

MGLN06MV Cruise Log Book.

July 21 – September 1, 2006

J2-200, July 22, 2006

12:01 (GMT); 22:01 (Local)

12:03 Jason off deck
12:08 Media in water
12:13 Control van has control of winch; launch depth = about 2500 mbsl
12:35 595 mbsl
12:42 862 mbsl
12:49 No Maggie Twist yet
12:54 Dropping two weights to ensure positive buoyancy
12:56 Data magnetics calibration
12:59 Starting Maggie Twist
13:06 Maggie Twist completed
13:20 Problems with wrapped tether
13:24 tether unwrapped
13:26 Continuing descent
13:40 1500 mbsl
13:46 Problems with ground faults; appears to be one of the thrusters. Forward looking sonar also unhappy
13:59 Continuing descent
14:00 Switching on SM 2000
14:39 See bottom on sonar. 180 m off bottom.
14:48 Approaching bottom ~30m off
14:50 bottom in sight depth 2470m, alt 15m
14:52 dead sulfide chimneys d: 2479, alt: 6.7m, ~1m in height, X 3319 Y 5782
14:58 Turning around, chimneys to the south
15:05 Sampling at X 3323 Y 5781,
broke a sample but fell away
15:12 Keep looking - lots of dead chimneys, shimmering water, gastropods, galatheid crabs,
Sample J2-200-1-R1 sulfide chimney tip, bsk=red,
moving
15:25 X 3325 Y 5798, out of sulfides into lava terrain pillow basalts
15:37 another hydrothermal field,
lots of biology - gastropods and crabs
15:43 Stn #2. Begin to take sample J2-200-2-R1
15:53 Old chimney sulfides, stop to take samples X3375 Y5847 Z2484,
knocked over large chimney onto basket
pushed off basket,
no pieces apparently fell into basket
16:02 Continue to hunt for a sulfide sample; plenty to choose from
16:10 Sitting down to get a rubble piece; dead chimneys on pillow basalt
16:15 Trying to grab a sample,
retrace back to find another place to sample
16:22 Sample J2-200-3-R1 in basket red-C,
X3369 Y5847 Z2843
16:25 Leave station 3 head 040 degrees

16:27 X3381 Y5862 Z2481 Drop a JASON Weight
 16:28 60lbs buoyant (120lbs steel), traversing pillow lava terrain-sedimented
 16:33 Turn off bottom sonar
 16:47 Continue to move slowly 040 degrees
 17:01 Continue traversing pillow lava and lobate pillow lava, lightly sedimented
 17:13 197865, 9650088
 ~ 17:17 Crossed over a small valley
 17:21 c/c to 310°. Head on this course for 20m before turning south to return to
 suspected sulfide fields. Passed over fissure oriented 040 degrees,
 waiting on Medea
 17:40 UTM 197859, 9650123
 17:50 Waiting for Medea to turn
 18:03 shift change/ Vanko on watch with Paul Craddock,
 Jason has moved~20m NW; getting ready to start traverse at heading 220 degrees
 (reverse of previous course)
 18:08 Traversing pillowed terrain at 220 degrees
 18:15 ditto, making 0.3 knots
 18:21 Lobate flows (over-flowing more ropy sheet flows?), not much apparent
 hydrothermal activity or assorted biology in this area
 X3425 Y5965
 18:25 still making traverse with bearing 220 degrees
 18:33 traversed >100m over flat terrain w/ lobate and ropey flows, slight sed. cover, no
 observable hydrothermal activity, minor biology in water column (jelly?).
 18:39 Adjust bearing to 250 degrees,
 heading back toward area visited earlier on dive w/ hydrothermal activity.
 (activity according to Justin consists of gray smoker and shimmering flow),
 Approx. 40m away?
 18:47 Perceived increase in epifauna - seapens, etc.
 18:51 greater relief, chasm oriented about same as track. Change heading to 220°,
 epifauna continues to increase
 18:55 Traversing pillowed terrain w/ a few sea pens
 19:01 Adjust to ship orientation has jogged us off course a little. Bottom is pillows
 poking up through sediment 75% sediment cover.
 19:07 This traverse is now in "old" pillowed terrain with >50% sed.
 Nav. has us due west of the original site of sample #1 by 160m. Change course to
 090 to return to sulfide field
 19:11 90% sediment cover
 19:15 Jason heading 090 degrees, enters sharp contact with pillowed terrain
 19:18 large vertical chasm (Jason could set into it-see Medea pictures)
 19:22 Traversing 090, broken-up rock outcrop rather than constructional pillows
 19:23 old pillow-could be sulfide? (#1029 on virtual van)
 19:24 Bottom dotted with white spots, crabs and gastropods
 19:28 Active black smoker (#1049 and 1050 in virtual van), ~5m tall chimney with
 sessile organisms on sides of chimney-snails, clams/mussels, fluid discharge from
 single orifice from tip of chimney deposit.
 X3237 Y5745
 19:34 waiting for ship altitude adjustment, plan-get back to the chimney for sampling
 19:44 waiting for the ship; watch change, possibly launching of ABE?
 20:09 waiting, tracking problem with ABE, launch now planned for ½ hour later
 20:43 ABE launched delayed for 60 minutes. Propose Jason operations to restart shortly
 and Jason to head back down to seafloor.

20:51 begin to plot a track to the position of the last black smoker,
not sure if we will have LBL navigation.

20:57 Begin to DP the ship to the location - ETA 6 minutes

21:05 Ship in position - target is beneath stern. Wait 5 minutes for Medea to settle
straight down, and then we will go down to the bottom.

21:13 Heading down to seafloor, Jason comes into view on Medea's camera

21:15 structure in view, tall one on left (active smoker) and shorter one on right
(inactive)

21:24 Easing in to get a sample

21:28 Close-up, the structure has places where it is broken, oxidized color

21:39 Trying to get the top off a small spike, it's hard

21:41 Reposition to try to get it with the stronger (port) arm

21:45 Still repositioning-shift change coming in

21:49 Shimmering water out of a small beehive with snails (alb. and infr.)

21:54 Sample J2-200-4-R1
X3227 Y5749 Z2475

22:01 Ship controlled by bridge. Planning launch; hovering X3229 Y5742 heading 221
over fissure. Inactive chimney on port. The plan is to explore the extent of the
sulfide field
Heading 120, taking sulfide samples every 20 meters.

22:33 Going back to location of sample 1 heading 052, from there start grid at heading
130

22:44 fault scarp 050, SE of scarp-inactive chimneys

22:48 Attempting sampling dead chimney (diffuse tip)-failed, sample 5R-1
X3272 Y5757 Z2478
fell away, picked up again. Chimney on fresh pillow basalt.

23:00 sample in basket red-E,
Sample J2-200-5-R1

23:07 Moved up along fault scarp X3287 Y5788 Z2481 heading 171,
sample broke off but fell away

23:13 X3286 Y5791 Z2485
heading 162.
Tumbled chimney, broke piece off central part of structure

23:30 Hydraulic leak port arm-out of commission

23:35 Picked sample up with starboard arm in biobox stbd 6R-1, move heading 130

23:40 Waiting for Medea, X3302 Y5779. Fissure in old lava terrain, sponges growing
on fissure wall

23:45 X3312 Y5782 Z2482 heading. Tumbled chimney on fissure in sed-covered
pillow flow,
Sample J2-200-7-R1 & 7-R2

23:54 X3312 Y5782 Z2480
Biology - barnacles, snails.
12m high chimney densely colonized w/ sessile barnacles.
Diffuse venting through cracks.
Venting (vigorous) of clear fluids at tips of spires growing out of the structure.
"Longfoot vent"

July 23, 2006

00:03 Move heading 130. Over fissured, sedimented terrain

00:07 next grid point, [X3330 Y5757], little chimney

00:10 End of field. Turning 240°; Waypoint 20m ahead
 00:14 Going over fissured terrain in lobate terrain
 00:15 X3313 Y5728. Heading 310, move to first sulfide
 00:18 Small chimney
 00:21 Fissured terrain, large sponge DSC 613
 00:28 X3271 Y5793 Z2480. Crossed sedimented terrain, came up against fresh pillow,
 active chimney, diffuser.
 00:34 X3250 Y5796 Z2482 contact sheet (hackly) pillow, bacterial mats in hackly
 flow, traversing 220°
 00:38 Some hydrothermal staining, nontronite(?),
 minor fissure X3263 Y5783, turn 130
 00:45 X3237 Y5773 Z2483 inactive field, dead snails
 00:50 X3237 Y5771 Z2484, alt 0.6, heading 123,
 piece of top of inactive chimney sample
 Sampling J2-200-8-R1
 00:55 Move heading 130
 00:59 X3258 Y5759 Z2481 Moved across sedimented flat terrain with small inactive
 chimneys into pillows, fissured
 01:06 weight dropped X3258 Y5758
 01:10 Went across large fault/fissure into pillowed terrain with inactive chimneys,
 sampling piece of chimney debris,
 sample J2-200-9-R1 in basket yellow K,
 X3257 Y5754 Z2480 alt 4, heading 130
 01:22 Continue heading 130 [X3266 Y5743], back over sedimented old flows, some
 fissures
 01:26 next WP, continue same heading
 01:36 next WP [X3301 Y5711], turning 220, next WP 20m ahead
 01:40 X 3297 Y 5699 fissure in sed. pillow lava, striking ~230
 01:49 turned 310°
 01:50 crossed fissure at X3281 Y5698
 01:52 X3269 Y5709 crossing more fissures, striking ~230
 01:55 X3254 Y5713 Z2476 pillow flow front.
 01:57 Inactive chimney going for a possible sample
 02:01 Tivey on watch. Iron oxide floc surrounding chimneys
 02:03 Moving around structures in a pit trying to sample, take a sample DSC 608
 02:10 X3237 Y5732 Z2478+2=2480m,
 Sample J2-200-10-R1 in basket red-G
 02:13 moving from sample station# 10. Sitting waiting for Medea.
 Shimmering water and snails on structure,
 ~15m high edifices black smoker on top venting nicely; clear and smoky with
 v. friable top, X3220 Y5746 Z2468
 02:21 start DVcam
 02:24 stop DVcam
 02:25 Move off slowly to gain on Medea
 02:28 At station 11 stop for sample of sulfide rubble X3197 X5738 Z2477+0.9=2478,
 J2-200-11-R1, drop weight
 02:32 end of station 11, moving north
 02:52 station 12, stop to sample debris field
 02:55 X3193 Y5743 Z2480
 J2-200-12-R1
 sulfide chimney debris from fallen structure

03:02 J2-200-13-R1
X3204 Y5723 Z2477 small sulfide spire from large edifice, sample in yellow D

03:09 Descended to base of edifice - get a sample on floor from debris.
Couldn't get sample in time as Medea moved to far.
Went into basalt sediments. Stopped and tried to return but lots of sed. in the
water column was stirred up.
Reached edge of sulfide field.

03:25 Now heading 220 through basalt and sediment

03:27 Shake off some dust and get back to bottom

03:31 Extinct sulfide chimney

03:32 DVcam

03:34 sample J2-200-14-R1
Spire, small spire dead chimney, basket yellow J,
X3216 Y5686

03:38 sulfide chimney along fissure basalt. Sedimented basalts [on other side of
fissure?].
Moved to southeast 130 and found sediment pillows

03:39 fissure azimuth 225

03:42 back into chimney field

03:45 stopped after about 5m to get a rubble piece

03:49 X3204 Y5691 Z2475
J2-200-15-R1
sulfide rubble piece from fallen structure, yellow L

03:52 Turn around head 310, Jason spin to take out a wrap

03:57 Sediment on pillow basalt [X3184 Y5704]

04:01 back into sulfide, trend of sulfide ~000

04:02 stop to get a sample; Chimney tip
J2-200-16-R1 in yellow B, X3179 Y5718 Z2476

04:08 continue 310

04:10 Tall sulfide spires

04:11 Stop to sample some rubble from collapsed chimneys, wait for dust to settle

04:23 Jason has lost bottom lock

04:23 J2-200-17-R1 piece of rubble from base of chimney
X3172 Y5728 Z2479,
drop a weight

04:27 continue driving 310, coming up to a fissure

04:29 crossed over into pillows, highly sedimented

04:31 turn onto 220 and head for 20m before turning onto 130

04:41 change course to 130

05:02 into sulfide field,
J2-200-18-R1
X3183 Y5663 Z2471

05:04 sulfide spire from large edifice yellow E

05:13 Drove out of the sulfide field edge take a sample here

05:16 J2-200-19-R1 in yellow C,
X3203 Y5652 Z2472

05:21 Drive a little east of fissure to check out terrain. All heavy sed cover on basalt

05:22 turn onto 220

05:23 Small chimneys

05:35 Small spires

05:38 J2-200-20-R1 intact small chimney extinct [X3177 Y5651 Z2472]

in basket yellow I
 05:42 Finished sampling, watch change
 05:53 Vanko on watch, bearing 310 at 0.25 knots
 05:55 deep NE-SW fissure
 05:56 100% sedimented, buried pillows
 05:59 another NE-SW chasm w/ broken pillows in walls (?)
 06:01 come left 90° to 220 for 20m
 06:05 Continuing SW along chasm
 06:09 Turn left 90 to 130-toward more sed terrain
 06:12 Old chasm, sed. somewhat, trends NE-SW
 06:15 Crossing wide deep chasm, NE-SW oriented, broken pillows
 06:18 Sedimented terrain
 06:19 Crossing at another older chasm (seds draping in)
 06:19 turn on SM2000 to get a SM2000 profile (~10m wide)
 06:22 Hummocky sedimented surface
 06:23 Another NE-SW oriented chasm, tin can
 06:24 Drained/collapsed structure
 06:26 Another NE-SW chasm, stop, raise up w/SM2000 and pivot
 06:31 Lifted up 10m and turned left 180°, but saw no target. Return to seafloor
 and traverse NE 40° heading, traveling along two parallel fissures/chasms.
 06:37 Traversing 040, two fissures merge to make one
 06:40 SM2000 yields a 5m depth to the fracture that we are following
 06:50 Adjust track left to 000. Same old sed. terrain with fissures
 06:54 Still making ~ 040. Same sed/fractured terrain
 06:58 Jason driving to left, looking for sulfides! No luck yet!
 07:00 Field of spires near samples 14 and 9 (target 14 and 9?)
 07:03 Sample J2-200-21-R1-extinct spire
 07:14 Underway at 110
 07:17 Stop. Informed that if we don't come up now to recover by 8 then we will have to
 come up at midnight. So we will get one more sample and then ascend.
 07:20 Found one more chimney field-try for sample 22-R1. Diffuse venting at base of
 chimney
 07:27 X3244 Y5750 Z2483 heading 280, alt 0.8.
 Top of inactive chimney breaks in two pieces upon sampling. Piece 22-R1A (tip)
 in bin yellow H, piece 22-R1B on top of bins Red G and H
 07:37 J2 starting to ascend heading 040
 07:44 estimated arrival at surface-19h45 local
 08:17 depth of fish = 1600m
 08:27 depth of fish = 1350m
 08:34 Stop winch to check out noisy brake, depth of fish = 1203m
 08:39 Winch okay to resume ascent
 08:48 Depth of fish = 1000m.
 Vanko leaving Van w/ logbook to attend science meeting in library
 09:44 depth of fish = 57m
 09:50 control van to kill Medea lights; Medea shut down
 09:52 Medea on fantail
 09:59 Jason out of water
 10:02 Jason on deck. **End of dive J2 200.**

J2-201, July 24, 2006

22:23 (GMT); July 25 08:03 (Local)

22:27 Jason in water
22:31 Jason on descent
22:34 Dropped a weight
22:35 Dto.
23:12 1000 mbsl
23:15 Ground fault on HPU
23:19 Decision: abort dive estimated recovery time 00:00
23:54 Stopped at 100 mbsl
00:03 At surface
00:14 On deck
|
02:52 Preparing to launch JASON
02:53 Securing power - still having some problems apparently
03:24 Preparing to dive after repairs
03:34 Jason in water, launching Medea
03:34:20 Lowering away, Jason target #29 is dive target 150 degrees 9.47's, X198120 Y9650560 Z565
03:42 Ground fault on HPU, coming back on deck
04:03 On deck
|
05:47 Jason over the side
05:51 Both J2 and Medea in the water
06:06 depth of ROV-350m, target #29 X3725 Y6475 8m spire on ABE survey map
06:27 stop winch D = 999m. Tivey Twist - set up to do one
06:31 D=1017m ship stopped to do the Twist
06:35 beginning Twist, ccw, 1 degree per second
06:40 Checking Jason gauges, gauges ok
06:42 Tivey Twist completed, turning back cw
06:47 Ship moving forward 0.5 knots and ROV re-starting its descent
06:55 Glenn has a new dive plan-wants new target [X3865 Y6510]. Named and dropped target 29
07:07 One lift thruster not working
07:21 d = 1712m, target near bow of ship
07:27 d = 1727, no LBL nav. no bottom yet
07:31 d = 1785m
07:37 d = 1900m
07:42 d = 2000m, ship is stationary directly over target
07:48 d = 2120m
07:52 d = 2200m, trying to get a plot of Jason location
07:55 d=2255m, target right below ship stern, see bottom on sonar
07:57 d = 2300m
08:00 d =2360m, have seen 1 or 2 bugs swim by
08:02 d =2416m , alt=74, E=2490-seem correct
08:03 Stop winch
08:07 Turned on LBL briefly at 07:40-07:50 to get location
08:09 d=2444, alt=49, E=2493
08:11 Descending

08:12 2460m
 08:16 2475m
 08:17 See bottom
 08:19 Reset doppler to LBL
 08:24 Moving 300 for distance 20-30m
 08:28 Old volcanics, heavy sediments and sparse pillows
 08:30 Medea starting to move finally, Jason moving to sonar targets
 08:32 on station J2-201-1, screen capture virtual van 2901
 08:43 sample 201-1-R1 drop target 30
 08:48 leaving station 1, see numerous extinct chimneys in immediate area, 6-8 several meters tall
 08:50 old pillow lava rubble
 08:55 DPing to next station, WOM
 08:58 drift by some small chimlets
 09:00 some large old chimneys, 4-5m tall
 09:07 station 201-2-wait for sed. to clear, target 31
 09:19 sample J2-201-2-R1 in basket - very large sample
 09:20 Lifting off station 201-2-have made an outcrop in the soft sed. at the base of the mound; lots of FeO(OH) – red/rusty in color.
 09:22 DPing along 210 for 20m to next mound
 09:30 old degraded sulfide mound
 09:32 setting up for station 201-3, d=2490m
 09:40 shift change, new pilot re-sets
 09:49 Sample 201-3-R1
 @ 09h54
 10:00 Large chimney structure 8m high, X3809 Y6484
 10:02 Station 4, sampling spire from near the top of the structure [X3812 Y6487 Z2481, alt 7.8, heading 116, target 34]
 10:04 1st sample 201-4-R1
 10:07 2nd sample 201-4-R2 (broke into 2 pieces, basket red C)
 10:09 Off station, new target 27m W
 10:11 X3793 Y6485 pillow flow front target 35, pillows are partly covered with sediment
 10:17 Station 5 on station, chimneys in part tumbled down, sampling piece of talus from base of structure, lots of red-staining, [X3776 Y6480 Z2487, heading 241, alt 1.3, vvan #3285]
 10:23 off station, new target small mound at 13m heading 240
 10:25 Pillow outcrop [X3770 Y6476] hummocky pillow terrain
 10:30 On station 6 small solitary chimneys
 target 37, X3752 Y6482 Z2485, alt 1.1, heading 271,
 sampling know from base of small chimney structure failed
 10:36 Sampling solitary spire w/sponges
 X3747 Y6485 Z2484, alt 1.5, heading 241
 10:40 Off station, new target large mound 15m heading 240
 10:41 More small chimneys X3747 Y6477
 10:43 15m south of target 37 small mound w 1-2m high chimneys and spires surrounded by Fe-oxides
 10:44 Station 7 on station target 38
 10:49 Attempting to sample spire off central part of structure
 10:55 Sampling top of spire - in bins red K and L
 10:58 Off station. On standby due to ABE launch

11:26 Moving 270° to small mound 15m W of
 11:29 X3740 Y6482; 5-6m high structure-inactive chimneys. Dropping weight
 11:34 heading 249; On move
 11:37 On station 8. Inactive field, collapsed chimney in sediments
 11:40 grabbed big sample - too big and samples dropped
 11:51 sample J2-201-8-R1
 Spire picked from talus
 11:55 off station, next target 16m heading 10
 11:56 target is mound w/ up to 12m chimney inactive on station 9
 12:03 attempts at sampling talus fail
 12:05 sample J2-201-9R-1
 piece of rubble from base of 12m high chimney
 [X3720 Y6475 Z2478 hdg 279 alt 3.0]
 12:09 Off station, moving 20m heading 265.
 Ridge appears to be a single large fallen chimney
 12:14 on station 10. Pillows are sedimented.
 Attempt at sampling tip of fallen giant chimney. Fail
 12:20 Moved few meters E, trying to sample talus
 12:25 Sample J2-201-10-R1 [target 41 X3707 Y6476 Z2480 heading 130 alt 1.3]
 Little spire within talus of broken giant chimney
 12:30 Off station heading south exploring nature of small mound
 12:35 Navigation fix; ship has drifted off
 12:52 On station 11 east-sed sulf. mound, attempting to sample piece of talus sample
 stockwork(?) from talus
 13:07 off station heading 220 for 10m top of mound is target
 13:11 on top of mound is 8m high dead chimney
 13:14 on station 12 on south slope of mound trying
 13:20 off station heading south 50m
 13:21 4m tall dead chimney
 13:23 on station 13
 Talus of large fallen chimney
 sample J2-201-13-R1
 13:28 Off station; continuing south
 13:30 collapse pit / pillow flow margin.
 13:33 Waiting for Medea
 13:38 Change heading to 225
 13:42 Fissure in pillow flows, sediments. Fissure strikes 230
 13:51 new heading 340
 13:57 steep slope sediments
 14:00 Stopping for a sample. Station 14. At extinct sulfide chimney; broke chimney into
 slabs and pieces but seem to be too big for sample
 utmX 198021 utmY 9650479 Z 2482
 14:14 waiting for dust to settle.
 picked up tip of sulfide from rubble we had lost it after breaking apart sulfide
 chimney,
 J2-201-14-R1
 X3679 Y6419 Z2479 in yellow K
 14:34 stopped to take a sample at station 15. X3673 Y6439 Z2470 yellow F
 J2-201-15-R1
 Dropped weight. End of station
 14:42 Moving of on course 220 to another structure

14:44 Waiting for Medea; Sitting in front of an extinct sulfide a few meters away,
Structure seems about 6m high,
moved around field of sulfide edifices

14:52 sample J2-201-16-R1
sulfide spire from larger edifice in Red-J
X3663 Y6423 Z2478

14:57 Now turn and head 170

15:04 Stop on slope and sample rubble

15:07 Stir up sed. and wait for cloud to clear

15:13 Broke piece off base of chimney
J2-201-17-R1
X3665 Y6414 Z2483 in yellow D,
Note vvan log for samples id as J200 should be 201

15:19 Drive along slope course 215

15:20 Stopped; waiting for Medea. Sedimented slope

15:22 sulfides small field in heavy sediment cover; very knobby appearance.

15:24 stopping to sample station 18
picked tall small chimney
put it down and pick up smaller piece

15:27 broke a small piece from base of chimney
J2-201-18-R1
X3646 Y6388 Z2490 in basket yellow E

15:34 sitting still, unwrap Jason

15:38 starting to move Jason. Cross over small sulfide structures

15:40 large extinct sulfide structure 8m high

15:41 stopping for a sample, station 19, at base of large sulfide complex.
Fe-staining

15:49 Stir up lots of floc like sed. as we sit down, wait for sed cloud to dissipate

15:52 Starting to sample from large sulfide edifice

15:55 J2-201-19-R1
X3649 Y6425 Z2478 target 50, yellow J may have broken

16:01 Begin to drive on course 315, waiting for Medea, go over small sulfides-extinct

16:09 Crossed over into pillow lavas turn around so as to sample earlier sulfide
chimneys

16:11 Stopped at station 20

16:12 Sampling at station 20

16:13 J2-201-20-R1 X3631 Y6439 Z2479 yellow behind basket

16:17 Change course to head 200. Cross some Fe-oxide deposits? Stop and wait for
Medea

16:28 stopped to sample station 21. Heavily sedimented sulfides small sulfide field with
low lying mounds and small chimneys.
Hard to break off piece.

