

Jason Dive J2-217, August 12-13, 2006 (GMT)

10:38 Off Deck

11:49 On Bottom: 3° 47.40'S, 152° 05.84'E, 1540 mbsl

23:50 Off Bottom: 3° 47.28'S, 152° 05.65'E, 1505 mbsl

01:02 On Deck

Aim:

The goal of the dive is to collect solids and fluids from the Suzette hydrothermal field, specifically

- (1) sample high-temperature fluids at waypoints 1 and 4
- (2) collect sulphide chimneys, active (highest priority are pairs to go with fluid samples -- pick orifices for fluid sampling that allow chimney sampling) and inactive. Look for cpy linings.
- (3) collect samples from outcrops of basement, if exposed. (The area is reported to be heavily sedimented, so basement outcrops may not be encountered. Look for them, though along scraps and at pinnacles in the map)
- (4) Make general observations to establish the nature of morphological features (scarps, pinnacles, etc.) in the map.

Co-ords for the landing site:

- **Lat/long:** **3°47.395' S, 152°05.837'E, 1540 m**
- **UTM:** **399763, 9581041 (WGS84 Zone 56S)**

Summary

Bach: Jason landed in a heavily sedimented area with occasional patches of dead snails. Moving NW towards a circular mound, the numbers of snail shells increases, and galatheid crabs appear. The slope at the mound is covered with sediment and chimney debris. Further examination of the mound shows that it is entirely composed of sulfide, mostly fallen chimneys, but a few are still standing and reach up to 7 m in height. We continued to the NW towards WP 1 and encountered red and white (bacterial?) mats before reaching the base of the southeastern slope of a mound with a small fissure that extends from the sedimented base up to chimneys on the mound's slope. The fissure issued clear fluid venting at >76°C. Alvinella worms and shrimp colonize the fissure (x3323, y4827, z1523; vvan# 41332). Going up the east side of the mound we found an active chimney field with focused venting of clear to dark-gray fluids through multi-spired chimney complexes that are densely colonized with snails (Ifremeria and Alviniconcha)(vvan# 41396). We had located the area called "forest" by Nautilus Mining. Briefly exploring the area to the east, we located more chimneys, gently issuing clear fluids about 30 m east of "forest". We returned to "forest" for sampling, as it appears to be the site of highest temperature venting in the area. Water sampling (full bottle set) of a gray smoker with multiple chalcopyrite-lined orifices and a beehive-type diffuser just left of those went smoothly, and we recorded temperatures of 302°C with the T-probe and both IGT bottles fired here. A piece of cpy-lined chimney could be retrieved (sample J2-217-2-R1, x3323, y4846, z1504; vvan# 41473). The temperature on the outside of the chimney wall was 13°C. A second chimney was retrieved here, that seemed mostly sealed up and was just gently diffusing fluids (x3320, y4843, z1503; vvan# 41612). The base of the originally large sample broke off, when we tried to

remove attached biota, leaving the football sized top of the specimen for sampling (J2-217-2-R2).

Tivey: We now want to go to sample the small chimlets adjacent to the orifice that was just sampled by the fluid samplers. Chimney is covered by snails, shrimp. We get got for a moment but then find our way back to the smoker. It is difficult to sample these chimlets as they disintegrate upon touching. Finally get a piece ripped off from remaining stump (J2-217-2-R3, x3323 y4846 z1503). Stow the sample and start moving west (14:27). We immediately come to the base of a small scarp down to east running north-south almost. At this scarp base we see what looks like lava outcrop from a distance but as we get in closer it all looks like collapsed sulfides and cemented sulfide debris. We move parallel to the slope to the north and see the sulfide chimney debris scattered on the slope. We stop and move back to the south. Again, we cross by the same sulfide debris and pseudo outcrop. We then climb up this small scarp (14:55). Start to see more intact chimneys, a couple have snails and shrimp on them and white staining. We pass by a tall monolithic chimney about 14 m tall and inactive. We circle and come back to the adjacent snail covered chimney with shimmering water and try to take beehive chimney structures from the top of it. They all collapse. Finally, we get a good top 12 inches of the chimney intact (J2-217-3-R1, x3277 y4818 z1502). We then measure the temperature of the exiting fluid and get a max temp. of 280C (J2-217-3-T1, DVL target#5). We now move south on course 120 for 22 m to check out another set of chimneys. We go by tall 10 m tall spires some encrusted with barnacles and smoking at their tops. We stop at the barnacle-encrusted chimney and do some DVCAM taping (15:59) and check the chimney temperature. We get a max of 290C at the mouth of a large vigorous orifice with clear to gray smoke (J2-217-4-T1, x3290 y4808 z1494) and 288C at an adjacent smaller black smoker (J2-217-4-T2). We stop the DVCAM at 16:13. We move off to the north now on course 305 for about 120 meters heading to the summit area of the Suzette mound. We pass by the sulfide structures we previously saw (16:19). Then we pass more inactive spires seemingly sampled previously probably by Nautilus. At 16:29 we come to a solitary sulfide spire in sediment with altered sulfide and oxide crusts around its base. Also at its base is a shimmering pool of water on sediment with a crack emanating clear fluid. We check the temperature of this pool. It has a max temp of 83C (J2-217-5-T1, x3237 y4837 z1501). Interestingly, when we pushed the t-probe into the sediment the temp. went down to 55C or so: does this mean this was a standing pool of hot water? We continue over a sediment plain (16:44) heading at 310. We see sediment ripples oriented parallel to our track or azimuth 327. We come across a small patch of oxide crusts and altered sediment, vigorous shimmering water and snails. More Fe-oxide stained sediments come into view and some white patches. Back to mud, then Fe staining again. We come to a low lying rock outcrop with Fe-staining and some white patches. We stop to sample this rock. We believe it is lava. We get a piece (J2-217-6-R1, x3188 y4875 z1490). We are essentially at the summit of the Suzette mound here. We continue our northward trek now on the way to a set of black smoker targets. Continue moving over flat-lying sedimented terrain, prominent ripples.

