UNOLS Committee Reports
July 1999

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UNOLS Arctic Icebreaker Coordinating Committee

Report to the UNOLS Council
June 10, 1999
James H. Swift, Chair AICC

The UNOLS Arctic Icebreaker Coordinating Committee (AICC) held its most recent meeting 24-25 March 1999 in New Orleans.

Several notable changes have taken place in the Coast Guard personnel overseeing construction of USCGC HEALY. The head of the group, Capt. Greg Johnson, is on medical leave and his second in command, CDR Ian Grunther, has taken command of a new Coast Guard cutter. Capt. Jeff Gamble will be filling in during Capt. Johnson's absence.

HEALY delivery has been delayed until ca. October 1999. This is a result of delays in equipment and sensor testing, and will cause some rescheduling of the post delivery trials. Warm water trials should take place ca. January/February 2000, after which the ship will make a public relations visit to Baltimore. NSF and USCG will be getting together to discuss planning for this, and the AICC plans to assist by providing posters for labs and persons to explain Arctic research projects. The ship will conduct ice trials in the eastern Arctic in winter/spring 2000 and will not transit to its homeport until after completion of both ice and science trials. Present plans call for HEALY's availability for agency-funded Arctic marine science support - the vessel's primary mission – beginning early 2001. HEALY crew training is well underway. Crew familiarization of the ship is receiving a high priority. Marine Science Technicians (MSTs) continue to be sent on UNOLS vessels. The meeting included an in-depth tour of the vessel, during which the AICC noted:

1. HEALY's science winch systems will remain a question mark until those systems are thoroughly proven. The caution arises because the installed system is much more complex than the simple winch-sheave-water systems which are the norm on research vessels. The AICC has advised the Coast Guard to begin thinking what can be done during the post-shakedown availability period to improve winch performance if the present winch arrangements do not work satisfactorily.

2. A low overhead clearance in the main lab was an unwelcome surprise. The AICC has advised the Coast Guard to investigate gaining additional headroom. Ample space appears to be available in the overhead.

3. Moving large objects on the main deck to and from the science hoist is hindered by lack of a clear path. The AICC has advised the Coast Guard to remove the present blockage.

4. Other needs include science network connections in the Science Freezer, Science Refrigerator, and Climate Controlled Chambers; cable ports for running cable between labs (interior and exterior); a means to keep CTD wire on equipment between casts while in the Starboard Staging Area with the roll-down door closed; improving diver access to the water; and improving visibility to the helmsman of video

monitors on the bridge.

5. Somewhat lower immediate priority was given to providing 480 volt capability for van power, improving visibility from the science conning station (less important only in the sense that the vessel may not frequently be conned from this station), reducing condensation on exposed copper piping in Climate Controlled Chambers, providing matting on some hard deck surfaces, providing pan/tilt for more of the video cameras, addition of port lights in all exterior mounted hatches and stair towers, providing an area to launch weather balloons, improving tie down provisions in the aft staging area, and adding finished overheads for the labs.

6. Lower priority was given to addressing drainage for the daylight incubation area, improving the size of the Met Lab, improving access to the XBT launch station, addressing means to handle the heavy doors to the Science Hoist, and to improving a number of minor habitability concerns.

7. A list of safety-related concerns was also drawn up.

The Coast Guard has begun work in making or scheduling most of the needed modifications.

John Freitag (UNOLS RVTEC) continues to coordinate the oceanographic community's participation in HEALY's science systems testing and has kept the AICC up to date. The basic outline of this program includes: (a) Warm water Phase I testing of SeaBeam, ADCP, data network, CTD, Bathy 2000, coring and winch systems and hull and machinery acoustic noise tests; (b) Transit Phase II includes little or no science system testing; (c) Level Ice trial, Phase III is almost exclusively a programmed sequence of ice breaking, with little science systems testing per se except for bathymetry and the data network, though teachers and or wildlife observers might be appropriate for his phase; (d) Science Systems Testing, Phase IV consists of four, one week legs moving to progressively more intense and complex tests of all major science systems in a high arctic environment, and may also include teachers. AICC member Kelly Falkner has indicated that she would write a proposal to NSF requesting funding for teacher participation.

The Committee discussed the need to develop a process by which test evaluation reports are developed and routed through the system. The Committee discussed the release of data after the science systems testing program. All data coming out of the science testing program are public. A plan and data policy is needed. Further discussion on this matter will be included in the next AICC meeting and must take into account relevant USCG policies.

