DEEP SUBMERGENCE SCIENCE COMMITTEE
Annual Planning Meeting
Sunday, December 9, 2007
The Whitcomb Hotel
1231 Market Street
San Francisco, CA 94103

Executive Summary:

The Deep Submergence Science Committee (DESSC) met on December 9, 2007 at the Whitcomb Hotel in San Francisco, CA. The meeting was chaired by Debbie Kelley and began with presentations by the Principal Investigators who used submergence vehicles in 2007. Funding agency representatives provided budget information as well as agency priorities. A variety of reports were made by the National Deep Submergence Facility (NDSF) operator to summarize facility operations, planned activities, and system upgrades. Reports on the status of design, development, and construction of the AUV *Sentry*, the replacement HOV and the hybrid ROV were provided. DESSC activities, future plans and issues were reported including discussions on long-range planning and educational activities.

Summary of Action Items:

New Action Items:

1. DESSC Phone Meeting – Schedule a DESSC phone meeting in early 2008. Discussion items will include NDSF vehicle operation/exclusion limits, bringing *Sentry* into the facility, and other action items requiring DESSC attention.

2. HDTV Upgrade Plan - Bill Lange has requested DESSC endorsement of an HDTV upgrade for *Alvin* and *Jason* in 2008. A quick response is needed.

3. Archive Video – DESSC will be asked for a recommendation regarding whether the science party should be required to provide personnel to run *Jason* DVD decks for archive video (even if they don't intend to use DVDs).

4. Magnetometer - DESSC was asked for a recommendation regarding whether the magnetometer should be a standard sensor for all vehicles. If so, should there be a requirement for calibration turns for each dive/lowering. Mag data are useless if they are collected without calibration turns (*Alvin* does this naturally, *Jason* takes an extra 45 minutes per dive). Should *Jason* users be required to conduct this calibration, considering the cost of dive time?

5. Forums and Format of future DESSC Meetings – DESSC discussion is needed on future DESSC meeting agendas/formats, as well as, locations/forums.

6. DESSC Membership – Review nominations for two candidates and vote by email.

7. Future Role of merged NURP and OE – Form a subcommittee to prepare a DESSC statement regarding the future role of the merged NURP and OE programs.

Continuing Action Items:

8. Pilot Retention and Career Advancement –DESSC recommends that WHOI prepare a document that articulates the institution's strategies for pilot retention as well as procedures for implementing exit interviews for those pilots who resign. DESSC recommends that WHOI management promote learning opportunities and career advancement opportunities for pilots.

9. Mode of Operation for *Jason* Watches – DESSC recommends that WHOI explore options for staggering the start and end times for *Jason* watches with the goal of achieving better continuity through a dive cycle.

10. OOI/DESSC Liaison – Deb Kelley will contact Holly Givens in the OOI office to establish a liaison process between OOI and DESSC.

11. Science Outfitting Survey for the Replacement HOV – At the appropriate time, develop a community on-line survey and circulate it to the community.

12. Science Training Opportunities for Pilots – DESSC, WHOI and agency representatives should discuss the feasibility of conducting workshop/training science sessions for pilots. The session(s) should demonstrate how the data from the vehicles are used for different research disciplines.

13. R2K Lectureship program – DESSC recommends that the R2K Lectureship program include an *Alvin* or ROV pilot as a distinguished lecturer. (Kelley)

DESSC Recommendations:

Day rate of NDSF Vehicles – DESSC recommends that the AUV have a separate day rate from that of *Alvin/Jason*.

Appendices*:*

I	Agenda
II	Participant List
III	2007 *Alvin* PI Reports (4.2 MB)
IV	2007 *Jason* PI Reports (4.8 MB)
V	2007 *ABE* PI Reports (1.6 MB)
VI	2007 *Pisces* PI Report (5.9 MB)
VII	2007 *ROPOS* PI Report
VIII	NOAA Report
IX	Okeanos Explorer Update

X	NASA Report (1.5 MB)
XI	NDSF Personnel Changes and Organization Chart
XII	NDSF Vehicle Operations Summary
XIII	NDSF Data Manager Report
XIV	*Jason* Control Van
XV	NDSF-wide Navigation Update
XVI	NDSF-wide Imaging Update (3.5 MB)
XVII	AUV Sentry Update
XVIII	Summary of *Jason* User Debrief Interviews
XIX	*Jason* Proposed Corrective Actions
XX	Summary of *Alvin* User Debrief Interviews
XXI	*Alvin* Proposed Corrective Actions
XXII	NDSF Scheduling: 2008 and Beyond (1.3 MB)
XXIII	UNOLS Report
XXIV	Replacement HOV Update
XXV	*DSL-120* and IMI-30 Systems (5.7 MB)
XXVI	HURL Vehicle Update (3.6 MB)
XXVII	MATE Report (4.2 MB)
XXVIII	Hybrid ROV Status Report (3.7 MB)

Meeting Summary Report:

Introductory Remarks, Meeting Logistics, and Introductions - Deb Kelley, Deep Submergence Science Committee (DESSC) Chair, called the meeting to order at 0830 on Sunday, December 9, 2007. The meeting was held at the Whitcomb Hotel in San Francisco, CA. The agenda for the meeting is included as ***Appendix I***. The items of the agenda are reported in the order addressed. The list of attendees is included as ***Appendix II***.

2007 Principle Investigator (PI) Reports - Deb Kelley moderated the science report session of the meeting and provided introductions of the PIs who used the NDSF and other deep submergence vehicles in 2007. Some of the issues raised during the PI reports were addressed later in the meeting by the NDSF operators during the afternoon debrief presentations.

***Alvin* PI Reports –** PI reports for *Alvin* cruises in 2007 are summarized below. All of the presentations are included in ***Appendix III*.**

Richard Lutz, Tim Shank, Costantino Vetraini, and George Luther - *Jan 10 – Feb 5, 2007 –* George Luther provided the report on their *Alvin* cruise titled, "Integrated Studies of Biological Community Structure at Deep-Sea Hydrothermal Vents." They carried out integrative bio-chem-micro colonization experiments over 22 *Alvin* dives. It was a full cruise and operations included:

- High-definition and Imagenex imaging.

