HAWAI'I UNDERSEA RESEARCH LABORATORY
QUICK LOOK REPORT
DIVE: PV-636

MISSION STATUS

Location: Volcano 19, South Tonga (Tofua) Arc

Latitude: ***Begin*** 24° 47.900'S **Longitude:** ***Begin*** 177° 01.200'W

Mission Date: June 13, 2005 **Duration:** 5 hours 26 min (Bottom Time)

Maximum Depth (m): 1025 m

Project Title: SITKAP
(Submersible Investigations of the Tonga-Kermadec arc using PISCES)

Principal Investigator: Prof. Peter Stoffers, Kiel University
Guest Scientist from Canada, Mark Hannington

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Observer 1: Mark Hannington **Observer 2:** None
Address: GNS, 30 Gracefield Road, Lower Hutt, NZ

Pilot 1: Terry Kerby **Pilot 2:** Max Cremer

Scientific Data Acquired: Video, hand-held still photos, CTD, rock samples, bio sample, scoop samples, geological map

Objectives:
Land at bottom of crater (NW corner, 1025 m). Transit to the slope of the caldera to a contour depth of (970 m). Follow the lower crater wall/slope, circumnavigating the crater in a clockwise direction. Search for evidence of hydrothermal activity by looking for debris shed into crater from the walls. Coss the intersection of the inner crater wall with the larger outer caldera faults (at the approximate location of the two low bathymetric features on the caldera floor). Test whether the plume (at 890 m) is sourced at or near the fault intersections. Continue completely around the crater returning to WP1.

Observations, findings, etc: (Also see Appended Dive Log)

Summary: The dive was launched in good weather conditions, allowing a bottom time of 5.5 hours (total distance traveled = 3.1 km). All objectives were achieved. A nearly

complete circumnavigation of the crater at a contour depth of 970 m located a large area of diffuse low-temperature venting (maximum 30 deg.C), bacterial mats and Fe-oxyhydroxide "chimneys" along the base of the crater wall on the south side. The field is located near the intersection with the assumed bounding faults of the outer caldera and near the location of a dike swarm/complex at the crater wall. The two main areas of bacterial mat and Fe-oxyhydroxide+silica "chimneys" were about 50 m across, but discontinuous Fe-oxyhydroxide and patches of bacterial mat were present along a strike length of nearly 500 m. Abundant orange floc was was presetn at the base of the slope. Two scoop samples of Fe-oxyhydroxides+bacterial mat and clay-altered blocks of volcanic ash were recovered. The blocks of ash appear to have fallen from the upper rim of the crater. One rock sample of altered volcanic rock (talus) and one sample of dike rock were recovered from near the low-T vent vent field.

Species List:

As for Dive P5-635, except for one small shark (1 m) and a number of possible vent-related animals near the low-temperature vent field.

Also seen during P5-635 (observer and pilot report):
- small rat tail fish (blue)
- unknown shrimp
- tripod-like fish with long vertical antannae
- Natastoma hertaseps fish
- anenomae
- Sanaptibranchid fish
- Sledenia fish

Near the low-temperature vent fiels during P5-636 (observer and pilot report):
- 3 pink crabs (up to 15 cm diameter, including legs), possibly Brachyuran(?) among Fe-oxyhydroxide chimneys
- single swimming scale worm (Polynoidae?)
- clumps of small (3 cm) controurted worm tubes in fracture in basalt and on rocks near bacterial mat and Fe-oxyhyroxide precipitates (possibly Siboglinidae polycheate worms similar to those normally associated with vents); dead
- clumps of live Seripulidae filter feeders at the base of an Fe-oxyhydroxide chimney (sampled)

Midwater organisms observed in video (L. Lundsten, MBARI):
Munopsidae (Isopoda)
Calycophorae (Siphonophora)
Bathylagidae (?)
Trachymedusae (Medusae)
Crossota ? (Medusae)
Sergestidae (Decapoda)
Mysida (Decapoda)
Chaetognatha (Arrow Worms)

Appendicularia (Larvaceans)

Benthic organisms observed in video (L. Lundsten, MBARI):
Brisingidae (Asteroidea)
Zoarcidae ? (Eelpout fishes) possibly Ophidiiformes, though difficult to see)
Lepidisis (unbranched Isididae upon rockwall)
Anthomastus (Octocorallia - I think)
Porifera (Possible, though no good closups)

MISSION EVALUATION:

A. Limitations, failures, or operational problems noted:

None.

B. Recommendations for corrective action or improvement:

None.

C. In your opinion, did the mission essentially achieve its purpose?

Yes, for all objectives.

D. Compare actual work accomplished with the work that was expected to be accomplished.

Because of the exploratory nature of the dive, limited sampling was undertaken.

E. List specimens or samples collected on the mission. (See Sample List Below):

Sample Number	Time (L)	Latitude Min/decM 24degS	Longitude Min/decM 177degW	Depth(m)	Comments Volcano 19:
PV-636-1-Scoop#1	11:57	(48.29)	(0.91)	972	Fe-oxyhydroxide floc material (marker 35)
PV-636-2-Scoop#5	13:39	48.280	0.929	971	Clay-altered talus sample with dissem. pyrite
PV-636-3-R1	14:09	48.280	0.929	971	Clay-altered talus sample with dissem. pyrite
PV-636-5-A1	14:31	48.336	1.089	969	Seripulidae filter feeders at the base chimney
PV-636-4-R2	14:35	48.336	1.089	969	Fe-oxide crust (accidental sample in quiver)
PV-636-6-R3	14:43	48.339	1.157	934	Dike rock from south wall of crater
	15:26	48.207	1.365	971	(marker 36)