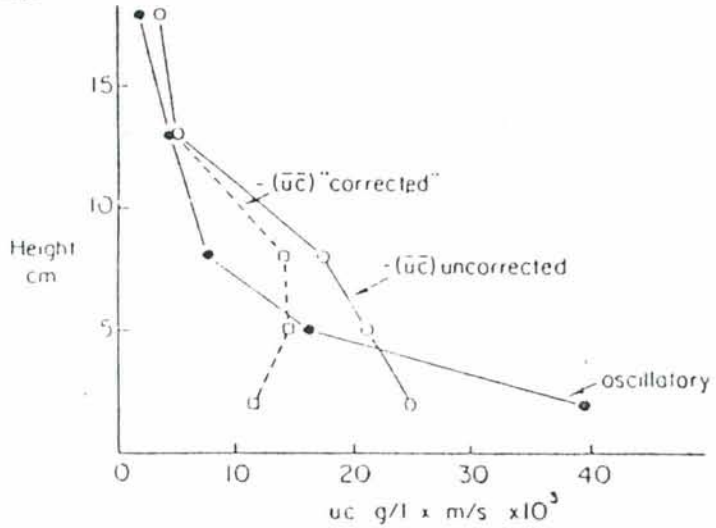
MOLECULAR BIOLOGICAL OCEANOGRAPHY

Advanced molecular tools to understand biological oceanographic processes. ASW/MIW/SSBN; Logistics

IN SITU SURFICIAL SEDIMENT GEOACOUSTIC PROPERTIES

Small-scale acoustic propagation and scatter in sediments - heterogeneous, porous, elastic media. MIW/ASW; Logistics

NEARSHORE PROCESSES



Objective:

To understand the cascade of energy to short length scales and the consequences on fluid and sediment transport processes

Approach:

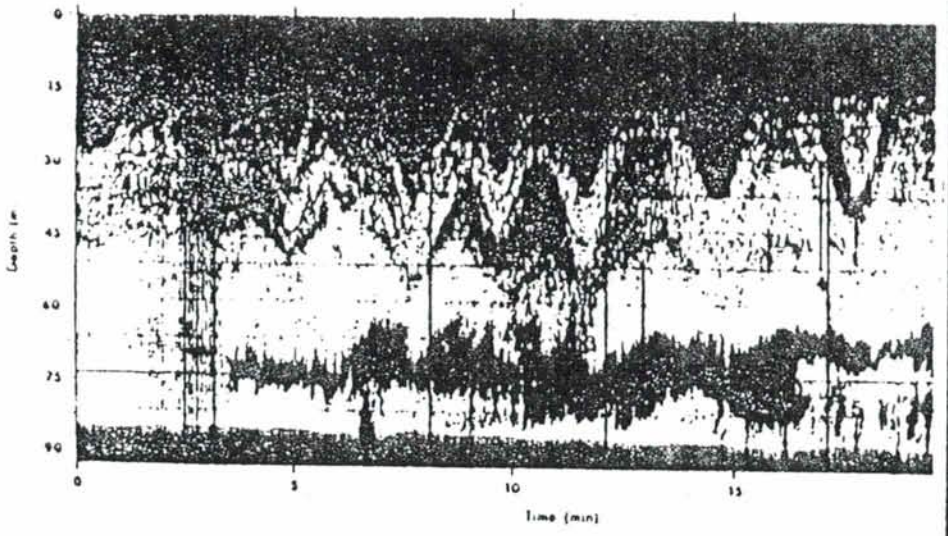
- field measurements including instrument development
- parallel theoretical and numerical modelling effort

Payoff:

- environment prediction (amphibious assault, over-the-shore)
- mine detection
- sediment transport
- broad applicability

Feb. 22, 1990

INTERNAL OCEAN MIXING



OBJECTIVE:

UNDERSTAND THE FORMATION AND EVOLUTION OF OCEAN MIXING EVENTS (PATCHES)

- IDENTIFY MECHANISMS CAUSING INTENSIVE MIXING/DISSIPATION EVENTS
- ESTABLISH BOUNDS ON ENERGY LEVEL & SPATIAL EXTENT
- DETERMINE ASSOCIATED PARTICLE FLUXES
- IDENTIFY ACOUSTIC SCATTERING MECHANISMS

APPROACH:

- THEORETICAL & LABORATORY STUDIES TO CHARACTERIZE MECHANISMS
- FIELD EXPERIMENTS IN REGIONS OF KNOWN INTENSE MIXING TO CHARACTERIZE PATCH GENERATION & EVOLUTION
- MODELING TO IMPROVE CLOSURE PARAMETERS

PAYOFF:

- ESTABLISH BASIS FOR UNIFIED FINE/MICROSTRUCTURE MODEL
- PROVIDE IMPROVED CLOSURE FOR MODELS
- ENHANCE UNDERSTANDING OF ACOUSTIC SCATTERING & PARTICULATE FLUXES
- CHARACTERIZE OCEAN BACKGROUND

6.1 OCEAN SCIENCES

FY92 UNIVERSITY RESEARCH INITIATIVES (URIs)

REAL-TIME ENVIRONMENTAL DATA MANAGEMENT

The objective is to develop the capability for real time collection, assimilation, and display of in situ and/or remotely sensed data, as well as understanding the processes being observed.

BIOPHYSICAL INTERACTIONS IN THE MARINE ENVIRONMENT

Determine how system dynamics on widely differing scales are to be linked in theory or numerical models to predict the distribution of biological organisms and biologically derived materials.

OCEAN SURFACE PROCESSES

Develop linkages between remote sensing efforts at small scales (km) with signatures at larger synoptic scales, including the physically-based closure of numerical models at sub-grid scales.

APPENDIX XV

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Silver Spring, MD 20910
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

JUN 15 1992

Dr. Garrett W. Brass
Chair,
University-National Oceanographic Laboratory System
RSMAS-MGG,
University of Miami
4600 Rickenbacker Causeway
Miami, Florida 33149

Dear Gary,

Through internal routing, I received a copy of your 29 May letter to Dr. Knauss. There was one part in particular which caught my attention. This was in reference to my saying that NOAA would probably ask for only 100 days on the UNOLS vessels. The tone implied that I was being less than cooperative. In fact, what I was attempting to do was to clarify the issue of number of possible days earlier rather than later. I also mentioned that the issue of the number of days revolved around the proposed reactivation of the OCEANOGRAPHER. As clarification:

- The letter from Dr. Knauss, as I understand, was for fact finding with the expressed intent of determining if UNOLS could provide sufficient ship time to cover NOAA's needs during the time that the DISCOVERER and BALDRIGE are scheduled for extensive repairs. This information will be used in making the decision for reactivation of the OCEANOGRAPHER. If UNOLS cannot provide the 240 to 250 days, then a compelling argument can be made for reactivating the OCEANOGRAPHER. The repair work on the DISCOVERER and BALDRIGE was originally scheduled for Fiscal Years 1994 and 1995, but now due to the funding may be delayed until Fiscal Years 1995 and 1996. The out years referred to in Dr. Knauss' letter were based on the anticipated increase in allowable number of funded sea days as part of our fleet modernization.

- Totally independent of the OCEANOGRAPHER reactivation issue, NOAA has identified a need for 189 days of UNOLS ship time in Fiscal Year 1994. Of these, 80 days are tentatively identified with the VICKERS to support a WOCE line and an additional 109 days to support TOGA TAO in the equatorial Pacific. It was this last 100 days to which I was referring.

I will make no attempt to prejudge the decision process regarding the reactivation of the OCEANOGRAPHER. What I find particularly appealing, however, is that NOAA is taking positive steps to work closer with UNOLS to meet both of our needs.

Sincerely,

William L. Stubblefield
Executive Director

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

RSMAS-MGG, Univ. of Miami
4600 Rickenbacker Cswy
Miami, FL 33149

Dr. John A. Knauss
Undersecretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration
Department of Commerce, Room 5128
14th Street and Constitution Avenue, NW
Washington DC 20230

29 May 1992

Dear John,

Thank you for your letter of 18 May describing NOAA's needs for time aboard large, general purpose oceanographic vessels. UNOLS will make every effort to fill your needs. I am circulating your schedule to the operators of the large vessels in the UNOLS Fleet (WHOI, SIO, LDGO and Univ. of Wash.) for their information. The UNOLS preliminary scheduling meeting takes place during the week of 15 June. We should be able to respond to your request by 1 July. As you may know, the UNOLS Scheduling system operates on a calendar year basis. The scheduling activity now underway will have to include your requests for time in calendar year 1993 even though it represents FY '94 money to you. A financial commitment to use this ship time in calendar 1993 will be needed by the time of the Fall scheduling meeting on September 14, 1992 (assuming you are satisfied with the time and vessel assigned).

On Monday Jim Baker, Jack Bash, Dick Pittenger and I had a fruitful meeting with Ned Ostenso, Sig Peterson, Chris Andreasen and Admiral-to-be Stubblefield. At this meeting Bill Stubblefield informed us that the ship time that NOAA would be able to buy was unlikely to be the 250 days you have communicated to us. Bill informed me that it would be more like 100 days. This is disappointing but UNOLS will accommodate NOAA as best we can, regardless of the days requested. I must ask, however, for clarification of your ship time requirements. We need to know which of the days you requested in your letter you will actually request and, in particular, whether you will actually use the days you have requested in calendar 1993. You can, I'm sure, appreciate the difficulty we will face if we try to fit in your 250 day requests and then disappoint our operators and disrupt our schedules with a much reduced number of days at a later date.

