**DRAFT Minutes**

**UNOLS**
**DEep Submergence Science Committee**
**Woods Hole Oceanographic Institution**
**Carriage House**
**May 30-31, 2001**
**Meeting Report**

***Appendices***



**Day One: Wednesday, 30 May 2000**

**Introductory Remarks** – Patty Fryer, DESSC Chair, called the meeting to order at 0835. The meeting agenda is enclosed as ***Appendix I*** and the participant list is contained in ***Appendix II***. A motion was made and passed to accept the minutes of the December meeting.

**National Facility Operators Report** – Dick Pittenger began the National Deep Submergence Facility operations summary report. His viewgraphs are attached as ***Appendix III***. Since ATLANTIS was delivered in March 1997, the ship has had 1009 Days at Sea and 557 ALVIN dives have been made. The success rate for ALVIN is 96%.

The crew of ATLANTIS returns on June 4th to resume operations following ALVIN's overhaul period.

**Vehicle Operations Summary** - Rich Chandler continued the operator's report with a summary of the ROV 2001 statistics and highlights to date. His viewgraph is included as ***Appendix IV***. In 2001 there have been two cruises, one along the California coast and one in the Indian Ocean. A total of 329 bottom hours was accomplished with the ROVs and 196 nautical miles were covered. A highlight of the year was carrying out concurrent ROV operations in two oceans. The new elevator system is now in service.

ALVIN has been in overhaul since the start of the year. The sub will be back in service in about a month (late June 2001).

**Archive Status Report** - Dan Fornari provided a summary of the Deep Submergence Facility archives. The details of his presentation are included in ***Appendix V.*** Dan reviewed the contents of the archives which include ALVIN moving images, ALVIN still images, ALVIN digitized images, ROV data and ALVIN data. Dan guided us through the web pages that lead you to the ALVIN Dive Log database and showed how that data is organized. He also showed how to access data through the MBL/WHOI library. Examples of the web pages are included in Appendix V. Improvements that have been made to the vehicle navigation systems allow better correlation to visual information.

Dan explained that 35 mm film is expected to last 50 to 75 years. Some of the oldest film in the archives is approaching 40 years old. The film can be cleaned and duplicated. A rough estimate for duplicating all the film for the 3600 ALVIN dives is approximately $100,000.

**ROV Upgrade Status** - Andy Bowen reported on the ROV upgrade progress. His viewgraphs are provided as ***Appendix VI***. Many of the components for the subsea control are complete and presently being tested on DSL120A. High voltage testing of the main umbilical is underway. The main penitrators are on order for all vehicles. Evaluation of a new neutral tether is underway on DLS120A. Prototype testing of the surface control and GUI software is being conducted. The initial round of Jason II thruster tests has been completed. The main Jason II flotation module order has been placed. The Kraft manipulator purchase is in progress. MBARI has had favorable experiences with this manipulator and it will be evaluated on ALVIN as well.

Andy presented viewgraphs of the upgraded vehicles. The Jason II design weight is about 6100 lbs and the size is approximately the same as TIBURON. The DSL120A will include a multibeam sonar system made by University of Hawaii (Margo Edwards).

The plan for the DSL120A field trials was presented. Evaluations will be conducted at night during ALVIN off-hours. Some of the systems and capabilities to be evaluated include tow dynamics, control and telemetry, the fiber optic north seeking gyro and attitude reference, the bottom lock Doppler sonar, the HMRG sonar system and the

bathymetry data products. All systems will receive careful post cruise analysis. Field trials for DSL120A will take place around June 22, 2001.

Next the Jason II field trial plan was presented. Andy will submit a ship time request for field-testing, which could conceivably require ten days of ship time. A test plan is being developed that will include options for perhaps reducing the amount of ship time needed. The proposed test plan would be carried out in three phases. It would include full operation tests at maximum rated depth in the Deep Ocean Pressure Test Facility at Annapolis, MD. This would cost approximately $120K. Dock trials at WHOI would follow to test science tool interface (including the elevator) and to test the control systems. The estimated cost for this phase is $145K. Lastly WHOI would like to propose adding three days to the initial science deployment for final testing at a cost of around $90K.

DESSC input was requested regarding the need for and extent of field trials necessary for Jason II. The relative costs of the two options are approximately $650K for a ten-day test cruise versus approximately $355K for the three-stage plan. The three-stage plan has some technical advantages. It would allow for more flexibility in scheduling and allow opportunities for repair and rework after the pressure test and before the dockside test. The test in the chambers allows testing of most functions, but would not test the high voltage on the cable. In no event would the cable be operated at a voltage greater than that recommended by the manufacturer. Mark Chaffey reviewed the testing procedures that were followed for MBARI's Tiburon vehicle. MBARI did pressure testing of individual system components, dockside testing and then extensive (approximately two - three weeks) at-sea testing. Marv Lilley commented that the three days planned for the at sea testing of Jason II is on the ragged edge of being sufficient. Andy agreed.

There is a straw-man test schedule for Jason II, which starts around March 15, 2002 and runs for about 2.5 months before the ROV would be available for science. Some of the component testing will take place during the DSL120A testing, as the two have systems in common. This straw-man plan puts the first science around June 2002. The first science operations should have a reasonably modest objective that can deal with some risk of failure.

