

**UNOLS DEep Submergence Science Committee (DESSC)
Annual Community Meeting
Sunday, December 13, 2009
San Francisco, CA 94103
Location: Moscone Center South- Room: 302**

Executive Summary:

The Deep Submergence Science Committee (DESSC) met on December 13, 2009 at the Moscone Center in San Francisco, CA. The meeting was chaired by Deborah Kelley. Federal agency representatives provided budget information as well as agency priorities. A variety of reports were made by the National Deep Submergence Facility (NDSF) operator summarizing facility operations, planned activities, and system upgrades. Principal Investigators who used submergence vehicles in 2009 provided cruise highlights and assessments. Two special sessions were held in the afternoon. The first session provided a report on the status of the design, development, and construction of the replacement HOV (RHOV). Options for science sea trials of the RHOV were discussed. The second session highlighted the hybrid ROV, *Nereus*, and its science operations in 2009.

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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 13, 2009. The meeting was held at the Moscone Center in San Francisco, CA. The agenda for the meeting is included as *Appendix I*. The list of attendees is included as *Appendix II*.

Deb announced that this is her last meeting as the DESSC Chair. Peter Girguis will take over as Chair following the meeting. Deb will stay on the committee during 2010 as a member. Three positions will open on DESSC in the fall and there will be a call for nominations.

Agency Reports

National Science Foundation (NSF) – Brian Midson reported that in 2009 NSF was fortunate to receive \$3B in stimulus funds. In 2010 a budget increase of 6.9% is anticipated.

In the fall of this year (2009) the preliminary design review (PDR) for the Replacement Human Occupied Vehicle (RHOV) was conducted. NSF has given Woods Hole Oceanographic Institution (WHOI) permission to move forward on some of the RHOV project long-lead items.

Question:

- John Delaney – What is the long term plans for academic fleet renewal? Brian – NSF has funded the construction of the Alaska Region Research Vessel and the ship is expected to enter service in 2013. Although we are facing budgetary constraints, NSF recognizes that fleet renewal efforts need to continue.

National Oceanographic and Atmospheric Administration (NOAA) - Karen Kohanowich could not attend the meeting, but sent her report (*Appendix III*). Sandy Shor provided a summary of the report to the meeting participants.

The report summarized the Hawai'i Undersea Research Laboratory (HURL) and NOAA's Undersea Research Center for Hawaii and the Western Pacific activities. The HURL facilities include the HOVs *Pisces IV* and *V*, the ROV *RCV-150*, and R/V *Ka'imikai-o-Kanaloa (KoK)*. A major refit for the support ship R/V *KoK* was completed. During February to April 2009, there was a dive program in the Main Hawaiian Islands for chemical and conventional munitions studies with 40 *Pisces* dives and 18 ROV days. Following the dive program, *Pisces IV* underwent a refit period and ABS recertification. Refit of *Pisces V* is planned in 2010.

HURL's full resolution High Definition tapeless video system is operational and the standard PI product is now a disk drive. HURL is ending 2009 with another dive program in the Main Islands. A highlight of the year included National Geographic and Nova Television specials on HURL's Marine Archeology operations searching for the Japanese minisubs that are sunk off Hawaii.

In early 2010, a dive program to the Main Islands is planned.

New HURL capabilities include full High Definition (HD) video that is taken using a mini-Zeus camera. Images are recorded with Convergent Design's Flash XDR then transferred to hard drive.

Of particular interest to the deep submergence science community is a new arrangement between NOAA and NSF where NSF will support highly ranked science projects using the *Pisces* submersibles.

Navy - Mike Prince provided the report for Navy. Tim Schnoor sends his apologies for not attending. The Navy is moving forward with the acquisition of the two Ocean Class Research Vessels (OCRV). Mike Prince is working part time with the Navy to assist with the project.

Discussion:

- Andy Bowen – Is there a way to insure that the new OCRVs can support deep submergence assets?

