

DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Clark Building, 5th Floor, Room 509
2-3 May 2002

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Day One: Thursday, 2 May 2002

Introductory Remarks, Meeting Logistics, and Introductions – Patty Fryer, DESSC Chair opened the meeting at 0830. Dick Pittenger reviewed the meeting logistics and some of the recent ATLANTIS problems associated with its A-Frame and motor. The A-frame problem is being addressed and the motor problem has been fixed.

Meeting participant introductions were made. The meeting agenda is included as [Appendix I](#) and the attendance list is included as [Appendix II](#).

Accept minutes – The meeting minutes from the June 2001 and December 2001 were accepted as written.

Report on Shallow Submergence Science Committee (SSSC) Meeting – On 1 May (the day before this meeting) a meeting of the SSSC was held. Shirley Pomponi, SSSC Chair, provided a summary report of the meeting. Her summary report is contained in [Appendix III](#) and the minutes of the meeting are posted on the web at: <http://archive.unols.org/meetings/2002/200205des/200205shemi.html>

Shirley reviewed the committee's membership and terms of reference. The committee established a definition of "shallow" submergence assets. These are facilities conducting research at depths between 100-1500 m. There are also biological and technological justifications for this depth definition. The definition excludes scuba diving and habitats, as access to these facilities does not seem to be a problem.

There are a variety of shallow submergence assets currently available, however, the community may not be aware that they exist. SSSC has recommended that an inventory of assets be compiled. The inventory should specify compatibility with UNOLS vessels and also indicate how to gain access to these facilities. Potential users should be encouraged to communicate with the facility operators.

Some of the other shallow submergence facility needs identified included:

- Mission specific AUV, inexpensive, generic, interchangeable with variety of sensors for variety of applications, to be used independently or as part of observatories
- High-resolution, shallow water mapping systems
- Better imaging capabilities
- Long term goal: development of a national pool of shallow submergence assets

Other topics of discussion during the SSSC meeting included identifying:

- Scientific themes
- Systems/features particularly suited for shallow submergence research
- Processes/shortcomings for access to and funding for assets.
- Mechanisms to increase funding:
- NSF funding for assets (this was focus since ONR and NOAA already support shallow assets)
- Budget increases for agency programs
- Legislative appropriations for program and/or facilities
- Increase in interagency support

The SSSC action plan includes the following items:

- The committee will draft a document to be distributed to DESSC and other members of SSSC.
- The committee will meet one more time to review responses and make final recommendations to DESSC.
- They will consider the establishment of a submergence science committee (with interagency funding) to serve as a steering committee and provide a focus for increasing the funding base.

Barbara Moore remarked that she plans to contact all of the NURP centers to request that they compile an inventory of all their facilities and post it on one central place on their web page.

Patty Fryer commented that NSF policies towards funding non-NDSF assets need to be addressed and communicated to the community. There are some program managers at NSF that discourage NSF support for non-NDSF facilities.

Mike Reeve commented that with the addition of observatories, there will likely be new facility demands and that these facility needs are to some degree unknown. In terms of facilities at NSF, most attention has focused on ships. There will be a variety of new types of facilities coming on line, and NSF will need to

figure out where they all fit and how they will be supported. Bob Embley asked if new money to support these new facilities was anticipated. The answer is most likely, "no." Bob also asked if observatories would decrease the need for ships. Mike Reeve replied that the Cowles/Atkinson workshop indicated that ship time needs will increase.

Reaching the Marine Biology community:

ASLO/AGU Ocean Sciences meeting - Patty Fryer reported on the DESSC special session that was held at the February ASLO/AGU Ocean Sciences meeting in Hawaii. The session included both posters and papers. The format of the session had to comply with AGU/ASLO session guidelines. The poster session was well attended. The oral session was also well attended before the mid-afternoon break.

There was some discussion on the effectiveness of using this type of forum to reach the community. It could be difficult to engage the biology community with a DESSC special session during a science conference. There is too much competition from the other concurrent science sessions. Other ways of engaging the biological community need to be considered.

Holding a DESSC planning meeting the day before the Ocean Science conference, as is the model for the Fall AGU meeting was discussed. This year it had been decided not to use this format for Ocean Sciences Meeting as many would not be familiar with the meeting and the result would be low attendance. Mike Reeve stated he would like to see only one DESSC community meeting in the years when the AGU/ASLO Ocean Sciences meeting is held. Dan Fornari firmly objected, stating that it would jeopardize the success of the traditional Fall AGU meeting, which is well attended. In addition to engaging the biology community we must keep the others engaged as well.

Mike Reeve explained that this is not something that NSF is going to dictate at this time. It can evolve as the community becomes more familiar with both Meetings. For a number of years we may have to have both meetings. He thinks that it would be a good idea for all disciplines to be engaged.

