

***Jason Dive J2-226, August 21-22, 2006 (GMT) Suzette Sediment Traps***

**02:25 Off Deck**

**03:33 On Bottom: 3°47.52' S, 152°05.77'E, 1525 m**

**00:30 Off Bottom: 3°48.52'S, 152° 05.72'E, 1524 mbsl**

**01:22 On Deck**

**MAGELLAN 06 Cruise Manus Basin  
LEG 2**

**Aim:**

The goal of the dive is to follow-up from the previously aborted dive (225) and deploy 6 sediment traps around the Suzette hydrothermal mound area. The ADCP has already been deployed at the center of the array. The 6 sediment traps are currently in an elevator on the seafloor. Today Jason will dive with two full sets of gastight water bottles (4) and 2 major samplers. With the sediment trap deployment out of the way we would like to sample fluids in the "turtle area" and in an area of a strong Eh hit just northwest of the mound. Other sampling as required.

**Co-ords for the Elevator launch:**

- **Lat/long: 3°47.52' S, 152°05.77'E, 1525 m**
- **UTM: 399641, 9580812 (WGS84 Zone 56S)**

**Summary**

Tivey: Jason touched down a hundred meters to the east of the elevator target (x3146 y4594). We reached the elevator at 03:46 and transferred 3 sediment traps (#1,#2,#3) onto Jason and then headed back up into the water column for a drag over to the northern edge of the mound for us to deploy the sediment traps. At 04:20 we reached the first sediment trap site and deployed sediment trap#1 on a gentle sedimented slope (x2886 y5011 z1537 vvan#62253). We leave for the second trap deployment.

Vanko: The second site had too much slope so we moved several tens of meters to a flatter spot (vvan 62266). Somehow during the handling of sediment trap #2, it got mud on the top, so the trap was held upside down and shaken for several minutes until no more sediment fell out. Then the trap was placed in an upright position. Navigation here on the bottom is poor (transponders can not be heard), so we ascended several tens of meters until we got a good fix, then descended at exactly the same spot, with the sediment trap in view (vvan 62295). So the location is well-known: x 3059.1, y5195.8, z1533.5.

Underway to deploy trap #3 (hdg 120°, range 314 m), we cross sediment and just a few scattered rocks. In some places the sediment is sculpted into low-relief possible dune-like shapes (vvan 62302). The third spot is again too steep, so we search several tens of meters for a suitable spot. There are scattered volcanic boulders in the sediment here, and we find a good place. Ascending to get a navigational fix did not work, so the location is based upon that of the after end of the ship: x3365, y562, z1548.6 (vvan

62315). The depth figure is very accurate, but the x-y values are probably only good to +/- 15 m.

We get underway at 181° for a distance of about 200m with the hopes of getting a chimney sample from near the center of Suzette. Passing heavily sedimented terrain, we soon see chimneys sticking up out of the mud. These are relict ones, but there is some shimmering water associated with them. We try to sample a 2 m-long one, but it is too bulky and we feel it is unsafe to keep trying. So we transit to the elevator to pick up three more sediment traps. Nearby, though, we spot a large rock with shiny chalcopyrite and, drawn like moths to a Coleman lantern, we swoop down to grab Sample J2-226-R-1 (vvan 62448). Continuing on we pass some more chimneys, then 100% sediment, until we reach the elevator.

Bach: We moved to the target site for sediment trap #6 and deployed it at x2883, y4701, z1527 (vvan# 62688) in a heavily sedimented area with hydrothermal activity. Next, sediment trap #5 was deployed at x3173, y4597, z1524 in sedimented terrain (vvan# 62800). We picked up weights that were dropped next to the elevator earlier to adjust buoyancy, and moved to the target area for sediment trap #4. Those target coordinates are near a slope, and we move the deployment spot several meters east to a flat, thinly sedimented area (x3418, y4764, z1542; vvan# 62980). We next transited to the Marker 9 area (turtle back mound) for sampling, heading 309°. We crossed terrain that is flat and thickly sedimented with occasional microbial mat-related red and white staining. Mounds encountered en route to Marker 9 are all densely packed with chimney, all inactive (bar rare seeping of clear fluids). The slopes of the mounds are littered with fallen chimney debris and dead snails. No volcanic rock outcrops were observed. The chimney field was sampled during dive 217, so no further examination was conducted here. The turtle-back site is on the E flank of the central volcanic edifice in the Suzette area. Coming up that flank of that edifice, we encountered chimney debris on the sediment surface, as well as a few inactive, standing chimneys 35 m SE of Marker 9. We arrived at the target site (vvan# 63082, 63088) and set up against the fringe of the turtle back pavement where venting of clear fluids is most prominent in the area (vvan# 63103). We measure temperatures at different locations around that structure and got maximum temperature between 147° and 153°C. The highest temperatures were measured when the probe was inserted into the crumbly upper few cm of the structure. At the site where a temperature of 125°C was measured in fluids flowing up the edge of the flange-like pavement, we collect fluid samples. The thermocouple of the first IGT bottle (IGT6) reads 157°C before the bottle is fired. During collection of the fluid, the temperature dropped to 60°C, obviously because cold seawater was sucked in, and temperature went up again to about 140°C after the fluid was sampled. The opposite effect was observed during sampling with the second IGT bottle (sample J2-226-W2-IGT5). Temperature was 189°C before sampling and increased to 250°C during sampling, followed by a drop to 220°C after sampling was completed.