16:34 Move slightly for a better sample location. Fe-stained area.
Got a sample - ripped off side of sulfide chimney,
Sample J2-201-21-R1, X3627 Y6412 Z2485 in yellow-H

16:40 Drop a weight

16:43 Change course to 215 for 25m, heavily sedimented pillows

16:44 Pillowed lava flow fault

16:47 Waiting on Medea

16:49 Sedimented pillow flow

16:50 Moving 210 to top of small mound/dome. Looks volcanic, lots of pillow lava
 Heavily sedimented
 16:53 Reached summit and it is completely dominated by pillow lava
 16:55 Begin to move on course 165 for 120m,
 Pillowed lava terrain; heavy sediment cover
 17:08 lobate flow, heavily sedimented low lying lava forms, low relief terrain
 17:15 sedimented pillow lavas on a small slope
 17:16 climbing a slight slope
 17:17 fissure azimuth 226
 17:23 following a fissure to top of scarp of pillow lava
 17:24 turn around and head 085 for 105m at 0.3 knots
 17:35 flying over sedimented pillow lava terrain
 17:37 pillow lava
 17:40 sitting in front of talus slope of fractured lava
 17:42 highly fractured lava scarp
 17:50 heavily sedimented low lying lava flow terrain
 17:55 DPing on bearing 009 for 180m at 0.3 knots
 18:03 transiting old pillow basalt terrain with sediment cover
 18:07 pillows are out, and the bottom is mostly sediment - have probably come off a
 pillow flow
 18:15 beginning to see few% pillows
 18:18 more pillows
 18:21 Extinct sulfide spire-establish station 201-22
 18:42 Sample J2-201-22-R1
 small weathered sulfide from about midway up chimney structure
 18:52 Move Jason for a second sample
 18:55 Jason on bottom at base of mound for rubble sample
 19:02 waiting for water to clear
 19:05 repositioning slightly
 19:08 Had a rock and then dropped it
 19:17 reposition slightly
 19:23 DP ~47m on heading 301, leaving station 22
 19:29 dropped a weight
 19:31 old sedimented pillow
 19:33 old chimney structures, 5-7m tall
 19:38 sample J2-201-23-R1
 19:41 leaving station 23, DP bearing 015 for 18m
 19:46 passing another sulfide
 19:48 3 more chimneys
 19:52 old sulfide mound, small, lower relief
 19:53 station 201-24
 19:59 sample 201-24-R1
 19:59 off station, ascend to surface
 20:03 off bottom, alt = 15m
 20:05 drop a weight
 21:04 d = 1245 m - half way home
 22:00 d = 120 m
 22:42 Medea on deck
 22:51 Jason on deck. **End of dive J2 200.**

J2-202, July 25, 2006

06:39 (GMT); 1:39 (Local)

06:39 Jason off deck
06:40 Jason in water
06:43 Media in water
06:45 dropped a weight
07:08 Ground fault forward lateral thruster @ 640 mbsl
07:20 1000 mbsl doing Maggie Twist
07:36 End of the Tivey Twist
Dive plan land on mound, near NE end of original Vienna Woods field.
D = 2486m. Negate through a number of targets planned from ABE survey.
TARGET #56
08:05 Stopped at 1900m
08:11 checking A/C ground fault disable port vertical
08:13 Disable thruster
08:15 Turn lights off
Turn on stern thrusters
08:23 All thrusters off. Lights off
Testing various thrusters trying to isolate ground fault
08:30 All powered up seems to be no worries
08:34 d=2149 stop and maneuver Jason
08:36 continue decent
08:38 d=2200
08:43 d=2300m we have LBL nav on Medea
08:47 d=2360m Jason is pulling media approx 40m ne of ships stern
08:49 d=2400m
08:53 180 deg to check tether d=2411 m stopped
08:57 Depth =2450, Alt = 32m
09:00 d=2482m see bottom - >90% sediments, few pillows set Doppler to ?LOL
09:02 DPing 40m by 251 to knoll
09:07 ship has DPed .Jason now moving
09:08 heavy sedimented; pillows 5% of ground cover
09:11 nothing at top of hill but volcanic rock
09:12 next target by 277° at 71 m
09:14 small fisher across top of knoll
09:15 another small fisher
09:17 media video shows structural clarity of seafloor nicely
09:22 waiting on media
09:24 move on target; increase in epifauna
09:25 Sulphide field; shimmering; snails
09:27 Lost Doppler
09:33 Stratum J2-202-1 Target 57
abort this stratum it is where a sample was previously taken
09:38 hdg 245°, for 70 m to real target.
Shift change
09:46 Barnacles encrusted sulphide chimneys, shimmering water
Crabs, worms, snails
09:48 Station 202-1
09:52 Temperature measurement 255 deg c hot for a clear fluid

09:55 Sample 202-1-R1
rubble - broken into at least 4 chimneys

10:02 Off station

10:05 moving; hdg 290 for 15m

10:06 On station 2 (target 58)
ridge of sulphide rubble
sample ledge of ridge representing base of chimney
J2-202-2-R1
X3296 Y5828 Z2484, hdg 345, alt 1.4

10:10 Off station; Next target mound 76m hdg 013

10:11 Crossing pillow ridge X3298 Y5834 Z2487

10:21 hdg 19°; going up slope of pillow flow
elevation change 5m top of slope?
X3308 Y5889
Thin sediment dusting

10:30 Arrive at base of mound, mound is pushed up larva

10:37 distance 34m heading 259° to next target

10:38 chimney field; some live biota; snails colonies dead

10:45 On station hdg 244
Sampling 202-3-R1 VVan#5770
Tip of little spire from base of chimney
X3287 Y5911, Alt 11, hdg 290, Z2483, target 59

10:47 Off station; hdg 244 for 10m

10:50 Active chimney, ~10 m tall large orifice, gray smoker
knock off tip of spire vigorous of T 285 °C chimney
[target 59 X3280 Y5905 Z2473 hdg 235]

10:55 Off station

10:57 dead snails down slope of pillow flow

11:00 dead snails; live crabs

11:05 X3234 Y5869 Z2482, alt 4.8, hdg 214
Sampling flange of large active chimney. Diffuse venting at base of structure.
Parasitic chimney venting vigorously clear to grey fluid. Chimney has flanges.
Sampling a flange - fails due to friable and hard nature.

11:12 Taken sample 4-R1 in red 3 gray smokers 283°C target 61
Sample J2-202-4-R1

11:21 Off station; 15 m hdg 225°
next target little mound

11:25 On station 5
Sample of fallen large chimney near edge of ghor

11:35 sample J2-202-5-R1

11:38 off station. Hdg 300 for 10m

11:39 Tall inactive chimney; dead snails

11:40 multi spire edifice on station 6
North side of mound visible in map. Snail colonies around edifice. Venting from
chimney wall broken spire off side of edifice about half way up structure

11:45 Off station new target: dst 30 m, hdg 10°

11:46 pillow lava

11:57 Broken up larva piles
target 64 X3219 Y5914 Z2484

11:59 60 m hdg 235 target large mound

12:04 Through pillow; a few little chimneys

12:12 Nontronite staining
 12:13 on station 7
 Sulphide structure draped with pillow flow. Large spire on top; broken when Jason ran into it.
 Fluid venting (clear) just from base of structure
 12:20 Off station
 12:22 Marker 23. Unknown source spotted
 12:24 Going around sulphide complex
 12:25 On station 8: Sampling at base of multi spired chimney field
 Snails around shimmering water
 Sample J2-202-8-R1
 X3152 Y5871 Z2484
 12:37 Off station;
 Next target mound 25m, hdg 180
 12:39 Inactive chimneys protruding from large pillows
 12:40 Dead snails, small inactive chimneys
 12:41 On station 9; North side of sulphide mound sampling talus of fallen chimney
 multi spire chimney complex sampling failed
 12:53 sampled spire from base of chimney structure
 J2-202-9-R1
 12:56 Off station, target mound 30m hdg 300
 12:57 Spire; chimney inactive
 13:00 Small bacterial mat - probably sulphur
 13:02 On station 10
 sampling small knobby chimlet
 13:06 Off station follow across ridge hdg 300°
 13:08 Steep pillow ridge
 13:09 X3112 Y5858 on station 11
 steep sided multi spired chimney complex
 sample tip of small parasite spire from 3 m high multi structure
 13:14 off station
 new station 35m hdg 190°
 13:22 Pillow; heavy sediments
 13:28 Solitary chimney on station 12.
 Sampling attempt breaks chimney about half way up
 13:31 sample J2-202-12-R1
 13:35 off station; Next target 30m hdg 250°
 13:38 pillow flow front
 13:50 Shift change
 Tivey on watch
 13:56 Waiting for Medea. Traverse over a pillow dome
 14:05 At top of dome of pillows; heavy sediment cover
 14:06 Drop a weight
 14:08 Change course to 300° for a 50 m traverse over another dome at 0.3 kts
 14:13 Waiting on Medea; Traverse heavily sediment pillow flows
 14:19 beginning to climb pillowed dome
 14:23 At summit of pillowed dome; heavy sediment cover
 14:26 Change course to 220°, drive 200m
 14:32 Sinuous fissures in pillow basalt terrain
 14:36 Reset the Doppler
 14:39 Transiting heavily sedimented pillows; less sediment cover on slope

14:52 Off of dome onto heavy sedimented pillow terrain
 14:55 Pillow lava dome crust
 15:04 Change course to 200 ranges 136 to next target area
 15:11 Pillow out growth
 15:28 Climbi ng basalt dome
 15:33 Change course to head North to next set of domes
 15:36 At pillow larva hey stack
 15:42 heavily sedimented pillow larva
 15:42 coming up on fissure in pillow larva
 15:47 head 290° range 30m
 15:51 Sedimented lava
 15:56 Reached summit of another pillow larva dome
 16:00 Changed course 350 range to target 70 m
 16:13 pillow larva
 16:24 Crossing heavily sedimented pillow larva terrain
 16:25 Beginning to climb dome
 16:27 Ship has lost DP,
 Reached summit of larva dome pillow larva
 16:35 Larva hay stack, heavily sedimented pillow larva
 16:41 Climbing pillow larva dome less sediment cover near the top hey stack of pillow
 larva
 16:50 Waiting for Medea
 16:55 sulphide looking structure. Stop Jason to take a look
 16:58 Oxide staining on these structures
 17:01 Very friable/floc oxide sulfide structure
 17:15 Positioned in front for a sample oxides stained o/c
 17:27 Not able to sample as sample to friable
 17:28 Continue to drive course 250 range 40 m cross over oxide staining and deposit 17:37
 Summit of dome pillow larva
 17:39 summit of dome pillow larva
 17:39 On course 010
 17:45 Driving off dome sediment pillow larva
 18:31 Transiting from bathymetric high to bathymetric high on Abe map. All old
 sedimented pillow terrains, generally <5% to a trace of pillows in the deeper
 areas.
 18:34 Apparent infauna based on sediment markings - not very many
 18:42 100% sediment
 18:47 ~ 0.5 m cleft in sediment sea floor reveals underlying pillows
 18:51 Nothing at this hill but old pillows. Change course to 076 for 272 m and head to
 a small hill
 18:55 Check gauges
 18:59 Fissure orientated at 045
 19:05 Large d eep chasm 6m deep using sm 2000
 19:10 Scant solitary pillows
 19:16 Fracture outlined by pillows
 19:20 Some platey flow fragments Ground beginning to rise rocky tubes
 19:23 Pillow mound
 19:25 This is a large younger pillow formation
 10:29 Top of hills all pillows
 19:31 To check one more hillock
 19:41 Bearing 157, range 240 m to next target

19:48 Underway across pillows
 19:52 crossing over a tectonic drop off
 19:56 Big ass pillows
 20:00 Passing a populated sulphide chimney (previously sampled).
 20:02 Another chimney old target
 20:05 Top of thin spire alt = 12m
 20:07 Pillowed terrain
 20:10 Rusty deposits; not pillow possibly plateau ropy volcanic
 20:11 Small active vents snails shimmering water drop target 71
 20:13 Large structure 2 massive spires lots biology 2m across base 7m tall
 20:21 This chimney was sampled at target 10
 20:23 Nice and stable will take sample anyway
 20:25 On station 13 take sample 13R1 (same locations as 6-R1?)
 J2-202-13-R1.
 20:30 move 33cm on 240 to next feature in bathymetry
 20:33 Small chimney
 20:37 Plateau. Rocks broke up. Groups of snails and crabs occur in patches between
 plates in plateau
 20:39 Small rusty mound base of old dead sulphide - probably lots of old oxidized
 sediment underneath
 20:41 On station 14
 20:42 Sample J2-202-14-R1
 Crumbly degraded chimney base
 20:48 Off station. Transit 125m along 199 to next target
 20:51 Old pillows; possibly degraded sulphide sediment (more oxide?)
 20:53 Passing a good chimney
 20:55 very nice chimney
 20:57 nice chimney
 20:58 Abort transit. Steady to visit a new sample site
 20:59 nice chimney
 21:00 tectonic fissure.
 21:01 Large fallen chimney
 21:04 Station 15
 21:08 Repositioning near base of chimney
 21:12 On new station 15
 21:17 Repositioning
 21:20 Jason fixes bogus.
 Nav good at last near fix and haven't moved since last target drop
 21:22 Trying for some sample with port claw
 J2-202-15-R1
 21:25 Sample 15R1 lying on top of basket
 21:26 Dropping 2 weights
 21:27 Leaving station 15 reset Doppler
 21:29 underway. Hdg 193°, 45m to next target
 21:29 sulphide chimney
 21:31 ascend wide chimney 8-9m tall
 21:33 platey cracked volcanics
 21:34 heavily sedimented area
 21:37 reset doppler on station 16
 21:44 sample 16-r1
 J2-202-16-R1

21:48	Off station 16 move 10m
21:51	On station 17
21:53	drop weight
21:54	sample J2-202-17-R1
	top of inactive chimney 2159 ascending
23:27	100mbsl
00:03	On deck. End of survey 202.

J2-203 July 26, 2006

09:20 (GMT); 19:20 (Local)

09:20 Jason off deck
09:21 Jason in water
09:23 Medea off deck
09:24 Medea in water
09:25 Jason lowering
10:00 at 1090mbsl stop for Tivey Twist
10:05 starting Tivey Twist
10:51 All stop
10:56 See the bottom, old pillows, light sediment. Rather large. Alt ~ 10m
11:00 Slowly ascending a gentle pillow mound d=2499m
11:03 Good nav. on Jason, will turn right to 180 and climb the hill, d=2493 alt=10.8
11:10 Nearing the top-same terrain of lightly sediment pillows, d=2498 alt=2.7
11:12 Moving bearing 195 for 160m to next hill top
11:13 Unusual broken up platy volcanics (not really platy-more blocky), nothing to indicate hydrothermal activity
11:20 d=2502 alt=4.0, faint bottom
11:23 alt 4.6 m, but have good view of pillows, so p/u speed
11:39 big mound of blocky lava
11:40 New course: hdg 225, distance 160 m
11:45 Moderately sed pillow terrain
11:47 Sediment thickness increasing
11:49 More lobate lava and broken up sheet flow. More sediment
11:51 Going up slope, back in pillow flow.
11:55 black lava forming steep ridges near top of mound
11:59 heading 265 200m. Target is twin peaked mound
12:00 Flying over pillows again
12:05 more sediment in valley
12:06 Coming up pillow flow front
12:18 Going up mound [X6683 Y8716] mound composed of pillows
12:22 200m heading 250 to target of Eh anomaly
12:50 reached area of Eh anomaly; nothing but pillow everywhere
12:52 heading 208°, 140m
12:54 Flying over old, sedimented lobate right back into pillows
13:01 Going up slope, pillow flow front
13:05 Bridge in control of ship
13:07 Starting ABE launch
13:23 ABE launched
13:30 Jason heading 300°, 240m
13:34 Dana requests the ship not to be moved
13:45 Ship moves 100m NW
13:58 Pillow flow terrain
14:24 Have the go ahead to move now on course 320
14:31 Traveling over pillow lava terrain
14:47 Heading 225 range 630m, transit
14:57 Traveling over pillow lava terrain
15:16 Lobate lava flow terrain on top of lava plain
15:30 Pillow lava

15:32 lobate flow
 15:40 lava flow contact, hackly flow
 15:43 hackly flow
 15:46 Jumbled sheet flow
 15:49 fractured sheet flow
 15:50 Lobate flow
 15:53 At base of scarp of a rubble wall stop to sample rubble,
 J2-203-1-R1
 X5716 Y8462 Z2462 in basket red B
 16:15 Leave station and move 240 to top of scarp
 16:18 Climbing scarp
 16:23 Now on an intact lava flow wall, pillowed flow
 16:27 Reached the top with pillows covering the top 17m high wall
 16:31 Pillow flows
 16:32 Lightly sed pillow flow
 16:39 Stop to sample on top of rampart of pillow flows.
 Navigation is flaky - lost bottom lock plus no navigation as ABE is using it.
 16:43 Stopped DVcam after 18mins
 16:43 Sample J2-203-2-R1
 X5614 Y8386 Z2400 basket RED A
 16:52 Head south course 165 range 220m
 17:01 Drop a weight
 17:08 crossed over edge of rim
 17:12 chimney/sulfide; long tall and skinny in front of wall
 17:16 sulfide sample from extinct chimney
 J2-203-3-R1
 X5634 Y8287 Z2433 in red C
 17:22 Winds shifted ship move heading 90 degrees to the right heading 165
 17:31 Waiting on Medea
 17:35 Sitting on blocky broken lava talus
 17:45 Vanko on watch, climbing target hill out in front of "fort", consists wholly of
 blocky talus
 17:52 top of hill in high relief broken pillows, one large broken pillow at top
 Moving 100 m along bearing 216, to sw along crest of feature
 17:55 Virtual van is dead, Paul can not log
 17:57 Still lots of relief, broken pillows, 100% outcrop is of light sediment
 17:59 some white encrustation on a few blocks
 18:02 rugged relief at top
 18:04 sonar and bathymetry make good sense
 18:06 Phil reading off gauges
 18:09 Smallish flat plateaus with more sed cover
 18:12 Phil says this terrain is not unusual for a ridge axis.
 e.g., EPR is similar except no sed there and rocks are black
 18:14 Top - flattish area with more sed
 18:16 New cursor at 40m range bearing 285
 18:26 New cursor bearing 220 range 49m
 18:28 14m alt - coming down - same style of terrain-pillow ridge with considerable
 relief, steep walls, many broken surfaces, more sed at top
 18:33 Talus of broken pillow fragments.,
 Very little bio-a solitary star, or cucumber now and then
 18:36 No LBL, no sharps right now

18:41 new cursor, 196m on 233°
 18:52 soft coral, solitary.
 19:02 Still traversing SW towards end of ridge, plan to head back NE along parallel ridge
 19:10 blocky pillow talus
 19:26 Convinced of good location for Jason, we are going to a new waypoint and will then traverse NE, pillow talus, blocky
 19:29 Bearing 053 range 95m-new target
 19:47 New waypoint, bearing 061, 87m, new pilot
 20:01 New waypoint 54m away on heading 033
 20:09 Checked at a sonar target-a pillow basalt spire
 20:11 Pillow fragment talus, to a nice wall
 20:15 This ridge is very sharp, tectonically controlled, won't be any vents up here
 20:22 on station 4 for a lava sample
 20:27 sample J2-203-4-R1
 20:29 Off station 4, continue to waypoint
 20:35 New waypoint bearing 028°, 183m, to go down off this ridge and across the valley to the previous hydrothermal site
 20:50 Transiting across valley and up to the wall of the "fort"
 20:59 Checking out a sonar target
 21:03 Steadying Jason-Medea, gauges
 21:07 Sonar target shows chimney
 21:09 This is a tall spire, maybe 10m
 21:12 Passing a small group of short old spires (Target # 87? Justin recognizes it).
 ~12 fat blades, straight up, not knobbly.
 Plan - return reciprocal course - do not sample the one seen at 21:07
 21:21 On station 5
 21:24 Sampled 2 chimneys - small tip of first and a complete of second. These are old, inactive, encrusted over. They are single spires, vertical. Simply rise up out of the blocky pillow talus.
 21:33 Drop one weight
 21:35 off station 5
 21:38 Heading NE along same wall
 21:40 Justin says "big crack there"
 21:41 sonar target = volcanic
 21:46 Shift change
 21:52 Continuing NE of station 5, rubble
 21:59 Begin u-turn to the right to make a reciprocal traverse a little ways down slope
 22:08 Base of talus field, lobate flow, sedimented
 22:10 front of ropey over lobate
 22:18 pillows
 22:27 talus
 22:38 going up against wall; hydrothermal staining in talus at base.
 22:45 following contour 2440 heading 230
 22:53 Large talus blocks with staining
 22:56 Going up wall, red and yellowish white staining
 23:04 After catching up with Medea going up with wall again.
 Heading 300 going down on NW side of wall/ridge through pillow
 23:14 In flat, completely sedimented area
 23:32 Talus going up slope within center of "fort"
 23:37 Still on talus

23:41 Outcrop of big diameter pillow with nice columnar jointing
23:43 Sampling talus piece from large pillow sample
J2-202-6-R1
X5345 Y8292
23:50 Resetting Doppler new X5327 Y8295
23:55 Heading 190 for 300m
00:11 Back over sedimented slope looks like steep flow front with big pillows here
00:23 crossed sedimented flat and come up N side of large wall small pillow mounds
00:29 Large pillow flows forming steep flow front
00:31 Small fault striking 247
00:35 big fault
00:40 talus
00:45 Very steep wall is fault 20m wall very narrow ridge crest
00:47 7m big wall; very narrow ridge crest
00:50 On sheet flow taking sample of hackly sheet flow
00:55 dropped weights
00:58 Coming up
01:04 Started winch
02:28 Jason on deck. **END OF DIVE 203.**

J2-204, July 27, 2006

10:00 (GMT); 20:00 (Local)

10:00 Dive begins
10:24 Resetting system to update dive number
11:18 all stop 2248 mbsl
Drifting ~ 060° for ~ 1 km
12:33 on bottom [X7048 Y9100]
Pillow flow down slope of N rift shoulder heading 060
12:39 Climbing up hill of WP 100 pillow flow front
12:42 Reached top of hill-pillow flow
12:46 Continue 052, 140m
12:59 Coming down hill, pillow flows
13:06 Over young pillow flow with whitish-yellowish patches with black crusts; no macrofauna, no Eh hits
[Target 161 X12360 Y11831 Z2569]
13:11 little knoll; just pillow
13:16 Young pillow going up slope heading 180 hundreds of gorgonian corals
13:18 Turning 090 over lightly sedimented pillow.
J2 stirs up yellow flocculent sed
13:23 Waiting on Medea Eh drops from 230 to 210mv
13:28 Eh comes up to 214mv
13:33 up slope; more yellow mats.
13:35 Eh down to 211mv
13:40 stuck t-probe into sulfur mat, very soft pudding like material,
T-probe in pudding reading 5 °C,
T-probe adjacent to feature pulled onto sediment 6.3 °C
13:46 drop target 102
X1246 Y11824 Z2557 T ambient is 1.9 degrees C, distance to first mat 102m
at heading of 094°
14:25 pillow mound, 100m at heading 190 from target 102.
Small chimneys venting; snails and crabs.
T-probe in vent 194 °C,
Sample J2-204-1-R1
[X12445 Y11725 Z2570 target 103 in red]
14:39 At small chimney active venting clear fluid,
picking up second piece from venting chimney
J2-204-1-R2
[X12445 Y11725 Z2570 in RED K] [*Paul - Active? I think inactive.*]
14:46 Beginning to move south
15:03 Reached dome and it is all pillow flow; lightly sedimented
15:04 Move on to the next mound target heading 210 for 50m
15:05 Moving over lightly sedimented pillow flow;
shimmering water, barnacles, gastropods crabs nestled in basalt X12437 Y11645
15:13 moving across pillow flow again; sporadic oxide staining
15:17 checking transponder Nav for correct pair to use "C" and "D"
15:21 on top of small dome with pillow flow
15:27 change course to 110 for 108m
15:29 traversing lightly dusted pillow flow
15:31 Waiting on Medea

15:35 moving 110°
 15:40 Moving up dome with pillow flow
 15:41 Lightly sedimented pillow flow, waiting on Medea
 15:47 Transponder nav should be improving here as we head up this dome
 15:49 Tubular pillow flow
 15:50 haystack on top of dome
 15:52 begin new course; 010°, 86m at 0.3 knots
 16:03 Driving north off of dome
 16:06 Pillow lava terrain no corals or other biology, light dusting of sediment
 16:13 Change course to 348 at 230m at .4 knots
 16:20 Lightly sedimented pillow flow
 16:24 Pillow flows-distinct lack of animal life
 16:25 Tubular pillow flow
 16:29 Lobated pillow flow lightly sedimented
 16:32 Waiting on Medea
 16:35 Fault edge drop off to vent
 16:36 9m deep fissure several meters wide, climbing constructional pillow ridge/dome sediment on top
 16:38 another fissure, 6m deep
 16:42 fissures
 16:44 change course to 070°, 100m at 0.3 knots
 16:50 Waiting for ship to move
 16:56 Moving slowly over Sedimented terrain ~90% sediment
 17:04 New course 070 for 50m
 17:06 Stopped-will drop a weight, weighted dropped
 17:09 Moving on across hackly sedimented terrain
 17:18 Move onto next mound at 085 135m .4knots
 17:21 Traversing heavily sedimented terrain
 17:27 Small fissures azimuth 54-65 degrees up to 8m deep
 17:32 Heavy sediment cover on pillow lavas pillows exposed in fissures
 17:34 Jason following fissure for past 5 minutes
 17:36 Now turn and head to top of mound target
 17:38 Top of mound is sediment covered pillow basalt
 17:43 Next mound target at 060 125m at .4 knots
 17:49 Vanko on watch - traversing sedimented bottom with very sparse rock-probably individual pillows
 17:55 Pillows increasing to 10%, very little biology
 17:58 Small old pillow mound at summit
 18:00 Heading 057 177m to next mound
 18:04 99% sediment cover, rest pillows
 18:07 Small pillow ridge forms little high feature-continue NE across sediment
 18:10 10-30% sediment covered pillows
 18:12 Small pillow mound, old, fissured-fissure trend 060 +/-
 18:14 Pillow ridge – actually a scarp, 2-3m, down to SE
 18:19 Pillow along the scarp/fissure have some light colored edges-weathering(?)
 18:24 Next mound target 80m on 056
 18:30 Heavily sedimented terrain
 18:39 Fissured sediments; looks like there is a lighter sublayer
 18:45 heading 267° for 216 m to next knoll
 18:50 some pillows seen in heavily sedimented terrain
 18:54 ditto

19:06 ditto
 19:07 begin a pillow flow - old, sedimented, but 100% pillows
 19:13 nice elongate pillows point downhill!
 19:18 Underway, heading 242° and 82m to next peak
 19:24 More 100% pillows, old
 19:32 peak of pillow pile
 19:35 heading 311°, 70m to next presumed pillow pile
 19:46 Flying pretty high - no visual bottom for awhile
 19:47 100% old pillows
 19:53 heading 167°, 49m to next pile of pillows (check mark indicates that Vanko was correct)
 20:04 heading 199° for 44m to next pile of pillows
 20:13 really elongate pillows at top of pile, is 277°, 25m to next hillock
 20:24 still nothing, but pillow piles
 20:36 more pillow piles, proceed to fissure, 253° and 59m away.
 20:46 nice 3-4m deep fissure
 20:54 Have reached a more vertical wall. Have floated up to top and will patrol up here and to the SW to another target
 20:56 Wall bearing 055
 21:05 Pillows <5% on sediment
 21:20 Still traversing this sediment-rich plain with ~10-20% pillows peeking through along lineaments parallel to the overall structure trend
 21:29 underway heading 236°, distance 279m, speed 0.4 knots
 21:40 same old sediment pillows
 22:05 heading 220° for 110m to explore small mounds-all pillows
 22:35 heading 240° for 100m to explore nature of hummocks on flat terrain
 22:41 heavily sedimented
 22:48 Abort dive. [*Presumed lack of hydrothermal activity and hydrothermal features*].
 Jason leaving bottom.
 00:20 Jason is up and out of water
 Jason on deck.. **END OF DIVE 204.**