It was suggested that the biologists on DESSC take advantage of the various biology meetings held each year and request special sessions for submergence science. WHOI also has a NDSF poster that can be used for these sessions. Dan Fornari remarked that RIDGE is trying to introduce their new initiatives throughout the community and have been using newsletter articles to spread the word. RIDGE drafted a template that could be used for preparing the articles. There are some new DESSC initiatives on the horizon that could use this same model.

It was recommended that DESSC:

- Create a template for writing articles
- Write articles
- Make a traveling show
- WHOI prepare a PowerPoint presentation that would provide facility and operation descriptions and capabilities.

Dan Fornari remarked that WHOI has just finished completing a CD that is a compendium of 25 years of vent exploration. Copies were available at the meeting.

Operational Summary of Other Deep Submergence Activities

MBARI – Mark Chaffey reported on ROV Tiburon's recent cruise highlights. Highlights include deployment of new laser Raman spectrometer and the recovery of the Scripps Landers.

There has been an increase in outside funding for MBARI vehicle use:

- NURP funded 4 days.
- Ocean Exploration funded 7 days.
- The Keck Foundation funded 14 days.
- The BBC funded 2 days.

Major expeditions in 2002 and 2003 include work in the Pacific Northwest and off Mexico.

Mark reported on the MOOS mooring system and its capabilities:

- 4000 m depth
- 10 km Benthic runs
- Power and data to the seafloor
- Support for AUV docking
- Support for vertical profiler

They are working on the Benthic instrument nodes assembly. Mark showed pictures of one being deployed.

Marv raised the question of whether there always be the constraint that ALVIN maintain a depth length away from a mooring. As observatories are developed, there are likely to be more moorings deployed in the areas of interest to dive. This is an important issue that will need to be addressed.

Mark showed a picture of MBARI's vessel ZEPHER, which is their support platform for AUV operations. In 2002 there are 138 project days planned. The AUV system is to be installed over the summer, 2002.

MPL - Joris Gieskes reported that Christian DeMoustier has left SIO and John Hildebrand is taking over his responsibilities. The Control Vehicle (CV) is working well. On a recent 18-day REVELLE cruise near Hawaii, 32 CV lowerings were made. CV was used to make vertical measurements and replace transponders. Future operations include work off Juan de Fuca, the coast of Peru, and Hawaii. CV is a good tool for borehole reentry exercises.

ATV – SIO is interested in testing ATV and making the system operational. They plan to do in-water tests from MARFAC pier in June and July. In November, there may be U.C. ship time and an opportunity off San Diego for sea trials. The Navy submergence group is located in San Diego and would be available to help support operations. Joris will try to participate. Patty asked if the University of Hawaii is participating in these exercises. Joris indicated that he was unaware of any UH plans. They plan to use ATV off of REVELLE. The basic plan is to make this facility available for the community

use.

Additional details will be provided at the December DESSC meeting. The MPL and ATV reports are included as [Appendix V](#).

The question was asked if NR-1 is still in service. Tim Pfeiffer replied that the vehicle is still in operation and that they are trying to re-establish a relationship between the science community and Navy. There had been a Memorandum of Agreement (MOA) between NURP and operational navy. This MOA still exists but many of the Navy facilities have been retired. It was recommended that this MOA be reactivated and used to perhaps help meet some of the shallow submergence needs. Tim said that there is a problem of scheduling science programs on NR-1 since it usually is scheduled only two quarters in advance. NR-1 may need to be re-cored in three years. Barbara indicated that there has been a decision to extend the life of the NR1.

NURP (Centers and Ocean Exploration) - Barbara Moore reported that there are two NOAA programs that support submergence science, NURP and Ocean Exploration (OE). NURP has an annual commitment of \$500k for NDSF vehicle operations and they schedule these operations one year in advance. In 2002 dives had been planned in the North West Pacific and the Gulf of Mexico. However, things have changed because there are no other operations planned in the Gulf of Mexico. These dives have been deferred to 2003. Additional dives were added for NURP and OE. There are now nine dives in Galapagos, 29 days in the Gulf of Alaska, and other west coast areas. In 2003 there are 15 days planned in the Gulf of Mexico. It has not been decided whether these dives will be with ALVIN or an ROV. OE has planned 30 days in the Caribbean and the South East US.

ROPOS – Patty Fryer summarized ROPOS operations. The report is included as [Appendix VI](#). Operations include:

- July 14-19 on NEMO at Axial Seamount.
- July 20 – Aug 5 – Explorer Ridge from THOMPSON
- Aug 5-12 - Vancouver Is. From TULLEY

Bob Embley commented that they have been getting 15 hours per dive.

HURL – Patty Fryer continued with a report on HURL. The report is included as [Appendix VII](#). Alex Malahoff is currently in New Zealand on sabbatical. HURL has 17 panel approved PISCES dives and numerous ROV dives for 2002. Other NURP dive commitments are anticipated. In addition to NURP dives, HURL has been contracted by NOS and NMFS as part of the Coral Reef Initiative.

