

Jason Dive J2-219, August 14-15, 2006 (GMT) Suzette II

07:54 Off Deck

09:12 On Bottom: 3° 47.40' S, 152° 05.35'E, 1626 mbsl

23:50 Off Bottom: 3° 47.33'S, 152° 05.74'E, 1499 mbsl

01:10 On Deck

Aim:

The goal of the dive is to further explore and sample the Suzette hydrothermal area

(1) examine and sample the basement in the area of a pronounced magnetic low centered around WP2, also explore mound at WP3. These could be the sources of the Eh anomalies, if the plume was swept to the north by currents (see map in van).

(2) explore an area of Eh lows at WP4 and WP5. If vents are located there, collect fluids and sulfide chimneys, active (highest priority are pairs to go with fluid samples -- pick orifices for fluid sampling that allow chimney sampling) and inactive.

(3) Explore areas of temperature anomalies at WP6.

(4) At waypoints (or on transit): collect samples from outcrops of basement.

(5) 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°47.40' S, 152°05.35'E, 1640 m**
- **UTM: 358864, 9581040 (WGS84 Zone 56S)**

Summary

Vanko: The landing site was 100% sediment covered, but before traveling more than 10 meters or so a solitary old dead sulfide chimney is seen poking up from the sediment, with just a couple of broken ones near the base. We traveled on a heading of 083°, toward a possible pinnacle in the high-resolution bathymetric data about 160 m away. The ground sloped upward and became stained with white bacterial mat and orange Fe-oxide. Steepening, the slope becomes less like sediment and more like wasting rock, with spotty outcrops. There are long cracks, a few cm wide and running across the weathered mass-wasted outcrop – two or three run up and down the hill, and at least one runs across the hill. We speculate that they might be sulfate, carbonate, etc. Reaching a break in slope, there is a horizontal white pavement outcrop about 4 square meters (vvan 45774). It appears to be a part of this white fracture-filling system. The pavement appears almost brecciated, and it is heavily populated by crabs, worms of several types. Shimmering water is oozing out from underneath the edges, which are like flanges. We measured the water to be 52°C without inserting the T probe very far underneath. Attempting to sample this ledge, we first pluck a small nubbin that seems to be growing vertically off of it near the edge (Sample J2-219-1-R1; visible prior to sampling in vvan 45844). Then we get a piece of the ledge (J2-219-1-R2, vvan 45893). We dig around beneath the ledge and can't get a sample, but the material is gray and flakey and at least one fragment had a core of yellow, as if there is native sulfur involved here (see SciCam, vvan 45902). Just down slope from that is a gray sediment with a clayey consistency,

which we sample unconventionally with a pushcore holster used as a scoop (the push core itself did not retain the sediment). This is Sample J2-219-1-R3 (vvan 45942).

Bach: The mounds around x2600, y4820 were our next target. Like the area between Station 1 the mounds themselves are heavily sedimented and feature numerous chimneys, all of which are inactive, many are fallen. On top of the largest mound at x2600, y 4830 is a small inactive, but largely intact chimney complex. Heading for the first waypoint, a reportedly active chimney field, we found more chimney debris in sedimented terrain, before reaching an area of low-T diffuse venting and a field of oxide mounds and a pavement-like feature, similar to the one sampled at station 1 that is crowned with a little white chimney (vvan# 46123). A separate circular mound with the appearance of a turtle shell due to the development of white veins is also observed (vvan# 46140). Two 10-m tall chimneys with diffuse venting through walls near their tops were encountered (vvan# 46170), before the main chimney field was reached at x272, y4725, z1558. A beehive-type chimney (vvan# 46195) issuing black smoke was selected for a temperature measurement. The beehive fell into basket, when J2 set up against it (sample 219-2-R1 – it was subsequently washed out of the basket and could hence not be retrieved). At temperature of 283°C was measured for fluids venting from a chalcopyrite-lined stump that remained after the beehive broke off. (The stump looked exactly like the stubby chimneys sampled at Suzette during Dive 217, so that it appears likely that those also represent the feeders of a beehive.) A full set of bottles was fired to collect fluid samples. IGT samples gave temperatures between 280 and 288°C. The first major bottle did not fire, because the pin was blocked. The second bottle was used to sample here, preventing us from sampling with the Ti bottle at the second sampling site. The little Cpx chimney stumb broke off during fluid sampling. However, a large piece of the chimney wall could be broken off (sample J2-219-2R-2), whereby a large cavity in the chimney was exposed (digital still image). Marker 12 was left behind at the sampling station (vvan# 46400). We subsequently sampled an inactive spire from a location 2 m N of the active chimney (Sample J2-219-2R-3, x2729, y4727, z1558, vvan# 46459).

