

**DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Carriage House / Clark Building
Woods Hole, MA
May 24-25, 2006**

A copy of these minutes are available as a pdf document <[200605desmi.pdf](#)>.

Executive Summary:

The Deep Submergence Science Committee (DESSC) met on May 24-25, 2006 at Woods Hole Oceanographic Institution (WHOI). The meeting included agency reports from NSF and NOAA. Representatives of the National Deep Submergence Facility (NDSF) provided reports on:

- Vehicle operation summaries
- NDSF data and archives
- Ship maintenance updates and vehicle improvements
- Navigation upgrade
- Deep submergence scheduling in 2007 and beyond

The meeting included status reports on new vehicle design efforts at WHOI. The replacement deep diving Human Occupied Vehicle (HOV) is moving forward and if all goes on schedule the replacement HOV would be ready for service in 2010. A first draft of a community on-line survey to obtain input on the sensors desired for the RHOV was reviewed. The Hybrid ROV project is also progressing and the vehicle should be ready for service in 2007. An update on the status of AUV development efforts at WHOI was provided. The DESSC reviewed WHOI's proposal to incorporate *Abe/Sentry* into the NDSF and in turn, approved the incorporation of *ABE/Sentry* into the NDSF concurrent with the removal of *DSL-120A* and *ARGO II*. They will present this recommendation to the UNOLS Council during the summer meeting.

A status report was provided from the DESSC subcommittee on their efforts to establish safety standards for HOVs.

The DESSC discussed NDSF personnel issues and the need to provide training opportunities to the pilots. They also reviewed their draft document on criteria for bringing new assets into the NDSF. The document will be finalized and presented to the UNOLS Council during their summer meeting.

Action Items:

1. **December 2005 DESSC Meeting Minutes** – Incorporate revisions provided by Hedy and repost as final. (DeSilva)
2. **Ocean Observatory ROV Workshop** – Organize an ROV workshop for technology exchange and defining future needs to support ocean observatories. Participation should include ROV operators and engineers from WHOI, MBARI, and ROPOS. Commercial entities might also be considered. The workshop would be supported through UNOLS. DESSC, in collaboration with the agencies and UNOLS, will formulate the workshop description, objectives, and invitation list. (Kelley/DeSilva)
3. **DESSC Recommendation on WHOI's ABE/Sentry proposal** – DESSC recommends that ABE/ Sentry be incorporated into the National Deep Submergence Facility with the following conditions: 1) ABE/Sentry replaces DSL-120, 2) WHOI provides clarification on the final bullet of their proposal letter regarding Data support, and 3) clarification on how the AUV missions will be programmed (if Yoerger/Bradley are not cruise participants). Deb will request the additional clarification from Bob Detrick. Additionally, she will request an information package that provides details on ABE/Sentry vehicle specifications, capabilities and how to use. This document is needed no later than June 13, 2006 so that it can be provided to the UNOLS

Council prior to their June meeting. Deb will present the DESSC recommendation to the UNOLS Council on June 21st. If the Council endorses DESSC's recommendation, the Council will forward the recommendation to the supporting agencies and request that it be available for the August proposal deadline. ABE/Sentry will be added to the UNOLS Ship Time Request on-line form. An announcement will be distributed to the community at the appropriate time that provided information about ABE/Sentry and it's inclusion in the NDSF. The announcement will also inform that the DSL120 is no longer included in the NDSF (we should let them know who to contact for future use). (Kelley/Detrick/UNOLS)

4. **NDSF Vehicle Debrief Interviews** – In order to better track the status of vehicle and system performance, DESSC will conduct debrief interviews of PIs who use Jason2, Alvin, and ABE/Sentry. Agendas for future meetings will include summary reports of these debrief. Participation in the debriefs will include DESSC, the science user, and the NDSF operator (Chris German). DESSC will compile a list of items that have been identified as problems or areas where improvement is needed, then track them. A standard set of debrief questions will be drafted (the AICC debrief questions can be used as a template). The following individuals volunteered to conduct debriefs:
 - a. Jason2 – Bill Chadwick
 - b. Alvin – Michael Tryon
 - c. ABE/Sentry – Hedy Edmonds(Action – DESSC draft debrief questions, Watchdogs conduct interviews)
5. **R2K Database and Visualization Tools** – Invite Suzanne Carbotte or Vicki to a future DESSC meeting to provide a presentation on the R2K database and visualization tools. (Kelley)
6. **Shore-side Data Management** – DESSC recommends that shipboard personnel conduct the daily quality checks of cruise navigation data (as opposed to shore-side checks). Deb will send a recommendation to whom? (Kelley)
7. **Science Training Opportunities for Pilots** - DESSC will formulate a recommendation to offer a workshop/training science session for pilots. The session should demonstrate how the data from the vehicles are used for different research disciplines. Offer the training in an interesting setting such as Hawaii or Iceland. (Kelley)
8. **R2K Lectureship program** – DESSC recommends that the R2K Lectureship program include an Alvin or ROV pilot as a distinguished lecturer. (Kelley)
9. **Career Advancement /Learning Opportunities for Pilots** – DESSC recommends that WHOI Management promote learning opportunities and career advancement opportunities for pilots. (Kelley)
10. **Criteria for Adding Assets to the NDSF** – DESSC accepted the draft Criteria. Deb will present it to the UNOLS Council on June 21st for endorsement. (Kelley)
11. **Science Sensors for Replacement HOV** – A community on-line survey on science sensors for the RHOV has been drafted. Annette will add science outfitting such as tools and sensors based on input from Bob Brown. Buttons that will link to “additional information” will be added. A deadline of when the information is needed will be added. Annette will circulate to the DESSC for review when available. (DeSilva/Brown/DESSC)
12. **Winter Meeting Strategies** – Contact Phil Taylor regarding the next DESSC meeting venue. The two upcoming biology meetings are the 2007 Benthic Ecology Meeting - Atlanta or Savannah -- dates TBA and the Western Society of Naturalists - November 9-12, 2006. Redmond, WA. NDSF users will be contacted for slides in advance of the meeting. (Kelley/DeSilva)
13. **DESSC Membership** – Annette and Deb will contact DESSC members with terms ending in 2007 about staggering term lengths. Deb and Annette will present a recommendation at the next meeting.