- They constructed/utilized the "Fish-Slurp" suction sampler,
- Near-bottom magnetics from *Alvin*
- Time-lapse camera imaging
- McLane™ large-volume water pump (4 deployments)
- Tide Gauge (2 deployments)
- Conductivity-Temperature-Depth (CTD; 3 surveys)
- Ocean Bottom Seismometer (OBS; 9 of 11 recovered)
- Towed-camera system (12 surveys) (Soule et al., 2007)

A Lexington Middle School teacher and an Education and Outreach coordinator from the Ridge 2000 program participated in the cruise activities and provided daily teacher's log, images, video and essays, posted on the RIDGE2000 SEAS website. A partnership with GLOBE via R2K's FLEXE program was initiated. GLOBE is a large-scale, web-based, international science education program that joins students, teachers and scientists in studying Earth Systems Science, GLOBE (http://www.globe.gov/). R2K's program FLEXE: From Local to EXtreme Environments, features coordinated student-scientist interactions. A unique event during the cruise was the NASA phone call from *Alvin* at depth to the International Space Station with a live feed answering questions from more than 40 elementary schools. National Geographic magazine photographer documented the research for a future publication. The high-definition video collected during the cruise is to be distributed to museums and aquariums.

Raymond Lee, Wash St. U and Peter Girguis, Harvard U. - *Aug 26 – Sep 6, 2007* – Raymond Lee provided the report on his *Alvin* cruise titled, "Thermal biology of vent paralvinellids." Other participants included L. Levin, SIO; M. Lilley, U Wash; W. Ziebis, USC; K Halanych, Auburn; and P. Yancey, Whitman College. The cruise included ten NSF funded *Alvin* dives. This was year 1 of a 3-year project.

Their dive area was in Canadian waters and the Canadian clearance was late, which resulted in loosing 1.5 days of diving. Some of the operations carried out during the cruise included:

- Suction sampling of biology with new sampler
- Pressurized incubations of animals on board ship
- Recovery/deployment of the Kelley/Girguis microbial incubators
- Deployment of whale bone settlement experiments
- Pushcores at Middle Valley
- Girguis/Cordes tubeworm sampling with Chuck Fisher's Bushmaster
- Peter Girguis carried out in situ mass spectrometer experiments

Ray commented that the new suction sampler on Alvin worked beautifully. He would like to have more chambers added the sampler.

David Valentine – July *13-17, 2007* – Monica Heinz provided the report for David. David's *Alvin* cruise was titled, "SEEPS '07 (Studies of the Ecology and Evolution of Petroleum Seeps)." Accomplishments included:

i) Comparison of CH4 oxidation rates in seeps ranging in depth from 80m to 800m.*
ii) Discovery and sampling of 2 extinct asphault volcanoes.
iii) Quantified depth distributions of CH4 turnover and methanotroph identity at dozens of sites along southern California margin.
iv) Testing, validation and intercomparison of in-situ mass spectrometers to depths greater than 1500m.

v) Testing of novel pore water equilibration samplers.
vi) Comparison of microbial mat communities from several distinct seep environments.
vii) Participation and training for 14 undergraduate and 7 graduate students.

Curt Collins - *Sep 30 – Oct 6, 2007* - Deb presented Curt's slides on his *Alvin* cruise titled, "Hoke Seamount Mooring Recovery." On the *Alvin/Atlantis* transit from Aberdeen, WA to San Diego, CA. a stop was made at Hoke Seamount. The dive party included Pat Hickey- Senior Pilot; Marla Stone, NPS; and Chris Miller, NPS. The cruise/research objectives were to conduct a Sea Beam survey of Hoke Seamount prior to the *Alvin* dive and then recover a mooring using *Alvin*. The mooring had been deployed in Oct 2002 and then lost. A recovery was attempted in Oct 2004, but the swage socket failed and the instruments fell to bottom in 800m. During Curt's cruise, the deployed mooring could not be located during descent and the dive time was curtailed by weather. They were able to estimate the approximate mooring location during ascent using sonar.

Keir Becker - *Sep 11-28, 2007* – Keir's cruise included *Alvin* operations at Juan de Fuca Ridge. There were 12 dives, 8 dives for routine data downloads and instrument servicing at seven CORK observatories and 4 dives for remedial wellhead cementing at 1301A/B CORKs. The cruise also included a 3-dive program for Di Iorio that included a survey, and acoustic mooring recovery and redeployment at Dante on Endeavour axis. The cruise experienced weather issues. They lost 5 of 15 scheduled dive days, mainly to weather. Is mid- to late-September a viable scheduling window at Juan de Fuca?

***Jason/DSL-120* PI Reports:** The *Jason* and *DSL-120* PI reports are included as ***Appendix IV*.**

Emily Klein, Scott White, and Dan Fornari - *Mar 24 – April 27, 2007* – The research area was 9N OSC and included a *DSL-120A* survey, *Jason* operations, and Tow Cam operations. The survey was carried out over six days and covered 235 km^2. There were four *Jason* lowerings over 16 days, with 213 video hours collected, and over 30,000 van records logged. One new hydrothermal vent was discovered and 282 rock samples were collected. The cruise also included an EPR-ISS benchmark survey. Four permanent benchmarks were installed, two of three OBS' were rescued and a tiltmeter was rescued.

Scott White reported that for the first time the SM2000 and *DSL120A* worked well together. Bathymetry processing was done post-cruise, and was not a smooth process. Paying out or pulling in wire on the *DSL120A* causes the vehicle to pitch, and disturbs the magnetometer. Towcam was very useful in combination with *Jason*. They appreciated the improved event logger on *Jason*.

Chuck Fisher – *June 4 – July 6, 2007* - Deb presented Chuck's slides. The slides provide highlights of the *Jason* operations from the NOAA Ship, *Ron Brown*, titled, "Investigations of chemosynthetic communities on the lower continental slope of the Gulf of Mexico." The project was funded jointly by the Mineral Management Service and the NOAA Ocean Exploration Program. PIs included James Brooks and Bernie Bernard (TDI Brooks Int.), Robert Carney and Harry Roberts (LSU), Erik Cordes and Peter Girguis (Harvard), Charles Fisher (PSU), Ian MacDonald (TAMU), and Samantha Joye (UGA).

The R/V *Ron Brown* was spacious, stable, and fully capable for *Jason* operations. The overall goal of the cruise was to ground truth their techniques to discover new sites with significant

chemosynthetic or coral communities, characterize the new sites and communities, and continue process oriented studies designed to understand the forces that lead to the establishment of cold seep communities and the differences among them. Five new sites were discovered using *Jason*. The cruise highlights included:

- Fast processing, turnaround and use of SM 2000 data collected at sea.
- Efficient exploration of new sites, visiting up to 10 geophysical targets spread over several km during single lowerings (and discovery of macrofaunal communities during every lowering to a new site)
- Discovery of Active mud volcano and Asphalt seep
- Re-imaging of tubeworms banded for growth studies using *Alvin* in 1992.
- Discovery and characterization of new type of oil seep community: heart urchins
- Extensive efficient use of elevators.