After exploring the area 20 m to the NE and SE of Marker 12 and finding literally hundreds of 5-10 m tall chimneys, standing side-by-side and forming what looks like a forest, we set up against a cathedral-like chimney complex to measure the temperature of a gray smoker (vvan# 46505). We are only 7 m East of Station 2. The maximum temperature here is 294°C. Sampling of a cpy-rich small, nubby chimney was attempted, when the Tivey watch came on

Tivey: Couldn't get the chimney so move around the structure for a similar feature. Broke off an active orifice intact (J2-219-3-R1, x2737 y4725 z1550) and measured a max. Temp of 280C at the remaining orifice. We then headed on course 106 along and towards a left handed bend in the ridge. We passed by many chimneys in a sedimented bottom. We come to a sedimented slope with areas of disturbed landslide material. Moving along the slope we find partially buried sulfide chimneys. We stop to sample a low lying block possibly outcrop. We get a sample here (J2-219-4-R1, x2837 y4721 z1543). We continue on a course of 080 crabbing along the sedimented scarp in front of us. Old sulfide chimneys partially buried. At 14:52 we arrive at a larger sulfide chimney

complex. There is some shimmering water at the top of the chimney along with bacterial mats and some biota. We continue on a course of 76. We come to some white chimneys just in front of a much larger inactive edifice of sulfides. Note we seem to be about 20 m too far west relative to the DVLnav map. We stop to sample a rock nearby, we get a variegated copper stained sulfide sample here, which has two pieces (J2-219-5-R1 and J2-219-5-R2, x2920 y4774 z1516). We drop a weight and move on eastwards. At 15:52 we come into white bacterial mats and a forest of chimneys standing side by side, We note a 15m tall inactive sulfide chimney. There is some shimmering water here but not much else other than a lot of dead sulfide chimneys. We move on east and north. We shifted the underlay map by 23m east to align observed topo with map. We see another chimney edifice 12 m tall at 16:08. Continue on and see lowlying crack with small sulfide chimneys. More chimneys with some clear fluid shimmering and snails. We go down to the northwest into a small depression (16:33), we dig into thick sediments and stir up a big sediment cloud that does not clear readily. We drive north out of the depression and finally escape the cloud at 17:07. We come across sporadic chimneys and blocks of talus before coming to a small sulfide spire complex. We move around the complex to the left (west). No obvious activity. See an octopus on the tallest chimney. We then continue onto a small valley to the north of this complex and set up for a push core in this small basin.

Vanko: Three attempts to retrieve a pushcore from this sediment resulted in the material falling out of the core. We think we got some on the third try, but later we find that the material all washed away during the rest of the dive.

We started heading up the steep hill to the NE and first observe small conical spires sticking out of the sediment. A small fraction of the dead chimneys have coproform shapes, but most are simple spires. The amount of sulfide rubble increases, then we find a chimney with shimmering water near its base, and with the telltale horizontal white cracks that suggest it is still warm inside. This one is 5m tall. We probe two small white chimneys, one like a Christmas tree, and get temperatures of 132°C and 55°C. We thoroughly explore the ridge-like top of this hill located around x3150 y 5025. We locate a 1-m-wide white flange with good water flow from underneath it at x3150 y 5025 z 1510 (vvan 47494). There are many large clusters of massive extinct chimneys (typically 10 m high, individuals 1-2 m wide, clumps 3-5 m across, estimated). Active vents are few, identified by local clusters of snails and shimmering water. We note that “normal” biology of sponges, anemones, gorgonians seem to be absent, even though there are good places in the current for attachment. Is it the sulfide? We investigate two little chimneys to get temperatures and see about a water sample location. The orifice at target 15 is 233°C. At target 16 we get 200°C. We sample the top of this chimney (J2-219-10-R1; vvan 47868), then get two IGT samples (J2-219-10-W1-IGT8, Tsteady = 228°C; and J2-219-W2-IGT5, Tsteady = 227°C; vvan 47929).

Bach: We went around the eastern and southern slope of the mounds that host the chimney field and find nothing but sediments with occasional pieces of sulfide talus. We next crossed a sediment flat to examine the nature of the slopes that bound the large central volcanic edifice within the Suzette area to the east. These slopes are also thickly covered with sediment, but a large pillow flow could be sampled (J2-219-11-R1) at

x3196, y4942, z1510 (vvan# 48316). Continuing on south along the east-facing slope to explore a little knoll at x3230, y4920, we found that the said knoll is yet another site of hydrothermal seepage with turtle shell-like pavement (vvan# 48375). We measure temperatures of 80°C and 125°C for fluids seeping up from under the ledge of the pavement structure. A sample of a little chimney, crowning the pavement was recovered (J2-219-12R-1). Sampling the turtle shell –like crust itself was unsuccessful.