The AICC discussed the National Oceans Partnership Program (NOPP) with Dr. Cynthia Decker, including examples of the programs funded through that program, and possible future Arctic interests.

The outlook is positive for NSF's Arctic marine science programs, including both that HEALY funding will not eat into traditional ocean science funding at NSF and that OPP Arctic science funding looks healthy. The deadline for OPP Arctic proposals will be the same as for other ocean science programs at NSF. NSF agrees that expeditionary planning will be important for developing cohesive programs. The Arctic Section is working on the question of how to handle equipment upgrades and new equipment needs and is planning to hire an Arctic Research Support and Logistic Manager. In response to questions of how technical support, over and above that provided by HEALY, should be handled - i.e., be part of the proposals and come out of science budgets or provided outside the science proposal budgets - it is possible that OPP may adopt practices similar to those in Ocean Sciences, where technical support is shifting over from the research budgets to the technician support budgets.

AICC has been modeled after DESSC for expeditionary planning. The Committee's responsibility is to pull together a critical mass to give direction for scientists in writing proposals but in no way be meant to influence agency funding decisions. To advance expeditionary planning and to keep the community at large informed the AICC plans to continue its involvement with the UNOLS booth at AGU and will conduct a town meeting on the day before AGU. Participation in some form will also be necessary at ASLO in San Antonio and at the next OAII meeting in October.

NSF has funded a study to develop capital and operating costs for a SSN operating for science. A steering

committee has met to provide the contractor, Rand Corporation, study direction. At least two AICC members are on this steering committee and in addition to other business will keep an eye toward joint HEALY/SSN science programs.

The AICC continues to be represented at Antarctic Research Vessel Oversight Committee meetings when possible, and vice versa. This has proven useful to both committees.

AICC member Dan Lubin and USCG Commander George Dupree provided a presentation about Science of Opportunity cruises on USCGC HEALY at a recent Oceans Studies Board meeting. George explained that the Coast Guard would be seeking $20,000 as reimbursement for the daily operating cost for HEALY. The specific language in the Arctic Research Policy Act states the USCG can only charge incremental costs for ship use. If full reimbursement were to become necessary this act would need to be changed. The Coast Guard position is to continue with the incremental charge procedure.

Other Coast Guard news includes continuation of plans to keep alternating the polar class ships with six months of a year in the yard and a year operating. The Coast Guard's mission for breaking into Thule remains. Presently the Canadians have been picking up the mission but this may not always be possible.

The AICC has completed its 1999 Science of Opportunity (SOO) review and reported to the Coast Guard and scientists. It was likely that, once again, all applicants with active requests will be accommodated. The 2000 SOO cruise announcement will be published in September 1999. The AICC is charged with assessing SOO proposals for logistic and overall compatibility with the SOO mission. No decisions are made by the AICC with regard to participation, and AICC comments are specifically not to be used to leverage agency support for any proposal. The AICC continues to caution the community that science support is not necessarily the chief mission of SOO cruises, and the AICC reminds all that the Coast Guard will continue to accept ship-time requests for funded Arctic science missions on the Polar-class vessels and HEALY. On funded science missions the expectation and goal is that science will be supported in a manner and devotion to mission similar to that supported by the operators of large UNOLS vessels.

The AICC sees potential benefit in a direct, funded conduit for supplemental UNOLS technical support for USCG Arctic marine science operations. The University of Washington has expressed interest in pursuing this and is considering submitting a proposal.

The AICC has been briefed by Dr. Bernie Coakley of Tulane University regarding his recent experience with Arctic bathymetric and sub-bottom surveys. In ice-covered waters it is most effective to use a submarine. With heavy emphasis on central Arctic marine geology and geophysics expected for future HEALY proposals, joint submarine/HEALY ventures could provide a substantial science benefit.

The next AICC meeting will probably be held in the fall on the east coast, possibly Virginia Beach in association with the OAII meeting.

Fleet Improvement Committee Report

Submitted by: Larry Atkinson

The Fleet Improvement Committee is finalizing plans for the document, "The UNOLS Biennial Review of Sea Going Oceanographic Facilities". The outline has been under review by the Committee and the Council for several months and will be adopted at the Summer Council meeting. Immediately after that the meeting authors of the various chapters will be contacted and schedules agreed upon. We anticipate the review being an online document appearing and modified as the situation merits.

