HAWAI'I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT
DIVE: Pisces IV - 150

MISSION STATUS

Location: Northwest side of Palmyra Atoll, northern Line Islands

Latitude: 05°54.305'N **Longitude:** 162°09.620'W

Mission Date: 29 July 2005 **Duration:** 6 hours 15 mins

Maximum Depth: 808 m

Project Title: Exploration of the deep slopes of the US Line and Phoenix Islands to investigate the biogeography of deepwater fish and corals, and identify paleo-shorelines.

Principal Investigator: Dr. Frank Parrish & Bruce Mundy

Address: Pacific Islands Fisheries Science Center
2570 Dole St.
Honolulu, Hawai`i 96822

Phone: (808) 983-5374 (Mundy)

Observer 1: Bruce C. Mundy
Address: Pacific Islands Fisheries Science Center
2570 Dole Street
Honolulu, Hawai`i 96822

Observer 2: Frank Parrish
Address: Pacific Islands Fisheries Science Center
2570 Dole Street
Honolulu, Hawai`I 96822

Pilot 1: Max Cremer

Pilot 2:

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

Objectives: To collect data for 1) a comparison of fish and coral community structure at 300-500 m between the U. S. Line Islands and the Northwestern Hawaiian Islands (NWHI), and for 2) a comparison of the submerged paleo-shorelines of the U. S. Line Islands with those of the NWHI. Survey protocols are those previously used for surveys in the NWHI.

Observations, findings, etc:

The dive was intended to begin at 0800 according to standard HURL practice. The Pisces IV was placed in the water at 0805 and was cleared to dive at 0811. When the pilot attempted to turn the thrusters vertically to enable the descent, it was discovered that the thruster tilt hydraulics were not working. The dive was aborted because of this problem. As the submersible was being recovered, positive buoyancy decreased as air ballast was lost from the tanks. The negative buoyancy was likely a result in part of the drop ballast still being held in the release containers because the sub had not descended, although it is still not clear why air ballast was lost. Upon return to the deck, the HURL submersible crew determined that a mechanical linkage in a thruster bar had failed. Parts were replaced, the hydraulic system was serviced, and the system was checked for problems. The repaired system was found to be operating correctly and the operations chief decided that it was safe to deploy the Pisces IV again.

The submersible was placed in the water again at 1036 and was cleared to dive at 1043. At 1142, bottom was reached at 808 m (temperature = 4.4°C; 05°54.305'N,162°09.620'W). The topography here was a gradual shelf with small carbonate benches and moderately thick sediment cover. Although the usual *Nematocarcinus* shrimp seen at this depth were present, several other animals not observed before in the Line Islands dives were also seen. These included small (10 cm) bathygadids hovering a meter or two above the bottom, umbrella-like *Metallogorgia* gorgonians, and a small, red-brown octopus with lateral fins drifting a meter above the bottom. Problems were noted initially with the top camera working only in black and white, but this disappeared soon thereafter during the dive and both cameras worked properly. At 1153 we began to move upslope to the south-southeast, but stopped almost immediately at 1157 on a soft, fine-grained sediment flat to take a sediment sample (4.5°; 05°305'N, 162°09.620). We continued upslope, over topography that had turned to carbonate ridges and ledges, stopping to obtain a position at 1232 (673 m, 5.2°; 05°54.116'N,162°09.592'W). At 1253, we stopped at a low incline of coarse, *Halimeda* derived sediment to obtain a sediment sample at 513 m (05°53.948'N,162°09.507'W).

The first survey transect started from the position of the sediment sample, above, at 1322 and went to the east. This transect went across rugose carbonate ridges and steep-walled canyons and chasms. In the later half of the transect went across an escarpment wall intersected with canyons, and ended at the escarpment base. The fauna on this transect was dominated by anemones, small shrimp including *Plesionika*, various soft gorgonians, macrourids, and juvenile *Setarches*. The transect ended at 1356 (508 m, 6.3°) at the bottom of a canyon. Communications to the K-O-K were faint and garbled at this point, so a position was not obtained for the transect end. We therefore moved directly upslope on the canyon wall to 450 m in order to obtain a position for the start of the next transect that would be above the end of this.

The 450 m transect began at that depth on the canyon wall cliff face at 1413 (05°54.017'N,162°09.170'W). This transect ran to the west over ridges, canyons, and escarpment faces. Many areas of jumbled boulder falls were passed. Juvenile *Setarches* scorpionfishes, roughies (*Hoplostethus* sp.), deepwater cardinalfish (*Epigonus* species), and various gorgonian fans including blue paramuraceids were dominant organisms on this transect. The transect ended at 1444 (450 m, 7.4°; 05°539'N,162°09.540'W). From there, we moved upslope to the 400 m transect isobath.

