

NOAA Pacific Islands Fisheries Science Center

Small Boat Mission Report

Mission Number: SB-09-03

Operator-in-Charge: Jeremy C. Taylor

Small Boat ID/Type: M/V *Huki Pono*

Mission Title: South Oahu Autonomous Underwater Vehicle (AUV) Survey

Mission Area: South of Oahu, Hawaii

Mission Dates: 31 August–05 September 2009

1. Objectives

In our attempt to collect seafloor imagery in coral reef ecosystems and at known bottomfish sites in collaboration with representatives from the Northwest Fisheries Science Center (NWFSC) and Jeff Drazen of the University of Hawaii's (UH) Oceanography Department, we suffered several mechanical setbacks. The AUV is a relatively new piece of equipment to the Coral Reef Ecosystem Division (CRED) and our inexperience with troubleshooting problems and our reliance on Woods Hole Oceanographic Institute's (WHOI) expertise became evident. The major mechanical problem plaguing the cruise involved the AUV's on board batteries. We theorize that the battery controller board stopped functioning normally after sitting for several months between missions. This was not fully discovered until the last day of underway operations. We obtained little data but we acquired a lot of valuable troubleshooting experience. Also, the few deployments that occurred proved that the Sea Engineering vessel M/V *Huki Pono* is an excellent platform for future AUV and AUV/BotCam missions.

2. Schedule

31 August At 0900, the CRED's AUV team packed up the AUV and AUV-related equipment from Snug Harbor and transported them to Pier 26. At 1130, we started assembling the AUV with the assistance of one member of the NWFSC team who arrived the day before. At 1300, a second member of the NWFSC team arrived and was picked up at the airport. At 1700, the AUV was almost completely assembled and was craned aboard and secured on the M/V *Huki Pono*.

1 September At 0830, the team met to complete assembling the AUV and to perform ballasting. At 1200, most of AUV and ship's personnel prepared to go to

sea but discovered that no power was being outputted by the batteries. The brand new conductivity-temperature-depth apparatus was also not outputting data. We decided to open the battery canister and check for loose wires and obvious issues (2-h process). At 1600, the batteries, themselves, held a charge but we were unable to communicate with the batteries controller board; therefore, we contacted the WHOI on the phone for assistance.

- 2 September At 0800, we learned from the WHOI that if the batteries sat for an extended amount of time they would shut themselves down to preserve their health. We jumper-started the batteries to activate them but we still were unable to get them to communicate with us and to show the amount of charge per battery. At 1200, we decided to run a brief out and back test in the harbor. The AUV lost power during the mission, was rebooted, and started drifting. We recovered the AUV with boat hooks and brought it back aboard. At 1400, we ran a Depth Servo on deck power to determine that the battery was the weak link. The mission plan ran successfully and then we ran a Heading Servo that continued to rule out the thrusters as a problem. At 1700, we ended for the day and decided to charge the batteries all night to bring them up to full capacity.
- 3 September At 0800, the battery was still not communicating with us, but it showed evidence of a full charge. At 1100, we decided that the AUV was ready to attempt its first sea trial of the mission, so we cruised out to the test area. At 1300, we ran the test mission. The AUV stopped its mission early and ascended to the surface. We ended the underway operations and put the battery on charge all night.
- 4 September At 0830, we conducted the last day of possible underway operations. From the computer logs, we learned that the computer was rebooted during the mission and that we ballasted a little too light originally, so more weight was added in order to not tax the thrusters as much. At 1000, we performed successful Depth and Heading Servo missions on battery power and deemed the AUV ready for its second attempt at sea operations. At 1300, we ran a short mission to test the readiness of the AUV cameras. This mission was successfully completed. We returned to deploy the position and extended the mission for a longer period. When we were 40 min into the mission, the AUV computer rebooted and ascended to the surface. After securing the AUV, it was determined that the thruster shaft on the starboard side was loose and missing ball bearings. All underway operations were scraped.
- 5 September At 0900, we disassembled the AUV and stored it at Snug Harbor and Ford Island.

3. Field Party

Name	Role	Organization
John Rooney	Chief Scientist	JIMAR
Jeremy C. Taylor	Vessel Operator-in-Charge	JIMAR
Jeff Anderson	Alternate Deck/Lab Leader	JIMAR
Benjamin Richards	AUV Team	JIMAR
Jacob Asher	AUV Team	JIMAR
Elizabeth Clarke	Alternate Party Chief	NWFSC
Curt Whitmire	AUV Team	NWFSC
Jeff Drazen	Observer	UH

4. Results


One full line of seafloor imagery was collected on site on the ground fish site and much experience in troubleshooting AUV operations was learned.

Operations did not run as smoothly as expected. We have proved that we need to practice with the AUV more frequently to become proficient at operations and troubleshooting. The Sea Engineering vessel M/V *Huki Pono* proved to be an acceptable platform and should be considered for future operations. The captain, Griffith Jones, should be complimented for his willingness to help with operations and offer suggestions on how to improve them. Jeff Drazen has determined that the M/V *Huki Pono* should be able to perform AUV and BotCam operations simultaneously for future collaborations.

5. Attachments


Photos of the Battery Controller and AUV's Thruster Shaft.

6. Approvals



John J. Rooney
Chief Scientist
Pacific Islands Fisheries Science Center

12/8/09
Date



Samuel G. Pooley
Science Director
Pacific Islands Fisheries Science Center

12/16/09
Date

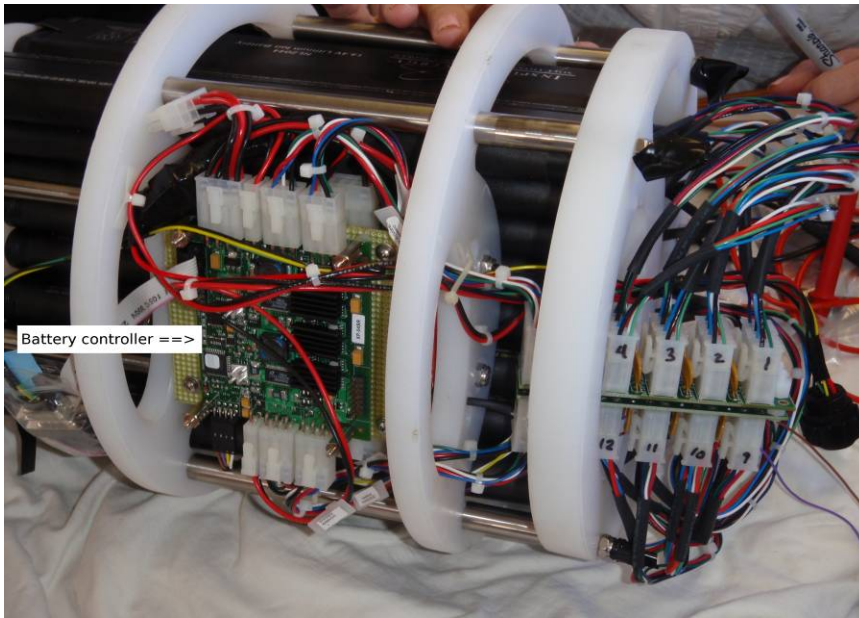


Figure 1.--Battery Controller.



Figure 2.--AUV's Thruster Shaft.