J2-205, July 27, 2006

10:00 (GMT); 20:00 (Local)

10:00 Jason in the water
10:06 Jason diving
10:40 Tivey twist
11:39 on bottom, pillow flows X12126 Y11148 heading 280 for 100m along pillow flow front
11:50 X12092 Y11162 giant sponge
12:00 heading 275 for 140m target little mound
12:09 X11982 Y11174 going down slope of pillow flow front
12:11 on flat, it is heavily sedimented pillow basalt
12:24 went over flat to mound that is also entirely sediment cover, there are occasional crabs and an old dredge track
12:26 going down slope of mound heading 326 for 100m of pillows, ++ sediments
12:28 X11858 Y11226 large fissure 5-6m wide, <9m deep (south) strike of fissure is 043
12:34 X11856 Y11252 crossed another fissure, same strike
12:36 reached top of another mound
12:37 new target heart of magnetic anomaly heading 310 for 110m
12:47 X11769 Y11318 pillow flow front fly over steep ridge (razor back?) and up a fault scarp
12:52 over heavily sedimented area with occasional fissures, few pillows
13:00 over fissured and faulted terrain (++ seds) to X11724 Y11397 turning 90 degrees for 40m to start a grid over magnetic anomaly heading 230
13:05 following edge of ridge through strongly fissured terrain
13:11 turning 90 degrees heading 140
13:16 over entirely sedimented area
13:24 pillows, fissure
13:27 down a fault w/ razor back ridge (?) into fissured, heavily sedimented terrain
13:33 on base of small fault ?????? deposits and small degraded chimney, flocculent Fe oxyhydroxides "chimneys" are entirely
13:44 drop target 7 X11775 Y11293 Z2589
13:55 X11781 Y11297 more yellow floe in fissured terrain
13:57 Tivey is on
14:06 bottom temps are ~3.4 degrees
14:06 crossing fissure, thick sed cover
14:10 crossing another fissure
14:11 crossing fissure
14:14 crossing fault offset down to south
14:15 crossing lava at a fissure
14:18 crossing fault down to south ~10m
14:19 turn and go along the fault to west azimuth 240 for 40m heavy sediment cover
14:26 driving along fault-sediment T=11.3 degrees CTD=2.96 degrees T, T-probe is turned off
14:29 turn to course 325 116m
14:30 cross over fault
14:30 cross filled in fissure-heavy sed cover
14:31 turn off lasers
14:34 crossing heavily sedimented pillow lava

14:35 fissure
14:39 fissure
14:40 fissure, and another fissure
14:44 jumbled broken pillow blocks heavy sediment cover
14:46 at small fault wall exploring pillow basalt, some blocky talus
14:49 ~9.5m high fault wall
14:51 Turn west and go along the base of the scarp fault 050 100m at 0.2 knots
14:53 Jason stopped while they figure out where Medea is, ????? nav is secured for ABE ops so only have Doppler nav on Jason
15:12 Traveling on edge of fault drop down to south take wraps off Jason
15:16 Heading 012 up to scarp again, talus at base
15:21 looking directly at wall face, ship moving 041 truncated pillow flow face
15:24 Lots of talus at base of scarp staining off to right
15:29 moving azimuth 208 60m Medea and Jason sitting still
15:31 oxide staining on wall, basalt stained
15:35 talus at base of scarp, moving along scarp to south west
15:39 of into sedimented plain coming to a faulted edge
15:41 waiting for Medea
15:45 continue to head 208
15:46 start moving again
15:49 back to Fe-fluc sample spot, some staining in sediments
15:50 oxide staining in sediments, strange looking growth of thorny looking orange encrustation
16:00 Fe-fluc on block
16:04 Jason stopped to check on Fe-floc outcrop, disturbed the floc-blob and it totally disintegrates X11764 Y11273
16:08 fissure-turn around
16:10 sediments-transit 310 range 300m
16:13 at edge of fissure ~2m deep
16:16 coming up to another small fissure crossing mat
16:16 heavily sedimented terrain pillow lava
16:18 coming up to a series of trenches before a scarp face that slopes up to north
16:19 at scarp face, climbing the wall ~5m
16:21 Talus field
16:22 scarp face truncated pillow
16:23 top of scarp 9.6m to base now into heavily sed pillow terrain
16:25 drive off cliff down to north 8m high cliff
16:26 back into sed pillows
16:28 pillow rubble
16:29 smaller scarp ~1-2m high
16:30 now back into heavily sed pillows
16:31 talus filled fissure
16:32 coming up to another steep scarp face up to the North
16:33 back into sed pillow terrain
16:34 coming up to a fissure, cross over
16:36 crossing a complex of fissures
16:37 another fissure
16:39 pillow lava-sed but less so now
16:43 traversing pillow lava less sed cover ship move 60 degrees to port
16:48 pillow lava terrain at summit
16:53 at summit pillow lava

16:54 move over to next target azimuth 050 150m
 17:08 pillow lava terrain
 17:12 transiting over lightly sed pillow terrain
 17:26 waiting for ship to move over top of hill
 17:31 reached summit of hill~pillow lava with light sed cover, turn and head 130 308m
 17:36 tubular pillow flow-flow down off the dome
 17:44 into more heavily sed pillow terrain almost completely covered pillows
 17:55 Vanko on watch, Plan-continue survey, probably ascend at end of this watch, recall xponders C+D, transit toward E+R to ??? ABE. If dive is exciting can stay down another 2 hours after end of this watch
 18:00 old slightly sed pillow lava exposed at crest of ridge
 18:14 moving toward target heading 054 up onto another large volcanic feature to the east. Pillow flow front-100% pillows with blocky talus, light sed.
 18:23 pillows and talus, moderately sed covered
 18:31 ditto
 18:38 84m farther on 064, still pillow talus X212005 Y11404 (no LBL)
 18:46 pillow talus, some steep relief
 18:51 X212077 Y11440 exploring volcanic
 18:53 moving 108 for 33m
 19:02 small hill with heavier sed on one side-possibly the ??? side of the hill
 19:07 pillows and talus, moderate sed
 19:11 setting up for a sample
 19:13 station 1-basalt fragment
 19:20 sample 205-1-R1 representative pillow basalt fragment
 19:24 re-booting DVL nav computer
 19:29 turning off nav computer to re-start, the reason is that the nav computer is showing 100% CPU usage (a red warning is illuminated)
 19:39 CPU nav ok
 19:40 off station, reset Doppler, moving 245 for 270m
 19:50 blocky pillow talus
 19:55 ditto
 19:59 lost bottom lock for a minute or two, nav back down, same blocky pillow talus
 20:05 sed pillow talus, a small slight increase in concentration of biology-white things-???star, sea ??????-type things
 20:12 plot a course 243 380m 0.4 knots
 20:16 rising up and over a south facing scarp
 20:18 crossing a razor back?
 20:22 have come off of pillow flow into heavily sed terrain-90% sed
 20:25 sonar target-a pillow ice cream cone
 20:27 crossing fracture oriented ~20 degrees right of Jason heading of 200
 20:29 Jason turned-fracture trend is more like 240
 20:35 white circular feature in the sediment?
 20:37 2 more of these sharp sed gashes like we saw a few days ago-thin straight arch, maybe 50cm long-some kind of borrow??
 20:38 2 fish
 20:39 small fissure oriented 240, sonar shows a group of these parallel to us
 20:43 continuing SW on heading 240, in area of increased sed. Bathymetric low-depth ~2572m Approx. 90m from target
 20:48 flew over a 240 north facing scarp
 20:51 flying along south facing scarp
 20:53 these 2 scarps flank a nice fissure (10m deep SM2000)

20:59 at high point-just a pillow pile, sed
21:00 set course for next peak, bearing 297, 139m
21:06 mostly sed bottom with 10-20% rocks
21:07 fissure scarp just to port (see in aft facing camera)
21:09 leaving fissure behind
21:12 10% pillow + sed, look newer
21:18 ascending large pillow pile
21:21 very impressive pile of pillows, elongate ????? down hill
21:25 top of mound-reset Doppler
21:28 moving bearing 057 for 112 m
21:34 Jason is now moving off the peak
21:39 riding downhill-pillows in butt cam
21:44 14m alt-looking for bottom
21:45 bottom >90% sed
21:49 2 more sed ?gashes?-are they fish fin tracks?
21:57 5m deep fissure
22:05 off bottom
23:32 Jason on deck. **END OF DIVE 205**

J2-206, 29 July, 2006

08:19 (GMT); 20:19 (Local)

08:19 Jason off deck
08:21 Jason in water
08:24 Medea in water
08:25 Medea coming back on deck-fouled line (good job, James!)
08:26 Medea back in water
08:35 Jason at 180m depth
08:37 There are 34 monitors in the van
10:01 Depth 2495 m; Alt 150m
10:05 all stop
10:06 going down; alt = 10m
10:09 see the station; 100% sediment
10:12 heading 032 for 86 m to mounds
10:23 Strange holes in sediment often with discoloration on bottom
10:25 Sampling rugged-surfaced rock that is
10:29 Hills in map turn out to be artifacts, stop to put sample 1R1 in stbd biobox
10:36 pushed up mudstone
10:46 Crack, pillows under sediment
10:53 more sediment and concretions
10:57 Fissure, strike ~80 degrees
11:05 pillow flow front
11:11 Entire hill is pillow basalt, heavily sedimented at top
11:13 Following fissure with strike 130 with dark sediment and rare yellow patches (bacterial mats?), no Eh hit
11:30 bottom of hill: young pillow flow
11:34 Fault, pillow flow, talus at base
11:36 Microbial colonies (yellow jell-o)
11:39 pillow flow front, fissure 6m deep, 3m wide
11:41 Going up talus field - turns into coherent flow
11:43 Deep fissure w/corals growing on wall
11:55 Crossing fissure >15m deep
12:00 >20m deep fissure following small graben striking 075
12:13 going down slope, more fissures
12:18 on base of slope, heavily sedimented pillows revealed in deep fissures
12:24 Huge fissure
12:42 on base of fault bearing 279 for 540m
12:46 going up fault
12:51 top of wall, throw is 30m
12:57 followed trace of fault scarp, now west of pillow mound, offset of fault here is 47m
13:00 Flat on top of fault is heavily sedimented
13:06 Crossing fissure, trending N-S, floor is heavily sedimented
13:10 In little graben that appears to be sub-parallel to big fault, trending ~050
13:17 Crossing heavily sedimented fissure
13:27 Going down fault, talus with whitish staining
13:39 Presumed peaks turn out to be artifact, new bearing 225, Tivey on watch
14:10 New course 221 at 270m continue over sedimented terrain of pillows, 100% sediment cover

14:28 traversing 100% sediment cover
 14:32 crossing the major valley fault, ~70m high
 14:38 pillow basalt in wall
 14:41 very steep or vertical wall
 14:43 stop and wait for Medea
 14:47 talus ramp
 14:52 lost bottom lock
 14:55 moving 180°, for 20m
 14:56 100% sediment cover
 15:05 new target [X 20154, Y 15373] ~1000 m away
 15:12 Traversing southwest to neovolcanic axis; crossing sediments 100%
 15:16 Pillow forms poking through the sediment
 15:24 Fissure
 15:25 Oxide staining on slope. Some blocks with oxide coatings and decrepitation on side of small dome
 15:27 large fissure, 12-14m deep
 15:29 back into 100% sediment cover; occasional pillow outcroppings
 15:30 Crossing summit of dome
 15:36 100% sediment cover
 15:36 Pillow basalt ridge
 15:39 climbing constructional volcanic slope sediment cover less here
 15:52 100% sediment cover
 15:57 Fissures
 16:00 100% sediment cover
 16:12 pillow [*purud?*] flow front?
 16:13 fissure
 16:14 small haystack of lava
 16:14 sinuous fissures, pillow flow outcrop
 16:18 small fissure
 16:23 ditto
 16:25 ditto
 16:28 disturbed area of pillow flow, thickly sedimented, constructional volcanics – pillows
 16:33 fissure
 16:35 small fissure
 16:39 covering top of sediment ridge dropping away
 16:45 climbing sedimented slope
 16:52 climbing steeper sedimented lava slope
 16:56 heavy sed pillow lava, continue on to next target
 16:57 azimuth 155 130m range
 16:59 waiting for ship to move Medea
 17:02 Large pillows
 17:06 Very rough terrain of pillows much less sed
 17:09 Crossed summit of pillow ridge now going to climb up neovolcanic ridge to Presumed spreading axis
 17:11 Climbing constructional volcanic ridge very rough lava rubble much less sed cover
 17:18 reached summit of ridge, sed pillow and tabular lava debris
 17:19 stop to sample a rock from here, reset the Doppler
 17:25 J2-206-2R-1 rock sample
 [X20171 Y15242 Z2587] in yellow B

17:28 heading 050 for 250m, turn and head to north east off axis
 17:43 Rubbly basalt terrain
 17:50 Now driving aft the ridge
 17:59 Vanko on watch, sed plus some old pillows poking through, headed toward two lumps targeted by Maurice
 18:13 The two little lumps turned out not to be there - it appears they are artifacts of the ABE survey. The previous watch saw examples of this and half suspected as much, underway to more lumps on bearing 108 for 563m at 0.3 knots
 18:15 A few solitary pillows on sed
 18:24 Small fissure oriented parallel to upcoming ridge
 18:26 Single pillow
 18:29 First pillows at the base of ridge that we will cross obliquely
 18:31 fissure with pillows
 18:37 Phil saw some same white features he though could be shells-hard to tell, too hard to stop
 18:39 Rock outcrop base of slope-a little bit of light discoloration of sed
 18:40 steep sed slope with inducted shelves cropping out
 18:42 Nice big pillow
 18:44 sediment - coarse grain
 18:50 Mud
 18:53 Summit of this rige is flat, all mud
 18:58 top of edge of ridge is a sharp little rocky outcrop
 19:03 rocky talus as we descend off the ridge
 19:04 muddy flat
 19:10 Large earthy outcrop does not look like pillow basalt, maybe weathered sulfide? "dropped target" 20 labeled "weathered outcrop" with intent to setup and sample it
 19:17 Ship has stopped, Medea is settling, should be able to reacquire target
 19:22 Setting up to sample, mound surface knobbly rocks poking through sediment Fe-oxide rich sediment on crust
 19:26 On station 3, rock is very crumbly, light inside, J2-206-3-R1
 19:33 Reset Doppler, get underway to next bumps (the original bumps we were going to)
 19:50 Phil new driver
 19:51 Reddish covered rocks on mud bottom-microbiology?
 19:52 Volcanic rock and other rock that could be old sulfide?
 19:54 fault scarp
 19:55 all mud
 19:57 little rocks on mud
 20:02 sediment gash-see these once in a while, made by fish?
 20:04 Sonar shadow compounds to the linear drop off seen in the ABE bathymetry, but the bump in ABE bathymetry may not be here.
 20:07 moving 063 for 138m
 20:15 mud bottom with old rocky ridges poking through
 20:16 following top of small scarp with mass wasted pillows
 20:18 tracking away from the scarp-flat mud
 20:27 Looking for something at the location of these 2 pimples on the ABE map
 20:34 mud and solitary rocks now and then
 20:43 Heading east, should be reaching volcanic mound shortly
 20:46 not sure if mound exists

20:51 set course for NE, bearing 011 for 630m at 0.5 knots
 20:56 mud
 21:04 mud
 21:07 Lava rock and a different rock-knobbly, looks like are of these crusty rocks that
 could have a white interior
 21:08 Mass-wasted pillows, mud talus
 21:09 pillow talus 100%, base of wall
 21:10 Reaching top of talus pile, more sed
 21:15 very impressive pile of rocks
 21:17 At top of ridge - mostly mud with some fractures showing exposing rock
 21:22 Top of ridge
 21:29 Mud
 21:32 mud with solitary rocks
 21:33 mud flat
 21:39 A small trough in the mud floor, maybe a meter wide and several meters long. In
 the bottom was some dark debris, 3 sea cucumbers and a white crab. Around the
 margin was a concentration of infaunal mounds. Also at one end of the trough
 was a big half-meter trough; Target 12.
 21:43 Ship parking at cursor for deployment of ABE
 21:46 A degraded mound poking through the mud flat, ship is 120m ahead and cant
 sample.
 Target 23 - small irregular mound, I guess this is probably more of the crust
 rock with a white interior
 22:03 Took sample of broken up pillow flow from top of little knoll
 22:26 ABE is launched, heading 180 for target 23
 22:54 Sediment mounds, T probe inserted - no T anomaly, material is very soft, can not
 be sampled with claw
 23:13 Sampling orange material from mound, soft and friable sample goes in port
 biobox. Heading 190 for microbial mats emaciated with small fissures, located
 earlier
 23:35 Crossing small fissures striking 040
 23:50 Sampling concretion
 Sample J2-206-6-R1
 23:55 Coming up. **END OF DIVE 206**

J2-207, July 30, 2006

12:12 (GMT); 22:12 (Local)

12:17 Jason off deck
12:19 Jason in water, ground fault on ICL 2
12:27 Lowering away
13:01 Tivey twist started
13:06 Tivey twist completed
13:52 60m off bottom
13:57 Jason diving down to seafloor
13:58 12m off bottom
13:59 On bottom
14:18 Diving 300 at range 80m to first target X3240 Y5745
14:19 Chimney in sight, snail colony, shimmering water clear fluid venting on small chimneys. DVcam running
14:23 Continue moving. On major edifice ~black smoker, more gray than black.
14:33 Stop DVcam; Deciding on how to sample top of structure, bottle #7
14:43 Top of small shimmer/knocked off very friable 20cm high.
T >280 degrees ~ 281/282 degrees
14:44 Taking sample
J2-207-1-W1-IGT
[X3243 Y5747 Z2470]
14:48 Done with sample, lay T probe against outside of chimney to measure T ~32 °C, in other diffuse flow around chimney
14:50 Stow sample #7, need to move Jason to stow sampler
14:53 Pick up water sampler #3, moving back to chimney position to sample the same orifice, collapsed chimney behind fell in front but orifice still there and smoking.
14:57 Put in T-probe at water sample #3, >280 C. Starting the sample; T = 282 °C peak.
15:00 Finished sampling, stow the bottle #3
15:03 Bottle stowed, now try for solid sample of or like/ chimney
15:05 Very strong orifice not breaking, small piece, J2-207-1-R1, chimney orifice piece put in basket behind 1GT#3 and #7
15:11 Now use major water sampler, clear to gray fluid, vigorous. Water sampler coming out of spy hole. Used arm ram-spring moving.
15:16 Done sampling-stow water bottle J2-207-1-W3-M2, M yellow
15:18 Stowed and done moving on to X3312 Y5782 chimney ~9m high from altimeter
15:25 Starting to move to new target, course 062, we will traverse along a major fissure feature
15:33 passing a dead chimney
15:37 Over a large structure but not venting south but to head southwest
15:38 Collapsed chimneys, shimmering water with snail dominated chimney. Small orifice in clear fluid.
Drive around chimney looking for a good venting place
15:54 Set up to sample a small chimney with small orifices a few centimeters across ~10cm high. Jostled the chimney, sample 207-2-R1 chimney top multiple spires [X3336 Y5785 Z2474] in port basket behind #6
16:02 Sampler #4 pick up to sample fluid 272 C max T, taking sample 207-2-W1-JGT4
16:08 Stow this bottle and pick up another, clear-gray smoker
16:11 Start DVcam on sampling 1GTwater bottle #5 picked up for second set of samples 266 C max T

16:15 Start sampling. Abort sample due to malfunction of sampler - no sample taken
 16:18 stowing water bottle
 16:19:50 stop DVcam
 16:21 New target X3280 Y5905 for 135m heading 336
 16:23 hold up for media
 16:30 traversing across sedimented bottom
 16:35 pillow basalt
 16:38 fissure
 16:38 White staining and shimmering water out of basalt substrate some biology crabs and limpets
 16:39 Coming up to sulfide structure, white staining
 16:40 Multiple orifice vents on top of sulfide structure, beehive lays on spires, snails shrimp crab, ~9.5m tall chimney
 16:43 Looking around for a likely target to sample for both fluid and chimney
 16:44 DVcam start, at top of structure try to sample small chimney smoking ~gray fluid
 16:50 Pick up gas tight sampler #8
 16:53 Now move into chimney for sample try to measure outside wall temp max
 T=284°C
 Taking sample of fluid.
 17:01 207-3-W1-IGT8
 [X3277 Y5984 Z2475]
 17:05 Done sampling fluid.
 Cool thermocouple then measure outside temp. T ~18 C
 17:07 put bottle back in holster
 17:18 solid sample of wall of orifice-broke off a small piece of wall
 J2-207-3-R1
 17:21 Now pick up sampler #6
 17:21:50 Stop DVcam
 17:30 Trying to get in correct position to sample-trying to get back to high temp fluid of previous sample 284C
 17:36 flooded thermistor housing so reference temp is too high by ~20°C, taking a sample of fluid T = 230C estimated (250-20)
 J2-207-3-W2-IGT6
 17:41 Stow the bottle
 18:03 Vanko on watch-moving to target 4 to try to sample "stockwork", in this low area between mounds - fresh pillows with light sediment and sparse dead chimneys, and patches of snails
 18:05 Chimney
 18:08 Fallen chimney, shimmering water-at target 4
 18:10 Yellow biomat -Dvcam, up above some snails (Chris says 19-25 C temp range for these)
 18:14 Moving to the right around base of mound
 18:16 Crack in sulfide, 10cm wide, ~2m long-no venting
 18:19 Can see a second fracture with concentration of snails and crab, Fe-oxide flocs.
 18:24 Base of mound, Chris Yeats. thinks it may be rock - may be platy sediment.
 Station 4
 18:26 Sample J2-207-4-R1
 VVan# 17683. Platy rock from base of chimney – possible inducted sediment.
 18:32 Chimney growth right off of two pillows.
 18:40 Positioning to try to sample a rock from large pillow that has chimney growing out of the top of it. The rock may be lava w/ sulfide on it.

18:42 On station 5
Two pieces plucked off and fell. Picked one up.

18:47 Sample J2-207-5-R1
Lava from base of chimney.

18:49 Ditto

18:54 Second piece of same sample.
J2-207-5-R2

18:59 Off station. Continuing to crab around the mound. Looking for Wolfgang's stockwork.

19:00 Bacterial mat in fissure

19:05 Large pillows at base w/ white bacterial films developed along cracks between pillows.

19:10 On station.

19:13 One rock from broken pillow taken but fell. Try for another? Got one.

19:15 Sample J2-207-6-R1

19:19 Underway ~ 20m to Wolfgang's stockwork.

19:21 Inactive chimney with spires and flanges, and a soft-looking coating of bacteria (looks like velvet)

19:25 Group of light-colored chimneys, covered in bacteria? Look like the one that Wolfgang knocked over to create flow.

19:27 Shimmering water
Chimney w/ oxide color.

19:36 Rocky base beneath mound has sulfide all over it.

19:38 Huge pillow

19:42 Floated back up to active beehive like feature supported by stockwork.

19:50 Trying to sample volcanic rock coated/shot through w/ sulfide.

20:07 Still trying – going for a piece that has fallen

20:11 Station 7-R1. Lava rock from beneath a beehive-like structure. Maybe could have sulfide in it. Much of the rock around it looks like Wolfgang's "stockwork".

20:14 Doppler reset

20:17 Doppler still off sample location.

20:25 The beehive is all new growth from the sampling done previously. Paul Craddock identified the base from the previous dive's VVan pictures. We will try to get some of it (very friable) into biobox.

20:30 On station 8. Scooping sulfide from the beehive, lifting and dropping into the biobox. Major Eh drop in this area.
Sample J2-207-8-R1.

20:40 Phil excavated the beehive. It's fairly hollow looking. The outer crust crumbles away and the interior is either gone or hollow.

20:42 Off Station 8.

20:45 Underway; heading 165° for 164 m to a bmp which is the most SW one visited on previous dives. From there, we will explore new territory to the SW.

20:48 Lifting off this mound. Phil followed a trunk like chimney up ~ 12.5 m.

20:52 Nice clear vent

20:53 Transiting away from the chimney field. Hdg 165°

20:57 Measuring a pillow – 2.5 m wide

21:01 Will driving. Transiting to target.

21:03 ~ 50 % sediment; 50 % pillows

21:08 Chasing a fissure.

21:11 Blocky talus of both lava and chimney

21:13 Chimney ~ 8 m tall. Inactive.