(Kelley/DeSilva)

Appendices

I	Meeting Agenda
II	Attendees
III	National Science Foundation Report (1.4 Mb) - E. Dieter
IV	UNOLS Report (2.8 Mb) - P. Wiebe
V	NDSF Vehicle Operations Summary - R. Chandler
VI	NDSF Science User Report: - W. Chadwick <ul style="list-style-type: none"> • Melville/Jason2 Ocean Exploration Cruise - Ring of Fire, April 18 - May 13, 2006 (3.1 Mb) • Jason2 User Perspective Paper
VII	Atlantis Maintenance Period Update - A. suchy
VIII	Alvin Overhaul Report - D. Foster
IX	ROV Update - A. Bowen
X	Alvin Personnel Issues - D. Foster
XI	2006 NDSF Schedule and NDSF requests for 2007 (1.8 Mb) - E. Caporelli
XII	NDSF Requests for 2007 ad Beyond - A. DeSilva
XIII	NDSF Data and Archive Report - M. Tivey
XIV	Update from NDSF Data Manager (3.6 Mb) - V. Ferrini
XV	Hybrid ROV Report (32 Mb) - A. Bowen
XVI	AUV Status - Sentry Report (2.2 Mb) - B. Walden Movie Clips: <ul style="list-style-type: none"> • Sentry Launch <sentry_launch.wmv> (6.2 Mb) • Sentry Recovery <sentry_recovery.wmv> (7.9 Mb) • Sentry Night Recovery <sentry_night_recovery.wmv> (7.9 Mb)
XVII	AUV Users Conference on Science Applications (AUV SA)
XVIII	ORION Report (17.52 Mb) - R. Detrick
XIX	ROPOS Report - D. Kelley
XX	Replacement HOV Update (1.4 Mb) - R. Brown
XXI	Subcommittee Report on HOV Safety Standards Project (1.4 Mb) - C. Young
XXII	NDSF Navigation Upgrade Status - J. Howland
XXIII	Winter Meetings
XXIV	Ocean Exploration Education and Outreach Programs (1.7 Mb) - C. Martinez
XXV	DESSC Membership

Meeting Minutes**Day One: Wednesday, May 24, 2006 - Carriage House**

Introductory Remarks, Meeting Logistics, and Introductions – Deb Kelley, Deep Submergence Science Committee (DESSC) Chair, called the meeting to order at 0830 on Wednesday, May 24, 2006. The meeting was

held at Woods Hole Oceanographic Institution (WHOI), Carriage House. The agenda for the meeting is included as *Appendix I*. The items of the agenda are reported in the order addressed. Meeting participants introduced themselves. The list of attendees is included as *Appendix II*.

Accept minutes – Hedy Edmonds indicated that she had a few corrections and would provide them to Annette DeSilva. The minutes of the December 2005 DESSC Meeting were approved upon incorporation of the corrections.

Agency and UNOLS Reports:

NSF - Dolly Dieter provided the NSF report. Her slides are included as *Appendix III*. Dolly reported administrative personnel changes. Bruce Malfait, MGS Section Head has retired. Dr. Julie Morris is now on board as the new Division Director.

The projected timeline for construction and funding of the Alaska Region Research Vessel (ARRV), the Regional Class ships, R/V *Langseth*, and the replacement HOV were presented. The ARRV is in the MRE account and funding is expected in FY07. If all goes on schedule, the ship would be ready for service in 2010. The Regional Class acquisition process of three ships has begun. In April 2006 two design competition contracts were selected. It is a one-year design competition. Operator solicitation is expected in September 2006. The R/V *Langseth* is in the shipyard for conversion modifications and will have a 3-D seismic capability. UNOLS has established a science oversight committee for the facility that will be modeled after DESSC. It is expected to be ready for service in 2007. The Replacement HOV is in the 3rd year of a design/build process and should be complete in 2010.

In other activities, Dolly reported that:

- The UNOLS Office Cooperative Agreement was renewed for another 3 years.
- UNOLS Wire Pool news:
 - Testing is being conducted to determine the wire specs and if the manufacturers are meeting them
 - There is a need to start looking at the next generation wire
- Load Handling systems – Matt Hawkins (UDel) headed a symposium to look at handling systems. The R/V *Sharp* is getting a new Caley handling system.
- NSF has renewed its contract with JMS for ship inspections. They should restart in June. Operators will be asked to use the web-based ship condition form
- SSSE Group purchases – NSF is supporting group purchases:
 - Gets standard equipment across the fleet
 - Cost saving in buying in quantity

Lastly, the Federal Oceanographic Facilities Committee (FOFC) has been finalizing their Fleet Renewal Plan and hopes to have it published by the end of this year.

NOAA - Barbara Moore (NOAA) reported that the Ocean Exploration (OE) program and the National Undersea Research Program (NURP) are merging to form one organization. There is an increased emphasis on technology development. The program is under construction and will be involving outside partners. This was an action that was planned some time ago, but is finally getting underway.