There are some subtle problems with your request that should be made clear at this stage. Your schedule indicates "Days at Sea" and notes that these are "actually at sea rather than away from home port." You should be aware that UNOLS vessels are required to charge all federal agencies in the same way. Ship time charges will include as billable days time spent during turn-around activities in ports away from home port. In-port time is pro-rated between the user getting off the ship and the user getting on. Some of your needs may require substantial transits to your starting ports. Long transits must be paid for and this is usually accomplished by agency-to-agency negotiations between the agencies sponsoring the cruises immediately before

and after. I bring these items up as they may represent significant difficulties in the future and UNOLS Operators are not at liberty to change their accounting procedures.

Another factor which may influence your decisions is your speed request. The UNOLS vessels capable of meeting your needs are capable of 14 knot speeds but generally cruise at 12.5 knots. If 14 knot speeds are actually essential we need to bring this fact to the close attention of the operators.

For the time being, UNOLS will proceed to supply you with the information you have requested. We will include the 63 days you have requested for the equatorial Pacific in 1993 in the current scheduling process. Please provide us with a revised schedule of future NOAA needs as soon as possible

Sincerely,

Garrett W. Brass
Chair, UNOLS

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

RSMAS-MGG, Univ. of Miami
4600 Rickenbacker Cswy
Miami, FL 33149

Mr. Ken Palfrey, UNOLS Scheduling Committee
RADM Richard F. Pittenger, WHOI
Dr. Robert A. Knox, SIO
Mr. Robert Hinton, Univ. of Wash.
Mr. Michael Rawson, L-DGO

29 May, 1992

Dear Operators and schedulers. Enclosed please find the details of NOAA's expected needs for ships in the "large" class. Also enclosed please find a copy of my reply to Knauss. Please come to the Scheduling Meeting on 16 and 17 June prepared to discuss the possibility that your vessel might be able to handle all or part of this ship time. NOAA representatives will be present at the meeting for discussions. Please note that the only calendar year '93 time requested is 63 days-at-sea (sic) in the Eastern Equatorial Pacific for TOGA and EPOCS. Also note in my reply that there remain some gaps in understanding of UNOLS standard billing procedures which NOAA will have to come to grips with. Please be particularly sensitive to any equipment requirements spelled out by NOAA that you are not currently able to supply so that we can consider equipemtn swap arrangements as necessary.

NOAA has <u>not</u> committed to buy this ship time. It is up to UNOLS to lead them to the light. We need to be most forthcoming to NOAA while at the same time educating them in the ways of the UNOLS Fleet. I have every confidence in you, the "Big Four" of UNOLS.

Sincerely,

Garrett W. Brass
Chair, UNOLS

JOI **Joint Oceanographic Institutions**
INCORPORATED

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Washington, DC 20036-2102 USA

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May 26, 1992

TO: JOI Board of Governors
Academic Fleet Committee

FROM: D. James Baker DJB
President

SUBJECT: Academic Fleet/NOAA Interactions

On Monday, May 18, Dick Pittenger, Gary Brass, Jack Bash, and I met with NOAA representatives Ned Ostenso, Segmund Peterson, Chris Andreasen, and Bill Stubblefield to discuss the next steps in NOAA interactions with the academic fleet. The discussions ranged from the general concept of the National Research Fleet to the specifics of ship time use.

On the National Research Fleet concept, NOAA is not yet convinced. The enclosed letter from Knauss, received yesterday, presents NOAA's position. In my view, we should start by working agency by agency, using NOAA as a test case with this scheduling process. If this doesn't work, then a broader concept probably wouldn't work either. NOAA is also concerned that it might lose a constituency in Congress with an integrated fleet; I don't know if this is true or not.

On scheduling in the near term, we were interested in seeing whether NOAA's need for time on large ships could be met with UNOLS vessels (e.g., Knorr, Melville, Ewing, or AGOR 23–25). The UNOLS estimate is that about 300 days of large ship time and 700 days of intermediate ship time will be available in the next few years. The latter is easier to handle than the former, and in fact is being covered with the NOAA time on the Vickers, other NOAA purchases, and the current planning for T-AGOS. But the former, the 300 days, is a major problem.

It is clear that NOAA does have needs for the larger vessels, but would it insist on blocks of time or rigid schedules that cannot be accommodated by the UNOLS process? Brass pointed out that UNOLS is ready to help and emphasized that the UNOLS process can and does regularly accommodate fixed schedules for time series measurements, cooperative programs, etc. The NOAA scheduling process is about six months ahead of the UNOLS process; Brass pointed out that UNOLS would be willing to respond, especially if NOAA could make early commitments. It was agreed, as Knauss says in his letter, that NOAA will come to the next UNOLS meeting ready to lay its specific requirements on the table.

Enclosures

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

MAY 18 1992

Dr. Garret W. Brass
Chair, University-National Oceanographic
Laboratory System Council
Rosentiel School of Marine and Atmospheric Sciences
4600 Rickenbacker Causeway
Miami, Florida 33140-1098

Dear Dr. Brass:

In response to my request for an academic spokesperson, D. James Baker responded identifying the Joint Oceanographic Institutions Incorporated (JOI) as the appropriate representative. Based on his letter, NOAA anticipated that JOI would identify excess ship capacity within the academic fleet for possible use in support of NOAA needs. However, subsequent discussion between NOAA and JOI has identified that you, as chair of the University-National Oceanographic Laboratory System (UNOLS) Council, should be the contact in regard to possible excess ship time.

I am presently in the process of determining how NOAA can accommodate high-endurance research platform requirements during the initial years of our fleet modernization. UNOLS has suggested that it may have the capacity to respond to NOAA's needs for the interim period. The feasibility of this depends on the availability and costs of your ship resources, specifically for substantial blocks of dedicated Class I - Class II high-endurance ship time in locations that will not require unreasonable transit times.

During fiscal years (FY) 1994 and 1995 we have identified a shortfall of approximately 250 days at sea per year. Depending upon funding for NOAA's fleet modernization, this shortfall could be increased by as much as 325 days per year. Furthermore, we expect a shortfall of at least 250 days per year to continue through FY 98. It is for this 5-year shortfall that we are pursuing alternative solutions. Accordingly, we need to know if the university community can commit to satisfying NOAA's shortfall of at least this level over the entire 5-year period. NOAA's needs are summarized in the enclosure.

My decision on satisfying this shortfall must be made soon in order that our research programs not be affected. I ask that you review the availability of UNOLS fleet assets in FYs 94 and 95 and identify the support level which the university community can commit to NOAA. I also ask you to provide a cost estimate which

THE ADMINISTRATOR

will include all ancillary equipment and technician support. In conducting the review, UNOLS should not include augmentation of the university fleet with the express intent of meeting NOAA's programmatic needs. I encourage you to contact and coordinate your review with Captain David Yeager at (301) 443-8007. I also ask that, if at all possible, you respond by July 1, 1992.

I look forward to working with you on this issue.

Sincerely,

for John A. Knauss

Enclosures

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

MAY 18 1992

Dr. D. James Baker
President
Joint Oceanographic Institutions Incorporated
1775 Massachusetts Avenue, N.W.
Washington, D.C. 20036-2102

Dear Dr. Baker:

Thank you for your letter regarding an academic spokesperson to foster improved coordination of ship operations within the oceanographic community. While the National Oceanic and Atmospheric Administration (NOAA) has certain mission requirements and priorities that are not compatible for an integrated approach, some are, and I am interested in improving the effectiveness of our overall response to ocean needs.

Your response indicated that the Joint Oceanographic Institutions Incorporated (JOI) would provide NOAA-academic fleet liaison and identify excess ship capacity within the academic fleet for possible use in support of NOAA needs. As a result of further discussions, NOAA now understands that Dr. Brass is to be the contact for identifying excess ship time within the academic community. Thus, I am forwarding to him a detailed listing of our anticipated needs for high- and medium-endurance ship time for the period FY 1994-1998, which represents needs during the initial years of our proposed fleet modernization program.

The concept of a "national fleet" cited in your response conjures up many interpretations and definitions. I endorse the concept of a nationally integrated fleet wherein individual operators coordinate the most effective response to our national priorities for oceanographic research. Of course, my view of a "national fleet" pertains only to NOAA's relationship, and I cannot speak for other agencies in this regard. My response is not intended to imply a restructuring of our respective fleets. Conceivably, we can achieve the goals of a "national fleet" through an integrated approach of more effective coordination and cooperation without restructuring.

NOAA looks forward to our continued efforts to achieve such an integrated approach.

Sincerely,

John A. Knauss

THE ADMINISTRATOR

T. Pyle

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May 14, 1992

Dr. Ned Ostenso
Assistant Administrator for
Oceanic and Atmospheric Research
National Oceanic and Atmospheric Administration
1335 East-West Highway, Room 4318
Silver Spring, MD 20910

Dear Ned:

Thank you for your letter of March 5 on research ships. Since then, JOI and UNOLS have continued to discuss our priorities and we have provided our viewpoints to the Ocean Studies Board at their Monterey meeting.

Our meeting on May 18th will be a good opportunity for JOI and UNOLS to discuss these issues in more specific terms with you and your colleagues, as you proposed in your letter. I suggest that we keep the agenda simple, and focus on just two items: (1) What NOAA research ship shortfalls can be filled by UNOLS? and (2) What is the best mechanism for accomplishing this?

We're looking forward to seeing you then.