The risk factors were discussed. Data formats and management outputs for the new system will be an evolutionary change. Some of these changes are being worked out now so the risks are minimized. A question was asked about the factors that could impact the test schedule. Andy replied that there are no single factors that could impact the schedule. Suppliers and manufacturers should not have a large impact on the schedule. The biggest unknown is the impact of the elevated voltages. Propulsion system components could be a lead-time factor, but WHOI is considering constructing those components in house.

The vehicle control system software is being tested on a Johns Hopkins vehicle and these components will also be tested in DSL120A and on test bed facilities. Mark Chaffey mentioned that software development and debugging was the single most troublesome factor to completing the TIBURON development.

**ALVIN Overhaul and Upgrades** - Dudley Foster reported on upgrades to ALVIN. His viewgraphs are included as ***Appendix VII***. The 35 mm camera systems will be removed from the vehicle as permanent equipment, but will be available as required. The port and starboard strobes will be replaced with 200w HMI. New single chip color cameras, a new 3-chip color camera and new observer camera control will be installed. They will be changing to a DVCam digital video deck with the ability to dub to other formats. Flat panel color displays will be added and the one 486 computer will be replaced with six Pentium III's which will take up less room. The data logger will be replaced with a Win2000 based system.

Dan Fornari raised the issue regarding the need to inform the science community about the specifications required to read the DVCam tapes. Dan will work with the ALVIN group to send out this information to community as soon as possible. Barrie Walden reported on the many ways that tapes could be duplicated and that there would be the ability to burn additional data to the tapes if required. He stated that the specs for the new system have been written and that it was necessary only to put this into an understandable format for the Web.

Dudley continued with further upgrades to ALVIN and showed a schematic which indicated where various components would be located on ALVIN.

Dan asked about the time standard and time stamping protocols. Barrie indicated that the in-house data logging would be recorded at 1-second intervals and that one of the computers would provide the time synchronization through a real time precision clock that will be used for the navigation system and for the data logging system. There will be one of the six computers available as the "science" computer and that unit can be used for any equipment that may be brought on board and may require faster than one-second intervals.

Barrie Walden covered some of the aspects of ALVIN certification and sea trials. When ALVIN goes into a major overhaul they lose its certification and it needs to be re-certified before the end of the overhaul. The certification takes place when ALVIN's overhaul work is about 85% complete. The certification is currently in process. During the current inspection the certification team is requiring that the spheres be re-inspected. Additionally the oxygen system needs to be re-certified according to new regulations, which will require removing the system, having the materials analyzed to verify the materials, re-cleaned and reinstalled. Barrie believes that they will be completed on time, however, there will be some items that will not be finished. The certification team has recommended that a quality assurance program manual be developed for ALVIN operations.

**R/V ATLANTIS Status** - Joe Coburn reported on ATLANTIS' shipyard period and upgrades. His viewgraphs are attached as ***Appendix VIII***. ATLANTIS was in dry-dock in January 2001 to meet U.S. Coast Guard and ABS haul-out requirements. The shipyard bid was approximately $500K higher than the estimated cost of the shipyard period work

list. There was approximately $700K in deferred projects. Sources of funding for the ship improvements include ONR supplements of approximately $250K to correct original problems with the vessel. The remainder of the funding came from the ship's major maintenance account (MOSA).

The projects completed with a direct interest to Science/ALVIN included:

- Bow thruster sound deadening in the three forward staterooms.
- Improved HVAC on 01 deck.
- A ladder added on the 01 level to ALVIN area aft.
- Limited drainage improvement.
- Revised remote control of the port ROV traction winch.

Some of the deferred projects due to a lack of funds include:

- Lab power distribution improvements.
- Battery locker fire protection.
- Relocate winch SCR's to make more room in the ET shop.
- More drainage improvements.
- New ALVIN dehumidification system.
- Renew compressors for science freezer and climate chamber.
- ROV fairlead block revision.

Projects of general interest that were completed include:

- Replace sewage pumps.
- Dryer/laundry exhaust system.
- New search light.
- Renewed or replaced weather doors.

Projects of general interest deferred included an expanded potable water tank capacity (needed for extended stays in foreign ports).

Drains are always a problem on a ship because of the lack of pitch, size of drains and the requirement for everything to drain to the port side. They would like to have selected the drains go to the starboard side with the option of closing them or redirect them to port when needed. They are still planning on some additional improvements in the next couple of weeks. Ship designs always fall short when it comes to drains and storage space.

**6000-Meter Submersible Proposal** – WHOI's proposal for a Human Occupied Submersible (HOS) with a 6000+ dive capability was reviewed. The viewgraphs are included as ***Appendix IX*****.** The proposal has been submitted to the funding agencies and is out for review at this time.

The new submersible development project is split into two phases. Phase I involves community input/review and concept development. WHOI's proposal covers the efforts of this phase. In Phase II the concept design would be sent out to bid for detailed design

and construction. The entire process once funded is estimated to take approximately four years.

The proposed work for Phase I include:

- Gathering community input.
- Determining the certification requirements.
- Evaluating viewport location and sizing.
- Developing the submarine systems specifications.
- Formal assessment of an available 6000 meter hull.
- Engineering support.

Dolly Dieter asked at what point would WHOI get the community input that very clearly identifies the scientific need for a new sphere and the greater than 4500 meter depth capability. Dolly indicated that these questions are continually asked.