- Dan Fornari – UNOLS held community workshops and there have been many on-line surveys for input on vessel science mission requirements (SMRs).
- Annette DeSilva– There are SMRs for each class of UNOLS vessels. We continually work to update these and community input is needed. Please contribute.
- Mike – The OCRV performance specifications are based on the SMRs, but constrained by the cost.
- Annette – The Ocean Class vessels are expected to have 20 science berths.
- Chris – The science berth constraint presents a problem for ROV operations. We have learned that the ROV users require additional science berths from their user debrief interviews. Mike – The OCRV will be more limited in terms of berths than *Kilo Moana*.
- Andy – Can we formalize a process for providing deep submergence input on the OCRV performance specs? Mike – The performance specs have been available for a long time. DESSC can take a look at these and provide feedback.
- Ian McDonald– In the selection of the Ocean Class will there consideration of distribution of the fleet? Mike - It is possible that the two highest ranked proposals come from the same area. John Delaney – UNOLS vessels are aging. The Global vessels have had increasing number of failures with their propulsion systems. The parts required for repair sometimes have very long lead-times. (Example – *Thompson* seals and *Melville* prop). A spare parts pool is needed for long-lead items. Will UNOLS take this under consideration?
- Dana Yoerger – The system is broken. Two cruises were lost this year because of system failures and availability of spares.
- Mike Prince – The Navy is fully aware of the problems and they have some spare parts.
- Annette – We will bring this issue of aging ships, lack of spare parts, and lost cruises to the attention of the Fleet Improvement Committee.

UNOLS Announcements – Annette DeSilva provided a report on UNOLS activities in 2009 and the goals for the upcoming year. Her slides are included as *Appendix IV*.

The UNOLS Office moved from Moss Landing Marine Labs to URI on May 1, 2009 and the new staff is in place with Jon Alberts as the Executive Secretary. In 2009 the UNOLS Office published the updated UNOLS Fleet Improvement Plan (available on the UNOLS website), a new UNOLS Brochure: “The Research Fleet,” and the update of the Research Vessel Safety Standards (RVSS). Copies of the brochure and the RVSS are available from the UNOLS Office.

The UNOLS Council set two new goals for 2010 which include improving the coordination of Polar research vessels by enhancing the relationship between UNOLS and NSF’s Office of Polar Programs. The other goal is for UNOLS to explore strategies for how making the present and future fleet more environmentally sustainable.

At the request of DESSC, UNOLS ship schedulers and users are being informed about ship operations Juan de Fuca. Karen Bemis (Ridge) is compiling the planned ship use data and they are being circulated. Slides on the planned 2010 JdF ship cruises are included in Appendix IV.

National Deep Submergence Facility (NDSF) Operators Report:

NDSF Announcements – Susan Humphris provide information about various personnel changes at WHOI and within NDSF. At the next DESSC meeting there should be a new WHOI Vice President of Operations in place. There were excellent candidates and an appointment is expected soon. Chris German’s term as the NDSF Chief Scientist ends at the end of 2009 and WHOI has decided to

reappoint Chris for another 4-year term. His reappointment will lend continuity to NDSF at a time when there have been a variety of personnel changes. Lastly, Susan reported that she has agreed to stay as the PI for the replacement HOV project.

Summary of Upgrades to NDSF vehicles – Andy Bowen reported on NDSF improvement and activities in 2009/10. NDSF received American Recovery and Reinvestment Act (ARRA) funds that will be applied to upgrades. Andy's slides are included as *Appendix V*.

The *Alvin* activities and improvements included:

- Improvement to the spares inventory
- Reson Multibeam integration is ongoing
- A new pilot was qualified, with two more expected in 2010.
- Recently WHOI had difficulties shipping equipment to Manzanilla. The *Alvin* team sacrificed their personal time to support the equipment switch out.