One constraint on the cruise was the safe air weight payload limitations of *Jason*. This can limit multifunctional payloads, including biological collections into temperature insulated containers because of the weight of water. Also, current limitations virtually prohibit the use of the 5-chamber suction sampler with most other equipment because of its air weight. Repeat users should expect diminished payload capacity compared to pre-2007 cruises.

Anthony E. Rathburn – *July 22-29, 2007* - Deb presented the cruise report. The cruise objective was to use *Jason* to collect samples from methane seep habitats and nearby environments to determine the relationships between the biology, ecology and isotopic characteristics of benthic foraminifera and ambient geochemistry. The goal was to determine why the carbon isotopic values of calcareous foraminifera are out of equilibrium with ambient pore water. Numerous seafloor core samples were collected using elevator deployments/recoveries. They took professional HD and 3-D video of operations. They also successfully re-engineered and manipulated injector cores to conduct *in situ* incubations on the seafloor. The ship operations, *Jason* operations, logistics, and technical assistance were all excellent and contributed to the success of the cruise. However, the 8-12 hour turnaround time for *Jason* is a major concern for deep-water operations and for multiple deployments on a short cruise. At sites of several thousand meters, researchers are not typically able to use an elevator, necessitating multiple deployments of *Jason*. When diving in deeper water, the elevator couldn't be used because it could drift too far from the ship on its way to the surface. Adding 8-12 hrs to a proposal for each planned ROV deployment is very costly in terms of underutilized ship time.

Bill Chadwick - August 3-20, 2007 – Bill reported on his NeMO 2007 cruise on *Atlantis* that used *Jason* and the MBARI AUV. The *Jason* operations included work at Endeavour (2 dives), Axial (6 dives), and Cobb (2 dives). The AUV was used during 2 dives at Axial. The science operations included fluid & bio sampling, pressure measurements, BPR & OBH moorings, RAS, MTRs & HOBOs, CTDs, and geologic surveys. They were very happy with the HDTV imaging obtained using *Jason*. Two new vent sites were discovered at Cobb.

Beecher Wooding and John Collins - *Oct 31 – Nov 10, 2007* – Beecher Wooding (WHOI) was the Chief Scientist for the fall OBS rescue cruise aboard R/V *Kilo Moana* with *Jason.* Thirteen OBS' had been lost on PLUME 1 (3) and PLUME 2 (10). The cruise goal was to learn why OBS were not recovered by the normal acoustic means and if the OBS have a fundamental design flaw. Glass ball implosions were responsible for non-recovery at 5 of the 8 sites visited.

One OBS had pre-released and two OBS are likely stuck in soft mud. The overall assessment of Deep Submergence Lab's (DSL) performance was excellent. DSL's ability to navigate the ship during the vehicle descent was fantastic. The instruments were commonly sighted as soon as the bottom was. In cases where searches were required, the aerial coverage was maximized and time was minimized. They had hoped to visit six instrument sites, and were able to actually visit 8. The increase was due almost entirely to DSL's ability to quickly locate the lost instruments. Suggestions for modest, purpose-built hardware that would improve the capability of *Jason* to salvage OBS has been forwarded to DSL.

***ABE* PI Reports:** The *ABE* PI reports are included as ***Appendix V*.**

Bob Embley - 29 July – 16 August, 2007 – Dana Yoerger reported on the *ABE* cruise aboard R/V *Sonne*. The title of the project was, "Preliminary Results of a Near-Bottom Integrated Seafloor and Water Column survey of Brothers volcano, Kermadec arc, using the Autonomous Vehicle *ABE*." The program was carried out jointly with NOAA OE and New Zealand GNS Science funding, and joint with the GEOMAR ROV test cruise. The primary objective was to map the caldera of Brothers volcano, one of the most hydrothermally active arc volcanoes found to date. *ABE* made 7 long dives and mapped most of Brother's caldera. They found that there are good correlations between morphology, hydrothermal activity and magnetic lows. *ABE*'s bottom tracking capability is unique in being able to survey complex terrain such as steep caldera walls. The PIs were very pleased with results. *ABE* track-lines were based on EM300 contours, which helped *ABE* do bottom tracking. *ABE* also carried an eH sensor at the hydrothermal sites (in addition to measuring temp, magnetization).

Chris German - Feb 19-Mar 11, 2007 – Chris reported that during his cruise they made the first discovery of high-temperature venting on an ultra-slow ridge (SWIR) using *ABE*. They observed the animals that live on the SW Indian ridge. Chris commented that there was a very quick turn-around period in generating the bathymetry maps.

Other Facility User Reports:

Pisces – Rob Dunbar: Rob reported on his cruise to study deep sea corals using the submersible *Pisces.* His slides are included at ***Appendix VI.*** Co-PIs on Rob's *Pisces* cruise were Brendan Roark and Tom Guilderson. Rob commented that the *Pisces* vehicle is very good at recognizance and it has a lot of power. The title of his study is, "Deep Sea Corals – Long-lived Recorders of Ocean Climate." Corals have extreme longevity; colonies can be 1000's of year old and offer information on ocean circulation, ventilation, productivity. The November 2007 *Pisces* dives were off of Hawaii on Brooks Bank. Robs slides include images of corals from previous studies. The sampling included live, subfossil, and fossil corals. Some specimens might be in excess of 10,000 years old. They are developing tracers of ocean ventilation, ocean temperature and C flux.

ROPOS – Deb Kelley – Deb reported on the University of Washington's cruise that used *ROPOS* from R/V *Thompson* on July 31 to August 13, 2007. UW partnered with Neptune Canada and the *ROPOS* Team. The goals of the cruise were to:

- Entrain 9 undergrads in seagoing research with an ROV
- Survey Hydrate Sites 889 and Barkley Canyon
- Recover Keck Seismic Array (OBS's) and Short-periods

- Explore Stockwork System
- Test out Cable Laying System

Images of *ROPOS* are included in Deb's slides (*Appendix VII*). In addition to ROPOS shallow (1000 meters) and deep (5000 meters) systems, a new 2500 meters mid-depth system is now available. The new *ROPOS* vehicle doesn't need a cage when diving to depths up to 2500m. The cage is still required for work at depths between 2500m and 5000m. This mid-depth *ROPOS* system was designed as a self contained launch and recovery platform and uses a Launch and Recovery System (LARS) and an umbilical winch to deploy the vehicle with minimal crew requirement. This system allowed operations in increased sea states. Its crane uses a passive heave compensation mechanism and can be mounted at mid-ship where the effects of the ship's heave are greatly reduced. The 4000 lbs through-frame lift allows *ROPOS* to be used to recover or deploy heavy packages as well as carrying out sub-sea cable laying operations. A 4-hour turnaround time for the vehicle was achieved during Deb's cruise.

