HAWAII UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT MISSION NO. P4-079

MISSION STATUS

Location: Loihi, Marker 18 to 48

Mission Date: Monday, November 18, 2002

Maximum Depth: 1330m

Project Title: Microbially Mediated Glass Alteration

Principal Investigator: Dr. Hubert Staudigel

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Observer 2: N/A

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Scientific Data Acquired : Prepare an abstract outlining your objectives, techniques, findings, etc.

The main objective of this dive was to recover several short-term exposure experiments deployed at three Loihi sites during two previous dives last week, and to deploy new exposure experiments to replace the ones we recovered. The list of objectives was long (approximately 18 tasks at three sites) and we did not fully expect to accomplish them all. In general, the plan was to approach the crater via Marker 18, then move into the pit to Marker 48 and then come up to Pisces Peak and out. Terry Kirby was the pilot today and Colin Wollerman was the training pilot.
We entered the water at 8.26 am and reached bottom at 1098 m at 9.51 am. Our position was 18.54.518, 155.15.770. A lot of sediment covered the rock surfaces at bottom. We contoured at 1100 m to the south east to Marker 18, located at the edge of a fault scarp at 1104 m. At Marker 18 we did some initial "housecleaning" (wiping off Marker 18 with a rag so it would be more visible on future dives), and then removed SIO charge #32, loaded with a temperature probe (set to record data for 1 year), from the biobox for deployment. We then collected WHOI charge #7 and SIO #10 from the site and put them in the outer milkcrate. After the recollection effort at M18, we entered the pit through the Gateway. We dropped into the crater until reaching bottom at 11.18 am, at 1330m. Our objective was to find the north wall. The first wall we reached had a lot of fresh rubble and the rocks were heavily veined and banded with white minerals. Terry thinks we are near old Marker

20. Black sands descend below the cliff walls. This may have once been a talus slope that is now buried in sediments.
We next reach the "Curtis Vents" near Marker #8. We are south of the Jet Vents site, at 1308 m. Move to another wall, but this is not the Boiling Pot site, as expected. We're at 1313 m. We call KOK for location: 18.54.346, 155, 15.466. Looking at the map, we may be in the Spillway and need to move northeast to Marker 48. So we repass Marker #8 and find Marker 42 at 1314 m. There appears to be a 2 m offset in the depths measured by the Pisces 5 vs. Pisces 4. At the Boiling Pot wall, we see shimmering and note that venting has resumed, even though they didn't see much activity here last week. Bacterial mats have begun to form.
We move up from Boiling Pot to 1265 m. We move across a new landslide of rubble that was derived from a knife-edge ridge where Marker #46 used to be. As we move upslope, the whole surface is shimmering with extensive venting. At 12.21 pm, we reach Marker 48. The exposure charges and "Bailey's Bong" are in place and are exposed to vigorous venting. There are numerous vent shrimp and a lot of microbial mat material both floating in the water and attached to the rock surfaces. The outside temperature fluctuates between 2.2 C and 3.2 C. Terry put the temperature probe into the base of the cliff and got a maximum reading of 74 C. We move into the deployment site and pick up the 450 g basalt charges and shove them halfway into the sand, so that they will be warmer. We also deployed SIO #27 (with new temperature probe set for 1 year) and SIO #31. We pick up a SIO charge with 1 stripe (number unknown) with lots of oxidized material attached.
At 1300, we slide downslope to collect scoopers of black sands. We first try to collect pieces of the wall rock with mat attached, but they break apart in the Orion arm. We fill Scoop #14, close it, and start to fill Scoop #15. A lot of light grey rock fragments are mixed into the sands. At 13.31, the Orion arm seizes. The pump will not engage. We are somewhat stuck because the Hyco arm doesn't have any extension at the moment. We find a way to pick up at drop Scoop #15 into the milk crate (unsecured) and move over to pick up WHOI #5 (1270 m). Terry Kirby notes that Marker 51, 14 and 47 have all disappeared due to landslides, perhaps only M 48 is left.
Our major objective, now that the Orion arm has seized, is to get back to Marker 48 and find a way to grab the bong and close the valve, using only the Hyco arm. It is very difficult to reach into the protected location of the deployment site without extension on the arm, since the top of the submersible (and the cameras mounted there) will crash into the overhanging cliff. At 13.57, Terry manages to dig out the bong without crushing the other exposures or damaging the cameras. We pull back, dropping downslope, and spend approximately 1 hour trying to turn the two valves into a closed position. At 14.50, the bong is sealed and secure and we prepare to head up and out. For the next hour, we move slowly up and to the north to the top of Hilolo towers/the tower vents and then a series of steep walls. At 1600, we reach1065 m, make sure the science package is as secure as possible, and leave the bottom at 16.11.

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

Orion arm seized halfway through the mission and the Hyco arm could not extend. Also, the Rosette sampler was not operational (hydraulic fluid leak?).

Recommendations for corrective action or improvement:

In your opinion, did the mission essentially achieve its purpose? Compare actual work accomplished with the work that was expected to be accomplished.

The main goal of recovering short-term exposure experiments was achieved. WHOI and SIO exposure charges deployed at Marker 18 and Marker 48 during early dives were collected, and new charges were deployed to replace them. We also successfully recovered the Bong, with the valves closed. Additional objectives, such as collecting mat material, water in the Niskin bottle, or collecting and deploying charges at Pisces Peak, became undoable after the Orion arm seized, due to lack of maneuverability and lack of time. However, these objectives were secondary.

List specimens or samples collected on the mission.

Deployments:
Marker 18: SIO #32 and WHOI #7
Marker 48: SIO #27 and SIO #31

Sample pickups:
Marker 18: SIO #10 and WHOI #5
Marker 48: SIO – number unknown, Bailey's Bong

DATA RELEASE

Data may be retained by the project leader for up to 2 years after the mission date with the following exception. NOAA may request to use photos for publication or publicity purposes at any time.

Fill in the appropriate statement below and sign this form.

I hereby release the data archived by HURL for public consumption following mission

_____(project title)

held on November 18, 2002 (date) in the following way:

a. CTD data by any (date)

b. voice transcripts, video, and still camera film by Nov. 2004 (date)

c. other_____(date)

d. I will give my written consent to individuals wishing to use these data prior to the above dates depending on the nature of the request(s).

_____Principal Investigator