# HAWAII UNDERSEA RESEARCH LABORATORY

## QUICK LOOK REPORT MISSION NO. P5-026

MISSION STATUS

Location: Loihi Seamount, Hawaii

Mission Date: 8/31/87

Maximum Depth: 3770 ft.

Project Title: "Geology, Geochemistry & Microbiology of Hydrothermal Systems, Loihi..."

Project Leader: Dr. Alexander Malahoff

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Observer: Dr. D. Karl, Dr. A. Malahoff

Address: MSB 629 MSB 319

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

(see attached progress report prepared by D. M. Karl)

MISSION EVALUATION:

**Limitations, failures, or operational problems noted:**

There is a serious payload limitation. The sub should eventually be able to carry a greater load of scientific gear and samples. A second manipulator would also increase the sub's capability to perform in situ experiments.

**Recommendations for corrective action or improvement:**

None, other than the above mentioned aspect of the operation.

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

Yes. The cruise, and this dive in particular (P5-026) was a great success.

**List specimens or samples collected on the mission.**

Water samples (Niskin bottle and titanium sample). See attached sample log.

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 "Geology, Geochemistry & Microbiology of Hydrothermal Systems, Loihi..." (project title) held on 8/31/87 (date) in the following way:

a. CTD data by 7-1-88 (date)

b. voice transcripts, video, and still camera film by 7-1-88 (date)

c. other 7-1-88 (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).

Dale M. Kell (microbiology subtask)
Project Leader

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# VOICE TRANSCRIPT FOR HAWAII UNDERSEA RESEARCH LABORATORY MISSION

Dive Number: P5-026

Location: Loihi Seamount, HI

Date of Dive: 8/31/87

Project Leader: A. Malahoff
University of Hawaii
MSB 319
Honolulu, HI 96822

Observer: A. Malahoff, D. Karl

Pilot: Dave Foster

Note: No tape 1.

TAPE 2, SIDE 1

Malahoff: This is dive 26: now we're launching at 9:50 over Loihi. Starboard side Dave Karl; port side Malahoff.

Malahoff: Cleared the LRT at 9:54.

Malahoff: At 10:50 bottom is in sight. We've landed on a talus slope, broken pillows with nontronite in the orifices. Small fist-sized basaltic fragments constitute most of the slope. Our water depth is probably about 1155 m. We are up from the bottom at this stage trying to escape our dust cloud.

Malahoff: We are ascending upslope, direction 011. The slope is probably 15 degrees. Consists of large pillow fragments fairly fresh and smaller talus fragments with nontronite in between.

Malahoff: Time is 10:58. We're in the process of landing on the bottom.

Foster: We are on the bottom.

Karl: Another fish ahead of us.

Malahoff: Talus slope with nontronite patches and black patches inbetween.

Foster: Okay Terry, I have you loud and clear. We are on the bottom at 1140 m. over.

Malahoff: 1140 m. on the bottom. Talus slope.

Malahoff: OK at 11:03 we are proceeding uphill to the north. The slope is variable with large talus fragments and small ones. There is no consistant sorting here. And black patches in the interstices between the talus. Proceeding to move up north.

Malahoff: 11:07 we are taking hand-held video, moving up the slope. The talus is now encrusted with nontronite which tends to outcrop in a layer-like fashion. So moving upslope at 356.

Malahoff: Water depth 1135 m.

Malahoff: At 11:09 talus fragments seem to be smaller; perhaps 5-10 cm across. And there is an increase in the slabiness, slab-like nature of the nontronite. At this stage I will take some hand-held video.

Malahoff: 11:11 finished filming handheld. There is definitely an increase in the coverage of nontronite. And the floor is littered with platelets of nontronite overlying angular talus. Talus blocks are 50 cm. to 5 m. across. No particular floculant material in the water mass. No benthic animals; attachments of any kind.

Malahoff: Time is 11:12. Moving upslope. No change in terrain. Dave remarked again that there are no benthic animals. The water depth is 1110. Still moving upslope. The slope is probably 10 degrees now.

Malahoff: Observing the fragments. The fragments are pillows that are perhaps 50 cm. in diameter.

Foster: There is one more eel over there.

Malahoff: The large areas where the nontronite is entirely covering the talus, forming a pavement. And in between the nontronite one finds these black patches.

Malahoff: Looks as if the slope is smoothing out at this stage at 11:14.

Malahoff: Time is ...

Malahoff: At 11:20 we are proceeding upslope. Still in the talus slope. I've notice there are a few hair-like worms sticking out of some of the talus. We have seen that on Loihi before. No macrofauna. Still patches of nontronite covering the talus in plate-like slabs.

Malahoff: The water depth is ... What was it Dave?

Foster: It's 1050 now. No let's see, 1060.

Malahoff: Water depth is 1060 m. Still moving upslope. Moving at 350 or thereabouts. Generally we're trying to go to the northeast.

Malahoff: At water depth of 1050 m. 1050 m. still moving up hill. The dominant landscape now is yellow nontronite in between talus. Ever so often you'll see a large talus outcrop but the slope is generally smooth and covered by the snow-like fall of nontronite. David do you see ever so often you'll see a rock with worms in it?