Yours sincerely,

Jim

D. James Baker
President

cc: JOI Ship Committee
J. Bash
G. Brass

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Silver Spring, MD 20910
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

MAR - 5 1992

Dr. D. James Baker
Joint Oceanographic Institutes,
Incorporated
1755 Massachusetts Avenue, N.W.
Washington, D.C. 20036

RP JOI Ship file

Dear Jim,

I have read with interest your February 22, 1992 letter to John Knauss regarding coordinated ship operations between NOAA and UNOLS. The letter and its attachment suggests that NOAA might assume a role analogous to that played by NSF and ONR in this relationship and, further, that UNOLS might also assume the rasponsibility of satisfying the research vessel requirement for other Federal agencies (e.g., USGS, DOE, EPA and OPNAV).

The analogy of NOAA assuming a role similar to NSF and ONR is limited in that NSF has no operational responsibilities and ONR does not incorporate its laboratory vessel requirements into the UNOLS pool. The further extension of UNOLS meeting other agencies' research mission needs is tantamount to converting UNOLS to NOLS. Under "the principle that research facilities are best managed by the scientists they serve whether from academia, industry, or government laboratories is derived from experience" would argue that Federal agencies then become full NOLS partners. This has profound consequences and I would welcome your thinking on such a transformation. Accordingly, I am asking my secretary, Judy Ceasar, to schedule a meeting after my return from Bangkok so that I might learn more about you and JOI's views on this topic.

Sincerely,

Ned A. Ostenso
Assistant Administrator

MAR 3 1992

TESTIMONY
OF
RAY KAMMER
DEPUTY UNDER SECRETARY FOR OCEANS AND ATMOSPHERE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U. S. DEPARTMENT OF COMMERCE

BEFORE THE

SUBCOMMITTEE ON OCEANOGRAPHY, GREAT LAKES
AND THE OUTER CONTINENTAL SHELF
COMMITTEE ON MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES

MAY 20, 1992

Mr. Chairman and Members of the Subcommittee:

Thank you for the invitation to testify on the Fleet Replacement and Modernization (FRAM) Program within the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The Congress has recognized this very important program by appropriating $33.2 million in FY 1992. This funding is enabling us to begin this vital program earlier than originally planned by NOAA. We are using these funds in FY 1992 and FY 1993 in a cost effective manner to ensure a well executed program. These funds are being used to develop ship requirements, start design work on the replacement ships, begin specification development for the Repair to Extend (RTE) for the first of the existing ships, perform critical maintenance on the existing ships, purchase a multibeam sonar in accordance with Congressional direction, charter commercial ship time and pay for program office salaries and expenses directly associated with fleet modernization.

In FY 1991, NOAA conducted a major Ocean Fleet Modernization Study which led to the establishment of the FRAM Program to repair, modernize and eventually replace the current fleet over the next 15 years resulting in a modern, supportable fleet with the capabilities to meet NOAA's mission requirements both now and well into the 21st century. The Administration acknowledges and supports the need to replace NOAA's aging fleet. The plan, as it currently exists, would cost approximately $1.4 billion over the next 15 years. There must be flexibility in the plan to account for differing alternatives and developing technology. Like any other program, the annual funding request for the FRAM Program is subject to the budget process. However, it is not a question of whether we are going to do the program, but only a question of how much per year.

The Program is comprised of several parts. The first is critical maintenance of our existing fleet. This effort is necessary to keep our existing ships in satisfactory condition so that they can continue to perform NOAA's legislatively mandated mission. Eight million dollars of the FY 1992 appropriation has been allocated to this effort and the $2 million requested in FY 1993 is also for critical maintenance.

In accordance with the language in the FY 1992 Appropriations conference report, NOAA is proceeding with the development and procurement of a multibeam sonar. The cost of this development

and procurement, including spare parts and user training is currently estimated at $1.6 million of the FY 1992 appropriation.

The most important part of the FRAM program is the eventual replacement of the aging fleet. The program plan is to construct, convert, charter or otherwise acquire 20 new ships for the NOAA fleet over the next 15 years. The procurement of these ships is spread over this time period for several reasons. Practically, it takes time to design and build a fleet of the magnitude and capability NOAA requires. There is also long term benefit to NOAA in this approach. By procuring the new ships over the next 15 years, the ships will not all reach obsolescence at the same time. At the end of the 15 year period, the ships procured first will be ready for mid-life upgrades. When the ships reach the end of their useful lives, usually 30 years, NOAA will be faced with replacing a few ships at a time in a gradually aging fleet. This way NOAA can maintain a modern, up-to-date fleet to meet its changing mission needs well into the future.

We have started the process with the FY 1992 funding. The 1991 Ocean Fleet Modernization Study defined initial draft requirements for the future NOAA fleet. Using the FY 1992 funds, we are defining the ship-specific requirements. This effort is being performed by the Office of NOAA Corps Operations, working with each of the NOAA Program Offices. This is an iterative process. Once requirements are drafted, design and costing

studies are conducted. These initial studies roughly define the size and cost of the replacement ships. This effort is being performed by the Systems Program Office (SPO) within NOAA. Since this is a major program within NOAA, the SPO is responsible for the design, technical specification development, and contract development, award and oversight for the FRAM program.

The FRAM Program Office is in the process of hiring its staff. In order to minimize the size of the office and the short and long term personnel costs associated with it, NOAA is utilizing some U.S. Navy civilian personnel experienced in the commercial design of oceanographic type ships. The SPO has signed a Memorandum of Agreement with the Naval Sea Systems Command for support of the FRAM program and its personnel. However, this support is provided only in response to specific requests by NOAA and will be under the direct management of the NOAA FRAM Program Office. The Navy has recently delivered a number of oceanographic ships designed to commercial standards. In fact several of the University - National Oceanographic Laboratory System (UNOLS) ship requirements specifications were prepared by the Navy and the ships were purchased by the Navy, including the recent AGOR for the University of Washington. This experience, along with that of the shipbuilding design and construction industry, will all be used in the NOAA FRAM Program. The Program Office will be a mix of NOAA employees and Navy employees working for NOAA on an interagency cost reimbursable basis. The Program

Manager and all upper level managers will be NOAA employees. Reimbursable employees can be used for shorter term needs without incurring the long term liability of permanent NOAA hires. This will help keep down the management costs to the program. The NOAA ships will be designed to commercial specifications, meeting American Bureau of Shipping and U.S. Coast Guard requirements. They will not use U.S. Navy standards. The Navy has several design contracts in place that can be used to support the FRAM Program. Most of the major U.S. ship design firms are covered by these contracts. It is faster to utilize these contracts rather than for NOAA to develop and award their own. The ship design efforts will be managed by the NOAA FRAM Program Office, not the Navy. The Navy will not be issuing any design contracts for NOAA. Ship design work must be ongoing now to support the FRAM Program Plan. Using existing Navy contracts provides this design support immediately. Utilizing experienced Navy personnel as necessary on a cost reimbursable basis also benefits the program. NOAA can take advantage of the Navy's experience and lessons learned from similar ship acquisition programs.

As ship design studies are conducted, the results are fed back to the platform users to ensure that the designs meet their needs and are affordable. Often, especially in the early stages of requirements definition, this feedback process results in modifications to the requirements. This iterative process will be conducted for each type of ship in the program. A process has

been established to ensure participation by all parties in the definition of requirements and in the design development. The first new ship construction awards are planned for FY 1994, subject to the budget process. We also have a contract option in the Navy's new AGOR solicitation for a NOAA AGOR. This is a follow on procurement of ships similar to the University of Washington's THOMAS THOMPSON. Once this contract has been awarded by the Navy, the NOAA AGOR option can be exercised in either FY 1994 or 1995. Because of the number of different types of ships within the NOAA fleet and the diversity of scientific missions, this requirements and design process will continue throughout the program until all ships have documented, affordable requirements and are under contract. It is imperative that the platform users, NOAA Corps, and the Program Offices maintain this dialogue with the FRAM Program Office in the SPO throughout the program. This has been the case thus far and it will continue. Ships are very complex systems to design and build. In order to have good shipbuilding, conversion or repair contracts, you need clear, enforceable technical specifications. This does take time. However, we are taking care in this major NOAA program to conduct this process properly, therefore ensuring that we procure ships that meet our mission needs within a reasonable budget and schedule.

As part of this requirements and design process, we will also evaluate different ways of meeting NOAA's needs. This includes chartering, use of the UNOLS ships as well as other existing government assets. NOAA already uses chartering to a large extent; 32 percent of NOAA's total days at sea in FY 1992 will be chartered. Three million dollars of the FY 1992 appropriations is planned for charter. NOAA also is currently operating the University of Southern California ship, the R/V VICKERS. This is giving us experience with NOAA operating a non-NOAA ship. NOAA also has committed to issuing Request for Proposals for a one year trial Exclusive Economic Zone (EEZ) chartering effort. Assuming the costs are affordable, NOAA would contract with a commercial firm to collect data in the EEZ. The details will be in the solicitation. The Navy has determined that some of its soon to be excess T-AGOS ships will be available to NOAA. These ships were designed and built to commercial specifications. Although the availability schedule is unknown at this time, we expect to be able to modify these relatively new ships to meet some of our mission requirements. Neither the development of T-AGOS conversion specifications and contracts nor the conversions of these particular ships were in the original plan. However, we expect that they can be used in place of some of the new construction ships in the plan and the plan will be modified to reflect those changes. This is a welcome new development that we are actively pursuing.

