

**DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Clark Building, Room 509
11-12 June 2003**

MEETING SUMMARY REPORT

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Executive Summary

The UNOLS DEep Submergence Science Committee held their spring meeting at Woods Hole Oceanographic Institution on 11-12 June 2003. The meeting included a variety of reports including those from Agency and UNOLS representatives. A report from the National Facility Operators was provided and included information on scheduling, operations, NDSF archiving, vehicle upgrade plans and ATLANTIS improvements. Patty Fryer and Debbie Kelley provided reports on their recent cruises using NDSF vehicles. Outreach and education efforts were discussed.

Deep Submergence Facility requests for 2004 and beyond were reviewed. There are many ALVIN and ROV programs that have already been funded for 2004. Some of these funded programs were deferred from 2003. Scheduling options for ALVIN operations along with the vehicle's required overhaul were considered. ROV maintenance time was also addressed. WHOI would like to have four weeks in the year dedicated for ROV maintenance (plus time for shipping). DESSC endorsed this request and recommended that down time for ALVIN should not coincide with scheduled down time for Jason2.

DESSC discussed the annual request for upgrades to science sensors and operational capabilities of the NDSF vehicles. Prior to the meeting the biology community was asked to provide suggestions for system upgrades. Their input was summarized at the meeting. DESSC recommended that the biology community prioritize their upgrade list. Additionally, DESSC recommended that a web page be developed to provide an inventory of community assets and tools, as well as, tools available through the NDSF.

Winter DESSC meeting strategies were discussed. To better engage the non-G&G community, the agency program managers have requested DESSC to hold their winter meeting in Portland, OR. They would like the Portland meeting to be modeled after the tradition DESSC meeting held each year in San Francisco. The UNOLS Office and DESSC will work to broadly advertise the meeting.

Alan Chave, Chair of the UNOLS Working Group on Ocean Observatory Facility Needs, made a presentation on the status of their study. The group was asked to identify facility support needs for ocean observatories in terms of both ships and submergence vehicles. He reported that routine access to ROVs for all observatories operations would be needed. Eventually, observatory intervention tasks related to its infrastructure should become predictable and well defined, therefore could be appropriate for commercial off-the-shelf (workhorse)

ROVs. Routine operations will require a less capable, smaller crewed ROV. However, observatory work will require deep diving ROVs and very few commercial ROVs can go as deep as needed. Observatories will likely generate much science work similar to the conventional vehicle operations that are conducted with vehicles like Jason2. These operations will continue to be best served by a science facility such as what presently exists. With the introduction of observatories additional ROVs would be needed.

Jim Luyten (WHOI) reviewed the NDSF and WHOI Marine Operations (F. Sayles) Committee report recommendations and the status of the NDSF Chief Scientist Replacement. The report includes a lot of praise as well as identification of concerns. The core focus was the NDSF facility and the role of the chief scientist. The report addressed the integration of the ALVIN operations and ROV groups and noted that additional effort is needed in this area. The Chief Scientist position description was addressed and the committee recommended the formation of a committee to conduct a search for a replacement. WHOI would like to fill the position from within, but would be willing to go outside of the institution. The report recommended that there be improved implementation of new instrumentation and technology on ALVIN. The study also recommended the reactivation of WHOI's Deep Submergence Advisory Committee in accordance with their existing charter. DESSC members were encouraged to read the report and provide comments.

There was a lengthy discussion on the National Academy of Science (NAS) Ocean Studies Board (OSB) study on Future Needs for Deep Submergence Science. Dan Walker (NRC) reported on the status of the OSB study and plans for their upcoming meeting. The OSB Committee has been working with the Navy, NSF and NOAA to change/clarify their tasking. DESSC was encouraged to provide input to the OSB study both on an individual, as well as, on a group level. DESSC discussed the information that should be included in their response. They will work to identify the science drivers for future research.

Bob Brown reviewed the status of the New Alvin design effort. The project is in the Concept Development Phase. Various hull forms and view port arrangements are being evaluated. WHOI has submitted a request to ONR for the new vehicle to be Navy inspected and certification. They are waiting for a reply.

The meeting concluded with an exciting presentation by Andy Bowen on WHOI's Hybrid ROV Proposal. The proposal has been submitted to NSF, NOAA and ONR and is under review. The proposed vehicle will be designed for a full ocean depth capability of 11,000m. The HROV will be able to operate in two modes: as an AUV for wide area surveys, and as a tethered vehicle for close-up sampling and other tasks. The vehicle system is compact and should be able to be used from small, coastal vessels. It will have a flyaway capability and can be shipped in a single 20 ft van.

Recommendations/Endorsements

- WHOI would like four weeks in the year dedicated for ROV maintenance, plus time for shipping. DESSC endorsed this request and also recommended that scheduling of maintenance time should be coordinated so that ALVIN down time should not conflict with down time for Jason2.
- DESSC recommended that a web page be developed to provide an inventory of deep submergence community tools, as well as, tools available through the NDSF.

Action Items

Task	Assignment
Review WHOI archiving policies and guidelines –Send comments to Dan Fornari	DESSC and Agency Reps
Jason 2 maintenance - Endorsement of WHOI’s request to schedule Jason2 maintenance time (4 weeks) and include it on the vehicle’s operation schedule.	DESSC
Equipment and tool Inventory – Develop a web page that will provide an inventory of PI owned equipment/tools as well as NDSF tools. DESSC could provide some examples to start the inventory. Request input from the community. The inventory could reside on the UNOLS server with a link to the WHOI/NDSF website. Patty and Annette will also follow up on getting information regarding progress on the LINK inventory effort	Annette, Patty, Dan, and DESSC
Navigation – Provide training session at one of the winter conferences	WHOI with assistance from UNOLS and DESSC
Winter Meeting – The traditional DESSC meeting will be held on Sunday, January 25, 2004 in Portland, OR. Broadly advertise the meeting.	UNOLS Office with assistance from DESSC
Special Session - Patty will work with members of DESSC and the community to arrange a special session at the Fall AGU meeting. [A special session has been accepted for the Fall AGU in San Francisco (OS33 Recent Advances in Understanding Submarine Biosystems and the Future of Submergence Research)	Patty Fryer and DESSC
OSB Committee on Future Deep Submergence Facility Needs – DESSC should continue to remind the community that their input is needed. Input should be provided before the committee’s last meeting in August.	DESSC
DESSC Response to OSB Committee –Provide the OSB committee with DESSC input and responses to their questions that are posted on the web.	DESSC with lead from Patty
IMAX film publicity - IMAX will be released in the fall. DESSC volunteered to help publicize it for educational	DESSC - Patty will contact other Marine institutions to raise

purposes. Consider publicity strategies and spread the word. [Patty has established contact with IMAX distribution offices in California for Hawaii and West Coast and arranged with SOEST to provide tickets to the presentation as prizes associated with activities during SOEST Fall Open House.]	awareness and encourage similar activities. Patty will write an article for the next UNOLS news letter regarding these efforts
Long-Range Planning Issues – Post the 2004 NDSF request maps on the DESSC homepage and advertise that they are available. Contact the major programs (RIDGE and Margins) with this information.	Annette – this has been completed. < http://www.unols.org/dessc/maps/ndsf_maps04.html >
DESSC membership - Mark Chaffey will complete his first term. Determine his interest in serving 2 nd term.	Patty
Upgrades – Compile and edit the input received from the biology community regarding upgrade needs. Resend the list to the community for input and broaden the call to all upgrades (not just biology).	Tim Shank – biology upgrades

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Proceedings of Meeting

Day One: Wednesday, 11 June 2003

Introductory Remarks, Meeting Logistics, Introductions – Patty Fryer, DESSC Chair, opened the meeting at 0830. Meeting participant introductions were made. The meeting agenda is included as [Appendix I](#) and the attendance list is included as [Appendix II](#).