In the FY06, the NURP program budget was hard hit, as well as OE. OE was only allowed to fund a portion of their planned work. The NURP *Alvin* program was not funded. Of the six NURP centers, only Hawaii and Mississippi was fully funded. The West Coast center was partially funded. In the East:

- The Caribbean is closing as a NURP center.
- Connecticut and Rutgers have no operations, but are preserving personnel
- North Carolina will remain open, maintain equipment, but reduce personnel.

NURP/OE is restructuring to meet the budget of President's request. The request restores some funds to OE, but is

lower than FY05. Despite these significant reductions, NOAA supported the *Alvin* cruise in the Gulf of Mexico (May 2006) and is also able to support their portion of the *Alvin* overhaul.

Question: After the merge, how will grants be administered? Barbara - It is not clear yet, but it will be more streamlined.

UNOLS - Peter Wiebe, UNOLS Chair, provided the report for UNOLS. His slides are included as *Appendix IV*.

He began by reporting on ship utilization and ship time for 2006 and beyond. In 2006 there was a sharp decline in funded ship days as a result of budget constraints. The scheduled ship time in 2006 is not at the optimal level. The worse case is with the intermediates ships. For 2007, the preliminary Letters of Intent show double and triple bookings with pending work. It looks even bleaker than 2006

In 2005, Larry Clark asked for advise from UNOLS on how to deal with the budget shortfall. In March 2006, the Council formed a subcommittee to prepare guidelines that would be used by the Council to make recommendations regarding ship lay-ups or retirements from the Fleet. Peter reviewed the charge to the committee, the Committee's considerations, and their recommendations.

Peter reported on Fleet Renewal efforts. In the Spring 2006, the Navy formed a Naval Research Advisory Committee (NRAC) to provide recommendations regarding Navy's role in acquisition of the Ocean Class. There is a lot of competition for Navy funds and UNOLS is not a high priority. The NRAC is expected to provide their recommendations soon.

Global Class SMRs and Mid-Life Considerations – The Global ship SMRs have not been updated since the late 1980's. An online survey for community input is coming soon.

Peter reported that the Fleet Improvement Committee is preparing an updated Fleet Improvement Plan. It will be based on the future science needs.

Another effort that UNOLS is involved with is establishing Research Vessel Guidelines for accommodating Americans with Disabilities Act (ADA). NSF has indicated the need for new ship construction and ship conversion efforts to address ADA requirements. Vessels that support Federally funded academic research should be equipped and arranged as feasible to accommodate persons with disabilities. FIC Member, Terry Whitlege, has agreed to chair the committee.

Peter reported that a brochure has been drafted that describes UNOLS. There are a lot of people who do not know what UNOLS is. The brochure describes UNOLS and provides ships descriptions, distribution, and utilization. Peter asked that all of the Committee's look this over and send him any comments.

The UNOLS Research Vessel Operators' Committee will hold their Annual Meeting on April 25-27, 2006 at the University of Washington. They will discuss the update of the Research Vessel Safety Standards, security plans, safety, ISM, uniformity for port and EEZ fees, and alcohol, drugs, and sexual harassment policies.

The Research Vessel Technical Enhancement Committee will meet in October, just prior to the INMARTECH 2006 Symposium on October 17-19, 2006, at Woods Hole Oceanographic Institution.

The Arctic Icebreaker Coordinating Committee met at NSF on April 18 & 19. They reviewed de-briefs from last season's cruises and generated a list of recommendations. They also reviewed requirements for future upgrades and improvements for science outfitting. *Healy* is underway for this summer's field season with two NSF and two NOAA funded cruises.

At the time of this DESSC meeting, the UNOLS SCOAR committee is meeting. It is a joint meeting of the UNOLS Scientific Committee for Oceanographic Aircraft Research (SCOAR) and the Interagency Coordinating Committee for Airborne Geosciences Research and Applications (ICCAGRA). Their meeting will be immediately followed on May 24-25, 2006 by the first ever Airborne Ocean Science Conference. The conference will include

posters and presentations on the use of aircraft in marine science research field programs.

A new UNOLS new standing committee, the Marcus Langseth Science Oversight Committee (MLSOC), was formed in October 2005 and Steven Holbrook, U of Wyoming, is the Chair. They will hold their first meeting on 31 May and 1 June at the Shelburne Nova Scotia shipyard.

The 2006 UNOLS Annual Meeting will be held on Friday, October 6, 2006 at NSF.

The keynote speaker will be

Former California Congressman and White House Chief of Staff,
The Honorable Leon E. Panetta.

Questions:

Bob Detrick stated that CORE sent a message that the NRAC would not report until the summer. He asked if this would hold up the FOFC and FIC plans. Reply – No, both plans will continue to move forward.

Deb Kelley asked what is the prospect of the mid-life refits for the Global ships? Dolly replied that we won't see mid-life refits like those for carried out for *Knorr* and *Melville*, but the Navy would like to provide funds for upgrades. At the NRAC hearings, there were strong pleas for continued support of UNOLS.

National Facility Operators Report – Bob Detrick (WHOI) began the National Facilities Operator's Report and introduced Rick Chandler.

NDSF Vehicle Operations Summary – Rich Chandler reviewed the *Alvin* and ROV operations in 2006. His viewgraphs are included in *Appendix V*. The *Alvin* overhaul was completed in mid-April. It is carrying out its first cruise of the year in the Gulf of Mexico. *Jason2* has completed two cruises at the time of this meeting.

NDSF Support Ships - Liz Caporelli reported that a *Jason2* test on *Kilo Moana* is planned in November. There is a *Jason2* cruise scheduled on *Ron Brown* next year in the Gulf of Mexico. There are some Dynamic Positioning concerns that they will be looking into.