Barrie indicated that this current proposal really represents Phases III and IV of the project. Phase I was the DESSC study that recommended the need for the deeper new manned submersible. Phase II was WHOI's engineering study that examined the feasibility of using Sea Cliff or its sphere. This study clearly indicated that it would be a mistake to try to utilize Sea Cliff as a replacement for ALVIN. It recommended that a new submersible would be the best option for a deeper diving research submersible. It was suggested that the results of these two studies be formally identified as complete and restated in the new proposal process. Community input is needed to re-emphasize the conclusions and clearly state the need for a new, deeper diving sub. Dolly stated that the agencies (ONR, NSF and NOAA), the science community, and Congress need to be convinced.

Barrie suggested that the Sea Cliff engineering study include an executive summary that states the purpose of the study as well as the study's final recommendations. This should be appended to all future proposals for a new submersible. Also, the community should be resurveyed with more constrained choices regarding submergence facility needs. Examples of specific questions might include:

- Why do we need to go from 4500 meters to 6000+ meters?
- Do we need human occupied submersibles?
- Why do we need human occupied submersibles, ROVs and AUVs?

Dolly indicated that there is a need for a condensed version of the full DECEND report and a way to distribute it in hard copy.

Shirley Pomponi has been working with the Ocean Exploration program and her interactions with Congress indicate that they are not getting the message that technology and facilities development are required for ocean exploration. The project is not big enough in some ways. The Ocean Exploration report to the President included $75 million for infrastructure, however the amount in the NOAA budget is less than that.

Returning back to the proposal, the tangible products from Phase I will include science requirements integrated into a conceptual design. The feasibility of functional specifications will be demonstrated. The system level conceptual design will be completed and the cost estimate updated. The design and construction "Request for Proposal" will be ready to advertise.

The improved science capabilities of a new submersible would include:

- Increased bottom time.
- Increased battery capacity.
- Improved fields of view.
- Increased access to the sea floor.
- Improved interior ergonomics.
- Increase interior electronics and science payload.
- Reduced physical and chemical impact to study area (water ballast).

Improved operational and maintenance features would include:

- Improved battery access.
- Reduction in cabling and personnel sphere penetrations.
- Elimination of hazards associated with a mercury trim system.

That concludes the operators report.

**Compliment of Science Sensors on Vehicles -** Dan Fornari reported on science sensors and data formats. His viewgraphs are contained in ***Appendix X***. He reviewed the data format that the user would receive for vehicle navigation and attitude, geophysics and water properties, and third-party science sensors. For navigation, the user gets raw data (LBL, Doppler, heading and attitude) and processed data of dive/lowering track with first pass editing and most flyers removed. Data logger flexibility permits recording in data logger stream in open fields4.

The various video imagery systems available on the vehicles were reviewed along with the format of the imagery or data that would be provided to the users. These are covered in Appendix X.

**Agency Reports and UNOLS Report**

**National Science Foundation (NSF) -** Dolly Dieter gave the NSF report, which included the announcement that Linda Goad will now be responsible for NSF ship operation proposals and scheduling. Dolly would continue to oversee the National Deep Submergence Facility program. Dolly outlined the ship operation MOSA accounts and how they spread out the costs of overhauls over multiple years. As Joe Coburn mentioned earlier in his report, the funds from the MOSA account were used to support the ATLANTIS shipyard period.

The NSF 2002 budget is still unclear. The budget request for NSF from the Bush administration is a one percent increase and a shift from research to education.

**National Oceanic and Atmospheric Administration/National Undersea Research Program (NOAA/NURP)** – Barbara Moore reported that for the first time in twenty years, NURP is fully funded in the administration budget at the level Congress funded last year. They will continue to fund ALVIN and this level has been growing in past years.

Barbara continued her report with information on the Ocean Exploration project. She reviewed the report to the President by the panel on Ocean Exploration. Her viewgraphs are included as ***Appendix XI***. The panel concluded that there is no U.S. agency that is responsible for ocean exploration. One of the recommendations from the panel is to establish a single agency leadership for exploration, although this would be a multi-agency program. Objectives and priorities should include mapping at new scales of the bottom and water column including looking for new resources. Investigating ocean dynamics at new scales was identified as an objective as well as using new technologies and tools. The exploration program should include a major education and outreach component. Including archaeological aspects was also important.

The panel key science recommendations included:

- Characterize vast array of biology, physical and chemical aspects, including new ecosystems
- acoustic research
- biotechnology and mineral resources
- Technology development.

Recommended exploration research priority sites included the:

- Arctic
- Antarctic
- Inland seas.

The panel report recommends support of $75 million/year for ten years. They recommended single agency leadership, with multi-agency participation. Existing interagency mechanisms should be utilized. The stakeholders (private sector, educators, government, and academia) should be involved in the planning and through all stages.

NOAA's Ocean Exploration Initiative goal is to explore unknown ocean realms based on solid science programs and share the information gained with educators and the public so it is available for the future.

NOAA themes include:

- Exploring Frontier Areas
- Exploring the ocean's resources, living and non-living
- Exploring Maritime Heritage
- Exploring natural sounds in the oceans

- Developing new sensors and systems for exploration.

Patty asked about long term monitoring and how this might fit into the program. This is a debate within NOAA as to where to draw the line. Some long-term observatories can be considered exploration while other operational monitoring systems may not be included. Some types of monitoring could be springboards to exploration programs.

Barbara reviewed NOAA's plan for getting started in FY 2001. A NOAA office of Ocean Exploration has been established with multi-line staffing and a board of directors. The budget is $4 million to support 11 high visibility programs with maximum outreach potential. Some examples include:

- ALVIN expedition - Deep East
- Continuing Lewis and Clark trail
- USS Monitor
- Next generation tools for exploring benthic habitats.

