

DEep Submergence Science Committee Meeting
The Marriott Courtyard at San Francisco Downtown
* Rincon Hill Room*
299 Second Street, San Francisco, CA 94105
December 4, 2005

A copy of these minutes are available at <200512desmi.pdf>

Executive Summary

The Deep Submergence Science Committee (DESSC) met on December 4, 2005 at The Marriott Courtyard hotel in San Francisco, CA. The meeting was chaired by Debbie Kelley. The meeting began with presentations by the Principal Investigators who used submergence vehicles in 2005. 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 and construction of the replacement HOV and the hybrid ROV were provided. DESSC activities, future plans and issues were reported including discussions on long-range planning, public outreach and educational activities.

Action Items (New and Continuing):

- **Community Input on science instrumentation, tools, sensors, etc for replacement HOV**
– Create a community on-line survey and request input. (Action – UNOLS Office/DESSC)
- **Guidelines for Bringing New Assets into the NDSF** – Committee review and comment on the NSF revisions to the draft guidelines. Hold phone conference in early 2006. Work to finalize guidelines. (Action – DESSC)
- **Evaluate ABE/Sentry for NDSF** – Review request by WHOI to bring ABE/Sentry into the NDSF. Evaluate vehicles and formulate recommendation (Action – DESSC)
- **Membership** – A nomination is needed to fill Dave Mendel’s vacancy. A call for nominations will be distributed to UNOLS reps. DESSC is encouraged to provide member suggestions. (Action – Annette and DESSC)
- **HOV Safety Standards Project** – Establish committee (1 female science rep needed) and appoint Chair. Organize initial meeting. (Action – Deb and Annette)

Appendices:

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Meeting Summary Report

Introductory Remarks, Meeting Logistics, Introductions - Debbie Kelley, Deep Submergence Science Committee (DESSC) Chair, called the meeting to order at 0830 on Sunday, December 4, 2005. The meeting was held at the Marriott Courtyard 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*.

The minutes of the June 2005 DESSC Meeting <[200506desmi.html](#)> were accepted as written. Debbie introduced the members of the DESSC.

2005 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 2005.

Alvin PI Reports – PI reports for *Alvin* cruises in 2005 are summarized below. All of the presentations are included in *Appendix III*.

Jeff Karson, January 30 to March 8, 2005 – Jeff Karson reported on his *Atlantis* cruise to the Pito Deep. Jeff was the Chief Scientist of the cruise and participants included individuals from Duke University, University of Hawaii, University of South Florida, Scripps Institution of Oceanography, College of Wooster, University of Victoria, University of Illinois, University of Rhode Island, and France. There were two study areas that were about 6 km by 3 km each. They conducted full side-scan surveys and transects at 300-500 m. DSL-120 Side-Scan Sonar was used for five days along with a towed magnetometer. *Jason II* was used for nine transects (11 days) with 200 hours on the bottom. They collected about 254 samples. Twelve *Alvin* dives

were made and 181 samples collected. Other activities included Sea Beam mapping and dredging.

Jeff reported on some vehicle improvements that would be helpful. Navigation is always a problem when working on deep escarpments. The *Jason* navigation was much better on this cruise. Lighting is another issue and improvements are needed when working on high relief areas.

Robert Vrijenhoek and Cindy Van Dover, March 12 - April 6, 2005 - Bob Vrijenhoek reported on his and Cindy's *Atlantis/Alvin* cruise. Bob has 12 NSF-funded dives and Cindy had 2 NSF-funded dives. The goals were to sample biology at 38°S vents on the Pacific Antarctic Ridge, revisit vents at the 31-32S region of EPR, and to sample biology at vents on the eastern and western flanks of Easter Microplate. Collaborators included Greg Rouse and Karen Jacobson. Accomplishments included 12 successful *Alvin* dives, two dives were lost to weather. The *Alvin* digital video was very good and the DVD copies were very useful. Support from the *Alvin* pilots was excellent. Some things however, did go wrong. No weather days were scheduled into the cruise and the transit time was underestimated. Vacuum sampling needs improvement. They recommend a rotary suction sampler like the Harbor Branch design. The digital overhead cameras were not very useful.

Tim Shank, 19 May – 3 June – Tim Shank's slides were presented by Dan Fornari. This was a NOAA funded project "Exploring New Patterns of Biological Succession at the Rosebud Hydrothermal Vents - Galápagos Rift." PIs included Shank, Fornari, Seyfried, Ding, Ward, Rzhhanov, Beaulieu, Soule, and Susan Humphris. Vehicles and equipment used during the cruise included *Alvin*, the TowCam, the Ghostbuster Chemical Sensor, In-situ Chemical Analyzers, Larval/Sediment Traps, Time-lapse camera, In-situ Fixation Chambers, Major Samplers, Basalt Colonization Panels and Vemco T°C loggers. There was an education element of the project, Dive and Discover Expedition 9.

Highlights of the cruise included a multibeam survey, nine TowCam surveys, mosaicked Rosebud field (60x50m area) from *Alvin*'s downlooking camera, eleven *Alvin* dives, Imagenex Sonar, and vent sampling. A new venting area was discovered, "Rosebowl." Two integrated colonization experiments were deployed.

Kevin Brown and Dave Hilton, June 7 - June 16 – The Brown/Hilton *Atlantis/Alvin* cruise was off of Costa Rica to deploy instrumentation. An Osmotic sampler, 6 CAT meter, a new deep sea (Mass Surfer) mass spectrometer system, and a precision pressure gauge and temperature sensors were deployed. They deployed five peepers for pore water analysis. Various biological samples of: Cold seep crabs, tubeworms, clams, and shrimps for microbiological studies were collected. They found a large mass of tubeworms on the cold seeps, some very long. Eight dives were planned, with one lost to a ship failure. The equipment will need to be picked up next year (2006) in June.