FIC has represented the community in the various reviews of AGOR-26, the Hawaii SWATH. While the path to this new ship is a new one and sometimes torturous we have managed to have input at critical

points to help insure a ship that meets the needs of the oceanographic community.

The planning of the WHOI coastal swath ship has resulted in a letter from FIC congratulating WHOI on their work that will benefit the whole oceanographic community with a very capable ship. FIC also urged WHOI to have the new ship within the UNOLS scheduling system.

The Alaska Science Mission Requirement document was accepted and is now in the hands of U. Alaska. The East Coast SMR is nearly complete depending decisions on how detailed it should be.

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5 July 1999

From: Paul Ljunggren, RVOC Chairman

To: UNOLS Council

Subj: RVOC Report - UNOLS Council Meeting 13-14 July 1999

Earlier this year NSF requested that RVOC take steps to develop an inventory of portable labs/containers, their use/capabilities, and their condition. Additional areas to be addressed will include:

-Are these portable labs/vans Coast Guard compliant?

-Requirements/standards that our portable vans/labs should be complying with in order to be used onboard R/V's.

-Proposing a schedule for replacement or upgrading of portable vans/labs.

-How should portable lab/vans be secured on board research vessels

Joe Coburn of WHOI has already been addressing these issues at WHOI and has agreed to head up this project.

As a result of a discussion at the last RVOC Meeting NSF agreed to fund the acquisition of automatic external defibrillators (AED) for UNOLS vessels. Mike Prince coordinated the acquisition and delivery of Automatic External Defibrillators (AED) for each of vessels. The AED's have been distributed and personnel at the various institutions have been receiving training in their use.

The 1999 RVOC Meeting is scheduled to be held at Harbor Branch Oceanographic Institute from 2-4 November. Topics being considered for the agenda include; discussion and demonstration of computerized machinery maintenance and ship stability systems; an update on the new FRVs for NOAA-NMFS; panel discussion on the implications of issues such as STCW, GMDSS, and ISM for those vessels less than 300 grt; and recommendations of the Academic Fleet Review and the implications of these recommendations for operators.

The Safety Committee has completed the change to RVOC Safety Standards. This amendment will be presented during the course of this meeting for approval and adoption by the UNOLS Council. The Safety Committee is planning to hold a meeting later this year to further examine the application of the Code of Federal Regulations to uninspected oceanographic research vessels in light of new international standards being accepted and implemented.

Sincerely,

Paul Ljunggren

Committee report from RVTEC to UNOLS Council 6 July 1999

RVTEC activities for the first half of this year have focussed on the science trials of the Icebreaker HEALY in conjunction with the AICC. At the present time the delivery of HEALY has been delayed until 29 October of this year and may well be delayed until sometime in January of 2000. Many of the delays to date have been due to the inability to maintain the testing schedule upon which the original delivery date was predicated. This includes tests of many of the major ship systems. The latest problems involve the propulsion plant system. Although the cycloconverter AC drive system is not a new concept it has not been extensively applied in the US and has never been used on an icebreaker. To date the contractor has not been able to achieve the required results under impulse load testing. Because the ship utilizes an integrated propulsion-hotel electrical generating system it is crucial that stability be maintained under dynamic loading conditions. This may well be the cause of a delay until January 2000. Should that be the case, science testing will be delayed until the late spring/summer of that year. RVTEC involvement has been in the design and staffing of the science ice trials to be conducted subsequent to the HEALY's delivery.

From the onset it was deemed mandatory by the AICC that the science community be heavily involved in the specification and testing of this vessel in order to avoid the pitfalls of previous projects which were conducted without science community involvement. As has been mentioned previously, the Coast Guard has been extremely cooperative in this regard. NAVSEA requires that a uniform testing sequence in a prescribed format be followed for all tests conducted for final acceptance from the builder. We have been working closely with the NAVSEA group responsible for writing these procedures and although some of our needs are not easily accommodated in the Mil Spec style of format we are working collectively toward a common goal.

The cross training of Coast Guard Technicians on UNOLS vessels put into place more than a year ago has been very successful. Technicians have served on board several vessels including REVELLE, MELVILLE, THOMPSON and SEWARD JOHNSON. The feedback from both sides has been uniformly positive and it is anticipated that this interaction will have a positive effect on the level of technical support provided to scientists using HEALY.