The minutes of the December 2002 DESSC meeting were accepted as written.

Agency and UNOLS Reports

National Science Foundation (NSF) – Mike Reeve provided a very brief NSF report. Optimistic projections call for a doubling of the NSF budget in the future. NSF needs to have plans in place that identify the items an increased budget could support. Submergence research and facilities should be considered in this planning. Mike also commented that a procedure for post-cruise NDSF assessment should be considered.

National Oceanic and Atmospheric Administration (NOAA) – Barbara Moore reported that there is a lot going on in NOAA. RADM Lautenbacher conducted a top-down review of the agency. They are just beginning to learn about the impacts of the recommendations. The most significant changes will be in the realignment of programs along thematic lines. Some matrix management is planned.

NOAA received their FY03 budget in March. The agency was level funded, but internally, Ocean Exploration (OE) was decreased by \$1M from the FY02 budget and NURP was decreased by approximately \$300K. The FY04 is unclear at this time. NOAA/NURP will work to meet their annual ALVIN funding commitments.

Dick Pittenger commented that it has been difficult to schedule the NOAA programs due to the late funding decisions. DESSC agreed and encouraged further efforts in this regard.

UNOLS Report – Peter Wiebe, UNOLS Chair-Elect, provided the UNOLS Report. His viewgraphs are included as [Appendix III](#). His report covered the following topics: fleet renewal implementation, marine mammals and acoustic permitting issues, UNOLS wires and cables, quality of service, ship scheduling, and annual meeting plans.

UNOLS ship time use is increasing and as a result ship scheduling is becoming more challenging. Peter showed figures from the FOFC Long-Range planning report. The report calls for the construction of Regional and Ocean Class vessels over the next decade. Science Mission Requirements (SMRs) for both ship classes have been drafted. NSF has funded the Naval Architect firm, JJMA, Inc., to conduct a Regional Class Phase II study. The study will estimate construction costs as well as the feasibility of meeting the SMRs. Preliminary findings show that a Regional monohull design can meet all desired SMRs and stay within budget (~\$28M). The Regional Class construction will be funded from the NSF Mid-Size Infrastructure budget. The Ocean Class SMRs are in place, but construction support has not been identified.

Other design efforts underway include EWING midlife or replacement. Lamont-Doherty Earth Observatory (LDEO) is investigating the feasibility of acquiring an EWING replacement vessel suitable for 3D MCS and conversion for general-purpose capability. The Alaska Region Research Vessel (ARRV) is well along in its design effort. Funding for construction of the ARRV will be requested from NSF senior management for MRE consideration in a budget

beyond FY05. Replacement plans for CAPE HENLOPEN are progressing. The specifications and drawings will be complete by 6/20/03. They plan to begin construction in Spring 2004 and complete construction by fall 2005.

Other facilities are also under consideration. These include the need for new deep submergence vehicles including a Human Occupied Vehicle (HOV). The USCG Polar Icebreakers are in need of refit at an estimated cost of \$400 M (without science improvements). Finally, ocean observatories are coming on line and being proposed. Their facility support requirements will need to be considered.

Marine mammals and acoustic permitting issues have been an important concern this year. Permitting issues have disrupted EWING and NEW HORIZON operations. Various options to assist in the permitting are being considered and include hiring a UNOLS expert or possibly retaining consulting services.

Specifications for new UNOLS wire and cables have been under consideration. Mike Prince will draft a performance specification for community review and input.

In an effort to improve UNOLS quality of service, a Council subcommittee has been formed to evaluate Post Cruise Assessment (PCA) recommendations. Additionally an RVTEC subcommittee has been making progress in their efforts to establish definitions of technical services.

There was DESSC discussion regarding the assessment process and RVTEC effort. Dolly commented that ship users should all submit their PCAs electronically. She also indicated that they would like to see some standardization of services and equipment support across the fleet. She hopes that the RVTEC effort will address this area. Dick Pittenger remarked that he thinks that the PCAs for NDSF operations should be distributed to the DESSC. Annette explained that distribution of the PCAs is limited and this would need to be brought before the UNOLS Council.

Ship time demand for large ships is high in 2004. Many programs were deferred in 2003. This was due to a variety of issues including acoustic permitting, clearance problems, funding shortfalls, and scheduling conflicts.

The UNOLS Annual Meeting is scheduled for 19 September 2003. RADM West (CORE President) will be the keynote speaker. Nominations are needed for various UNOLS Council positions.

Science Reports – Patty Fryer and Debbie Kelley provided reports on their recent cruises using NDSF vehicles.

Patty used Jason2 and DLS-120A from R/V THOMPSON in a cruise that began on 17 March and ran through 4 May. Operations were at the South Mariana Arc to study deep-

sourced mud volcanism. The cruise included a visit to an ODP site to support Geoffrey Wheat's borehole instrument recovery.

Patty reported that they were able to obtain detailed imaging using DSL-120A and EM300. Patty displayed the images using 3-D glasses. The surveys were done in very high relief areas.

Jason2 performed well throughout the cruise. This was the first cruise that the vehicle was operated at its full depth capability of 6500 km. The dive was due south of Guam. Rocks were collected. Transit to the bottom was approximately 4 hours long and the dive was one day.

Patty raised a few issues regarding recovery operations. On THOMPSON, recovery is from aft A-frame and aft port side crane. In Patty's opinion it would have been better from starboard. Andy commented that this is a good point. Since the system is portable, operational limits depend on the launch configuration options on the support platform. There are things that can be done to broaden the vehicle's weather window, but it will come with a price.

Debbie Kelley reported on her recent ATLANTIS/ALVIN cruise on 21 April to 22 May 2003. Her program was to investigate a new class of hydrothermal system at the Lost City Hydrothermal Field, an off-axis system at 30°N on the Mid-Atlantic Ridge. The cruise involved ALVIN dives, a SeaBeam survey, CTD operations at full depth, ABE operations, rock dredges, and one mooring rescue operation. Debbie's viewgraphs are included as [Appendix IV](#).

ABE was used at night to characterize the bathymetry and water column around the Lost City and for exploration of possible fields less than 80 km away. ABE worked very well. ABE was tethered to the sea floor and did a spin. It got stuck a couple times, but it was able to get unstuck. They are able to image very small features.

ALVIN was used during the day. During the ALVIN dives, the vents were sampled for fluid, microbes, and chimney material and the surrounding geology and tectonic setting was characterized. They estimate that the venting has been going on for 30,000 years. Some of the chimneys are the size of a 15-story building. This was the first cruise using ALVIN since its overhaul.

Approximately 30,000 images were collected using Dan Fornari's cameras. About 25,000 frame grabs were taken with ALVIN. The new frame grabbing system could be processed immediately after a dive. This was very useful for planning next dives.

The cruise included a lot of students in the science party and the users required a lot of learning. The pilots are very busy.

Debbie reported that there were some navigation issues during the cruise involving set up of the transponders. Dana Yoerger reprocessing the data at the end of the cruise. Additionally, ALVIN computers were a problem and sometimes the screens went blank. There were also

some issues with the pan and tilt caused by condensation. Sonar was not available until last dive, but this wasn't a problem because they had ABE survey data.