Karl Booksh, Marv Lilley, Bill Seyfried, and Maurice Tivey, 13 August - September 3 – Marv Lilley reported on his *Atlantis/Alvin* cruise (see slides) to Endeavour. It was a 19-*Alvin* dive program. One dive was for engineering, but they were able to accomplish science as well. Some of the equipment that they used included a RAMAN Spectrometer, and a surface plasmon resonance spectrometer.

They had no problems with the sub and support from the pilots was great. The only problem experienced was that they were at the end of the vehicle battery cycle, so a few of the dives were short. They were able to complete all of the objectives and the cruise was a big success.

Bill Seyfried and Kang Ding, 13 Aug – 3 Sep – Bill Seyfried reported on his and Kang Ding's *Atlantis/Alvin* cruise to Juan de Fuca. There were 19 dives total. Chemical sensors were successfully deployed at both high-temperature and diffuse flow sites. The ship and submersible performed extremely well. No dives were lost for weather or for mechanical difficulties with *Atlantis* or *Alvin*

Maurice Tivey, 13 August – 3 September – Maurice reported on the China Ocean Mineral Resources R & D Association (COMRA) *Alvin* Dive Program at Juan de Fuca. COMRA purchased four dives to gain experience in working at vent sites. Participants included four COMRA engineers and one scientist. The cruise activities included deploying and retrieving three vent caps. Eighteen mineral baskets were deployed and recovered. Gas tight water bottles were tested and used successfully. Samples included 375 kg of sulfide, biological material, and fifteen sediment cores. They were very happy with their results.

Jason2/DSL120a* PI Reports** - PI reports for *Jason2/DSL120a* cruises in 2005 are summarized below. All of the presentations are included in ***Appendix IV.

Meg Tivey, April 5 - May 11, RV *Melville*/DSV *Jason2* – Geoff Wheat presented the report for Meg Tivey. The *Melville/Jason2* cruise was on April 5 – May 7, 2005 at the Lau Basin. PIs included M.K. Tivey, J. Seewald (Woods Hole Oceanographic Institution), C.G. Wheat (University of Alaska), M. Mottl (University of Hawaii), A-L. Reysenbach (Portland State University), and S. Kim (Moss Landing Marine Lab). The program was for sampling and initial characterization of hydrothermal fluids, deposits, microfauna and megafauna at vent fields along the Eastern Lau Spreading Center (ELSC). They successfully characterized each of 6 vent fields for:

- Distributions of types of venting, types of vent structures and morphologies, and their relations to substrate and the range and distribution of megafauna (SM2000 and down-looking pixelfly)
- Fluid chemistry (Seewald gastight and major bottles)
- Vent deposit mineralogy/bulk geochemistry (grab samples/bioboxes)
- Molecular and physiological diversity of microbes associated with diffuse and high T fluids and active chimneys (subsamples of fluids/solids)
- Range, abundance, distribution, and reproductive status of dominant megafaunal organisms in vent fields and distribution of larvae/plankton in water column above vents (slurp/grab/bioboxes and MOCNESS)

R/V *Melville*, ROV *Jason2*, systems, operations, and process were all very good. The SM2000 worked well because they brought an extra person to support the system, which allowed near real-time processing. There were still some lessons learned, and if they were to do it over again they would:

- Lay their own transponders (takes less time than trying to figure out why ones left by earlier cruises are either not responding, or responding with a weak signal)

- Ask for more contingency days if ship time is in cyclone season. They lost nine days to weather (when they could not put *Jason2* in the water, or had to recover early. (They had 21 days of successful dives)
- On the 10-year time frame there should be some plan for *Jason2* to be able to launch in higher sea states.

Robert Vrijenhoek and Cindy Van Dover, May 15 - June 3, *Melville/Jason2* – Bob Vrijenhoek provided the report on his and Cindy’s *Jason2* expedition to Fiji-Lau Basin. Bob was funded for 12 *Jason2* dives and Cindy was funded for two dives. The goals were to sample biology at the Lau sites identified by the RIDGE program and to sample biology at N. Fiji sites. An emergent fungal disease in Fiji Basin mussels was identified. The disease affects the connective tissue and is identified as a “black yeast.” Its prevalence is greater than 58%. US deep-submergence operators are being notified of the potential role vehicles and gear may serve in transport of the pathogen. There is a proposal pending to study the progress of disease.

Cruise accomplishments included 14 successful *Jason2* dive days with no dives lost to weather. *Jason2* payload and digital video was excellent. The *virtual van* had an excellent annotation capability. *Jason2* pilots were excellent. Items that could be improved include:

- Scheduling weather days into the program.
- The vacuum sampling was very poor
- They recommend a rotary suction sampler like the Harbor Branch design
- Launch crane is dangerous even at mild sea-states

Debbie Kelley and John Delaney, September 11-September 17, *Thompson/Jason2* – Deb Kelley reported on the *Thompson/Jason2* cruise to examine extreme conditions under which life thrives, survives, and expires. The program included development of microbial incubators. The cruise also included rock drilling using *Jason2*. They completed all objectives with successful holes in Roane, Giraffe, Hulk, and Gremlin. Three incubators were deployed for use in three colonization experiments.

Deb reported that it was difficult to drill and fly the vehicle system. Often the drill would decouple from the vehicle sled. Finding good drilling targets was difficult. *Medea* met an early demise when the pressure housing leaked. *Jason2* team did a great job fixing the problem. It is recommended that they consider operating the system without *Medea*. The time it takes to maneuver with *Medea* is difficult. Deb also recommended that a different location, mid-ship, be considered for launching *Jason2* to be able to launch in higher sea states.

John Delaney and Debbie Kelley, September 18-October 4, *Thompson/Jason2* – Deb continued with a report on the VISION05 cruise using *Thompson* and *Jason2*. This represented the first high-definition transmission from the seafloor reaching across the US, Canada, Australia, and Tokyo. The cruise also had participation by the REVEL Program. Five middle-high schoolteachers and one mentor participated from REVEL. During the cruise they were able to complete the KECK-funded proto-Neptune Observatory that included installation of 20 in situ seismic instruments, chemical, thermal, and biological sensors. It was a very intense cruise for instrument deployment.