The NOAA 2000 plan includes a $14M request in addition to full funding for NURP; however, the Congress needs to be better educated about what will be provided. There will be an Announcement of Opportunity in early summer 2001. There will be a website available in the near future. Peer reviewed research themes will be used in the future for exploration project projects. Education and outreach programs will represent 10% of the budget. Data management and dissemination require 5% or more of the budget. Technology development will also require support.

For 2003 the initiative prospects are not as clear (or rosy), because there are no political appointees in place other than the Secretary of Commerce to promote the project. NOAA is looking at living within a 4% growth cap. They are still working to make this into a multi agency program.

**Break - Lunch**

**UNOLS Report** - Mike Prince provided the UNOLS report. The main current issues for UNOLS have been the long-range fleet planning process, the replacement of the Academic Fleet (primarily Intermediate, Regional and Local vessels), and the quality of service initiative.

UNOLS with input from the community provide comments to FOFC working group on their long-range plan document for the Academic Research Fleet. The letter was presented by UNOLS as a letter with several recommendations that are being considered by the working group as part of their next draft. A summary of this input was provided to FOFC at their recent meeting. The UNOLS response provided to FOFC will be posted on the UNOLS website.

As part of UNOLS Quality of Service (QSI) initiative, a proposal was submitted in February to the NSF program called Innovation and Organizational Change by researchers from Berkeley and Renseller Polytechnic Institution. This proposal would

have taken input from oceanographic scientists and ship operators and looked at ways to improve the organizational structures and methods of communication in UNOLS to improve how we complete our roles of coordinating the use of facilities and planning for their upgrade and replacement. This proposal was peer reviewed and evaluated to be more of a consulting project than a research project. Decisions about whether or not to resubmit and what course of action UNOLS should take remain to be determined.

In other activities, HEALY's final test cruise has been completed with a one-week trip from Seattle to San Francisco. The Seabeam system, winches, CTD and science data network were all tested on the Gorda Ridge. Peter Michael was the chief scientist. Peter Lemond, Dale Chayes, Margo Edwards, Bill Martin, Jack Bash and I (Mike Prince) among others took part. Sea Beam system works well enough in open water to accomplish the level of mapping that Peter Michael will need during his HEALY cruise planned for this summer. System operation in the ice remains to be effectively tested. Winches had problems with the safety systems overriding control. These problems seemed to have been resolved. Rock dredging operations were successful despite the winch problems. Work continues on set-up for the science data network. The NOAA SCS system has been installed with other direct methods for logging data from CTD, ADCP and the SeaBeam. The ADCP system needs some additional work, planning and testing before next year's SBI programs in the Bearing Sea and western Arctic. This year's HEALY's projects include a two ship operation with the POLAR STERN on the Gakkel Ridge for sixty days from Tromso, with Peter Michael as the chief scientist. This will be followed by about a month-long cruise with Jim Bellingham testing AUV operations under ice and at the ice edge.

Mike reported that he would be making a presentation as will others from WHOI and MBARI to a NASA workshop entitled Exploring Earth's Extremes on July 24$^{th}$ and 25$^{th}$ at NASA/AMES at Moffett Field. The objective of this workshop is to evaluate the relevance of exploring Earth extreme environments in the context of NASA missions to explore Mars and Europa. The focus of the workshop will be on presenting NASA goals in this emerging field of research, providing background and context to potential researchers and technology developers, soliciting input from the research community on future NASA plans in this area, and fostering the interaction between scientists and engineers. Four sessions will be held. They are:

* Overview of the science of extreme environments. This session is constructed to provide a broad overview of the study of extreme environments and their potential relevance to NASA objectives.
* Overview of deployment platforms, robotic systems and trends in automation. This session is constructed to provide information on available and potential platforms from which extreme environment studies can be conducted and the tools and techniques which can be utilized to gain access.
* Overview of instrument development activities. This session is constructed to provide an overview of existing and projected instrument development programs.

* Future opportunities. This session will focus on developing plans for next steps in the NASA planning process for exploring extreme environments. Chairs from each of the previous session will present summary recommendations from their sessions in a panel discussion format.

Barbara Moore added that NOAA is also planning an Explorations workshop for April/May. The program has not been set yet, but a brochure on the workshop is available.

The UNOLS Council will hold a meeting in June to look at the future objectives and goals of UNOLS, including where we are going with Quality, Science Feedback (post cruise assessment), ISM, the role of UNOLS with regards to a broader range of facilities such as the various observatory programs.

The UNOLS Annual meeting along with an AICC, FIC and scheduling review meeting will be held the week of September 10th with the Annual Meeting on Friday, September 14th. Details of that meeting will be determined in June. One item of interest will be that a change to the UNOLS charter will be presented for vote that will create a Chair Elect instead of the Vice Chair. There will be two-year terms as chair elect, as chair and then as immediate past chair. The 2002 elections will be transitionary in that a Chair and a Chair elect will be voted on and unless someone seriously objects Bob Knox would become immediate past chair.

There will be a combined RVOC/RVTEC meeting hosted by URI the week of October 23rd.

Another high priority area for UNOLS is wire issues. There will be an updated version of the winch and wire manual, in hard copy, on the web and on CD-ROM. The web versions and CD ROM versions can be updated more readily and hard copies can be updated on a longer term basis if needed. There is a group looking at the criteria for establishing safe working load. A plan to get science community input on the payload requirements of wire in the future is underway. Wire science mission requirements that will be used with industry input to develop specifications for new wires will be developed. Goals are to meet the scientific need, improve handling systems and minimize the need for new winches and frames.