HBOI – Shirley Pomponi reported on HBOI facilities. Viewgraphs are included in [Appendix VIII](#). Johnson Sea Link I (J-S-L I) underwent routine maintenance of all systems from Nov. 2001 to Feb. 2002 before beginning the operating season in March 2002. J-S-L I has completed 4,390 dives to date. In addition to normal maintenance, the power distribution system was upgraded. Also, a new set of main battery cells was installed.

During the 2001 season, the sub's video system was upgraded to a digital camera with 850 lines of resolution. The camera is configured so that full factory controls are available to the pilot in addition to a data overlay system. The camera housing is mounted to an HBOI-designed electrical pan and tilt mechanism with two green lasers for scaling purposes. The pan and tilt is mounted on a three-function hydraulically operated boom that provides the operator with a wide variety of camera and lighting positions. Also during the 2001 season, J-S-L I was outfitted with the new Sunwest SS-300 CTFM Sonar

system with a 12" display monitor.

JOHNSON-SEA-LINK II (J-S-L II) underwent major maintenance from Nov. 01 to April 02. During that time, all systems were serviced or replaced. The pilot sphere was replaced incorporating a redesigned hatch and lower penetrator. All of the internal high-pressure valves, tubing and fittings were replaced. All external valves, tubings and fittings were rebuilt, pressure tested or replaced. The submersible's hydraulic system was overhauled. In addition to the general maintenance, a new Sunwest SS-300 CTFM Sonar was installed with a 12" display monitor to match J-S-L I. Sea trials are scheduled for the first week of May with an ABS certification dive at the end of those trials. J-S-L II has completed 3,252 dives to date.

CLELIA underwent routine maintenance during Jan-March 2002. CLELIA has completed 625 dives to date and supported operations for NOAA's Ocean Exploration Program in 2001.

All thrusters on the three subs underwent preventative maintenance.

HBOI operates two ships. Their operational schedules are provided in [Appendix VIII](#).

Agency and UNOLS Reports

NSF - Dolly Dieter reported that NSF and NURP have funded WHOI's new ALVIN design study. The ROV upgrades are all funded and testing is in progress.

In other areas of interest, NSF is supporting the replacement of shipboard vans with USCG approved vans. They hope to establish a few van pools.

The agencies will work to limit the operating days on large ships to 300 days so that adequate time will be available for maintenance periods.

NSF ship inspections have resumed. Dolly is participating in the inspections. Community input is needed to help identify requirements for next generation wire and winches.

The NSF budget is anticipated to be level for 2003.

ONR - Tim Pfeiffer reported that ship maintenance is also an issue for the Navy. The Navy has decided to decline funding for WHOI's new ALVIN design effort. In recent years there has been no ONR science on ALVIN to justify support. This doesn't mean that the Navy is stepping away from deep submergence. There are no institutional barriers for use of ALVIN.

The ONR facilities program now supports ship time at 100%. There is no longer cost sharing with the science programs.

Dan Fornari encouraged a connection be made by DESSC to the ONR program managers regarding use of ALVIN. Dick commented that the Navy interest has moved into the littoral zone; however, there is interest within other non-ONR Navy for deep submergence work. These groups have toured NDSF. Dick commented that it might be difficult for the Navy to maintain the submersible certification program for just one sub, ALVIN. There was discussion on how can DESSC can reach out to the Navy. It was suggested that a letter be drafted expressing the need for continued Navy support. Tim encouraged the community to submit proposals. Bob Brown pointed out that NRL chartered a Russian ship and sub. This was probably because the request came late, after ALVIN was already scheduled.

NOAA – Barbara Moore reported on NOAA's budget. NURP's request was for \$14M and OE was also

for \$14M. The actual appropriation is unknown. NURP will proceed as in the past with support of \$500 K for the NDSF. OE expects to have an RFP announced by the end of May with proposals due in early fall. This will help 2003 scheduling decisions and planning.

OE is still getting the word out to the PIs regarding funding decisions for this year (2002). Since it is so late, some of the PIs might not have enough time for planning and will not be able to carry out projects. The RFP for 2003 OE projects will be more specific than this year. The last year for OE was a learning process. It was commented that there might be enough highly reviewed programs this year to carry over until 2003. Shirley expressed concern that OE is moving away from the original intent of the President's panel recommendations. It was recommended that OE work more closely with NURP and that advance planning for submersible operations is critical. It is critical that adequate advance planning time is made for sub programs. The operator must have advance notice to adequately prepare for the cruises.

UNOLS Report – Annette DeSilva reported on UNOLS activities and issues. Implementation of the FOFC Fleet Renewal Plan is a major priority. The Fleet Improvement Committee established two subcommittees to establish Science Mission Requirements (SMRs) for the new Ocean and Regional Class vessels. The Ocean Class will be a replacement for the Intermediate vessels. They should be capable of supporting submergence assets. Workshops are planned for the summer. There are some construction and design efforts currently underway. KILO MOANA, the new U.Hawaii SWATH vessel, is undergoing sea trials this summer and science operations are planned for the fall. Preliminary design efforts are underway for the Alaska Region Research Vessel and a CAPE HENLOPEN replacement.