Dana Yoerger *ABE* operations, VISIONS05, *Thompson/Jason2* – Dana Yoerger reported on the *ABE* operations that were conducted during the Kelley/Delaney cruise. Using *ABE*, they were

able to map the cable route approaching Axial Valley and the Axial Valley from 47° 56' to 48° 01'N. *ABE* operated simultaneously with *Jason2*. They would launch *ABE* before or during the *Jason2* dive and then *ABE* would “sleep” until the *Jason2* dive was completed. The vehicles shared the acoustic net in rudimentary fashion.

Non-NDSF PI Reports - PI reports for *Pisces* and *Hercules* cruises in 2005 are summarized below. All of the presentations are included in ***Appendix V***.

Hubert Staudigel, March-April, 2005, *Pisces V* – Hubert reported on his *Pisces V* cruise to Vailulu'u Seamount, Samoa. They were interested in the area on the eastern side of Samoa. An active volcano was discovered in 1999. The crater creates about 60 black smokers and seismometers have indicated earthquake activity. Maps of the research area were displayed. One of the areas, Nafanua showed the presence of a lot of eels and was full of fish carcasses. They caught some eels and discovered that they eat shrimp, however, they did not find shrimp at the site. The cruise was successful and all goals were accomplished.

Bob Embley, April-May, 2005, *Pisces V* – Bob reported on his cruise off New Zealand that included 17 dives at eight sites with *Pisces V*. Very few of the sites had ever been visited with submersibles. It was a very successful cruise. Dan Fornari's camera was used on the sub. There are very interesting features on the Arc volcanoes and there is a lot to learn. Muscles were found on all of the volcanoes.

Dwight Coleman, Robert Ballard, and Deb Kelley, July 17 – August 4, R/V *Ron Brown/Argus* and *Hercules* –Dwight reported on the NOAA funded Lost City Hydrothermal Field Expedition in 2005. They had nine days on site that included eight dives with vehicles *Argus* and *Hercules*. *Argus* is similar to *Medea* with a high-definition video camera. The system is linked to a satellite-tracking antenna for networking back to shore. Networking with via a C-Band Satellite. There was a shore-based command center at the University of Washington (UW), where Deb Kelley was located. From UW, they were able to direct the dives and sampling efforts. There was also collaboration with the University of New Hampshire (UNH). Multibeam datasets were ftp'd to UNH, where Larry Mayer's group processed the data and turned it back around to the ship. They collected over 150 hours of video footage and thousands of digital stills images. They had a steep learning curve to get the shore-based system up and running.

In other news, the conversion of Ocean Exploration's ship, *Okeanos Explorer*, is moving along. The University of Rhode Island has plans to build an Institute for Exploration.

Chuck Fisher and Jim Childress, June 2005, *Melville/Jason2* – Chuck reported that the *Jason2* cruise to Lau Basin went well. They were looking at the biology of animals and were able to bring animals to the surface alive. One of the highlights of the cruise was the ability to use the *Jason2* navigation and mosaic on the centimeter scale. The information could then be used to plan the next dive. Chuck recommended that on cruises that have lengthy vehicle dives, such as this one, it would be useful to have two Chief Scientists on the cruise.

Mid Morning Break

Agency and UNOLS Reports:

National Science Foundation (NSF) - Dolly Dieter briefly reported that most of the NSF items would be addressed later in the meeting. She cautioned that the budget projections are not optimistic.

National Oceanic and Atmospheric Administration (NOAA) – Barbara Moore provided the report for NOAA. Her slides are included as *Appendix VI*. She provided highlights of this year's NOAA cruises. They included:

- NDSF cruises:
 - May 20-June 3, 2005 - Tim Shank, 11 *Alvin* dives (90 hours) to Investigate colonization of a recent lava flow found in 2002.
 - Nov 3, 2005 - Jan 10, 2006, Rachel Haymon - 40 days of *DSL-120/Medea* planned to investigate how magma supply and crustal thickness may affect hydrothermal activity and processes. NSF is the principal funder of the Haymon project
 - Oct 20-31, 2005 – Three *Alvin* programs were funded for deep-sea coral studies. Hurricane Wilma and a gale resulted in seven of the ten dives being weathered out.
- NOAA ship *Ron Brown* & IFE ROVs programs:
 - *Hercules* and *Argus* program to the Lost City Hydrothermal Vent Field with Deb Kelley & Bob Ballard.
 - Deep Atlantic Stepping Stones program with PIs Peter Auster, Les Watling, Tim Shank
- KOK & NURP submersibles program to the South Pacific Expedition using *Pisces IV* and *V*
- USCG *Healy* & *Global Explorer* ROV under the ice.

In FY06, 42 days are planned in the Gulf of Mexico for an *Alvin* program. The plans may have to be adjusted because of budget shortfalls.

Barbara explained that FY06 included budget surprises. Both OE and NURP budgets were cut in half. This could result in the potential closing of the NURP centers on the east coast. It will take a couple months for all of this to be sorted out and it is difficult to know the outcome. A lot of the decisions are being controlled by external forces. Barbara has appreciated the support and letters that have been sent in response to this situation. The FY06 budget is signed in stone. The best NURP and OE can do is seek funds from within NOAA, which is a very difficult thing to do. They need to concentrate on the FY07 budget. Dolly Dieter added that NOAA has been a partner in NDSF for years. Any community support that can be sent to Barb would be helpful.

The new OE ship is expected to be ready for service in the fall 2007.