**Operational Summary of Other Deep Submergence Activities**

**Monterey Bay Aquarium Research Institution (MBARI)** - Mark Chaffey provided the MBARI operational report. His report is included as ***Appendix XII***. WESTERN FLYER/Tiburon and POINT LOBOS/Ventana have been operating a full schedule since last summer's DESSC meeting. In 2000, a major expedition to the Juan De Fuca area was conducted where they were able to use the Stakes/Holloway rock drill to take basalt cores at depths reaching 3000 meters. They now have four sleds for Tiburon. Overall during 2000, WESTERN FLYER/Tiburon was scheduled for 150 operational dive days and had a dive success of 98%.

This year, 2001, WESTERN FLYER/Tiburon's major expedition has been a transit and series of dives in Hawaiian waters to depths of 3820 meters. Over the course of the cruise, 67 dives have been conducted. Some of these dives were conducted enroute, but most took place off the Hawaiian Islands. Tiburon was used to get over a thousand rock samples, push cores, and heat flow measurements. The transit dives were in mid water where they found numerous new species. Only one dive day was lost. In Hawaii they had problems with unusually windy days that required them to relocate some dives to leeward sides of the island.

There are 11 bunks available for science on Western Flyer. During the Hawaii dive operations, they were operating to 18-hour days. In 2001 there are 148 dive days scheduled of which five are NURP funded. A total of 11 outside collaborators participated in the various legs of the expedition. The next major expedition will be to the Sea of Cortez in 2002.

In 2000, Ventana/POINT LOBOS has had about a 90% success rate out of 153 scheduled days, with losses primarily due to weather. A new tool sled is under construction for laying benthic cables for sub sea observatories. This is part of MBARI's increasing efforts toward supporting in-situ long-term ocean observatories, including the NEPTUNE Program.

During 2001, 162 days of Ventana operations are planned and 18 days of CTD transect work is scheduled.

In other activities, MBARI recently acquired an 85-foot Pilot boat. It will be their main tender for the Dorado class AUVs. MBARI's AUV program has two major projects, one in the Arctic and the other in development of the docking moorings.

Dan Fornari commented on the recent trend for increased collaboration with outside users and access by outside researchers to MBARI assets. Mark commented that the mechanism for this has been with NURP proposals or with collaborations with MBARI scientists. It was asked if this is something that will someday be widely advertised. Mark indicated that he will bring the question up at MBARI, until now it has been an ad hoc arrangement. Barbara Moore added that NURP has a Memorandum of Understanding with MBARI for access to their facilities.

**Harbor Branch Oceanographic Institution (HBOI)** - Shirley Pomponi provided the report on the HBOI facilities. Her viewgraphs are included as ***Appendix XIII.*** Shirley explained that HBOI cost shares the time for the submersible use. In 2001, HBOI paid for 61 days of submersible time (for ship time funded by NSF) and four days of submersible time (for ship time funded by NOAA). NSF and NOAA paid for their respective ship time and science research for these projects. R/V SEWARD JOHNSON II will be brought on-line later this year. In September, R/V EDWIN LINK will be taken out of service for the remainder of the year. SEWARD JOHNSON has a full schedule.

In 2001, Johnson Sea Link I (JSL-I) has 132 days scheduled ad CLELIA has 43 days. Johnson Sea Link II is undergoing retrofit and is scheduled to be operational in 2002.

Upgrades to JSL-1 include:

- Sunwest sonar
- Digital video camera
- Digital S and Mini DV recording format.
- Camera boom arm with HBOI design pan-and-tilt
- Extendable light boom

Clelia upgrades include mini-DV recording format. A new thruster design is in progress.

For 2001 there are 181 submersible days scheduled (102 days on SEWARD JOHNSON I, 40 on SEWARD JOHNSON II and 39 on EDWIN LINK); HBOI funded 94 of these days and a total of 135 dive days. Shirley showed a chart that indicated the number of dives by funding source. Shirley showed a chart indicating the entities benefiting from the HBOI cost sharing. Shirley showed two charts of the last 10 years, which show the submersible operating days by agency, and the HBOI funded sub days, respectively.

**Hawaii Undersea Research Laboratory (HURL)** – HURL provided a written report in advance of the meeting. It is attached as ***Appendix XIV*****.** Patty Fryer read the report. In CY2000 Pisces V was damaged on the deck of the ship and they are replacing the tubular frame underbody. Upgrading of Pisces IV is proceeding. A new Schilling Orian arm, a digital camera, and a Paro Scientific digital depth sensor are being added as standard equipment. The ROV RCV-150 is fully operational for depths to 800 m, in slow transit mode.

In 2001, 43 NURP funded Pisces dives are planned. HURL has not issued a 2002 call for proposals because there is quite a bit of carry-over work.

HURL is participating in the NOAA Ocean Explorations by developing a plan for exploration of the Northwest Hawaiian Islands. There will be 60 days of voyage of discovery for the NW Hawaii islands. The proposal is not in yet.

Dan Fornari commented that there is some confusion within the community regarding the explorations program. Has NOAA established the program? Barbara indicated that there is some confusion partly because there is a catch 22. The science can't get started without the funding and the funders need a vision from the science before they can support the program. Dan suggested an article in EOS to advertise the program. Barbara was very receptive to it.