NDSF Science User Report – Bill Chadwick provided a report on his recent Ocean Exploration cruise aboard R/V *Melville* using *Jason II*. Cruise highlights as well as comments regarding *Jason2* operations were provided. Bill's report is included as *Appendix VI*.

During the cruise, they made dives at nine different active volcanoes in the Western Pacific. The first volcano visited was NW Rota. In 2003 CTD surveys of the ARC were conducted. The following year there were *ROPOS* dives at the site. In the fall 2005, Japanese dives were conducted. These were followed in 2006 by *Jason2* dives. It is still erupting. Six dives were made at this site. Bill showed video footage from the site. A portable hydrophone shows when vent shuts down and starts up.

The Daikoku volcano was also visited. On the flank they found molten sulfur. There were lots of animals (flat fish).

At the Nikko volcano, there was incredible biomass and they again saw molten sulfur along with CO₂ bubbles. At the end of the dive, the vehicle was heavier than when it began, by about 60 lbs. *Jason2* had broken through the crust. The fluid sampler got most of the damage.

Bill continued with a report on *Jason2* operations. The vehicle and crew were very capable. There was also room for improvement. The LBL navigation is very archaic and needs to be replaced as soon as possible. It is a risk to science operations. The cameras worked, but not optimally. The suction sampler worked about half the time. The motor broke down.

Discussion followed:

- Bob Detrick – Was there evidence that the site was erupting? Bill – They didn't know for sure if it was still erupting. It has been erupting since 2004. They did more dives at that site than originally planned and saw two species of shrimp, one of them thought to be new. They saw dead mid-water animals drop to the floor, and then the shrimp ate the dead animals. The volcanoes seem to be poisoning the mid-water animals.
- Maurice Tivey – Requested comment on the navigation system. Bill – They ended up using the Doppler most of the time. They were very impressed with the Doppler and closed loop system.
- Andy Bowen – If additional work is planned in the volcanic areas, there are improvements that can be made and should be considered for the vehicles to work optimally. Bill - Adding sound to the video would be useful.
- Deb Kelley – There is a lot of productivity at the shallow volcanoes (Iceland for example).

Mid-morning break

Upgrades to National Deep Submergence Facility

Atlantis Maintenance Period Updates - Al Suchy provided the *Atlantis* maintenance period update. The list of maintenance items is included in *Appendix VII*. Overhaul of starboard propulsion motor was not planned. Overhaul of the bow thrusters was a big effort. Renewal of the hydro lab deck was expensive and also a big effort. They did some work on the drains, but more required in future.

A new DP system is planned for *Atlantis* and it will be installed in stages. It will be like the system on *Knorr* in 2004. In 2007 they have a 6-week period where the system can be installed.

Discussion followed:

Andy Bowen – Based on the overhaul of the bow thruster, will past problems be avoided? Al - With regard to the DP, training is important and this is planned. Bearing failure and shafting of the thruster was due to a lack of lubrication of the bearing in thruster. It was difficult to find where it was to be lubed. Also one of the anti-torque fittings had been installed incorrectly, putting wear on the good one. They have corrected the fitting. As for training, for *Knorr* they attended training by Kongsberg. From the start, *Atlantis* will have 3 trained people. Then training will be put into the annual budget. They will use Kongsberg.

Andy Bowen – Is there any formal mechanism for WHOI to communicate with NOAA Corp regarding the *Ron Brown* DP system. Al – When *Brown* visited WHOI last year, they discussed the DP and other systems. They can follow up on these things. Catalina Martinez commented that the DP system problems on *Brown* occurred at Lost City. They wrote the problem up in detail and it is being addressed. The ship's DP and GPS need to be upgraded. Erroneous GPS data feeds in, resulting in the ship cruise off in the wrong direction. The system is working a bit better, but they would not want to go back to an area like Lost City until they feel more secure with the system.

Peter Wiebe remarked that on his recent *Ron Brown* cruise, the main lab was ice cold making it very difficult to work in.

Alvin Overhaul Report - Dudley Foster reported on the Alvin overhaul. The list of overhaul items is included in *Appendix VIII*. The overhaul was completed on budget and on schedule. During the overhaul hull inspection, they found porosity in the welds and some cracks. Most were surface cracks. These could be ground out, but is an expensive process. Dudley thanked John Freitag for diverting funds to get this repaired. The Navy was very responsive to the timing issues. They imposed a new 2-year inspection to some of these areas. They can reassess the areas that are accessible (no vehicle stripping required).

Dudley reported that the Navy's certification process is becoming more detailed. They always find more issues. They finally completed the overhaul on schedule. Three mornings a week, the whole crew met and reviewed progress. Sea trials were conducted as planned. There was a new requirement for inclining.

Deb Kelley asked why there have been changes with the certification. Dudley – The changes are probably mostly due to personnel changes.

Dolly stated that because this was such an expensive overhaul, NSF chipped in. The hull work alone cost \$250k to \$500K. This is the item that NSF chipped in on.

A functional audit of *Alvin* was also conducted. Al Suchy reported that the functional audit was also conducted on the handling system.

Barrie stated that the certification took up 100% of Dudley's time with paperwork.

ROV Update - Andy Bowen provided the ROV update. His presentation is included as **Appendix IX**. He discussed the multi-chamber suction sampler, *Medea*, and *Jason2* operations at the Ring of Fire site. The final version of the multi-chamber suction sampler should be ready in the fall for *Alvin*. The *Medea* vehicle has been upgraded and can provide stand-alone operation when required. If *Jason2* operations are going to continue in active volcanic sites, such as Ring of Fire, there should be time to consider the impact on equipment. There are a variety of interesting technology challenges that should be considered for continued work in these areas.