UNOLS Report - Mike Prince provided the report for UNOLS. UNOLS slides are included as *Appendix VII*. There is a lot of exciting Fleet renewal activities ongoing, but there are also ship scheduling challenges ahead. Mike reported on the major UNOLS activities in 2005:

Budget Shortfalls and Impact on 2006 Ship Use – In February 2005, Larry Clark (NSF) sent a letter to UNOLS outlining the projected NSF funding shortfall. In response, UNOLS formed an Ad Hoc Committee in March 2005. Members included Marcia McNutt, MBARI (Chair), Eileen Hofmann, ODU, and Denis Wiesenburg, UAF. They worked to provide a short-term recommendation to address the 2006 budget shortfall and long-term scenarios (3 years) for ship lay-ups and retirements. UNOLS provided preliminary recommendations to Larry Clark on July 18, 2005. The recommendation is available on the UNOLS website at http://www.unols.org/projects/UNOLS_response_to_Clark_July05.pdf

2006 Ship Scheduling Process and Results - The UNOLS Ship Scheduling Committee meetings were held in July and September 2005. ONR advised large ship schedulers that NSF and ONR had come to an agreement to use rotating extended maintenance periods in homeport for 2006. A large portion of the shortfall in funds and ship days will fall upon Intermediates and Regional Class vessels in 2006. *Alpha Helix* will be in lay-up status. *Marcus Langseth*, *Oceanus*, *Endeavor*, *New Horizon* and *Wecoma* are working on the premise of partial lay-ups. Many other vessels are operating well below optimal utilization. Some institutions will receive lay-up support from NSF and perhaps from ONR. UNOLS institutions and funding agencies will have to work together in order to help with crew retention. In 2006 there are 3986 ship operating days at a cost of about \$80M for operations and technician support. Mike presented a chart showing UNOLS Fleet operating days and cost for 2002 to 2006. Ship time is down significantly in 2006 and most ships are operating below optimal utilization levels. The decrease is not due to a reduction in demand; it is a reflection of budget reductions. Further evaluation of budget impacts on long-term fleet utilization projections is needed. For 2007, deferred NSF programs along with other projects such as multi-year funded projects indicate that the total cost of NSF funded programs for 2007 is already at a full-year funding level. It is difficult to see how new NSF funded programs will fit into the 2007 budget. Additional analysis of delayed access to the sea and its impact on seagoing science is needed.

Marcus Langseth Science Oversight Committee (MLSOC) - A New UNOLS Committee was formed (Oct 2005) to oversee science and ship operations for a National Oceanographic Science Facility (R/V *Marcus Langseth*). Membership on the committee includes nine voting members with representation from 3D and 2D seismic, OBS and PASSCAL experience, and general oceanography. Appointments include Steve Holbrook (Chair), Michael Enachescu, Graham Kent, Nancy Grindley, Mitch Lyle, Ray Schmitt, Peter Tyack, Paul Johnson and Peter Littlewood.

Americans with Disabilities Act (ADA) Guidelines for Research Vessels - 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. In turn, procedural guidelines to carry out shipboard operations and emergency procedures when persons with disabilities are on board are needed. A committee is being formed and will include Terry Whitley (Chair and FIC), the UNOLS Risk Manager, a Safety Committee Rep, seagoing scientists with disabilities, a ship master, a marine superintendent, a *Langseth* Conversion Rep, and a RVTEC rep,

UNOLS Office Review - The UNOLS Council performed a review of the UNOLS Office. Based on their evaluation, the Council passed a resolution endorsing MLML to host the UNOLS office for a third three-year term.

Fleet Renewal and Activities:

- Regional Class – An RFP for design/build teams for the Regional Class ships was released on October 31st.
- Ocean Class – Early in 2005, UNOLS provided ONR with a recommendation on a hull form for the Ocean Class. A monohull was recommended.
- General Purpose Global Vessel SMR – A community on-line survey for the Global science mission requirements is being drafted. Stay tuned. The survey information can be applied to any mid life refit considerations.
- Bermuda Biological Station for Research (BBSR) has acquired *R/V Seward Johnson II (SJII)* from HBOI and will retire *R/V Weatherbird II*. After a 4.5-month modification and maintenance period, *SJII* begins operations from BBSR in late March 2006.
- After 32 years of service, the *R/V Gyre*, operated by Texas A&M, retired from the UNOLS Fleet in August 2005.
- The Fleet Improvement Committee is drafting an update to the Fleet Improvement Plan. A draft should be available for review in 2006. Based on the plan drafted by the Federal agencies, the fleet of 2020 will have fewer ships and days available to support science than the current fleet.

Mike encouraged the meeting participants to visit the UNOLS Booth #228 at AGU.

Discussion:

Mike Perfit asked what the science community could do in regard to the budget shortfall and access to ships issues. Reply - Individual institutions need to contact their Congressional representatives. UNOLS cannot lobby. The community must clearly articulate their needs. They can communicate with CORE for advice.

Larry Clark (NSF) provided some thoughts on the funding issues and elaborated on NSF Activities. NSF is not allowed to lobby Congress. One way that the community can help is by getting the word out about the exciting research that is being conducted. Communicate with the NSF program managers and directors on science accomplishments. Project reports are very important and should be better done. These are important things.

It is important for people to understand and be aware of the ongoing facility investments at NSF (*Marcus Langseth*, the RHOV, the ARRV, and the Regional Class ships). NSF is often asked how they can continue to move forward with new investments, when they can't afford to support the facilities that they have. In response, in the years of healthy budgets, NSF set aside funds for renewal. They have planned and budgeted funds for the next years to support these facility efforts without impacting science.

Larry explained that there are some contradictions and mixed messages within the community. The community should not think that this is a bad time to submit proposals. NSF can show that the highly rated proposals exist. It is important to keep proposal pressure high. If the proposal pressure drops, the agencies will have a difficult time promoting science budgets.

In other NSF news, there is an MG&G Program Director vacancy. Dave Epp, Program Director retired in the fall. The position has been advertised and the end of January is the target date.

National Facility Operators Report - Bob Detrick (WHOI) opened the National Facility report and provided an update on personnel changes. His slides are included as ***Appendix VIII***.