An important part of NOAA's FRAM Plan is the replacement over 15 years of small vessels that are operated by NOAA programs and laboratories. NOAA's investment in these vessels, although small in comparison to the large ships, will provide more productivity and enhance our ability to collect and analyze oceanographic and limnological data critical to our missions. NOAA's Great Lakes Environmental Research Laboratory (GLERL), located in Ann Arbor, Michigan, operates the vessel SHENEHON. This vessel will be replaced during the early part of the FRAM program. Scientists at the GLERL working with the Fleet Modernization Staff are currently defining the requirements which will serve as the basis for the design and construction of a research vessel that will provide support to the Laboratory. The replacement vessel will be outfitted with modern state-of-the-art instrumentation and will significantly improve the research capability in the Great Lakes Area.

As we develop ship requirements documentation and specifications, we will invite the shipbuilders to comment. Some ships will be procured utilizing a Circular of Requirements (COR), thus allowing shipbuilders to propose their own solutions to meet NOAA's requirements. Others will be NOAA commercial designs or existing designs. In either case, the CORs and designs will be provided to the shipbuilding industry for review and comment. This will allow the industry to identify areas where they believe NOAA's requirements or specifications are overly burdensome or

costly, thus keeping the ships as affordable as possible while meeting NOAA's needs. Ultimately, the contracts for ship detail design, construction, conversion, lease or other alternatives will be openly competed, thus obtaining ships that meet NOAA's needs at the lowest realistic cost. The restriction on foreign construction of ships and ship repair that applies to the armed forces does not apply to NOAA. This is consistent with our international trade obligations. NOAA is subject to an international agreement to which the United States is a party, the GATT Agreement on Government Procurement (Code). The Code requires Signatories to conduct procurements subject to it in a competitive and non-discriminatory manner for products of other Signatory countries. The Trade Agreements Act of 1979 which implements this agreement is based on reciprocity and is in the best interest of U.S. industry.

Parallel with the requirements, design, and procurement effort for the new ships is the repair and modernization of the existing fleet. This portion of the program, called RTE, will take 13 of the ships in the existing fleet and repair and modernize them over the next several years. This effort is concentrated in the earlier portion of the program. RTE is not intended to be a complete rehabilitation of these ships, rather to do only what is necessary for these ships to perform their mission reliably until a replacement ship is operational, usually 8 to 10 years. Ships being replaced earlier in the program will not go through the RTE

process. This effort also includes a requirements definition for each RTE as well as the development of a technical specification and contract. The first RTE awards are currently planned for FY 1994, subject to the FY 1994 budget process. The scheduling of these RTE periods will be worked closely with the program users to minimize disruption to their work. Chartering will be used as necessary to fill some of the gaps. This portion of the program is necessary in order for NOAA to continue to support its current commitments as the replacement portion of the FRAM program proceeds. In addition to the requirements definition, and specification and contract development, $1.5 million of the FY 1992 appropriations is planned for an initial industrial period on the OCEANOGRAPHER. When the NOAA ships were built, asbestos was used for insulation. Where the RTE work will disturb the asbestos, we must remove it. NOAA currently plans to do this prior to the RTE shipyard period.

The above describes the major components of the FRAM Program; the critical maintenance, requirements definition, alternative evaluation, specification and contract development, RTE, and new ship procurement. It also describes how we are using the FY 1992 funding to proceed with the program. This integrated program, planned over the next 15 years, consists of 13 RTEs and 20 new construction, conversion, chartering, or other new ship support. The first new construction or conversions and RTEs are planned for award in FY 1994, following requirements definition and the

design and specification process described above. However, the FY 1994 budget process will determine the level of funding that will be requested for this program.

NOAA and the Department of Commerce greatly appreciate the subcommittee's and the full committee's continued support of NOAA and its efforts to modernize its fleet. We look forward to working with you to keep this necessary program on track.

Mr. Chairman, this concludes my prepared statement.

APPENDIX XVI

Outline for UNOLS Fleet Plan 1992

I. Introduction:

A. Brief summary of the history of the UNOL fleet replacement and improvement activities.

B. UNOLS and FIC mandates.

II. Elements of the UNOLS Fleet

A. Compositon of the 1992 UNOLS fleet Emphasis on intermediate sized vessels.

B. Projected composition of the 1997 UNOLS Fleet.

1. Large ship construction-AGORS, ARV, N. Palmer, submersible support
2. Other oceanographic facilities-Submersibles, Flip, Multibeam sounding and multichannel seismic systems, etc.

III. Maintenance of ships > 150 ft LOA.

A. Update of available shiptime vs utilization data for all ships through Dec. 1992.

B. Operating costs-1992 for three major components of the fleet

1. Mode of funding:

a.Operating costs-break over in the daily rate vs number of days at sea curve.

b.Layups and refits- Government-owned ships vs Institution-owned ships.

2. Projected costs of operating the 1997 fleet (1992 dollars).

C. Projected sources of funding for shiptime and facilities for ocean science.

1.Up-to-date compilation of large program use of shiptime-RIDGE, WOCE, TOGA, JGOFS, Core Program.

D. Conclusions and recommendations.

III. New areas of focus:

A. Facilities for coastal Oceanography (Develop from Coastal facilities Workshop)

B. Accommodations and Laboratories, (What features make a difference?)

C. Impact of new technology on ship use and shiptime.

D. Conclusions and recommendations.

IV. New era of cooperation and optimum use of the US Research Fleet now and in the future.

A. NOAA's Fleet Modernization Plan

Facilites for Coastal Oceanography

1. Proposal for Workshop is being prepared
   Site and date- Williamsburg VA, November '92.
   50 Participants 30/20 Academic/Agency
   Steering Committee formed.