For *Jason*, two maintenance periods are planned in 2010 at WHOI. Integration of a new Schilling Titan 4 Manipulator that is identical to *Alvin*'s is planned. Launch and Recovery System (LARS) development is in progress with integration planned in 2011/12. A Reson Sonar will be acquired in 2010.

Some general upgrades and improvements include:

- USBL integration is in progress. There are three complete systems with spares.
- HDTV integration is in progress and will be completed during the second quarter of 2010.
- Best practices for archive and recording are being examined.
- Purchase of an Edgetech SBP/SS
- Full integration of the USBL into the pre-existing navigation system, including improved tools
- Development of cross-platform tools for Reson sonar processing
- Data repository improvements
- Migration to WHOI of MGDS-developed metadata search portal progressing
- Virtual van now allows search/extraction of data by lowering
- Revision to Event Loggers

Discussion:

- Dan Fornari – The Sonardyne 7866 transponder (USBL) is an enabling technology. It is very important for the group to understand the system's trade-offs and what its capabilities consist of. Can you get the resolution you need using USBL?
- Andy Bowen – Perhaps WHOI should produce a paper on the baseline USBL standards. The USBL is not fully appreciated and the real-time aspects have important implications. Perhaps there could be a workshop demonstrating how to use the USBL most effectively. It could be added to a future DESSC meeting.
- Dana Yoerger – A long conversation on this topic is needed. Ship operations must also be considered. If you want the ship to remain stationary in one spot, you will get great data.
- DESSC should consider ways to educate the community on the USBL.
- Mike Prince – Is there anything that the ship would need to support the USBL? If so, it should be documented for consideration with the Ocean Class.
- Sandy Shor – The FINS is controlled and an export license is needed it to transport it. It takes some care to get the permits in place.

- Dave Caress – MBARI uses the FINS. It is good, but time must be allotted for FINS notification.

Deep Submergence Scheduling: 2010 and Beyond – Chris German presented the 2009 schedules and maps of the cruise sites for the NDSF vehicles. His slides are included as *Appendix VI*.

In 2009 there were 134 *Alvin* days, 178 *Jason* days and 31 *Sentry* days. The 2010 schedules include 149 *Alvin* days, 122 *Jason* days, and 68 *Sentry* days. The 2011 vehicle requests include 84 funded days for the NDSF vehicles and an additional 191 pending days.

Break

PI Reports:

NDSF 2009 Vehicle Operations Summary – Chris German summarized the NDSF vehicle operations that were carried out in 2009. His slides are included as *Appendix VII*.

Alvin completed seven cruises so far in 2009 with 81 dives. Operational areas included Costa Rica, Juan de Fuca, Guaymas Basin, and Southern California. Three dives were lost to weather, two to mechanical issues, and one to clearance. The average dive duration was 7.46 hrs with an average bottom time of 5.32 hours.

Jason completed seven cruises with operations in the Tasman Sea, Mariana Arc, Lau Basin, Gulf of Mexico, and Loihi Seamount. There were 97 lowerings with over 1,260 hours of bottom time. *Jason* was used with *TG Thompson*, *Ron Brown*, and *Kilo Moana*.

Sentry completed two cruises with operations in the Gulf of Mexico and Southern California. The vehicle had 20 lowerings for over 156 survey hours and 327 kilometers surveyed. The vessels used were the *Brooks McCall* and *Atlantis*.

***Alvin* PI Reports** – The slides provided by the *Alvin* users are included as *Appendix VIII*.

Deb Kelley presented the slides from Geoff Wheat's *Alvin* cruise off Costa Rica. PIs included Geoff Wheat, Miriam Kastner, and Evan Solomon. Seven dives were conducted and included recovery and deployment of borehole instruments and data. Measurements of fluid flow and heat flow were made. There were many successful operations, but there were also some issues with the sonar and deep Homer/Transponder. The cruise included extensive education and outreach efforts (see slides for details).