Alvin Personnel Issues - Deb Kelley opened a discussion on *Alvin* personnel issues, noting the shortage of pilots. Many of the pilots are new and have come on during the overhaul. Dudley Foster reported on the status of pilot employment (see **Appendix X**). Anthony Berry has left and Tony Tarantino left after the overhaul. There are now four pilots: Pat Hickey and Bruce Strickott are senior pilots, and Eppard and Spear are new. They have hired three Electronic Technicians and all gained experience working during the overhaul. The 2007 ship schedule is light and will pose employment challenges for the group. In 2007 there will be about 6 months of non-*Alvin* cruises. There may be opportunities for some of the existing people. For new hires, it is difficult to provide job security when the schedule is so weak.

Discussion Followed:

Jeff Karson – Are there training programs that the pilots can take advantage during the slow periods. Dudley – Dolly encourages and supports training. Deb Kelley remarked that when she was on a cruise, she got feedback that they would like training on the cameras.

Jeff Karson stated that he found that the pilots who get involved in the science are very productive. Science training sessions for pilots would be beneficial.

Deb commented that dives with new pilots have to be planned very differently. They are less optimal in terms of accomplishing science.

Dudley – The bottom line is that they lose people because they don't want to go to sea as much. This has been a problem forever. They are staying on the job longer than the national average.

Bill Chadwick remarked that it seems that the *Jason* group has less of a problem with pilot retention than *Alvin*. Dudley – They have a smaller core crew and they have supplemental programs that can keep people busy between cruises. There are several factors, including less time at sea.

Deb raised the issue of what would happen if Pat Hickey were unable to work for a lengthy period.

Question - Are exit interviews conducted when pilots leave? Barrie Walden replied that they used to conduct interviews and found that the reasons varied significantly.

Peter Wiebe asked if all of the pilots for the various research subs could be trained in a standard way such that there would be pool of pilots. Dudley – They have looked into training facilities, but these are expensive and often become obsolete quickly.

Barrie – This is a problem that the NDSF operator has recognized and addresses. They have revised the pilot training program and hope that it would provide the adequate amount of time for training. The training focuses mostly on safety.

Action Item – DESSC will follow-up on this issue and formulate a recommendation regarding science training for pilots.

An *Alvin* ex-pilot was present and commented that he left the group to do more design and engineering. This is why he left *Alvin* for the *Jason* group. If the pilots are provided with more design/engineering activities, they might want to stay on longer. Dudley – The problem is that this may not be effective. When the pilot goes back to sea while working on an engineering project the engineering project goes on hold for a couple of months.

Lunch Break

Deep Submergence Scheduling and Related Issues: 2007 and Beyond – Liz Caporelli reviewed 2006 NDSF schedule and tentative schedules for 2007 and beyond. Her slides are included as ***Appendix XI***. In 2006, days were added to support the NEPR eruption event. The 2006 *Alvin* schedule includes 264 operational days and includes operations in the Atlantic, Gulf of Mexico, and Pacific. The cruise track was presented. The 2006 ROV schedule includes 148 operating days with work at the Galapagos, the Western Pacific, and off Hawaii.

Ship scheduling for 2007 is still on-going and there are still issues to resolve. Liz showed a map of potential operational areas for 2007 work. Funded and pending *Alvin* operations totals 291 days will all work in the Pacific. The ROV operations total 160 days with work in the Pacific and Gulf of Mexico.

In 2008 there are currently 17 ship time requests *Alvin* for the NDSF for a total of 118 days. There are seven ROV requests for a total of 164 days. In 2009 and beyond there are 12 ship time requests for the NDSF vehicles for a total of 127 days.

Review of facility requests and identification of funded programs - Annette DeSilva continued by presenting maps showing the areas where NDSF operations have been requested in 2008 and beyond. These maps are available in ***Appendix XII***.

NDSF Data and Archives Report - Maurice Tivey provided the archives report. His slides are included in ***Appendix XIII***. There were 150 external requests for visuals and deep submergence information through May 2006. The total income received for the first half of FY2006 is \$10,384.18.

Update from NDSF Data Manager - Vicky Ferrini, the NDSF Data manager provided an update. Her slides are included as ***Appendix XIV***. Her report covered:

- Navigation
- Virtual Van/Framegrabber
- Video
- Bathymetric sonars
- Available software
- Documentation
- Future directions

For navigation, the Sonic High Accuracy Ranging and Positioning System (SHARPS) will be used in lieu of *Jason2*'s LBL fixes. Planned upgrades for the *Jason2* virtual van and framegrabber were reviewed. Examples of the photo mosaic images were displayed. Grid Rectification has been created to combine *Alvin* Imagenex data from multiple dives into high-resolution composite maps. It can be used with other data. A list of resource documentation that is available or being drafted was provided. Future directions include continued development of existing software tools.

Discussion followed:

Question - Can a fairly computer illiterate science party handle this? Vicky- they are working to make it easy to

use.

Deb Kelley asked if the Chief Scientist would go to the SSSG to find out if the renavigation data is good. Vicky explained that the data would be sent to her for scripts processing and checks. If it is good, it would automatically go into the framegrabber. If it is bad, Vicky will have the data and she will deal with it. Deb expressed concern that the pilots would be too far out of the loop. If there is a problem, they wouldn't know how to deal with it.

Jeff Karson asked about the status of existing data? Vicky – They need to address the historic data.