Tivey: We finished sampling with the major water sampler (J2-226-W1-M2 x3245 y4911 z1500) although it was difficult to see the tell-tale. We looked for a piece of the "turtle" pavement. The pavement is very hard and it took us some time to break off even a small piece (J2-226-2-R1). From here we began a traverse across the mound to a

possible ABE Eh and optical backscatter hit on the northwest flank of the mound. We traversed over relatively heavily sedimented terrain with amorphous ripple marks with no dominant direction. At 14:39 we saw dead snail shells followed a steep scarp covered with sulfide talus blocks from toppled chimneys. At 14:44 we reach a sulfide chimney field with abundant snails, so presumably the field is still active. We continued our northwesterly trek and at 14:55 we turned to head south to skirt around a chimney complex. At 14:58 we arrived at a group of sulfide chimneys with a platy sheet-like coating covering the base of the chimneys and forming an apron. We tried sampling this platy material and again it was very hard. We finally obtained a sample of this cemented sulfide sand material (J2-226-3-R1 x3018 y4938 z1506 DVL Target#8). We continued our move to the south and gradually the sulfide chimneys diminished and by 15:26 we were in heavy sediments. At 15:28 we saw a dredge track in the sediments. At 15:32 we changed to course 204 and continued to cross over heavily sedimented terrain. At 15:45 we arrived at a solitary “topped” sulfide chimney complex. We turned back to the northwest and headed downslope bearing 303. We traveled over heavily sedimented terrain almost exclusively. At 16:26 (1555 m) we came across a low lying small ridge which shows up in ABE bathy. This ridge looks like a small lava flow perhaps. Nothing in the Eh or on sonar shows up here that could be related to the ABE hit –maybe it was a plume from further up the mound. At 16:35 we turned and headed west. At 16:45 we came upon a number of talus blocks in the sediment. It looks like old sulfide. We tried sampling but were not successful. We climbed a gentle slope to the west and reached a talus ramp a few meters high composed of sulfide-looking chimney pieces. On top, there is a small sedimented bench at the summit of the talus ramp with increasingly abundant areas of Fe-staining in the sediments. At 17:33 we reached a small isolated island of hydrothermal activity about 1-2 meters across i.e. “Lilliput”. This isolated mound was composed of low lying flanges and ledges leaking shimmering water and topped with a few small knobby looking chimneys < 1m tall. A temperature measurement in one of the small orifices pumping out shimmering clear fluid gives a temperature of 210C. We decide to try and get a fluid sample here.

Vanko: First we broke off one of the chimneys, but it unfortunately fell down right back onto the site (vvan 63876 and 63877). The stump of the chimney had two flowing orifices, and we chose the best one for fluid sampling (J2-226-4-W1-IGT7,  $T_{max} = 226^{\circ}\text{C}$ ; J2-226-4-W2-IGT8,  $T_{max} = T_{steady} = 224^{\circ}\text{C}$ ; J2-226-4-W3-M4). After retrieving the chimney in three pieces (J2-226-4-R1 et al.), we also sampled an associated flange (J2-226-4-R4) and measured a temperature on the broken flange surface of  $58^{\circ}\text{C}$ . Next we drove west for the dive 219  $52^{\circ}\text{C}$  shelf area, and sample the shelf (J2-226-5-R1, vvan 64161), and a different shelf about 10 meters away (J2-226-5-6-R1, vvan 64210). We began a transit to the ESE over heavily sedimented terrain when we crossed a talus pile consisting of dark brown and black volcanic rocks and some light-colored rocks. We picked up one of the light-colored rocks that, upon close inspection also had a lot of green on it (J2-226-8-R1, vvan 64428); and then we picked a volcanic sample (J2-226-8-R2, vvan 64441). We dropped a weight and moved directly uphill and found a knob of massive whitish rock that looked like weathered or altered sulfide chimney material (vvan 64458), and further up, some more white rock (vvan 64471).

Bach: The intended sampling of rock from an outcrop had to be aborted, because the rock would not break and J2 had to catch up with the ship. We moved to the elevator site across uniformly sedimented terrain with occasional small outcrops of rubbly rock. We came up to 500 mbsl and tried to release the elevator acoustically. This attempt failed, forcing J2 to dive down to the elevator and release it mechanically. Following was the recovery of Jason and the elevator.