APPENDIX XVII

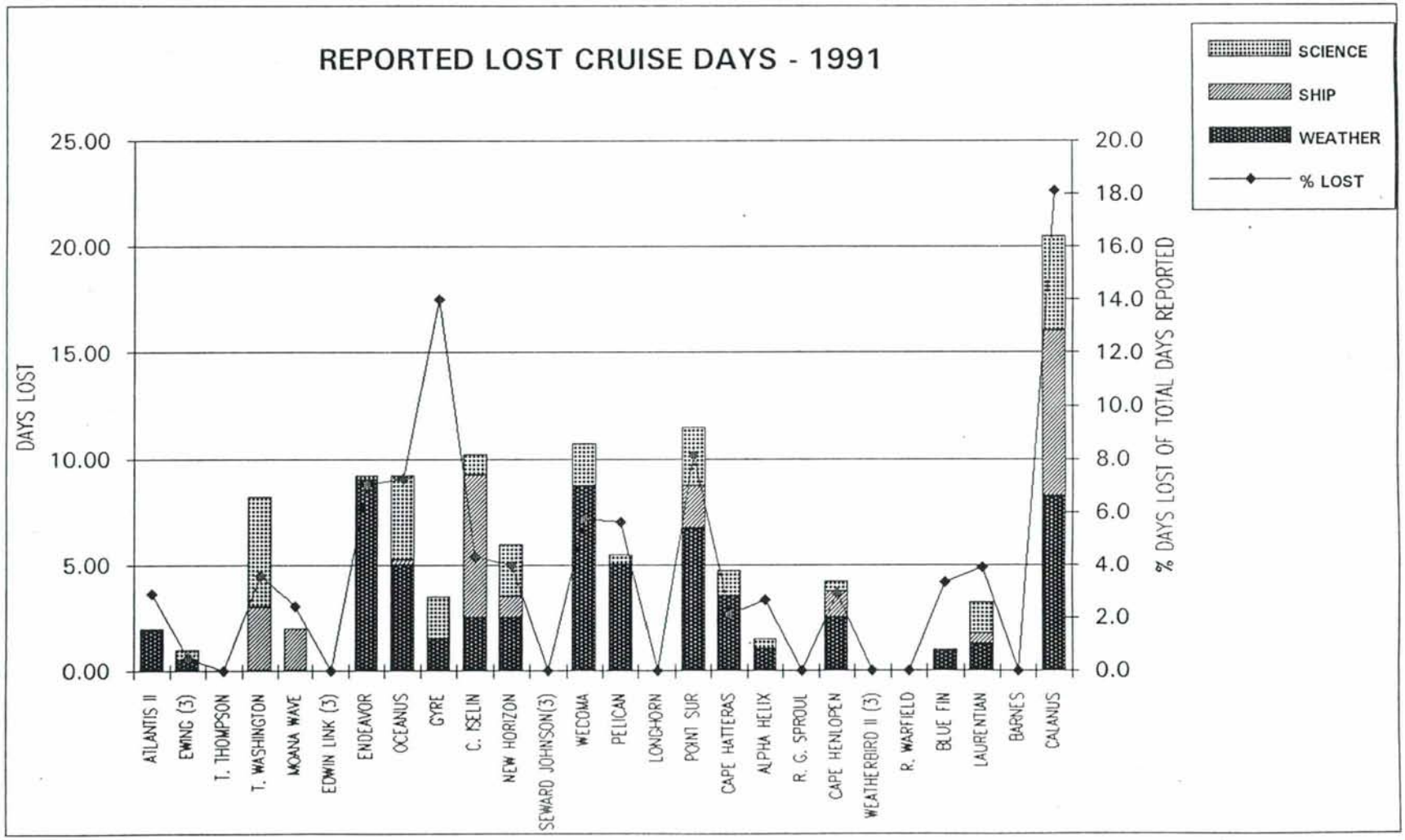
1991 CRUISE ASSESSMENT SUMMARY

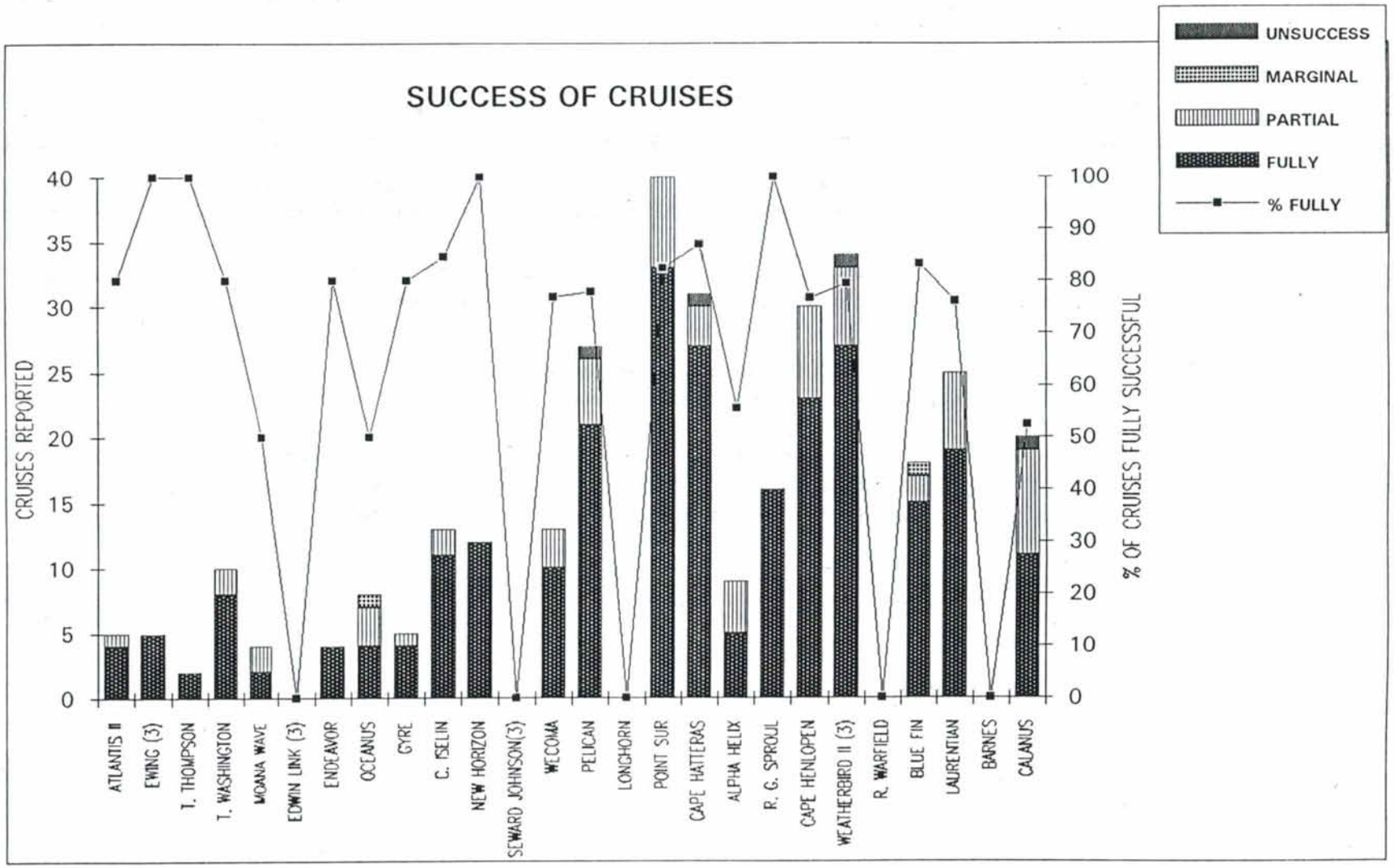
Date Compiled: July 1992

SHIP	OPER. DAYS (1)		TOTAL	RPTS	% RPTS	REPORTED LOST TIME					SUCCESS					COMMENTS			
	TOTAL	REPORTED	CRUIS.(2)	RECVD	RECVD	WEA.	SHIP	SCI.	TOTAL	%	F	P	M	U	%	KUDOS	%	CORR	%
MELVILLE	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
KNORR	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
ATLANTIS II	292	69	13	5	38	2.00	0.00	0.00	2.00	2.9	4	1	0	0	80	4	80	2	40
EWING (3)	301	219	7	5	71	0.50	0.00	0.50	1.00	0.5	5	0	0	0	100	2	40	2	40
T. THOMPSON	81	31	4	2	50	0.00	0.00	0.00	0.00	0.0	2	0	0	0	100	2	100	2	100
T. WASHINGTON	336	230	12	10	83	0.00	3.00	5.25	8.25	3.6	8	2	0	0	80	9	90	5	50
MOANA WAVE	269	82	13	4	31	0.00	2.00	0.00	2.00	2.4	2	2	0	0	50	4	100	2	50
EDWIN LINK (3)	195	0	10	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
ENDEAVOR	196	132	7	5	71	9.00	0.00	0.25	9.25	7.0	4	0	0	0	80	3	60	1	20
OCEANUS	213	127	17	8	47	5.00	0.25	4.00	9.25	7.3	4	3	1	0	50	8	100	3	38
GYRE	222	25	7	5	71	1.50	0.00	2.00	3.50	14.0	4	1	0	0	80	3	60	1	20
C. ISELIN	239	239	13	13	100	2.50	6.75	1.00	10.25	4.3	11	2	0	0	85	9	69	4	31
NEW HORIZON	207	150	14	12	86	2.50	1.00	2.50	6.00	4.0	12	0	0	0	100	10	83	3	25
SEWARD JOHNSON(3)	226	0	14	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
WECOMA	212	187	14	13	93	8.75	0.00	2.00	10.75	5.7	10	3	0	0	77	8	62	1	8
PELICAN	98	98	27	27	100	5.00	0.00	0.50	5.50	5.6	21	5	0	1	78	13	48	7	26
LONGHORN	110	0	11	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
POINT SUR	155	141	46	40	87	6.75	2.00	2.75	11.50	8.2	33	7	0	0	83	23	58	2	5
CAPE HATTERAS	225	225	31	31	100	3.50	0.00	1.25	4.75	2.1	27	3	0	1	87	20	65	8	26
ALPHA HELIX	112	56	15	9	60	1.00	0.00	0.50	1.50	2.7	5	4	0	0	56	2	22	1	11
R. G. SPROUL	136	48	24	16	67	0.00	0.00	0.00	0.00	0.0	16	0	0	0	100	13	81	1	6
CAPE HENLOPEN	158	147	33	30	91	2.50	1.25	0.50	4.25	2.9	23	7	0	0	77	15	50	4	13
WEATHERBIRD II (3)	185	120	55	34	62	-	-	-	-	- *	27	6	0	1	79	6	18	13	38
R. WARFIELD	0	0	0	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
BLUE FIN	49	30	31	18	58	1.00	0.00	0.00	1.00	3.3	15	2	1	0	83	0	0	1	6
LAURENTIAN	83	83	25	25	100	1.25	0.50	1.50	3.25	3.9	19	6	0	0	76	13	52	10	40
BARNES	157	0	46	0	0	0.00	0.00	0.00	0.00	0.0	0	0	0	0	0	0	0	0	0
CALANUS	127	113	23	21	91	8.25	7.75	4.50	20.50	18.1	11	8	0	1	52	6	29	10	48
TOTALS	4584	2552	512	333	62	61.00	24.50	29.00	114.50	4.9	263	62	2	4	79	173	60	83	30
TOTALS FOR 1990			497	252	51	11.00	25.00	13.00	49.00		208	44	1	0	83				

Notes:
(1) Statistics are based on days reported.
(2) Total cruises represent total science cruises.
(3) Became a UNOLS vessel in October 1991
* WEATHERBIRD II Assessment Form did not include lost days.

APPENDIX XVII


REPORTED LOST CRUISE DAYS - 1991
SCIENCE
SHIP
WEATHER
% LOST
DAYS LOST
% DAYS LOST OF TOTAL DAYS REPORTED
25.00
20.00
15.00
10.00
5.00
0.00
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
ATLANTIS II
EWING (3)
T. THOMPSON
T. WASHINGTON
MOANA WAVE
EDWIN LINK (3)
ENDEAVOR
OCEANUS
GYRE
C. KSELIN
NEW HORIZON
SEWARD JOHNSON(3)
WECOMA
PELICAN
LONGHORN
POINT SUR
CAPE HATTERAS
ALPHA HELIX
R. G. SPROUL
CAPE HENLOPEN
WEATHERBIRD II (3)
R. WARFIELD
BLUE FIN
LAURENTIAN
BARNES
CALANUS


SUCCESS OF CRUISES
UNSUCCESS
MARGINAL
PARTIAL
FULLY
% FULLY
CRUISES REPORTED
% OF CRUISES FULLY SUCCESSFUL
0
5
10
15
20
25
30
35
40
0
10
20
30
40
50
60
70
80
90
100
ATLANTIS II
EWING (3)
T. THOMPSON
T. WASHINGTON
MOANA WAVE
EDWIN LINK (3)
ENDEAVOR
OCEANUS
GYRE
C. SELIN
NEW HORIZON
SEWARD JOHNSON(3)
WECOMA
PELICAN
LONGHORN
POINT SUR
CAPE HATTERAS
ALPHA HELIX
R. G. SPROUL
CAPE HENLOPEN
WEATHERBIRD II (3)
R. WARFIELD
BLUE FIN
LAURENTIAN
BARNES
CALANUS

