HAWAI'I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT
DIVE: P5-606

MISSION STATUS

Location: South Oahu, Site #1

Latitude: 21° 15.17 **Longitude:** 158° 03.61

Mission Date: 13 Dec 2004 **Duration:** 6 hours 0 mins

Maximum Depth: 179 m

Project Title: Exploration of Deepwater Macroalgal Meadows in the Main Hawaiian Islands

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Pilot 1: Max Cremer **Pilot 2:** none

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

The objectives were to survey deep water macroalgal assemblages and associated organisms from 50 to 150 m depths to determine the composition, densities, lower depth limits, and breadth of deepwater macroalgae and macroalgal meadows. These data will be compared with surveys done in Sept. 2004 to test for any seasonal differences in the macrophyte assemblage. We were particularly interested in the abundance of *Udotea* sp. and *Avrainvillea amadelpha* at depths from 90 to 50 m depths. The prototype sediment pore water sampler was deployed in the *Udotea* sp. meadow with a subsequent water column sample, and sediment samples were collected inside and outside meadows of dense macroalgal growth to determine if sediment grain size may affect the distribution and abundance of large psammophytic (sand-dwelling) algae. The photosynthetic efficiency of algae, particularly *Udotea* sp. and *A. amadelpha*, were measured topside on the boat using Pulse Amplitude Modulated fluorescence and samples were taken for

physiological measurements. Deepwater macroalgae were surveyed using 4 lasers for percent cover and density estimates, and collected with the manipulator arm. Lasers were calibrated prior to the cruise date.

Similar to the Sept. 2004 cruise, the lower depth limit of macroalgal growth (a nongeniculate coralline) was 115 m depth. Various green algae (*Caulerpa* sp., *Cladophora* sp.?, prostrate *Halimeda* sp.), and other flabellulate brown and dichotomous red algae were collected from 100 to 80 m depths over sand and occasional coral rubble and rock outcrops. Numerous feeding depressions were observed in soft sediments, often with mats of a filamentous green alga (possibly *Cladophora* sp.) accumulating in the bottom of the depressions. Sparse individuals (4.5 cm canopy height) of the calcified green alga *Udotea* sp. began at 90 m depth, forming dense meadows from 80 to 50 m depths (the shallowest depth surveyed). *Udotea* patches ranged in size from ~1 to 40 m^2 with canopy heights up to 20 cm tall. Small fish appeared to be associated with the *Udotea* meadows. Co-occurring with *Udotea* sp. meadows was the invasive green alga *Avrainvillea amadelpha*. *A. amadelpha* was found from 67 to 50 m depths, and forming dense ~0.25 - 3 m^2 patches from 60 to 50 m depths with canopy heights up to 13 cm tall. This is deepest collection of *A. amadelpha* in Hawaii and the first record of high densities of this invasive alga in deep water in Hawaii. Future surveys will elucidate any possible invasive interactions of *A. amadelpha* with *Udotea* sp. Overall, the most abundant macroalgal species were the green algae *Udotea* sp., *A. amadelpha*, and *Caulerpa* sp. Further processing of samples at the University of Hawaii will provide additional data on species identifications. Fish data from the submersible video will be provided by Frank Parrish. Associated invertebrates are being processed and identified by Pakki Reath. Invertebrates associated with macroalgae were typical of epiphytic shallow water (< 30 m) invertebrate communities (i.e. ascidians, bryozoans, and spirorbid polychaetes), with the exception of some unique decorator crabs and sponges.

Observations, findings, etc:
Large meadows of *Udotea* sp., observations of small fish associated with *Udotea* sp. meadows, abundant populations of the invasive alga *Avrainvillea amadelpha* in deep water co-occuring with *Udotea* sp., *Cladophora* sp. mats in feeding depressions, ~5 % cover *Caulerpa* sp. over soft sediments, sediment pore water and sediment collections. Excellent video footage of a white moral eel with 2 trigger fish and sediment collections.

Species list:
Macroalgae and invertebrates were preserved for identification at the University of Hawaii. Fish will be identified at a later date. A gross tentative species list of macroalgae includes:

Udotea sp.
Avrainvillea amadelpha
Ulva sp.
Caulerpa sp.
Cladophora sp.
Lobophora or *Distromium*
Halimeda sp.
Red alga with marginal cystocarps
Filamentous red algae
Large red, brown, and green macroalgae
Nongeniculate coralline algae

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

The Titan manipulator arm was not functioning at the beginning of the dive. We headed back to port to exchange submersibles. The Titan arm began to function halfway to port, so we returned to the dive site. The dive was started ~2 ½ hours late.

Recommendations for corrective action or improvement:

Despite the time lost during technical difficulties with the submersible and transit to and from port, we were able to complete a ~6 hour dive.

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

We were tremendously successful with the submersible dive in collecting numerous species, surveying macroalgal populations at multiple depths, and collecting sediment pore water chemistry and water column data.

List specimens or samples collected on the mission.
Algae and associated invertebrates were collected in 15 containers in the inauguration dive of the new collecting box (a.k.a "Kim and Doug's Hope Chest of Wonders"). A sediment pore water sample, 2 sediment collections, and a water column sample were taken at 75 m depth. CTD data was taken throughout the dive.

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_____(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