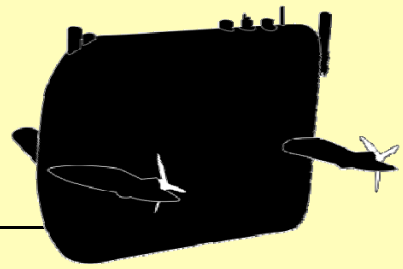
2014 Sentry Debriefs

6 cruises, 4 debriefs

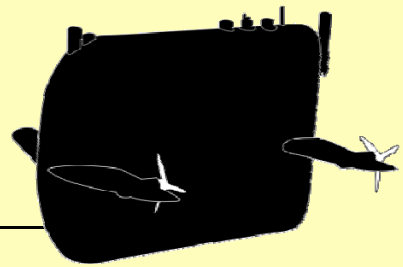


Area	Project	Dates (2014)	Platform
Central Pacific	Manganese	1/18-2/8	K.O.K
GoM*	Seeps	4/27-5/16	Atlantis
GoM*	Seeps	5/21-6/14	Atlantis
Loihi	Microbio	6/25-7/7	Falkor
JdF/Axial	Hydrothermal/Technology	7/14-8/6	Ron Brown
Marianas	Geology/Microbio	11/29-12/21	Revelle

*Multi-vehicle ops

2014 Sentry Debriefs

6 cruises, 4 debriefs



Pre-cruise planning

Overall – very good.

"Pre-cruise planning was great."

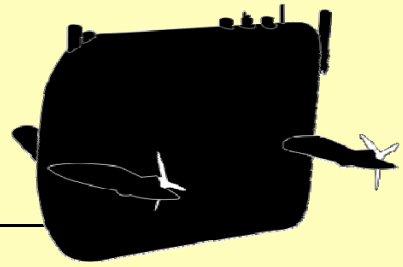
"Pre-cruise planning was wonderful. Ops teams did a good job planning for complex operations."

Challenges:

- Last minute schedule change prior to cruise presented some risk to the mobilization due to a tight shipping schedule. This did not end up causing problems.
- Personnel change prior to cruise resulted in a different EL who was not sufficiently informed of intended cruise operations
- Personnel changes are inevitable, but we will work to improve the EL briefing process

2014 Sentry Debriefs

6 cruises, 4 debriefs



Operations - Sentry

Overall - Sentry generally operated well with minimal issues at beginning of two cruises (viewed as expected shakedown). Mapping results were considered 'excellent' by nearly all the PIs.

Challenges:

- Significant operational problems associated with rough terrain on one cruise resulted in science party failing to meet objectives.
- Apparent problems with communications and navigation.
- We definitely had more trouble than expected operating in the terrain which was the most severe we had ever worked in.
- Since that time, we have:

  1. Substantially improved the bottom follower (and are working on still more improvements)

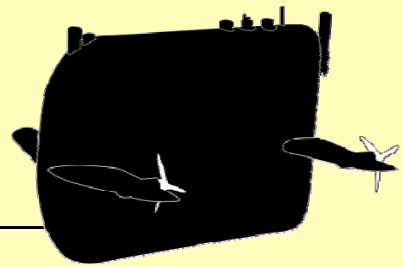
  2. Added forward looking obstacle avoidance sonar and software through the use of outside funds

  3. Identified a firmware bug from the manufacturer in the main navigation sonar and inoculated ourselves against it.

- We would be cautiously optimistic about greater success this time around, but the terrain remains extreme

2014 Sentry Debriefs

6 cruises, 4 debriefs



Operations - NDSF-provided equipment

Equipment generally worked well.

Challenges

- On one cruise data were noisy and *"unusable."*
- This was the cruise from the previous slide. We were under the impression that we had eventually delivered useable data, but will re-engage with the PI to determine what he still requires.

Operations - User-provided equipment

User-provided equipment was successfully integrated.