SHIP	BRIEF SUMMARY OF COMMENTS
MELVILLE	No reports
KNORR	No reports
ATLANTIS II	Excellent cooperation with shore & ALVIN crew & Science personnel (4)/ Electronic difficulties (1)/ Support problems (1)
EWING	Good equipment (1)/ Problem with captain (1)/ Hydrosweep problem (l)/ Hydrosweep improved (1)/ Dredge problem (1)
T. THOMPSON	Superb ship at such early stage (2)/Visibility from bridge (1)
T. WASHINGTON	Capt & crew excellent performance (9)/Problem with: SEABEAM (2) Electrical (3) Cable (1)
MOANA WAVE	Crew excellent (4)/Lack of "A" frame (1) /Camera failed (1)
EDWIN LINK	No reports
ENDEAVOR	Capt & crew great (2)/ Most sophisticated ship in UNOLS (1)/ replace speed log (1)
OCEANUS	Great ship & crew (5)/ Problem with GDR, XBT & sail system (1)/ Lack Tech support (1)/ inexperienced winch operator
GYRE	Crew members & shore staff helpful (2)/Winch cable termination problem (1)
COLUMBUS ISELIN	Capt & crew extremely helpful (9)/Problem with: hydraulics (2) CTD (2)/ Fine Kudas on AMASEDs work
NEW HORIZON	Commend Capt, crew & techs (l0)/Winch needs replaced (2)/ Stern configuration (1)
SEWARD JOHNSON	No reports
WECOMA	Competent & professional crew & management (8)/Crane awkward (1)
PELICAN	Crew very helpful (13)/Problems with: MIDAS (2)/ O_2 Probe (1) ADCP (1) Loran (1) Crane (1)
LONGHORN	No reports
POINT SUR	Capt & crew excellent as usual (25)/Acoustic transponder signal problem (2)
CAPE HATTERAS	Great support from ship & crew (20)/Problem with: fish finder (1) Zodiac (2) CTD (3)
ALPHA HELIX	Capt & crew competent & helpful (2)/Sediment trap & rosette broke (1)/Stabilization Desirable (1)
R.G. SPROUL	All crew & techs very helpful (13) /Engine belches fumes
CAPE HENLOPEN	Praise to tech & crew (15)/Problem with: CTD (1) O_2 Probe (1) Box core (2)
WEATHERBIRD II	Crew professional & appreciated (6)/ Need air conditioning (3)/ Needs Bow Thruster (2)/ Rusty doors(3)/ Better liaison (3)
R. WARFIELD	No reports
BLUE FIN	Equipment failure on sampling device (1)
LAURENTIAN	Capt & crew outstanding (l3)/CTD problems (4)/ Winch level wind problem (4)
BARNES	No reports
CALANUS	Crew performed well (7)/Problem with: boat engine (1) Hydraulic (2) Davit (1) Maintenance (2)

APPENDIX XVIII

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

March 17, 1992

Dr. Vernon L. Asper
Center for Marine Science
Building 1103, Room 102
Stennis Space Center, MS 39520

Dear Dr. Asper:

We are in receipt of your application for membership in UNOLS. Your application will be reviewed by the UNOLS Council at the July '92 meeting then presented to the general membership at the Annual meeting 17 September '92. Please call or write me if you have questions or would like more information.

Sincerely,

John F. Bash
Executive Secretary

cc: G. Brass

P.O. Box 392
Saunderstown, RI 02874

Phone: (401) 792-6825
FAX: (401)792-6486

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

APPLICATION FOR MEMBERSHIP

Pursuant to the UNOLS Charter the below named organization hereby submits application for membership in the University-National Oceanographic Laboratory System. In doing so the applicant understands and agrees to work for the objectives set forth in the UNOLS Charter. (Attached)

Name of Institution University of Southern Mississippi

Name of person delegated to act as representative to UNOLS:

Name: Vernon L. Asper

Title: Assistant Professor

Address: Center for Marine Science,
Building 1103, Room 102, Stennis Space Center, MS 39520

Telephone Number: (601)-688-3178

Fax Number: (601)-688-1121

General information on oceanographic, Sea Grant and other marine science programs:

No. Professional Personnel 15 No. Graduate Students 35

Approximate Annual Budget $600,000

List of research vessel owned or operated:

NAME	SIZE

NOTE: Please attach copies of brochures, bulletins, photos, etc. which describe the institution and its facilities.

Please attach a brief list of the names and addresses of key individuals to whom the following information sent out by UNOLS would apply (Note: The Institution UNOLS Representative receives all):

Ship user information - research ship schedules, ship availabilities, etc. (intended for scientists and ship users);

Research ship operations and maintenance - for marine superintendents and port captains.

SUBMITTED:

Signature _____

Name: Vernon Asper

Title: Assistant Professor

Date: Feb. 28, 1992

Send to:

UNOLS Office
P.O. Box 392
Saunderstown, RI 02874

Revised 11/91

Phone: (401) 792-6825
FAX: (401)792-6486

APPENDIX XIX

UNOLS DIRECTORY (with designated representatives)

Operator Institutions in **BOLD**

Rev. 6/92

ALABAMA MARINE ENVIRONMENTAL SCIENCES CONSORTIUM
Dr. George F. Crozier

UNIVERSITY OF ALASKA Dr. Thomas Royer

BERMUDA BIOLOGICAL STATION Dr. Anthony K. Knapp

BIGELOW LABORATORY FOR OCEAN SCIENCES
Dr. David Townsend

BROOKHAVEN NATIONAL LABORATORY Dr. Creighton D. Wirick

UNIVERSITY OF CALIFORNIA, SAN DIEGO, SCRIPPS INSTITUTION OF OCEANOGRAPHY Dr. Robert Knox

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

CAPE FEAR TECHNICAL INSTITUTE Mr. Edward Foss

COLUMBIA UNIVERSITY, LAMONT-DOHERTY GEOLOGICAL OBSERVATORY Dr. Dennis Hayes

UNIVERSITY OF CONNECTICUT Dr. Donald F. Squires

UNIVERSITY OF DELAWARE Dr. Carolyn A. Thoroughgood

DUKE UNIVERSITY/UNIVERSITY OF NORTH CAROLINA Dr. Dirk Frankenberg

FLORIDA INSTITUTE FOR OCEANOGRAPHY Dr. John C. Ogden

FLORIDA INSTITUTE OF TECHNOLOGY Mr. Jack Morton

FLORIDA STATE UNIVERSITY Dr. William C. Burnett

HARBOR BRANCH OCEANOGRAPHIC INSTITUTION
RADM John B. Mooney, Jr.

HARVARD UNIVERSITY Dr. M.E. McElroy

UNIVERSITY OF HAWAII Dr. Roy Wilkens

HOBART & WILLIAM SMITH COLLEGES Mr. Al Roth

THE JOHNS HOPKINS UNIVERSITY

LEHIGH UNIVERSITY Dr. Bobb Carson

LOUISIANA UNIVERSITIES MARINE CONSORTIUM
Dr. Paul Sammarco

UNIVERSITY OF MAINE Dr. Robert E. Wall

THE MARINE SCIENCE CONSORTIUM Dr. Darlene Richardson

UNIVERSITY OF MARYLAND Dr. Tom Malone

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Dr. John M. Edmond

UNIVERSITY OF MIAMI, ROSENSTIEL SCHOOL OF MARINE & ATMOSPHERIC SCIENCES
Dr. Garrett W. Brass

UNIVERSITY OF MICHIGAN, CENTER FOR GREAT LAKES & AQUATIC SCIENCES Dr. Theodore C. Moore, Jr.

MONTEREY BAY AQUARIUM RESEARCH INSTITUTE
Dr. Bruce Robison

MOSS LANDING MARINE LABORATORIES
Dr. John H. Martin

NAVAL POSTGRADUATE SCHOOL Dr. Curtis Collins

UNIVERSITY OF NEW HAMPSHIRE
Dr. E. Eugene Allmendinger

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

UNIVERSITY OF NORTH CAROLINA AT WILMINGTON
Dr. Alan Hulbert

NOVA UNIVERSITY Dr. Julian P. McCreary

OCCIDENTAL COLLEGE Dr. John S. Stephens, Jr.