Unfortunately the several delays in the delivery date have hindered securing contracts with the various participating institutions. We have held off in this regard because cruises on the institutions own vessel would naturally preempt HEALY participation should there be a conflict. Once the date has been cast in stone we are prepared to proceed in due course with final contracts for the science testing program. The delays will ultimately effect not only the timing of the operations but also the location of the science testing. At the present time it is anticipated that much of the testing will take place in the Davis strait and Baffin Bay possibly using the port of Iquallat (Frobisher Bay) and Western Greenland ports. At the present time we have secured commitments for the testing of the major systems from institutions having expertise is particular areas.

Plans are proceeding for the 1999 RVTEC meeting in Port Aransas, Texas. Our Vice Chair Tony Amos of University of Texas offered the location. At this time plans are in the works for a session on data management and the implementation of a common data format among the various operator institutions. The meeting will take place in Port Aransas from 20 through 22 October.

Submitted,

John S. Freitag

Chair, RVTEC

SCHEDULING COMMITTEE

Report to the UNOLS COUNCIL
July, 1999

UNOLS ship's schedulers are in the process of creating first drafts of their CY2000 schedules and preparing for the first scheduling meeting on July 15 in Arlington. As part of the new approach to scheduling, almost all schedulers submitted letters of intent, which provided a list of ship time requests that might be accommodated on each ship. These letters arrived in several different forms, including some that followed the instructions. The different formats did reveal some weaknesses and better ideas that will most probably lead to a modified form of the process. In just the past week, schedulers have started to hear the results of the latest NSF panels. This has allowed us to move to the next step in the process which is to create draft schedules. A conference call was held on July 6th to work on large ship schedules. This session revealed a few double bookings and identified issues that will impact these schedules such as the ROV schedule and transits. In preparation for refining these large ship schedules, we will be trying to better define the schedule for the ROV's, verify what the NAVO and LWAD requirements are, determine if any of the commercial/foreign interest in large ships might come to fruition and attempt to remove the double bookings. To date, there are 245 days of NAVO requests that have been formally submitted and an indication that there will three LWAD exercises again next year including one in the Mediterranean. Clearly identifying if there are any other Navy requirements will be important to all vessels of the fleet.

The large ships all have reasonable schedules that accommodate projects around the world. It appears at first glance that there could be sufficient work for all Class I vessels. Remaining funding decisions and the advent of additional work will determine the final outcome. For the time being the plans for the Class I's is as follows. The REVELLE starts with work out of Korea and then moves to Hawaii and the West Coast and then back to Hawaii at the end of the year. MELVILLE spends the year mostly along the West Coast of Central and South America, with one trip out to Tahiti. THOMPSON will work along the US West Coast, with the possibility of a trip to Hawaii. EWING starts the year in New Zealand, where they will complete two projects before moving north to Fiji and New Guinea. Next, EWING transits to Newport, Oregon and completes several projects on the West Coast moving south to Panama after which they transit to Halifax and begin a series of cruises on the East Coast, ending the year in Florida. KNORR leaves Woods Hole in January and works in the Caribbean and off Brazil before heading back to Bermuda, Norfolk and Woods Hole. Next, KNORR transits to the Mediterranean for an LWAD project and a Bob Ballard project and then possibly on to the Indian Ocean, ending the year near Cape Town. The ATLANTIS and ALVIN will spend the year at the Guaymas basin, the East Pacific Rise and the Juan De Fuca Ridge.

Intermediate and smaller research vessel schedulers were still getting calls regarding funding decisions as of July 6th and schedules had not all been published. I hope to have a summary of activity for these vessels by the time of the Council meeting.

Respectfully,

Mike Prince, Chair

Report of the UNOLS DEep Submergence Science Committee (DESSC)

Activities from Dec. 1998 through June 1999
Patty Fryer, Chair

Executive Summary

Since the December 1998 DESSC meeting, the DESSC has engaged in two major efforts:

1. Support for the WC/PR NURP office's commitments to scientists promised funding to perform

submergence science in the Gulf of Alaska,
2. Aspects of planning for the UNOLS Submergence Workshop "Developing Submergence Science for the Next Decade" (DESCEND).

In addition, DESSC has carried out some minor business:

1. DESSC sent out an announcement to the scientific community regarding opportunities for submergence science in the Pacific and Indian Oceans
2. DESSC has considered mechanisms for disseminating to the scientific community information regarding funded submergence science programs (so as to encourage expeditionary science efforts).
3. The committee is working toward revision of its Terms of Reference. Once these are revised, UNOLS will be asked to review them.