- Dr. Vicki Ferrini was appointed as the NDSF Data Manager
- Phil Forte was promoted to ROV Expedition Leader
- Gavin Eppard was promoted to *Alvin* Pilot
- Anthony Tarantino is leaving the *Alvin* Group
- Maurice Tivey steps down as Chief Scientist of Deep Submergence at the end of 2005; he will remain chair of the internal WHOI Deep Submergence Advisory Committee (DSAC)
- Chris German will become Chief Scientist of Deep Submergence effective January 2006

There was a round of applause in appreciation for Maurice Tivey's efforts.

NDSF Vehicle Operations Summary - Rick Chandler provided the summary of operations over the past year. His slides are included as ***Appendix IX***.

In 2005 *Alvin* operations included work at the Pito deep, South Pacific, East Pacific Rise, Off Costa Rica, Juan de Fuca, and off New England. There were 278 operating days for eight science cruises. It was a short season due to the overhaul planned at the end of the year. Days on station totaled 101 with 85 dives. Fifteen dives were lost (10 weather, 3 medical emergency, and 2 ship-related). The average dive duration was 8.0 hours. The current *Alvin* operations group includes four pilots and three technicians. The average dive depth was 2,443 meters. The operating budget for 2005 was \$1.9M budget. Rick provided a breakdown of *Alvin* dives by discipline. He showed a movie of the overhaul that included *Alvin* being stripped down, the sphere inspection, fore-body block inspection, and removal of the spheres.

The 2005 ROV schedule includes 201 operating days for six science cruises and 67 lowerings (66 *Jason*, 1 *DSL120* sonar). Rick showed a map of where the vehicles had to be shipped over the past year. In 2005, *Jason2* had its longest dive to date: 60 hrs. There was a single *DSL120* dive of 104 hrs. Vehicle highlights included:

- Upgraded *Medea*: additional telem/control, added 2 thrusters
- Added Insite DSC on science pan & tilt
- Tested components of new suction sampler
- Operated rock drill
- Supported HiDef video camera (Visions '05)
- *ABE* rescue of *Jason2* (*Jason* got stuck and was freed by *ABE*.)

A *Jason2* launch, recovery and operation test is planned on *Kilo Moana* in the fall 2006.

NDSF Support Ships – Rick reported on plans for *Atlantis*' shipyard period in Feb-March 2006. Projects include:

- Overhaul the bow thruster to address vibration issues
- Repair Hydro Lab deck (sound insulating false deck)
- Tank repairs and inspections (routine maintenance)
- Routine underwater body preservation and coating of bottom and freeboard
- A-frame maintenance, including climber rail

The *Atlantis* equipment proposal that will be submitted in December 2005, will include the following in its request:

- New Kongsberg DP system

- New Isotope van
- Winch slip ring assemblies (ROV Use)

Update on Data and Archiving - Maurice Tivey reported on NDSF data and archiving activities. His slides are included as *Appendix X*.

Dr. Vicki Ferrini was hired in late summer as the NDSF Data manager. This is a new, half time position and the responsibilities will include:

- Support for DVLNav processing software
- Support for Imagenex sonar processing (*Alvin*) and SM2000 multibeam sonar (*Jason*, *Alvin*)
- Assures shipboard support for mapping and data processing
- Interface with external database efforts (R2K-ISS)

Vicky can be added to science proposals for additional support.

Maurice discussed the Framegrabber for *Alvin* and *Jason2*, which allows image frames to be captured from video sources. It allows the science party instant feedback and it can be used to plan next day dives. The information can also be sent back to shore. Other features include:

- Archiving effort extends real-time data collection
- Web access and security
- Data quality assurance needed (e.g. navigation)
- Derived data sets not included (Imagenex sonar)
- Improves efficiency of science program planning

For additional information about the Framegrabber, visit the website at http://www.whoi.edu/marops/vehicles/Alvin/Alvin_framegrabber.html http://www.whoi.edu/marops/vehicles/Jason/van_cruises.html.

Maurice discussed the experimental shipgrabber <http://4dgeo.whoi.edu/shipdata/index.html>. Presently the shipgrabber is in operation on *Oceanus* (*Knorr* and *Atlantis* trials). The Shipgrabber provides a real-time display of underway data. There is web-based access and online archive access after the cruise has ended. Maurice showed some examples.

Deb Kelley commented that currently the whole dive program (cruise) is contained on one file. She recommended that it would be good if each *Jason2* dive were listed separately.

In other activities, WHOI, SIO and the San Diego Supercomputer Center are working together on a digital data archiving and preservation project including both shipboard and deep submergence vehicle data. NSF/CISE and the Library of Congress fund the effort. The project goals are to:

1. Combine digital library architecture and search/display tools of SIOExplorer with *Alvin* Framegrabber and *Jason* Virtual Van;
2. Test notions of scalability to handle vast volumes of digital video and camera data collected by NDSF vehicles;
3. Establish interoperability between existing data repositories at SIO and WHOI;
4. Develop prototype system to retrieve selected shipboard and *Alvin* data from the Galapagos region for cruises from 1977 to 2005

The Legacy Data contains approximately 70,000 *Alvin* and *Jason* images. Images are mostly *Alvin* shots, but IMS database includes vehicles, people, and “classic” images. <<http://www.whoi.edu/ims/>>

Lastly, Maurice provided a summary of how the archives were used in 2005 and income from the archives. There were 2500 external requests for visual or deep submergence information in 2005. Examples include National Geographic Magazine, Geo Magazine, Houghton Mifflin, Dorling Kindersley, Scholastic, Oxford Univ. Press, Pearson Education IRC, museums, planetariums, and marine scientific associations. There were about 500 press kits plus media events such as the Visions05 cruise, media activities related to NOAA cruises, and a Naval Command college presentation. There were science and educational materials for museum exhibits, television e.g. Discovery Channel, BBC, TLC, History Channel, PBS, and radio broadcasts. Material and information was also provided to educators and authors for books and classroom activities, student competitions like the MATE ROV and LEGO Challenges and outreach websites such as Dive & Discover and Extreme 2005. FY2005 total income received was \$22,989.46. These funds are returned to science. Many images and video clips are provided to the WHOI community, the news media, the scientific community, funding agencies and others at no charge. WHOI also responds to educators around the country sharing information with their classrooms.