Data hand-over

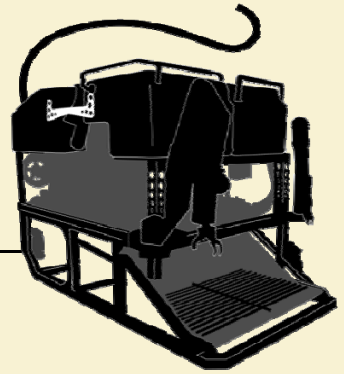
No problems

Recommendations

" Kudos to the ops groups for the complex choreography of multiple vehicles"

2014 Jason Debriefs

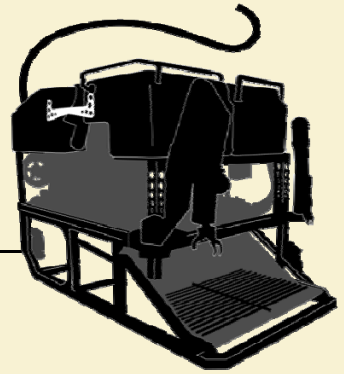
8 cruises, 4 debriefs



Area	Project	Dates (2014)	Platform
Loihi	*Microbiology*	*Mar-Apr, 2013*	*Thompson*
East Pacific Rise	Sub-sea life	12/31/2013-1/19	Atlantis
MAR, North Pond	CORK Ops	3/21-4/12	Merian
JdF Plate	Benchmarks	6/09-6/13	Thompson
Cascadia	OBS recovery	6/21-7/02	Thompson
Axial Volcano	Fluids & Microbio	8/11-8/18	Ron Brown
Hawaii	Munitions	10/22-10/29	Kilo Moana
Hawaii	Observatory	10/29-11/03	Kilo Moana
Marianas	Geology/Microbio	11/29-12/21	Revelle

2014 Jason Debriefs

8 cruises, 4 debriefs



Pre-cruise planning

Great. Extensive discussions with individuals in Jason group were very helpful.

"Pre-cruise planning was great. It was accomplished with one large conference call and several calls with individual ops managers."

Operations - Jason

Variety of operational concepts were employed from day-dives (due to 9 rather than 10 Jason operators) to long dives with short turnarounds. All CSs felt that Jason operations were efficient and exceeded expectations.

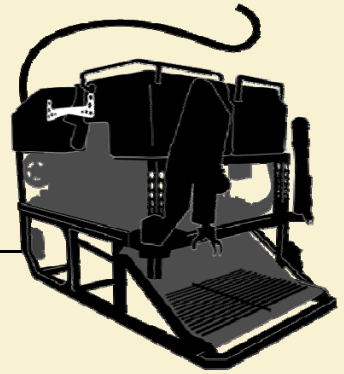
"There was increased efficiency compared to similar operations in 2009 and bottom times were longer."

"Seven out of 10 completed dives were day dives, but there were also three survey dives that were 36 hours…"

"Only mechanical issue was a fiber break that coincided with a recovery initiated by deteriorating weather. The fiber break added a small amount of time (2 hrs) to a planned, weather-related ~40 hr. turnaround."

2014 Jason Debriefs

8 cruises, 4 debriefs



Operations - NDSF-provided equipment

Equipment worked well other than minor technical glitches that were solved during turnarounds. Users were happy with the improved lighting and imaging.

"Science really liked the new lighting systems on Jason and felt that it gave them much better vision of the surrounding terrain."

Operations - User-provided equipment

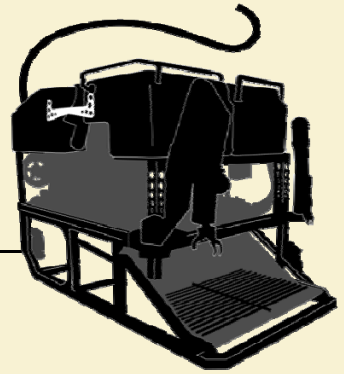
User-provided equipment was of the type that is routinely used on Jason (e.g., pumping systems, chemical sensors) and integration was straightforward and benefitted from past uses.

"The only difficulty was a faulty cable supplied with the O2 sensor, which the Jason group was able to get working."

"Jason had used all of this equipment during a 2012 cruise, so the ops team was primed and everything worked well."

2014 Jason Debriefs

8 cruises, 4 debriefs



Data hand-over

Data hand-over went smoothly and there is agreement that all of the expected data was provided, but there is a persistent problem with user expectations for media and formatting and what is delivered.

"Science party provided hard drives for data transfer and also received a set of DVDs. Sievert did not place any embargo on the data and would be happy to see it transferred to an external facility for archiving and distributing the data (e.g., MGDS)."