In summary, there were 19 Alvin dives averaging 5.7 hours in length. The science party included 19 scientists and students. There were 17 ABE missions lasting 127 hours, and approximately 200 km of seafloor was surveyed. They produced a map with resolution of 2 km x 1 km of Lost City. One ALVIN dive was lost because of variable ballast problem. All in all it was a successful cruise.

DESSC discussed the issue of navigation and transponders. Patty commented that transponder placement was a problem during her cruise due to the high relief terrain and strong and variable currents both at the bottom and in the water column. There was concern in getting tangled with transponder cables.

National Facility Operators Report – Dick Pittenger (WHOI) welcomed everyone to the meeting. They have been very busy since the start of the year. Al Suchy has replaced Joe Coburn (who retired) as the Marine Superintendent.

NDSF Vehicle Operations Summary - Rick Chandler provided the NDSF vehicle operation summary. His viewgraphs are included as [Appendix Va](#). Since the start of 2003, four NDSF cruises have been completed.

WHOI completed construction of the ROV ISIS for the Southampton Oceanographic Center. It was dedicated in March 2003. Sea trials for the vehicle were conducted off the Bahamas. The full ISES system is 100,000 lbs and of these 80,000 lbs is the handling system.

Two ROV science cruise have been conducted, one for Patty Fryer in the Western Pacific and one for Alan Chave off Hawaii. As of June 2003, Jason2 has had 24 lowerings, for 339 hours in the water. DSL-120A has had 10 lowerings and 319 hours on the bottom. Jason2 successfully was used to its full depth capability of 6,500 m. Three more Jason cruises are scheduled for this year.

As of June 2003, ALVIN operations have included two engineering dives off Barbados, Debbie Kelley's cruise at the Mid-Atlantic Ridge, and Jess Adkins/Dan Scheirer cruise at the NE seamounts. Thirty dives have been completed with 130 hours of bottom time. Some dives have been lost due to rough weather and Navy clearance problems. The engineering dives included science equipment checkout, testing of the Sidus pan and tilt, testing of the Kraft manipulator, and lighting experiments. ATLANTIS will transit through the Panama Canal for work in the Pacific. Six more science cruises are planned. This year Pat Hickey marked his 500th dive. ALVIN is approaching 40 years of operation.

NDSF Archiving - Dan Fornari provided a status report on the archiving of deep submergence data in the WHOI archives. His viewgraphs are included as [Appendix Vb](#).

To begin he reviewed the new shipboard data archiving/sign-off sheet. The form and [Appendix Vc](#)) is for use as a sample and data log sheet. Dan and Barrie would like DESSC comments regarding the form. This is to be used both for frame grabs as well as digital images.

The question was asked, “Is there is a way to log non-consecutive dives by a PI.” Dan replied that hopefully The Chief Scientist would be able to manage this logging issue, as NDSF cruises often involve multi-PI. Perhaps there can be more than one form on a cruise.

Mike Reeve commented no additional text is needed after Statement 4. He also suggested that the word “intended” be removed. Dan explained that Statement 4 is included in case there is to be access to the data prior to two-year release date. The distribution prior to two years can be limited and password protected on the WHOI archive server. After two years data will be available to all.

The question was asked if past track-lines that have been re-navigated and corrected, can be revised and corrected in the archives. It was explained that WHOI is addressing this and they are looking at DVL and LBL data. Louis Whitcomb explained that he is working on the renavigation project. In the short term they plan to renavigate the Doppler track. John Howland will train and provide this service. Bill Ryan asked if those who hold their data for the first two years should be required to renavigate it before submitting it to the archives. Patty suggested that perhaps there should be a standard established. There should be a requirement to provide the best data available into the archives. There was concern on the burden this might place on the PI.

Dan discussed archiving of the Frame-grabber data. The frame grabber has been implemented on both ALVIN and Jason2. Examples and practical approaches to providing useful data and metadata on a real-time and archiving basis, as well as, a template for migration of legacy data are available at <file:///Users/dfornari/Desktop/ARCHIVING_STUFF/framegrabber/Alvin-D3874/html/S0364.html>. The frame grabs are produced in about an hour after the dive on ALVIN and in real-time for J2. It is very convenient for someone to review the data that has been collected.

Dan reviewed the WHOI archives/data website and suggested improvements. They are improving the information access to NDSF vehicles, see <http://www.whoi.edu/marops/vehicles/index.html>. Other vehicle imagery is being included besides ALVIN. They are prototyping moving the visual data migration scheme using EPR and Endeavour Ridge2000 Integrated Study Site data, [file:///EPR Web Galleries/1996_EPR- webgallery/index.htm](file:///EPR%20Web%20Galleries/1996_EPR_webgallery/index.htm). The ALVIN ‘Best Hits’ collection has been completed and is available at http://www.whoi.edu/marops/vehicles/deep_submerge.html.

Lastly, Dan provided a summary of income from NDSF vehicle imagery/data and WHOI outreach efforts. Underwater still and video images from NDSF vehicles have appeared in seven popular books, 16 textbooks, three exhibits (such as the current Dive and Discover exhibit at the Museum of Science in Boston), three magazine articles and eight television productions (including Australian Broadcasting, Discovery Channel, Korean Broadcasting, and

Chedd-Angier). Total 2003 income received to date is \$8,101. This does not include dozens of still images or video footage that are supplied routinely to NSF or other funding agencies, collaborating researchers and institutions, and internal requests. Also note that some of those listed above were not charged, which is generally the case.

Upgrades to National Facility Vehicles, Science Sensors, and ATLANTIS:

ALVIN and ROV equipment and operations - Barrie Walden reported on various ALVIN equipment and operational issues that have been addressed over the past year. His viewgraphs are included as [Appendix Vd.](#)

- Manipulator - The Kraft manipulator will require additional testing. Kraft has been very responsive in this process.
- Pressure Transducer - The pressure transducer failed on Jason2 while at 4000 meters.
- Batteries – There has been a lot of change in battery vendors; they are not staying in business. ALVIN battery performance is not as bad as some may think. Power demand has been increasing, resulting in shorter dives. Increasing use of equipment and instrumentation during dives uses the available power more rapidly.
- ALVIN Video Cameras – there are many available at the NDSF. Everything seems to be working reasonably well. Performance is better.
- HDTV is big – space compromises need to be considered.
- Computer problems – They are still having some computer problems. Some have been identified and are being addressed. Others are still being troubleshot.
- Computer displays - The flat panel displays are difficult to see. They have decided to purchase Dell laptops. Barrie showed the Dell laptop to DESSC and demonstrated that it could operate off ALVIN's computer. A scientist would be able to run his/her own software on the Dell, yet still have access to all of the sub software.

Andy Bowen continued with a discussion on ROV improvements status. His viewgraphs are included as [Appendix Ve.](#)

- Manipulator - WHOI continues to work on the manipulator.
- They are working to improve the tools and sensor inventory.
- Upgrade to the DVD, which includes a frame grab capability.
- Forward floatation has been added to increase payload capability.
- Effer crane pitch damper. – They are thinking about adding this to the knuckle boom.
- SeaNet - A SeaNet Virtual Van Link has been developed with funds from the Keck Foundation. The virtual van is available on the ship and will soon be available on shore. The bandwidth is variable and the system can also be used for conferencing. The SeaNet website gives estimates on operating costs. Support for SeaNet is an issue. It isn't clear if support for use should be included in the science budget or operations budget.