Deb Kelley presented Lisa Levin's slides from her cruise off Costa Rico studying the “Structure and Function of Authigenic Carbonate Ecosystems.” Thirteen *Alvin* dives were conducted. Habitats studied included carbonate rocks, mussel beds, clam beds, tubeworm bushes, bacterial mats, corals, and wood. Night operations included Sea Beam mapping, CTD casts, and multicoring.

Jim Holden reported on his cruise to Endeavour Segment and Axial Volcano in June 2009. There were 13 scheduled *Alvin* dives for three funded programs. Twelve dives were completed with one dive lost to weather and two dives shortened. Overall, the cruise was very successful. The cruise included hydrothermal fluid sampling, sulfide chimney and deposit studies, and basalt sampling.

Deb presented Andreas Teske's slides on her November/December *Alvin* cruise to Guaymas Basin. The program studied microbial methane and sulfur cycling in hydrothermal sediments. Images of the instrumentation used (including the in-situ chemical profiler) during the dives are included in Andreas' slides.

Jason PI Reports – The slides presented by PIs who used *Jason* are included as **Appendix IX**.

Jess Adkins reported on his *Jason* cruise aboard *Thompson* in December 2008 to January 2009. *Jason* was used to collect deep-sea corals south of Tasmania and *ABE* was used to map the sea floor and search for likely deep-sea coral locations. Elevators were used to carry samples, and they came home with about 10,000 samples. It would have been very time consuming to obtain these samples by coring.

The cruise was successful, even in pretty tough weather conditions. They completed 1/3 of the planned *ABE* dives and about 50% of the planned *Jason* dives. HD video with stills is beautiful. NDSF should consider post cruise hard drive data delivery.

Bill Chadwick reported on his *Jason/Thompson* cruise that took place in April. The operating area was 100 KM north of Guam. The program objectives were to characterize longer-term eruptive activity; sample tephra, lava, fluids, gases, biology, eruptive and landslide plumes; and to look for interactions between the volcano and biological community. There were many cruise highlights. There were 17 *Jason* dives with 160 hours of bottom time. The full list of accomplishments is included in the Appendix.

When the site was visited in 2006, they saw a lot of explosive features. When they returned in 2009, they observed slow lava. Bill showed a movie clip. In 2006, the biological community was about 10%. In 2009 the environment was less explosive, but there was much more biology. An image of *Jason* was taken from a camera mounted on *Medea*. Then they used the camera on *Jason*'s arm for close-up work.

- Dan Fornari – The camera mounted on *Medea* provides a birds eye view – how useful was it and should it be considered for future application? Bill – The HD camera on *Medea* was not needed for his program, but it offered an interesting perspective. There is some value of recording regular video from a camera mounted on *Medea*.
- Dan – The images from the camera on *Medea* have some value for outreach purposes.
- John Delaney – It might be better, to have the camera positioned closer to *Jason*, somewhere between *Medea* and *Jason*.
- Deb Kelley – At Lost City it was very valuable having a camera overhead to image the ROV. Better lighting is needed.
- Matt Heinz – The amount of space between the *Jason* and *Medea* needs consideration.

Bill Chadwick reported on Joe Resing's *Jason/Thompson* NE Lau Response cruise in May 2009. The cruise was jointly funded by NOAA and NSF. Seven dives were conducted; five at the erupting West Mata and two at the NE Lau spreading center.

Highlights included a first discovery of molten lava at the Summit of W. Mata. *Jason*'s flexibility added to the success of the cruise.

Only a few problems were experienced. The HD video failed on last dive due to a fiber issue.

- John Delaney – Were there any concerns about the ship working in an actively erupting area? Bill – the plume raises about 100m from the sea floor and then dissipates, so it was not a problem for the ship.
- Dan Fornari – This cruise should be highlighted as a wonderful opportunity for event response and great partnering between UNOLS, NOAA, PIs, and Agencies.
- Cindy Van Dover – What is the scale of the eruptions? How do these compare to the EPR. Dan Fornari – The 2005/6 eruptions were larger.