OLD DOMINION UNIVERSITY Dr. Larry Atkinson

OREGON STATE UNIVERSITY Dr. Douglas Caldwell

UNIVERSITY OF PUERTO RICO Dr. M.L. Hernandez-Avila

UNIVERSITY OF RHODE ISLAND Dr. Paul J. Fox

RUTGERS UNIVERSITY Dr. Frederick Grassle

SAN DIEGO STATE UNIVERSITY Dr. Clive Dorman

SEA EDUCATION ASSOCIATION Dr. Susan E. Humphris

UNIVERSITY OF SOUTH CAROLINA Dr. Robert Thunell

UNIVERSITY OF SOUTH FLORIDA Dr. Peter R. Betzer

UNIVERSITY OF SOUTHERN CALIFORNIA
Dr. Cornelius W. Sullivan

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

UNIVERSITY OF TEXAS Dr. Robert S. Jones

TEXAS A&M UNIVERSITY Dr. Gilbert Rowe

VIRGINIA INSTITUTE OF MARINE SCIENCE Dr. Frank O. Perkins

UNIVERSITY OF WASHINGTON Dr. Arthur Nowell

UNIVERSITY OF WISCONSIN AT MADISON Dr. Anders W. Andren

UNIVERSITY OF WISCONSIN AT MILWAUKEE
Dr. David E. Edgington

UNIVERSITY OF WISCONSIN AT SUPERIOR Dr. Mary Balcer

WOODS HOLE OCEANOGRAPHIC INSTITUTION
RADM Richard Pittenger

APPENDIX XX

Date: July, 1992
From: UNOLS
To: NSF, ONR, NOAA

Subject: RECOMMENDATIONS FOR RENEWAL OF THE MEMORANDUM OF AGREEMENT FOR THE NATIONAL OCEANOGRAPHIC FACILITY: ALVIN

In response to requests from the funding agencies, representatives from the ALVIN Review Committee (ARC), Woods Hole Oceanographic Institution and UNOLS have reviewed the current Memorandum of Agreement (MOA) for support of the Deep Submergence Vehicle ALVIN. This letter forwards recommendations which we hope will be considered by the National Science Foundation, Navy and NOAA in the renewal of the MOA.

Over the years, undersea technology has progressively developed and continues to develop in the areas which include submersible instrumentation, deep ocean sampling equipment and ROV technology. These advances can help to enhance the present capabilities of our National Facility and need to be addressed in the renewal of the MOA. Additionally, in light of the 1992 ALVIN/ATLANTIS II operating schedule, it has become obvious that changes are required to ensure the safe and continued operation of ALVIN during lean times. An acceptable scheduling and funding process for the facility needs to be identified by the MOA and adhered to for prevention of another year in which ALVIN is not utilized to an acceptable level.

Attached is a two-part document. The first part provides recommendations on deep submergence support for the next decade and the second is a recommended concept for operation of the National Facility. Part I was prepared by ARC and endorsed by the UNOLS Council. It provides an academic perspective of the need for a National Deep Submergence Facility. ALVIN's history, accomplishments and potential for continued contribution to the realms of benthic science are described. Part II recommends methods in which the MOA can be modified to allow a means for continued safe, beneficial deep oceanographic research using ALVIN and advanced undersea technologies.

We hope that these recommendations are accepted and that the National Deep Submergence Facility can continue in its dominance as a world renown oceanographic research tool.

PART I

UNOLS Recommendations on Deep Submergence Support for the Next Decade: ALVIN and ROVs

It is an undeniable fact that in more than two decades of service, ALVIN has crossed the threshold of greatness. This reliable workhorse has provided a mechanism to place scientists and their equipment in the deep sea where key observations, sampling, and experiments have been conducted resulting in data that has changed, in fundamental ways, the geological, chemical and biological sciences.

In its more than two decades, the marine sciences have experienced a technological revolution, and ALVIN has evolved accordingly continuing to improve and develop new capabilities; so completely that only the name has not been replaced over the years. As important as these improvements have been, however, the characteristic which has made, and continues to make, the submersible unique as an investigative tool remains not only undiminished, but enhanced. This characteristic is the on bottom interactive and cognitive presence of the human mind coupled with a system that permits, even in the most rugged of settings, complex manipulations (sampling and equipment deployment) by powerful and dexterous robotic arms, and that provides the user with the capability to take large payloads to and from the bottom.

Presently, and probably for at least the next 5-10 years, remotely operated vehicles (ROVs) can't match what ALVIN offers the investigator. ROV technology has developed to the point where it is a superb fine-scale imaging and mapping tool, creating a high resolution (centimeters to meters) acoustic (backscatter and bathymetry) and visual data set that makes it possible for the first time to completely image patterns and relationships created by a mix of biological and physical processes at a local scale (meters to kilometers) providing an essential linkage between our regional data sets and the outcrop scale. These results from ROVs, rather than diminish the real relevance of ALVIN, enhance ALVIN's productivity by creating a superbly well-constrained framework into which ALVIN can be placed most effectively to maximize her unique potential.

To illustrate the important contributions that ALVIN's unique capabilities can make during the next decade, let us give a few examples of how these ALVIN-specific capabilities are pivotal in the solution of a range of critical problems. Because the dynamic environment of the axis of the Mid-Ocean Ridge system is the focus of a NSF/ONR/NOAA endorsed national interdisciplinary research initiative, the ridge environment has been chosen as the illustrative area of interest.

• **Cognitive On Bottom Presence:** Photographic and video images of the seafloor, unless taken in stereopairs, are two dimensional creating a flat perspective that makes it impossible to recognize, assess and comprehend complex spatial relationships. On bottom presence allows one to establish an accurate definition of scale and extent of seafloor features that is not possible with remote systems. An observer in a submersible gets an undistorted view of the seafloor and can integrate complex three-dimensional spatial information. The essence of making geological observations lies in pattern recognition and three-dimensional reconstructions. The recent documentation, based largely on submersible observations, that along some magma starved ridge segments the oceanic lithosphere is dismembered along low-angle normal faults has profound implications for our understanding of the processes that govern the formation and evolution of oceanic lithosphere. The key to a definition of the salient kinematic properties of these faults and the properties of the deep seated rocks that they expose will depend on detailed structural observations and the collection of oriented samples of gabbric and ultra-mafic rock at key contacts and localities determined in real time from on bottom observations. Such data can only be obtained by scientists working in a submersible.

• **Sophisticated On Bottom Experimental Implementation:** The ridge axis is a dynamic interface where the consequences of the interplay of extensional tectonism, magmatism, and hydrothermalism lead to a dynamic and evolving physical, chemical, and biological environment that can only be understood if salient parameters of these processes can be characterized by sampling, instrumentation, and visual documentation. Now that we have developed a high resolution definition of the expressions of the ridge axis processes in a few localities (e.g., Juan de Fuca Ridge, East Pacific Rise at 9^{o}N), plans are in progress to establish seafloor observatories where interdisciplinary time series experiments can be implemented. To carry out the investigative protocol that these experiments necessitate, a submersible is needed that can implement demanding tasks in rugged terrain. The shear mass of ALVIN (17 times heavier than the ROV Jason for example), coupled with two manipulator arms give the submersible the capability needed to do these tasks. In the last few years, ALVIN has successfully deployed over 40 different instruments, has carried out sophisticated *in situ* measurements of vent fluids, has selectively sampled specific organisms, and has used a newly developed hydraulically-driven drill to sample consolidated material in demanding settings: these achievements are a ringing testimony to the fact that ALVIN and a skilled support team (pilots and engineers) working in collaboration with scientific investigators are prepared to meet the demanding on-bottom investigative needs of the 1990s.

• **The ALVIN Payload:** Although not immediately obvious to many, one of ALVIN's greatest strengths is its capability to carry material down and/or back from the abyss. During the last decade, thousands of pounds of equipment and samples (water, biological, sediment and rock) have been successfully transported in this manner. To provide just one example, the microhabitat characterizations for clams, mussels and tube worms at vents is central to our understanding of the unique hydrothermal vent environment. To solve this problem it is essential to obtain (a) temperature probe data, (b) real time characterization of reaction compounds in vent fluids (e.g. H^2S and $0^{2)}$, and (c) collection of animals from the characterized habitat. The requisite instruments needed to meet this investigative challenge - temperature probes, a bulky flow-injection analyses system and an insulated collection box - can all be carried and used during an integrated sampling protocol on a single ALVIN dive. This extended payload capacity can't be matched by an ROV, now or in the near future.

• **ALVIN Performance:** Finally, it should be emphasized that although other deep submergence platforms (>2000 m) in this country and abroad have many of the general capabilities mentioned above, none have ALVIN's track record as a reliable platform that can dive day in and day out for weeks at a time, and that can rapidly respond to community needs. This important quality does not happen by accident and is made possible by a dedicated and skilled group of technical staff that have successfully built on almost three decades of deep submergence experience. In addition, there is an organizational stability that schedules programs in a dependable manner. An institutional commitment to the submersible by Woods Hole Oceanographic leadership and the continuity of funding provided to ALVIN by the tripartite agreement have made the ALVIN facility the premier deep submergence operation that it is today.

To conclude, ALVIN represents a mature system with tested technology that is presently uniquely capable of carrying out important tasks on the seafloor. There are exciting and compelling scientific biological, chemical and geological questions that can be most effectively addressed with a submersible and, if US investigators are to remain competitive in the arena of the abyss, then the ALVIN facility must be supported in a way, and at levels, that insure operational stability. Although the manipulative and sampling capabilities of ROV technology are still in the formative stages of development, the existing fine-scale acoustic and optical imaging strengths of ROV driven systems are superb. These capabilities, far from diminishing the utility of ALVIN, in fact, vastly enhance its value for scientists interested in complex instrument deployment and challenging sample recovery. The potential for the development of other capabilities that could eventually duplicate those of the submersible is real and ROV technological

development should be nurtured, both in terms of field programs to test and utilize existing systems, as well as laboratory development of new capabilities. For US leadership in marine science to remain broad and complete, the operation of ALVIN and the development of ROVs must both receive agency support.

The UNOLS Advisory Council recommends without qualification and with unbridled enthusiasm that the NSF, NOAA, and ONR forge a new tripartite agreement for ALVIN support. Manned presence in the deep-sea, the last frontier on earth, is necessary and the ALVIN operation represents the premier capability in the world. The development of ROV technology is happening at a number of institutions in an independent fashion as each group explores new avenues of development. It is important that these groups be encouraged to compete for resources set aside for this kind of technology. The challenge before the funding agencies and the marine community is to formulate a robust support strategy that maintains the strengths of ALVIN on one hand and that allows ROVs to reach their promising potential on the other.