Andy provided the status of DSL 120A upgrades and planned improvements:

- A bathymetry update is planned
- Improve the fish tow dynamics – the vehicle lacks the stability they would like to see in towing.
- Repair foam – The foam sustained damage on the Tivey cruise. The glue failed. This will take some effort to repair.
- Return sonar electronics to HMRG for further refinement
- Dock trials are planned at WHOI in fall 03
- DVL Navigation is implemented – Multibeam sonar and Doppler are to be added. They have been funded to do this. They will improve navigation data for post-processing.

Other Deep Submergence Group ROV activity over the past year has included development of a Jason2 clone, ISIS. Sea trials were carried out on the McCartney cruise. They used the vehicle for mooring recovery. This was significant as it demonstrated that the ROV could work around moorings, typical of what might be required by ocean observatory servicing. Other efforts have included design of an 11km Hybrid ROV (HROV).

ATLANTIS Improvements status – Al Suchy provided a report on the status of ATLANTIS improvements. His viewgraphs are included as [Appendix Vf](#). He began by describing the bow thruster problems. High vibrations were experienced after the ship's yard period in Jacksonville, FL. Three to four bolts had backed out from anti-torque plates after maintenance. The specs required that the bolts be tack-welded (they were not). The repairs required dry-docking in March 2003. The only available dry dock was in Grand Bahamas Island and this resulted in a ten-day delay. WHOI has filed a claim against Atlantic Dry Dock to recover costs lost from the loss of six ship days

Al reported on plans for ATLANTIS' port visit to Woods Hole in August to October 2003.

- A-frame maintenance
 - Replace main cylinder block fasteners
 - Replace wasted main cylinder 2" piping
 - Replace main supply piping up A-frame leg
 - Replace 4-bolt flange on both sides of main hoist
 - Replace anti-swing relief valves
 - Refurbish tail winch
 - Perform general corrosion maintenance
- Install Counterbalance sheave on port hydro boom
- Hiab crane maintenance (maybe)
- Install fire door magnets around galley
- Switchboard maintenance
- Main Breaker maintenance
- Hydro Winch maintenance as required after assessment in Bermuda – There was some discussion on the winches. The winches are new (not cross-decked).
- Clean Generators (if funds available) – Al commented that they would make sure that they have a rotation plan to clean the generators.
- Hurricane Mooring Plan

A supplemental proposal will need to be submitted to support some of these items.

Lunch Break

Deep Submergence Scheduling: 2004 and Beyond – Jon Alberts reviewed the 2003 schedules for ALVIN and the ROVs. Jon's charts are included in [Appendix Vg](#). ATLANTIS began the year with a shipyard period and INSURV inspection. Science operations began in April at the Mid-Atlantic Ridge with Debbie Kelley's program. After work in the Atlantic, operations continued in July in the Gulf of Mexico. In August, operations moved to the Pacific with a program at the Galapagos Rift. Work continued in the Pacific for the remainder of the year with operations off California, at Juan de Fuca and at the East Pacific Rise. There were six ROV programs in 2003, all from THOMPSON. Operation areas included the Western Pacific, off Hawaii, and at Juan de Fuca.

Jon reviewed the 2004 requests for ALVIN operations. There are many programs that have already been funded. Some of these funded programs were deferred from 2003. Jon also showed 2004 ROV requests. Again, there are many programs that have already been funded. Demand is high.

Jon discussed the timing of ALVIN's overhaul, which will need to be factored into the 2004 or 2005 schedule. Jon provided charts showing two overhaul options. The first option would schedule the 6-month overhaul over the end of 2004 and beginning of 2005. The second option schedules the overhaul during the end of 2005 and beginning of 2006. DESSC members discussed the options. Dan remarked that from a RIDGE 2000 perspective, they would need ALVIN in the near term, so the option for a later overhaul is preferred. Debbie Kelley agreed that for work at the Endeavor site, a later overhaul is better. Barrie Walden commented that the later overhaul would stretch the period between overhauls longer than normal, but there haven't been as many dives as during past years. Barrie stated the from a funding perspective, it is best to schedule the overhaul during the fall/winter since housing is more affordable in Woods Hole for the ALVIN team during that time. Also, this divides the overhaul cost over two operating years.

ROV maintenance time was also addressed. WHOI would like to have four weeks in the year dedicated for maintenance, plus any time needed for shipping. DESSC endorsed this request and additionally recommended that scheduled maintenance time for ALVIN and Jason2 should not conflict with each other, both for budgetary reasons and time series work.

Jon provided a chart showing 2005 ROV and ALVIN requests. There are quite a few requests and some are already funded.

Review of facility requests and identification of funded programs – Annette DeSilva continued by provided maps showing geographic areas of interest for work with ALVIN and ROVs in 2004 and beyond. The maps are included as [Appendix VI](#).

In 2004 there are 92 funded days for ALVIN and include operations at the North East Pacific Rise, Costa Rica/Galapagos, Vancouver Islands, Juan de Fuca, off California and in the South Pacific. There are 236 funded days for Jason2 and include operations at the Mid-Atlantic Ridge, off Hawaii, Costa Rica/Galapagos, Aleutians, Vancouver Islands, Juan de Fuca, off California, Lau Basin, and in the South Pacific. There are 58 funded days for DSL120A and include operations at the Lau Basin and in the South Pacific.

There are 63 pending ALVIN days and 78 Jason2 days for 2004.

Requests for 2005 indicate 37 funded ALVIN days and 52 funded Jason2 days. Pending days is high with 64 ALVIN days and 185 Jason2 days.

Annual request for upgrades to science sensors and operational capabilities of NDSF vehicles – Lauren Mullineaux summarized input received from the Biology community prior to the meeting regarding upgrade suggestions:

- Improved capabilities for sampling in the water column (such as for plankton sampling). This may require a lot of power. The community needs to decide if this is a high priority.
- Sterile recovery capability for plankton sampling
- Samplers that maintain in situ conditions (pressure and temperature)
- Sampling capability for microbes in the sediment. This requires undisturbed samples, sterile samples, and high volume sampling.
- Butterfield samplers
- Large samplers with lids and bio boxes with lids
- Bushmaster tool
- Variable ballast capability
- The ability to approach animals without disturbing them.
- Investigate potential new energy sources (including in situ energy sources)
- Work toward miniaturization of sensors and tools (to reduce energy requirements)
- Develop means to determine orientation of samples
- Larva samplers

In addition to the biology recommendations, it was suggested higher resolution and better arrangement is needed for imaging

DESSC recommended that the biology community prioritize their upgrade list. Lauren indicated that it would be useful to have an inventory of individually owned equipment that can be used with NDSF vehicles. The community would be better informed of the tools that are available.

The following tasking was recommended: Develop a web page that provides an inventory of community tools as well as tools available through the NDSF. Annette will work with Patty and Dan to establish the inventory and request input from the community. The database can reside on the UNOLS website

Status of Rock Drill Proposal – The proposal received favorable reviews, but exceeds the available budget. Two types of drills were proposed. Hopefully it will be funded at some level.

Tool Sleds and Third Party Tools – Andy Bowen discussed the issue of interchangeability of tool sleds between various ROVs (i.e. MBARI and Jason2). WHOI took a serious look at an interchangeable capability, but came to the decision early on that this would not be practical. Telemetry compatibility is possible, but it is unlikely that they will be able to share tool sleds easily.