The third transect began at 1458 and 402 m (7.6°; 05°53.885'N,162°09.537'W), moving eastward. Juvenile *Setarches* were absent or rare on this transect. The topography at first was a dome-shaped carbonate lobe, but changed to ridges and canyons, and then to a sheer cliff face. A notable find on this transect was a lost plastic lobster trap of the type used in the lobster fishery of the Northwestern Hawaiian Islands. The trap was open, but had little fouling, making it difficult to determine if it was recently lost or had been there for a long time. The trap was a Fathom Five trap with the escape vents required for the Northwestern

Hawaiian Islands fisheries. It is possible that it was from a Hawai`i based commercial fishing venture, but it is also possible that the trap was lost from a research cruise, although neither NMFS observer on the submersible could remember the use of lobster traps on NMFS cruises to Palmyra in recent years. The trap had a bridle but no connecting line to indicate that it was part of a larger string. The transect ended at 1537 (402 m, 7.7°; 05°54.066'N,162°09.093'W).

From there we moved upslope to quickly begin the final transect, aware that time was running short for the dive. The fourth transect began at 1544 (352 m; 7.7°; 05°54.026'N,162°09.074'W), moving back to the west. The topography was again domed carbonate lobes, ridges, canyons, boulder slides, and escarpment faces. Gorgonian fans were sparse and spiral wire coral (*Cirrhipathes spiralis*) was seen often. Otherwise, the fauna was similar to that on the previous transect and at the 350 m isobath on the previous day's dive. Wood and coconut debris was encountered several times during the dive. The transect ended at 1620 and 334 m (7.7°; 05°53.803'N,162°09.561'W). From there the submersible moved directly offshore toward a depth suitable for surfacing and recovering, because of the late hour at which the transects were completed. The submersible surfaced at 1658.

At the end of the dive, when the submersible was secured on deck and being serviced, the HURL crew discovered that the hydraulics pump and motor were badly overheated. After troubleshooting the system, it was decided to replace the pump and motor before deploying the Pisces IV again. The repair took all of the next day, and the next day's dive was done with the Pisces V. Repairs were successful and both submersibles were deployed for a two sub dive on the final diving day of this cruise.

Species list:

Sponges:
Columnar sponge similar to or a species of *Regadrella*
Unidentified circular "waffle sponge"

Ctenophora:
Various pelagic ctenophores, including oval and lobate species

Cnidarians (gorgonians, antipatharians, corals):
Unidentified gray *Antipathes* species
Bathypathes conferta (plume-like antipatharian)
Unidentified plume-like cnidarian shaped like *Bathypathes* but gray and with much finer pinnae
Calligorgia species (gray-white feathery fan)
Narella species (white finger-like gorgonian)
Candidella species (small white bushy gorgonian)
Unidentified grayish-tan gorgonian
Metallogorgia species
Yellow paramuraceid (Paramuraceidae)
Blue paramuraceid (Paramuraceidae)
Cirrhipathes spiralis (spiral whip coral)
Dendrophyllia species
Unidentified cup corals

Cnidarians (others):
Pelagic siphonophores
Purple, conical pelagic jellyfish

Corymorpha species (hydrozoan on stalk with inverted bell)
Hydrozoan? Clumps resembling algae
Actinostolid sea anemone (large, long tentacles)
"Squeeky toy" anemone (numerous short, thick brown tentacles with yellow tips)
Various sea anemones (Actinia)
Cerianthid tube anemones
Orange *Corallimorphus* species

Molluscs:
Pelagic small red-brown octopus with fins.

Crustaceans:
Nematocarcinus species (long legged shrimp)
Plesiopenaeus species (bright red shrimp with flexible swimmerets)
Heterocarpus laevigatus
Plesionika species (small shrimp with translucent tails and dark-blotched carapaces)
Large crab with a body and claws like a *Cancer* species, but with long legs (golden crab, Geryonidae)
"Sumo crab", large species with rounded, lumpy body, short legs, and short chelae
Eumunida species (large galatheid crab on or near cnidarian fans)
Munida specides (small galatheid crabs in substrate holes or on sediment)
Commensal barnacles on *Histocidaris* urchins

Other arthropods:
Pelagic red and half-red mysids, including *Gnathophausia*?