HDTV Video - Deb showed a video from Tim Shank's *Alvin* cruise that was taken with the HDTV system.

Agency Reports:

National Science Foundation (NSF) - Dolly Dieter reported that NSF's FY2008 budget still had not passed. There are personnel openings at NSF including the Section Head positions for the Ocean Sciences and Integrative Programs Section (IPS). Interviews for the Ocean Section Head position are on-going. The IPS Section Head position has been advertised. Jim Holik has been hired as the Program Director for the Oceanographic Instrumentation and Technical Service Programs. He was formerly with Raytheon Polar Programs.

National Oceanic and Atmospheric Administration (NOAA) – Karen Kohanowich provided the NOAA report. She has been Barbara Moore's Deputy Director since 2005. Barbara is currently on detail to the Department of State and Karen is taking on Barbara's responsibilities. The NOAA slides are included as ***Appendix VIII***. NOAA's NDSF use in FY2007 included two programs that were reported on earlier: Chuck Fisher's cruise using *Jason* from R/V *Ron Brown* in the Gulf of Mexico and Bob Embley's cruise in the Western Pacific using *ABE* off of R/V *Sonne*. Other deep assets used by NOAA in FY2007 included two *Johnson Sea-Link* submersible cruises, NOAA's *Pisces IV* and *V* submersibles, and the *Eagle Ray* AUV.

The new NURP and OE merged organization is called Ocean Explorations and Research. Karen showed the Ocean Exploration and Research budget for 2006, 2007, and 2008. Although the budget has increased each year since 2006, the 2006 budget was significantly reduced from previous years. A chart showing NOAA's NDSF funding levels from 2000 to 2008 indicates that no support is planned in 2008.

UNOLS Presentation to Barbara Moore – Deb Kelley presented a plaque for Barbara Moore on behalf of UNOLS. Barbara provided a lot of support to DESSC and the NDSF for many years. Karen Kohanowich accepted the plaque for Barbara who could not be at the meeting.

Okeanos Explorer* Update** – Steve Hammond (Ocean Exploration) provided an update on the refit of the NOAA Ship *Okeanos Explorer*. His slides are included as ***Appendix IX. The Ocean

Exploration and Research goals will be accomplished within the context of four principal activities:

- Mapping and characterizing physical, chemical, biological environments and ecosystems, as well as maritime heritage resources;
- Developing a better understanding of ocean dynamics and interactions in new places and/or at new levels;
- Development of new ocean sensors and systems;
- Reaching out to the public to communicate how and why exploration of the oceans is to the benefit of current and future generations.

Some guiding principles for *Okeanos Explorer* operations are that it will serve as a reconnaissance vessel operating in regions with a high potential for discovery. Expeditions will be interdisciplinary. Since the ship isn't very large, they will operate the vessel with a large on-shore science group. Some things still need to be worked out, including watch standing. OE will staff the ROV support. Of the approximate 20 technical personnel onboard the ship, approximately five will be specialists from the science PI group. Most of the investigative scientific team will participate from one of five shore-based Exploration Command Centers (ECC) via telepresence. The investigative team will be participating on behalf of the entire oceanographic community. The goal is to have results of expeditions available immediately and distribute an "iconographic" set of products.

Some key *Okeanos Explorer* operations will include: Deep Water Mapping (6000 m), science-class remotely operated vehicle operations (6000 m), daily "Ewing Stations" (e.g., water-column and seabed characterization and sampling), and real-time broadband satellite communications. The ship will have dynamic positioning. The ship's operations will complement ongoing investigations aboard more traditionally outfitted, larger vessels (UNOLS). The ship's operating range will typically be between 30 degrees South to 30 degrees North, in other words, an "endless summer." They don't expect to operate the ship above the tropic of Capricorn and the goal is to give plenty of notice to the community as to where the ship will operate. *Okeanos Explorer*'s home port is expected to be the University of Rhode Island.

This year's plan is to have a series of local shakedown cruises for the purpose of confirming *Okeanos Explorer*'s operational readiness. The "Sticks and Boxes" cruise from NE Pacific to NWHI is planned. Next year the ship will have expeditions within the Pacific Basin with target areas determined from community-based input. Steve's last slide showed the project timeline.

Discussion followed:

- Alex Isern – Why is the focus on lower latitudes when arguably most exploration interest is in higher latitudes. Steve Hammond – This may be true, but it is really a ship operations logistic issue.
- John Delaney – What type of support will there be for scientists after the cruise. Steve Hammond – It hasn't been worked out yet, but there will be funds available.
- Liz Caporelli – Where will the ship's maiden voyage be? Steve Hammond – The maiden voyage will probably be to the Hawaiian Islands. There is a lot of interest in getting the ship in the Western Pacific. Liz explained that the location of the ship's operations must be known in advance so that there is not a conflict with other deep submersible operations.

- Mike Prince – Who will be the main point of contact for ship scheduling. Steve Hammond – Three people will be involved in the ship's scheduling; John Macdonough, Karen Kohanowich, and Steve Hammond.
- How will the community get access to the data collected for the ship and other operations information? Steve Hammond – NOAA is putting a lot of resources into this. Access will be web based.
- What will be the onboard science complement of personnel? Steve Hammond - There will be 20 mission-related personnel aboard organized as blue and gold teams. The teams will alternate work at sea and on-shore.
- The Navy TAGOS vessels are known as being slow. Was anything done to increase the ship's speed? Steve Hammond – There were no changes to the ship's speed capability. They hope to be able to cruise at 10 knots.
- Phil Taylor – How many days will the ship operate annually and what is the cost? Steve Hammond – The annual operating year is expected to include 200-ship days. He doesn't have the annual operating cost estimate available. Phil – Where will the operating funds come from? Steve – NOAA has included the ship operating funds in their fleet budget; it won't compete with science funds.

NASA Report – John Rummel reported on NASA's Astrobiology Science and Technology for Exploring Planets (ASTEP) Program. His slides are included as ***Appendix X***. John provided information on astrobiology, past and present. Astrobiology studies today have offered a revolution in our understanding of biology on Earth. There are increased mission opportunities and capabilities with a much higher rate of data being returned. John provided an overview of the astrobiology program from 1965 to 2001. The ASTEP began in 2001 and included eight science-driven field campaigns and/or advanced instrument projects based at US research institutions, universities, and NASA Centers. Examples of ASTEP programs include DEPTHX, AGAVE, and ENDURANCE. John reviewed the seven goals of the astrobiology roadmap. A $4M request for proposals for the ASTEP program should be advertised soon. This should be of interest to the deep submergence community. Funds to support research at ocean observatories would be considered.