21:14 Massive chimney top ~ 12 m tall. This appears on the ABE bathymetry
 21:17 Second massive chimney; also seen on ABE bathymetry. 16 m tall.
 21:29 Approaching new target; bottom in vent – fallen chimneys.
 21:32 Large extinct chimneys, rather massive ~ 9 m tall.
 21:35 LBL quirky; but JASON Doppler good.
 21:38 Still have the 21:17 chimney in view.
 22:02 Back on watch. Following fissure to sedimented mound with microbial mats.
 Could be buried sulfide. X3186, Y5654
 22:11 Fissure ~ 4 m deep, 3 m wide w/ sedimented talus on floor; revealing pillow
 basalt in otherwise completely sedimented area. Pillows overlain by few sheet
 flows.
 22:16 Fissure now 9 m deep and narrow. Turning 150°. Collapse pit in sheet flow.
 22:18 Collapse pit in sheet flow is visible in ABE map.
 22:25 Heading 100°, for 60 m.
 22:30 Sedimented terrain with fissures revealing pillow overlain by sheet flow.
 22:38 Seeing small collapse in lobate flow.
 22:48 Explore the area around a large, elongate depression bound by small offset fault in
 pillows.
 23:00 NW and NE border of depression is fault w/ 1 m offset. Exploring depression
 further. Hdg 200° for 30 m.
 23:05 Deep fissure on SW side of depression (10 m deep)
 23:08 In center of depression. Flat sheet flow(?). A ridge of hackly sheet flow has giant
 sponge growing on it.
 23:14 Collapse pit in sheet flow.
 23:20 SE border of depression.
 23:30 Fissures trending 045 outside of ditch
 23:37 Preparing to leave bottom
 01:18 On surface.
 01:28 Jason on deck. **End of Dive 207.**

J2-208, 2 August, 2006 – Roman Ruins/ Rogers Ruins

08:02 (GMT); 18:02 (Local)

08:02 Jason in water
08:04 Medea off deck
08:05 medea in water-winched zeroed
08:11 strobe to digital still camera not working-continue dive
08:13 dropped a weight
08:14 hydraulic problem-coming back up
08:33 medea on deck
08:40 Jason on deck
09:25 Jason off deck
09:26 Jason in water
09:29 medea in water-winch zeroed
09:37 155m depth
09:59 1000m depth
10:04 starting tively twist
10:33 1450m depth, water appears very cloudy
10:37 Eh is 186mv, 1500m depth
10:39 Eh is 204mv, 1570m depth
10:41 all stop, 1609mbsl
10:46 Eh is 221mv at 1675mbsl
10:47 See bottom
10:50 Waypoint ODP hole 1189B is @ hdg 293, 177m
10:53 coming up slope, front of steep side block flow of viscous lava
10:59 going along crest of marked by irregular blocky to maty very rough surface of lava flow
11:04 Irregular shaped blocks up to 1m
11:07 Smoother surface, more sed
11:09 Microbial mats whitish and FeOx-sulfide debris?
11:11 Smooth sed mound with FeOx staining
11:12 Eh 160 mV. Diffuse venting and shrimp at base of talus covered slope with broken chimney
11:15 come up to top of mound ODP re-entry cone, no obvious flow coming out of the cone
11:20 In gray smoke, Eh dropped to 61mv, small sed
11:21 Chimney line up strike 340
11:25 chimney of coalesced spires, gray smoke
11:28 black to gray smoker, vigorous near base of 5m tall spires
11:30 Setting up to sample solid/fluid pairs
11:38 Preparing for T measurement from a spire venting vigorously
11:44 Sample J2-208-1-T1/T2 307/277C
11:49 tops of chimneys are extremely friable impossible to recover
11:53 setting up to sample fluids at vent T1
12:06 Took two IGT samples (bottles 8 and 5) 208-1-W1/208-1-W2, temps between 312 and 314 C
12:10 setting up to take majors samples, piston does not fire
12:23 Problem solved, sample taken 208-1-M1
12:28 broke off chimney but lost it, move around chimney to look for it
12:51 After looking for lost orifice piece, we returned to vent and were able to pry off a small piece of stump of chimney sample J2-208-R1
12:58 measure T on outside of chimney wall: 6C (208-1-T3)

13:00 vent fluid T measure with t probe 315C
 13:03 sample knobbly piece of altered rock from base of chimney complex sample 208-1-R2
 13:05 Realize that piece of sulfide fell in basket A, this must have happened when the ROV was set to sample at the site
 13:10 Set marker 2
 13:11 Chimney fell on basket sample 208-1-R4 remains in basket C, bottles damaged?
 13:20 photo coverage for Vicki.
 13:28 off station, moving 230 to end of field
 13:30 in a depression between flow front and chimney talus. Blocks of flow seem *in situ*.
 13:32 fallen chimney, white chimneys with shimmering water. Biota: polychaetes, shrimp, crabs, snails.
 13:36 big diffusers in back ground with white tips target X:2797 Y:3238 white chimneys
 13:39 some of the white-tipped chimney vent whitish gray smoke ~7m tall features
 13:42 hovering near fringe of white chimney field Eh 133mv
 14:00 white chimney field, determining good location for fluid sample
 14:05 lots of smoke, hard to see, get t probe out to check temp of white smokers
 14:11 checking temp of knob topping beehive smoker, collapsed beehive top, with probe big dust cloud wait for it to clear
 14:22 moved to a series of low lying white smokers to right, knocked off top of one of beehive to get orifice to sample????????????????????
 14:42 284C from beehive with ?????? top, nice vigorous gray smoker, take a fluid sample here X:2802 Y:3234 Z:1675 heading 328 alt~3.5m, smokers on ????? show significant bending over in the current- ~N vent flow?
 14:36 begin gastight water sample procedure
 14:37 start DVcam, measure temp on outside of chimney beehive ~5C ~ambient (2.9C) stick in snorkel to beehive 270C max T
 14:46 finished water sample, stow sampler, sample J208-2-W1-IGT 1 X:2802 Y:3234 Z:1675 heading 333
 14:47 picking up second sampler #2
 14:50 putting sampler into orifice 270C 272C max taking sample J208-2-W2-IGT2 X:2802 Y:3234 Z:1675
 14:56 finished sampling with gas tight #2 stow the bottle, now pick up major water sampler yellow-stripe bottle, snorkel is loose-use it anyway
 15:03 fire off the ram J2-208-2-W3-M2
 15:06 finished sampling-probably only half filled, stowed in rear basket L
 15:09 now sampling, shrimp around small knob at base of smoker 208-2-R1 small piece of sulfide chimney more pieces from same knob basket F
 15:17 sample J2-208-2-R2 from chimney in orifice fell apart in basket H, try for another piece, nice piece from remnants of chimney J2-208-2-R3 basket E
 15:21 moving aft a bit noticed a knocked over chimney adjacent to our sampling
 15:26 picked up sample still chimney water coming from it J2-208-2-R4 large sulfide spire in basket L, 40C at center of sample while in basket
 15:31 flying over to check temp of where spire fell over from, 269.2C from remaining orifice, drive around but no higher temp.
 15:37 sulfides talus lots of clear shimmering water all along base of chimneys, place a marker at this sample station 2 marker #1 being deployed
 15:40 deployed, DVcam stopped earlier
 15:43 leave station #2 on course
 15:47 pan down with Jason see a sulfide sed apron at 1677 depth lava outcrop
 15:48 colony of snails, moving on 225 course

15:49 another set of spires on edge of flows, extinct chimneys lots of chimneys extinct to northwest tall free standing chimneys

15:55 stopped to sample volcanic talus just beneath sulfide structures J2-208-3-R1 rock sample from base of sulfide basket D behind bottle #1 X:2778 Y:3225 Z:1683

15:59 continue moving to southwest still in sulfide chimney field white coatings being grazed by shrimp and crabs

16:02 pockets of gastropods large scale worm, chimneys with gastropods must be a lot of diffuse flow, no obvious black smokers continue moving southwest more spires-inactive, small pagodas and toadstool-like chimney

16:06 shimmering water, now volcanics, chimneys in the background

16:08 back into sulfides, waiting on medea, get rid of one plate

16:14 dropping a weight, continue on and still in tall chimneys

16:17 active smokers, lava flow ??????-sheet flow like

16:20 ?????????????????????????????????

16:21 stop here to sample rusty looking sulfide spires, some have white coatings (bacterial mat?) there are smoking slightly with shimmering water and gray smoke J2-208-4-R1 thin skin from surface of Fe stained chimney, 4-R2 small 20cm high spire pulled off X:2746 Y:3189 shrimp were feeding on top of it

16:33 get a temp reading where we picked the sample

16:40 moved 220 at 0.1 knots

16:41 iron stained volcanics, shimmering water from fissures

16:43 lots of volcanics mostly Fe stained

16:46 more smokers tall chimneys, beehives

16:50 sulfide chimney fallen over but still smoking-two small chimneys growing out the side, one is a clear smoker the other is gray to black, station 5

16:52 kicked up major snow storm of white floc materials, 178C from small smoker adjacent small mushroom was only 18C ?????????????????????????????

17:00 tried sampling small smoker but lost it behind larger piece x2726 y3185

17:01 continue moving to south west heading up a small cone in the bathymetry, big tall chimneys extinct

17:02 more smoke-look like a fort of chimneys in the way to the dome, so we need to move around the dome to find a way up it some other way

17:08 ship heading 119 to get back to Jason-jason waiting for media and ship

17:13 tall-free standing pillar chimneys smoking

17:15 massive lava flow-white staining z1672

17:16 just up slope are the sulfide chimneys climbing mound-fallen over chimney, into role lava, back into chimneys all in a straight line smokers, target 19, linear line of smokers ????????? azimuth of chimneys ~287

17:21 continue passing by the tall smokers

17:26 smokers on volcanic basement, actively smoking

17:29 shimmering water through Fe-stained lava substrate

17:31 continue to pass by smoking sulfide chimneys, tall and skinny

17:33 individual groups of chimneys sticking out of very granular looking volcanics, Fe-staining with white mushroom smoking feature about 1m high, hard core to the white mushroom

17:38 move over to another small smoking chimney that seems to have collapsed. Lots of Fe staining

17:40 lavas relatively unsedimented

17:47 now sediment of top of dome

18:04 Vanko watch, setting for rock sample, station 5, rock frags, irregular-blocky shapes, some looked layered

18:14 off station 5-will circumnavigate this hill
 18:16 lose sight of bottom for a minute, bottom returns to view-blocky rocks, isolated patches of orange sed between rocks-rather large patches (whole field of ?????)
 18:18 wisps of smoke in the water, smoke in the media camera 40m up
 18:21 waiting for medea, now moving
 18:24 NW edge of hill-kind of sub???? Relief-orange and black crust
 18:25 fallen chimney
 18:30 small vent group-half a dozen grey smokers, a few meters tall, to the right is a crack in orange-colored rock with clear shimmering water, stop to take T, on station 6 T=106C in a clear fissure vent
 18:36 on extraction, fissure caved in-it's very friable
 18:38 crabbing around the vent site, appear to be a few in across, but surrounded by dead sulfides fallen over, height of central spire approx 3 or 4m high
 18:42 still on site-a few meters away, knocking off top of chimney-all ?????? ash T=277C, taken off the top 10-20cm of chimney-rest is solid
 18:48 the chimney is really not sampleable unless all one wants is friable, soft material
 18:52 there are snails and crabs here that were orange (Fe stained), discussing if they are dead or alive, lots of shrimp
 18:53 off station 6, looking back 263 see dead chimneys, buttcam (to east) shows dead chimneys, turning east, large orange chimneys with some smoker activity at base, as well as at top
 18:58 rising up, this massive chimney is about 8m tall, the very top is not venting, but lot of venting from the base and farther up, reset Doppler
 19:06 on station 7, measuring T of a vent about midway up a chimney-black smoker
 19:10 on station against spire-inserting t probe T=316C vent is possibly sampleable, but not very thick-looking
 19:15 stow t probe and put a marker at base of chimney
 19:19 deploy marker #4, heading 247
 19:24 underway to the north to explore the bathymetry hole due north of this hill
 19:26 pointing E, moving N, still seeing many chimneys
 19:29 have moved 20-30cm, still seeing nothing but chimneys
 19:30 backing into deeper water (d=1684, 4m alt)-volcanic rock talus
 19:32 Volcanic rocks at the seafloor
 19:37 moving to north to explore northern rim of the bowl, small chimney field near base of slope, some white coated tops, on spire with black smoke
 19:40 driving west out of bowl
 19:45 N edge of bowl, massive fallen chimneys among massive dacite blocks
 19:46 active and upright spindly spires
 19:51 investigating and unusual chimney that is not just a simple spire, instead it has a knobby globular look to it. Lots of diffuse venting coming out of it, clear. Populated by shrimp, a crab, a scale worm.
 19:55 station 8, by grasping the top, the whole structure fell over, grey smoke came out of base, which is right on blocky volcanic rock
 19:58 grasping T probe
 20:01 T=266C in the gray smoke, should have measured the T of the clear fluid before we knocked over the chimney
 20:04 off station 8
 20:05 we shall call these "coproform" chimneys
 20:08 lifting and crossing left towards media, lots of spires, mostly dead, some active, diffuse vents
 20:10 nearing top of ridge just N of the bowl, active smokers

20:16 moving up and over the ridge
 20:20 all sulfide spires, upright and fallen
 20:25 ditto, they are everywhere
 20:29 on station 9, small 1m y shaped stubby chimney, snow capped, diffusely venting clear shimmering fluid. Plan is to measure T around outside, then try to knock off and ???????? smoking ?????, re-measure T, and sample broken chimney if the two Ts are different
 20:32 DVcam is recording
 20:34 T probe in hand, 39C on surface of right hand knob, 13C elsewhere on right hand knob, 4C at top of left hand knob, 11C on left hand knob
 20:42 t probe around base is pretty cold, 8C around ????? to right, 8C around back of base
 20:44 stow t probe
 20:46 sampling right knob
 20:48 no sample yet, bur right hand knob is starting to smoke from the t probe hole
 20:50 repositioning Jason
 20:57 ???
 20:58 knob is gently smoking light gray, get t probe
 21:01 T=196C
 21:08 off station 9, continue east along ridge
 21:11 ship is changing heading-pulling us a little south
 21:17 some navigation issues, for some reason the ship is jumping a hundred meters or so ahead, we are flying! Track is along a ridge, covered by chimneys, mostly looking at water
 21:21 net ~13m, particulate filled water
 21:24 bottom in view, a rounded knob of pillow lava or sulfide knobs, we appear to have been pulled off Roman Ruins o the SE
 21:29 chimneys have, some active, based on white and orange colors
 21:31 shimmering water
 21:32 smoker!
 21:33 nav is back, we are still in Roman Ruins
 21:37 off slope to the N of RR, steep but low relief-sed, platey rock
 21:40 big short ???????? chimney-diffuser (coproform)
 21:42 volcanic rocks ~50% of bottom, also relict sulfide pieces
 21:44 more coproform chimneys
 21:46 lots of coproform
 22:00 back at chimney complex of station 1
 22:11 took sample of basement rock underneath chimney colonized by shrimps 208-10-R1
 22:19 T at base of ???????? rock sample was taken T=55C
 22:25 decided to do a detailed SM2000 survey over area of x2780 y3260, x2776 y3230 inactive chimney about 14m high
 23:08 sonar survey ended heading 335 to ??????????????????
 23:10 huge cloud of black smoke target-smoking mound x2767 y3262 heading is 045
 23:13 heading 308 chimney debris
 23:16 x2756 y3289 ???????? smoke target large chimney complex few active orifices gray and white smoke, steep sided chimney, some with white beehives
 23:21 volcanic ridge with FeOx mats in map x2737 y3330
 23:24 crossing volcanic ridge, no hydrothermal
 23:30 over oxide deposit, shimmering water, shimmering oxide mound x2718 y3393
 23:33 inactive chimneys, small heading 215 ??????????????????????????
 23:37 heading 306 for 38m to check out nature of mounds

23:43 arrived at ?????????????????? on volcanic mound are steep sided multispire chimney
complexes with diffuse venting ?????????????????? reddish and ??????????????
particles large x2672 y3426
23:47 backed out of smoker area 208-11-N1 ?????????? bottle sample of back ground seawater
Eh 142 T=2.4
23:52 dropping weight
23:55 off bottom
00:55 on surface
01:03 on deck. **END OF DIVE 208.**

J2-209, 03 August, 2006 – Satanic Mills

09:34 (GMT); 19:34 (Local)

09:34 Jason in water
09:37 Media in water
10:09 Starting Tivey twist
10:37 Eh goes down to 194 mV from 230 mV at 1500 mbsl
10:43 Eh down to 180 mV
10:45 Eh down to 175 mV
10:51 On bottom x=2588, y=2538; steep sided flows with rough surface
10:59 big fish about 60 cm long
11:01 heading 289 for 124; target ODP Hole 1190A
11:03 going up very steep slope with big sheets of ropey lava, occasional pillows and talus. Massive to blocky flow with vertical striations. Sheet is broken up into meter-sized fragments.
11:08 steep wall with diffuse venting. Mussels, crabs, worms; densely populated
11:11 top of slope; snail and microbial mats; x2509, y2551; oxide staining with shrimp
11:14 x2483, y2569; white pond "bacterial?"
11:18 inactive chimneys; Eh 174, T 2.4°C
11:20 active smokers (based on smoke); white patches and white staining along cracks in inactive chimney
11:23 active gray smokers; spiny chimney with white smoke; x2449, y2565, z1681
11:29 spotting black smoker; it is a diffuser, not a good solid sample
11:38 gray to black smoke coming off a multispired complex; setting up to sample; chimney is 6-7 m high, spire venting smoke. Sampling target
11:44 decided to sample spire first, then fluids. Sample of spire in biobox
11:52 sampling orifice to the left, 293°C
11:58 other orifice is 298°C
12:00 sample
12:06 temperature on outside of chimney is 9°C (by IGT bottle T probe)
12:16 snails, scale worms, shrimp, crabs
12:20 taking sample of inactive smoker; anemones, worms, barnacles, on inactive smoker; broke into 3 pieces
12:32 off station, hdg 230, range 28 m
12:36 volcanic mounds with chimneys
12:37 down in depression, volcanic talus
12:40 in depression between steep flow fronts
12:45 T in depression is 2.5°C/3.0°C
12:46 Niskin N1, 4 m alt; Niskin N2, 0.8 m alt
12:51 continuing hdg 230; block lava terrain, up slope on ridge crest is no hydrothermal activity
12:54 new heading 109, range 25m, to mound = all volcanic
13:01 new hdg 15, range 50
13:06 coming up steep slope; vesti, mussels, snails, scale worms; flying by NW edge of field of station 1
13:12 coming up another slope hdg 15; crabs, snail, smoky water
13:14 big diffuser, multiple beehives; snails, shrimp; next to spiny chimneys; low activity, diffusers only
13:22 went around northern part of mound; diffuse venting through rocks; plenty of crabs, mats
13:25 x2445, y2589, gray smoker
13:26 x2432, y2602, big diffuser - ??? Magic Mushroom

13:35 return to sample site station 1 and drop Marker 3
 13:45 hdg 90 for 50 m to check out mound north of white pond area
 14:00 traveling 045° for 40 m going over volcanic terrain; small dome that previous watch was heading to was volcanic – no hydrothermal activity
 14:03 waiting on Media; moving over slabby-looking lava, lightly sedimented; move up a small “coulee” or valley between lava flow ridges, 285°
 14:25 massive lava sheets
 14:28 white staining on lava; shrimp/crab; shimmering water coming out at edges of slab of lava. x=2456, y=2620, z=1683; stopped to take sample of altered lava; shimmering water out of cracks
 14:36 J2-209-3-R1, basket B, altered lava rock sample from shimmering water site target#18; now checking temperature of shimmering water; 8°C was the highest temp measured
 15:09 stowed the T probe; move on; white staining, galatheid crabs, alteration along cracks, tiny amount of shimmering water
 15:15 moving 320° up to what might be a scarp of a flow front
 15:16 oxide staining, coral, smooth lava flow, steep sided, altered flow along its edges; climbing a rubbly-looking front
 15:28 changing direction, heading 090°, 60 m
 15:33 large ?? striated lava flow ridges
 15:39 into blocky talus of lava flow; little to no sediment
 15:42 continue over block lava terrain
 15:48 large (1 m) blocky lava flow terrain, lightly sedimented
 15:51 large fish; turning to head south
 15:54 blocky talus pieces on massive flow, lightly sedimented
 15:56 knobby lava flow blocks
 16:00 intact auto-brecciated lava flow all cemented together, lightly sedimented; large slabs of flat lying lava
 16:06 reached scarp of lava, down to south; now head to previous site visited by Shinkai 2000. Recorded a smoker of 257°C. Head 240°, 70 m; going to 2475, 2547
 16:08 lava talus
 16:09 dead tree with galatheid crabs
 16:14 striated lava flow ridges
 16:16 continue over lava terrain
 16:17 white staining, some biota, biomats, crabs and snails; no obvious diffuse venting – must be some but very minor
 16:20 oxide staining on lava
 16:21 coming into some biology; crabs, white dots on the lava; lava knobby texture, looks altered with white staining
 16:25 chimneys inactive; white stained chimney; snails and shrimp, ~gray smoker, ~lazy smoke
 16:28 shimmering water
 16:30 station 4; check temperature of shimmering water; x=2461, y=2542, z=1684; small sulfide structures growing out of lava flow
 J2-209-4-T1 : 136°C max temp of shimmering water
 J2-209-4-T2 : 219.5°C on small chimney

J2-210, 04 August, 2006

09:03 (GMT); 19:03 (Local)

09:03 Jason in water
09:07 medea in water, winch zeroed
09:46 Tivey twist d=1023m
09:56 tivey twist completed
10:15 Eh went down to 120mv from 210mv depth ~1600mbsl
10:23 on bottom x2482 y2581 z1656 sed terrain bearing 270
10:28 going up steep slope, sed, few lava outcrops
10:30 heavy staining red and white
10:34 going 090 rock outcrop, crabs, mats
10:39 hyaloclastite field
10:41 flying over little crater, reddish and whitish staining
10:43 lava outcrop with shimmering water
10:45 lava encrusted with white material
10:50 up ridge – more hyoloclastite (?)
heading SW along ridge crest
white patches everywhere
10:52 (inactive) chimney
Eh dropped to 25 mV
on close inspection: diffuse venting through chimney
small colonies scaleworms, shrimps, crabs
11:03 x 2148 y 2439
chimney (diffused) growing out of cracks in lava
11:08 went up over ridge, turned around, went up flow front with heavy alteration
11:18 x 2150 y 2424
11:20 checking out nature of Eh signals in ABE survey over area just north of Snowcap dome
hdg 015
11:22 driving up along ridge crest over large field of shimmering water with snails, crabs
11:29 up the(?) ridge crest, corlisbrew(?) worms
11:32 up to top of northern most part of Snowcap dome: no hydrothermal activity
11:43 up sedimented slope
11:35 hdg 268 to go to area of Eh anomaly in ABE survey around x2100 y2500
moderately sedimented terrain of ropey and pillowed lava
no hydrothermal activity here(?)
same FeOxide staining and scattered crabs
11:45 going back to “Japanese Chimney” location
12:06 finding chimney and focused venting of clear fluids from tube worn colony
12:20 T=107°C (T-probe)
12:31 fluid sampling IGT8 T max = 117 degrees celcius
12:39 fluid sampling IGT5 T max = 151 degrees celcius
12:49 majors fires(?) – looks like good sample
12:57 Place Marker 6
13:00 sampling “bleached rock” from outcrop. It is hard and crumbly, difficult to sample
13:25 sample in basket H
13:27 looking for fresh reference sample
found it
Scot had to remove double twist from tether first
13:47 setting up to grab sample

14:03 66m bearing 105 degrees. Going to ODP hole 1188A target x2214 y2403
traversing up dome - galatheid crabs
rubble/gravel = hyaloclastite

14:06 white staining on gravel – crabs. Sm white chimney

14:09 shimmering vent. Bigger chimneys extinct. White coatings on rock floor

14:13 off onto highly sedimented terrain, flat laying(?) with gravelly texture

14:14 white staining again. Snail colony in a hollow. Shimmering water

14:17 old chimney ~1m high

14:18 flying over a depression with white coatings on walls

14:20 white(?) stained gravels

14:25 arrive at drill reacting(?) cone. x 2218 y 2407 z = 1634 m
(original 2203 2423)
 $\Delta x=15$ $\Delta y=16$

14:29 flying over the cone. No Eh anomaly

14:32 retrace our trace and head back to the top of the mound where we find white coated
ground
mussels

14:34 stop to take temperature at ground

14:36 stop and pick T-probe up

14:42 probe all the way in (about 50cm long Check this)

14:46 10.6 degrees celcius surface temp 2.4 degrees celcius

14:49 try an adjacent spot in more white
approx 9.6 degrees celcius
9.6
9.7 max

probe goes all the way to its limit

14:52 pull out the t-probe and try to scoop the sediment

15:07 nice scoop sample – put in bio box
of white coated sediment/gravel
J2-210-3-R1 x=2209 y=2398 z=1635
scoop white nails – alvinconcha

15:14 now try a push core but not possible to keep it in the tube

15:22 finished here

15:25 move off to east
snails – black = ifremeria

15:28 heading 080 @ 0.2 kts

15:30 extensive white staining of sediment/gravel

15:32 into sediment cover now – no staining

15:34 drill hole in sediment x 2243 y 2423 z 1634; probably 1188A (B thru E)
oxide staining

15:38 plastic lid marker # 2 CSIRO camera x2248 y2418 from SUNlg

15:42 driving off dome of hyaloclastite Snowcap and heading 66 degrees downslope

15:45 sedimented debris occ. rough blocks of lava

15:49 continue along small ridge flank heavily sedimented with occasional blocky lava slicking
out

15:54 sedimented terrain 100% cover
steep “floor edge” heavy sediment cover

16:00 waiting for Medea. Head for Satanic Mills “South” where there is an Eh hit in ABE data
x2508 y2396
course 110 degrees 125m

16:08 traversing thickly sedimented terrain with occ.block of lava

16:16 continue over thickly sedimented terrain with occ. lava outcrops of slabby block lava
 16:18 small area of broken shells
 16:20 small area of white staining
 16:21 patch of snails shells
 16:25 oxide staining – lots of crabs. Eh has dropped down. Smoke in Medea cam. Slope has staining and some possible shimmering water but very weak Areas become more intense
 16:27 mussels - dense biota now
 16:28 smoking chimney, lots of smoke. Small collection of chimneys a few meters high, white coatings on some; tightly grouped together
 white chimneys with black smokers at the base – shrimps on chimney tips
 Eh went down to Eh.
 circumnavigate the structure
 16:49 stopped
 trying to get in on structure and black smoke but difficult access
 16:56 move around other side of structure. Remove a dead chimney that is in the way.
 Knocked spire over by mistake
 17:01 waiting for smoke to clear
 17:07 reposition. Pick up bottle # 2
 17:12 doppler reset
 75 degrees celcius on outside but suspect. We think probe in broken
 17:18 collect fluid at this place. J2-210-4-W1-IGT2 x=2490 y=2376 z=1716
 stopped sample – stow away
 17:21 pick up gastight #1
 temp reading on outside ~ambient ~2.5
 225 degrees celcius in vent small hole in ground at base of large structure after we had knocked away shell
 old sulphide piece from broken down spire
 J2-210-4-R1 same position as last water station
 17:40 move off to the northeast (approx 045 degrees) looking for smokers
 17:45 dead chimneys; dead mussel shells
 17:48 white zone of staining. More smoke. Shell debris on slope
 17:59 Vanko – on slightly elongated hill – climbing to stop. Slight cusp at top of ridge – current generated? Lots of bio – mussels, crabs, worms
 18:01 very low relief, mixed rock/sediments. Rocks look like crust(?)
 18:02 Fe- staining patch. Targets on sonar are large boulders of _____
 18:04 contacted bottom in Fe stained area – soft
 18:07 lumpy rock outcrop – still low relief
 18:10 looking for a place to settle
 18:11 on bottom station 5
 18:15 sample 5-R1 - large platy rock
 18:18 T probe – side of hill indiv(?) sample – 5.5 degrees Celsius at surface
 18:19 insert to the hilt(?); 20.4 degrees Celsius = temperature
 18:25 reposition slightly to get T in shimmering water; T=8.2°C
 doesn't insert far – rocky
 insert approx. halfway; T=12.9 degrees Celsius
 18:32 off station 5 – heading up to top of hill, sparse boulders
 18:35 large boulder on the mound top – hard, encrusted, much has biology except in the patchy areas where there are oxide
 18:40 station 6 – on ridge, there is an indurated crust on top, has oxide staining inside. Jason sits try and breaks it up. Will see if a sample is useful
 18:47 getting scoop sample. Eh measures 70