Various members of UNOLS, including Bob Knox have had opportunities to testify before the Ocean Commission. The need for Fleet Renewal is being conveyed.

The UNOLS Quality of Service initiative is also a priority for UNOLS. The new on-line Post Cruise Assessment form should be available soon. The agencies and UNOLS would like to see an increase in feedback. The RVTEC continues in their efforts to define levels of technical services.

Fleet Security is also an area of importance. A subcommittee of RVOC was established to address security issues and needs. They will be looking into various training courses. The ship schedules are being reviewed to determine any proposed operating areas of high risk.

UNOLS will continue in efforts to define requirements for next generation wire and safe working loads for wires. Community feedback is needed.

A question was asked regarding the status of ISM. All UNOLS large ships are required to be in ISM compliance by July 2002. ISM focuses on improved safety and involves all levels of ship operations including shore support, at sea personnel, as well as the science party. The science parties need to beware of the new requirements. The operators will need to communicate with the science parties. This will be addressed as part of the pre-cruise planning process. It is mandatory. There was concern that each institution has their own procedures and requirements. Joe Coburn explained that the large ship operators have been communicating throughout the compliance process. Most of the large ships are already in compliance.

Lunch Break

National Facility Operators Report (Pittenger/WHOI Personnel)

Dick Pittenger began the discussion and introduced Jim Luyton. The issues relating to the recent ALVIN and ATLANTIS problems were addressed. The viewgraphs are included in [Appendix IX](#). In general the problems experienced during Karen Von Damm's ALVIN cruise were related to:

- Poor communications between the operator and chief scientist.
- Underestimation of the scope of the program.
- Under-reaction to concerns and the lack of resources (people and time) to correct problems.
- Design flaws.

Programmatic and operational issues were related to:

- Ship construction and continuing maintenance problems.
- Engineering staffing
- Decision to evaluate unmanned engine room approach
- A-frame maintenance
- Budget driven decision not to do maintenance during spring 2001, during ALVIN overhaul.
- Funding availability
- Inter-group communications
- Scheduling process
- ALVIN data logging/computer hardware/software

The ATLANTIS motor problems were discussed. To repair the motors, they were removed and recoated. The windings were fixed and everything was reinstalled. There was discussion on ATLANTIS' electrical system. The system is very flexible and very complex. They are maintaining it with a handful of people. Preventing and remedying problems once they occur is difficult. After repair of ATLANTIS, the ship underwent sea trials. The goal was to clear ABS and USCG restrictions, operate all six engines at full power, exercise the main plant, and operate the propulsion at full power. The results showed that the motors are now very good and the control system is better. They are not quite at full power, approximately 85%. All ABS and USCG issues were cleared.

The ALVIN engineering dive agenda and results were reviewed (see Appendix IX). The systems were operating well when science operations resumed. Corrective actions underway include the following:

- Reviewing scheduling principles to ensure sufficient maintenance and training time.
- Better more formalized communication at all levels
- Marine ops management meetings (bi-monthly)
- Directive to masters to get involved with science and all aspects of ship evaluations.
- Frequent follow-ups and checks
- Directed maintenance action and reports.
- A second WHOI science liaison person has been hired.

- Adding back an electrician and two oilers. This is an \$11M cost over the lifetime of the ship. The ship was designed to have an unmanned engine room. WHOI is the most automated of the AGORS. For ships coming on line we need to address for maintainability.

Obtaining clearances has been problematic. Mexico has been a problem and continues to be a problem. The request was sent seven months in advance for Jim Cowen's cruise and they finally received the clearance for the cruise while at sea.

WHOI has established an ALVIN Internal Review committee. Fred Sayles is Chair and committee members include Bob Weller, Susan Humphris, Meg Tivey, and Dana Yoerger. Dan Fornari has agreed to stay on as chief scientist until a replacement is found. The committee will look at the Chief Scientist position and attempt to define it. It is being realized that it will be difficult to find one person who can fill the position. They hope to have a report by mid summer. They hope to find someone for the Chief Scientist position from within WHOI, but will go outside if necessary. WHOI wished to foster better communications within the various operation groups. Mike Reeve asked if external participation to the review committee was considered. It was replied that external participation had been considered, but it was decided not to since there are some internal issues that need to be addressed. Patty Fryer requested that DESSC get regular updates on the Committee's status.