Morning Break

National Facility Operators Report - Bob Detrick (WHOI) began the Facility Operator's report by reviewing personnel changes within NDSF. His slides are included in Appendix XI.

Bob Brown has left WHOI and has been replaced in his position as Project Manager for the Replacement HOV project by Tom Lewis. Pat Hickey has been appointed at the manager of the *Alvin* operations group. Matt Heintz is the manager of *Jason* operations and Dana Yoerger is currently overseeing AUV operations. Scott McCue is the new NDSF Data Manager. During all of these personnel changes, everything ran smoothly thanks to the efforts of Faith Hampshire, Rick Chandler, and Barrie Walden.

NDSF Vehicle Operations Summary - Rick Chandler summarized NDSF operations in 2007. His slides are included in ***Appendix XII.*** Seven *Alvin* cruises have been completed and two are upcoming. Operation areas have included EPR 9N, So Cal, JdF, OR Margin, and Guaymas for a total of 77 dives with 92 total projected. There was a four-month layup from February to June. Three engineering dives were conducted in late June. The *Alvin* group now has a new pilot,

Sean Kelley and Mike McCarthy should qualify as a pilot in February 2008. There are two new technicians, Jeff McDonald and Wyatt Jamison.

Average *Alvin* dive statistics for this year were:

- Time submerged: 7.6 hrs/dive
- Bottom time: 5.1 hrs/dive
- Depth: 2,100m/dive

Jason has eight cruises this year. There have been 72 lowerings with 1614 hrs bottom time. A new record for longest *Jason* lowering occurred on Emily Klein's cruise at EPR 9North for 100 hours and 32 minutes. This was also the first cruise ever completed with only one lowering (Rathburn, off Monterey Bay: 99.5 hrs). This year marked the first *Jason* operations aboard a European vessel, *Maria S. Merian,* and the first working operations aboard R/V *Kilo Moana.*

Alvin's support ship *Atlantis* had a maintenance period in June 2007. Vessel upgrades that were incorporated during the period included:

- Installation of Kongsberg SDP-11 Dynamic Positioning System
- Replacement of local engine control system for all six engines
- Installation of new winch and crane load monitoring system
- Prototyping of high speed and peak load detection system on both hydro winch wires.

NDSF Data Manager Report Including Data Archiving - Vicki Ferrini reviewed the NDSF Data management structure and introduced the new data manager, Scott McCue. The data management slides are included as ***Appendix XIII***. The Standard NDSF data deliverables *o*ffer prospective vehicle users information necessary for pre-cruise planning**, i**mpose responsibility guidelines on NDSF**,** assure a departing chief scientist that she or he has received the expected collective of data, and serve the larger ocean science community by ensuring that products of consistent content and quality are available long after the initial science studies have concluded. The commonality of the data deliverables among the vehicles was reviewed:

- Software DVLNav (Whitcomb and Kinsey) collects, and processes (ROV/AUV), navigational data. Integrates ship and vehicle data, acoustic LBL if deployed, DVL.
- Real-time/raw data: time, position, heading, pitch, roll, depth, altitude, temperature, salinity, magnetometer (optional on *Alvin*)
- Imaging: video and stills from digital camera, bathymetric sonar if requested
- Autosnaps and events: framegrabbed video coregistered with sensor data
- Archived in accordance with WHOI Archive Policy; hard media archived at WHOI Data Library

The data deliverables that are specific to each vehicle (*Alvin, Jason,* AUV) were reviewed and details are included in the slides.

Next video and imaging systems were discussed. NDSF now has improved cameras. The vehicle lighting is being revisited. Video is a standard product offered to science parties. Vicki asked the question to DESSC, "Do we require science to provide personnel to run *Jason* DVD decks for archive video?" This question will be addressed by DESSC after the meeting.

Real-time data logging and display were discussed. WHOI is working towards vehicle metadata standardization and the ability to transmit data to shore and make it available during the

cruise via xml files. An update on the event logger was given. WHOI hopes to develop an NDSF vocabulary and to do this they will have a consultation in 2008.

A coherent pan-NDSF backbone data structure is critical. They will evaluate the feasibility of management of all vehicle data on one server (RAID drive) by the NDSF Data Manager. Long-term goal 1 is to make the data available online and Long-term goal 2 is to establish a remote data archive.

At-sea processing pipeline and quality control efforts were reported on. WHOI would like to organize all NDSF vehicle data at sea by lowering. Data deliverables provided to the science party and archives would be by lowering/dive. Hard drive backups are now standard for *Jason* dives in addition to DVDs. The longevity of DVDs is unknown. Ninety DVDs were examined from 2003 and three were found with read errors.

Advanced processing tools were discussed. WHOI's goal is to put NDSF data into more generic formats for processing with other tools. They will continue to support existing DSL software. For photomosaics, WHOI will use the existing DSL mosaicking code for better georeferencing for individual images in large area down-looking mosaics. They will also work to make the UNH video mosaicking software available.

The report ended with a question to DESSC "Should the magnetometer be a standard sensor for all vehicles? –If so, do we *require* calibration turns for each dive/lowering?" Mag data are useless if they are collected without calibration turns (*Alvin* does this naturally, *Jason* takes an extra 45 minutes per dive). Should *Jason* users be required to conduct this calibration, considering the cost in dive time?

Upgrades to National Deep Submergence Facility:

Jason* Control Van** - Chris German reported on the results of a community survey regarding the design of replacement control vans for *Jason*. Feedback included 25 responses. Chris' slides are included as ***Appendix XIV. The comments received included:

- A Science Leader position is needed - set back from pilot/navigator
- HD flat-screens: should be bigger
- Floor plan: good; use of headsets: mixed reviews
- Auxiliary position: needed, but can bring own laptop (sensors)
- Chart table important too: tilting on rear wall = not enough
- Extra scientists = seating at rear;
- Two small low-cost monitors for Watch Leader (logging feeds)
- External feed should include large split-screen video & audio

As a result of the feedback received, WHOI revised the control van design. The revised design is included in the slides. They also plan to implement external feed upgrades that include:

- Video: 42" HD flat-screen in split-screen mode. This has been successful with ROV *Quest* (Germany) and it also provides a spare for larger in-van screens.
- Audio: one-way feed *from* van.

Dolly Dieter asked if the Navy had provided any funds for the control van replacement. Andy Bowen replied that the Navy had not and he would check the van logos.

