

Jason Dive J2-218, August 13-14, 2006 (GMT) North East Pual Ridge

08:41 Off Deck

09:55 On Bottom: 3° 40.50'S, 151° 43.67'E, 1875 mbsl

23:50 Off Bottom: 3° 40.04'S, 151° 43.99'E, 1915 mbsl

01:02 On Deck

Aim:

The goal of the dive is to

- (1) examine the North East Pual ridge area and sample the basement in the area of a pronounced magnetic low centered around x4870, y4550, z1880, also explore mound at x4900, y4490, z1875.
- (2) explore and sample an area of Eh lows around x4900, y4380, z1875.
- (3) explore areas of temperature anomalies around x5550, y5500.
- (4) collect samples from outcrops of basement.
- (5) make general observations to establish the nature of morphological features (scarps, pinnacles, etc.) in the microbathymetry map.

Co-ords for the landing site:

- **Lat/long: 3°40.504' S, 151°43.674'E, 1870 m**
- **UTM: 358724, 9593689 (WGS84 Zone 56S)**

Summary

Bach: Jason landed near the base of a south-facing slope in an area of rubbly lava pieces penetrating a rather thick layer of sediment. Near the base and about half way up the 10 m high steep slope was patchy red and white staining and occasional white, filamentous microbial mats on exposed rock surfaces, and very minor diffuse venting (x4943, z4599, z1870; vvan# 43636). We explored walls and gullies to the east and to the south of the location of shimmering water and could not find more hydrothermal activity. The slopes are extremely steep, and appear to be faults. Talus at the base is minor, however, so that the slopes might as well be steep flow fronts with some mass wasting. We next headed to the center of the magnetic low in the map and ran a grid of 30x30 m, finding a mussel beds with shimmering water (x4864, y4564, z1881; vvan# 43777), but no further hydrothermal activity. The area is sedimented and fragments of hard rock – rubbly lava and possibly a few dead chimneys. We decided to explore the area of Eh anomalies to the south of the mussel bed. Surveying an area of extending from x4925, y4550 to x4825, y4350 we could not locate any further hydrothermal activity. The seafloor in the area is blocky lava, occasionally pushed up to ridges and mounds, and with generally thick sediment cover. We decided to examine the area north of the mussel bed and located a site of diffuse fluid venting though small oxide mounds at x4807, y4582, z1880; vvan# 44158). Temperature of venting fluids was measured at 31°C with the T-probe. Further exploration 50 m to the north and 50m to the east of that location unraveled no further hydrothermal activity. Eh, which had dropped over the oxide field, went back up during that survey, so that it was concluded that the area west of the oxide field should be explored next. An extinct oxide field was located at x4830, z4600 just before the Tivey watch came on.

Tivey: We proceeded southwest on a course of 220 to examine possible mound like features approx. 150 meters away in that direction. If any neovolcanic zone was present we would cross it on this traverse. We crossed monotonous rugged lava that is heavily sedimented with no indications of any young lava or hydrothermal activity. No hydrothermal biota indicators. The mounds turned out to be small volcanic domes. At 14:35 we turned around and began a traverse back to an earlier zone of snails and shimmering water. At 14:58 we begin to see signs of hydrothermal biota with crabs dotting the lava. The lava is remarkably unsedimented here. The transition in sediment cover is pretty quick. Snails are found within crevices of lava and then shimmering water is seen emanating from diffuse areas populated by snails, crabs, shrimp. At 15:00 we come across an old inactive sulfide spire about 1 meter tall (vvan#44430). We sample this sulfide spire (J2-218-2-R1, x4875 y4568 z1880). After sampling the spire (15:21) we move to look around the field and get a temperature measurement of shimmering water. We find more dead sulfide chimneys in an area of actively shimmering water (vvan#44407). The shimmering areas are covered by snails. Another old sulfide beehive shaped (vvan# 44519) is seen. We stop here at the beehive for a temperature measurement of shimmering water in front of it. We get a max temp of about 30C (J2-218-3-T1, x4864 y4565). Continue to look around here. We find an extensive area of snails, mussels, white bacterial mats and shimmering water (vvan#44606) at 16:04. We come across a small heap of smoking snails, a small gray plume is rising out of this clump of snails (vvan44647 x4874 y4597 z1879). We come across more old sulfide chimneys several meters high plus collapsed sulfide chimney debris (vvan#44652 x4883 y4591 z1877). There are adjacent areas of white bacterial mats and shimmering water and snails. We drive to a small hill to the south and it is heavily sedimented lava again. Driving north we get back into the unsedimented lava and snail beds and shimmering water. We stop at a location of this unsedimented lava and sample some of the lava. There are extensive snail beds on lava nearby. We get two pieces of lava at two adjacent locations (J2-218-4-R1, x4897 y4601 z1875 and J2-218-5-R1, x4900 y4600 z1875). We start out on a course of 103 and come into the entrance of a small scarp-bounded valley with talus and fault truncated walls (17:03 vvan# 44799). We wander up this valley near the north wall. Sediments appear thicker here. Jason needs to clear the valley for Medea tether. We fire Niskins while waiting on medea at 17:14 at depth 1856 m. We go back down into the valley at 17:20 and drive eastwards up and out of the valley gradually turning to the south. Everything is sedimented here.

Vanko: The plan at this point is to work our way back to the 30°C oxide mound that was visited on the Bach watch to obtain water samples. First, we explore the eastward continuation of the lineation along which the hydrothermal activity in this area appears to be concentrated. This lineation extends E into a crater, but we find that there is no more hydrothermal activity to the east – just old, heavily sedimented lavas. The Eh is high and the signal is flat. Biology is scant – just a few sea pens, corals, sponges, fish. At the crater there are some fabulous large pillow-like flows that extend down slope into the bottom (vvan 44983, x5032 y4595 z1875). We take a sample of volcanic rock from nearby (Sample J2-218-7-R1, vvan 44995).

Heading back west, as we come off the volcanic hill we re-enter the field of hydrothermal activity. Eh drops to 125 as we see abundant patches of biology – tubeworms and crabs predominate, but snails and mussels are also seen. White microbial films are common on rock surfaces. Near a pocket of dense biology we come upon the old chimneys sampled by the Tivey watch (1-2 m tall, degraded, some fallen, Eh = 147, then drops to 120). We get to the oxide mound visited on the Bach watch and check the orifice temperature - 30°C. By pushing the T probe to the hilt we measure 35.2°C. The hole left over is still producing, so we deploy the water samplers (Samples J2-218-8-W1-IGT3, Tsteady = 33°C; J2-218-W2-IGT4, Tsteady = 35°C; J2-218-W3-M4; vvan 45151).

After sampling, we get underway on a course 086° for 680 m to Chris Yeats' CTD site which is also a magnetic low. On the way we re-cross the hydrothermal area, then climb up onto the volcanic hill with heavy sedimentation. A few interesting sea critters were observed – a nice coral, stars, and a crinoid looking very Devonian.

Bach: We finished the transit to site of supposed plume activity, but could not find evidence for hydrothermal activity there, either there or on route to that waypoint. We checked out the last waypoint, an apparent temperature in the ABE survey, but could not find any hydrothermal activity there either. The seafloor in the entire area is heavily sedimented, with only big blocks of lava and occasional large pillows sticking out of the sediments. A bud off a large pillow was retrieved (sample J2-218-9-R1; x5541, y5462, z1915; vvan# 45622) shortly before the dive was terminated.