

***Jason Dive J2-214, August 8-9, 2006 (GMT)***

**08:00 Off Deck**

**09:13 On Bottom: 3° 43.58'S, 151° 40.31'E, 1684 mbsl**

**23:55 Off Bottom: 3° 43.78'S, 151° 40.01'E, 1658 mbsl**

**01:05 On Deck**

**Aim:**

The goal of the dive is sampling solid / fluid sample pairs at Satanic Mills (WP1) and Fenway east (WP2), as well as sampling of hydrothermally altered rocks/precipitates from exposed escarpments. Unlike at Roman Ruins, escarpment here should in places expose footwall/stockwork (cf. sample J2-209-8-R1.)

We will also attempt to sample basement from Snowcap and further explore the nature of the slopes around Snowcap and the gully in the area of hyaloclastite and native sulphur flows in the area of Snowcap high-T field. Finally, we will revisit the Tsukushi low-T vent site to complete fluid sampling and collect a sulfide sample from the inactive chimneys.

**Co-ords for the landing site:**

- **Lat/long: -3°43.62'S, 151°40.36'E, 1690 m**
- **UTM: 352598, 9587938 (WGS84 Zone 56S)**

**Summary**

Vanko: Owing to the ship's heading, Jason landed 26 m NW of the first waypoint, which was the "magic mushroom" chimney, in search of a good smoker to sample. We first observed rugged old volcanic rocks, and turning SE faced a small volcanic ridge, probably a flow front. Stepping up and over the ridge brought us into volcanic rocks with some oxide staining, much biology (crabs, snails), and thence to the magic mushroom. This chimney, now inactive, is a central short fat spire surrounded by numerous relict chimlets, mostly < 1-2 m tall. We noticed that magic mushroom has a Japanese dive marker (like a little metal tiara) at the top, but it is dirty and illegible. The white chimney next to magic mushroom was giving off gray smoke, but more smoke was coming from chimneys a little farther away. We approached those and found a good gray smoker and measured its temperature at 262°C. Then we moved into the chimney group a bit and knocked off a large spire to try to clean a good orifice, but this made a mess. We handed the watch over to Wolfgang.

Bach: Temperature-probe measurements gave 278°C maximum temperature of fluids venting from exposed orifice. The freshly broken off chimney was set aside and the site was targeted for later sampling. We left the site to look for stockwork exposed at escarpments beneath chimney complexes, heading south for 50 m. We came across an active chimney complex (x2450, y2569, z1685; vvan# 34842), sampled in dive 209 (station 1) and continue to have a look at a steep slope that forms the southern border of the chimney cluster. We found no stockwork there, just lava flow front with sulfide talus. Continued 20 m further south to examine another south-facing escarpment. We found gray to white rocks in talus and cropping out underneath an extinct sulfide chimney and took two samples (J2-209-2-R1-, and 2-R2; x2463, y2549, z1688; vvan#34868). They turned indeed out to be clay-altered and sulfide-veined stockwork, reminiscent of sample

J2-209-8-R1 sampled about 50 m NE of here. Encouraged by this success, we checked out similar features in the map at x2420, y2520 and x2490, y2590 and on slopes and in gullies in between these sites, but saw nothing but steep-sided block lava flow fronts, with rare sulfide talus. It is obviously very hard in this terrain to distinguish between faults and flow fronts.

We returned to the location of station 1 to sample the 278°C hot gray smoker fluids discovered earlier. When sampling the orifice with IGT samplers, we detected temperatures between 280°C and 288°C. Sampling with both IGT bottles and a major bottle went well, although the tell-tail was hard to see. Before leaving the site, a beautiful sample was taken from the base of the chimney that was broken off earlier (sample J2-214-3-R1). It corresponds to the base of that structure that was sitting right on top of the orifice from which the fluid samples were taken (x2454, y2601, z1682; vvan#35231).

Leaving Satanic Mills we crossed the entire field that ends around x2483, y2523. We saw the contact between the block lava flows and more sedimented knobby pillow flows at x2477, y2520, z1695, and crossed sedimented, low-relief lava terrain to x2488, y2436, z1701. Here is the northernmost extension of Fenway along our track line, marked by abundant biota (crabs, mussels, fish, worms; vvan#35338) and heavy white coating of sediments. The abundant fauna continues all the way to the location of the chimneys at waypoint 2 (x2490, y2382, z 1709). We started to look around for the vent orifice of samples 210-7-W1 and W2, when Tivey watch came on.