Ian MacDonald presented Chuck Fisher's slides for the *Jason/Thompson* cruise in May/June 2009 to Lau Basin. There were 12 successful *Jason* lowerings at five different sites on the ELSC. The primary purpose of the program was to study the physiological and behavioral ecology of ELSC vent fauna. Operations included a combination of in-situ imaging and habitat characterization through in-situ measurements of chemistry and temperature. Some very preliminary results indicated no large scale geological or chemical changes on the ELSC and in general, the communities are quite stable with respect to faunal composition. The vehicle cameras worked great!

Ian MacDonald reported on his *Jason/Ron Brown* cruise in August/September 2009 that was funded by MMS and NOAA. The program was for exploration and research of the Northern Gulf of Mexico deepwater natural and artificial hard bottom habitats with emphasis on coral communities. There were some problems encountered with *Sentry* that impacted the science mission. A launch and recovery problem resulted in about 24 hours of down-time. Early dives were limited by inexperience with the USBL navigation system. There were multiple problems with the photographic imaging system. A premature ballast weight release caused unprogrammed termination of about seven dives. Dana Yoerger and Rod Catanach worked hard to fix the problems and *Sentry* was able to survey.

Jason was extremely useful in the collection of corals. Ian furnished the camera system for *Jason* and the *Jason* group was very effective in integrating the camera.

Matt Heinz showed a video provided by Craig Moyer from his *Jason/Kilo Moana* cruise in October 2009. The video demonstrates the labor intensiveness of the operations. If *Medea* is removed from the system the operation would be easier to carry out. NDSF needs community input on the value of *Medea* to the science program.

NDSF Vehicle Debrief Interviews

Bill Chadwick provided a summary of the **2009 *Jason* debrief interviews**. The details of the summary are included as *Appendix X*.

The users appreciated the improvements that had been made to the *Jason* system by WHOI (new control vans, increased vehicle payload, two Kraft arms, more flexibility with dive schedules and turn-around times, and better communication and cooperation).

Issues and questions that came up during the debriefs included:

- Software issues – should there be better training for renav and mosaicing software?
- Is it possible to expand the weather window for launch and recovery?

- HD Video
 - Improved control system and pan-and-tilt for HD video camera is needed
 - What is the best HD format(s) that balance high quality with accessibility for science?
 - Maybe best to have option of multiple formats, including compressed recording to hard disk
- Navigation
 - USBL tested but some problems with drift and positions dependent on ship's heading
 - Future need: processing of non-LBL navigation

Community feedback on the following issues is needed:

- Do we still need a digital still camera (DSC) with HD camera frame grabs?
- Would it be better to have a DSC mounted in the basket for close-up imagery?
- Do we really need 3 cameras recorded to DVD?
- Is there a preferred HD video format for science? Recording has been to tapes and the players are very expensive. This is frustrating for users.

Discussion:

- Dave Caress – MBARI continues to struggle with USBL. He would be very interested on how WHOI approaches this.
- John Delaney – Is the issue of HD viewing because the player is not central? Bill – The HD is recorded to tape and the players cost \$25K each. At full-resolution, there is a lot of data. Delaney – if NSF can't fund each PI to have player, then PIs should be able to scan the data at WHOI and get what they want.
- Jess Adkins – He used Bill Lange's camera during his cruise. He had an issue with the paperwork and policy regarding the use of NDSF data policy. Dan – it would be useful to relook at the policy. DESSC should look at this again.

Mike Tryon summarized the *Alvin* debriefs. The details are included in *Appendix XI*.

All the PIs were very satisfied with their *Alvin* experience and felt that their scientific goals were all met or exceeded. These were repeat users of the facility and many noted significant improvements from previous years.

The issues that were identified included:

Pre-Cruise Planning:

- Despite the advance planning, operating in and out of Costa Rica (Puntarenas) proved difficult due to customs issues and anchorage vs. docking
- Juan de Fuca work required complex planning due to multiple programs occurring in the area such as Neptune-Canada. Most was anticipated but the arrival of MBARI's vessel and ROV was not. Scheduling improvements are needed.