NDSF-wide navigation update – Andy Bowen gave the NDSF navigation update (***Appendix XV)***. A new DSP system, dubbed *n456*, was developed at WHOI using the WHOI OSL board as a basis. Initial 2007 tests were conducted on *Ron Brown* and weren't as successful as they hoped. They had better success on the next cruises. In August, on a *Jason*/*Atlantis* cruise, n456 was used exclusively for survey. The Benthos 455 was never used. In September/October, on the *Jason*/*Kilo Moana* cruise, n456 was used exclusively, including in relay mode. The Benthos 455 was never used. The prototype has proven itself during the field trials. A production board has been developed and tested in the lab.

In 2008, the plan is for implementation/testing on *Atlantis* in the spring during the engineering dive. Full implementation for ROV use is planned when the new vans "debut." The replacement of the *Alvin* navigation system will follow. A proposal has been submitted to ONR DURIP for an Ultra-short Baseline (USBL) system. The proposal was for two units and one would be fly-away. The funding decision will be made in March.

NDSF-wide imaging update - Bill Lange gave a report on NDSF optical imaging and upgrade plans. His slides are contained in ***Appendix XVI***. The design goals for the HDTV upgrade are to develop an imaging system upgrade that improves the overall quality of motion and still-based imagery on *Jason* and *Alvin* without impacting the day rate. As a by-product of this upgrade, our resulting infrastructure would become more closely compatible with current and future media best-practice. This would greatly simplify future collaborations between documentary film-makers and scientific parties. Bill reviewed the HDTV system design criteria (details are in his slides). WHOI is currently evaluating sensors for the camera head that may decrease the amount of lighting required. It is hoped that the result will be an increase of 1.5 to 2 times the sensitivity over the cameras used in the 2007 evaluation process. A 13X zoom lens was selected over a smaller, less expensive fixed focal length lens design after input from the scientific community at the spring DESSC Meeting. This change requires a 7-inch OD housing.

NDSF tests and evaluations of HDTV components were conducted using *Alvin* and *Jason* in 2007. Examples of the images obtained are included in the slides. *Jason*'s imagery appeared to be darker than *Alvin*, but the HDTV camera was not mounted in an ideal position. *Alvin* and *Jason* can benefit from improved utilization of their existing lighting systems. Reorientation of the camera/light geometries and lighting footprints should improve overall quality. The addition of HMI, HID, LED or quartz light heads on *Jason* is recommended. WHOI will evaluate using strobe or LEDs for a pulsed illumination lighting source to augment the continuous lights for still image acquisition. LED tests currently being conducted on *Alvin* are showing promise as a viable lower power alternative to HMI and HID lighting systems. These will be equally applicable to *Jason* in the future.

WHOI hopes to get an endorsement by DESSC of the HDTV upgrade plan for *Alvin* and *Jason.* If endorsed, the HDTV upgrade could be implemented this year with the acquisition of two HDTV cameras with zoom optics; interface and control electronics. Integration and testing of the HDTV cameras on *Alvin* and *Jason* would take place by the end of 2008. The HDTV upgrade would be operated as standard equipment with zero cost impact on the vehicle day rates.

Discussion:

Bill Chadwick – Would this take the place of the digital still cameras? Billy Lang – Yes.

John Delaney – What is the amount of data that will be stored annually? Bill Lang – He estimates a terabyte per cruise. Bill Lang clarified that WHOI does not intend to routinely record in HD. The HD camera hardware greatly improves standard recording of images. They would be able to use HD recording when desired, e.g., National Geographic dives. Problems with recording in HD are 1) huge data set, 2) cost of recording media, and 3) scientists are unable to play HD recordings in their own labs without purchasing new HD players.

Lunch Break

AUV Sentry Update - Dana Yoerger provided the AUV *Sentry* update. Sea trials for *Sentry* have begun. Near-shore, shallow water tests were conducted during the first week of December. Bathymetry data was collected during the shallow-water trials. Operations were in about 30m water depth. The Reson 7125 system was tested at the dock. *Sentry* upgrades include a new weight dropper, RF modem, Payload bay, interconnects for science payloads such as Mass Spec, and an acoustic modem. Dana reviewed the other *Sentry* upgrades that are in progress or planned. A *Sentry* sea trial was scheduled for October 2007 on *Oceanus*, but didn't happen because Dana was unavailable.

John Delaney asked what the vehicle's day rate would be. Bob Detrick replied that the day rate would be discussed with DESSC and a recommendation would be sent to NSF. Bob added that depending on how the trials go in the spring, *Sentry* could be available for science operations in May.

Establishing Safety Standards for the use of Human Occupied Vehicles - Craig Young reported that the HOV Safety Committee had completed a draft of the HOV Safety Standard document. The draft document is in the review cycle. The document is short, about 18 pages, and contains eight chapters that address HOV operations, the support ship, handling system, crew training procedures, and science user guidelines.

NDSF Vehicle Debrief Interviews – Bill Chadwick provided an update on the NDSF user debrief procedures implemented in 2007. His slides are contained in ***Appendix XVIII.*** The goals of the debrief interviews are to obtain candid assessments of NDSF performance at sea from the science users' point-of-view. It offers a way for DESSC to track problems, implement solutions, and facilitate constructive communication between science users and NDSF. A standardized 10-point questionnaire is used for the interview. Chief Scientists are interviewed by phone after each *Alvin*/*Jason*/*ABE*-*Sentry* cruise. Chris German (CSDS) and one DESSC representative participate in the debriefs. A summary of debriefs are presented at DESSC meetings with an opportunity for NDSF to respond. Sensitive or confidential issues are discussed in DESSC executive session.

Jason **debrief summaries** – Bill summarized the issues identified in the *Jason* debriefs. These included:

1) 12-hour turn-around time between dives – Some users wish to visit multiple sites and have shorter dives, with quicker turnaround for time-sensitive sampling, or to visit many different dive sites. Elevators can help, but it is not always possible to use them: in deep water, in bad weather, on some ships (*Kilo Moana*). A possible solution may be to re-thinking the *Jason* watch schedules.

2) Air-weight limitation for *Jason* (& crane?) – This currently limits how much science gear can be on the vehicle, especially biological samplers that hold water.

3) Catastrophic failure of Kilo Moana cable during testing

4) *Kilo Moana/Jason* ops – Although they can operate in rougher sea states, there are some limitation such as fewer number of berths for science and restrictions on elevator usage.

5) Pre-cruise planning could be improved - Cruise equipment was promised by the operator, but was not brought on board. The needs of inexperienced users should be better known. The expedition leader should participate in pre-cruise planning.

6) Equipment issues were experienced with the Kraft arm, science video camera position and lighting, and digital still camera results.

NDSF Response to *Jason* Debriefs - Matt Heintz – Provided proposed corrective actions for *Jason*. His slides are included in ***Appendix XIX***.