18:56 this is sample 6-R1 – scoop. Sample of oxide crust and fine chocolate covered sediment
 19:05 T ambient = 2.4 degrees C
 19:05 T sedi surface of where the crust was – T=3.0 deg C
 19:06 T inserted T = 11.4 deg C (inserted to the hilt)
 19:13 u/w bearing 259 degrees, range 25 m. this knob is a lot like Snowcap says Chris. Except more fauna. Tracking along ridge top looking for sediments
 19:21 now heading 184 degrees, another 27 m
 19:22 approaching chimneys, active smoker
 19:25 Jason has been here before but had no sample according to Chris. Many white spires without evident flow. Many dead spires. 3 – 4 short active spires. Will smashes in to it. Phil takes over.
 19:44 station 7 – around the S side of the chimney site, some delicate black smokers. Try to sample. 7-R1 – inactive spire
 19:51 Phil lifted a whole meta chimney, place base into basket – top fell
 7-R2 – base of chimney, top fell off forward
 19:56 now looking at orifice – venting black smoke. Hole surrounded by snails. Looks like its not clear – getting cooled before we see it. Will excavate. Target 23
 20:06 woke Jeff for sampling
 20:13 IGT1 into black smoker orifice
 20:15 having trouble getting w-T using water sampler probe
 20:16 up to 270 deg C, 286, 290, 296. mostly 280 deg Celsius during first half of sampling; T dropped during second half
 20:26 Trigger the major sampler Red4 (note that prior major sampler at 12449 was logged as “M4”, but this one is definitely red and it looks like a 4)
 20:32 now excavating some more
 20:38 7-R3 loose rock from next to the sampled vent. Sulphide or volcanic?
 20:42 plan – move up valley toward three small bumps, investigate them
 20:45 leaving this field, mostly dead! Approx 12m high. +/-
 20:48 u/w brg 320, 50 m. hill to the right is the one we have seen before, w/ snow and patchy oxide staining
 20:57 a small rock outcrop with a patch of shimmering water and white stain, live mussels
 21:02 knobby rock outcrop, lots of sediments, biology has dropped
 21:05 waiting on Media
 21:13 still just knobby old outcrop and mostly sedimented
 21:17 not much here but mud and few rocks. Change hdg to 134deg., 20m
 21:23 firing niskin bottles
 2126 Fire1 d=1698 alt=3.0 Red
 2127 Fire2 d=1698 alt=3.1 Green
 X=2427 Y=2388
 21:30 heading for another target hillrock –
 21:39 SE – (check!!! I don't understand the handwriting)
 21:44 outcrop of white crusty indurated sediment; falling apart
 21:45 on station 8
 22:18 sampled 3 rocks from outcrop; 2 pieces of altered, hard rock and a _____
 22:22 went up slope. Chimneys! Most look very degraded and oxidized. One active spire, very spindly
 22:24 measuring T with T-probe: 190 deg Celsius at top of spire
 22:34 recovered small piece of spire
 22:45 T max of 260 from stump of spire
 22:53 leave marker 7

22:55 tether wraps ?
23:00 black smoker with very vigorous venting
Visible uia(???) video
Illumination near orifice
23:25 bubbles?
23:29 353 deg. Celsius 2331: 351 deg. Celsius
23:35 going around structure x2462 y2493
Gray smokers with shrimy(???) alvinella(???)
23:40 setting up to grab a piece of rock – volcanic
23:46 going around base of mound. Staining, venting, sulphide everywhere
23:51 around mound is sedimented terrain with staining
23:53 dropping weights
23:55 coming up x2451 y2368 z1708
23:56 x2446 y2379
>10 m fall dead chimney
01:10 Jason on deck. **END OF DIVE 210.**

J2-211, 05 August, 2006 - Tsukushi

08:06 (GMT); 18:06 (Local)

08:06 Jason in water
08:10 Medea in water
08:43 Tivey twist d=998m
08:50 twist completed
09:11 bottom 200 m below
09:12 maybe seeing smoke in Medea camera
09:15 d=1560, 100m to go
09:18 30m alt
09:22 see bottom – sedimented lava
09:25 head 270 deg. for 80 m. Look for Tsukushi on sonar
09:28 large bulbous lave rocks with lots of sediments in between and on top of them
09:32 wall of brg rough pillows jutting out
09:33 iron oxide stain in seds coming down from above – minor but we'll take a look
09:36 found an old dead chimney at top. Highly degraded
09:40 more structures in the distance on 300
09:42 moving 277 deg – graveyard
09:44 more old tall chimneys 8 m tall +/-
09:46 Eh=180 – not low. Dead chimney ahead has some snails on it
10:00 looking for high T venting
10:02 finding shimmering water and oxide chimney x1836 y2242
target oxide field
10:04 mostly lava flow
10:09 x1844 y2248 more oxide mats
10:10 fallen chimney
10:13 chimney field, shimmering water. Measuring temperature = 26 deg. Celsius
10:36 chimney field
10:40 extends 30m on to NE
10:44 seafloor more sediments, no chimneys to NE
10:48 checking area NW of present location
10:49 block lava overlying sedimented flat terrain following contour of flow. No hydrothermal activity at all
11:00 going south 30m towards oxide mound
11:05 doing sm2000 calibration lines
11:22 survey over survey 30m heading 090 deg.
11:26 oxide staining
11:32 back near easternmost chimney. Looking back toward oxide field filling in gap in survey N of chimney
11:35 reaching oxide field. Eh drops. Surveying it and finding seeps up to 59 deg. Celsius
12:02 T-probe = 59 deg. C
12:12 – 12:26 sample IGT bottles
12:42 sampling oxide coated rock 2-R1
12:47 sampling fresh rock 2-R2
12:50 surveying area SW of SW-most chimney
13:02 coming up slope of knobby lava flow. Here is where Tsukushi field begins
13:05 heading 357deg. for 200m to collect sample from dome that appears to the center of local magnetic high
13:08 Waiting On Medea

13:17 moving up slope thru block lava
 13:34 slope gets steeper, some local talus, big blocks of lava
 13:59 climbing front of volcanic dome. Very knobby texture massive looking lava
 14:04 sediment in swales on top of dome
 14:07 stop to take a sample of this rock/lava. Station#3
 sample of lava taken. J2-211-3-R1. x=1805 y=2440. in basket F
 14:19 moving off dome @ azimuth 060 deg – 225m
 14:21 yellow staining ~sulphur? on lava surface
 14:24 large pillow forms sticking up with corals
 14:31 lava terrain. Little to no sediment cover. Rough blocky terrain
 14:34 occasional pillow forms
 sediment cloud
 14:43 large V shape in lava terrain. Large massive chunks of lava with striated surfaces. Large
 blocks of knobby surfaced lava
 no fissure or faults – but large
 14:53 blocks of lava tipped on their sides and slabs
 14:59 looking at flank of a massive flow to the north
 15:08 move back west to see the central rift at the dome and lava source – i.e. where the flows
 have come from
 15:16 large blocks of lava jumbled up
 15:16 turn and head back east
 15:26 lava terrain. Eh down to 155
 15:31 rubbly light sediments covered lava
 15:39 turn onto 350 deg approx.40 meters
 Eh going up
 15:45 rubbly lava terrain
 15:46 on top of another small lava dome that is covered by sediment
 15:53 turn and head 160 deg for 120 m
 16:01 drive off dome
 16:03 lava rubble
 16:06 continue over rugged lava terrain. Little to no sediment cover. Knobby blocky lava
 outcrops
 16:07 large slabs broken off
 16:10 getting more sediment cover now. Lava forms buried by sediment
 16:12 galathea
 16:19 sitting still doing pilot training
 16:21 driving again. Heading 050 deg for 60m
 16:23 sediment-covered lava
 16:27 floor edge sticking up in front of us
 16:31 heading 125° 30m. Blocky lava terrain
 16:38 looking at a wall of lava
 16:40 turn to 185deg 85m
 16:46 steep slab sided ~lobate flow slope
 16:49 sedimented plain
 16:51 galathea crabs, tubeworms, mussels. x = 2137 y=2475
 16:53 small rubble field of lava unsedimented
 16:56 white staining – crabs, snails
 16:57 shimmering water on white stained area
 17:09 sitting at chimney complex and set up to try and sample. We are close to marker # 6
 (2147, 2426)
 17:30 J2-211-4-R1. very small piece of chimney near shimmering water of chimney

x=2139 y=2428 z=1639
 broke off a large spire of adjacent chimney
 17:40 J2-211-4-R2. x=2139 y=2478 z=1639
 17:57 Vanko watch
 setting up for T sample. Water is now gently shimmering out of the hole under the last sample. T=173 deg C
 18:08 second T is from the original orifice that they saw shimmering before they sampled. T=177 deg C
 18:12 weight placed on top of chimney
 18:16 found marker#6 – at a chimney 10m away along ~150°
 18:19 reset Doppler to marker 6 – 10m hop
 18:23 u/w 242 deg for 140m – 5min at 0.5 kts then slow down
 18:24 white chimney, clear fluid – same one with above(???) weight
 18:26 old platey volcanics, some orange staining, spotted with white crabs
 18:29 large light gray mass of – outcrop looks like granite – rather coarsely layered or platey. (???) a few snails, some yellow stuff peeking out from under ledges. Chris says this is a native sulphur outcrop/flow. Phil aggress.
 18:33 set up for sample. A few crabs, a few mussels, lots of snails
 18:36 5-R1. native sulphur sample – plate should have chill margin
 18:39 off station – seek a vent for this flow
 18:43 left contact of sulphur flow is against a glassy? lava flow
 18:50 patch of tubeworms and crabs in the sulphur flow. South of marker 6 is a gully of brown chimney debris. The South wall of the gully is hyaloclastite
 18:59 hyaloclastite is layered/bedded
 19:02 sample 211-6-R1. bedded rock, hyaloclastite? Or possible sulphide
 19:12 setting up where sulphur is really bright – check its T
 ambient is 2.4 deg C. insert probe - ΔT
 19:14 plenty of crabs around but corkscrew worms seem dead. One is alive!!!!
 19:24 u/w 251°, 100m down east of ridge.
 Old sedimented lava exposed down over the edge of the ridge
 12:29 small patch of crabs, mussels, white mat
 19:30 old lobate flow, some collapse
 19:31 wonderful toothpaste tube – 1-2m diameter several 4-5m long, partly collapsed
 19:36 crest of ridge – very old weathered rocks – oxide stained
 19:38 shimmering water, oxide conduit?, just down-ridge from the crater
 19:46 chimney complex – some white tips, 3-4m high, dead, no smoking(???)
 20m south of the little crater
 19:54 on station7 for a sulphide spire – inactive
 shimmering water – T=63 deg C
 20:04 sample 211-7-R1. large inactive spire
 20:10 now heading 340° back to oxides of shimmering water
 20:23 setting up on oxide outcrop of shimmering water. Lots of floc
 T=8°C, another T=25°C, another T=28°C
 20:32 decide to take an oxide sample (CY think it is altered rock). Sample 211-8-R1
 20:39 u/w 268° - headed back toward Tsukushi
 20:43 lots of shimmering water, Fe-staining, platey rock
 20:49 moving out of oxides → lavas
 20:56 lava is fairly old, sedimented
 21:02 still underway – old volcanic rocks
 21:11 still old lavas and sediments. Sparse gorgonians
 21:12 fresh lava, some minor white staining

21:25 5m high dead chimney (5-6 spires at top)
21:30 different group, 5-6m tall
21:32 marker C1 – at 13m of altitude
Dead. Not 27m, because marker is near top. Broken
x1868 y2240 → ours
x1838 y2226 → Japanese
-30m -14m → Δ
21:38 u/w 084 deg, 224m to crater
21:39 a little bit oxide visible, little chimneys
21:41 nice big lava lobes
21:48 old lavas
21:53 come off bottom so ship can change course
22:10 back in control of ship. Heading for white smoker to sample fluid
22:38 nice pillows
22:43 coming up flow front, crabs, serpulids
22:47 more biota
22:50 cruising Fe-oxide chimney field
23:00 native sulfur? flow
23:05 back at high T Tsukushi vent site
23:10
23:36 7°C outside T chimney wall
23:45 major bottle
23:50 dropping weight
23:56 off bottom. x=2147 y=2439. **End of Dive 211.**

J2-212, August 6, 2006

08:06 (GMT); 18:06 (Local)

08:06 Jason hanging over water waiting for smaller wave
08:07 Jason in water
08:10 Media in water
08:45 starting tively twist
09:12 100m off bottom
09:15 Eh 110 and falling-11m alt
09:18 Eh 100, waiting on media
09:20 Eh 59, d-1700, alt-5.3 we are 40m away from Fenway
09:20 see bottom now-sed and crusts?, many white crabs, other animals (snails and mussels)
09:21 Eh backup to 106-???are below the plume from Fenway????
09:26 close up of animals, white and orange staining on sed
09:31 setting up for a high resolution ????? map of Fenway using sm2000 and the other hi-tech multibeam on Jason
09:34 chimneys were not expected-group of ????, lots of white some black smokers, x2495 y2371 d1712 alt-5.4, some gray smoke, this looks like where dive 210 took sample fluid target 20
09:40 going around this-some gray and whitish smoke from 50-60 of them
09:42 slightly up hill N are tons of fallen dead chimneys
09:45 Jason shift change
12:35 sm2000 survey finished, it started at 10:00
12:50 located big ????? and set up to take a sample
12:54 trying to sample chimney, extremely friable and crumbles
13:00 Pivot 30 degrees around chimney to see if sampling is more favorable
13:10 recovery of active chimney
13:16 T probe gives 352 max
13:27 hole through which venting takes place is too large to take fluid sample, the bottle gets too hot
13:28 looking for suitable orifice to sample
13:50 setting in front of vent that is "bubbling" strongly, vent is on wall of edifice x2463 y2357 z1707
13:54 shrimp on wall of edifice
13:56 sitting right on marker 7 to right
14:11 having a hard time getting at the black smoker as it is coming out at cracks in a steep sided edifice, we are looking 259 but sitting on left side of ????? target~10m aft to the vent, the entire wall of the edifice has streams of black smoke going up its face. North of the smoke is coming from cracks in the edifice rather than distinct chimneys, white smoker sits in front with a more lazy flow of smoke.
14:20 moved around the structure facing now 293 x2465 y2349
14:26 taking sample of black smoker edifice max 330C, J2-212-2-W1-IGT8 x2465 y2349 z1707
14:30 done with bottle-stowing it away
14:33 pick up gas tight 5, go in and take a second sample
14:40 in the vent now, 340 C taking a sample, J2-212-2-W2-IGT5 x2465 y2349 z1707 alt-3.7 heading 291
14:44 sample done-stow the bottle, ambient water temp ~20C on outside of structure
14:51 picking up major sampler (RED) 4 tell-tale vent is showing smoke, taking major sampler J2-212-2-W3-M4

14:56 stow the bottle, put in back of basket, now set up to take a sample of the sulfide, small piece from orifice-very friable-may not hold together
 15:02 J2-212-2-R1
 15:04 try for another piece-very difficult the stuff is extremely friable J2-212-2-R2 different part of edifice in basket B
 15:14 move to collect another water sample from a white smoker on edge of
 ?????????????????? Doppler dropped out
 15:22 moved around to right and looking at white smoker in front of main edifice-shrimp all over it
 15:25 x2472 y2355 z1708 nav looks better now relative to bathy, Jason heading 223
 15:32 back nearby marker 7 in distance x2472 y2355 T 142C
 15:39 not that exciting for a water sample cant get it hot enough after poking around, stow the bottle, try for a rock sample small piece of white smoker chimney J2-212-3-R1 in basket D x2473 y2356 z1708
 15:46 try for another piece J2-212-3-R2 larger piece further down chimney in basket D
 15:51 move around to left to find altered host rock, oxide coating beneath sulfide structure
 15:52 setting at mound of oxide shimmering water
 16:01 debris slope of fine material sulfide sand perhaps that is warm and shimmering with white coatings ??????????????
 16:04 big slab of something, also looks like there are pieces of massive anhydrite gray in color and a distinctly granular texture
 16:17 J2-212-4-R1 piece of talus at base of sulfide edifice not sure what it is thought it was altered rock but it may not be, behind basket D x2458 y2353 z1712 target 31
 16:25 native sulfur on surface of slope marker 7 in view
 16:30 moving down large piece of massive anhydrite
 16:33 z1715 alt 2.8 at base of sulfide sand debris cone with large blades ~20cm of anhydrite
 16:46 stopped to get another rock sample at base of sulfide field x2471 y2366 z1716
 16:51 J2-212-5-R1 in basket H
 16:56 move back up the hill-oxide stained stacks of rubble
 16:59 coming into anhydrite sand slope now small sulfide chimneys inactive ??????????????
 17:00 back at white smoker we excavated earlier x2466 y2352
 17:20 at top of structure with very high volume vigorous black smoker flow where they tried to sample before but were smoked out, pick up bottle 2 DVcam on
 17:24 put bottle into flow trying to get 300+ temp but so far not able to T-349C 355C max taking sample J2-6-W1-IGT2 x2464 y2354 z1706
 17:36 done with sample-stow bottle
 17:39 picked up bottle 1 take sample of fluid here for second bottle J2-212-6-W2-IGT1 max T-356C
 17:57 vanko on watch, water sampling continues at Big Papi, major yellow 2 picked up
 18:07 successfully obtained major sample M2, looks good
 18:10 manipulator show that chimney material seems very friable, lower the grap force
 18:13 sample 212-6-R1 sulfide from near vent-as close to orifice as possible
 18:18 sample 6-R2 from sulfide at the left of Big Papi
 18:22 doppler reset
 18:39 slightly off structure to the south in a active white chimney group, gently giving off shimmering water, it's perched on degrading anhydrite beneath it, trying to sample the anhydrite
 18:54 7-R1 big piece of anhydrite rock with sulfide attached-looks like it may have ?bromite? – the color
 19:02 setting down on a ~2m diameter low relief white mound to see what it is, white granular surface littered with orange-brown sulfide fragments

19:04 take t probe, very soft, probe in to hill, T 42C 17.6C at surface
 19:21 scoop bag of the mound, white sand, dark fine underneath, + crusts, sample 212-8-R1
 19:37 returned to the chimneys right above sample 7-R1, trying for inactive chimney, got a little piece 212-9-R1
 19:46 re-positioned to the top of chimney (same station) to get T at very top T-241C
 20:00 dropped weight
 20:09 unwinding three wraps in the tether
 20:20 phil to attempt sampling of a delicate pipe
 20:26 still trying to get into position for a chimney sample
 20:39 no luck, moving 078 for 50m to new target located during sm2000 survey
 20:49 have passed the target 20 chimneys, lots of dead shells
 ??????????????????
 20:52 short sulfide mound 2m across, 3-4 m high, inactive except for white lined cracks, plenty of snails
 20:56 continue to the east along lineating
 21:03 2-3m spires with some active black smoke
 21:09 setting up to sample a toad stool-like feature-sulfur?, sample 10-R1
 21:25 white coating in patch, shimmering water T up to 15C, snails T up to 60C
 21:33 looking for an approach
 21:39 going to set up for one shot E to W sm2000 ???
 21:44 shift change-waiting
 21:54 doing a short sm2000 survey line over this little field
 22:22 surveying completed
 22:50 "lights out" experiment at Big Papi-no emission of light at orifice
 22:55 heading 270 to explore mounds W of Fenway
 22:58 floor between mounds is rock talus, densely colonized with mussels, crabs,
 ??????????????????, diffuse flow overall minor
 23:04 heading up slope, biota continues, steep slope clasts, angular, friable, ???????? lava
 23:08 top of mound with platy material ??? looks like
 ???-Ox encrusted Fe-oxyhydroxide
 23:14 valley between mounds is sedimented
 23:15 coming up slope, sedimented steep flow front
 23:20 that second mound along west bound talus set is entirely sed. covered
 23:29 up slope to snowcap mound oxide deposits, heavily sedimented outcrops of ??????? volcanics
 23:34 more outcrops of ?????????? rock occasional talus rubble
 23:41 come up slope, more encrusted oxide rich material
 23:43 off bottom x2242 y2379. **END OF DIVE 212**

J2-213, August 7, 2006

09:02 (GMT); 19:12 (Local)

09:02 Jason in water
09:42 beginning tively twist
09:49 ending tively twist
10:19 Eh dropping to 100 (from 180)
10:23 all stop, z1650, Eh 135
10:30 on bottom x3050 y2947 z1693 sedimented pillows, no trace of hydrothermal activity
10:33 heading 293 for 40m Eh 156, target mound in center of anomaly no hydrothermal indicators of any fluid
10:44 mound is heavily sedimented with occasional small pillows
10:50 dealing with wraps in the tether
11:08 tether wrap fixed, moving over mound, big, rubbly pillows, hundreds of little starfish
11:19 steep slope, sedimented with few outcrops of massive rock
11:21 thruster problem, shipped stopped came up, J2 is spinning
11:31 J2 under control again, reset Doppler
11:32 coming up slope of blocky flow
11:40 less sed cover here, big blocks, some oxide staining, Eh dropped to 160
11:48 Eh down to 120, no diffuse flow visible, rare oxide staining
11:59 over fresh lava terrain now
12:05 up slope of mound, chimneys slowly smoking light gray, crabs, otherwise little biota
12:16 chimneys everywhere
12:36 sampling slope of S border of RR field, gray slab near talus
????????????????????????????????
12:59 shimmering water through talus heavy oxide staining
13:01 reached top of crest, tall chimney largely inactive chimney with diffuse veting and snail colonies
13:20 reached maker 4 site and sample active spire (gray smoker)
13:58 sitting at x2726 y3166 z1658 altitude = 10 m
14:01 smoke everywhere – zero visibility. Moved to another smoker
14:06 try to sample solid first; not possible. Knocked over some old sulphides to get in but lost the active piece and then lost sight of everything. Move on
14:12 now at x2722 y3162. Tall orange sulphide chimneys; some active. Now at gray smoker – narrow organ-pipe-like
14:12 at x2722 y3161. Got large piece of chimney including tip – try to reduce the size of it
14:20 J2-213-3-R1. large chimney spire sample – includes active spire tip. Placed in rear of basket. Now picking up water bottle #7
14:24 water bottle in orifice. 274 deg C max T. x2722 y3167 z1660. target #5
14:25 taking sample
14:29 vehicle took a walk. 14m offset and vehicle jumped. Knocked sampler out of orifice
14:30 closed -
14:30 picking another water sampler up #6. structure is orange in colour with some gastropods nearby on structure. Multiple chimneys are inactive
14:34 DV Cam on
14:37 move around to get a better vehicle perch before putting the sampler in the orifice. J2-213-3-W2-IGT6. ~278°C max T
14:38 taking sample
14:42 finished sampling 6
14:42:30 DV Cam off

14:44 now picking up major water sampler (red)
 14:47 vehicle in too close – must move out a bit
 14:49 in the orifice – take the sample. J2-213-3-W3-M4
 14:50 end of sample
 14:59 course 350, 30m range. Head out looking for host lave outcrop
 15:02 pass over a smoking chimney 9.5m tall.
 Multiple smokers below us
 Tall single organ pipe-like chimney about a foot in diameter approx. 4-10m tall
 15:04 8m off bottom – water shots
 15:14 slowly moving up slope of lave beneath
 sulphide chimney edifice
 dead field of chimneys
 15:23 stopped at an o/c (outcrop) with a stump of sulphide growing out of it
 15:27 x2708 y3189 z1683.
 J2-213-4-R1 rock sample. x2707 y3189 z1683. target(??????)
 15:32 now move to Rogers Ruins x2672 y3426. passing over low lying knobby lava formation
 15:43 stopped for a piece of lava – slightly altered looking + white staining. Some crabs and
 amphipods around. Some shimmering water also - but weak
 16:09 reset Doppler. Finally got a sample of the altered outcrop
 16:12 J2-213-5-R1. x2706 y3201 z1688. target #47
 16:16 moving on to Rogers Ruins now
 16:19 smoke in water column. Going over lava
 16:21 oxide crust - shimmering water in lava. Passing white altered lava
 16:25 more smoke
 16:27 passing over smoke – beehive caps. Lots of mushroom-type of chimneys
 16:29 bottom dropped away – left smoker and chimneys behind
 16:30 white staining of lava
 16:32 large pyramid features
 16:34 small dome of lava?
 16:36 smoke in Medea cam. Sedimented lava
 16:38 Fe-oxide staining. Degraded sulphides?
 16:40 continue over lightly sedimented blocky rugged lava. Some pillow forms
 16:44 knobby lava
 16:48 gold nuggets – ok only Fe-oxide in sediment
 16:50 rough rugged lava
 16:56 Rogers Ruins coming into view. Some smoke around
 17:10 a couple of big smokers
 17:13 waiting on Medea
 17:23 DV Cam on
 17:33 took off a small chimney – black smoker
 J2-213-6-R1 sulphide chimney (active black smoker) from larger active structure. x2669
 y3430 z1709
 17:45 now set up for water sample
 17:54 Vanko on watch
 beginning water sampling
 17:59 213-6-WA1-IGT3. Tmax=320 deg C – very stable
 18:10 213-6-W2-IGT4. Tmax=320 deg C – very stable. T outside of chimney is 3.75 deg C =
 ambient
 18:24 213-6-W3-M2
 18:48 sample 213-7-R1. small white diffuser near/slightly below marker 8
 19:00 213-7-T1 – orifice of sample. T=202 deg C

