Project Rationale

The deeper structure of the Wai‘anae Volcano and Ka‘ena Ridge is poorly known. Recent work has shown that most of Ka‘ena Ridge represents a precursor volcano to the island of O‘ahu. It is presently not well constrained how far to the ESE Ka‘ena extend under Wai‘anae. The great Wai‘anae Slump landslide deposit almost certainly contains debris from both of these volcanoes. There is some uncertainty about the age of the Wai‘anae Slump. Submersible dives on the break-away scarp can contribute to understanding the timing of the landslide.

HAWAI‘I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT (QLR) for *Pisces* and *RCV-150*

DIVE: P4-275

(*Extend length of sections as needed/appropriate*)

MISSION STATUS

Location: WSW Barber’s Point, Wai‘anae, O‘ahu

Latitude: 21° 17’ N **Longitude:** 158° 14.5’ W

Mission Date: **16-Dec-2012** **Duration:** **8** hours **6** mins

Maximum Depth: 2002 meters

Project Title: Waianae Geology

Principal Investigator: John Sinton

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Observer 1: Sinton **Observer 2:** SK Pandey (ABS)

Address: (see above) **Address:** ABS

Pilot 1: Terry Kerby **Pilot 2:**

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

Objectives:

1. Obtain ABS certification to 2000 m of Pisces 4
2. Observe and sample lava flows along the west-facing scarp (landslide headwall)

Observations, findings, etc:

The top of the scarp is near 1740 m bsl near 158° 14.368 W, 21° 16.776 N. At this location the bottom is composed of a hard substrate, probably carbonate. From 2000 – 1750 m the scarp wall primarily consists of a series of subaerially erupted basalt lava flows. Both 'a'a and pahoehoe lava flows were observed. The deepest observed lavas were massive 'a'a interiors and not sampled. The deepest sample at 1980 m is highly vesicular pahoehoe. Samples were taken approximately every 30 m up the scarp wall. Near 1755 m, the in tact, broken lava flows are overlain by a conglomerate with very rounded boulders up to 2m across. The conglomerate is in turn overlain by ~30 m of fine grained, bedded sedimentary rock. The west, the sediment stops abruptly as the underlying basement rises up. The basement consists primarily of breccia with volcanic clasts, possibly a debris flow. Several samples of clasts from this breccia unit were obtained between ~1765 and 1665 m depth. In total, 11 samples were collected (list below)

Observed Species list:

Rat tail fish, corals, crinoids, sponges; one large (1.5 m) unidentified fish

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

Limited illumination owing to failure of one of the lights (short). This problem did not affect the dive in any meaningful way.

Recommendations for corrective action or improvement:

None.

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

Absolutely. Pilot Kerby did an excellent job of sampling in indurated and steep outcrops. Every sample was taken directly out of outcrops rather than simply picking up loose rocks.

List specimens or samples collected on the mission:

(see next page)

Sample	Depth (m)	Long	Lat	Description
P4-275-1	1980	W158° 14.447	N21° 16.667	subaerial basalt lava; probably pahoehoe
P4-275-2	1948	W158° 14.429	N21° 16.683	small piece; moving up wall
P4-275-3	1908	W158° 14.454	N21° 16.716	flat slabby rock; oxide staining
P4-275-4	1880	W158° 14.429	N21° 16.744	massive 'a'a lava from outcrop
P4-275-5	1831	W158° 14.427	N21° 16.716	small lava sample with red band and white stripe; note Lat is from log; my notes say 21:16.763
P4-275-6	1802	W158° 14.418	N21° 16.776	two samples from same place, probably broken from same outcrop
P4-275-7	1766	W158° 14.406	N21° 16.786	15 cm-long piece from breccia (?) outcrop breccia unit of sample 7 overlain by boulder conglomerate
P4-275-8	1733	W158° 14.419	N21° 16.815	bedded sediment - carbonate?. Unit is ~30 m thick overlying boulder conglomerate
P4-275-9	1750	W158° 14.462	N21° 16.828	lava sample from breccia unit; possibly debris flow beneath thick bedded sediment
P4-275-10	1755	W158° 14.489	N21° 16.856	massive lava block from breccia unit
P4-275-11	1665	W158° 14.485	N21° 16.935	block from cemented rubble unit on east side of deep gully