There was discussion on third party tools and the general issue of interchangeability between platforms. In the future, as more ROVs come on line to support general science as well as observatory needs, there will be an increased need for interchangeability. This should be kept in mind in future development efforts.

Navigation – There was a lengthy discussion on the issue of navigation. Patty commented that having 3-D maps of the research area prior to her cruise was beneficial. There is an improvement in efficiency in having the areas mapped at high resolution and the maps available in the sub or control van. It also improves the sampling ability. The availability of navigation data for bathymetry is very useful, however, requires manpower and coordination between the navigator and science users. There is an issue regarding the workload on the pilots. It was suggested that a half-day workshop on navigation would be useful. New, state-of-the-art, navigation equipment is needed, as well as education of users.

Winter Meeting Strategies – The DESSC and agency representatives discussed winter meeting plans. There will be no agency funding to support a DESSC meeting at the San Francisco Fall AGU meeting. There are three winter meetings scheduled:

- Fall AGU – 8-12 Dec 2003, San Francisco, CA
- 2004 Ocean Sciences Meeting, AGU – 26-30 Jan 2004, Portland, OR
- 2004 Ocean Research Conference, ASLO – 15-20 Feb 2004, Honolulu, HI

Patty reported that special session requests have been submitted for all of the meetings. We should know in July if the sessions are accepted. DESSC members pointed out there are creative ways to have DESSC activities at the various meetings at very low cost.

Dolly Dieter stated that the agency program managers want DESSC to hold their 2003/2004 Community meeting in Portland, OR. The objective is to get the biology community better engaged.

Dan Fornari expressed concern about disenfranchising the G&G community. The G&G community will attend the Fall AGU meeting. He asked the agency reps if there could be an ad-hoc DESSC meeting at Fall AGU (in addition to a special session).

Dolly emphasized that the meeting in Portland should be modeled after the tradition DESSC meeting held each year in San Francisco. Program managers feel that they need the same following as the Fall AGU. Also, DESSC should only have one winter meeting and that will be

in Portland. There should be no DESSC sponsored events at the other two winter meetings (San Francisco and Honolulu).

BREAK

UNOLS Working Group on Ocean Observatory Facility Needs - Alan Chave, Chair of the UNOLS Working Group on Ocean Observatory Facility Needs, reported on the group's activities. His viewgraphs are included as [Appendix VII](#). The working group was formed early in the year by the UNOLS Council. The group membership and full task statement is included in Appendix VII. The group was asked to identify facility support needs for ocean observatories in terms of both ships and submergence vehicles. "What requirements can be met with currently available academic assets (vessels and submergence vehicles)? For those observatory facility needs that cannot be met by currently available facilities, the working group should: a) Identify what facilities should be added to the available suite of academic assets, b) Identify commercially available assets that could be used to meet observatory needs, and c) Address the effectiveness, both in terms of cost and practicality, of adding academic assets, using commercial assets, or a combination of both."

The group studied:

- Deep ocean seafloor cabled observatories
- Deck handling and mooring deployment/recovery needs
- ROV and AUV requirements
- Mapping requirements
- Coastal observatory requirements (including aircraft)
- Vessel characteristics, possible improvements, and recommendations for new vessel designs

They met once in February. Since that time they have been gathering information and drafting their report.

The deep ocean seafloor observatories will require:

- A heavy lift capability for cable servicing (20,000 lbf or more) – this is a requirement both in terms of equipment and specially trained personnel.
- More sophisticated, redundant DP capability
- The ability to operate in higher sea states
- Routine access to ROVs for all observatories operations

Alan showed slides demonstrating two baseline repair scenarios for seafloor observatories. Both options require ROVs.

He showed a slide of a typical cable repair ship. The ship is approximately 100m in length. It is equipped with a large cable drum, a heavy-duty a-frame, and open deck space. It includes an aft chute to guide the cable away from the propellers.

Alan discussed moored-buoy observatories. There will be an associated high maintenance cost. It is estimated that approximately one ship year will be needed for servicing all of the buoys.

Many of the planned locations for buoys are at high latitudes. And some are moored in water that is at depths of up to 3000 m. Under the existing distribution plan, but even deeper locations may be decided after future planning meetings. Alan showed a picture of the spar buoy design. The spar buoy is very large, approximately 40m long with a diesel generator. These will be difficult to service and fuel. Installation and buoy maintenance will not be feasible with the largest UNOLS vessels. Servicing is required on an annual basis. Installation and instrumentation maintenance will require an ROV.

Alan reviewed some possible solutions. One option might be to modify the UNOLS Class I vessels to increase deck-space to allow for larger deck gear. Another option is to lease or acquire a commercial, multi-purpose, heavy-lift vessel. Alan showed a slide of a commercial ship that might be appropriate. The ship would be equipped with an ROV as a tool. Potential applications for the ship include NEPTUNE servicing, long coring, high latitude buoy installation and maintenance (1/2 time), as well as other missions.

Alan next addressed the role of ROVs in observatory support. Observatory intervention tasks related to its infrastructure will become predictable and well defined, therefore could be appropriate for commercial off-the-shelf (workhorse) ROVs. Routine operations will require a less capable, smaller-crewed ROV. However, observatory work will require deep diving ROVs and very few commercial ROVs can go as deep as needed.

Observatories will likely generate much science work similar to the conventional vehicle operations that are conducted with systems like Jason2. These operations will continue to be best served by a science facility such as what presently exists. Since there might be science users that want to go on the maintenance cruises to do science, Jason 2 can do a lot of the maintenance operations. Currently, demand for Jason2 is high. With the addition of observatory work at least one or two additional ROVs would be needed.

Coastal observatory needs are also being studied and additional information is needed. Preliminary findings indicate the need for:

- Better access to vessels for observatory research
- Ten Local or Regional vessels distributed on east and west coast
- Need for coordination of multiple-vessel operations
- Need for rapid response capability
- Long duration glider-type AUV will be a key observation platform
- Aircraft Facility

Alan concluded by commenting that there are many safety issues involved with operations around the observatories. There does not appear to be an advantage in using HOVs over ROVs for observatory work. Debbie Kelley asked if there are any issues involved with operating ALVIN near a cable. Barrie replied that they prefer to stay a tree-length away.

Bill Ryan remarked that the scientific community should to be in the approval process for establishment of observatory locations. Locations that are of interest for ALVIN research need to be recognized in the planning process. Foreign collaboration in this area would be beneficial.

DESSC should keep this issue in mind and keep the community aware of the situation.

OSB Committee on Future Deep Submergence Facility Needs - Meeting review and tasking of DESSC for responses (This topic will be revisited on 6/12) - Patty Fryer sent the DESSC a message prior to the meeting indicating that a DESSC response to the OSB questions are needed. She has received some comments. These will be discussed as well as coordination of the response. Dan Walker commented that the OSB committee would like to see responses from individual scientists as well as groups.

Outreach, Education and Archeology

Archeology - David Mindell reported on archeology efforts that are underway or planned that use deep submergence assets. Bob Ballard has an expedition to the Black Sea in July and August. Centimeter scale mapping is planned for localized areas. The ROV *Hercules* will be used for these operations. The vehicle has three high-definition cameras and has a depth capability of 3000 m. The system is designed for precision manipulation, surgical level intervention.

The issue of state clearances for antiquity research was discussed. These clearances are very critical and Dave commented that many of the countries without robust antiquities programs might be difficult to work with. The UN is looking at this issue.