19:03 u/w 109°, range 150m to beginning of survey
 19:07 oxide capped chimneys (VVan #33747) in the VVan – SE of Rogers Ruins. Active shimmering
 19:12 heading over old volcanics and several chimneys near the base of the hill just SE of Rogers Ruins
 19:14 top of hill SE of Rogers Ruins is old partly sediment-covered volcanics
 19:18 old volcanics, large irregular pillow forms
 19:23 very large (3-5m) wrinkled inflated football shaped pillow form
 19:26 setting up for sm2000 survey at starting point
 19:43 have completed 50m of first line
 19:58 stoped reviewing DVDs
 20:00 turn 090
 20:03 turn 90 degrees to begin next line (actually 270)
 20:25 turn 90 degrees left
 20:30 90 degrees left- begin line #3
 20:44 turn right 90 degrees
 20:47 turn right 90 degrees-begin line #4, heading 316
 20:59 profile show a ~3m vertical feature that corresponds to a little closed contour on base map
 21:04 turn 90 left
 21:08 spires in pilot cam, alt 15m, urning left to begin line #5
 21:11 chimneys in brow cam
 21:15 billowing smoke
 21:23 begin to turn to right 90 degrees-much billowing smoke here
 21:28 turn right 90 degrees to begin line #6-much billowing smoke
 21:32 entering main field-all smoke
 21:40 more smoke-corresponds to target 26
 21:42 smoke continues over beyond target 26
 21:44 turn left 90 degrees
 21:50 chimney in science cam
 21:55 smoke, chimneys
 21:56 active gray smoker
 21:59 smoke
 22:01 more smoke
 22:07 smoke
 22:09 smoke
 22:10 lots of it (smoke)
 22:13 tall chimneys
 22:18 smoke
 22:19 tall chimney, inactive top
 22:23 active gray smoker
 22:27 big chimney complex, inactive?
 22:28 smoke, big time!
 22:30 ???????? in smoke
 22:33 ditto
 22:37 smoke
 22:45 smoke, chimneys
 22:46 billowing smoke
 22:48 ditto
 22:50 dead (?) chimneys
 22:52 billowing smoke

23:00	tall chimneys
23:04	active gray smoker
23:05	billowing smoke
23:09	still in smoke
23:16	smoke
23:19	ditto
23:23	big chimney 15m tall
23:24	more chimneys
23:29	white tipped chimney
23:39	chimneys (target 16)
23:42	chimneys, gray smoke
23:43	more smoke
23:46	tall chimneys, billowing smoke
23:48	active gray smoker
23:51	billowing smoke
00:01	survey finished
00:04	off bottom, x2874 y3301. END OF DIVE 213

J2-214, August 8, 2006

08:04 (GMT); 18:04 (Local)

08:04 Medea in water
08:39 Begin Tivey twist
08:45 end Tivey twist
09:05 d=1635 alt=53.9
09:13 rugged old volcanics. u/w 26m on heading 146 to major mushroom
09:16 facing = little ridge of lava. Flow front?
09:18 vents; a number of dead, some with white staining
09:29 old volcanics or old chimney rubble, oxide stain, many crabs, snails but no worm. Water observed
09:31 major mushroom – central short fat spire surrounded by numerous (?????) chimlets (most <1-2m)
09:33 white chimney next to major mushroom – has gray smoke
09:38 this has Japanese dive marker – illegible
09:40 shift change
09:44 major mushroom not smoking much, but we are at 4m alt and there's more smoke from elsewhere
09:46 old chimney – no black smoke here
09:51 nice big gray smoker, down low in front of a group of chimneys. Snails, crabs
09:53 on station # 1
09:57 Tmax at this gray smoke – T = 262 deg C
10:03 knocked off a tall thin 3m? spire to try to get a good orifice
10:16 T=278 max, target. x2450 y2603 z1682
10:21 heading 180 for 50m
10:22 crabs, dead chimneys to right
10:27 (?????) chimney field (station 1, dive 209)
10:30 looking at slope facing 180 south of sulphide mound – no stockwork
10:45 moved 20m, heading 160 and find a piece of presumed stockwork. Trying to sample it
11:10 picked two samples of soft presumed stockwork
11:15 going to check another slope 30m SE
11:20 it is all flow front
11:22 going to x2420 y2520 to gully that trends N-S
11:30 all slope are just volcanics
11:40 heading 50m to x2490 y2590 – a gully along strike of two previous stockwork locations
11:48 chimney complex, multiple spires
11:54 diffuse venting, mats, crabs, no chimneys
11:58 gully is devoid of hydrothermal rocks
12:00 diffuse venting through hole in volcanic basement
12:16 back at site of T=228 deg C smoker to sample fluid
12:26 pulling 1st sample. Tmax = 280 deg C. 214-W1-IGT8
12:34 pulling 2nd sample. Tmax = 288 deg C. 214-W2-IGT5
12:43 have to reposition to shoot major bottle. Cannot see tell tail.
12:46 pull majors sample. tell tail is hard to see, but snorkel is in orifice – fine. Sample 214-W3-M4
12:54 sampled base of spire, nice cpy lining. Sample J2-214-3-R1
12:56 leaving for Fenway
13:10 flying over station 2 “stockwork”
13:13 knobby pillow lava replaced blocky steep-sided flows

13:22 mussel beds, crabs, fish, worms, white mats. Terrain is heavily sedimented, outcrops of
 rubbly lava
 13:31 going down slope, still rich biota
 13:32 seeing chimne
 13:34 examining source gray smoker
 13:52 trying to identify gray smoker for a resample of fluid from gray/black smoker surrounded
 by tall edifice behind it.
 Sitting at x2491 y2378 z1709.
 pick up gastight #1.
 J2-214-4-W1-IGT1
 Dive weight in picture near vent so we must have been here. Lots of snails, shrimps,
 crabs, fish etc. vigorous venting of black smoker. Cleared off the little cone for a better
 measurement. Original temp 296 on earlier (???????)
 14:21 taking a sample of fluid. x=2490 y=2381 z=1710. target #34
 finished sampling. Tmax=330 deg C. stow away
 14:29 start on course 213 at 40m heading SW away from vents field (?????). anhydrite and
 sulfide debris field
 14:35 passing over sulphide talus with massive anhydrite blocks
 14:38 on slope of sulphide debris of big Papi mound. Fe staining and white oxide staining plus
 massive anhydrite blocks
 14:39 zone of Fe-oxides – sulfide debris
 14:41 large inactive sulphide chimneys
 14:43 black smoker – big papi
 14:43 move on course 285, 40m
 14:48 oxide staining on slope, bacterial mats, crabs on lava
 14:51 lots of crabs, mussels on lava. Stop to sample
 14:56 crushed an oxide crust – picked up oxide crust. J2-214-5-R1. x2434 y2360 z1709. in
 basket C
 15:06 move sideways (west) along scarp looking for a piece of lava from this level. See a large
 block, probably talus, but see if we can break off a piece
 J2-214-6-R1. x2432 y2360 z1707. VVan #3560
 15:16 on course 280, 30m
 15:18 coming to the edge of lava debris/talus field into sedimented slope
 15:21 into knobby lava with thick sediments cover; slope up to left
 15:28 onto course 230 at 25m. lava – zones oxide staining. Waitng on Medea
 15:34 more lava in outcrop now on side of mound.
 15:50 Stop to sample outcrop but crumbles away to dust. Decide to move on. Mangesde
 oxide crusts
 15:51 bearing 250, 125m. moving on up eastern slope of Snowcap dome
 15:54 on to sediment/hyalolastite. Sand slope. Patches of white oxide staining. White bacteria
 mat?
 15:57 on top of small dome. Flat lava pavement with thick sediment
 16:01 dropping a weight
 16:05 sedimented top
 16:08 sparodic blocks on sediments slope
 16:16 stop at a lava outcrop on slope. Very rugged blocks – look in place here
 16:19 sample J2-214-7-R1. lava from outcrop. x2286 y2314 z1667. target #37. basket D
 16:25 continue on. Course 250°, 140m
 16:27 old cruddy sulfide sticking up out of sediments
 16:30 waiting on Medea
 16:36 continue across sedimented slope to our right. Occasional blocks of talus

16:38 driving off slope of Snowcap
 16:43 crossing small gully between Snowcap and ash cone
 16:44 sedimented lava with heavy sediment cover – very knobby looking lava
 16:46 starting to climb small cinder cone. Thick sediments on slope
 16:53 at rim of small cone
 16:56 drive around tip of cone. Navigation seems to be off a little (about 10m north of map)
 stop in bottom of crater to pick up a rock. J2-214-8-R1. x2126 y2258 z1660. Reset
 Doppler
 17:13 reset Doppler
 17:16 move on course 005 deg, 85 m. move out of cone north to Snowcap dome
 17:26 sedimented terrain
 17:27 come across a small gully of broken lava, heavily sedimented
 17:33 lava flow outcrop – lobate flow
 17:36 station 9. trying to sample lobate flow. J2-214-9-R1 rock sample. x2138 y2337 z1660
 17:52 Vanko watch – moving N up Snowcap
 17:55 old volcanic rocks, outcrops, pillow and jagged forms
 17:59 puff-ball pillow
 18:04 flat area – manganese coating in rock. Patches of snails, shimmering water, mussels.
 Gentle diffuse flow
 18:09 native sulfur approx. 40 m south of marker 6
 18:12 hovering over deep gully
 18:18 marker#6 at 320deg.
 18:22 waiting on Medea so we can look very carefully
 18:33 heading down to rocks approx. 5-10m NE of marker 6
 18:37 gray boulder dome here look like more hyaloclastite
 18:42 station 10. sampling hyaloclastite ESE of marker 6. sample 214-10-R2 – plate of
 hyaloclastite, float
 19:04 sample 214-10-R2 more hyaloclastite. Sampled from bigger block (in place?)
 19:15 heading 208, the N-facing slope of the gully is the sulfur flow coming from type of
 hyaloclastite
 19:20 station 11
 (*refer to the sketch in pg 28 Dive Logbook #2*)
 19:40 sample 11-R2. (?????) rock from below 11-R1 rock
 19:56 moving slowly to the NE
 19:58 12m altitude – sm2000 survey of this valley
 20:09 nearing end of first line, flying E to W at 12m
 20:11 turn left 090
 20:14 u/w 180
 20:17 u/w 090 for second line
 20:20 chimera fish
 20:24 nearing end of line – seeing lots of snow on Snowcap
 20:26 turn left 090 to 000 to close the rectangle
 20:30 finished little survey, dropping to seafloor
 20:32 Snowcap – edge of snow, oxide crusts, Mn crusts?
 20:34 saddle in view (saddle between two snow-capped knolls)
 20:36 low relief volcanic rock, almost ropey, wrinkly, (????) a dusting of
 20:40 volcanic rock/knob (?????) surrounding it – corkscrew worms
 20:41 moving NE up find ridge top – a few volcanic rocks
 20:43 rock at top
 20:45 u/w 147 to ODP hole 1188F – no venting, no activity, open hole
 21:04 fire nisks. d=1636 alt=2.5. x2206 y2425. T=2.4 deg C

21:10 octopus!!!
21:20 u/w SW – outcrop of sulphide alteration zone
21:25 sample 13-R1 – outcrop of altered rocks – advanced argillic alteration with globular sulfur!
21:31 u/w west
21:35 dropped a weight
21:37 u/w – volcanics, moderately sedimented
21:39 tube worm, mussels, crabs, spares on lava
21:41 marvelous tabular pillow >1m across
21:45 shift change – older volcanics and more sediments
22:04 at Tsukushi
22:20 found oxide mound with venting
22:33 pulled IGT sample 214-14-W1-IGT2. T=55 deg C – steady
22:43 going for majors bottle sample
22:50 fire majors bottle, see telltail clearly
22:57 sample rock with oxide coating
23:01 2nd rock sample
23:03 off station, going 20m E to sample sulfides
23:18 picked small chimney from easternmost chimney cluster at Tsukushi
23:30 exploring south slope of Tsukushi
23:35 slope is steep flow front. Seafloor south of it is heavily sedimented
23:45 going back up slope, some minor oxide accumulations between lava blocks
23:50 back at chimneys
23:55 off bottom. **END OF DIVE 214**

J2-215, August 9, 2006

08:02 (GMT); 18:02 (Local)

08:02 Jason in water
08:06 Medea in water, winch zeroed
08:40 begin Tivey twist
09:12 see smoke at 180m
09:15 smoke continues, alt = 100m
09:21 see bottom, alt = 5.7m, sedimented lava flow – long tube or pillow
09:24 slabby lavas from 10m; smoke in Medea cam
09:26 sedimented pillow lavas from 4m altitude. Ridge – flow margin?
09:42 staying out waiting for good navigation. Lots of old dusty lava formations. Very little
boil. – 1 or 2 corals
09:46 old volcanic rubble. Black smoke in Medea camera
09:50 ditto
14:18 end of line making lateral move to wp (way point) # 77
start line
15:14 end of line. Target #78
15:15 move laterally to target #79
15:33 start next line 230 azimuth
16:14 end of line
16:15 turn and head 135 for 50m to finish last jog of survey
16:25 end of survey SM2K. stop recording SM2K Delta-T
head to way point #2. x2690 y3171
venting clear fluid
16:31 SM2K/Delta-T turned off. On bottom – sedimented lava, talus/rubble bottom
16:36 biology now on outcrop. debris apron of Fe-oxides. Extinct chimneys – copra form shape
16:37 gray smoking chimney
16:41 line of smokers ahead, looking for fissure in sonar
16:53 at crack location seeping gray smoker. Stop here to sample fluid. small little cones are
along the crack with discrete smokers. Pick up gastight #7
17:02 DV Cam start
17:13 decide not to sample after checking the fluid temperature of this area 167 deg C was
obtained
17:19 stowed bottle
take a sample from beneath small chimney area
17:29 J2-215-1-R1. x2694 y3172 z1670
17:40 go to northern side found by ABE. Course is 053 deg. approx. 1500m. Will drive up and
have the ship drag us over the site, just 200m short. x3888 y4038 z1680
17:58 Vanko watch – u/w 053, 1286m, d=1500m, alt=170m
19:01 target for landing on the seafloor is 200m SW of possible vent field. Settling down
toward seafloor
19:10 seafloor – moderately sedimented lavas
19:14 very nice blobby formation, rough surface, fairly rough topography
19:19 ditto. Very wrinkly surfaces
19:23 ditto. Not very much biology; d=1665m. x3797 y4020
19:30 still in the same formation – in the sense that the forms, shapes, amount of sediments
have not varied much
19:35 biology consist of sparse lone sea pens, gorgonians – not much

19:36 at original target. no activity here. Eh has been flat at 151 (actually smoothly climbing, lost 30 minutes from 130 to 150)
 19:39 lone galatheid crab
 19:40 sponge
 19:47 have traversed approx. 80m NE and will now turn right and move second line 20-30m south of the first
 19:50 same old volcanic terrain. Eh stable at 149
 19:52 light coloured material in a crack. Eh dropping to 143. Oxide or sulphur
 19:54 Eh is 139, much more oxide patches on top of lava lose(????)
 19:57 oxide crusts. Eh 133
 19:59 no more oxide, Eh 136 and rising
 20:02 now turning to go northeast, Eh dropping again
 20:05 Eh 140, old volcanics
 20:07 pile of platey, sheety lava with oxide patches
 20:10 same yellow stain (oxide)
 20:11 gentle shimmering water from under rocks. (?????) has layered yellow crust on it
 20:12 settling down – will it be crustly or gelatrous? (?????)
 20:14 the yellow is flocculent/fluffy
 20:16 moving again – see more yellow
 20:20 lots of oxide – will settle down
 20:21 Eh 120
 20:23 x3929 y4026 oxide mound. Lots of floc
 20:27 station #2 – Eh 118 – set up on shimmering mound. Rock coated in yellow floc. T-probe to see what we are dealing with. Tambient = 2.4 deg C. T=9.0 deg C
 20:36 sample 215-2-R1 – lave rock from shimmering water site. Eh = 120 and stable
 20:40 continue searching
 20:46 continue east. Eh = 110
 20:47 more “oxide”
 20:50 more “oxide”
 20:57 lots of sediments here, the farthest east that we have gone
 20:58 Eh=136. Turning right
 21:00 elevating up 50m to check Eh
 21:02 5m altitude – no Eh anomaly. It actually goes up some – but we are about 100m from the target
 21:11 coming back south of oxides – just old volcanics, heavy sediments
 21:18 quite heavy sediments here south of the warm water area; only 5% rocks, 95% sediments
 21:26 head NNW back to original target, back into old volcanics
 21:28 little oxide (???????)
 21:33 passed over target – nothing. Turning to NNE. Will elevate to 50m to sniff for Eh. SM2000 started too, to look for features
 21:38 rose up to 52m altitude – Eh dropped only a tiny bit, from 154 to 150 (Chris Yeats points out that this is definitely a drop)
 21:40 back down to the seafloor – sedimented rocks
 22:05 white mats, oxide staining. Eh down to 144. No macro fauna. x3990 y4100
 22:15 continue survey
 22:55 back over oxide mound, heading for ridge near way-point #2
 23:19 mound at x3750 y4040. all volcanics, no hydrothermal activity at all
 23:20 heading x3820 y4135 to check out bumps in map, no hydrothermals
 23:40 heading x3920 y4220 to ridge, no hydrothermal
 23:59 coming up. **END OF DIVE 215**

J2-216, August 10, 2006 – Return to Fenway

09:00 (GMT); 19:00 (Local)

09:00 Jason off deck
09:03 Jason in water
09:15 Medea in water
x2420 y2355 – bottom landing target approx. 60m west of Fenway. This spot will make it easy to approach big Papi Medea plus tether out of the way
09:39 Tivey twist start
09:48 done (more than done)
10:12 on bottom, on mound NW of Fenway. White patches and oxide staining
10:19 dead oxide chimneys
10:23 down slope of mound onto flat between slope and Fenway center, densely colonized by little crabs, mussels, little sediment
10:28 crabby flats, shimmering water, mussel beds, fish, worms
10:47 arrived at base of Fenway center. Sample anhydrite and sulphide halfway upslope. 1-R1.
10:53 marker 7 with white smoker (more like light gray)
10:59 move 1m south of marker 7. gray smoker. 2-T1 measurement = 264 deg C
11:05 break sample of chimney. 2-R1
11:09 repeat T measurement. T = 279 deg C
11:15 sample fluids 1st IGT7. 283 deg C
11:19 temperature on outside wall of chimney stump = 7-10 deg C
11:24 2nd IGT sample. T = 284 deg C
11:26 having to move hose clamp down handle of bottle
11:43 pulling major sample M2
11:50 moved to outcrop with shimmering water below what looks like a white vein (sulfate) in altered volcanics
12:00 need to move bottles around to free up cable of T-probe
12:10 “landslide”
12:12 3-T1. 62 deg C
12:17 3-T2. 83 deg C
12:20 leave marker 10
12:34 on station 4. Cracks in wall facing 140°. Black/gray smoke. T = 280 deg C (T2) T = 284 deg C (T2)
12:49 there is friable, platy white material forming around the vent sites on that wall. We try a scoop sample
13:03 scoop sample in biobox
13:20 went around entire structure about halfway up the slope (following first ____). Came to marker 7 and decided to return to marker 10 for fluid sampling
13:28 setting up for fluid sampling
13:39 firing IGT4 for sample 5-W1. Max T = 76 deg C
13:55 taking sample same position as above near marker 10. J2-216-5-W2-IGT3. x=2464 y=2358 z=1709. Tmax = 80 deg C
13:57 done
14:00 now pick up major sampler. After repositioning Jason we get snorkel in the rack
14:21 J2-216-5-W3-M4
14:21:30 reset Doppler
14:22 sampler done – restow
14:27 now sampling the ledge material

14:28 J2-216-5-R1. piece of ledge above the shimmering crack. sulfate – sulfide piece
x=2464 y=2358 z=1708

14:32 move up forward up small valley between mounds to look at shimmering water coming
out of slope

14:39 get T-probe to check temperature. ~90°C. ~113°C, ~2cm in. 6-T1. Push in wall the
way. 114.6 deg C. Now try a scoop bag

14:47 pass 1 gets some of the crust and sediment

14:48 second pass gets more. J2-216-6-R1 scoop sample. x=2469 y=2352? z=1710
reset Doppler

14:51 x=2464 y=2355. driving up a small ridge to south on to top of mound. Now cross
mound and sitting on old sulphide. J2-216-7-R1.

15:50 x=2475 y=2332 z=1723. piece of rock broken off outcrop

15:53 move up slope again

15:58 sulphide crusts over what looks like lava talus blocks

16:02 at top of small scarp – with sulphide chimney fallen over. Just beneath it look like lava –
so try and sample that.

16:24 working on slope trying to get a rock sample. J2-216-8-R1. x=2475 y2340 z=1716.
target # 46

16:32 drive back over top of dome heading 319°

16:32 degraded sulphides

16:36 shimmering water. Crabs on outcrop, white staining

16:39 drop a weight

16:57 search around top of dome for a lava sample. First some shimmering water in lava with
white staining, shrimps and crabs

17:10 time for Mr Schilling

17:17 rock sample from small high standing outcrop covered with galathea crabs. J2-216-9-R1.
x=2467 y=2348 z=1112. target #47. in basket H

17:36 now drive back down scarp. Passed over sampling location #7

17:37 talus blocks of lava / sulphides

17:38 more massive outcrop now as we continue down the slope

17:41 taking wrap out

18:03 Vanko watch
head to x2478 y2328 (a few meters away) to check out one more sharp bump at the edge
of the SM2000 survey SSE of Fenway

18:09 using SM2000 to check – alt=16m, heading=320, turning left 1-2°/sec. The feature is not
there. Drive west on 270°.

18:25 back to the bottom – we are 40-50m south of Fenway

18:29 on the bottom. Very old looking seafloor, talus

18:34 creeping NE – rocks and Fe-rich sediment. A piece of anhydrite talus down here

18:37 (?????)of talus stretching downslope – these could even be debris flow

18:41 fire the niskin, 1735 m depth

18:45 Medea cam has smoke coming from the west

18:53 S edge of Fenway (?????) – lots of sulphide rubble

19:03 sample 10-R1 – rock outcrop jutting out of talus, slope of sulphide, etc. rock appears to
be altered (slightly) volcanic

19:07 just above this sample site there is white staining and we stop to probe it with the T-
probe. Is this cold or warm? Tambient = 2.3 deg C. No T anomaly in the white stuff
(maybe 2.5 deg C)

19:17 a little bit to the left. 2.6 / 2.7 deg C at the white layer

19:25 talus slope SSE of Fenway, see blocks of white rock, lava talus – great stuff

19:32 216-11-R1. piece of lava rock

19:38 sample 216-11-R2. stockwork nearby
 19:47 so we seem to be looking at relatively fresh lava flow, and beneath it is these blocks of stockwork. We will go up above the flow to see if there is more stockwork.
 19:49 probe a white patch; 23.7 deg C to the hilt. 11-T1. dead tube worms here
 19:59 have come across inactive sulphides, and have now reached active sulphides where a fluid sampled in a previous dive (target 20)
 Interp – the flow that we sampled has stockwork under it and chimneys on top of it, and its all somewhat exposed on this traverse up and around the E of Fenway.
 20:10 now will go around the N and NW of Fenway, staying deep
 20:14 u/w around N of Fenway – dead chimneys at x2485 y2370
 20:16 anhydrite on base of Fenway – old rocks sticking out, already sampled
 20:23 crossing low pt N of Fenway and moving (?????) into fresh lava
 20:32 shimmering water vent here from lava. So this knob of lava is pretty fresh yet has oxide-rich patches and shimmering diffuse flow. No sulphides so far
 20:35 old dead sulphide mound. x2448 y2384.
 “slutty towers”
 20:40 u/w 200deg, 15m
 20:49 anhydrite in the hill N of Fenway. Sampl 12-R1
 20:56 will head south across crabby flats to the west of Fenway. See lots of anhydrite and Fe-oxide sediment
 21:02 slope to right up onto next mound is lava, crabs, mussels, little clams
 21:09 we are seeing lots of young lava, knobby, fuzzy with microbiol growth, populated by crabs etc
 21:12 decide to check out the deep knobs S of the mound – u/w 218°, 85m. 40lbs of sampling still possible
 21:16 smoker in Medea – still from Fenway?
 21:19 traversing over some very old terrane. 90% sediments
 21:22 85% sediments
 21:27 x=2396 y=2281 d=1725. Very old sediment-rich seafloor here. Old volcanics stick out.
 21:31 talus slope of rocks
 21:35 Chris Yeats notes how monotonous(?????) is the slope from here to the top of Snowcap – 80m rise in 160m run – perfectly straight
 bottom here is talus and mud – biology dead compared to the area around Fenway
 21:40 coming up the draw between 2 volcanic hills – a little bit of warm water venting (based on biological community and white bio mat)
 21:41 x=2394 y=2330 z=1698 – a snowcapped hill
 21:43 cracks of oxide floc
 22:00 heading for gully NW of (?????) towards sedimented slopes
 22:10 back in bacterial mat terrane sedimented talus field
 22:15 pick up altered (?????) rock?
 22:19 small mussel beds around boulders
 22:23 northernmost (?????) of hydrothermal activity
 22:30 patch of shimmering water with snails, worms, crabs, tubeworms. Otherwise scattered biota in area
 22:34 croning (?????) ridge, other side is densely populated, shimmering water
 22:37 went down slope, mats. Mussels
 22:40 turn east facing slope, field turns dead where wall faces away from Fenway
 22:45 going up slope, biota decrease dramatically at break in slope
 22:55 back at Fenway breaking anhydrite/sulphide sample
 23:11 sampled another anhydrite/sulphide sample
 23:15 at marker 7

23:45

sample chimney off wall SSE of marker 7

23:57

off bottom. x=2455 y=2367. **END OF DIVE 216**

J2-217, August 12, 2006 – Suzette I

Nav is LBL

10:38 (GMT); 20:38 (Local)

10:38 Jason in water
11:15 starting Tivey twist
11:30 Tivey twist completed
11:43 all stop
11:49 on seafloor, all sediment
11:50 dead snails, galatheid crabs
11:58 dead chimney complex. x3383 y4785. near slope and up slope
12:07 entire mound is littered with sulphide debris, slopes are covered with fallen chimneys. Standing chimneys <7m tall
12:10 going by hill to the north. Extensive areas covered with dead snails
12:11 white and red staining. Shimmering water. Alvinella worms, shrimp. Stopping to measure temp. clear vent fluid diffusing from crack in sediment slope. Moving uphill and continuing into sulphides. Location is on slope on little mound east of mound with black smokers
12:23 up west side of small mound: shimmering water, snails on fallen chimneys
12:26 clear fluid venting from little beehive
12:28 gray smoker chimneys, forest site
12:41 navigation issues, offset about 15m to the east
12:44 30m east of forest. Chimneys with clear fluid venting
12:56 T-probe of gray smoker at forest. 302 deg C
13:02 broke chimney off structure. It crumpled into several pieces few of which fell into basket
13:21 water sampling IGT8 = 302 deg C.
13:30 IGT5 = 302 deg C
13:38 major bottle M2, good telltail
13:58 J2-217-2-R2 old sulphide top of chimney from same place as fluid sampling edifice
14:02 going to sample active smoker part of chimney – shrimp, snails, large crabs.
Lost our way for a moment
Found our way back
14:23 try a sample at orifice next to one sample. Small piece ripped off the chimney – the orifice disintegrated and fell away. J2-217-2-R3. x3323 y4846 z1503
14:27 move west 238deg, 43m. waiting for Medea to move
14:34 come to base of scarp and see what looks like volcanic rock.
Looks like old sulphide chimneys have collapsed from further up this small scarp and cover the lava outcrop in places.
Now up close all of it looks like sulphide – more sideways – (north) along scarp – come into debris field at broken sulphide talus
14:47 move back to south sideways along the scarp
Water shimmering out of a crack
Entire slope looks like fractured and broken sulphide debris
14:55 dead chimneys field. A “forest” of chimneys
14:58 start to see some chimneys with snails = activity. Shimmering. A monolith-like chimneys. 10.5 m – 15m high chimney
15:10 circle a small field of tall chimneys. Stop and try to sample an active one with clear fluid and lots of snails. The chimney top has a couple of beehives on it.