Vanko: An old extinct degraded chimney, 2-3 m high, is observed poking out of sediment at x3101 y4890 z1510. The expected chimney debris here is therefore

completely buried. The chimney base looks like it has been sampled before. Continuing NW there is a large relict rounded chimney at x3088 y4907 z1512. Heading upslope near the target area we encounter small chimneys and some shimmering flow, and sediment patches densely colonized by snails. We reach a picket of fairly densely packed sulfide chimneys, most inactive, oriented roughly N-S. Some of the chimneys are colored white in the upper halves (or less), and there are some tall skinny beehive structures that are diffusing hot fluid. Nearby is a very dense forest of dead chimney trunks. Setting up for a temperature probe of a large beehive, we bump into it and get a lot of broken, dusty volunteer samples on the port forward basket area (Sample J2-217-7-R1; x3012 y4936 z1504). We inserted the T probe about 15 cm into this beehive and got a 296°C reading. Extracting the probe, we noticed a new focused lack-smoke outflow. Moving on to the NW the seafloor continues to be heavily sedimented and littered with “dead tree trunk”-like chimney fragments. A chimney densely populated by snails has a clear orifice among the snails, and a temperature measurement of 250°C is taken (navigational target #10).

Father NW, we set up on two tiny (1-2cm) pipes pumping out a rapid stream of hot clear fluid. Each pipe has a fragile black ash-like top to it (vvan 42644). The first pipe shattered upon touching, but the second was obtained (J2-217-9-R1, x2999 y4955, z1498). The temperature of the first orifice (probably equal to the second as well) was 260°C. We subsequently used the schilling (port) manipulator to get a 1-meter segment of the chimney just below, but abandoned it when we were unable to trim it to a smaller size.

We explore the fairly sharp ridge with sharp pinnacle chimneys, most relict, and reaching about 10 meters high. Many have horizontal white cracks. We moved up to a large elongate beehive that looks like Marge Simpson's hairdo. Its temperature with the probe inserted was 276°C. The hairdo fell completely with just a weak push, and the remaining wide orifice pumped black smoke at 275°C. Right beside the orifice is a remaining nubbin with black smoke emerging from the top (vvan 42929). We decide to try to sample the nubbin, and then see if the water coming out of it is sampleable. This is successful (Sample J2-217-10-R1, vvan 42943).

Using the IGT water bottle's thermocouple, the wide vent is flowing at 276°Cm, and the new vent beneath the sample is flowing at 274°C. We shoot three water samples constituting a good solid-fluid pair before leaving station 10.

Off station, we begin moving toward waypoint 5, and pass a massive 12 m-tall chimney with horizontal white cracks. This chimney is dead, looks like a tree, branches once about half way up. The basal cracks may be from earthquakes. The white is probably microbial material where a bit of still-warm water is leaking from the cracks.

Bach: Watch began, while sampling of a grayish white vein from an outcrop was going on. This sample (J2-217-11-R1) and a sample of the material that appeared to host the vein (11-R2) turned out to be massive sulfide, probably from stockwork underneath a chimney (x3041, y4974, z1500; vvan# 43230). Jason next went to west to three conical features in the map that strike SSE- NNW. These pinnacles turned out to be crowned with clusters of mostly inactive chimneys, up to 11 m tall. Some chimneys vent diffuse fluids and are colonized by snails. Fallen chimneys and sulfide debris litter the steep sedimented slopes of the edifices. Sample J2-217-12-R1 represents material from underneath a dead chimney exposed in an outcrop at a steep escarpment at x3069, y4971,

z1496 (vvan# 43330). The most active part within the chimney fields associated with the conical edifices in the area appear to be near the top of the NW-most edifice, where numerous chimneys ooze clear fluid. T-probe measurements gave temperatures of 220°C and 226°C. A sulfide sample was taken from the top of that chimney (x3048, y5001, z1488; vvan# 43454). It was very fragile, and the big piece intended for the biobox crumbled so that eventually only two fist-size samples could be recovered. Marker 11 was left behind (vvan# 42502) to mark the chimney for possible sampling during the next dive at Suzette. We finally explore the 35 m steep slope to the East, and found only sediment with common sulfide chimney debris. The base of the slope is covered with thousands of snail shells on sediment that shows ripple marks. A cone-shaped depression in the sediments near the base of the edifice (x3079, y5013, z1517) is likely related to Nautilus drilling in the area (vvan# 43547)