Karl: Polychaete worm?

Malahoff: Yes.

Malahoff: We saw an increase in polychaete worms yesterday as we moved towards the vent site itself.

Malahoff: And through my window I've just noticed for the first time Dave a sort of translucent material.

Foster: The snow.

Malahoff: Still moving upslope at 11:27. Water depth now 1015 m.

Karl: We're getting there.

Malahoff: At 11:30 we've come to the edge of the fissure. We'll now proceed to the summit.

Foster: Call to surface. OK Terry; we're at the edge of that fissure at 1030 m. Over.

Malahoff: Time is 11:30. Fissure we're on a ridge, 1030 m. And now we'll proceed to look upslope and see if we can find the vents.

Malahoff: We're now going in at 340. Fissures all over the place.

Malahoff: Time is 11:50; water depth 1030. We're apparently on the rim of the crater, the fissure. And now we are starting to move to the southeast to intercept Pele's vent.

Malahoff: The surface of this ridge is covered by nontronite and hiding the... well...covering...hiding...covering the talus. Steep dropoff to the north.

Malahoff: Crawling this ridge. Have we got the video on Dave?

Karl: See that fish Alex?

Malahoff: Yeah, isn't it amazing. This flare is on.

Foster: Oh there he goes.

Malahoff: Oh is he going. Oh too late. Too late.

Karl: _____ save energy?

Malahoff: Great isn't it.

Malahoff: So on top the ridge are we? It drops off to the right and the left. Absolutely amazing how everything is covered by nontronite.

Karl: I wonder if that's a depositional or if it's seeping or what's controlling that?

Malahoff: It's a good _____ isn't it?

Karl: You would think if it was being deposited from some major source to gradient. If it was seeping you'd think you'd see patches that were more _____.

Malahoff: There's slope to our left.

Foster: Sort of kinda a leveling out area.

Malahoff: Can we just mosey over to our left a little bit. I think I can see a slope up there.

Malahoff: Is that up?

Foster: Sort of up.

Malahoff: mmm

Malahoff: Or is it just flat?

Foster: Flat, but it's not down. Might even be up ahead of us.

Foster: _____ coming up here.

Malahoff: If we get less than 1000 m. we're in business.

Malahoff: It's still 1040.

Foster: We'll be there shortly.

Malahoff: Is it up?

Foster: Yup. Is that a ridge?

Malahoff: Aha, we're back in the fissure again.

Malahoff: It's to the left of us. I'll switch the sonar on.

Foster: We're getting the snow.

Karl: Look at all that white inbetween. Bacterial mats.

Malahoff: I guess ahead of you it's all white.

Karl: We're getting there. Look at that.

Foster: Going uphill now.

Malahoff: It's all white. Sure looks like it. Going uphill?

Malahoff: Oh look, the pillows. We're on Pele's. Oh yeah, yeah. Ah, that's great.

Malahoff: Ah, for goodness sake.

Foster: Going to put a stop on there?

Malahoff: I'm just going to do that right now.

Malahoff: OK at 11:59 we are moving upslope. Large pillows of Pele's vent, broken up pillows. We're at...What are we at?... 1030 m. moving upslope. A change in terrain to very large fresh pillows, pillow fragments. The pillows are a meter to a meter and a half across. And at the bottom the sort of yellow precipitate.

Malahoff: At 12:03 we're moving up what we believe to be Pele's vent. Very large fresh pillows and broken pillows protruding from the surface. And now we're getting fresh orangey color precipitates on top of the older material. Moving straight up. I've finished taking hand-held video. Our water depth is now, aha 990 m.

Malahoff: There probably is 30 or 40 m to go. Have a look at some of these rocks Dave, with the worms sticking out from them. Can you see them Dave?

Karl: Yeah.

Malahoff: 12:06 moving up Pele's pinnacle up to the Pele's vent. Again this time the fresh pillows are entirely covered by a snow of nontronite. The whole area is completely covered.

Malahoff: Water depth 970 m. At 12:05. Large pillows dot the landscape with smaller talus fragments located inbetween. We are now seeing an increase in the polychaete worms on some of the large fragments.

Malahoff: Time is 12:30. We are at Pele's vents. Water depth is 900. That's OK. Can't even see what the water depth is. We're 985 m. 985 so we're below the summit. Pele's vents occupies a shoulder. And the pinnacle, we'll call it Pele's pinnacle here, and it's of the order of 5 or 10 m. below the summit of the pinnacle. The pinnacle itself is being built up of fresh strews of pillows and in some parts the pillows are almost hydrothermal sediment-free along the lower slopes of the pinnacle. As you get to the top everything becomes covered with the nontronite. Here the hydrothermal vent field consists of crusts with holes that's the vents themselves protruding from the crust. Shimmering water occupying the whole of the near field. No macroanimals visible, of course. There's this whitish material seen around the vents.

Malahoff: Time is 12:40. We're manuevering around the Pele's vents, attempting to find a place to sample with the titanium water samplers. Water depth is still 985.