Major Activities since December 1998

The two main efforts of DESSC thus far this year have been to lend its support to the scientists promised funding to work on WC/PR NURP projects and to plan the DESCENC workshop. At the December DESSC Meeting Dr. Ray Highsmith of the WC/PR NURP Center described changes in funding allocations for support of NURP Centers and the ramifications of the change. The reductions allotted to the WC/PR NURP office would have severely impacted the 1999 ALVIN schedule. DESSC sent a letter of concern regarding this situation to Dr. Barbara Moore at NURP supporting the science commitments made by the WC/PR NURP Center, expressing concern regarding the procedure and a hope that the science could be reinstated. Fortunately, the issue has been resolved and funding was reallocated so that most of the work will be done.

Although the DESCEND workshop will be a UNOLS meeting and is designed to tap a broader representation than just the DESSC, several members of the committee were involved in planning. The proposal for the meeting was approved in early spring. A Steering Committee (Keir Becker, Jim Bellingham, Craig Cary, Annette DeSilva, Patty Fryer, Lisa Levin, Mar Lilley) was established and held a planning meeting in La Jolla on June 24. The minutes of the meeting are attached. A website has been designed by the UNOLS office with modifications suggested by the steering committee and will be put on line shortly. The announcement/invitation for the meeting will also be distributed shortly by UNOLS via an email blast to its distribution list. The chairs of the RIDGE and MARGINS offices have volunteered to send out announcements via their offices as well. Several individuals were selected as potential breakout session leaders and these individuals will be contacted directly by the steering committee.

The proposed agenda for the July 27 - 28 DESSC meeting is attached.

DEveloping Submersible SCiencE for the Next Decade

DESCEND
Steering Committee Meeting
Hotel La Jolla
La Jolla, CA
June 24, 1999

Introductions: Patty Fryer opened the meeting at 8:30 am. The participants introduced themselves. Bob Knox, UNOLS Chair, welcomed the group to La Jolla.

General Information Regarding the Workshop:

Annette DeSilva provided a brief overview of the proposal that had been submitted to NSF, ONR, and

NOAA. The workshop is scheduled for 25-27 October at NSF. There was some concern as to why shallow submergence needs were to be addressed by this workshop. It was explained that there are agency interests in shallow water/coastal processes and this community needs to be represented when considering future science and directions for technical developments. There was also concern as to how to reach these groups to let them know about the workshop. It was suggested that the following people be contacted for names of shallow water scientists:

- Barbara Moore, NOAA/NURP
- Phil Taylor, NSF
- Sujata Millick, ONR

An announcement for the meeting will be mailed out from the UNOLS Office. It will also be sent by e-mail blast from the UNOLS Office to the UNOLS list as well as to the RIDGE and MARGIN offices for distribution. In addition, steering committee members will contact some individuals (particularly potential breakout session leaders) directly. A limited travel budget is available to help defray costs for participants. The number of participants attending as well as distance traveled will determine the amount of reimbursement. All people requiring travel funds will need to apply by 24 August.

DESCEND Website – Annette reviewed the draft DESCEND website pages. The site should be posted in the next couple of weeks for the committee's review. She requested an image for use on the website cover page. Craig Cary offered to send an image. A list of the breakout sessions will be added to the on-line application form. We will ask that participants prioritize the sessions they prefer to attend. We will use the applications to assign participants to sessions. The leaders can then contact their respective session participants in advance of the workshop with specific questions to assist in writing the report. It was recommended that the website include links to related sites.

Report Writing – How and When - Patty Fryer suggested that the session leaders (including the assigned steering committee member) be responsible for writing a summary of the session discussions and that these written summaries be ready by Wednesday noon. This will require that the session leaders finalize the text of their report during the evenings of Monday and Tuesday after the plenary sessions. Much of the report writing will be finished before the participants leave the workshop. We would like to have a final draft report ready for distribution at the December DESSC meeting. The afternoon of the third day of the workshop will be devoted to report writing.

General Workshop Strategies – The steering committee discussed the workshop organization and session leader and steering committee member responsibilities. It was generally decided that the first day was to be dedicated to science discussions and the second day would be for technological discussions. Each day would start with a series of brief introductory presentations. This would be followed by breakout sessions until mid-afternoon. Each breakout session will be assigned two leaders from the applicant pool well in advance of the workshop and will be assigned at least one steering committee member. These individuals will be responsible for stimulating and guiding discussions, for writing a report of the discussion and presenting a brief summary of the session. In the late afternoon, everyone will regroup for a plenary session. The third day of the meeting will be devoted to a morning wrap-up session for all participants and a writing session for steering committee members.