- Turnaround Time – there is an NDSF published document defining the ROV turn-around time policy (on web). The current model provides flexibility at the discretion of the Expedition Leader. Incremental improvements are anticipated and are being investigated. These include:
    - Considering 12-hour watch
    - Input from other ROV operators
    - Better use of elevators
    - Developing ways to move biological samples better
    - Launch/recovery manpower issues

- Air Weight Limitations - The Jason vehicle has grown and become heavier over the years. NDSF is looking at an alternate crane and base; however, a bigger crane is a difficult, expensive solution due to ship deck strength and space constraints. NDSF is also looking at ways to reduce air weight of *Jason* and implement better use of the elevators.

- Pre-cruise planning – Pre-cruise planning will include the Chief Scientist for Deep Submergence (Chris German), the Expedition Leader and the ROV manager. All equipment requests must be in writing unless specifically identified as standard. Science-provided equipment must be identified. The web-based template for equipment requests must to be used. NDSF is updating their web forms. The EL/PI need to communicate daily during the cruise to facilitate common goals. The PIs need better communication among themselves, especially on multi-PI cruises.

- Cameras and lighting – NDSF will continue their efforts to move forward with the camera system upgrades as outlined by Bill Lange earlier in the meeting.

- Data Sets – There has been some confusion regarding cruise data sets. The data set is delivered at the end of the cruise to the Chief Scientist or designee. Since there has been confusion, WHOI will institute a sign off. The Chief Scientist of record must take the data or sign off for the designee to take it.

- Cable failures - Andy Bowen discussed the cable failures. The *Jason* system has experienced two independent fiber optic cable failures; one in 2006 and one in 2007. The 2006 failure analysis was inconclusive but the likely explanation is thought to be to either a manufacturing or cable heating issue. The 2007 failure is currently being analyzed by three parties: the Rochester Corporation, Tension Member Technologies, and Cable Testing Labs. WHOI is seeking outside consultation on vehicle power system

Alvin* Debrief Summaries** – Mike Tryon provided a summary report of the *Alvin* debriefs (Appendix XX***). *Alvin* debrief issues included:

- Pre-Cruise Planning - Pre-cruise communications between the PI and *Alvin* Ops Group are not always being relayed adequately to *Alvin* shipboard party. For complex operations, direct communication between PI, Expedition Leader and Pilots must occur well in advance. In spite of doing things "by the book" Navy and/or foreign clearances still frequently are not received until 11th hour.

- Mobilization/Demobilization - Shipping is becoming increasingly complex and expensive. It was suggested that there should be more coordination between PIs and WHOI to help consolidate shipping to keep costs down.

- Vehicle Operations - On the whole everything went well.

- NDSF Equipment Operations –Navigation was generally considered acceptable but some PIs wished in hindsight that they had taken the time to deploy the LBL system.

- User Equipment Operations - The key to success is a thorough discussion of all equipment issues and science needs with ALL of the *Alvin* pilot team well before the dive.

- Personnel – There have been significant changes in personnel in the past 1-2 years. The PIs found that the new team did an excellent job.

- Data hand-over - Data is not always accessible at sea or it is difficult to find. There needs to be a centralized Data Portal. PIs should bring a large hard drive with them to ease bringing data back to their labs.

- Additional PI recommendations included:
    - A better and simpler *Alvin* user information sheet is needed including photos and detailed specs of all available equipment - This should be part of the pre-cruise planning questionnaire.
    - *Alvin* office (shore and ship) should retain all science gear wiring diagrams for future use.
    - *Alvin* dives should not be scheduled on the Juan-de-Fuca after mid September – it is common to lose half of dives.

NDSF Response to *Alvin* debriefs – Pat Hickey presented the proposed corrective actions. His slides are included as ***Appendix XXI.***

- Pre-Cruise Planning - The Expedition Leader is included in pre-cruise meetings by phone when possible. An FTP site is available where all cruise info is kept and this is accessible from the ship. PIs are encouraged to visit the ship and meet with the Expedition Leader and pilots whenever possible.

- Mobilization/Demobilization - Incoming PIs are encouraged to arrive with their equipment as soon as possible after ship arrives in port. The *Alvin* Ops crew generally waits 2 or 3 days to start cruise wiring and get cruise gear; we could at least start dive briefs during this period.

- Operations - NDSF Equipment - PI's must weigh the pros and cons of time taken to lay and survey a transponder net. Multiple dive areas preclude laying of a net for only one or two dives. The CTD is now on a calibration maintenance schedule

- Data hand-over - *Alvin* dive data and Top Lab navigation data are downloaded to "Linus" 2 to 4 hours after a dive and are accessible via the "sci0" account. WHOI will relook at this and make sure it is more obvious to the users.

Deep Submergence Scheduling: 2008 and Beyond - Liz Caporelli reviewed the NDSF vehicle schedules for 2007 and 2008 and request for the out-years. Her slides are included in ***Appendix XXII*** and include maps of the operating and requested work areas. In 2007 there were 180 charge days for *Alvin* with 292 total ship days. *Jason* has a total of 207 days in 2007. In 2008, *Alvin's* schedule has 221 days with an open period of 4-6 weeks in San Diego in March. ONR has 17 days and COMRA has 8 days with *Alvin*. The *Jason* days total 143 in 2008. In 2009 there are already 147 requested days for use of Sentry.

Liz provided a description of the new UNOLS Ship Scheduling System.

UNOLS Report - Marcia McNutt, UNOLS Chair, provided the UNOLS report. Her slides are included as ***Appendix XXIII***. She reviewed UNOLS vision, mission, goals and objectives. Three major goals for the upcoming year are to: 1) Enlarge the group of supporters for the UNOLS fleet both in terms of capitalization and operations; 2) Plan for the UNOLS of the future to meet the fleet and other infrastructure needs of the future; and 3) Continuously work to lower barriers to effective use of UNOLS ships caused by disabilities, gender, or other special situations.

UNOLS Workshop – Deb Kelley reported that there will be a workshop on Technical Advancement of Remotely Operated Vehicles & Submersible on January 23-34, 2008 in Seattle.

Replacement HOV Update – Anthony Tarantino provided an update on the Replacement HOV project status. His slides are included as ***Appendix XXIV***. The Program Manager for the project is Tom Lewis and the Assistant Program Manager is Anthony Tarantino.

There are two major contracts associated with the RHOV acquisition project. Southwest Research Institute (SwRI) is the prime contractor for the design, fabrication and testing of the personnel sphere; while Lockheed-Martin (Riviera Beach) is the contractor for design, fabrication and testing of the vehicle (including integration with the personnel sphere).