Mobilization/Demobilization - Allowing PIs access to the ship two days in advance of a cruise was greatly appreciated.

Operations:

- The batteries on the sub worked well throughout all but one of the programs. A 6 week layup before one cruise resulted in the sub's batteries being in poor condition and consistently underperforming throughout the cruise. This resulted in 0.5-1 hour reduced bottom times.

- Navigation was hindered by the loss of the forward-looking sonar which failed early on and remained inoperative throughout the remainder of the dive-series and the following cruise. This proved a big setback because this sonar is relied on heavily for target location. NDSF is looking into purchasing a spare.
- There was a problem with generating usable data from the CTD on-board *Alvin* that required more than just the standard SeaBird software. The *Alvin* team was able to resolve this on board.
- There were a few camera issues during the early dive series but all were ultimately rectified and the later dive series reported no camera problems.
- A PI recommended adding an oxygen sensor to *Alvin* with the same dynamic range as used on a CTD. {note - this is planned for the next overhaul}.

Data hand-over is always put off until the end of the cruise and became a problem when there were only a few hours between the last dive and disembarkation. Often there is a significant amount of data copying required after handoff but before disembarkation. On one cruise the DVD copier became unreliable. A better system is needed, possibly copying all data to PI-provided external hard-drive(s) which allow data transfers at much higher rates?

User Recommendations:

- There should be a planned back-up for the Sonar on *Alvin*.
- Effort should be made to improve communications between the SSSGs and the *Alvin* Group with regard to data transfer.
- More attention should be paid to the still cameras on *Alvin*.
- One PI noted that the ship's IT system was showing its age.

Jeff Karson summarized the ***Sentry Debriefs***. The details are included as ***Appendix XII***.

The first *Sentry* cruise had a lot of problems, but the second cruise was much better. Issues that were reported include:

- During operations at sea there were dive weight release problems
- There were camera Problems: unexpected shut-off, focus, strobe synchronization;
- In summary, *Sentry* was sent to sea before it was fully ready.

Summary of WHOI's Response to debriefs - Andy Bowen reviewed WHOI's summary to the NDSF. The full details are provided in ***Appendix XIII***.

The spares and parts that have been acquired for Alvin include:

- 1 Spare 600 Khz ADCP to improve mapping capabilities
- 1 Spare plug and play external digital still camera.
- 2 Spare forward looking SeaKing Tritech Sonar
- 2 Spare Sonardyne Deep Homer Probes for full *Alvin* depth capabilities.
- 2 New internal digital HD hand held video cameras c/w ship board duplication decks.
- 2 Spare DSP&L Multi SeaCams (pencil cams).
- 4 Spare DSP&L LED lights.
- 6 McLane 4 ball float sets for elevator work
- The Digital still camera have been installed on it's own pan and tilt

Andy reported on many corrective measures that will be implemented to address the *Jason* problems. One major upgrade is with the Launch and Recovery System (LARS). NSF has

provided funding to develop a new LARS. It will have important implications with respect to shipping, deck loading, and fitting on the future Ocean class vessels. WHOI will provide a report about the LARS options at the DESSC's spring meeting.

As for *Sentry*, it is a new system and it was not ready for operation.

Certificate of Appreciation – Deb Kelley was honored for her many years of service as the DESSC Chair and she was presented with a plaque of appreciation.

Lunch Break

Afternoon – Special Session I: The Replacement Human Occupied Vehicle (RHOV) – Susan Humphris provided an update on the RHOV project. Her slides are included as ***Appendix XIV***. The slides provide the project status, timeline, capabilities, and budget. A staged approach will be applied to the project. The sphere is currently being fabricated. In Stage 1 (or A-4500), the new sphere will be installed into *Alvin*, but the vehicle will still be rated for 4500m. In Stage 2, the vehicle will be rated to 6500m.

