HAWAI'I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT
DIVE: P5-691

MISSION STATUS

Location: Twin Banks, NWHI

Latitude: 23° 6.8'N **Longitude: 163° 7.3'W**

Mission Date: 2 Nov 07 **Duration: 8 hours 15 mins**

Maximum Depth: 1502 meters

Project Title: Deep sea coral research activities in Papahanaumokuakea Marine National Monument (Monument permit # PMNM-2007-050)

Principal Investigator: Dr. Robert B. Dunbar

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Observer 2:
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Pilot 1: Terry Kerby **Pilot 2: Colin Wollerman**

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

Objectives: Deep-sea corals are a new and unique paleoclimate/paleoceanographic archive that can extend our observations of ocean physics and climate to periods well before the onset of the instrumental record. Using a collection of submersible- and ROV-recovered specimens of a variety of deep sea coral species our research program is working on the development of climate time series that will improve our understanding of North Pacific variability over decadal to centennial timescales. Preliminary results on deep-sea corals from Hawaii and the Gulf of Alaska document great longevity (live collected corals more than 4200 yrs old) and good preservation of even older fossil corals.

The primary objective of our research efforts in the PMNM is to recover a suite of different deep-sea corals, both living and dead, from a range of locations and depths (300-1800) to develop long climate time series. We will focus the majority of our work in the upper 700 meters where deep-sea corals are most abundant and are also at an optimal depth to monitor variations in the permanent thermocline. Different sites are needed to

assess the degree to which we are seeing artifacts associated with island or bathymetry effects that can influence the extent to which any specific site records regional versus local signals.

Deep sea coral species such as *Corallium* spp., Dendrophyllia, sp., and *Isididae* as well as colonial zooanthids such as *Gerardia* (gold corals) and *Leiopathes* (black corals) collected alive are the primary objectives. These are the species we have been working with to date as they hold the greatest promise as paleoclimate archives and are sometimes harvested as part of the precious coral trade.

Observations, findings, etc:

This dive began at 1502 meters on a steep slope on the southern side of Twin Banks. We proceeded upslope moving to the WNW. The slope between 1500 and 1300 meters was primarily sand on basaltic substrate with an occasional basaltic boulder lying on top. Above 1300 meters we began to observe occasional steep benches or steps, with vertical walls in the range of 3 to 10 meters. Generally, deep sea corals were present on the larger of these steeps (e.g. vertical rises of more than 5 meters). Our first collection was of a *Corallium* sp. at 1300 m. See attached table for species collected.

We proceeded above 1000 meters into steep terrain mostly composed of basaltic outcrop until the first appearance of layered carbonate rocks at about 790 meters. Carbonate rocks (dissolution hardground in part?) and modern carbonate sands dominated the rest of the dive above 790 meters. Sands became more common above 550 meters and exhibited sand waves and ripples at scales raging from cm to 10's of cm's.

We left the bottom at a depth of 521 meters.

Species list:

Coral samples were taken as follows:

	species	time	Lat			Long			Depth (m)
Sample 1	Corallium ?	10:40 AM	23	6.997	N	163	7.579	W	1300
Sample 2	Keratoisis ?	11:43 AM	23	7.012	N	163	7.743	W	1125
Sample 3	Corallium (x2)	12:11 PM	23	7.017	N	163	7.762	W	1072
Sample 4	Unknown (orig called Dendrophyllia)	1:15 PM	23	7.31	N	163	7.85	W	963
Sample 5	Corallium	12:11 PM	23	7.31	N	163	7.85	W	965
Sample 6	Bamboo stump	3:00 PM	23	8.013	N	163	8.24	W	622
Sample 7	dead Gerardia	3:15 PM	23	8.013	N	163	8.24	W	622

In addition to the above coral samples, we observed:

Iridigorgia spiralis (many specimens, as large as 3-4 meters in height)

Pyrosome

Antipatharian

Lemon yellow sponge

Galatheid crabs

Bathypathes abysalis

Narella

Gerardia

Paleopatides

Corallium

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

The Titan arm failed during the 1st use to collect a specimen. The arm became inoperable while it was extended off to port, creating complications for sampling during the remainder of the mission. The Tyco arm was used for all further collections.

Recommendations for corrective action or improvement:

I defer to Terry Kerby on this one. It is an old-arm, no longer support by the manufacturer. A new arm costs on the order of $200,000 so replacement will be an expensive proposition. Continued support of the arm by the HURL staff is likely to remain a desirable way to proceed.

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

We recovered most of the samples we hoped to collect. We did observe one large Corallium that we wished to collect but were unable to recover because of the Titan arm problem. The use of the Tyco arm slowed us down enough that we were unable to attain the planned-for stop depth of ~350 meters. Nevertheless, I consider the mission to be successful.

List specimens or samples collected on the mission. (see above)

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 11/2/07 (date) in the following way:

a. CTD data by immediately (date)

b. video and images by 11/2/08 (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

Robert B. Dunbar (dunbar@stanford.edu)