PART II

RATIONALE AND RECOMMENDED ELEMENTS FOR THE MEMORANDUM OF AGREEMENT

Rationale:

Benthic science, or the oceanography of so-called "inner space," is both rewarding and challenging. The remarkable discoveries of the past two and a half decades are only harbingers of future enlightenment. These and future discoveries have not come easily as the awesome pressures and nearly impenetrable opaqueness of the ocean deeps have permitted investigators only fleeting, narrow views of this vast realm.

While the past achievements of US benthic science have been great, we are now at a crossroads brought on by the confluence of several factors. Our leadership in the field is being challenged by several nations some of which have copied (indeed have been given) our technology. These nations have their own needs and all have noted our success and wish to share in that success in the future. DSV ALVIN is mature, but with proper care and upgrading is capable of prolonged continued excellent service. Its support ship R/V ATLANTIS II is reaching the end of its service life and must be replaced. Funding paradigms are changing in Washington in the face of such pressures as the budget deficit, the end of the Cold War, and shifting research priorities. Some perceive, incorrectly, that the discovery/exploration phase of deep submergence operations is over and thus much needed research has ended. In the face of these challenges, we can either capitulate and let our lead in this field go elsewhere or we can pull up our socks and craft a program to move to a higher plane of capability and achievement. UNOLS recommends the latter course of action.

In the belief that the United States must continue to lead the fields of benthic science and deep submergence technology development, we urge the strengthening of the national facility now centered around DSV ALVIN its support ship and the team which uses, operates, maintains and engineers it. The US cannot afford to lose its place in this vital field in which the competition is growing rapidly from France, Japan, Russia and Germany among others.

The function of this reinvigorated National Deep Submergence Facility would be to advance the state of the art of benthic science and related technology through closely coupled (1) science users, stating their needs and guiding solutions; (2) technology developers, turning the ideas and needs of science into carefully engineered, reliable upgrades; (3) facility operators, ensuring responsive reliable operations of deep submergence assets and providing vehicles on which to test new tools; and (4) government agencies, implementing national priorities and providing oversight and controls through policy and fiscal management.

Recommended Elements:

Given the rationale outlined in the preceding section, UNOLS proposes the following concepts to achieve continued success and health.

1. Ensure a National Commitment.
2. Enhancement of science utilization.
3. Renew commitment to deep submergence science development.
4. Update procedures to ensure a financially viable operation.
5. Integration of new undersea technologies, ROVs and AUVs into the Deep Submergence Facility.
6. Transition to a new support ship for ALVIN.

Ensure a National Commitment:

This will require a commitment at the National level from all involved agencies as well as Congress with strong support from the users of deep sea submergence vehicles.

Deep submergence is expensive - far beyond the means of individual institutions, states, regional consortia or even single federal agencies (unless budget-based interagency funding transfers were to take place). Therefore, it is incumbent that an interagency approach to this be taken. The US is particularly blessed in this regard because the federal government has for centuries beginning with Benjamin Franklin and continuing through Matthew Fontaine Maury to the present had enlightened leaders who, understanding the national value to this island country, have invested extensively and wisely to enhance and foster the nation's ocean science and technology community. The job is not done and this effort must continue. We encourage continued active participation in every phase and in every element of the revised Deep Submergence Facility including: (1) the issuance of national research goals and priorities; (2) participation in UNOLS and ARC process; (3) frequent, close interaction and support of the technology developers; and (4) management and funding oversight of science and operations/operators.

Enhancement of Science Utilization:

We must put in place a structure which enhances and fosters scientific interaction and stimulation with the facility. This should be done by:

a. Revising the ALVIN Review Committee (ARC) Terms of Reference to give it more life and scope. The new terms will provide for ARC a mandate to evaluate technical advances in submersible operations and the integration of ROVs and AUVs into the planning process.

b. Establish a more vigorous dialogue between ARC and the user community to solicit concerns of present operations and to generate improved procedures. ARC in turn will provide advise and perform its role as advocator for the submergence science community.

c. Establish at the operator institution an in-house science advisory panel for day to day connectivity between science, facilities and the UNOLS community.

d. Revise the methodologies of planning, reviewing and scheduling proposed deep submergence facilities operations with the view of enhancing quality and controlling costs. Encourage earlier proposal submissions to facilitate the revised scheduling procedure.

The root reason for the US's lead in deep submergence is our excellence in and commitment to the associated technologies. This field is moving and dynamic, and requires constant efforts to upgrade and remain on the cutting edge.

To ensure that the tools available to the science community represent the best available state of the art components it is necessary to couple the scientists and engineers who would develop system enhancements with the scientific users (to determine requirements and problems) and also the system operators (to understand operational constraints, safety considerations and testing criteria). Operators will assist developers to formulate funding proposals as well, and vice versa. To a maximum extent developers will take their lead from priorities stated by the user community.

Facility operators will play a central role in leading the National Deep Submergence Facility. First, of course, they will operate the facility in a safe, efficient, proficient and responsive manner. The operators will interact with individual users and, to the extent they are able given time and funding constraints, respond to short-term, cruise specific facility adaptations. The operators will interact with the ALVIN Review Committee to ensure that long term goals for the facility are consistent with established research priorities.

The operators will aggressively market both the deep submergence vehicles to both science and non-science potential users as well as the host ship(s) for general purpose use. Every effort will be made to reduce the expense of the operations without degrading performance.

Support personnel, pilots, engineers and technicians, are the heart of the operation and the key to the vehicles current success. These groups are fragile needing continuing protection. To this end they need consistent training and stability of employment. This requires a healthy submersible schedule for maintaining qualifications and providing

adequate funds to ensure an employment level necessary to maintain safe, efficient operation of the facility.

Develop a Workable Planning/Scheduling Process:

The present Memorandum of Agreement outlines a scheduling framework starting with proposal reviews 18 to 36 months before the operating year. It further indicates that the funding agencies decisions will be made in the 12 to 24 month time frame. These are lofty goals and do not seem to be realistic. Currently proposals are received 8 months and reviewed 6 months prior to the operating year. Funding decisions are made from 4 to zero months before the year of operation. This time frame creates innumerable scheduling problems for the operating institution and prevents the ship from fully participating in the UNOLS scheduling meetings to fill in open spots. If Deep Submergence proposals were to be submitted 14 months in advance of the operating year (ie the November panel at NSF and comparable panels at both ONR and NOAA) the operating institution would have adequate time to solidify the support ship's schedule and compete in the UNOLS scheduling cycle.

Update Procedures to Ensure a Financially Viable Operation:

ALVIN and its support ship are inseparable from an operational as well as funding standpoint. ALVIN cannot function without a support ship. The health and viability of the ALVIN operation is inextricably enmeshed in the platform that provides the transportation and nurturing for the submersible. Providing a base funding for the ALVIN Group is but part of the problem. Without support for the entire operation, ALVIN and its support ship, the program is severely handicapped. A safety net to ensure a full operating schedule is not sought. Instituting the scheduling procedures outlined in the above section goes a long way in providing the operator with time necessary to generate non-ALVIN use for the support ship during voids in the submersible schedule. This reduces the likelihood for the need to invoke the safety net. Hopefully the reinvigoration of the science users will also enhance the operation's financial viability.

Schedules must afford the operators an opportunity for a few non science dives for the purpose of: training, system checkout, and for testing new science tools-not at the expense of science. This will add to the operational excellence while further reducing the need for safety net support. When these elements are less than fully successful it will be necessary to execute the safety net.

A guarantee of full support of the ALVIN Group costs (estimated at $2M +/- .2) and a half year of support ship time is required for safe operations. Over the next few years additional funding for the ALVIN/JASON Group operations will ramp up as well.

Integration of New Undersea Technologies, ROVs and AUVs Into the Deep Submergence Facility:

Remotely operated vehicles of all sizes and description are rapidly maturing. These devices offer the potential of enhancing (perhaps by an order of magnitude) the capabilities of existing manned and towed systems. These tools must be integrated into deep submergence research in a planned and methodical manner in order not to jeopardize the viability of ALVIN. These vehicles must be science-driven and configured for maximum flexibility at minimum cost. ARC's new Terms of Reference will address this integration and the mechanism by which these tools can be most productively utilized.

Transition to a New Support Ship:

It is well recognized by the operating institution that ATLANTIS II is in need of replacement. It is further planned that KNORR can be outfitted as that replacement Submersible Handling Vessel. KNORR's size and extensive capability will provide a new dimension as support ship. The ability of KNORR to perform multidisciplinary non-submersible science is considerable. Because KNORR is sought after as a general purpose oceanographic ship the need to execute the base funding is lessened even more. The planning for this conversion, however, must take into account well thought out timing so as not to deprive the science community in the Atlantic Ocean the capabilities of a Class I ship.

Summary:

In summary, we feel very strongly that new direction, energies and commitment are needed for the United States to maintain its leadership in deep submergence science. We believe that ALVIN is still the right vehicle to anchor this effort. New tools to enhance ALVIN such as ROVs, AUVs and a replacement support ship(s) are now available or on the horizon and should provide additional capabilities and dimensions for this already highly effective submersible. We stand ready to work with the federal agencies in forging a Memorandum of Agreement that will revitalize this most important asset.