RIDGE Lectureship Program – Dan Fornari reported that a few years back, various DESSC members discussed the possibility of having a lectureship program for deep submergence research. R2K has taken this on as part of their education program. JOI USSAC has helped by providing information on their lectureship program. The RIDGE program has been funded and will happen in 2004.

NDSF DVD - Dan Fornari made a presentation on the NDSF at NSF in the spring. His PowerPoint presentation is being finalized and will be available to the community. It also will include an audio portion that provides a synopsis of the presentation.

IMAX - Peter Rona has reported that the IMAX deep submergence film will be released in the fall 2003. *DESSC volunteered to help publicize the IMAX film for educational purposes.* Patty plans to help publicize the film when it comes to Hawaii. [Note - Unfortunately, the IMAX Theater in Waikiki closed one month before the film's release.]

Dan reported that another IMAX film is planned. James Cameron has been working with members of the science community to make a film at the vent sites. Dives are planned in the summer at the MAR and in the fall in the Pacific.

WHOI Reports – Jim Luyten reported on the NDSF and WHOI Marine Operations Committee report recommendations and the status of the NDSF Chief Scientist Replacement. The committee's report was provided to DESSC members at the meeting.

Two years ago, driven by the need to find a replacement for Dan Fornari, Fred Sayles was appointed to a committee to look at the position of Chief Scientist and try to define it. Fred then decided to broaden their scope to include a study of all of Marine Operations. The membership includes Fred Sayles (Chair), Susan Humphris, Meg Tivey, Bob Weller and Dana Yeager. The group did many interviews. Their report includes a lot of praise as well as identification of concerns. The core focus was the NDSF facility and the role of the chief scientist.

The report studied the integration of the ALVIN operations and ROV groups and recommends the need for long range planning. There is need for a detailed plan to:

- Delineate an overall organizational infrastructure
- Address the issue of sea-time expansion resulting from growing demand of ROV ops. The plan must address the issue of personnel retention.
- Detail a means for standardizing sea time rates
- Identify budgetary implications of the above.

The report addressed the issue of Chief Scientist and recommended the formation of a committee that would include Jim Luyten as chair, Dick Pittenger, Barrie Walden, and one member from each of the science departments to conduct a search for a new chief scientist. Other committee members will include Tim Stanton, Lauren Mullineaux, Maurice Tivey, Jim Seewald, and Mike McCartney. They will hold their first meeting on June 9, 2003 and their first task will be to develop a job description. Jim commented that they would like to fill the position from within, but would be willing to go outside of the institution. It would take at least a year if the position were to be filled from outside WHOI.

The report recommended that there should be improved implementation of new instrumentation and technology on ALVIN.

The study also recommended the reactivation of WHOI's Deep Submergence Advisory Committee in accordance with their existing charter. The Committee consisted of the chief scientist and five members of the WHOI research staff. They provided technical and science-requirement advice to the DSOG at WHOI for matters relating to ALVIN and the ROVs.

Fred Sayles and Bob Weller joined the DESSC meeting and offered to answer any questions.

Mike Reeve asked if there is a role for the agencies to provide input on the report and the Chief Scientist position. Jim explained that the Chief Scientist is a WHOI contribution to the NDSF. Unless the agencies want to support the position, WHOI will work independently to fill the position. Dolly commented that she was surprised by the study's finding that the DSL and ALVIN groups need integration. The agencies funded WHOI to integrate DSL and ALVIN years ago. The operation groups have only been integrated on a few cruises. WHOI indicates that the cultural issues between the two groups have interfered.

Patty requested that the committee provide a draft of the Chief Scientist position description to DESSC. Patty continued by asking why WHOI thinks they would be able to find a Chief Scientist now, after they have been trying to fill the position for over a year, with no success. Jim thinks that perhaps the responsibilities can be split up a bit. They hope to have the position description advertised by August if needed. The person must be tenured. This would be a year minimum. Patty emphasized that the position should be filled by an individual, as opposed to a group. The users need to have someone to call for input.

DESSC members were encouraged to read the report. Jim Luyten also encouraged the DESSC to provide written comments and can be send them to him.

1430 Break

Operational Summary of Other Deep Submergence Activities – Reports were invited from other deep submergence facilities prior to the meeting.

Patty Fryer summarized the material received from **SIO/MPL**. The Advanced Tethered Vehicle (ATV) is operating. SIO will put together a list of equipment spares. They are confident that ATV can be operated as a 6000 m vehicle for science.

Barbara gave an update on the **NURP and Ocean Exploration** 2003 operations and plans for 2004. They will be using a variety of vehicles. Descriptions about the 2003 Ocean Exploration programs and vehicles used are provided on the NOAA website at <http://oceanexplorer.noaa.gov/explorations/explorations.html>. In 2004, Ocean Exploration work is planned at Juan de Fuca using ALVIN. Jason II NURP operations are planned in the Aleutians.

The **HBOI** operations will be reported on 6/12 when Shirley Pomponi is present.

Long-Range Planning Issues – There was a brief discussion on the Vehicle request maps that were presented earlier in the meeting by Annette DeSilva. It was recommended that the maps be made available to the community so that the geographic areas of interest will be known. Annette was tasked will posting the maps on the DESSC website and sending a short message to the community to let them know that the material is available.

It was also suggested that there be links to the other major programs, such as, RIDGE and Margins

Future global deep submergence initiatives:

Southern EPR - Dan Fornari reported that there is interest from RIDGE 2000 for work at the Southern EPR, but logistically it is difficult to get there without a lot of proposal pressure.

South Atlantic - There is some interest for work in the South Atlantic. This is an interesting area that has been relatively unexplored. Some mapping data exists, but not a lot. The UK cruise with ISIS in 2004 might catalyze a lot interest.

Western Pacific – There is interest from the Margins Program for work in the Western Pacific. There is multi-channel seismic data for the IBM region as well as data from EWING and by JMASTEC. It would be of interest to revisit this area. Bob Embley has been funded for work in the Back Arc Basin area. The Mariana system is more mature in terms of available data. The Japanese plan to revisit this area with their assets. This will become an area of mature research. RIDGE 2000 has designated the Lau Backarc Basin as a focus site and Jason2 work has been funded for fall 2004.

Patty Fryer commented that a proposal has been submitted to IODP create a cabled network off Guam. As part of a complex drilling program request, there is a cable available to the area. It would allow real-time modeling. They would like to instrument the flanks and summits of mud volcanoes. There is potential for the area to become a regional observatory.

High latitude work – Dan Fornari reported that detail mapping was conducted in the high Northern latitudes two years ago. There have been some requests for ROV work in high latitude areas. However, operation in the ice is a major concern. They are studying what assets could operate in the ice. A workshop is planned later in the month at Southampton where they will look at the interest to go to Gakkel Ridge. AUVs will be explored, but there is an issue on vehicle retrieval and ice movement. Autosub has been used under the ice. No current US icebreakers, with the exception of PALMER have a center-well. All of the Gakkel Ridge vent sites are at 4000m. The Canadians are looking into acquiring a new vessel with a new ROV. The ODEN may be sent to the Arctic for operations. The potential for use of the HROV was mentioned by Andy.

Peter Wiebe commented that he plans to bring an AUV to the Antarctic for operations. He is working with Al Bradley (WHOI).