Peter Wiebe – How do you know if the renavigation data is good? Vicki – The renav data has to fall between the Doppler and the LBL plots. They would also like to have an indicator in the virtual van to let you know if you have lost navigation.

HROV Status Report - Andy Bowen reported on the status of the Hybrid ROV. His slides are included as *Appendix XV*. The project highlights are listed in the Appendix. The micro fiber tether canister/brake is completed and tested using ABE and the WHOI pressure test facility. Deep fiber trials (5000-6000m) are planned at the end of May on R/V Oceanus.

The slides explain what an HROV is and its mode of operation. Andy provided a summary of the vehicle mission profiles and the science capabilities. They have been looking at power use and want to make sure that there will be sufficient battery capability for the missions. Mission planning is critical. If you deviate from the plan, the consequences can be severe. The various components of the vehicle system were reviewed. The manipulator will be hydraulically driven and will be delivered in a couple weeks. Lithium Ion batteries will be used. There is a contest underway to name the HROV. The list of potential names was reviewed.

At sea support for the HROV is estimated as four people.

AUV Status - Barrie Walden provided a report on the Sentry Sea Trials conducted in Bermuda in May 2006. His slides are included as *Appendix XVI*. ABE has been very successful, but is expensive and must be supported by Dana Yoerger and Al Bradley. The real goal is to go to sea with a support group that does not rely on PhDs. During the *Sentry* sea trials five dives were carried out: 500 m (3) and 2600 m (2). This was the first time the vehicle was tested without a line attached. The AUV can descend rapidly. They observed the vehicles speed of ascent and descent. Mission upload and execution was observed. The maximum horizontal speed is 2.5 knots, descent speed = 42 m/min, and ascent speed = 50 m/min. Photos of the trials were presented.

The vehicle's ability to follow directions was good. The vehicle is very stable. Barrie showed a few video clips of the launch and recovery exercises. These are included as Appendix XVI. Recovery is by tag lines.

The complexity of the vehicle requires that Dana program the vehicle. They don't want to require an individual with the qualifications like Dana for each cruise. This is the biggest hurdle.

Question - What needs to be done to make the vehicle fully operational? Barrie - One big thing is to outfit the vehicle with science equipment. Then they need to demonstrate that it can carry out these science programs. They are very close to having this completed. The plan would be to send *Sentry* out with *ABE*. They would try to use *Sentry* first, but have *ABE* as a backup. Another item is that maintenance access is needed. Right now these do not exist.

Maurice Tivey – What is the required recharge time? Reply – About 6 hours for about 150 km. Once they go to lithium acid batteries, they should be able to triple the range. The system can be shipped in a 20-ft container. It uses the ship crane. The vehicle has been used from WHOI's small boat *Tioga*.

Operational support at sea is estimated at three people.

Establishing Criteria for bringing New Assets into the NDSF including day rate considerations - Deb Kelley reported that the DESSC has drafted criteria for bringing new assets into the NDSF. The draft has been circulated

for a number of iterations. The agencies have also seen it. It will be finalized prior to the summer Council meeting.

Mid-Afternoon Break

North East Pacific Rise (NEPR) Event – Dan Fornari reported on his cruise to the North East Pacific Rise (NEPR) aboard R/V *New Horizon* to observe the recent eruption site. Dan showed some of the images he collected, including a new flow. They didn't see any OBS's and they are probably buried. A temperature probe was found still inserted and it is hopeful that some of the instrumented vents were able to continue to collect data. None of the biomarkers were found. The trough at 9.54 is narrower and shallower. Jim Cowen was Chief Scientist on the cruise. *New Horizon* was great support ship.

AUV Users Conference on Science Applications (AUV SA) – June 6-7, WHOI - Maurice Tivey reported that an AUV users conference will be held on June 6-7. Details are included in *Appendix XVII*. It is a conference to promote a dialog between AUV developers, engineers, and science users. Major AUV operators that will participate include CC industry, FAU, Autosub, *Sentry*, MBARI, etc. The conference was organized quickly. There are 70 to 80 participants registered.

Future Global Deep Submergence Initiatives:

RIDGE2000 - Deb Kelley reported that RIDGE 2K's recent activities have included mobilizing event response cruises to NEPR. The RIDGE lectureship program is very healthy. DESSC will suggest having pilots as lecturers.

Dan Fornari pointed out the potential of the French ship being at EPR next year. We will want to avoid conflicts with other operations.

Ocean Observatories - Bob Detrick provided a report on the Ocean Observatories Initiative (OOI) and ORION. His slides are included as *Appendix XVIII*. In FY2007, OOI was included for the first time in the President's budget. If funded, operations would begin in 2011 or 2012. There will be needs for both regional and global observatories. The funds required for Operation and Maintenance (O&M) are not included in the MRE budget. O&M funds would come out of presumed budget growth at NSF. Bob showed a breakdown of OOI budget. Kendra Daly is on board as the full time ORION Program Director.

The OOI Conceptual Network Design is based on input from the Request for Assistance (RFA) and previous workshops. This was presented at the March 2006 workshop. The documents are available on the ORION website. About 50 Principal Investigators responded to the RFA. About 300 participants attended the March workshop. The challenge has been to match the community ideas to the budget.

The slides include a world map showing the observatory sites. There are a number of high latitude sites. The purple dots on the map represent spar buoys.

The Regional Cabled Observatory (RCO), Neptune, includes two components – Canada and US.