The A-4500 will have new batteries. Lead acid batteries have been very reliable. WHOI has done an exhaustive evaluation of batteries. Lithium Ion batteries seem optimal, but the technology is not mature enough at this time. For the interim vehicle, lead acid batteries will be used. They hope to begin a battery evaluation/development effort.

Next Chris German presented plans for a science “proving” cruise that would demonstrate the readiness of the vehicle. The cruise would take place after completion of the vehicle and before science operations begin (~ November 2011). The community would participate in the cruise by submitting proposals for the cruise opportunity. There would be some cruise constraints, such as area of operation. The goal would be to plan a cruise that fully tests the capabilities of the new vehicle. Chris' slides are included in ***Appendix XIV***.

Discussion:

- Ian MacDonald – The science verification cruise will require deep water to test the A-4500 to the full 4500m.
- Alex Isern – A 30 day science test cruise will cost \$1.5M. There is a lot to test and she wonders if it can all fit into one cruise.
- Susan – Sea trials are part of the project and will be funded from the project budget.
- Dolly – Some of the things that Chris suggested for testing, should actually be tested during the sea trials.
- Alex – The science test cruise is a science cruise so there should be an expectation of getting science accomplished.
- Jim Holden – Can you comment on the batteries and energy capacity? Are there any efficiencies with the new vehicle? Pat Hickey – We are stuck with the lead acid for now.
- Deb Kelley – What will be the payload capability of the new vehicle? Susan – The new vehicle will have a capability of 200 lbs.
- Annette – An announcement that alerts the community to the science test cruise opportunity will need to be distributed.
- Cindy – Can DESSC members participate in the engineering dives? Pat – Before classification of the new vehicles, observers are not permitted on dives.

Break

Afternoon – Special Session II: HROV *Nereus* – Andy Bowen provided an overview of the *Nereus* system and highlights from its 2009 cruises. His slides are included as ***Appendix XV***.

In 2009, *Nereus* was used in the Mariana Expedition from R/V *Kilo Moana*. The cruise consisted of 14 days of deep ocean engineering trials. Patty Fryer and Tim Shank participated as science observers. A highlight of the cruise, was when *Nereus* reached 10,902 meters in the Challenger Deep on May 31 2009. During the trials, the fiber broke a couple of times. The cause is unknown, but both breaks were from the same fiber canister. *Nereus* has sampling capabilities, but doesn't have the payload capacity of *Alvin* or *Jason*.

Nereus was also used in the Cayman Trough. Chris German was the co-PI and the vehicle was deployed from R/V *Cape Hatteras*. An objective of the cruise was to locate any hydrothermal activity through the use of AUVs and CTDs. R/V *Hatteras* is a 40m vessel and does not have a dynamic positioning (DP) system. The ship day rate is about \$10k/day. The cruise proved the feasibility of supporting *Nereus* from a smaller class ship, but also identified some constraints; such as, limited science party berths and tighter weather windows. During this cruise *Nereus* was used in an AUV mode for the first time. No hydrothermal vents were found during the expedition, but some possible signals were detected.

Discussion:

- Bill Chadwick – How does the weather window for *Nereus* compare to that of *Jason's*? Andy – It is probably a little narrower, but the *Nereus* ops could probably be better optimized.
- Bill – How many people at sea does it take to operate *Nereus*? Andy - 8 in the AUV mode and 7 in the ROV mode.
- Mike – What was the ship doing when you were in ROV mode? Andy – The ship basically stayed in one place.
- Annette – Are the 8 AUV people the same as the 7 ROV people? Andy – No they are not, but hope to be in the future. Annette – Was it an easy transfer from ROV to AUV mode. Andy – No, it took two days to swap out the vehicles.

Closing Remarks - Deb Kelley thanked everyone for attending the meeting. John Delaney thanked Deb for her many years of leadership.

The meeting Adjourned at 4:15 pm.