Discussion of replacements on the DESSC - Mark Chaffey is completing his first term on DESSC. Patty Fryer will contact Mark to determine his willingness to stay on the Committee. Suggestions for replacements were made in the case that Mark wishes to step down.

Day Two: Thursday, 12 June 2003

MEETING BEGINS AT 8:30 AM

WHOI, Clark 509

Review of Day-One Discussions – Patty Fryer reopened the meeting at 0830. The WHOI Sayles report was revisited. Patty emphasized that the NDSF Chief Scientist should be an ex-officio member of the DESSC.

They discussed the status of the WHOI Deep Submergence Advisory Committee (DSAC). Dan explained that part of the reason that the committee disbanded was because Dan found it more effective to deal one-on-one with the science and facility personnel. Fred Sayles' committee has recommended that the DSAC be reinstated. Dan indicated that that he agrees since it would be useful for a new Chief Scientist to have the DSAC in place to help transition into the position. Dan also explained that earlier in the year an operations meeting was convened that included DSL, Marine Operations and other departments. They met for an afternoon and discussed a variety of management areas as well as did brainstorming. It was a very useful meeting and Dan encouraged the group to meet on a more regular basis.

Bill Ryan commented that the report is good in identifying areas of concern. He suggested that the Committee review the Spiess report (10+ years ago) and provide a list of the things that have been accomplished since that time.

There was a DESSC comment that the report does not address safety. Dan explained that the committee was aware of safety issues. There is a constant attention by the operation groups regarding safety.

Debbie Kelley pointed out that there may only be two ALVIN pilots in 2004 and there are 11 funded programs. Is there any way to facilitate the retention of these people? Barrie explained that they continue to try to retain pilots. When pilots spend time ashore, they often realize that they like it there. There is a lot of repetition with ALVIN operations. This is part of the reason why ALVIN operates safely; they do the same thing over and over again. The institution has many pilots who have stayed on in other positions. Unlike ship's crew, many of the pilots did not plan this as their life direction. They are often engineers by training. Barrie noted that over the years as the replacement ships got bigger and more modern, personnel retention got better. There is one thing that could improve retention and that is providing single staterooms for pilots. Shirley Pomponi agreed that this is a big issue. HBOI provides single staterooms and it proves to make a difference in retention.

Dave Mindell asked if retention of the ROV team would also become an issue over time. Andy answered that for some operations, when they are short on ROV team members, they can use contract workers as needed. But as the expeditions get longer this option won't be economical.

Dolly reminded WHOI that the report is in reference to the National Facility and there is an MOU between the agencies for operation of the facility. Before any of the study's recommendations are acted on it would be a good idea to have a dialog with the agencies.

To conclude the discussion, Dan ended by remarking that the study provides a positive review with constructive comments.

Shallow Submergence Science Committee Update - Shirley Pomponi reported that the committee has not met over the past year, but she has spoken to some of the committee members. They would like to look into the funding situation for use of shallow submergence assets. Options will be explored with the agencies.

Other Facilities: HBOI report - Shirley Pomponi reported on Harbor Branch Oceanographic Facility and Johnson-Sea-Link I and II operations. Her viewgraphs are included as [Appendix VIII](#). In 2002 the vehicles operated for a combined total of 169 days. Work areas included the Gulf of Mexico, Bahamas, Atlantic, South Atlantic Bight, Monitor NMS, and New England Canyons. Shirley showed a summary of dives by depth. The greatest number of dives (104) was in the 2000-3000 fsw range. Projected operations for 2003 include 131 JSL-I and JSL-II combined days. Operation areas included the Gulf of Mexico, Bahamas, Atlantic, South Atlantic Bight, and New England Canyons.

Lastly, Shirley provided a chart showing the facility funding by entity in 2002 and 2003. NSF funded 138 days of ship time in 2002 and will fund 91 days in 2003. There is no NSF support for submersible operations. NOAA OE or NURP funded 45 days in 2002 and will fund 40 days in 2003.

Ocean Studies Board (OSB) Committee tasking from the Future of Deep Submergence Science study - Dan Walker reported on the status of the OSB study. Information about the study is contained on the NAS website at <http://dels.nas.edu/deepsubmergence/>. He began by reviewing the OSB Committee's task statement and remarked that they have been working with Navy and NSF and NOAA to change/clarify the tasking. This includes:

- Remove reference to retirement of ALVIN (if a new ALVIN was brought on-line then ALVIN would be retired). Jim Yoder has indicated that if no new HOV were constructed, NSF would continue to support ALVIN. This study would not recommend the retirement of the HOV.
- The committee will be asked to assess current and projected capabilities of manned and unmanned vehicles.
- Cost of operations – not more than a modest increase in funding should be considered. The intent is for the committee to not make recommendations to expand the capability (2 HOVs) so that it would no longer be feasible to operate. Mike Reeve explained the mid-size infrastructure budget concept and what that budget will allow.

Their revised statement of task has been approved and will probably be posted on the OSB site by the end of the week. The committee is working to structure a report that identifies the key drivers for deep submergence science and indicates how these science needs be met.

Dan reviewed the committee membership. The Chair is Dr. John Armstrong. He has been on the NAS Board and has served on the National Academy of Science. They have tried to balance the committee between designers, ROV users and HOV users. It is a diverse group.

DESSC will be of most value in helping to identify science drivers. Dan Walker indicated that the committee would like to hear from individuals as well as groups. Dave Mindell asked if the committee has interest in hearing about how new technologies open new opportunities for science. It was commented that the questions that are being asked by the committee are looking at the past. It is often new technologies that have enabled new discoveries. Dan

Walker indicated that they could perhaps ask a third question, regarding future science needs and emerging technologies. Dan W. indicated that the committee is working to identify the science drivers and the best mix of assets required to meet these needs.

Dan W. showed the draft agenda for the next OSB committee meeting on June 25th. Presenters include Tim Shank (WHOI) who will discuss biology and Jason. Peter Brewer (MBARI) will address geochemistry and the MBARI ROV TIBERON. Mark Zumberge (SIO) will address geophysics and ROVs. Mid-water column work will be presented by Edi Widder (HBOI). Patty Fryer (UH and DESSC) has been asked to discuss marine science needs for depths in excess of 4500m.

The question was asked whether the OSB committee would address observatory facility needs. Dan W. replied that there are two other OSB committees that are looking at ocean exploration and ocean observatories. They will consider the facility needs for observatories. The OSB Committee on Future Needs in Deep Submergence Science recommendations will be above and beyond the needs of those that will be recommended by the others, so they will not address observatories.

DESSC commented that it is important to consider the needs of observatories in future planning. The observatories will allow real time collection of data. As events occur, access to ROVs and HOVs will be needed to conduct experiments. Specialized observatory operations will require dedicated vehicles. Observatories could greatly increase the already high demand on submergence vehicles.

Peter Wiebe commented that observatories would require a rapid response capability. This needs to be considered in future planning and scheduling paradigms.

Dan Walker continued by further describing the June meeting plans. On the second day of their meeting, there will be a report on the future of telepresence by Henry Fuchs (UNC). The future of underwater communications will be presented by Dale Green (Benthos). Dana Yoerger (WHOI) will make a presentation on augmenting ALVIN and Jim Newman will discuss innovative design concepts. Dan W. expects the discussions to be lively and filled with different perspectives. The committee will consider the input received from speakers, written comments, and group comments to come up with their recommendations. A draft will be reviewed by a select group of marine scientists, engineers, and operators.

The study should be complete at the end of September.