On April 26-27 in Seattle, there was a meeting on OOI Operations and Maintenance. Some issues that have arose and need to be addressed included:

- Engineers developing the technical specifications for OOI infrastructure should be talking more with vehicle operators in the academic community as well as industry. They haven't communicated much yet.
- DESSC should work with the ORION Office and funding agencies to define the future role of NDSF in OOI (installation, O&M, science support)
- DESSC should encourage the NDSF operator to ensure present and future systems actively incorporate OOI related capabilities and technologies
- DESSC should have a formal liaison from the ORION program

It has been suggested that there be a small workshop where users, operators, and engineers can meet. DESSC should come up with a charge for the workshop.

ROV facility estimates for Neptune call for about 276 ROV days over 3 years for installation beginning in about 2012/2013. These costs are included in the MREFC. O&M is estimated at 158 ROV days a year. This includes science. The cost for O&M is estimated at \$50M. This about $\frac{3}{4}$ the cost for operating the entire academic fleet. The ROVs would be needed during the weather window of the Neptune operating area.

Jeff Karson commented that there is a real mismatch. Do we just hope the budgets will increase, or do we mobilize the community to rally for support? Does DESSC want a role in OOI or do they want to stay with research and exploration?

Annette asked how ROV facility needs would be met during the non-weather window periods at NEPTUNE? Bob Detrick replied that it depends how much the equipment is valued. Andy Bowen added that it also depends how much you want to invest up front to improve reliability.

Operational Summary and Collaborations with Other Deep Submergence Activities:

ROPOS - Deb Kelley reported on the upgraded ROPOS vehicle. The new lift system allows vehicle operations in Sea State 6. If the handling systems on UNOLS ships can be moved mid-ship it would improve the Sea State capability. Deb's slides are included in *Appendix XIX*.

NURP & Ocean Exploration - Catalina Martinez reported that NOAA's acquisition of the ROV has stalled in their contracts office. The new OE support ship is scheduled to be in operations by 2008, but it might be delayed. They are working on determining how to staff and schedule the ship.

Day one of the meeting adjourned to the DESSC Executive Session.

Day Two: Thursday, May 25, 2006 - Clark Building, 5th Floor, Room 509

Day 2 -Opening Comments - Deb Kelley opened Day 2 of the meeting and reviewed the actions from the previous day meeting and executive session.

Action items:

- 1) DESSC will recommend a short science course for *Alvin*/ROV pilots – Hawaii or Iceland
- 2) DESSC will recommend that an *Alvin*/ROV pilot be considered for the RIDGE lectureship program
- 3) DESSC will carry out NDSF user debriefs:
 - a. Mike Tryon – Alvin
 - b. Bill Chadwick – Jason
 - c. Hedy – ABE

The debriefs would include the PI, DESSC member, Chris German (NDSF Chief Scientist), and an agency representative.

- 4) DESSC will make recommendations regarding ROV/AUV/*Alvin* pilot career advancement and training.
- 5) Criteria for added Assets to the NDSF and *ABE/Sentry*: DESSC will finalized the criteria document and recommend that *ABE/Sentry* be added to the NDSF. If *ABE/Sentry* is added to the NDSF, the UNOLS ship time request form should be revised to include the AUV. DESSC will send the recommendation to the UNOLS Council in June so that if approved, the vehicle could be requested in the NSF August proposal deadline. Once the Council endorses DESSC recommendation, the document would be forwarded to the Agencies.

- 6) DESSC asked for clarification on the last bullet of the *ABE/Sentry* proposal regarding the data products. It is unclear what data product will be provided. WHOI should better define the data products delivered.
- 7) Deb will send an email to Bob Detrick requesting an information packet for ABE/Sentry that can be provided to the UNOLS Council.
- 8) DESSC is concerned about the current arrangement to have Vicky Ferrini monitor the navigation data quality from shore. This doesn't seem to be an optimal arrangement. Navigation data issues should be dealt with on the ship and assigned to the SSSG. DESSC recommends that the NDSF operator take this up for consideration.

The future of the DSL-120A system was discussed. Dolly indicated that they would have to deal with any DSL requests that are currently in the system. She will talk to Sandy Shor about these. The DSL-120A system might be sent to Hawaii for future operations and support.

Replacement HOV Update - Bob Brown provided a report on the status of the Replacement HOV (RHOV) design/build project. His slides are included as *Appendix XX*. He began by reviewing the milestone history and risk management phased approach. Next he reported on the syntactic foam testing and development effort. A 32 lb/ft³ foam density has been developed and would be acceptable, but 30 lb/ft³ is desired. An additional manufacturer is starting R&D to produce a 30 lb/ft³ foam. The foam will be needed by 2008. It takes about one year to make. WHOI will need to know the density, so that they can design to it. WHOI will have to make their decision by the end of the summer 2006.

Various batteries have been evaluated. They are looking into alternative solutions to select ABS rules, such as for oxygen storage solutions and the number of external containers.

The *Sea Cliff* finite element analysis (FEA) model and preliminary analysis has been completed. This is part of the material study required since they are building the vehicle out of slightly different titanium than *Sea Cliff*. The *Sea Cliff* never had an FEA and was not destructively tested. They will compare the FEA to the stress analysis. If WHOI built to ABS specs, the hull thickness would have to be very thick. ABS realizes this, so they agreed that if WHOI uses the Navy methodology used for *Sea Cliff*, it would be acceptable. Now WHOI is going back and developing the methodology (since it was never done for *Sea Cliff*).

WHOI plans to purchase the Titanium early in order to lock in a reasonable price. Once the order is placed it would take about 8 months for delivery.

SWRI is looking at various viewport options. WHOI has asked them to look at having all of the viewports 7-inches. The outboard ports are currently the same as *Alvin* – 5 inches. These windows are close to the sphere seam, and they are checking to see if this is an issue. There are five viewports in the design.