Lunch Break

Upgrades to National Deep Submergence Facility:

Alvin* Overhaul Plans** - Dudley Foster reported on *Alvin*'s overhaul plans. His slides are included as ***Appendix XI. The major objective of the overhaul is complete disassembly, inspection and rebuild. Progress can be monitored at <<http://Alvincam.whoi.edu>>. The sub should be back in operation by April 2006.

Overhaul improvements include:

- Redesigned lights & propulsion relay chassis for solid state relays
- Revise mount for Doppler Velocity Log to allow spare interchange
- Titan 4 fully upgraded for 7000m capability
- Replace variable ballast sea water control valve
- Replace explosive bolts with Frangibolts
- Replace Octans gyro with Phins gyro -- improved heading accuracy, INS capable
- Upgrade *Atlantis* USBL to Nautronix NASPos
- WHOI funded *Sentry* tests during sea trials

Roadmap for a new acoustic navigation system - Jon Howland reported on navigation upgrades. His slides are included as ***Appendix XII***. He explained that a new system is needed because of obsolescence of current hardware systems and reduced reliability. Some hardware is over 20 years old. There are impending new requirements for navigational capabilities (Ridge DB, ISS, multiple vehicle nav) and there is a need for improved efficiency. The system currently has:

- Benthos 455 Acoustic Signal Processor (ROV, *Alvin*)
- LBL PC
- Custom Hardware (*Alvin*)
- DP/Display PC (ROV)

- DVLNav PC (ROV, *Alvin*)

They would like the upgraded system to have:

- “Generic” ASP usable with all vehicles (ROV, *Alvin*, AUVs)
- Computational engine
- Multiple customizable displays
- “Generic” I/O
- Extendable/supportable

A two-phase approach is planned. Phase A would include:

- Development/procurement of new ASP
- Development of requirements (ongoing)
- Promulgation to potential vendors/internal developers
- System development/test
- Software port/enhancement as necessary
- Hardware procurement/replacement

The Phase A requirements call for compatibility with existing vehicles/modes and compatibility with simultaneous multiple vehicle navigation. Phase B plans include enhancement to DVLNav capabilities and implementation of new hardware/software across vehicle fleet.

Suction Samplers – Andy Bowen reported on the status of the suction samplers (*Appendix XIII*). The sampler design would be a modular system suitable for use on both *Alvin* and *Jason2*. It would have removable “cassettes” with up to 3” inlet with variable flow rate. There would be no cross-contamination of samples. They want the system to be compatible with elevator use.

The design concept is complete with detailed component design underway. The main system suction pump was tested on *Jason2* during the 2005 operating season. The test of final system is planned for the April ‘06 *Jason2* engineering dive.

Bob Vrijenhoek recommended that it would be useful to have extra canisters; a surplus is needed.

Rock Drill – Maurice Tivey reported on the purchase of the ROV rock drill from MBARI and transfer to WHOI in August 2005 through a grant from NSF. His slides are included as *Appendix XIV*. The drill was used during Deb Kelley’s *Thompson/Jason2* cruise in September 2005. During the cruise holes were reamed out to 20” depth using the drill. Five cores were collected (15 – 45 cm) and five in-situ incubators installed. Those interested in using the rock drill should visit the cruise planning website at <http://www.whoi.edu/sites/rovd Drill/>. It is an interactive form. The estimated cost for use of the drill for a 2-week cruise is about \$27,000. The cost can be included in the science proposal.

Vibracorer – Eli Silver reported on vibracorers and indicated that if there is community interest, vibracorers can be acquired. MBARI has one for each of their vessels and has offered to build one for NDSF. Two things are needed, NSF funding to buy the vibracorer and NSF must see that the community has a need for this. If anyone is interested in having a vibracorer available for use, he/she should contact him. The vibracorer only cores in the vertical orientation for now

and the corer is about 3 inches in diameter. Drawings of the vibracorer are available. It is hydraulic operated. Eli would like to use a vibracorer on *Jason2*.

Deep Submergence Scheduling: 2006 and Beyond:

2006 NDSF Schedules and Beyond - Liz Caporelli presented the 2006 NDSF schedule (*Appendix XV*). The *Atlantis/Alvin* schedule includes 264 operating days. Science operations are expected to begin in May after completion of *Alvin*'s overhaul. Work areas include the Gulf of Mexico, Costa Rica, off California and Oregon, East Pacific Rise and Juan de Fuca. The proposed ROV 2006 ROV schedule includes 169 days (100 NSF days, NOAA 62 pending).

Liz provided a listing of 2007 NDSF requests by PI. There are eight 2007 funded *Alvin* requests for 66 days. Pending and new requests total 62 days. Funded requests for *Alvin* or ROVs include five requests for a total of 26 days. There are eighteen requests for a total of 146 NDSF pending and new requests. Funded *Jason2* requests total 95 days for 3 ship time requests. Pending and new *Jason2* Requests total Days 139.

NDSF requests for 2007 and Geographic Distribution - Annette DeSilva provided a summary of NDSF requests for 2007 and beyond along with maps showing the geographic distribution of the requests. Her slides are included as *Appendix XVI*. Funded work areas for 2007 include the Mid Atlantic Ridge, Juan de Fuca, North East Pacific Rise, South Pacific, and Off Hawaii.

Operational Summary and Collaborations with Other Deep Submergence Activities:

NOAA/HURL - John Smith (NOAA) provided a report on HURL programs. His slides are included as *Appendix XVII*. 2005 HURL accomplishments included:

- HURL organized a consortium of partners & led a US/internationally funded cruise to New Zealand
- Upgraded scientific capability of *Pisces IV & V* and ROV *RCV-150*
- 5-month expedition to the South Pacific including American Samoa, New Zealand, U.S. Line Islands.