BREAK

After the break Patty continued with a discussion on the content of the DESSC input to the OSB study and response to their questions. She plans to extract the main science objectives from the DESSC white paper and use them for her presentation. She needs DESSC input to OSB's second question – the mix of vehicles that are needed. Hedy suggested that the DESSC look at recent cruises and describe how they used the vehicles. Patty also suggested that they

provide information on the nested survey concept and how the suite of vehicles is used together to maximize science. Dan Fornari's paper on this topic could be used. In summary, Patty can provide input on Jason2 and DSL-120 operations and the nested survey operations applied during her 2003 cruise. Debbie Kelley can provide input on ALVIN operations from her cruise.

Dan Walker asked the DESSC to provide input by June 23rd so that it could be considered at their next meeting. He also mentioned that there would be other opportunities for input. The window for submitting input will stretch into the end of July. He thinks that the OSB committee would be interested to hear DESSC's views on how observatories will change the way their science is done, will change demand, and the potential impact observatories might have on HOV operating areas.

Shirley said that the committee would be interested in learning what science can only be done with an HOV. They may try to identify these areas by reviewing the DESCEND report. It was suggested that input from the Margins Program would be useful (Julie Morris).

KAIKO Loss - Keir Becker joined the DESSC meeting. He was on the recent JAMSTEC cruise that was cut short due to the loss of the 11,000 m ROV, KAIKO. The nature of the incident was briefly discussed. To date, the vehicle has not been found.

New Alvin Construction Advisory Committee (NADAC) update – Bob Brown provided an update on the New Alvin design project. The project is funded by NSF and NOAA. A committee meeting of the NADAC will follow the DESSC meeting. Information about the New Alvin design project is posted on the WHOI web site at: <http://www.whoi.edu/marine/ndsf/vehicles/newalvin/index.html>.

The project is in the concept development phase. Hull forms are being investigated. Maraged steel and titanium are being considered. There is an existing maraged steel hull (Lokomo) that is available from the Finnish. WHOI has requested a design review of the Lokomo hull by ABS. ABS currently requires a 4.04-inch hull thickness. The hull under consideration is 2.9 inches thick. ABS has indicated that this falls within the 1979 ABS requirements and would probably be acceptable. ALVIN's hull is 2.7 inches thick.

The hull design includes consideration of five viewports. Various viewport arrangements and sizes are under consideration. Sketches providing fields of view comparisons between ALVIN and the new ALVIN viewports were available for DESSC. The new configuration would provide a view of about 25 feet from the sphere and give about 250 degrees total field of view.

The new vehicle will be designed to have lighter foam, increasing its payload capability. The operating mode will be similar to ALVIN's with a crew of one pilot and two observers.

Dolly asked if WHOI plans to do destructive testing of the new hull. This would require the construction of more than one hull. Bob Brown replied that the plan is to build just one hull.

A variety of batteries and battery manufacturers are being evaluated. NiCad and Lithium Ion batteries are being studied. The new vehicle would be designed so that the batteries could be switched while at sea. WHOI is also conducting an energy source review.

WHOI has submitted a request to ONR for the new vehicle to be Navy inspected and certification. ALVIN is Navy inspected. ONR will in turn forward this request to NAVSEA, who currently conducts the inspections. NAVSEA will decide if this is something they wish to do and if so, will provide a cost estimate to ONR. In parallel, WHOI is pursuing ABS certification.

Bob reviewed the project schedule. By 27 August they plan to complete concept definition and have a review meeting. They plan to complete community review, the RFP package, and cost estimates by the end of September 2003. The RFP would be for construction of the new ALVIN.

Hybrid ROV Proposal - Andy Bowen provided a report on WHOI's proposal for construction of a hybrid ROV (HROV). The title of his presentation is, Exploring The Deepest Depths: For A Novel Light-Tethered Hybrid ROV For Global Science In Extreme Environments. PIs for the project are Andy, Dana Yoerger and Louis Whitcomb. The proposal has been submitted to NSF, NOAA and ONR.

The proposed vehicle will be designed for a full ocean depth of 11,000m. The HROV will be able to operate in two modes: as an AUV for wide area surveys, and as a tethered vehicle for close-up sampling and other tasks. In the latter mode, it will use a fiber optic micro cable one thirty-second of an inch thick. The vehicle can be converted from one configuration to the next during the same cruise. The HROV will have new technologies such as ceramic housings for cameras and other electronic equipment to withstand the pressures at its full operating depths. Andy showed a schematic of the vehicle deployment and recovery operation.

In the HROV configuration, the vehicle is launched using an armored fiber optic cable and depressor. Once clear of the vessel, the HROV is released from the depressor at about 1,000 meters depth and free falls to the seafloor using a descent anchor assembly. During the free fall it pays out the fiber optic micro cable from two small canisters, one mounted on the depressor and the other on the descent anchor assembly attached to the vehicle. The HROV uses the fiber optic cable to communicate with the support ship but not to supply power. Once the HROV reaches the bottom, the descent anchor assembly is jettisoned and the vehicle continues its mission while paying out up to 20 kilometers (about 11 miles) of micro cable from a third canister mounted on the vehicle.

Via the micro fiber, an operator on the surface vessel remotely controls the HROV. Mission durations are planned to be as long as 36 hours. When the dive is complete, the HROV jettisons the micro fiber and drops its ascent weights for the trip to the surface. Untethered, it guides itself to the armored cable depressor near the surface, latches onto the cable to the surface ship above and is recovered aboard ship. The micro-fiber is then recovered for re-use.

The AUV and HROV configurations were also shown. The AUV configuration will be equipped with the standard suite of sensors. The HROV configuration will have a sample sled, electric manipulator, and sensors. It will not be equipped to the level of Jason2, but will provide limited capabilities at full depth.

The vehicle system is compact and should be able to be used from a coastal class vessel. It will have a flyaway capability and can be shipped in a single 20 ft van. They have already done a fair amount of design work on the project.

Andy provided a table showing the HROV summary specifications:

Dimensions, L×W×H	3m x 2m x 2m
Air Weight	2100 kg
Payload Capacity	25 kg
Battery	Rechargeable Lithium Ion. 6 kWh in main pressure housing, 6kWh in tool package housing
Speed	3 knots (1.5 m/s), 2 knots (1.0 m/s) with work package
Manipulator	Electric, 5 DOF, 20kg lift at 1m
Thrusters	2 aft, 2 vertical, 1 lateral
Lights	Variable output LED array, strobes.
Sonar	Scanning sonar, forward look and profile, 675 kHz
Sensors, other	Magnetometer, CTD

Sampling capabilities For the HROV include:

- Push coring
- Heat-flow probe – e.g. the Alvin probe.
- Geotechnical/Geochemical sensors –pore pressure in sediments
- Rock sampling/drilling
- Biological sampling – small suction samplers, nets and “bio boxes”
- Water sampling

Potential HROV operations include:

- Event Response
- Under Ice Operations
- Margins
- Deep Subduction Zone Environments
- Public Outreach

At the time of the meeting, the proposal was under agency review and is proprietary to WHOI.

Shirley Pomponi asked the question of whether there would be a hybrid HOV/ROV capability. Andy explained that the plan is to test the fiber using ALVIN. This would provide a real time link between the ship and sub. Such a capability could be exploited for outreach programs as well as many other applications.

Tasking Review – Patty reviewed and discussed the various DESSC task items. The full task list is included at the top of this report.

The meeting adjourned at 12:15 pm.