J2-217-3-R1 – A large piece of multiple conduit “bowling ball” of a piece. x3277 y4818 z1502.
 Now measure temperature of vent fluid. Tmax = 242 deg C. Reposition. Tmax = 275 deg C, 280 deg C. So 217-3-T1 Tmax is 280 deg C. Target # 5

15:46 Ok move south course 120 deg for 22m. Passing by some inactive spires. A white spire with snails – shimmering water, shrimp and crabs

15:53 move slowly slowly pass more chimneys mostly inactive. Large fallen chimney almost a meter across in breath. Barnacles covering the outer surface. Smoking on top. Approx. 10 – 14m high

15:59 reset Doppler.
 Clear fluid
 DVCam on. Stop to take temperature of fluid. x3290 y4808 z1494. Heading 305 deg. Target # 5.
 J2-217-4-T1 290 deg C large orifice vigorous flow
 J2-217-4-T1 288 deg C smaller black smoker

16:13 DVCam

16:13 Move off to north. Course 305°, 120m

16:19 passing back by sulphide structures again. Past the large monolith structure

16:22 inactive sulfide spire

16:23 more inactive chimneys sampled previously by nautilus

16:29 solitary chimney with altered sulfide base – oxides

16:30 x3238 y4835 z1501
 pool of shimmering water adjacent to this solitary chimney that is inactive
 J2-217-5-T1. 70 – 83 deg C. x3237 y4837. Target # 7. When pushed in the temp went down. Suggests hot water is pulling over the sediment

16:44 moving across the mud plain

16:45 heading 310, 60m

16:54 ripple in sediment parallel to track azimuth 327deg

16:56 small patch of altered sediment. Micro-chimneys – inactive. Crusts of _____?

16:57 shimmering water, vigorous water, snails

16:58 Fe-oxide stained sediment. More white staining on sediments. Extreme white patches and Fe-oxide stain

16:59 back into mud again

17:01 more Fe staining

17:03 see a single rock here near summit of mound. Could be lava. Will stop to try and sample, surrounded by Fe-oxide stained sediment, patches of white bacterial material and Fe-floc material. Some galatheid grabs.

17:20 J2-217-6-R1. rock sample piece from single outlier in sediments. x3188 y4875 z1490
 Target # 8. In basket E. 3 pieces

17:31 moving on course 290 deg, 210 m

17:34 flat sediment terrain. Drive off at central dome at mound. Flat rippled sediments terrain

17:48 Vanko watch
 lone chimney and some rocks amongst sedimented plain. Looks like its been sampled by nautilus. 2-3m high

17:50 there must be a lot of stuff under the sediment as these old chimneys had more height, but they are fallen – but there’s no debris

17:56 shimmering water and floccy oxide around base of small sulphide, all surrounded by sediment

17:58 patches of snails on sediments

17:59 sedimented slope, has few chimney fragments on it form above

18:00 fault scarp? Wall with sulfide (relict) structure

18:02 active field with shimmering and some black smokers. Some “painted” white at top half
 – bio on sulfate/sulfur. Pausing for a temperature sample
 18:06 there are tall chimney beehives. There is no single orifice. They diffuse black smoke all
 around
 18:07 set up on one with T-probe
 18:10 nearby is a forest of dead trunks, very densely packed together
 18:14 larger structure is oozing shimmering water that turns black. Is it hot? Is it soft?
 Dumped it – a bunch fell into port-forward part of basket (sample 7-R1), piece of delicate
 structure has fallen onto Majors sample holder). Maybe other pieces as well
 18:24 T = 296 deg C with T-probe inserted 15cm. Upon extraction new flow is observed from
 the area of the T-probe insertion
 18:34 moving on – many fallen chimney trunks – like the painted desert in Arizona – petrified
 wood-like
 18:36 cool fat fish
 18:39 approaching an active chimney with many snails, an active orifice with clear fluid
 18:44 set up for T-probe work
 18:49 clear fluid orifice T= 250 deg C. Target 10
 19:04 move on to the north toward “black smoker” field – almost a solid wall of old chimneys
 19:13 set up on a clear vent for sample
 19:20 first pipe was too hard to handle. Try for a second one
 19:24 sample 9-R1 – chimney tip
 19:26 T-probe into first orifice (the sample that got away). T = 260 deg C (but probe is bigger
 than orifice
 19:40+/- sample a 15kg piece with the schilling but could not get it trimmed down. Abandoned it
 to Chris Yeats’ (???????)
 19:50 beehive – active, diffusing some black smoke
 19:52 at top of old pile of trunks, a single very large beehive, like Marge Simpson’s hairdo.
 Will set up
 19:57 Insert T-probe about 10cm. T = 276 deg C. Tried to insert further and beehive fell
 20:05 orifice is pumping black smoke, but T = 275 deg C. x2994 y 4959 z1488. heading 270.
 alt = 6m
 20:09 a bunch of clear vents
 20:12 this is a fairly sharp ridge, N-S oriented with sharp pinnacles of chimneys. Most relict,
 some active. 10m+/- in height. Many have horizontal white cracks
 20:35 black smoke – 276 deg C @ 19hrs 57
 decide to try to sample chimlet at first, then get water
(refer to logbook for sketch)
 return to station 10
 20:47 awake Jell Seewald to do water samples
 20:50 temperature from the right hand one is 276 deg C by IGT
 20:59 T-IGT = 274 deg C. sample 217-10-W1-IGT1
 274 deg C steady
 21:06 second IGT (#2). Having trouble attaining the high T again. Orifice walls getting
 destroyed. Finally did OK
 21:17 sample 217-10-W2-IGT2, T=272 deg C steady
 21:29 sample 217-10-W3-M4 – good telltail
 manipulator spasm after sampling – no damage
 21:32 off station 10
 21:38 massive old chimney, 12m tall. Horizontal. White crabs – earthgrates?????
 21:45 heading to waypoint 5 to explore pinnacles

21:50 stopped at outcrop featuring white veins on outcrop. sample vein (11-R1) plus host rock (11-R2)
21:10 move on to explore pinnacles
21:12 a couple of dead chimneys
21:14 top of crest. Forest of mostly dead <8m tall chimney, some diffuse venting, snails on chimneys walls
22:26 slopes of edifice are dropped with sediments and chimney rubbles
22:30 stop to sample rubble from underneath an inactive chimney
22:43 11m tall diffuser on steep NW facing slope, covered with snails
22:50 near top of large, NW-most edifice. Numerous chimneys, some venting/oozing clear fluid
23:00 attempting T-probe measurement. Tmax = 220 deg C
23:17 rock sampling recovered only crumbs that fell between baskets
23:21 and T-measurement = 226 deg C
23:28 leave marker 11
23:31 moving east to examine base of edifice
23:36 snail graveyard on sedimented slope near base
23:40 dredge scars in sediment. Sulfide debris, rich in cpy
23:45 entire slope = sediments + chimney talus
23:50 off bottom. x3056 y5007 z1505
00:59 Medea on deck. **END OF DIVE 217**

J2-218, August 13, 2006 – North Pual Ridge

Nav is LBL

08:41 (GMT); 18:41 (Local)

08:41 Jason in water
08:43 Medea in water
09:17 start tively twist
09:22 end tively twist
09:49 all stop
09:55 on seafloor
rubbly lava ridges sticking out from sediments. shimmering water, white patches. x4946 y4600. Snails, shrimps
10:03 going up slope. Occasional patches and shimmering water
10:05 only sediments on top. Going down slope heading 090. only lava and sediments
10:09 steep slope, flow front or fault?
10:15 white bacterial? Patch
10:20 check more slopes around waypoint1. no further hydrothermal activity
10:26 on flat between slopes and WP2. sedimented terrain, rubbly lava
10:29 crossing
10:33 snails, crabs, worms. x4864 y4562. shimmering water
10:35 flying a couple of NW–SE transects over area of magnetic low
10:39 dead chimney? x6874 y4533
10:45 trying to take sample, unsuccessful
11:20 surveying the area around magnetic anomaly yield no hydrothermal indications
11:30 extending survey to SE towards mound at waypoint 3
11:40 mound is volcanic pile. Continuing SE to location of E_h anomaly. Nada(?????)
11:55 continuing to south to location of 2nd E_h anomaly. Nada(?????)
12:00 going to north to test hypothesis that SE currents have swept plume signal. Nada(?????)
12:40 continue NE around previously survey area
12:46 crossing hill that is entirely sedimented
12:54 E_h dropping
12:56 few crabs
13:05 Fe oxide blotches with some shimmering water. x4807 y4582. T = 31 degC
13:52 reset Doppler
13:59 azimuth = 220, 150m course
14:05 crossing sedimented lavas – heavy drapes
14:15 small (?????) ridge. Heavy sediment cover
14:22 x4750 y4453. sitting at sedimented lava
14:32 rough rugged lava covered with sediments
14:34 small lava dome, slabby lava
14:35 continue moving. Go to x4875 y4550. azimuth 040, 90m
14:58 crabs, sediment, snails on lava. x4876 y4554. shimmering water
x4874 y4566 – sulphide chimney
out of field x4863 y4550
15:05 x4870 y4556 back in snails and shimmering water. no sediments on lava here. Old sulfides at edge of shimmering field
15:10 sit down to take sample old sulfide chimney about 1m tall. Snails. Old sulfide spire sample J2-218-2-R1.

15:15 x = 4875 y = 4568 z = 1880m. Shimmering water x4872 y4567. shimmering water area. Snails, white bacterial mats on fresh lava
 15:30 more old sulphide chimneys. x4865 y4566
 15:31 set at shimmering water patch. Target # 5. x4864 y4565. Take a temp sample here. Snails, crabs, galathea. Fairly vigorous shimmering water flow, shrimp
 15:35 J2-218-3-T1. Tmax = 25.8 deg C. Tmax = 30.4 deg C – in snail bed. Sediments (?????) quickly from the area
 white oxide patches.
 sediments now gone and into unsedimented lava with white coatings, snails and weak shimmering water
 15:52 drive back to first site – go into sedimented lava. Old sulfide chimney. Turn around and head back to white staining and fresh lava
 16:03 turn and head east shimmering water x4861 y4591. snails, mussels and shimps. Still in white staining crabs x4861 y4600
 16:14 smoking pile of snails. x4873 y4596 z1879. Target 6
 16:20 couple of dead chimneys. sulfide talus
 16:24 sitting at old sulfide chimneys. x=4883 y=4590 z=1879. target # 7
 16:29 drive to top of small hill to south – lava becoming more sedimented
 16:34 heading due east. Moving 070. More shimmering water, snail beds
 16:37 fresh lava snails. x=4900 y=4598
 16:41 sitting to take sample of lava. x=4896 y=4602. J2-218-4-R1 – rock could be old sulphide. x=4897 y=4601 z=1875. in basket A
 16:57 doppler reset. Course 103deg, 40m
 17:02 lava talus lightly sedimented. Large blocks of talus
 17:06 entering steep scarp faced valley. Fault scarp to our right (south)
 17:08 flow structures in wall
 17:14 fire nisks while waiting for Medea. x=4948 y=4598
 17:20 go down to small valley
 back at white staining that they first landed at
 17:32 much more sedimented as we drive east up out of small valley
 17:39 sedimented lava on summit
 17:55 Vanko watch -
 headed west along south side of ridge (the one just south of original landing target). Heavily sedimented, sparse volcanic rocks peek through
 18:03 very scant biology – sea pens, fish, etc. Eh = 164, flat
 18:09 the plan – go sample water at western site in this area (Wolfgang's watch got 20 deg C water there). Then a long transit to new area
 18:11 before doing that we will check out a structural trend that head EW into the crater to the east. Chris Yeats reckons that the hydrothermal activity to the W is aligned on the feature
 18:24 cracked pillow, and a moment later a large pillow-tube extends down into the bowl-shaped depression (crater)
 18:35 sample 218-7-R1 – volcanic rock sample from the crater. 90m east of the initial bottom target to this dive
 18:40 the lava is mostly in irregular mounds/bulbs, meter-scale in dimensions, and has very rough surface sometimes like pulled taffy – like stretched stuff
 18:56 biology – crabs, tubeworms and some white microbial films. Eh has dropped to 125 from 170
 19:06 a sheet-flow type of lava here, in places. Still a lot of tubeworms, some crabs, a few snails and mussels.

19:12 pocket of dense biology with old chimneys 1-2m high; some fallen. Shimmering water all around. Eh = 147
19:16 another little chimney. Eh dropped to 120
19:25 oxide area with shimmering water, where Wolfgang said it would be. x=4803 y=4588
19:35 T-probe – T = 30 deg C
19:39 push in to the hilt – T = 35.2 deg C
19:50 deploying IGT sampler
19:56 J2-218-8-W1-IGT3. T init = 33 deg C. VVAn # 45180
20:06 J2-218-8-W2-IGT4. T init = 35 deg C
20:20 J2-218-8-W3-M4
20:48 scoop bag sample of mound. sample J2-218-8-R1
21:01 underway 086, 680m to CTD site with magnetic low.
21:06 snails again
21:12 old sedimented volcanics again
21:15 some snails and white patch area
21:19 completely sedimented bulbous lava formations
21:25 nice big “pillow”
21:25 nice coral
21:30 bottom drops off as we start to descend
21:31 crinoids!
21:35 old sedimented volcanics. sparse biology – sea pens, sponges, gorgonians
21:44 shift change. Still transiting to Chris’ CTD site. About 200m away
22:18 not a trace of hydrothermal activity at site of supposed proximal plume. Heading north to explore area of T anomaly is ABE survey grid
23:26 reached x5550 y5490 – the location of a T anomaly. No hydrothermal activity in the area
23:40 sampled piece of rock, a bud of a large pillow
23:48 off bottom x5565 y5470 z1915. **END OF DIVE 218**

J2-219, August 14, 2006

07:54 (GMT); 17:54 (Local)

07:54 Jason off Deck.
07:56 Jason in water
07:58 Media in water
08:37 Tivey Twist begin
08:44 Tivey Twist finish
09:04 160 m off bottom. Eh ~ 182
09:08 25 m off bottom. Eh ~ 185
09:12 Bottom dimly in view.
Lots of sediment ~ 100 % coverage.
09:15 Underway 083 ° for 160 m to possible chimneys
09:16 Solitary, old chimney w/ a few broken ones poking up through sediment.
Depth 1608 m.
09:18 Sloping up; sediment w/ white and orange staining
09:22 Slope has white outcrops along cracks a few cm wide
09:23 White pavement rock at a break in slope – stop to investigate
09:25 Shimmering water coming out from beneath the white cap rock
09:32 52 °C. And that's not even getting the probe under very far. Crabs and worms on the rock.
09:43 Sample J2-219-1-R1. VVan # 45859
Little mushroom growing on the edge of the flange.
09:52 Sample J2-219-1-R2.
Part of flange.
09:57 Grey rock under the ledge is hard, brittle; looks like it may have sulfur in it – bright yellow.
10:05 Push core. (Green). Clay ~ 1 m below outcrop. Got cores but they slipped out. Will take the tube core holder and use as a scoop; then stow core on top of it.
J2-219-1-R3. VVan # 45945.
Sampling Clay.
10:23 Wading to mounds at X2600; Y4820
Background Eh ~ 144
All sediment, up slope.
10:33 Chimney debris
10:46 Extinct chimneys; colonized w/ corals
10:53 Ditto
10:57 On top of large extinct chimney complex getting a fix on navigation.
Map offset X ~ 23 m; Y ~ 5 m
11:00 Going to WP1
11:07 Chimney debris
11:09 Oxide mounds; Eh drops to 117
11:11 More oxide deposits in diffuse flow.
11:15 Little chimneys; diffuse venting; oxide mounds; white pavement underneath chimney similar to station 1. X2666; Y4784; Z1576
11:22 Little scattered chimneys. Snail beds. Eh drop.
11:30 Main chimney field. Overall low activity; mainly diffuse activity; snails and crabs.
11:36 Beehive smoker.
Measure T; beehive falls into basket. Cpy spire remains.
11:50 T = 283 °C.

12:00 IGT7 bottle fired. T max was 282 °C, but dropped to 245-255 °C during sampling.
 12:01 Orifice broken off when snorkel was retracted.
 12:10 Second water sample. IGT6 fired. T max 288 °C. Steady.
 12:20 Major bottle M4 did not fire; trigger was blocked.
 12:38 Take second rock sample from chimney wall.
 12:45 Leave marker 12. VVan # 46400.
 X2729; Y4727; Z1538(?)
 Sampled chimney is ~ 6 m tall.
 13:02 Sample to of inactive spire. 2 m N of active chimney.
 13:07 5 m N of sample site is a chimney that looks like it was sampled previously.
 13:29 7 m E of station is a cathedral like chimney complex with beehives.
 13:57 Broke off piece of active chimney piece from “cathedral complex”
 J2-219-3-R1
 X2737; Y4725; Z1550 at Tgt # 9.
 14:07 Max T ~ 280 °C.
 14:10 Head on new course towards end of ridge. Heading 106 °.
 Need to fly over smoker complex.
 Waiting for Medea.
 14:17 Moving now across older inactive sulfides
 14:20 Passing y chimneys; sedimented bottom.
 14:25 Come to sedimented slope.
 14:28 Landslide on slope.
 14:31 Sulfide chimneys in sulfidic sediment. Go downslope to look for outcrop. Stop for a
 sample at low-lying outcrop.
 J2-219-4-R1.
 Rock sample from low-lying sediment covered outcrop. X2837, Y4721, Z1543.
 Target # 10.
 14:46 Course 080° for 50 m. Start moving will crab up he slope at an angle
 14:49 Old buried chimneys on slope
 14:52 Larger chimney complex; some biota; white bact. Mat on chimney surface.
 Some shimmering water at the top; fairly vigorous.
 X2895, Y4735
 15:00 Course 076° for 45 m.
 15:03 Come to white chimneys just in front of larger edifice. At the pinnacle and extinct sulfide
 edifice.
 Doppler offset ~ 20 m from map (west)
 Driving N for 40 m.
 15:17 Waiting on Media.
 15:22 Stop to sample a rock
 J2-219-5-R1
 X2920, Y4774, Z1516, Target #11
 J2-219-5-R2
 Variably sulfide stained sample. From same location as 5-R1.
 15:49 Dropping a weight.
 15:51 Moving east, 50 m,
 Moving upslope.
 15:52 Bio-mats. Come into forest of sulfide spires. Multiple chimneys side by side forming an
 organ pipe like structure.
 Evidence of sampling Nautilus.
 15:56 15 m tall. Inactive chimney at center of complex. Some shimmering water in this field.
 15:58 Head 067° for 40 m

16:01 Another chimney edifice
 16:03 Flange on old sulfide. Collapsed chimney debris.
 Reached another large sulfide edifice of chimneys – some snails, barnacles, shrimp, crabs. Shimmering water
 * shifted underlay 23 m East*
 16:08 Chimney edifice is 12 m tall
 16:11 Course 045 ° for 43 m.
 16:15 Small low lying crack w/ sulfide chimneys. Bacterial material oxide staining in sediments – crusts; bacterial mats.
 16:17 More chimneys close together.
 A free-standing “tree trunk” chimney – inactive.
 16:19 More chimneys. Snails. Clear shimmering water.
 16:26 Multiple chimneys. Snails. No smoke though. Some “topped” sulfide chimneys.
 16:28 Reset Doppler.
 16:33 Go N for 45 m. Drive down into a small depression.
 Knock up a big dust cloud and it takes a while to settle – decide to continue NE.
 17:00 Course 050° for 75 m.
 17:07 Finally out run the sediment cloud and can see the bottom again.
 17:10 Boulders and sediment. Blocks of talus.
 Sporadic extinct chimneys – dead snails?
 Central tall chimney ~ 5 m tall; has look of being topped.
 17:18 Move around sulfide structure to left.
 Snails around shimmering water.
 Large collapsed slabs of sulfide. Among chimneys – no obvious activity.
 Octopus in chimney.
 17:35 Now continue E into a small valley depression.
 In our own dust cloud.
 17:50 Trying a push core.
 17:55 Vanko on watch.
 First push core attempt mostly fell out. Looked like a sulfide rich mud.
 Second attempt – no luck. Stow push core and try to remove rubber band piece still on it.
 Third try – most fell out but may have gotten some.
 J2-219-6-R1.
 18:09 Stowed the push core and started heading up
 18:13 Small narrow coursed chimney tips protruding from sediment
 18:14 Coproform here.
 18:16 Massive dense sulfide
 18:18 Chimney w/ shimmering water near base; white cracks.
 18:22 Small white “porcelain xmas tree” with conical shapes; horizontal blunt and little mounded ledges all around it like a pine tree covered w/ snow.
 A friable more degraded one is in front of it. T up to 132 °C.
 18:30 Now probing top of large tree. ~ 55 °C.
 18:38 Very large blocks and spires of fallen sulfide at base of this slope.
 18:41 Snail lag deposit in sediment pond; large chimney debris.
 18:44 Now at top of mound, labeled “active area” on our map. No smoke in water.
 Activity in these mounds of snails.
 18:47 White flange ~ 1 m wide. Shimmering water from under it. Target #14 – may return to sample.
 19:01 Lots of very large clumps of extinct chimneys – meters across and high.
 19:04 Eastern edge of this mound – rubble and a patch of snails and white ground and shimmering water.