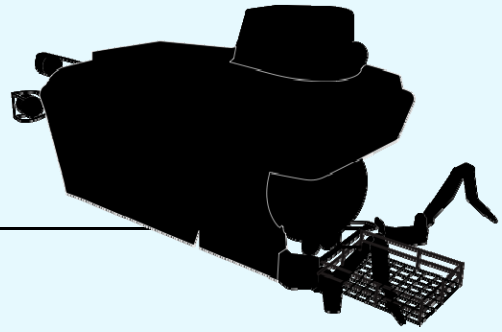
"It wasn't totally clear pre-cruise as to whether science needed to provide DVDs for copying video. They did so, but they weren't used. Nearly all video was successfully recorded on hard drives, but not all, so science had to ship a full set of DVDs home."

Recommendations

"Need to update website (Jason and Alvin too) for questions such as formatting of data."

2014 Alvin Debriefs

8 cruises, 4 debriefs

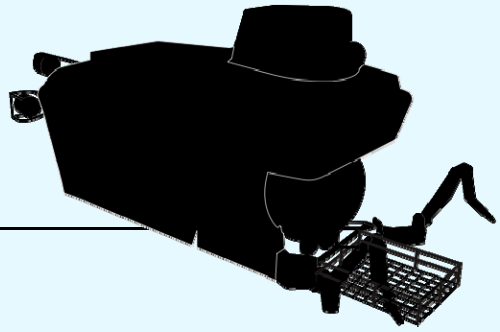


Area	Project	Dates (2014)	Platform
GoM	Science Verification Cruise	3/14-3/26	Atlantis
GoM	Brine Pools	3/30-4/22	Atlantis
GoM*	Seeps	4/27-5/16	Atlantis
GoM*	Seeps	5/27-6/14	Atlantis
Axial Volcano*	Venting & Technology	7/14-8/6	Atlantis
Costa Rica	Seamounts	8/10-8/24	Atlantis
East Pacific Rise	Microbiology/Geo	11/2-11/26	Atlantis
Costa Rica	Seamounts	11/30-12/12	Atlantis

*Multi-vehicle ops

2014 Alvin Debriefs

8 cruises, 4 debriefs



Overview

Chief scientists (CS) were experienced users so tempered expectations in light of Alvin's long layoff and recent return to service. Despite problems, most of the scientific objectives were attained. Alvin and Sentry were on two of the cruises.

There was a Science Verification Cruise (SVC) prior to these.

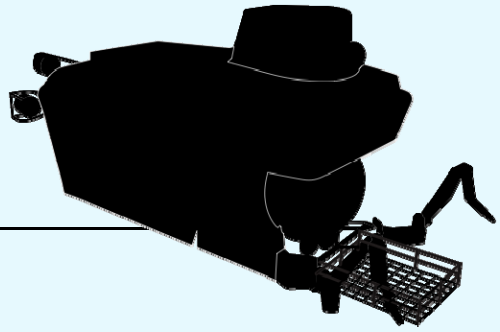
The cruises performed a range of biological, geochemical and geophysical work.

For the first 3 cruises, major issues involved the batteries (old, were not properly charged, leaks), hard ground faults, ease of video use, video data handling, etc. Many dives were lost on the first 3 cruises or cut short.

The batteries were not old - on the Mandy Joye cruise one battery had not been serviced as there had not been an opportunity to do so prior to the series. Loss of dive time later in the cruise was consistent with a battery that needed servicing.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Overview (cont.)

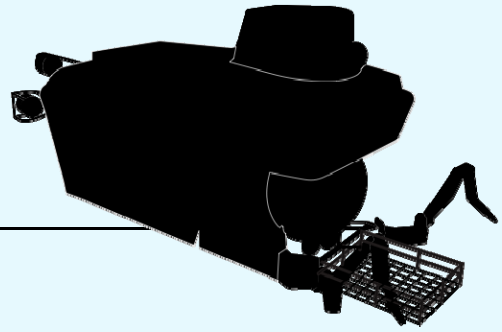
Mandy's cruise was the first after SVC and essentially the beginning of our servicing schedule so the lack of maintenance was not due to neglect.