The vehicle design solicitation is expected to be released in the fall. Once awarded, the preliminary design of the vehicle should be completed by fall 2007. This would coincide with the personnel sphere forging.

The schedule for the RHOV construction indicates that the vehicle would be ready for science sea trials in late 2009.

Science Sensors for Replacement HOV – Annette DeSilva presented the draft on-line survey for science sensors. It was suggested that buttons be added that would link to additional information about the sensor. It was also suggested to add the deadline of when the response is needed, and a listing of science outfitting of tools and samplers.

Establishing Safety Standards for the use of Human Occupied Vehicles - Craig Young provided a report on the subcommittee's efforts to establish safety standards for HOVs. His report is included as *Appendix XXI*.

NSF and NOAA have provided DESSC with a draft task statement to establish safety standards for HOVs. It will

be a multiyear effort.

The Committee membership includes:

- Dana Wilkes - NOAA Representative
- Tim Askew (HBOI) – HOV Operator, UNOLS Safety Committee
- Colleen Cavanaugh (Harvard U.) – Science HOV user
- Pat Hickey (WHOI) - HOV pilot
- Terry Kerby (HURL) – HOV Operator and Pilot
- Dan Schwartz (UW) - Marine Superintendent, past Ship Captain
- Barrie Walden (WHOI) – HOV Operator
- Craig Young (U. of OR) - Science HOV user, DESSC

The first meeting was held on January 25th. The agenda included reports from HOV operators from WHOI, Hawaii Undersea Research Laboratory (HURL), and Harbor Branch Oceanographic Institution (HBOI). The Committee brainstormed on what areas should be addressed by an HOV Safety Standards Document. Writing and research assignments were defined. The Committee decided that the HOV Safety Standards would be modeled after the Research Vessel Safety Standards.

General Topics of the document will address:

- The vehicle
- The ship
- The handling system
- The Operation
- Training
- Science Party Guidelines

Discussion followed. Peter Wiebe suggested that document address HOV operations in areas where there are moorings and other obstacles. Jeff Karson asked if environmental features would be considered, such as working in hot vent areas.

Mid-morning Break

Status of NDSF Navigation Upgrade - Jon Howland reported on the status of the NDSF navigation upgrades. His slides are included as ***Appendix XXII***. He began by explaining that commercial solutions were not available. They chose to base the system on the Digital Ranger. It is used by NAVOCEANO and every *Remus* user. The likely configuration will be a small box in the van and a small (shoebox) located at the ship's transducer (prototype). The plan is to build the hardware during the gap before the next *Jason* cruise period. The Benthos 455 is becoming increasingly difficult. The money that they have is not enough to get everything done. The system can be generalized to other NDSF vehicles, but will require further funding/development.

In summary, they have chosen and purchased the ASP hardware. They expect to have test results by end of the year. If acceptable, moving to the full operational status will be a rapid process. The system will be for *Jason* initially, but can work in parallel to make it available for Alvin.

Peter Wiebe inquired about the Benthos 455 status. Jon replied that there are only 3 or 4 Benthos 455 systems in the world.

Bill Chadwick asked why the development has taken so long? Barrie replied that they started dealing with this issue about five years ago, but they have gone down the road only to find that it didn't work. They have bought the hardware, but in testing found that it didn't work. They haven't ignored the problem.

Winter Meeting Strategies - Deb introduced the topic and explained that we were supposed to be at the Benthic Ecology meeting last year, but they were out of the country. Various meeting options are included in ***Appendix XXIII***. DESSC members expressed strong concern that we will lose continuity if we move the meeting from the fall AGU meeting. The DESSC meeting at the fall AGU is well attended.

It was suggested that if DESSC was to be at the Benthic Ecology meeting, a special session during the meeting should also be considered. There was some discussion as to if there should be a special session at the fall AGU Fall Meeting. Dolly commented that if there is a special session it cannot have a cost associated it.

There are two options for biology meeting:

- 2007 Benthic Ecology Meeting - Atlanta or Savannah -- dates TBA
- Western Society of Naturalists - November 9-12, 2006. Redmond, WA.

It was suggested that DESSC ask Phil Taylor (NSF) if he has a preference. The timing of the WSN November meeting would be better.

Outreach, Education and Archeology:

Ocean Exploration - Catalina Martinez provided a report on Ocean Exploration. Her slides are included as *Appendix XXIII*. We need to do as much as possible to inform the public about the oceans. 10% of the funds for research programs must go to education. OE has established an outreach and much of the 10% funds go toward web support. They include real-time expedition coverage. These include daily cruise logs, videos, and images. Sometimes they interact with classrooms and offer curriculums.

Catalina explained that they target school districts (minorities) also if there is an expedition in a particular area they target those. The teachers get stipends to attend the training.

Catalina reviewed the FY06 efforts.

RIDGE 2K - Deb Kelley suggested that we have Susanne Carbotte or Vicki Ferrini present on the RIDGE 2K database.

Other business:

DESSC Membership – The DESSC nominated Marsh Youngbluth to the Committee. The nomination will be sent to Peter Wiebe for endorsement.

There are quite a few DESSC members with terms ending in 2007. It was suggested that staggering these term lengths be considered. Annette and Deb will follow-up on this and present at the next meeting.

Marine Protection Act Issues – Barbara Moore reported that there is an international movement to protect the fragile genetic resources. Some of the fragile ecosystems are at the vent sites. Some feel that the biggest threat is by the scientists. The community needs to be educated on this issue.

Review Meeting Action Items – Deb Kelley reviewed the meeting action items that were reported at the start of Day 2.

1200 DESSC Meeting Adjourned