ALVIN Overhaul 2001: The report continued with details of ALVIN's 2001 overhaul. Barrie reported on the completed improvements:

- Doppler Velocity log navigation system and graphics
- CRT monitor replacements with color LCD monitors
- Digital video recording
- Video cameras replaced
- CTFM sonar replacement
- Computer system replacement
- Improved observer ergonomics
- Imagenex bathymetric profiler integration

In progress ALVIN improvements include:

- In hull data logging. Most problems have been related to hardware, not software.
- Video overlay process for dupe stations. Everything is in place except for the computers.
- Hard mount pan and tilt controls. A second pan and tilt will be included in next year's proposal.
- Acoustic modem installation – This is complete except for testing. It needs to be integrated into the datalogger. They hope to have it in place before the next cruise.
- Force feedback manipulator – This manipulator has been installed on Jason for evaluation. The arm on order for Jason will be installed on ALVIN after evaluation. This will replace the Schilling arm.
- Exterior still camera digital replacement is being evaluated on the current cruise.

Barrie discussed the ALVIN viewport problems. The “crazings” are very small and are difficult to see without a microscope. It is suspected that the varnish on the boxes used to store the viewports might be the cause of the problem. They are conducting cycling tests. Window failures have been very low over the years. They are inspected every six months. Once a flaw is detected, the window must be retired. There may be some correlation to the number of viewport failures to the time when they started examining them with a microscope.

In the past failures have been caused by crazing, old age, or bad handling. The lead-time for replacement of a window is 4-8 weeks. It then takes a couple weeks for WHOI to inspect the new window. Barrie reported that 50% of the windows from the vendors are rejected. The corrective actions that are being taken include:

- Increased onboard spares.
- Restrictions on the use of sealants on window storage boxes.
- Design change to minimize stress concentration.
- Scheduled cyclic test of new manufacturer’s windows.
- Monitor viewport surface condition.

ALVIN’s computer hardware issues were discussed. The computers have been returned to WHOI and all of the fans have been replaced and more added. The CPU problems might have been due to overheating. During recent sea trials, these computers were run 12 hours per day with no problems. They are running fine now, but Barrie noted that they ran fine for a number of months before failing.

NDSF Website new features, updates – Rick Chandler reported that WHOI is close to having the new NDSF website up and running, <<http://www.whoi.edu/marops/vehicles/index.html>>. Rick guided us through the new website design and encouraged feedback.

Navigation Status and Plans – Dana Yoerger provided the status of ALVIN’s navigation upgrades. In 2001 and 2002 ALVIN, DSL120A, and Jason II navigation systems were upgraded with a newly developed navigation system, DVLNAV, combining:

- 1.Long-Baseline Navigation (existing electronics, new processing).
- 2.Bottom-Lock Doppler Sonar Dead-Reckoning (new).
- 3.True-North Seeking Fiber-Optic Gyroscope (new).
- 4.Existing Depth, Altitude, Magnetometer, and Temperature Sensors.
- 5.New data log file formats.

The system incorporates a new bottom-lock Doppler sonar (1200 kHz system is on ALVIN and 300 kHz on DSL-120). The display screens on the sub are touch screens. The system offers data in real time and allows playback of dive tracks.

DVLNAV produces FOUR types data files:

- Simple comma-delimited 1-second data file: .CSV suffix, logs time-stamped navigation and sensor data at 1-second intervals. One file per day. 1 MB/hour. Compresses 5:1. Loads directly into spreadsheets

(Excel, Quattro Pro, etc.)

- Comprehensive DSL Format Data file: .DAT suffix, logs ALL sensor and processed data, time-stamped to 0.001 second. One file per hour, 60 MB/Hour. Compresses 10:1. Requires AWK/GREP and MATLAB to process. Supports planned re-navigation capability.
- Screen Shot JPEG File: .JPEG suffix. Time-stamped (to the second) screen shot image of the DVLNAV screen. 500 KB/Image. Created when you press the “screenshot” button. Press the button, Max!
- Hourly system configuration (INI file): Logs DVLNAV internal configuration once an hour. 6 KB.

Data file formats are documented in the document DVLNAV_DATA_FORMATS.TXT available from the SSSG Technician and from the DVLNAV web site.

Dan Fornari commented that this is something that the users have been requesting for years.

Dana went on to report on the additional navigation upgrades underway. He and Al Bradley are working on a multiple vehicle navigation capability. This would enable operation of multiple vehicles simultaneously. This would include mixes of ROVs, tow-sleds, and AUVs. It could also include ALVIN, pending resolution of any safety issues. This effort is collaboration between various WHOI R&D groups.

The Long-base-line (LBL) upgrades include:

- Replacing the aging WHOI LBL receivers on Jason/Argo/DSL120, ALVIN, ABE and sentry
- Electronics and signal processing based on WHOI acoustic modems
- The initial phase will be compatible with existing benthos-style classic transponders and receivers.

They hope to be able to demonstrate the upgrades this year.

Status of ROV upgrades – Andy Bowen reported on the status of upgrades to the ROVs. The Jason II (J2) capabilities include:

- 18 kW of power
- 450 pounds of thrusts in any direction
- Two 10 base Ethernet
- Multiple RS232/485
- Five auxiliary hydraulic circuits
- 150 pounds of science basket payload

Andy showed the layout of J2’s core components. The science sensors include:

- Pan and tilt color video
- Doppler navigation/auto position

- CTD
- Magnetometer
- High precision true north fiber optic gyro
- ICL temp probes

The DESSC was invited to tour J2 at the WHOI dock and in the Blake Building for assembly. After testing, J2 will begin science operations with a Paul Johnson cruise.