John reviewed HURL's 2005 operational areas. From March to July HURL carried out an expedition to American Samoa, New Zealand, and the U.S. Line Islands. There were eight cruise legs with 21 study sites. There were twelve chief/co-chief scientists with 58 science team participants from 21 participating institutions. *Pisces* completed 6 out of 56 science dives and there were 17 *RCV-150* ROV dives.

Highlights of the expedition included:

- First dives on Vailulu'u hot spot volcano
- First dives on 11 seamount volcanoes in the Tonga-Kermadec Island Arc
- First deep habitat mapping around American Samoa
- First deep dives on 4 atolls in American Samoa and the U.S. Line Islands

HURL's plans for 2006 included:

- Offer RFP in early '06 for dives in 2007
- Refit *Pisces IV*, add new hydraulic system
- Upgrade shipboard multibeam system

- Carry out 3 legs of science dives in the Main Hawaiian Islands, Northwestern HI Islands, and Northern Line Islands.

DESSC Activities and Issues:

Establishing Criteria for Bringing New Assets into the NDSF – Deb Kelley reported that the DESSC is drafting criteria for bringing new assets into the NDSF. They hope to have a final draft available at their next meeting in late spring.

HOV Safety Standards - Debbie Kelley provided a report on the effort to establish Safety Standards for Human Occupied Vehicles (HOVs). Her slides are included as *Appendix XVIII*. NSF and NOAA have provided DESSC with a draft task statement to establish safety standards for HOVs. The safety standards should address certification of the vehicle, the ship, the handling system, the operation, and training (vehicle and ship crew). The suggested membership includes:

- Science users (including a DESSC rep)
- RVOC Safety Committee representative
- HOV operators from WHOI, HBOI, and HURL
- HOV pilots
- Marine Superintendent
- Ship Captain
- Navy representative (NAVSEA Certification)
- NOAA Representative

This effort might span two years.

Community Input on science instrumentation, tools, sensors, etc - Deb Kelley reported that a list of planned sensors for the replacement HOV is available at http://www.unols.org/committees/dessc/replacement_HOV/RHOV_science_sensor_list.PDF and in *Appendix XIX*. Current sensors planned include:

Navigation Sensors:

- Depth transducers (2)
- Inertial Navigation System (INS).
- Doppler Velocity Log (DVL)
- Search Sonar 800 m range
- Altimeter

Environmental Sensors:

- Seawater Conductivity and Temperature Probe
- Portable Temperature Probes - new version
- Sound Velocity Profile similar to current one

Image Sensors

- Pan and Tilt (2) Observer controlled-use current *Alvin* 3-chips
- External Digital Still Camera (DSC) similar to *Alvin*
- Bottom Mounted Photo Mosaicing - not yet determined
- Handheld DSC, Handheld Video Camera, Lasers

A community on-line survey site will be posted in the future. Input is appreciated.

Replacement HOV Project Status - Bob Brown reported on the status of the Replacement HOV (RHOV) design/build project (see *Appendix XX*). The personnel sphere design contract was signed with Southwest Research Institute on 1 November. It will be a high priority to purchase titanium early to avoid escalating titanium prices. The syntactic buoyancy foam material has improved from 33 lbs/ft³ to 32 lbs/ft³. Development is continuing for lighter foam. The battery vendor study is completed. Cells from the following vendors have been selected for baseline testing: Eagle-Picher – Kokam, Lithium Technology Corporation, Lithion (tentative), and Sanyo-GS (tentative). A test plan has been developed. Review of the vehicle specifications have been completed by the *Alvin* Operations and Engineering groups, and the DSL group. It is currently under review by the RHOV Oversight Committee. Construction of the replacement vehicle should be complete by late spring 2009. *Alvin* would be taken out of service about four to five months before the replacement vehicle becomes operational. For more information about the project, visit http://www.unols.org/committees/dessc/replacement_HOV/replacement_hov.html.

Break

RIDGE Data Management Office Report - Dale Chayes reported on the data management project for Ridge2000 and MARGINS. His slides are included as *Appendix XXI*. Data systems for science are an enabling resource for obtaining new knowledge. It enables testing and verification of observations and hypotheses and provides access to underutilized data sets for new applications. They are resources that can be exploited for education and outreach. The goals of the program are to:

- Enable R2K & MARGINS communities to find what data have been collected, where, when, and by whom
- Provide access to the data
- Preserve data for future use (lifetime of the data)
- Facilitate visualization & exploration of the data.

They will need to handle large and diverse datasets and serve a diverse user community - non-specialist and specialist access.

Dale's slides provided many examples of the on-line system features (DataLink search, DataLink map view, show cruise tracks, downloads, deployed instrument example, map view of instruments, and NDSL image library link). There are standard forms for reporting cruise metadata. The system includes a map-based tool for exploring marine geosciences data.

Future plans include:

- Continue ingesting data and metadata
- Improved Project & Process Management
- Refine search capability
- Serve as OBIS data provider
- Become a GEON node
- Improve procedures for data & metadata capture
- Improved interface to NDSF Virtual Van
- Develop robust data quality metrics (start w/ MB)
- Web Services enable - GMA
- Google Earth

Discussion followed. Mike Perfit asked if the database gets updated if equipment is removed. Dale indicated that the user would need to let him know about equipment removals.

Maurice Tivey commented that there are a lot of DVDs that are in the archives, but are not in the data system. Dale indicated that they are exploring ways to get this into the system. The problems reside with the science user equipment that collects the data and then the data goes home with the PI.

Chuck Fisher commented that at the November RIDGE meeting the community was very excited about getting data into the system. There was the realization that this is a great way to establish collaborations.