**MPL** – No report.

**ROPOS** – No report.

**Advanced Tethered Vehicle (ATV)** - Joris Gieskes reported on ATV. There will be an MOU between the Navy, Scripps Institution of Oceanography, and the University of

Hawaii/SOEST. The transfer of the vehicle from the Navy just recently took place. Joris suggested that a working group be formed at both Hawaii and SIO to maintain and operate the vehicle. The Navy has offered their expertise to get the vehicle operational again. Joris showed photos of ATV, they are included as ***Appendix XV***. ATV is quite large with a length of 16 feet, beam of 9 feet and height of 7 feet. The gross weight is 6.5 tons. The vehicle and its accompanying systems cover much of the aft deck of the support platform, KELLIE CHOEST. The science community will need to get involved with ATV and provide feedback.

Joris went on to talk about the Explorer vehicle. The vehicle was used for Lisa Levin's recovery cruise. This cruise was very successful and the Explorer system was very useful. This was its first deployment in other than fresh water. They were very pleased with the video and biological samples obtained.

**Reaching-out to the Marine Biology and the Shallow Water Science Communities** – Patty Fryer introduced the topic. The goal is to reach out to the biology community, not just the vehicle users. They would like to educate the community on the capabilities of the facilities. Shirley Pomponi continued by reporting on her efforts in this area. Her viewgraphs are included as ***Appendix XVI***.

Shirley polled 60 members of the "submergence biology community." This included DESCEND workshop participants, current users of both deep and shallow submergence assets as well as other potential users. She asked them their preference in meeting locations, what would be the best forum to reach biologists? The overwhelming response was the ASLO/AGU Ocean Sciences meeting and the ASLO winter meeting. There were other suggestions that included the:

- Deep Sea Biology meetings
- Benthic Ecology meeting
- Western Society of Naturalists
- American Society of Naturalists.

Dolly Dieter said that it is necessary to talk to Phil Taylor (NSF's Biology program manager) who is adamant about reaching out to the Biology community. There needs to be better communications. He feels very strongly that the biology community has not been adequately represented by DESSC over the years.

The DESSC members clearly indicated that they did not want the AGU/ASLO meeting to replace the annual DESSC meeting held in San Francisco at the AGU Conference. Mike Prince added that the UNOLS budget would be able to support both meetings. The committee would like to continue with the AGU winter meeting and begin the process of building the presence for biologists at the AGU/ASLO Ocean Sciences meeting. The current plan is to go to both meetings with a slightly reduced effort and cost.

At the AGU/ASLO Ocean Science meeting we need to decide between the concept of a meeting before the main meeting or a special session at the meeting. If the later, the

deadline is June 25th to request a special session. The consensus of the DESSC was that for this first meeting we should request a special session. This session could include some key science presentations from users of the facilities, an operator report and response to user feedback. The facility reports would include both shallow and deep operations. There would need to be time for a session for questions and feedback on the process of getting access to facilities. Discussions about funding mechanisms may need to be addressed during the session, but it should be controlled.

**Facility Access and Funding** - This evolved into a DESSC discussion on submergence facility funding mechanisms and access. Patty suggested that a meeting be held to specifically address the issue of facility access and funding. She suggested this happen at NSF or one of the other funding agencies in a workshop or some other forum that includes funding agency people, program managers, scientists and operators. There was a lot of committee discussion about what this group could accomplish and how it might impact the existing budgeting decisions. It was recognized as a very difficult situation with no clear solution. The general sense among many of the committee and some agency representatives was that not much could be accomplished by such a meeting.

**Submergence Lectureship Program** - Dan Fornari raised the issue of reviving the idea of having lectures or presentations at various schools and colleges that promote the submergence science capabilities. The ODP lecture series could be used as a model. Ambassadors would be selected to speak as visiting lecturers to potential new facility users. Annette DeSilva indicated that she still has a folder on the lectureship program that was put together during the initial attempt to get this program started.

**DESCEND – Findings, Recommendations, and Follow-up** – Jim Bellingham provided a review of the April Submergence Technology Meeting and a proposed plan for a Technology Follow-on Workshop. His viewgraphs are included as ***Appendix XVII***.

The DESCEND workshop and technical follow-on intend to identify:

- great issues of submergence science
- observational challenges
- Technological opportunities providing dramatically new capabilities.

A vision is needed that provides a compelling case for investment when compared against those advanced by other scientific communities.

An evening meeting was held at the Oceanology Conference on April 4, 2001. Annette DeSilva, Jim Bellingham and Daniel Schwartz coordinated the meeting. The format of the meeting was an introduction, followed by free flowing exchange by the meeting participants and a follow up. A variety of needs and problems were identified and are listed in the appendix. Many of the needs and problems are associated with funding support.

The conversation evolved into a money discussion. Jim called this “the Black Hole.” The issue is not on the agenda, but emerges anyway. It is a strongly emotional topic that

is impossible to address in any substantive way. The evening meeting is not the right forum for this sort of discussion. It prevents consensus on other substantive issues.
Jim went on to discuss a technical follow-on forum. A potential title is "New Windows into the Ocean". It would involve a small, well-informed group to create a vision and a report. A balance of science and engineering personnel would be needed. We would need access to experts and operational access to new systems for educational purposes. A time commitment from all participants would be needed.