Batteries were not old nor were they improperly charged. This last comment was based on overheard conversations about equalize charge timing and was misinterpreted to be an issue. Batteries were fully and properly charged daily.

The Alvin ops group worked hard to get all in shape and improvements have been made with more to do.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Pre-Cruise Planning

For 2 cruises: All was fine – nothing was overlooked.

On a 3rd cruise, the absence of a requested CTD on Alvin and a lack of sufficient bandwidth on Atlantis to conduct planned outreach were limiting.

For a 4th cruise, one EL participated but personnel changed prior to the cruise. The actual ELs were not well informed about the cruise operations discussed in the meeting.

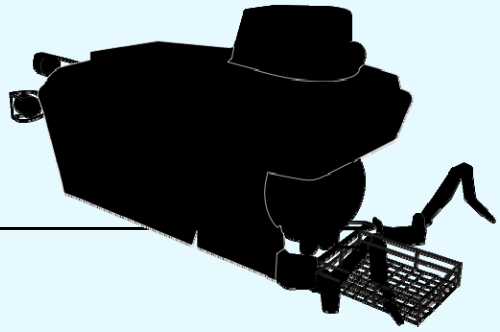
Pat Hickey took over as EL when Bruce Strickrott returned to shore as the Group Manager. I'm unaware of the communication issues during this period but it could be a result of pre-cruise meetings happening during operations at sea - sat phone issues and calls during dive operations can impact the effectiveness of pre-cruise meetings. The group has no official Operations Coordinator which would help with the initial science/operations communications.

Recommendation

Communication needs to be improved.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Mobilization

On all cruises. Science mobilization went well.

HOWEVER, for the first 2 cruises Alvin probably could have used more time during the mob as maintenance was more extensive than usual due to the long layoff.

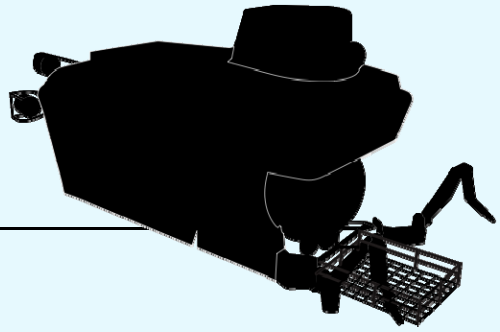
Issues with manipulators and batteries could have been better addressed, although it was not clear at that time how significant of a problem they were.

For the last 2 cruises, power and manipulator issues were addressed so all went fine.

Battery capacity has been very good once the routine maintenance schedule began. One port manipulator was sent to the manufacturer for an extensive ($100K) overhaul. The second manipulator will get overhauled by Alvin personnel during the 2015 non-operations periods.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – vehicle

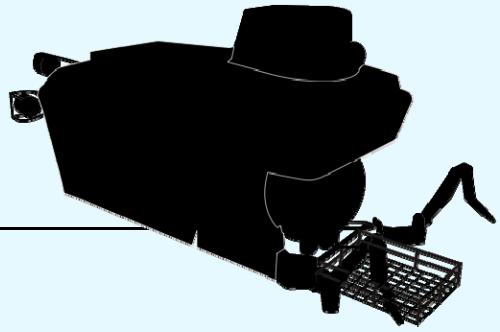
For the first 2 cruises, there were 2 major power and manipulator issues including battery leak and port manipulator hydraulic leaks. Battery problems were significant. On the 2nd cruise, the seal to the battery bay was replaced near shore at anchor (2 dive days lost). Bottom times then improved significantly.

Bottom times from the actual record are generally consistent with most dives as having average bottom time. However, dives late in the series suffered from battery maintenance issues.

The battery leak did require a loss of dive time for repair. New battery bladders are on order for 2015. No further leak issues have occurred since the initial problem.

2014 Alvin Debriefs

8 cruises, 4 debriefs



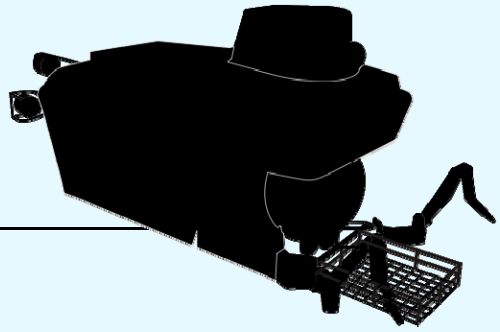
Operations – vehicle (cont.)