Tivey: We are looking for a gray/black smoker that was sampled previously but for which we had missed taking a gastight sample as the bottle had mis-functioned (J2-210). It is difficult to reconcile the images from the previous dive with today's view. We get depth heading and position all coinciding and see a likely candidate smoker that now look unmistakably like the one we had sampled previously. This is reinforced with the distribution of biology around (snail beds, etc) and that this is the only smoker in view now. We pick up gastight sampler and take a sample here (J2-214-4-W1-IGT1, x2490 y2382 z1710). Original temp. at this site was 296C, now we get 330C max temp after sampling. Now we start on course 213 and head over to adjacent mound, Fenway with big Papi smoker. We skirt around the north side of the mound. We travel almost exclusively on sulfide talus, and debris apron of sulfide sand. We pass by areas with blocks of semi-dissolved anhydrite, Fe-oxide staining and white-oxide staining. We pass inactive chimneys at 14:42 (x2465 y2358 z1712). Pass vigorous black smoker at 14:45 (x2465 y2356 z1710). Move on course 285 for 40 m. Oxide staining and bacterial mats on lava. Lots of crabs and mussels dotting the outcrop. We stop for a sample of lava here (J2-214-5-R1, x2434 y2360 z1709). We move sideways along scarp approaching main scarp of Snowcap.J2. See more of an outcrop of lava and stop to break off a piece. Sample looks relatively fresh taken from a large slab of lava (J2-214-6-R1, x2432 y2360 z1707). Move on course 280 along edge of slope. Becoming more sedimented now (15:18 x2424 y2372 z1707). Crossing knobby low lying outcrops of lava interspersed with debris fans of rubble, gravel and sediment covering. At 15:50, we stop to try to sample what looks like outcrop but is simply manganese crusts and simply crumbles away when touched by the manip. Decide to keep moving. Move up eastern flank of Snowcap dome heading to the west. Drop a weight at 1601 and now have reached sedimented top of small dome on east flank of Snowcap. Continue along sedimented slope and across rugged blocks of lava on slope of the snowcap dome. Stop to sample

this (J2-214-7-R1, x2286 y2314 z1667 target#37). Continue on course 250 and across sedimented slope. At 16:27 we come across a cruddy old sulfide stump. Drive off eastern slope of Snowcap on our way to small cone to south east of Snowcap. This cone turns out to be sedimented with little of interest, no hydrothermal indicators at all. We take a sample within the crater (J2-214-8-R1, x2126 y2258 z1660). Doppler is reset several times. Start moving out of the small cone to head to Snowcap itself. Come across massive smooth lobate lava flows. We stop to sample this (J2-214-9-R1, x2138 y2337 z1660).

Vanko: Moving north up snowcap we see outcrops of old volcanic rocks in pillow-like and more irregular, jagged forms. One looks like a puffball. We approach a flatter area with Mn-encrusted rock, patches of snails and mussels and shimmering water. Then we recognize a patch of sulfur flow, and it is the same one as that visited during dive 210(?) (vvan 36054). Marker 6 is seen nearby on a heading of 320°. We wait patiently on Medea, then begin as thorough as possible an investigation of the bathymetric trough that runs to the NE and separates the Marker 6 chimney field to the north from the hyaloclastite wall capped by sulfur to the south. We established two sampling stations, then flew a short (19 minute) two-line SM2000 survey to try to tie in our observations with the high-resolution bathymetry. The first sample station was of hyaloclastite in the trough ESE of marker 6. Sample 214-10-R1 is a plate of hyaloclastite float (vvan 36135), and sample 214-10-R2 is in-place hyaloclastite (vvan 36182). Moving upslope we determine that the sulfur flow seems to have flowed over top of hyaloclastite. But slightly downslope there is an outcrop that appears to be lumpy and rusty red (volcanic rock?; sulfide?), so we take a piece of it (214-11-R1, vvan 36226) as well as the more hyaloclastite-looking gray rock beneath it (214-11-R2, vvan 36241).

After the SM2000 lines, we continue up onto snowcap, and see a sharp demarcation into the snow-covered terrane (we presume the white snow is biological). We cross a shallow saddle where there is low-relief volcanic rock that is wrinkly and almost ropey, dusted lightly with sediment. Reaching the top of the knoll there is a volcanic knob with some biology (corkscrew worms) and a few scattered large rocks.

We got underway heading 147° for 60 m to find ODP Hole 1188F. This was easy to find using the LBL navigation and the sonar. There is no venting from the open hole in the center of the reentry cone. There was an occupant of the cone, though – a large octopus was hanging out underneath it (vvan 36466). At this point we fired the Niskin bottles. Nearby we found a cone-shaped depression in the seafloor that is probably one of the old ODP drill sites that did not have a reentry cone (vvan 36478).

Underway on a SW course to leave snowcap, we noticed an altered rock outcrop simply jutting up from the edge of snowcap (vvan 36482 to 36484). A close-up with the 3-chip camera clearly showed advanced argillic alteration accompanied by globs of native sulfur (vvan 36496). This was sample 214-13-R1. Underway to the west we dropped a weight and headed toward Tsukushi. After coming down off the gentle fairly rock-free snowcap knoll, we finally saw rocks and more biology (tube worms, mussels, and crabs, sparsely distributed on lava), and marvelous tubular pillows (vvan 36532).

Bach: We had a 120 m of transit left to Tsukushi and crossed, sparsely sedimented volcanic flows ranging in morphology from big, flat lobates with collapsed roofs to knobby pillow flows to blocky lava flows. We found the easternmost Tsukushi chimney closter (Marker C1) and continued on to the coordinates of the Fe-oxide chimney. Found

the old sample site without much delay and sampled one IGT bottle and a major sample to complete the fluid sampling program at this site (x1841, y2240, z1661; vvan#36650). Two pieces of oxide from the overhang of the venting orifice were also recovered. The south slope of the lava ridge that hosts Tsukushi was surveying to fill the remaining 15 minutes of dive time. As the majority of slopes in the area, it is the steep side/front of a felsic lava flow.