Some facilities would be used during the workshop for show and tell, and educational purposes. Jim provided a template for the follow-on workshop:
Day 1: Platforms and support platforms
Day 2: Sea experience – Day on WESTERN FLYER with Tiburon
Day 3: Sensor systems and data management
Day 4: Draft findings

There was discussion among the DESSC and some confusion about the education aspects of the workshop agenda and the objectives of the workshop. At question was whether or not a workshop of this level could provide coherent decisions and descriptions about where to go with submergence technology. Is the follow on meeting one to define a broad vision for taking advantage of technological opportunities or is it a method to identify specific technological needs and methods?

Dan Fornari suggested that it is possible to identify what technologies are out there now and coming in the near future. What is needed is to identify those things that need to be done that cannot be done with existing technologies. Cross-fertilization between various types of users and engineers could lead to good ideas for technology development.

Dolly indicated that the follow-on workshop concept was not approved by the OCE staff meeting because it was not focused clearly and specifically enough and the steering committee needs to be a smaller focused group than the DESSC to define the goals and specifications of the workshop.

The meeting adjourned for the day so that tours of ALVIN and ATLANTIS could be taken.

***Day Two, May 31, 2001***:

The day began with a demonstration of the DVCam Video on Dan's computer

**DESCEND Discussion continued** - Patty asked for suggestions for people to serve on a DESCEND follow-on steering committee. The list of suggestions is available at the UNOLS Office.

**DESSC Terms of Reference** - Patty asked that everyone review the revised DESSC Terms of Reference. The changes remove some outdated sections with regards to review of proposals. The Terms of Reference are enclosed as ***Appendix XVIII***. After review, the

Terms were accepted as written by the committee. They will be sent to the UNOLS Council for approval.

**Annual request for upgrades to science sensors and operational capabilities of NDSF vehicles - joint WHOI/DESSC** - Dan Fornari began the discussion and talked about the SM2000 system (200 kHz near bottom multibeam sonar) and getting it installed on the ABE. He showed maps of SM2000 Bathymetry taken from Jason. John Howland refined the map. The quality is better the phased bathymetry and the imagenix.

Dan went on to say that they have been very appreciative of the upgrade support that the NDSF has received. He reviewed the Annual FY2002 Deep Submergence Facility upgrade request suggested proposal content. A brief summary of his report is contained in ***Appendix XIX***. Dan proposes that this next proposal be dedicated to data processing and deliverable products resulting from the systems. The proposal would be to develop data processing and scripts for producing science data products from bottom mapping systems in a routine real time way on board ship. Dan Fornari showed maps of data that these systems are capable of producing with significant post processing. The proposed effort would make it possible to do some or all of this type of processing by the tech groups and scientific party. Dan listed the mapping systems identified in the proposal.

Bill Ryan suggested that the output from data processing system be compatible with GIS systems using a standard format. Bill feels that this is a very good proposal. Bill offered to help with the proposal and developing the system. There is some concern that this will be a lot of work for the ship's technicians. Also, Dan indicated that the data will be a little rough and the scientists must be willing to accept this. This will be part of the pre cruise planning. Bill Ryan mentioned that you can have a quality control document that scientists can sign off on indicating that the data product is what is it is advertised to be.

There was a discussion on what should be expected from the proposal and the support that will be provided. There is concern from Andy and Barrie that the degree of complexity will add to the burden on their people. Bottom line is that this is a good thing. The reason that this is being proposed is because it cannot be done properly on an ad hoc basis. Dedicated support must be provided. Patty suggested that this is perhaps a project for a post-doc.

Dolly pointed out that this not strictly an equipment proposal; it is also a people support issue. This is probably not a problem.

**Rock Drill** - Patty mentioned a recommendation from the Drill Workshop held earlier in the year, that a small rock drill be acquired for the ROVs and ALVIN. The Stakes/Halloway drill is no longer available to the community. Debra Stakes is willing to provide her specifications to make another community drill. It was suggested that the Stakes/Holloway drill be adapted to ALVIN and JASON without significant changes but some refinements. Mark Chaffey commented that it is not a very complex system and wouldn't be difficult to clone. However, will the ROV drill meet science demand? The drill takes 1-meter cores (four). Patty indicated that the drill would not just be a drill to

collect samples. It would likely also be used for observatory type work, drilling holes and putting instruments in them.

Discussion covered the issue of who should own and maintain a tool such as this drill. It is important that someone that is really up to speed with drilling be involved with maintaining and upgrading the drill.

The Final suggestion is that a PI needs to propose to have a drill built to do the work needed and then WHOI would work with MBARI to clone the Stakes Drill. Use of this drill would require PI's to include funds in their proposal for a maintenance and operations technician on their cruise.

Another recommendation of the Drill Workshop was to be able to create a rock corer that would be a standard on UNOLS vessels. There are actually four drill suggestions that came out of the workshop:

- A Prod drill
- 30m core
- meter long core – for ROV (drill)
- UNOLS rock corer

**Deep Submergence Scheduling - 2002 and Beyond** - Jon began with review of the 2001 schedule. His viewgraphs are included as ***Appendix XX***. On June 13 ATLANTIS/ALVIN will go to Bermuda for certification dives. Science operations are scheduled to resume in late June on the Mid Atlantic Ridge. Jon then presented the requests for 2002 work, which include several deferred cruises, mainly on the Juan De Fuca Ridge. The schedule is full with the pending and funded work and still needs room for transits and maintenance. There are 363 days of requests not counting the transits and maintenance.