Several dives went in late, mainly due to battery issues (hard grounds, etc.) so bottom time was affected. Power would abruptly be lost during a dive even though the pilots thought there was significant power still available. The battery problems were corrected later during the 2nd cruise.

Available power tends to drop off quickly when batteries are nearing our low limit - this is normal. Pilots do their best to anticipate this but available capacity can be impacted by multiple variables, including familiarity of the pilots with the submarine and dive planning.

2014 Alvin Debriefs

8 cruises, 4 debriefs



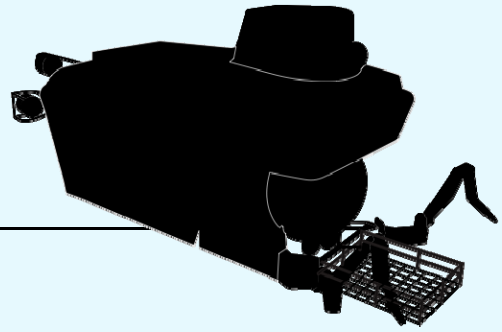
Operations – vehicle (cont.)

On the first cruise, a dive was cancelled due to a scrubber failure and subsequent maintenance (similar to SVC). The port manipulator had a slow leak that got much worse, and was swapped for a spare, which failed a pre-dive check and had to be repaired.

CO_2 scrubber issues have been addressed and a new scrubber assembly will be completed by the resumption of operations in 2015.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – vehicle (continued)

Significant weight had to be added to the bow and stern of Alvin. One CS noted that the ballasting problem was not explained; however, the CS did not ask for an explanation. The bow weights were placed in the basket (three milk crates full) taking up valuable basket space.

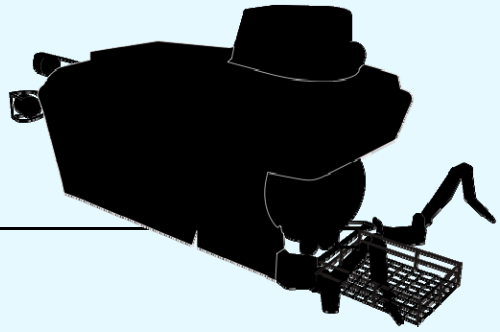
Extra science payload capacity is a welcome problem and steps have been taken to ensure any ballast added is generally out of both reach and sight of the pilot/observers. New weight releases will allow additional ballast to be accommodated so as to allow payload ballast to be moved if required.

For cruise 3, one of the two seawater ballast pumps did not work.

We have only one pump and it has remained functioning so I have no knowledge of this failure or its impact on the dives.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – vehicle (continued)

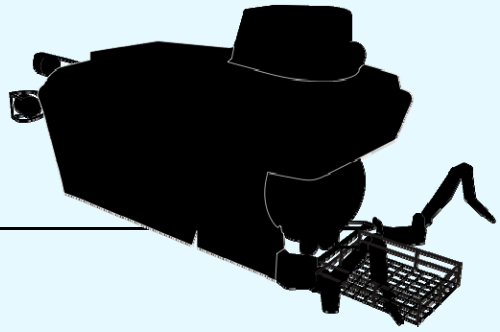
No weather or technical issues on last cruise. For the early cruises, Chief Scientists noted some of the weather calls seemed overly conservative as dive days were lost to weather.

The Alvin group seemed more conservative when making weather calls as they were learning the new Alvin. On one dive, the sub was down when bad weather occurred on the surface. The dive team was told to shut down power and sit on the bottom. When the weather improved, they dropped weights. By the time they reached the surface, the weather deteriorated and the recovery was rough. The Captain, crew and Alvin team did a great job during the tough recovery.

We are operating under the normal weather window and guidelines from pre-overhaul, and making conservative estimates of dive conditions has been our norm. As noted, an unforecasted gale formed at our dive location and did impact the dive as we waited for the weather to subside for a fast recovery. This is as per our operations manual.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – vehicle (continued)

On this recovery Alvin hit the water hard and the basket broke as a weld failed. Fortunately the safety lines held, but half of the sampled cores were lost. Alvin did not dive the next day due to weather issues and this time was used effectively to make repairs. One junction box did not work the rest of one cruise.

