Alvin de-brief summaries - 12/08

Five cruises for 67 dives

Luther/Nooner	Jun 2008	EPR
Lee/Di Iorio	Jul 2008	Juan de Fuca
Cowen/Becker	Aug 2008	Cascadia
Holden	Sep 2008	Juan de Fuca Endeavor
Sievert	Oct 2008	Guaymas EPR

Alvin de-brief summaries - 12/08

Overview:

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

All personnel from Captain to deck crew, Expedition Leader, pilots, and engineers were at various times singled out for praise. The Alvin team was universally praised for its professionalism.

The following is an overview of some of the issues that came up during the cruises. Some of these are problems that have or will require some sort of corrective action while others are issues beyond the NDSF's control but presented here for their educational value to future users.

Alvin de-brief issues - 12/08

Pre-Cruise Planning:

All PIs satisfied with planning in general with only a few issues. There were many complex operations issues from integrating a variety of user-supplied equipment to the inclusion of a legally blind observer participating in an Alvin dive. These worked out really well.

There were continuing issues with securing clearances from foreign authorities and the Navy that have caused delays in operations in recent years.

In one case the EL was unavailable for the conference call and the Ops Manager filled in. The PI thought it would have been better if the EL had been available for the conference call.

A PI had requested Jason for his operations but got Alvin due to NDSF programming constraints. He thought this might not have been as successful as using Jason.

Alvin de-brief issues - 12/08

<u>Mobilization/Demobilization</u>:

This went better than in previous years with all participants satisfied with the results. Those who showed up in port early to prepare were generally much better off. This was particularly important for projects with very short transits to the first dive site. We recommend science parties show up early as possible.

There is continuing dissatisfaction, for financial reasons, with not being allowed to sleep on board prior to the night before sailing (this is a ship operator's constraint, not NDSF).

Some PI's chose not to use the ship's agent because of prior dissatisfaction on that front.

When dealing with foreign authorities there can be unexpected delays. What was thought to be a simple small-boat transfer of personnel took 6 hours to complete because the local authorities decided they needed to clear the entire ship rather than just the arriving/departing scientists.

Alvin de-brief issues - 12/08

Operations - Vehicle:

All PIs reported that Alvin performed well.

Batteries worked very well. Even with long dives, few dives ended due to lack of power

In one case the Schilling manipulator arm was not getting full grip. This was fixed at sea.

The only major problem was when one of the manipulator arms fell off early in a dive. This was handled very calmly and professionally but nonetheless that entire dive was lost in terms of science and so was another dive which had to be dedicated to retrieving the manipulator from the seafloor. The fault was diagnosed to be due to new Frangibolts that had been installed to replace the explosive bolts. New larger/stronger bolts have since been installed.

Alvin de-brief issues - 12/08

Operations - NDSF Equipment:

Navigation continues to be an intermittent problem for some PIs. For two programs both DVL and LBL were problematic with DVL frequently inoperable and sometimes neither operational. Another had good LBL but DVL did not function on a number of dives. Use of ship-board USBL while Alvin remained stationary at the seafloor could not always resolve which of two or more close sites Alvin was on, critical at Endeavor and CORK sites. A further issue relating to the shipboard USBL system was that this is what the AUV was relying upon to initiate its navigation. PIs reported that Bruce, Sean and Mark were active at sea trying to get these systems to work right.

The only other problems reported were a broken suction sampler on one cruise and the focus controls for the starboard manipulator 3-Chip camera inoperable on one cruise.

Alvin de-brief issues - 12/08

Operations - User Equipment:

For this series of cruises there was much more user-provided equipment interfaced with Alvin than typically. These went quite well with few exceptions. This success was principally due to experienced PIs and from the PI's striving to minimize any changes to the science basket between consecutive dives.

Success in this area always requires thorough pre-cruise preparation and interaction between the science and Alvin personnel well in advance.

Alvin de-brief issues - 12/08

Data hand-over:

There were some issues with DVD copying – not clear if this was hardware (e.g. Alvin Group DVD copier) or different batch of blank DVDs. There may be a longer-term problem with the status of the DVD copier.

Otherwise the PIs reported that data handover went very well with data provided both in disk-form and loaded onto PI-provided external disk drive.

Alvin de-brief issues - 12/08

Other:

AUV operations could be programmed quite successfully alongside Alvin. The typical sequence was that the AUV be launched at 2am to start its program, Alvin dived the next morning and then the AUV was recovered after Alvin returned to the ship. 12 AUV dives were conducted in this way, 5 of which were fully successful.