Status report on the archiving of all deep submergence data in the WHOI archives - Dan Fornari reported on the status of WHOI revenues for deep submergence visual data. HI viewgraphs are included as part of [Appendix IX](#). Dan explained that the images contained in the archives are meant for public use. The quality of the digital images available on the web is suitable for PowerPoint presentations. If higher resolution is needed, it can be requested from WHOI. The digital images are being added to the public NDSF image database at: <http://www.marine.whoi.edu/alphotos.nsf?OpenDatabase>. Work on the ALVIN Galapagos 25th anniversary CD-Rom project has delayed some of the most recent archive scanning, but it will be current as of this summer.

There is a latitude and longitude associated with each dive program and it is correlated to the image. WHOI has been working to clean/resurrect some of the older films. The 35mm film is stored in climate-controlled areas. The older films have been examined. It may be necessary to replicate the old film at some point. The database is searchable by dive and area. The archive policy is for the original tape to be included in the archives. The PI gets a first order copy of the images before leaving the ship. The WHOI NDSF archive now has a digital video tape player and camera. The archive has room for several more years of growth, however space requirements will eventually need to be addressed.

Dan reviewed the NDSF income from licensing fees of NDSF imagery. The revenue information is from Shelley Dawicki, Director of WHOI Media Relations. In 2001, 342 visual requests were logged, compared to 234 in 2000 and 214 in 1999. The licensing revenue totaled \$30,450.75. Income from video amounted to \$17,749.50 and breaks down as follows:

- \$7,065 from 1985/86 TITANTIC expeditions
- \$8,397 from hydrothermal vent cruises
- \$2,287.50 of vehicles

Income from still images for 2001 from the NDSF amounted to \$12,701.25 (\$8,116.25 for hydrothermal vents and \$4,585 for 1985/86 TITANIC images).

WHOI's goal is to maintain the archives so that they are up to date with the data that is publicly available (2-year PI holding limit). Early cruises images have been reviewed and a good representation of the cruise images have been selected for inclusion in the archives.

There was discussion on navigation issues associated with archiving. With the upgraded navigation system, they intend to provide better navigation data for image correlation. There was some discussion on whether there should be some effort in classifying the level of navigation associated with each dive.

Web Content Management System – Dan reported that there is a web content management system available that will allow users the ability to better maintain their website. For more information, contact Dan.

Tour of Jason II, Blake Building Andy Bowen provided the meeting participants with a tour of the Jason II assembly process and dock testing.

Day Two: Friday, 3 May 2002 MEETING BEGINS AT 8:30 AM

K. Von Damm Post Cruise Assessment (revisited) - Issues that were identified in Karen Von Damm's Post Cruise Assessment report were revisited. It was pointed out that cruise clearance requirements are the responsibility of the PI, as well as any expenses involved. Mexico charges a fee, which is not common. Communications regarding berthing issue and darkroom use need to be improved. The berthing policies regarding WHOI's shipboard service support group technicians is documented. The issue is related to gender and if the techs are of opposite gender, he or she will need to bunk with the science party (to avoid opposite gender sharing staterooms).

The Need for a New Human Occupied Vehicle (HOV) – There was a discussion on the continued need for a Human Occupied Vehicle (HOV). The community will need to provide a coherent justification for a new HOV. The compelling research objectives that can be best accomplished with HOVs needs to be articulated. A new submersible would be a “next generation ALVIN” and be capable of accommodating state of the art technologies. A new vehicle would also be designed with a deeper diving capability. It was commented that all of the vehicles and systems in the NDSF have a need. They are each fundamental to science research. Patty pointed out that funding for a new submersible would compete with the funding for other facilities and tools. Dudley Foster commented that NASA has probably had to address these same issues regarding the need for a cognitive presence. Their efforts should be examined. Patty reported that she plans to contact each DESSC member individually for an HOV justification statement. Additionally, past workshop reports, such as the DESCEND report, will be revisited, as these reports addressed this issue and contained recommendations.

New Alvin Design Advisory Committee (NADAC) Status – Bob Brown reported that a meeting of the NADAC would be held following the DESSC Meeting. He reviewed the committee makeup. The members representing science include Keir Becker, Chuck Fisher, Dan Fornari, Patty Fryer, Cindy Van Dover, Karen Von Damm and Dana Yoerger. The meeting agenda will include the following items:

1. Introduction
2. Project objectives / outline
3. Project status
4. Review of proposed committee charter
5. Science community involvement
6. Committee action
7. Future meetings
8. Administration matters

The project status will address the following:

- Design review of hull configurations
- Analysis of ATLANTIS' a-frame

- Vehicle and pressure sphere conceptual design

Annual request for upgrades to science sensors and operational capabilities of NDSF vehicles - Barrie Walden reported that with the recent upgrades of the ROV and towed vehicle systems, an instrumentation/upgrade proposal was not submitted this year. The community is encouraged to provide suggestions for future upgrades. Next year's proposal will likely include a request for a second pan and tilt camera. A proposal request for a "clam grabber" is another possible option. The clam grabber would be compatible with both ALVIN and the ROVs. There may be other biological samplers that can be considered.