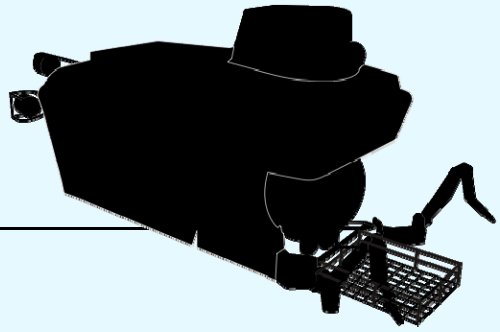
The basket failed during recovery on the above noted heavy weather dive, not during a launch as reported.

On another dive, a set of 18 cores were lost. Screws were not tightened to secure the box to the basket. She may have found the cores on another recent dive sequence.

As reported Alvin owned cores were lost during a launch, but sufficient cores were recovered/assembled to meet the demands of the cruise (24 per dive). New cores have been procured to replace the lost ones.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – vehicle (continued)

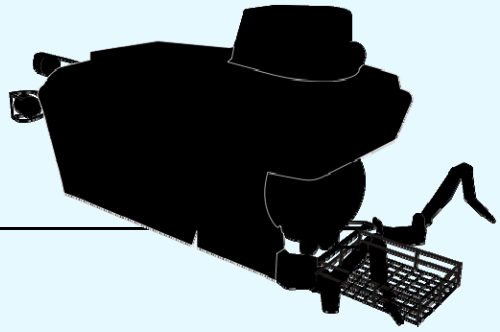
Recommendation

The Alvin group has much to maintain. An extra Alvin group person would help.

The group plans to hire an additional tech in mid-2015. We expect personnel exchanges with the other NDSF vehicles will promote technological exchanges between the vehicles.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – NDSF-provided equipment

VIDEO: Alvin HD cameras seemed improved from previous sub, and video imagery collected was generally successful. BUT, both brow cams, when zoomed out, had the housing in the field of view.

Video controls were disappointing. A lag was observed when switching cameras. Several camera switches were made without the video source updating, and then all of the switches would happen very quickly. Pan-tilt controls on some cameras were poor with the camera zooming off in one direction well beyond what the observer had wanted. The manipulator mounted still camera did not work on an early cruise.

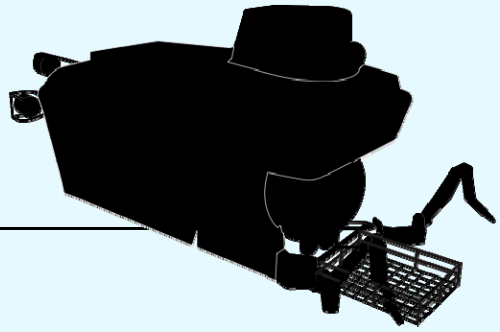
Alvin video improvements are ongoing and are a high priority item for the 2015 non-operational periods. Camera control issues and internal interface problems are clear and we are looking to address/improve functionality.

The time stamp on the video recorders was off from Alvin time by a matter of minutes.

We have addressed the time stamp issues as a part of the daily pre-dive.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – NDSF-provided equipment

Lighting is better than the previous sub. BUT, experienced filmmakers on one cruise had suggestions for improving lighting and imaging. Their general opinion was that the camera systems were well out-of-date and could be significantly improved for little cost.

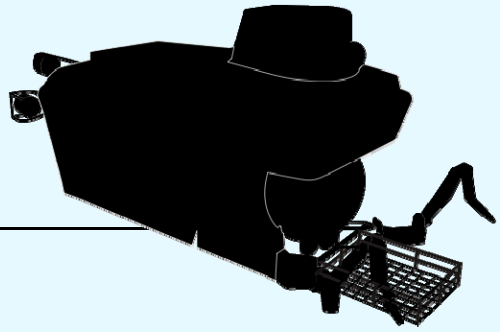
Alvin is not configured to provide broadcast or filmmaking imagery. The operational imaging system is based on COTs systems. In the future, if PIs have requirements for broadcast imagery we are ready to help enable such systems.