Outreach, Education, Archeology, and other Deep Submergence Programs:

RIDGE Lectureship Program - Chuck Fisher reported that the RIDGE Lectureship Program is in its third year. Dan Fornari, Moya Tolstoy, Peter Girguis, and Chris German are lecturers this year. Chris will fly to China and India to give lectures.

In other activities, RIDGE education programs are going strong. Liz Goehring of the RIDGE Office will stay with the office when it moves to Scripps Institution of Oceanography.

MATE Program - Jill Zande introduced Lani Clough, who is new to the MATE Office. Lani presented a report on the MATE Technical Internship Program. Her slides are included as *Appendix XXII*. Since 1999, MATE placed 132 students on research vessels, labs and industry settings. The students are from community colleges & universities. Fifty-seven percent were women, 43% were men, and 27% were ethnic minorities. Fifty-four received marine technology jobs as a result of their internship. Lani provided a few examples.

Lani provided information about the ROV competition program. To date more than 1,000 students have worked in teams to tackle tasks based on the real world. The 2005 competition was held in June at NASA's Johnson Space Center.

Dive and Discover – Dan Fornari reported on Dive and Discover activities. The system is receiving a major upgrade. In 2006, the Dive and Discover expedition will be to the Antarctic in February/March.

REVEL – Deb Kelley provided the REVEL report for Veronique Robigou who could not attend the meeting. Her slides are included as *Appendix XXVI*. 2005 was the last year of REVEL. The *Thompson* cruise, Visions05, included five REVEL teachers and a mentor. They were from Georgia, Idaho, New York, Oregon, and Pennsylvania. They were actively involved in the cruise and also wrote the website for the cruise. This is the last year of funding for this program. Veronique is working to extend the funding. Eighty teachers have participated in REVEL.

Ocean Exploration - Catalina Martinez reported that the NOAA Ocean Exploration projects require that 10% of the funding goes to education.

Long-Range Planning Issues

Ocean Observatory Initiative - Bob Detrick provided a report on the status of the Ocean Observatory Initiative (OOI). His slides are included as *Appendix XXIII*. They are hopeful that OOI will receive funding to begin installation in FY07. BY 2008/2009, as the observatory is installed, additional vehicles will be needed.

Some of the OOI activities that are underway include staffing the Project Office, establishment of Implementing Organizations (IOs), establishing advisory committees to facilitate communications with the community, and engaging the community in the observatory network design to insure that observatory research opportunities are maximized (Request for Assistance (RFA) and D&I Workshop).

Rick Jahnke has been serving as the acting ORION Program Director. JOI is in the final stages of hiring a permanent, full-time ORION Program Director who will start in 2006. Stu Williams was hired in Fall 2005 as OOI's Project Manager. Peter Milne and Emily Griffin are additional staff in the ORION Office. OOI is sharing staff with JOI/IODP to provide expertise in Project Management Control Systems/Earned Value Management and Cyberinfrastructure.

In 2006, the ORION Program Office will be soliciting proposals for Implementing Organizations (IOs) for management of the procurement and installation of observatory networks for the NSF-funded Ocean Observatories Initiative leading to the operation of these facilities for the ORION Program. An IO may consist of an academic institution, a consortia of academic institutions or an academic-industry partnership. Separate IOs may be chosen for the coastal, RCO and global components of the OOI, as well as cyberinfrastructure.

Bob reviewed that ORION Advisory Committees and their respective chairs. He is serving as the Chair of the Observatory Steering Committee

In January 2006, the RFP for RCO and CI IOs are due. In February, the draft OOI implementation plan is expected to be completed. An ORION Design & Implementation Workshop will be held in March. If all goes as planned, in fall 2007 the construction phase of OOI begins and will last through 2012.

The Request for Assistance (RFA) response has been very high, with about 550 investigators involved.

For additional information about ORION, visit, <<http://www.orionprogram.org/>>.

MARS Cabled Observatory - Steve Etchemendy (MBARI) reported on the MARS Cabled Observatory status. His slides are included as *Appendix XXIV*. Monterey Accelerated Research System (MARS) is a test-bed for Regional Scale Cabled Observatories. The start of full operations is planned for fall 2006. Information about the program can be found at <<http://www.mbari.org/mars/>>. MARS is a 62 km fiber optic cable with a single undersea node at .9 km depth. It has a data rate of 100 Mbits per second and provides 10 kW of power to 8 instrument ports.

Steve Etchemendy and Gene Massion are the MARS Facility Co-PIs. Craig Dawe heads MARS ROV Operations.

Neptune Canada - Deb Kelley reported that Neptune Canada is moving forward.

HROV Status Report - Andy Bowen (WHOI) provided that status of the Hybrid ROV (HROV) development effort. His viewgraphs are included as *Appendix XXV*. The vehicle can operate in two different modes, *AUV* or tethered. In the tethered mode, the vehicle can support a manipulator. The vehicle payload capability is 25 kg. The battery will be a rechargeable Lithium Ion. There will be two aft thrusters, two vertical and one lateral thruster. Sensors include a magnetometer and a CTD.

The dynamic model of the vehicle is complete with the results being incorporated into the final physical layout. All ceramic pressure cases have been successfully delivered and are awaiting final assembly and pressure test. Ceramic flotation sphere production is on schedule with delivery of the complete order expected early in 2006. Manipulator selection is complete with the workspace design underway. The prototype microfiber tether canister is completed with testing planned using *ABE* in December 2005 on *New Horizon*. Deep fiber trials (6000m) are planned for April 2006 near Guam. Control computer hardware selection/evaluation is underway and Lithium ion battery packs are on order. The prototype Light Emitting Diode array and components were tested on *Jason*. Initial sea trials of the vehicle system are pending 2007 ship schedules.

Other business – Deb reported that the next winter DESSC meeting would be held at the Benthic Ecology meeting in 2007. This will be in place of the Fall AGU meeting.

UNOLS AGU Booth #228 – Meeting participants were encouraged to visit the UNOLS booth.

1700 Adjourn