WHOI is trying to make data formats and procedures more uniform among the different vehicles.

Patty Fryer recommended that a rock drill be included in a proposal. The drill should be compatible for use from both the ROVs and ALVIN. The MBARI drill could be an option as this drill would work on Jason II and can be duplicated. Mark Chaffey offered to look into how the drill can be accessed by the community. There are operational and maintenance issues associated with the drill that will need to be addressed. MBARI's operations crew supports the drill while at sea. It was suggested that the MBARI drill be considered as a third party tool candidate. DESSC will need to pursue this further.

Deep Submergence Scheduling: 2003 and Beyond - Jon Alberts reported on scheduled and proposed operations for 2002 to 2004. His viewgraphs are included in [Appendix X](#). There are 298 ATLANTIS days scheduled. ALVIN operations began and will end the year on the East Pacific Rise. Other operating areas include work off San Diego, Guaymas, Alaska, Juan de Fuca and Cost Rica. WHOI is still waiting to hear from NOAA's Ocean Exploration program on which programs will be carried out during the June/July Gulf of Alaska cruise. This of concern as time is short for adequate pre-cruise planning. ALVIN's schedule ends on 24 December.

Jason II will conduct sea trials in July at Juan de Fuca. The first science operations are planned for September on Juan de Fuca. This will be followed by operations off Hawaii.

Next Jon showed a listing of the NDSF requests for 2003 and beyond. Annette DeSilva showed this same information on world maps. Linda Goad (NSF) provided the funding status of many of the proposals in advance of the meeting. There are many 2003 ROV requests and a lot of programs have already been funded.

Tim Pfeiffer suggested that the ATLANTIS INSURV periods be included in Jon's schedules.

Long-Range Planning Issues Future global deep submergence initiatives were discussed. Patty Fryer reported on plans for research in the Western Pacific and mid-Pacific. Fred Duennebeur and Loren have been conducting H2O operations off Hawaii. They are primarily interested in using ROVs. Eli Silver has already done work in the Western Pacific and is interested in doing more. The MARGINS program is also interested in doing work in this area and there are many PIs who would be involved in this effort. This effort is beyond 2004.

Marv Lilley reported on research interests in the South Pacific. Neil Driscoll has expressed an interest in future research at 30S. Dive requirements will likely require depths deeper than current vehicle capabilities. There is a lot of interest by others to return to the Southern EPR, but they need to publish their findings from their past work first. PIs who have expressed interest include David Naar, Jeff Karson, Marv Lilley, and Richard Hey. Proposals are still a few years away.

Dan Fornari reported that there is not much to report for future work in the South Atlantic. There has been some South Atlantic mapping that was conducted in the late 1980's and early 1990's. Nancy Grindley, Cindy Van Dover, and Rob Pockalny have expressed some interest for work in this ocean. There needs to be some additional mapping.

Dick Pittenger commented that the Ocean Exploration project has been addressing primarily exploration of the US regions. Perhaps OE should dedicate themselves to planning a major global initiative years. The Congress has charged the NRC to study the feasibility of a global ocean explorations program. Their committee is meeting in Paris on May 13-15. Shirley Pomponi will attend this meeting. The DESSC was encouraged to send their input to Shirley. They would like to get their study to the NRC before the end of the Ocean commission.

There is a lot of interest to return to the Indian Ocean; however, there is concern in the number of years that it could take to plan an expedition there. This might discourage PIs from submitting proposals for work in this area.

Tim Shank reported that with the research success on HEALY, there is a lot of interest to return to the Arctic. Research interests in this area would be under the ice. The Russians have plans to go to the Gakkel ridge in 2003. Work in the Arctic is of particular interest as it is isolated from a biological perspective. There are proposals for AUV work. Some of the scientists who have expressed an interest for work in this area include Rob Sonne, Tim Shank, Dana Yoerger, Margo Edwards, Stacey Kim, and Nicole Crane. A workshop is planned at MBARI for Arctic instrumentation development during mid-October.

Funding mechanisms – This issue is related to finding methods for increasing the visibility of the oceans for science. The benefits of public outreach should not be underestimated. We need to try to figure out how to make the oceans as important as space from a budgetary perspective. It is a NASA requirement that a portion of science proposal funding be spent on outreach. NSF does not have this requirement, but it might move in that direction. The Bio-complexity program requires a strong educational component. NOAA's OE requires an educational component as well. Bill Ryan commented that there is no guidance offered to PIs regarding the outreach/educational components of a proposal. It doesn't seem to be addressed in panels either. Mike Reeve stated that this is becoming more and more important. They ask the mail reviewers to look at this.