Lack of overlay and framegrabber is a problem and requires significant post-cruise work. There was no audio on the recordings for many dives (a problem seen on the SVC). The Port camera froze and could not record all the time unless the control computer was restarted.

The framegrabber has been installed and is working daily.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – NDSF-provided equipment (continued)

BEACONS: There was a lack of Alvin-tested USBL beacons on board, which put serious strain on the available beacons/spares for Alvin, Sentry, and the ship. More spares would alleviate this problem.

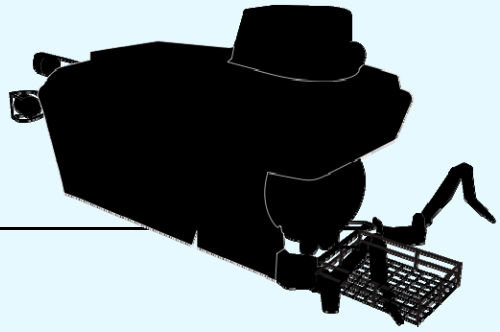
The ship/sub maintains three beacons on board, one for the submersible and two for alternate/spare use. During one series one beacon was returned to the manufacturer for repair. Additional shared beacons will be procured in 2015

Alvin's bio boxes were *in serious disrepair* and did not seal properly, and recommends that new bio-boxes be constructed.

The group agrees that new bio-boxes are needed and will be procured/ assembled.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – NDSF-provided equipment (continued)

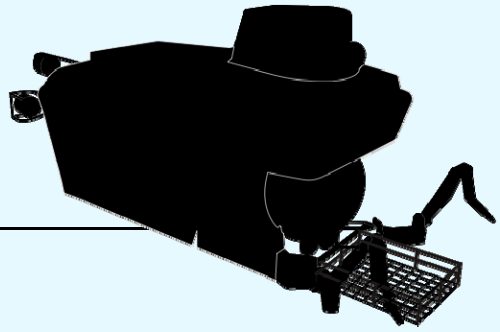
Alvin navigation was a struggle. Pilots were not familiar with the new nav system. Communication about navigation positions between Top lab and Alvin did not match up by about 100 feet. Much bottom time was lost trying to reoccupy sites even when there were recorded targets on the navigation software.

More problems arose post-dive as the science party had to use Matlab scripts (left on-board by Soule, post-SVC) to try to extract meaningful navigation. Processed navigation is an essential data product for any science operation that should be supplied when you contract Alvin.

Early dive operations did not provide adequate navigation. This has been corrected. While there is more work to be done, most operational issues were ironed out after the first few cruises and in general nav is becoming consistent with the other NDSF vehicles.

2014 Alvin Debriefs

8 cruises, 4 debriefs



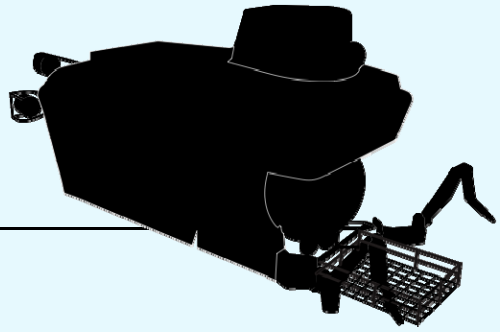
Operations – User-provided equipment

On the SVC, there were time out and lost data issues on geochemical analyzers connected through the junction boxes.

The Alvin group investigated the apparent data 'drop outs' and could not determine if the problem existed with the sub or equipment. Tests on the sub's data handling capabilities showed no issues (zero) during testing (1 million transfers). We are continuing to develop a means to evaluate the sub's data system and will include testing during 2015 engineering dives.

2014 Alvin Debriefs

8 cruises, 4 debriefs



Operations – User-provided equipment

On an early cruise, a user provide camera had problems although it functioned on Jason previously. The camera did not work on the surface but did at depth initially. Later it would work on the surface but not at depth. The Camera used RS232 communication from junction boxes on port and starboard sides, and there was a hard ground once. Problems similar to the SVC.