Malahoff: Estimate of the vent field is perhaps 20 to 30 m. across and it's located on a small ledge below the pinnacle. There are a number of nontronite chimneys at the edge of the Pele's vents. A chimney looks up to 20 cm. in height. The inner zone consists of these angular talus, some of them rounded from the precipitation of the nontronite on them.

Malahoff: The time is 12:52 and we are in the process of taking a rock sample out of the whitish vents. We hope to collect a rock sample with the white material on it.

Malahoff: Rock taken at 12:59. Small fist-sized rock sample with white and reddish material on it. Taken just about at the edge of the vent fields. Looking out of the window at this stage, I can see a slope. The slope is covered again with the reddish material. The water flow seems to be less vigorous at this site than at the earlier sites with the white framed vents. The outer zone of Pele's vents has these 20-30 m. high chimneys of yellowish material. But otherwise closer to the vent the yellowish material gives way to the reddish and then white. The few pillow fragments are recognizable but otherwise the rest of the field is all covered by the hydrothermal precipitate.

Malahoff: The time is 13:05 we are still at Pele's vents. Manuevering into the white throated vents to take Dave's sample.

Malahoff: Water depth is 980 m. And we are in the middle of the white throated vents.

Malahoff: Time is... Pele's vents, the time is 13:19. We've finished sampling Dave's baggy samplers. And we are attempting to pick up a rock. That will be sample No. 2 from this site.

Malahoff: Water depth is still 980 m.

Malahoff: Rock No. 2 in the front basket. Taken at Pele's vent at 13:29; water depth 980 m.

Malahoff: Time is a 13:34, 13:34; we are at the middle of Pele's vents. We are in the process of turning around and recovering our pingers. Crunch. There's a huge dust cloud behind us. Maybe we're fortunate that it will be blown away by all this hot water.

Malahoff: Time is a 13:48. We're in the process of recovering the pinger left in Pele's vents. Some close observations out of the port side. The white vents, the white vents seem to appear displaced in the talus. Talus looks very fresh. And in the Pele's field, there are no obvious pillow basalts, just angular fragments ranging in size from a few centimeters to 20 or 30 centimeters. So the general visual perception of field is a slow perculation through the talus, and there's speculation here that the talus was formed in situ through the fragmentation of pillows. Since the vent field is located perhaps ...

Foster: All that just to turn it 90°.

Malahoff: ...5-10 m. below the summit. The summit contained no active hydrothermal vents and the geology of that was coarse talus and pillow fragments. So Pele's vents are located on the southeastern segment of the Pele's pinnacle.

Malahoff: We are departing Pele's vents at 13:52.

Malahoff: And as we sail over the vents, in the edge of the vents...

Foster: Right over the vents.

Malahoff: Yeah, the edge of the vents characterized by larger pillow basalts also covered with the nontronite, and of course the absence of the white orifices. The field itself cannot be more than perhaps 10 by 20 m.

Malahoff: At 13:55 we are proceeding southeast. The field below us consists of pillow basalts... and talus.

Malahoff: Proceeding to move downslope, water depth is 1025 m. The slope is covered by large talus fragments still with nontronite dispersed in between. And the major component of the rock is talus, very large talus fragments, biggest of which are probably a meter and half in length. Still descending going to the south.

Malahoff: Water depth of 1100 m. We're passing a field of long lava tubes. These lava tubes break up very rapidly into angular talus. Slope seems to be to the left and we're still heading south. Interspaced between these large fragments of the tubes and the talus there's still a smattering of nontronite. But by now the ocean floor is generally losing it's hydrothermal character.

Malahoff: Time is 14:09, water depth is 1110. Still moving south. The bathology hasn't changed very much; it's still segments of tube lavas broken up into angular talus. There is less sediment in evidence now than further upslope. Smattering of black sediment here or there in the interstices.

Malahoff: Time is 14:15 and we've encountered rippled sediments in the sediment field. Water depth of 1125 m.

Foster: I like this geology.

Malahoff: Time is a 13:22? no 14:22. Can you grab one of those?

Foster: I bet you we can.

Malahoff: Yeah, why don't we just grab one of those chimneys.

Malahoff: Yep, water depth is 1150 m.; time is 14:27. We are going to attempt to sample some nontronite chimneys. We are right in the middle of a chimney field here.

Malahoff: What's that?

Karl: I look _____

Malahoff: Benthic part done?

Foster: _____

Karl: Yeah, there just really very fragile.

Karl: I don't know Alex, we can't do any....yeah, it'll get lost.

Malahoff: Yeah, we'll probably have to use the chlorine key for that.

Karl: Too much.

Malahoff: Can't do it, right?

Foster: KILA, this is PISCES V do you copy.

Malahoff: OK, we've finished sampling the... or attempted sampling the nontronite field. Large field of small chimneys. Small chimneys that are a few centimeters high.

Foster: Batteries are getting low. We are leaving the bottom from 1150 m. Over.

Malahoff: 1150 m. Dive is terminated. The field is interesting. You can see chimneys sticking down, sticking up obliquely from the ocean floor. We are on top of the ridge. The ridge itself is covered by sediment and this older nontronite. So there is a large field of fingerlets here and sort of large swails of nontronite running down slope.