SwRI completed the Detailed Design Review (DDR) for the RHOV personnel sphere in September 2007. There are three subcontracts in place: Ladish Forge (forging), STADCO

(machining and welding), and Bodycote Inc. (heat treatment and stress relief). ABS accepted the hull design and the forging process will begin in January 2008.

The contract with Lockheed Martin was executed on June 8, 2007 for vehicle design and fabrication. It is a Two Phase Contract. Phase I consists of Preliminary Design and Detailed Cost Estimate of the vehicle. In Phase II, detailed design, fabrication, and test of vehicle would take place.

Anthony reviewed the design specifications of the RHOv. The details are contained in the slides and address ergonomics, power consumption, weight, batteries, and variable ballast. The detailed cost estimate for design and fabrication will be presented to RHOC/NSF on 20-21 Feb 2008.

Operational Summary and Collaborations with Other Deep Submergence Activities:

DSL-120A* and IMI30 Systems** - Paul Johnson, U. Hawaii, reported on the status of *DSL-120A* and *IMI-30* (Appendix XXV***). The *DSL-120A* was transferred from NDSF to the Hawaii Mapping Research Group (HMRG) following its March 2007 cruise at the East Pacific Rise. The *120A* was then operated in August 2007 by HMRG for a survey around Oahu. The operations were funded by the University of Hawaii and the Department of Defense. A high resolution survey of seafloor south of Oahu looking for unexploded ordinance was carried out over seven days using the *DSL-120A*, *EM120*, and *EM1002*. This was HMRG's 1st solo operation of the *DSL-120A*.

The future *DSL-120A* equipment upgrade plans were reviewed by Paul. HMRG plans to modify the telemetry of the *120A* in order to make it compatible with the other HMRG towed mapping systems. This would allow for a common spares kit for all of the towed sonar vehicles. HMRG would also like to acquire an Ixsea Octans. The Ixsea Octans was not transferred to HMRG from NDSF because it is a spare for *Jason*. Acquisition is considered a very high priority as high quality mosaics require very high precision attitude information.

HMRG has purchased a new magnetometer and CTD and has integrated them into the *IMI30* system (both can be used with the *DSL-120A* as well). New layback software has been written allowing HMRG's real time mosaic display for sidescan and bathymetry to work (this code will also work with the *120A* for future surveys). Multiple day cruises around Oahu were conducted to verify the field worthiness of the *IMI30*.

In the fall 2007, HMRG conducted a cruise for the National Institute of Oceanography (NIO) in Goa, India. It was a 50 day cruise with 16 days of *IMI30* survey work. Data examples are included in the slides.

HURL Vehicle Update - John Smith provided an update on Hawai‘i Undersea Research Laboratory (HURL) vehicles and operations. His slides are included at ***Appendix XXVI***.

HURL operates the HOVs *Pisces IV* & *V*, and the ROV *RCV-150*. The support ship is the R/V *Ka‘imikai-o-Kanaloa*. In 2006 and 2007 the *Pisces* vehicles were refit for their ABS special surveys. *Pisces V* received new syntactic flotation to increase payload, a new utility hydraulics system. The *Pisces IV* ballast pack and trim weight assembly was overhauled.

2007 ROV *RCV-150* upgrades included an overhaul of its power pack, improved reliability of the hydraulic power unit, new fiber optic multiplexers, and a new main video camera with increased resolution.

In 2007 there were nine projects in the Main and Northwestern Hawaiian Islands with 43 HOV and 30 ROV dives. The HURL Benthopelagic Megafauna Database includes 85,613 records.

In 2008, HURL assets will operate in the U.S. Line Islands, Northwestern HI islands, and Main HI islands. In 2009 there will be joint program between HURL and the West Coast & Polar Regions NURP center. The planned operating areas are the NE Pacific, Alaska/Beaufort Sea, and Emperor/NWHI loop expedition. The RFP is expected to come out in early 2008. The vehicles will possibly return to the SW Pacific in 2010.

MATE Program - Jill Zande provided the MATE report. Her slides are included as ***Appendix XXVII***. Jill reviewed the MATE Internship Program. Since 1999, 194 community college and university students have been placed on research vessels, in labs, and in industry settings (107 supported UNOLS vessels). MATE has submitted a proposal to NSF to fund the internship program for the next three years. They plan to revise internship recruitment materials and the website to reflect technology and the emphasis on technician positions. Jill also provided an overview of the MATE ROV competition. To date more than 4,000 students have worked in teams to tackle tasks based on the marine workplace. In 2008, the competition will partner with RIDGE.

Long-Range Planning Issues – Deb Kelley provided brief updates on the following issues:

- Ocean Observatory Initiative Status – The Preliminary Design Review was held during the first week of December 07. It went well.
- Neptune Canada – The Neptune Canada installation is moving along. They are following a phased approach.
- Coordination of Multi-Vehicle Operations at Observatory Sites – Deb reported that this issue came up as the Regional Scale Node and Canada Neptune observatories move forward. UNOLS is aware of this issue and will try to stay informed of ship and vehicle schedules in the observatory regions.

HROV Status Report - Andy Bowen provided an update on the Hybrid ROV (*Nereus*) development effort. His slides are included as ***Appendix XXVII.*** HROV *Nereus* field trials were conducted in November 2007 from R/V *Kilo Moana* off of the Wai'anae Coast, O'ahu. Patty Fryer and Tim Shank participated in the trials to evaluate the science capabilities of the vehicle. The RHOV is a hybrid cross between an AUV and ROV in a single package. The AUV is for mapping operations and the ROV is for close inspection, sampling, and manipulation. Images from the sea trial are included in the slides as well as the HROV control and navigation highlights.

During the sea trials, the HROV demonstrated the following capabilities:

ROV:

- Sampling (push cores, grabs, and scoops- full manipulator function)
- LED lighting systems with utility cameras
- Near-bottom survey control (transit speed and auto-altitude for surveys)
- Proven viability of micro-fiber tether

AUV:

- Bathymetric mapping capabilities via track-line following
- AUV user-sensor payload and space (T track and car mounts)
- Bio-Geo mapping via bottom following and survey camera
- Data driven response survey capability

The HROV is expected to offer a 60% reduction in shipping cost compared to *Jason.* The vehicle system can be shipped in one container. The HROV is expected to have a 40% reduction in the estimated day rate as compared to *Jason.* The HROV can be effectively operated from non-DP ships (lowering cost). The payload capability is 70 pounds. The fiber tether is recovered, but it is not reused. During the sea trial, the maximum dive depth was 2500m. A lot was learned about the system's capability during the sea trial.

The meeting adjourn at 1700.