Next Jon reviewed the 2002 ROV schedule. The schedule includes the Jason II trials and mobilization. The ROV schedule would start in June in Hawaii for Garcia after JASON II is ready. There are 225 days of ROV time in 2002. In 2001 there are 159 days scheduled. Work in the Western Pacific is better from a wind point of view after April. January and February are dry but windy months in the Western Pacific. One proposed plan would be to start ROV operations in 2002 with Johnson and others on the Juan De Fuca and then go to Hawaii with the same ship and the ROV to do the Garcia and Smith programs. Then the equipment would be shipped to the Western Pacific for Fryer and Tivey. An alternate plan would be to leave equipment on the same ship all the way to Guam.

Next we reviewed the vehicle requests for 2003 and beyond. The number of days requested have been compiled by Annette DeSilva and displayed graphically on a world map. The maps are included in the Appendix. All of the requests for 2003 and beyond are pending. Work is primarily being requested in the traditional work areas. Dan Fornari mentioned that it is important that the ALVIN facility make it back to the Atlantic when it is needed and not every three years when it comes back for overhaul.

The requests were compiled from the WHOI Vehicle request (Letter of Intent (LOI) website as well as the UNOLS Ship Time Request (STR) Database. It is sometimes difficult to determine if a request is still current. It was decided to modify the STR form so that it can also be used as a planning document. This would allow us to eliminate the WHOI Vehicle Request form. PIs would only be required to submit one form. It was also suggested that a pdf file of requests and map be created. These could then be circulated for review and placed on the WHOI website.

Bill Ryan suggested that UNOLS make a plot going back five years with the list of PIs who have used the vehicles and the number of operating days to show when people became users and how much they use the vehicle. The idea would be to look at how well new users are getting access to the vehicle systems and how many of the chief scientists are first time users.

**Opportunities in Archeology** - David Mindell provided an update on this topic. He has been part of an ongoing effort to expand use of submergence facilities for traditionally funded archaeology projects. Dave's NSF program manager, John Yellon, was unaware of the facilities and funding mechanisms available through the National Facility. They have agreed to begin a mutual education process.

David indicated that there is a budding community of submergence archeologists. Plans are underway to hold a conference at MIT in April 2002 on Technology and Archeology of the Deep-Sea. DESSC's role at the workshop was discussed. Bill Ryan will try to attend. It would be useful to show the maps that can be produced and the facility capabilities.

There was discussion about the proposal process and educating the archeologists on the deep water facilities for archeology and how to get access to these facilities. The problems of getting permission for archeological work in other EEZs were discussed. Deep water archeology is exploration to some extent and this is a component of NOAA's Ocean Exploration program. Funding for the use of deep ocean archeology is at a scale beyond normal funding levels for archeology. Funding will have to come through Ocean Exploration efforts and by forming multi-disciplinary collaborations with MGG folks and others.

**DESSC Committee Membership –** The current membership of DESSC is listed in ***Appendix XXI***. Cindy Van Dover rotates off the DESSC this year. A biologist to replace her will be needed. Suggestions were made. Patty will contact the people suggested to see if they are willing to serve and if so request a copy of their CV.

The first terms of Patty, Bill Ryan, Anna-Louise Reysenbach, and Bob Embley are also ending. Patty has agreed to stay on. She will contact all of the other members to see if they are willing to remain on the committee.

**Other Business**

2002 DESSC Spring Meeting – The timing of the 2002 spring meeting was discussed. If the meeting is held in early May, there may be an opportunity to see Jason II during its trials. Bill suggested that we have an invited scientist come and open the meeting with a report on where they see science going. Dan will look into this.

**Action Items** – Patty recapped the action items from the meeting:

- Review Proposal for 6000+ sub and provide comments to NSF/NOAA/ONR by the end of the week. By the week after the 7th to NSF by email, followed by hard copy with a note to that effect.
- Get community input on the need for the deep submersible and in particular biologists/Margins people.
- Technology workshop steering committee needs to be formed and to start the work of formulating the plan for the workshop. Take into account the previous technology workshops.
- Give the DESCEND Brochure a better profile. Look at the online DESCEND report to see if it can be smoothed out and distributed. Write a little EOS article about the DESCEND brochure. Look into submitting an article for a biological journal and others such as Sea Technology and the MTS journal.
- Schedule a special session at AGU/ASLO Ocean Science meeting for DESSC presentations.
- Bill and Dave will work on arrangements for the MIT Archeology conference to see that DESSC is represented
- Modify the Ship Time Request form so that it can be used as a long-range planning document.
- Lecture series - develop a list of names that would be ambassadors for a lecture series, develop a set of resources for those ambassadors. We need to dust off the proposal and send it to all three funding agencies. Need to have a PI for this program.
- Use biologists as ambassadors to biology meetings and have them give presentations at regular biology meetings.
- Contact Phil Taylor regarding plans to reach out to the Biology community.
- Send abstract for special session to AGU/ASLO by June 25th.
- Should there be a session on funding paradigms for deep submergence facilities and access to those facilities. What about an education strategy?

There was further discussion on the issue of access to facilities other than those in the National facility. The committee basically decided that a meeting would not be useful in reaching any decisions. This topic will continue to come up. NURP is trying to support some of requests for other vehicle use.

Lastly, there was a discussion on ONR funding support. Sujata has indicated that ONR does not plan on funding facility studies in the future. They have not been users over the recent years. ONR will continue to fund the facility (maintenance). Dick went on to report that there are other elements of the Navy that are very interested in submergence and a new submersible (submariners).

The meeting was adjourned at 1240.