SENTRY/ ABE debrief summary - 12/08

Delaney-Kelley	July - August 2008	Thompson (Sentry)	Axial-Hydrate Ridge
Lin	August-Sept 2008	Da Yan Yi Hao (ABE)	Galapagos - EPR 0-3°S

Sentry debrief issues - 12/08

First Science Cruise for Sentry:

- RESON high resolution data extremely promising, as is INS and DVL couple

- Six dives, total distance covered - 205 km, average dive 16.8 hrs (depths ~3000 m to 700 m)

- Excellent first shake down cruise

Sentry debrief issues - 12/08

Navigation - INS-DVL system

- Multiple INS failures resulted in system being locked up, gaps in coverage
- DVL parsing error, rejected fixes
- Dead reckoning degraded over rough topography - vehicle “stalled out”
- Multiple failures of shear pins on the thrusters

Data flow - MBSystem

- Data processing on-going; change over to MBSystem

ABE debrief issues - 12/08

- ABE worked well on four dives, conducted Phase 2 and Phase 3 work at two sites

- Work on training program for next generation team members for operations

Develop stable 24 hr operational plan for Sentry

Jason debrief summaries - 12/08

Lonsdale	May 2008	Atlantis	Gulf of California
Reysenbach (& others)	July 2008	Revel	MAR
Moyer (& others)	Sep 2008	Thompson	Hawaii
Duennebier	Oct 2008	Thompson	Hawaii

Jason debrief issues - 12/08

1) Appreciated improvements:

- New control vans “vastly improved”
- DSC camera on pan & tilt with science video
- More turn-around time flexibility
- Improved pre-cruise planning
- Testing of USBL navigation system

2) Equipment issues:

- Kraft arm (sometimes lost delicate settings, hydraulic leaks, sometimes “twitchy”)

Jason debrief issues - 12/08

3) Need better follow-through at sea with previously planned operations

- Non-optimal results from SM2000 and photo-mosaicing surveys
- Lack of communication? Training?

4) Turn-around time between dives

- Under some conditions 8-hours (instead of 12)
- Would like to see more discussion of issues and options for science users who need short-turn around for time-sensitive sampling, or to visit many different sites

Alvin Debrief Issues

Doppler-Based Navigation

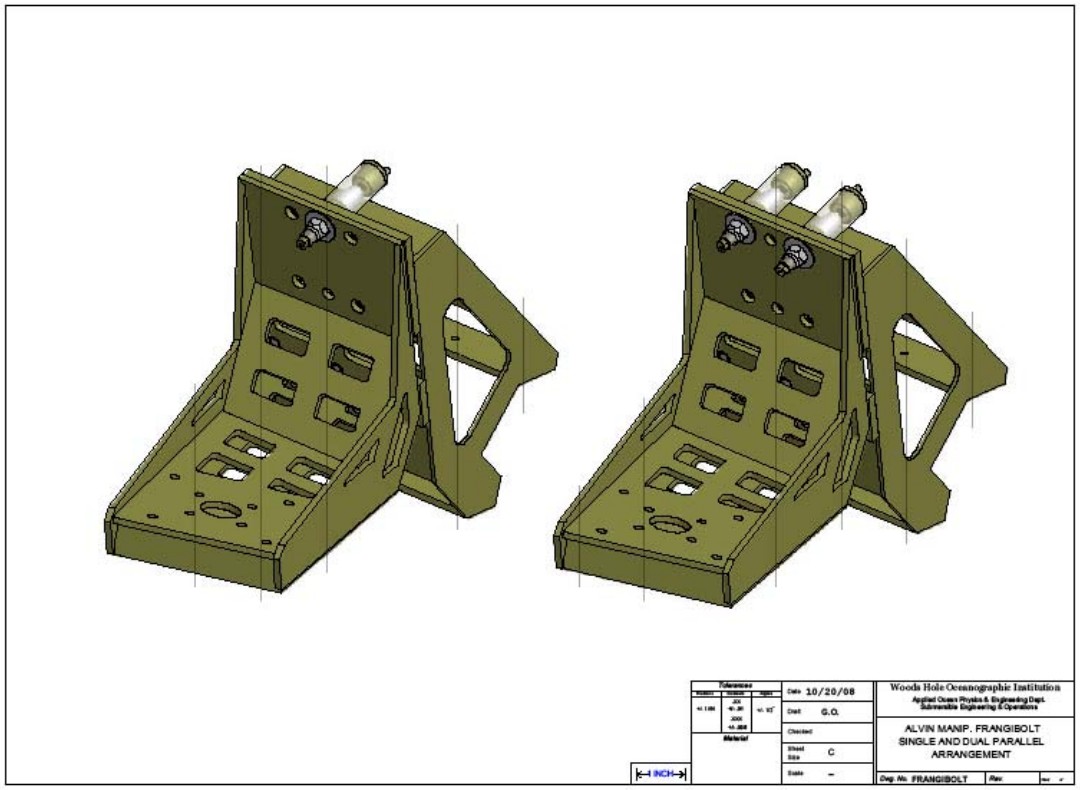
- Both RDI 1200 KHz experienced total failures during the Lee and Cowen legs.
- Borrowed a 300 KHz RDI from John Hopkins University while ALOPS units repaired.
- 1 newly repaired 1200 KHz failed again on Sievert below 2000M.
- Spare 1200 KHz currently installed and operational.