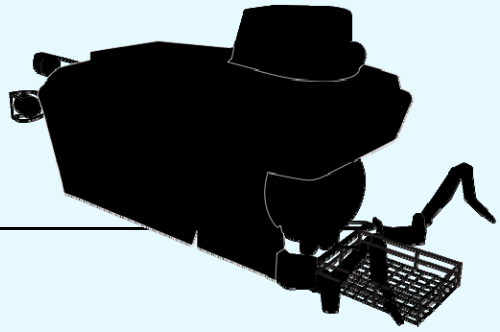
User did not bring the camera to the Alvin group beforehand for checks.

Problems associated with the noted camera were attributed to poor user-supplied cabling and a lack of available spares. Although the unit worked on Jason, issues on Alvin were eventually traced to broken wires and poor solder connections in the supplied equipment. We also recommend users include sufficient spares with their cruise planning.

Other items worked: Brine trapper for fluid samples (< 40 deg. C), geochemical analyzers

2014 Alvin Debriefs

8 cruises, 4 debriefs



Data hand-over

All data were properly transferred. BUT, Alvin handed over 6-8 HDs containing only 6TB (3 HDs) worth of data. If the costs for drives is burdensome (requiring the drives to be sent back to NDSF), some effort to more efficiently archive the data could help.

The contrast between the way the data is delivered between Alvin and Sentry is stark. Sentry hands over drives and descriptions of data in a nice Pelican case. Alvin gave a cardboard box with hard drives in it need to be returned.

The group agrees that improvements are needed to the navigation and data post-dive delivery and this is ongoing. We are working with other members of the NDSF to outline and define a better post-dive package and are considering the inclusion of a data person in the operations group.

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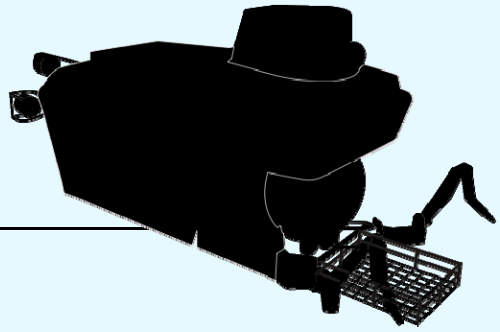

Demobilization

No significant problems.

One CS didn't get forms that were needed to fill out before leaving the ship.

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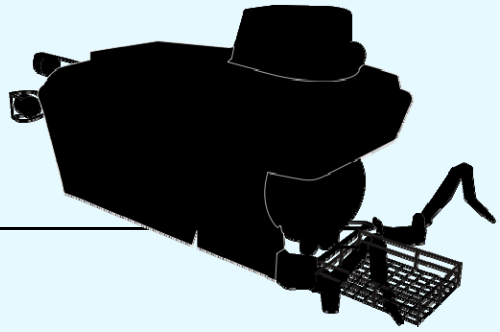

Recommendations

Condensation issues were noted.

Recommendation: Put a H_2O scrubber (silica gel or dri-rite that can be regenerated) in line with the CO_2 scrubber.

Condensation issues are directly related to the larger sphere and greater surface area for moisture collection. We are looking at a means to reduce the amount of moisture that can get to the observers and equipment. The most effective means to deal with the moisture is likely a towel (i.e. wipe down mid-dive).

CTD & Multibeam: The absence of a CTD and multibeam sonar was sorely missed on early cruises.

The group plans to reinstall the Reson in 2015 on an as-requested basis. It is not advisable to keep the Reson installed for non-mapping oriented cruises.

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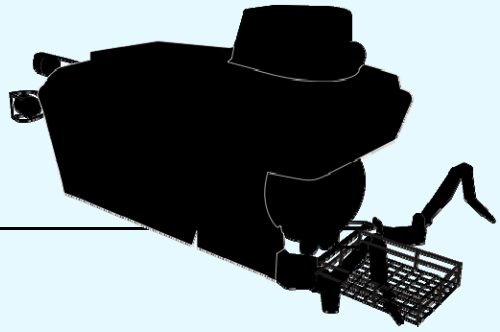

Recommendations

One CS would like to see optical modem tech integrated into Alvin so that images or compressed video could be sent up in near-real time. As an example, experiments that need to be prepped for certain specimens could be started as soon as the samples were obtained by Alvin. Also, it would help the CS know whether objectives have been completed so dive planning for the next site can begin.

The group is investigating a trial use of this technology in the near future.

Many CSs indicated that the SVC was helpful.