Echinoderms:
Various unidentified crinoids
Various brittle sea stars (Ophiuroidei)
Asthenactis species? (multi-armed, "fuzzy" appearing sea star)
Histocidaris variabilis (urchin with red-brown test and slender pale spines)
Unidentified orange sea star with a wide disc and short, tapered arms
Unidentified pentagonal red sea star
Unidentified orange sea star with long tapered arms and spines on arm edges
Novodinia species (large, orange-red, multi-armed sea star)
Araeosoma species? (large, depressed sea urchin)
White *Stylocidaris* sea urchin
Unidentified pales sea urchin living on edges of escarpments in colonies
Small pink holothurians with cirri on body
Small pale holothurians

Tunicates:
Pelagic colonial salps

Bony fishes:
Uroconger lepturus? (conger eel with a flattened snout and prolonged tail, Congridae)
Congrid eel with white edged fin (Congridae)
Unidentified snake eels (Ophichthidae)
Unidentified eel with green back, white ventral surface, and black lateral stripe (Congridae, Ophichthidae, or Xenocongridae)
Cyclothone species (bristlemouth, mesopelagic, Gonostomatidae)
Diaphus species (headlight lanternfish, Myctophidae)
Unidentified lanternfishes (Myctophidae)
Ijimaia species (jellynose eel, Ateleopodidae)

Pycnocraspedum cf. *armatus* (deep-bodied cusk eel, Ophidiidae)
Unidentified small Bathygadidae
Caelorinchus cf. *tokianus* (large, barred rattail with pointed snout, Macrouridae)
Unidentified small *Caelorinchus* species with two bars on body (Macrouridae)
Unidentified small *Caelorinchus* species (Macrouridae)
Nezumia species (bluntnosed dusky rattails, Macrouridae)
Ventrifossa species (bluntnosed shiny rattails, Macrouridae)
Lophiomus cf. *setiger* (monkfish, Lophiidae)
Chaunax species with orange spots on body (coffinfish, Chaunacidae)
Grammicolepis brachiusculus (tinselfish, Grammicolepididae)
Neocyttus cf. *acanthorhynchus* (oreo dory, Oreosomatidae)
Cyttomimus stelgis (dory, Zeidae)
Hoplostethus species (roughy, Trachichthyidae)
Juvenile *Setarches* species (scorpionfish, Scorpaenidae)
Satyrichthys species with short rostral horns (Peristidiidae)
Satyrichthys species with long rostral horns (Peristidiidae)
Synagrops cf. *argyrea* (silverbelly, Acropomatidae)
Epigonus atherinoides (large, iridescent green-blue deepwater cardinalfish, Epigonidae)
Small unidentified *Epigonus* species (deepwater cardinalfish, Epigonidae)
Chrionema chryseres (yellow-spotted duckbill, Percophidae)
Chrionema squamiceps or *pallidus*? (duckbill, Percophidae)
Rexea species (silver, somewhat elongate, snake mackerel; Gempylidae)
Purpleish, stockier bodied snake mackerel, *Neoepinnula* or *Epinnula*? (Gempylidae)
Hollardia cf. *goslinei* (Hawaiian spikefish, Triacanthodidae)

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

The hydraulic problems at the start of the dive shortened the dive day. Two hours were lost, but the prompt repair and turnaround time for resuming the dive enabled us to meet all of our necessary objectives.

Recommendations for corrective action or improvement:

The submersible crew identified and corrected the problem. It would be presumptious for us to make recommendations about this, given the professional, proficient, and rapid response of the crew in fixing the problem and enabling us to finish the work planned. We cannot think of better corrective actions than those which the crew took.

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

The mission achieved its purpose even though the hydraulic problem took two hours from the planned dive day. As noted above, the submersible crew worked rapidly and proficiently to correct the problem, and to enable us to finish our necessary transect surveys for the day. In addition, two planned sediment samples were obtained, as were images of various animals of interest. Specimen collection planned for the dive was not done because of time limitations, but this was an ancillary activity not necessary for completion of the dive mission.

We especially appreciate the actions of the submersible pilot, Max Cremer, in response to the problem when it occurred. His deliberate, careful, and professional response in trouble-shooting the problem, communicating with the ship, and working with the submersible's impaired function during recovery got us safely back on board the KOK without alarm.

We also appreciate the willingness of the pilot, the submersible crew, and the KOK crew's to let the dive go longer than the usual 1600 ascent time, in order to let us finish our scheduled work after the delayed start. This work beyond the usual dive schedule allowed us to meet all of our objectives.

In addition, the work of the submersible crew at night and during the next day to completely repair the problem of the overheating hydraulics system enabled the Pisces IV to be used for the final, two-sub dive of the cruise two days after this dive. This was also an effort that deserves recognition as special service to the science mission of the cruise.

List specimens or samples collected on the mission.

No specimens were collected during this dive. Two sediment samples were collected for analysis at the University of Hawai`i.

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 "Exploration of the deep slopes of the US Line and Phoenix Islands to investigate the biogeography of deepwater fish and corals, and identify paleo-shorelines"

held on_____(date) in the following way:

a. CTD data by_____(date)

b. video and images by_____(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

Bruce C. Mundy