LBL Navigation

- 455 ASP finally died after 30 +/- years operation at the end of Holden Leg.
- Conducted N456 trials during Hoke Seamount / Engineering dives with mixed results.
- Problems with DS7000 led to sporadic LBL in Guaymas during Sievert leg but was resolved and operational on the 9N EPR dives.
- N 456 now tested and will be in service.1st Qtr '09

Alvin Debrief Issues

Frangi-Bolt Failure



Alvin Debrief Issues

Frangi-Bolt Failure

- Failure analysis found that the new design put the frangi-bolt under loads that were unanticipated in the original design.
- As a stop gap measure a second parallel Frangi-bolt was installed which roughly doubled the strength and brought them up to near the strength of an explosive bolt.
- A redesign of the Frangi-bolts is underway which will increase the shear bolt size from 3/8” to ½”.
- The newly manufactured bolts should be installed by the 1st diving leg in 2009.

Alvin
Milestones, Improvements and Issues

General

- Received Reson SeaBat mapping sonar to replace the Imagenix scanning sonar. Currently installed and undergoing operational testing to determine the best setup and procedures for the submersible.
- Increased our ICL sparing for the major water samplers.
- Recovered an ONR sound source on Hoke Seamount.
- Recovered the MBARI AUV during the Holden leg after the vehicle became stuck

Operations Crew

- Bruce Strickrott has survived his 1st full year as Expedition Leader.
- Mark Spear was named Mechanical Section Leader.
- Sean Kelley continues to improve as a pilot.
- David Walter, Korey Verhien and Mike Skowronski hired this year.
- Revision to the cruise leave policy – improve retention and quality of life

Jason Debrief Issues

Kraft manipulator reliability issues

- Arms are getting older and more difficult to maintain, need to consider replacement, ($250K – titanium, Alvin compatible)
- Modified Kraft Jaw in ‘08 to increase closure force, resulting in slower speeds at low force settings
- Adding 2nd Kraft to Jason, will use one modified stronger jaw and one un-modified, faster jaw, to take place early 09

Jason Debrief Issues - 12/08

Mosaic and SM2K results are good

- Confusion about how to perform the surveys; surveys were performed correctly
- Established SM2K survey procedure information on web; recommend science party look over in advance

  http://www.whoi.edu/page.do?pid=11303
- Developing similar documentation for mosaicing
- Renew efforts to brief at-sea ops team in proper procedures

Jason Debrief Issues - 12/08

Turnaround Time

- NDSF published document defining turn around time policy (on web)
- Current model provides flexibility at the discretion of the EL when working with the PI (both pre-cruise and at sea)
- Have been doing shorter turnaround times and as previously noted, it is our intention to continue to make incremental advances in this area.

Jason
Milestones, Improvements and Issues

- New vans fully operational in 2008 – no complaints so far!
- LBL/USBL navigation upgrade and full integration
- Tool van replacement in ‘09 if funds available
- Added full depth homer beacons
- Acquired spare deck crane which will require new base and minimal refurbishment

Sentry debrief issues

- INS “lock up”, resulting gaps in data
  - Manufacturer has suggested an improved setup
  - Test by putting INS on Oceanus for a short WH-WH cruise
- DVL parsing error
  - Software repaired during the cruise
  - solution will be integrated into standard nav code
- Bottom following: slow down and stall in rough terrain
  - algorithm changes
  - simulation testing
- Multiple failures of shear pins on the thrusters
  - replace shear pins with proper couplings
  - long term cycle test
- MB-System: slow data pipeline
  - significant improvement with experience during and after the cruise
  - continued advice/support from MBARI and MB community
  - attend developers meeting at AGU Fall Meeting

Sentry Other Improvements

- Improved Multibeam tuning
  - increased swath (from 250m to > 300m)
  -fewer bad points, easier editting
- Drag reduction/propeller efficiency
  -increased speed and range
- Integrate Tethys mass spec (Camilli) under NASA ASTEP program
  - first deployments on Valentine cruise with Alvin, summer 2009
  -integrate with autonomous control algorithms
- Navigation: improved calibration and real-time LBL
- Camera and strobe installation
  - latest Nereus camera and software
  - LED strobe