Shirley Pomponi commented that when considering funding, it would be a mistake to fracture the submergence community into deep and shallow. The efforts that are being made should be for all deep and shallow submergence science. Dan Fornari added that this funding issue should be for all of the ocean sciences, not just submergence. It needs to be a broad-based ocean sciences effort.

NDSF Past Utilization Trends – Annette DeSilva presented a series of viewgraphs showing various NDSF utilization trends. Her viewgraphs are included in [Appendix XI](#). The annual operating days by agency and corresponding costs are provided for the support ship, ALVIN and ROVs for 1993 to 2001. Total ALVIN dives are broken down by discipline for 1964 to 2001. These statistics were obtained from the WHOI website: <<http://www.marin.whoi.edu/ships/alvin/stats.htm>>. There are a total of 3744 dives during this period. Biology and Geology each represent approximately 35% of the total dives. Chemistry represented approximately 12% of the dive total.

Lastly, Annette provided a handout showing a list of NDSF PIs from 1993 to 2001. The list contains the names of 158 PIs, representing 81 different institutions/organizations. It was suggested that Bill Ryan and Annette collaborate to write an EOS article using these statistics to show how many people we being reached through the use of the facilities. An interesting study would be to evaluate the NDSF support

cost and compare it to that of NASA's facilities.

Link Symposium discussion and Submergence Technology – The NOAA/NASA Link Symposium will be held on 20-22 May at the Kennedy Space Center. Patty showed the symposium event schedule. The three thrust areas of the symposium include human exploration, sensors/tools, and AUVs. The actual times for agenda are still under discussion. The problems related to workshop funding seem to be resolved and travel support for meeting participants will be provided. After the symposium, the need for a smaller focused workshop will be considered. Barbara Moore commented that originally the symposium had been intended to form a link between NASA engineers and ocean engineers. However, it has been difficult engaging the NASA engineers. Information about the Link Symposium is contained on their website at, < <http://www.thelinkproject.org/>>.

Opportunities in Archeology – David Mindell reported on the 2nd MIT Conference on Technology, Archaeology, and the Deep Sea held on April 26-28, 2002. The first workshop was held in 1999 and was funded by registration fees. Approximately 100 people attended and enthusiasm was very high. They are still publishing reports from the first workshop. Most of the 2002 workshop's proceeding will be posted on the web. The 2002 workshop addressed the development of archaeological methods and theoretical frameworks for remote and robotic operations in deep waters. The conference convened experts in archaeology, engineering, and oceanography.

Archeology field programs include a six-week Bob Ballard cruise request to explore large brine lakes in the Eastern Mediterranean. Artifacts in these lakes will likely be well preserved.

There is an increasing interest in Archeology programs. A marine heritage program is being established at URI under Bob Ballard's leadership. He is building a Hercules ROV with a 3000-meter depth capability. Additionally, Southampton, UK has a large archeology program and they are in the process of procuring a Jason 3 ROV vehicle.

AUVs – There was discussion on AUVs and the need to educate the community on their capabilities and availability. This is an important element in the future of submergence science. DESSC will need to address this issue.

DESSC Membership - The terms of three DESSC members are ending. Joris' first term is ending and he plans to retire in June. He does not plan to serve a second term. Dave Mindell is completing his first term and has agreed to stay on for a second term. Marv is completing his second term. Replacements for Joris and Marv were suggested. Patty will contact these individuals to determine their willingness to serve and circulate their CVs and statements of interest for DESSC voting.

Outreach Activities:

IMAX - Filming is complete. Helicopter footage of the ship and ALVIN was taken in San Diego. Dan sent the IMAX producers the 25 Years of Alvin CD. Their production may have shifted to early 2003. The producers have an advisory council. Dan suggested that the producers (Steve and Alex Lowe) be contacted to discuss outreach plans.

Dive and Discover - Dive and Discovery will carryout Expedition 6 in the Galapagos. There is a press release and will go out on 7 May. It will be a bit difficult to get student participation during this cruise since it is at the very end of their school year. National Geographic will have a cable TV crew on the cruise. There will be daily web postings. An organizational outreach meeting was held with the National Geographic group

Lectureship Program - Dan Fornari and Annette have been discussing a lectureship program with the

RIDGE Office. This would be modeled after the ODP USSAC lectureship program. The lectureship program would be a complimentary element of R2K. The RIDGE lectureship program would be broader than just deep submergence.

Discovery Channel – The Discovery Channel contacted the UNOLS Office for suggestions on possible cruise candidates to include in their ocean science TV series. They plan to have a series on the Abyss. If it is not possible for them to participate on a cruise, they have expressed an interest in training cruise participants on filming and providing the cameras.

The meeting adjourned at 12:00.