Introductory Speakers: Patty Fryer led a discussion to identify workshop presentation topics and speakers. The committee also developed a rough schedule for the workshop.

Breakout Sessions: After considerable deliberation on how to compose breakout sessions, the following sessions were agreed on (science breakouts to focus on processes occurring in the various environments listed and the technological breakouts to focus on how to accomplish this science within the requirements of the field approaches listed):

Science Breakout Sessions:

- Ridge Processes
- The Abyss/Open Ocean

- Margins (passive & convergent)
- Shelf & Coastal
- Polar

Technological Breakout Sessions:

- Event Response
- Time Series – Long
- Time Series – Short
- Expeditionary
- Global

Participants would be assigned sessions in advance of the workshop. We would strive to maintain a balance among disciplines and at the same time try to assure that everyone's interests are being met.

Next the steering committee suggested session leaders to go along with the topics. The leaders would need to be dynamic individuals, well organized and dedicated to fulfilling their writing assignments. Laptops at each session would be required. Two leaders would be assigned to each session. A member of the steering committee would also be assigned to each breakout session. A set of ground rules would be provided to each leader. Leaders must be willing to arrive late Sunday afternoon for an evening preliminary meeting with the steering committee.

Pre-workshop Application Form – The steering committee revisited the draft on-line participant application form. They recommended some modifications to the questions on the draft from. All completed applications will be posted on the DESCEND website. Additionally it was recommended that each applicant submit an abstract answering specific questions:

Abstract Questions:

1. What technological development would you like to see in support of your current work?
2. What are the current technological limitations on your research?
3. What science would you like to do if technological limitations were not a problem?
4. What capabilities should be generally available for submergence science?
5. Where do you see submergence science going in the next decade?

Adjourn – The DESCEND steering committee meeting was adjourned at 6:00 p.m.

Revised 6/30/99

DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Carriage House
27-28 July 1999
MEETING BEGINS AT 8:30 AM

Day One: Tuesday, 27 July 1999

AM

I. Introductory Remarks, Meeting Logistics, Introductions, Any Changes to Agenda Items, Accept minutes (Fryer)

II. National Facility Operators Report (Pittenger/WHOI Personnel)

A. National Facility Vehicles Operations Summary

III. Operational Summary of Other Deep Submergence Activities (Fryer)

A. MBARI

B. MPL

C. Navy

D. NURP

E. ROPOS

IV. Agency Reports

A. NSF - (E. Dieter)

B. ONR - (S. Millick)

C. NOAA - (E. Smith)

Terms of Reference

VI. Deep Submergence Scheduling: 2000 and Beyond

A. Results from May panel - updating DESSC/UNOLS deep submergence funded programs listing. Mechanism for dissemination of funded programs information to potential PIs.

PM

VI. Deep Submergence Scheduling: 2000 and Beyond (continued)

1. Review of Planning Letters and Website postings and identification of funded programs.
2. Review strawman schedule for 2000

VII. Long-Range Planning Issues

A. **Science/logistical constraints, different vehicle requests - Additional Long-Range Planning and dissemination of funded programs information to potential PIs.**
B. **Future global deep submergence initiatives: Western Pacific, Indian Ocean, S.EPR, Mediterranean, Polar Regions (DESSC members/area champions), HURL RFP for Hawaii and Western Pacific initiatives.**

<u>Day Two: Wednesday, 28 July 1998</u> MEETING BEGINS AT 8:30 AM

AM

VII. Long-Range Planning Issues (continued)

1. **Future funding for deep submergence science (possible new mechanisms)**

VIII. Upgrades to National Facility Vehicles, Science Sensors, and ATLANTIS (WHOI-DSF Personnel)

A. Status Report on current upgrades proposal (ROV - Bowen)

B. Annual request for upgrades to science sensors and operational capabilities of NDSF vehicles - joint WHOI/DESSC

C. SEA CLIFF Engineering Study

D. ATLANTIS - Review backlog items and pending projects

Other items?

IX. DESSC Membership Replacements - Summary of Current Membership Status and Suggestions for Replacements (The CVs for individuals interested in serving on DESSC are enclosed.)

PM

X. DESCEND Workshop discussion: role of DESSC in preparation for and as follow up after the Workshop