19:13 Thoroughly explore Eastern tip – dead.
 19:15 Lots of dead stalks and fallen rubble as we creep back west.
 19:17 No “typical” biology here – sponge, gorgonians, anemone. Is it a toxic place?
 19:19 Massive chimney and white cracks.
 19:25 Target 15. Good orifice that we can come back to
 19:31 Target 16. Another good orifice.
 19:34 Heading back to tgt 15 for a T measurement/ 12 m tall telephone pole passed by. Still venting diffusely from top.
 19:39 Approaching chimney at tgt 15.
 Light grey smoke; stubby white chimney w/ black top.
 19:45 Snapped off the chimney to reveal a good orifice; but the chimney fell and shattered.
 19:48 Rest of orifice creamed by the T probe. T 233 °C.
 20:02 Have looked for the orifice that fell, but no luck.
 20:11 On our way to tgt 16.
 20:21 Set up on tgt 16. Will get T first. T ~ 200 °C on little jet to left. Top does not have much of an orifice. T ~ 160 °C from little chimney to right.
 20:36 Sample 10-R1 from the top if this chimney – dust. VVan 47869.
 20:44 Orifice ~ 210 °C. Jet to the right ~ 223 °C.
 20:58 Sample J2-21-10-W1-IGT8
 T holding steady at 228 °C.
 21:08 Replicate. J2-219-10-W2-IGT5. T steady ~ 227 °C.
 21:15 Leaving station. Around to the right is a nice flange w/ a beehive (really a snail-hive) on top. Active.
 21:31 Eh halved from 160 to 80.
 21:35 Good beehive w/ grey smoke. Target 19.
 21:45 Shift change. Have circum-navigated the whole mount. Read to hand off.
 22:11 No sampling at WP6. Instead going to explore slopes around X3200, Y5025 (South of chimney field).
 22:23 Went around E and S of slope of mound. Nothing but sediment and chimney debris.
 22:50 Crossed sediment flat to slope of big centered mound in map.
 Big pillow, flattened; try to sample.
 23:12 Moved down S along slope toward little knoll. X3250, Y4920.
 Found seep with white pavement; little chimneys and diffuse flow.
 T1 = 80 °C max. T2 = 125 °C.
 Biota: scaleworms, crabs, shrimp.
 12:33 Marker 9. VVan 48460.
 00:02 Off bottom; at locale X3211, Y4929. **END OF DIVE 219.**

J2-220, August 15, 2006 – Desmos caldera

08:19 (GMT); 18:19 (Local)

08:19 Jason in water
08:23 Medea in water
08:59 starting the Tivey twist
09:05 Tivey twist completed
09:26 1650m depth. 424 alt – smoke in cameras – alt to change from 2080 TD
09:27 do 1682 z. 398 alt – alt to change from 2080 TD
09:28 do 1700 z. 378 alt – alt to change from 2080 TD
09:29 do 1722 z. 356 alt
09:30 do 1763 z. 314 alt
09:31 not sure 1820 z. 260 alt. water just seems cloudy
09:33 begin Eh measurement. Eh = 171
Question: Was the Eh being recorded though we did not have the plot turned on?
09:40 bottom in sight – sediments with pillow-like rocks underneath the mantle of sediment
09:47 shift change complete – now underway 355, 95m to waypoint1
09:50 large collapsed pillow under sediment
09:54 100% sediments
10:01 pillows
10:10 going to waypoint2. heading 290 for 680m
10:14 pillows overlain by hackly flow
10:19 long tabular pillows
10:21 sharp, hackly flow front, little sediments
10:25 pillow flow front
10:39 still going up steep pillow terrain
10:44 terrains of lava flows, mainly pillows
10:53 take sample of pieces of that fell off pillows (?????????????????????)
11:10 E-W trending vertical wall is likely a small fault
11:13 see a terrace to the east
11:16 reached a pronounced terrace
11:17 going 10m downhill
11:18 uphill again, more pillows
11:20 clam shells
11:27 microbial mat, small patch
11:40 worm, then tether issues causing delays
12:01 reached terrace. Heading for hi-T vents
12:02 hydrothermal staining in sediment patches, more clam shells, another steep pillow slope
12:09 microbial mats
12:11 passed by lobate flow and climbed up a steep sedimented slope with abundant reddish whitish stains
12:15 sediments with cratered (due to hyaloclastites) surface
12:18 hyaloclastite field. Eh dropping
12:20 back in sediments
12:21 massive white staining. Eh is 96
12:23 dead vestimentiferans; shimmering water
12:26 altered hyaloclastite. x1467 y2690
12:35 sampled altered lava
12:37 hyaloclastite field with crabs
12:38 seeing white smoke. Ship's track is leading us away from smoke

12:42 sharp contact between fresh and altered hyaloclastites
 12:44 beautiful columnar jointing in outcrop
 12:48 climbed up wall and smoke everywhere
 12:53 went east 60, then came down 45m to see a contact between fresh hyaloclastite and pillow flow
 12:55 moving 210 heading to look for vent sites. Waiting for new doppler fix
 13:23 altered pillows
 13:25 white smoke
 13:29 found venting of white smoke within altered talus
 13:39 measuring temperature at a site of vigorous venting from underneath a sulfur? ledge. T1=83, T2=112, T3=111. Make this a target in DVL. Target # 11. 1910m depth smoke from white zone of altered hyaloclastite.
 14:04 Looking at 228 see other smoke in distance just a few meters uphill. 1909 m. T=112 1364 2789
 smoke, pillows up slope at 237°
 moving parallel to slope come across three separate zones of smoking
 14:27 DVCam on for T measurement
 5-T1 max 117°C
 5-T2 max 92.6°C ledge
 14:37 x=1361 y=2790 z=1908, target #12
 stop DVCam. Stop to take sample of fluid here
 14:59 sampling white smoker of steaming sulfur patch
 J2-220-5-W1-IGT1
 Done; max T 113°C dropped to 80°C at end
 X=1361 y=~~1908~~ z=1908
 15:08 stow bottle #1 and get IGT#2
 IGT#2 has an ambient 12°C, i.e. 10°C offset
 15:12 taking sample
 J2-220-5-W2-IGT2
 Thermocouple 17° in seawater
 12.5°C
 finished, max T 129°C – offset = ~116°C
 15:20 now do major sampler
 15:27 major is in smoker orifice – telltale looks good
 15:34 triggered
 J2-220-5-W3-M4
 15:42 stowed bottle now go for a sample
 J2-220-5-R1 rock sample from vicinity of fluid sampled
 J2-220-5-R2 – scoop sample of ledge in biobox
 16:01 move north –laterally along scarp face
 16:13 shimmering water
 “floc-city”
 J2-220-6-T1 : 69C max T on shimmering crack; 72C max
 x=1355 y=2794 z=1908
 Fe-stained floc on o/c of hyaloclastites
 J2-220-6-R1 – rock sample from shimmering water, site of temperature measurement above
 Fossilized animals and worms Fe-stained and coated in an isolated bunch.
 16:37 smoking bare rock lava
 16:38 more staining, shimmering water, more smoke
 16:42 into just hyaloclastite talus now

16:57 continue to cross talus slope at hyaloclastite
 17:17 a number of larger angular flat blocks of lava ~ sheet flow?
 17:27 stop for sampling what looks like outcrop
 J2-220-7-R1 – a fragment of clast from a consolidated megabreccia of hyaloclastite
 X1437 y3025 z1894; target #14
 17:38 move on course to northeast heading for the headwall of the caldera
 17:55 Vanko watch: we are at the wall and will head south
 18:09 have decided the best approach to the watch is to drop down here rather than crawl any
 further east or come up the wall (which is considerable); we will descend back down to
 the flat area due east of the Onsen field, then ascend back to it
 18:18 the rocks in wall are pillows, large (1 m +), radial cracks, aphanitic rinds,
 oxidized/weathered. Found an outcrop that juts out of very altered rock
 18:20 Sample J2-220-8-R1 – altered rock from caldera wall – an altered promontory. Compare
 to alteration at Onsen.
 18:29 At base of the outcrop is a pile of gray rock with white alteration rinds – get a piece!
 J2-220-9-R1 – we have dropped 30 m in 10 m distance. Two tube worms
 18:38 looked at the vertical outcrop just above to image this – we can see where the altered rock
 came from. Small dip in Eh – consistent with tube worms? Eh 140 down to 125
 18:48 Backing down slope – fairly turbid water. Blocky talus – can't see much
 18:53 talus of volcanic blocks, pillow fragments, and some fragments of highly altered rock
 18:56 blue water
 19:04 u/w south, now contouring to the E of Onsen. Talus, dusted with sediment,
 depth=1915m. Eh dropping – 119
 19:10 still rubbly talus dusted with sediment; d=1908, Eh=1-6
 19:21 blocky talus, some large with a brecciated/cemented texture
 19:29 odd rock in the blocky talus – it has a very rough surface, may be a pillow with very
 coarse hackly surface. Hedgehog.
 19:34 morphologically young pillows – lightly weathered (not shiny glass)
 19:38 milky smoke wafting over pillow lavas; marker 17 – young pillows
 19:46 same – young pillows, a fog of wispy white smoke emanating from them(?)
 19:48 deposit of material that looks a bit like tufa or karstic limestone. Sits right next to pillows,
 maybe on top of them, too. 1-2 m high, 5-10 m lateral dimensions
 19:54 On station 10 – the material is fairly light and friable. Chris calls it “coralline,” but I see
 more “rose petals.”
 20:04 picked up a piece, but it was volcanic with just a tiny bit of hydro stuff, so we said “no,”
 and Phil the pilot thought we meant no sample and he lifted off. We had a good laugh.
 Anyway, got a piece. Has biofloc all over it. Is this all lava? Maybe a gas escape
 structure. Sample J2-220-10-R1.
 20:15 waiting on navigation
 21:21 still waiting on nav
 back over the flakey flow that was just sampled
 20:30 beautiful young pillows
 20:33 more “corn flake” formations. Some white bio floc
 20:34 dark rock with white floc, many crabs
 20:35 pillows dusted with white floc
 water column filled with white floc
 Eh plummeted to 70!
 20:43 moving west – large block outcrop of oxidized bleached rock
 20:46 pile of noodles – worms. On an outcrop of rock, altered.
 This is a several-meter wall of rock that is all altered, and should be the footwall of
 Onsen. The pillow flow to the east comes up to the foot of this wall and stops. Eh=95

20:54 Will gets a piece of the rock. J2-220-11-R1 – nice altered rock, soft, gray interior and white exterior (stained orange).
 21:00 moving up ridge, 270°. Oops – will went 290° and right past it
 21:03 coming back – see the white smokers
 21:05 a mound of altered rock, shimmering water and tube workms, top at 1906 m
 21:10 Medea view (sketch here in logbook original)
 21:23 native sulfur overlooking the wall of vents (sketch here in logbook original)
 21:26 Station 12 – It is taking Will forever to get a sample. I am getting frustrated! It's 21:42!
 Sample J2-220-12-R1 –this is probably gray volcanic rock. Need sulfur
 Shift change
 21:53 Sample J2-220-12-R2 – this is a plate of the native sulfur (Note added later – R2, taken by Bood, is ordinary native sulfur. R1 taken by Will is a fantastic delicate boxwork of crystals of native sulfur, so he did a good job sampling any of it!)
 21:52 Bach watch – moving 20 m to the west
 22:06 talus wall, highly altered; going south and up a wall – razorback ridge?
 22:16 vestimentiferans
 22:27 sampled piece of altered pillow from outcrop
 22:33 heading for transition fresh/altered to sample rock
 22:37 diffuse flow hyaloclastite
 22:41 back to altered pillow wall
 22:50 transition fresh-altered
 sample altered clast 14R-1
 fresh, massive clast 14R-2
 fresh, vesicular clast 14R-3
 23:00 move to target 13 to sample 70°C fluid
 23:40 shooting IGT bottle, T=72°C
 lots and lots of microbial mats around vents decrease visibility and make sampling difficult
 23:50 second IGT bottle (no. 3) T=68°C
 23:57 major bottle fired
 00:00 off bottom 41.49 51.93 1906. **END OF DIVE 220.**

J2-221, August 16, 2006 – North Su

09:02 (GMT); 19:02 (Local)

09:08 Jason in water
09:11 Medea in water
09:18 Jason is having some thrust issues. Winch stopped, J2 depth = 47m
09:21 heading down
09:33 stopping the winch again, 333 m depth
09:36 going down again; all the guys are here now
09:41 troubleshooting complete; shift change
09:50 communications dropped again; Bood says if it happens again we're bringing it up
10:11 Tivey twist done
10:22 Eh drops suddenly at 1280 mbsl
10:27 on bottom
10:33 sediment, volcanic clasts/bombs?, microbial mats, white and red hyaloclastite apron, fresh lava and pieces of bleached rock
10:48 up slope are more stained sediments, occasional large boulders/bombs? Ar commonly occupied by large red shrimp
10:57 Eh dropped 20 units to 104 in last 2 minutes
10:59 big buoder, about 15 c. high, sitting in a little rubble field; boulder is a massive chunk of rock that looks like a spine or dike; some diffuse shimmering, very gentle; few shrimp
11:05 navigation issues / sharps problem
11:35 started moving NE up talusslope
11:38 got to what looks like a dike; Eh dropping rapidly
sulfur flow and white venting; crest of dike is covered with whitewater (sulfur) and a sulfur ledge is sticking out from near the top of ridge/dike
11:47 setting up to sample sulfur ledge; close-up reveals it is all covered with sulfur(?)
microbial mat; x3755 y3533
11:58 sulfur finger and white smoke; diffuse venting
12:05 move 18 m to the north and find more vigorous venting of white fluid from the base of dike; measuring T – not possible to get to vent – too much smoke
12:19 try less vigorous venting here
12:30 T measurements yield temps up to 284°C when inserted into sediment. The T probe is covered with black sulfur when taken out of sediment. Above sediment surface temps are very low, ~20°C, even within gray-white smoke
13:05 moved N a few meters; white smoke issuing from collapsed roof of pillow; T = 20°C
13:10 getting into terrain of volcanoclastic material, steep walls, pillar-like structures peeled off from wall
13:15 T-measurement if white fluids venting from crack in wall, T = 45°C
13:30 take fluid samples here → sampling sheet
13:38 reset Doppler x3726 → 3729, y3590 → 3581
13:58 move east 15 m to go back to several outcrops; crack with shimmering water; moved back along track to find outcrop for Wolfgang
14:31 stop to sample outcrop x3743 y3555
14:35 4-R1 upper piece o/c
4-R2 lower piece o/c
x3744, y3558, z1262, target #7; try to pick a piece of rock from smoking white vent area
14:40 J2-221-5-R1 rock from smoking white, vigorous; x=3751 y=3553; in basket B, target #8
Now take temp measurement, DVCam on; Tmax = 193
Set up for fluid sample of billowing white smoker

14:57 taking sample; J2-221-5-W1-IGT6, Tmax 204°C, fluctuating 180-204°C
stow bottle

15:01 Jason has been dropping out thruster power and HPU due to tether problems

15:03 pick up next bottle for fluid sample
Jason can't drive forward, no lateral control; operator error

15:06 DVCa, stop

15:14 taking water sample
J2-221-5-W2-IGT5, Tmax = 215°C, ~ 200 T for most

15:17 done; now major sampler

15:23 tell tale venting good, take sample J2-221-5-W3-M2

15:25 done

15:29 moving 060°, 30 m
lost in cloud – Jason comes a log way off bottom – lost bottom lock in smoke

16:01 reset Doppler – in smoke

16:02 move 310°, 30 m; finally out of smoke; very steep promontories of rock o/c

16:10 floc/bacterial mats on walls

16:11 massive o/c

16:17 stopping to sample massive orange-looking o/c

16:25 J2-221-6-R1, hyaloclastite from scarp; x3770 y3621 z1202, target #9

16:30 move again on 310 parallel to slope in smoke

16:34 some smoking vents z=1202

16:40 in smoke

16:53 moving ship uphill to east in smoke

16:56 lots of floc in water?

16:59 cleared up – no smoke here; stop to sample hyaloclastite coating on rk
small promontory o/c – very friable material

17:04 doppler reset

17:08 221-7-R1; x3757 y3656 z1192; hyaloclastite from small promontory v. friable outcrop –
3 pieces

17:17 moving again – black stripe in cliff face it's a small erosional gully
move 090

17:24 pass over a flow – looks like a sedimentary slope deposit or possibly a very smooth lava
flow of material

17:34 into some o/c – breccia flow – white coating

17:38 stop at the top of this flow front to sample – lots of fish on this part of the slope. Small
fault or fracture runs through this area oriented 55°
J2-221-8-R1; x3795 y3653 z1164; target #11

17:52 near summit. Black smokers in a line- azimuth 305° at 1161 m

1754 Vanko – on station 9. This is an active chimney area – some relict structure a meter
across and lumpy, several m high, and next to it some small pumping orifices

18:03 5-cm delicate orifice with black smoke
9-T1 = 302°C
marker #12
Chalcopyrite in conduit wall; biology here is shrimp, rock crabs, fish

18:11 tried to sample a relict – disintegrated

18:13 10 m-tall active chimney, oozing black smoke all up and down, including beehives at top.

18:23 approaching station 9 from the other side to try to pick up the fallen piece of orifice.
Sample 221-9-R1 – tip of spire, inactive, fell into basket in pieces

18:36 Sample 9-R2 – nice relict or recently active chimney; will get T of black smoke now
coming out of the cpy base of it: 9-T2 = 286°C

18:46 the 10-m structure has a ~ 2X2 m or larger base that is a forest of smaller several-m relict chimneys. Chimneys continue lined up along the ridge. Most all are relict. Except some shimmering water.

18:56 Continuing up ridge – hundreds of extinct chimneys. No biology. Some shimmering water, one place at 18:58 – black smokers

19:01 this is a smoker complex with at least 8-10 smokers

19:06 Station 10 for a sample of slabby rock, probably sulfide, from the chimney substructure at the summit. Target #13, Sample 10-R1; shimmering water from under the ledge

19:11 off station – this whole area is ethereal – dusted with “snow”

19:18 SE side of summit, sampling a bench of rock. For identification. Too cloudy to work. Delete station.

19:28 Station 11. Bench on N side of summit – I say sulfide and Chris says hyaloclastite. Too crumbly to sample – will try scoop bag. Sample 11-R1 – biobox

19:53 stowing the scoop bag in the biobox, we’ve drifted off east. Now seeing the NE slope of the summit

19:58 Station 12 – on north side of summit – sampling the overhang slab at the summit – probably same as 10-R1; Sample 12-R1

20:08 take a temp of the shimmering flow from beneath the ledge
Tambient = 3.5°C; T in crack in outcrop = 26°C, 68°C

20:16 finally in clear water – on S-facing slope of summit heading E. Slope is talus, clear water, no activity, snow, oxide, and white floc. Fish fairly abundant.

20:18 large old sulfide edifice base forms the local summit here. Several meters in diameter and maybe 5 m high. Very old and worn.

20:27 old rounded chimney-like forms

20:33 going down the ridge to the SSE – very cloudy water. Old jagged peaks covered in snow, fish, squat lobsters, shrimp.

20:45 huge volcanic form – pillar, tilted, 1 m+ diameter, sulfide? volcanic? – comes into view (it’s been very cloudy – almost no visibility)

20:46 shimmering water

20:47 white smokers

20:48 stopping for T probe of white smoker with a ½-m white chimney, rather fat

20:54 T1 = 71°C – 13-T1, white smoker, target 16

20:59 Sample 13-R1 – chimney sample – white

21:16 Sample 13-R2 – gray rock from seafloor (float) nearby. (It took a while to find, after setting down right on the white smoker that we just sampled.)

21:24 travelling west along contours with the aim of heading N back up to the summit

21:28 terrain is stark, eroded, some rock jutting out from scree slopes. Stop to sample it – Station 14, Sample 14-R1 – gray rock disintegrates; tested the “outcrop” and it’s all very soft

21:42 beautiful wall of a ridge that could be a crater wall of maybe a volcanic plug/dome

21:46 shift change

22:00 going south to base of cliff

22:01 lots of white smoke venting from steep slope

22:11 all the way down to x3765 y3583 there is continuous white smoke activity

22:15 started moving NW staying underneath smoker field

22:19 getting into much white smoke

22:20 came down to measure T; got smoked out again

22:30 going south, trying to stay out of smoke, and work our way to the sulfur finger site for rock sampling

23:00 arrived at target site and attempt to sample native sulfur

23:30 abandoned attempt to sample sulfur ledge; it is too brittle

23:33	picked up piece of rock from site where we measured 284°C in liquid sulfur in sediment
before	
23:40	sampled piece of fresh lava from talus pile
23:47	dropping a weight
23:50	off bottom 3° 48.07 152° 06.02 1260 m
01:11	on deck. END OF DIVE 221.

Jason Dive #222

08:04 Jason in water
08:06 Medea in water
08:43 Tivey twist
09:09 alt:140, Eh:167
09:15 bottom in sight, crash a bit into soft sedimentary bottom
09:17 scant rocks, a couple of percent of bottom, look irregular <1m across
09:19 mud bottom, brittle star, infauna
09:20 hdg. 029° for 40 m to crater
09:26 crater – heavily sedimented. No outcrops.
09:32 Volcanic outcrop a meter or two wide. Fairly fresh looking lava.
09:35 going to drop outside this ridge and travers the crater slope. More outcrops – like large lobes.
Sediment separates them
09:38 good pillows
09:50 Moving on to Rogers Ruins field, had 240, range 250 m
10:02 Sedimented block and pillow lava flows everywhere
10:30 Dead oxide mound
10:33 Smokers, tall chimneys with shrimp and snails. Flange on chimney. Gray smoke issuing from a simple active chimney.
10:36 Found Marker 6, c. 20 m south of first chimney sighting.
10:45 8-m tall chimney complex with white smokers 10 m south of Marker 8
10:50 Clear to light-gray smokers from on opposite side of Marker 8 complex
11:08 T=268 after sampling of chimney (222-1-R1). Sample is from base of chimney
11:13 Fluid sampling begins
11:28 Fluid sampling done. Tmax=273°C
11:40 Sampling inactive structure from same complex
11:47 Hdg 211 for 60 m to explore nature of elongate mound
11:51 Inactive oxide mounds
11:55 Mound at target location is a steep sided short lava flow. Sampling piece of rubble here (224-2-R1)
12:11 Moving to Marke 4 site, hdg 230, range 230 m
12:36 Diverted from track to check out peaks in SM2k map and found a solitary chimney complex with an active oxide mound on its SW base
12:42 T of fluids seeping from oxide mounds is 88°C
12:49 Leave Marker 20 here
12:51 Chimneys are mostly inactive, many are fallen. Central chimney is 12 m high and dead. Small spires around it gently vent gray fluids
12:59 Going to next chimney complex 30 m NE
13:08 Got there: very similar situation with oxide mounds near base of chimney complex. Chimneys have varied shapes and show some gray smoker activity. Many are fallen and oxidized
13:12 20 m further east is a chimney wall of tall spires fused together. There is black smoker activity. Trying to measure temperature
13:47 Sampling for T, solid, or fluid failed. Black smoke prevents us from sampling
14:04 Dove around sulfide complex to find a good sampling spot. Knocked over a couple of dead chimneys to get access to active smokers
14:13 Set up to sample small black vigorous smoker on side of large beehive. Can't get a clean look at chimneys. Two we tried collapsed. Heading south
14:38 Forest of chimneys of all sizes, some several meters high, some only 10's of cm high

14:45 DVCAM on. Stopped at some small black smokers at the top of a coupled of m high chimney
 14:50 Sample J2-222-4-R1, active sulfide, black smoker chimney
 X2763, y3261, z1680. Target #62
 Get fluid sampler. J2-222-4-W1-IGT2, maxT 339°C
 15:00 DVCAM off
 15:08 stop sampling – stow and pick up next sampler
 J2-222-4-W2-IGT1, maxT=341°C
 15:17 J2-222-4-W3-M4 major water sample
 15:24 Done with fluid sampling
 4-R2 Inactive sulfide conduit
 15:32 Deploy Marker #18, x2764, y3264, z1679; Target#63
 15:39 Moving 270 c. 20m
 15:40 Large volume black smokers – quite a few, all vigorously smoking
 15:46 Arrived at another field of tall sulfide chimneys some of which are smoking black smoke
 15:48 Downwind in thick smoke, line of chimneys below is oriented c. 265°
 15:55 Gray smoke here from white stained/covered chimneys
 15:58 View of base of chimney shows them growing out of the sulfide sediment. No obvious volcanic rock here
 16:03 11-m tall chimney – gray smoke, lots of smaller chimneys around
 J2-222-5-R1, oxide crust sample from near a stand of chimneys x2719, y3273, z1695.
 Target #64.
 Shimmering water nearby
 16:40 Moving 153°, 44 m back into main Roma Ruins field. Small hummock, lava perhaps
 16:49 Volcanics
 16:50 Lone chimney a few meters tall, gently smoking
 16:51 More chimneys now
 Chimneys growing out of lava basement seems to be a little offset step up
 Angular jutting rock – turns out to be easily broken - suspiciously like cruddy old sulfide
 16:57 Sample J2-222-6-R1 cruddy old sulfide from base of sulfide, x2727, y3228, z1682
 17:01 Head 144°, 24 m towards a sulfide chimney complex within the main field
 17:03 Sitting next to inactive chimneys
 17:04 Onto flat pavement – broken/collapsed chimney pieces
 17:08 Small chimneys growing out of talus, dead
 17:09 Taller chimneys now – white and shimmering water, gray smoke
 17:10 Reset Doppler
 17:12 Lots of chimney+smokers – mostly spindly shaped
 17:15 White mushrooms, ½ m high
 17:17 DVCAM on
 Sitting at mushroom flange. Sample J2-222-7-R1 active sulfide flange piece, x2750, y3211, z1678
 17:21 DVCAM off
 17:24 Inactive black smoker chimney field, >10m tall chimneys
 17:31 In smoke, moving to the west
 17:42 Tall, skinny chimney amongst many white-capped tree-trunk like chimneys. Will try and sample this chimney
 17:55 Vanko – during shift change the pilot tried to sample and knocked over chimney
 17:56 view 10m to the NNE, see large mound of sulfide
 17:59 Large chimney, some active, most not. Gray smoke
 18:02 Biology here is pretty scant – a cluster of snails here and there

18:09 Moving to the right – east – very dead area
 18:14 Sampling station 8
 Moving some little inactive ones out of the way – picked a small red one, inactive.
 Sample 8-R1
 18:36 Sample 8-R2, active one
 18:39 Try to get a temperature
 8-T1=254°C orifice on the left
 8-T2=288°C orifice on the right
 18:59 Station 9 – between 2 mounds, at base of Marker 4 mound, we look for volcanic rock
 9-R1 and 9-R2
 19:03 9R-1 is light-colored rock
 19:05 9R-2 is gray, volcanic rock
 19:14 At Marker 4 – good nav! Needs only 1-2 m reset
 19:16 Move 319, 260 m to mound along strike of Rogers Ruins
 19:29 Traversing hackly lava with some ropey sheets
 19:32 Shimmering water and oxide mound x2666, y3236, z1690
 19:36 More shimmering water
 19:40 Old lava sheets and lobes, Not much sediment
 19:50 Very odd creature – vvan# 56245
 19:58 Have arrive at ridge – it is lava. No hydrothermal features
 20:00 Head 222° for 50 m to the next lumps of lava
 20:11 Next target is also lava
 20:14 Fire Niskins
 20:17 Head 197° for 60 m
 20:21 Hackly pillow lava with 2.3 bulbous flow front
 20:28 Head 153° for 50 m, slightly sedimented lava
 20:35 Many pillow forms, but often deeply fractured
 20:41 Fault-like scarp, drops down a few m
 20:47 into same tectonic morphology – NE-SW trending scarps
 21:05 Bottom of hole is sedimented lava at x2491, y3065, z1674
 21:10 Stopping for white-stained lava talus (11-R1) we follow uphill to a stump of lava tower, 1
 m tall, 1 m wide, with irregular surface. Flinty fracture pieces are gray, with white
 alteration and white veins. No shimmer, no Eh change
 21:33 Head 206° for 83 m
 21:44 Shift change
 21:55 Heading 220° along fault bounding rift to the NW. Talus, little sediment. Ridge to the
 NW of fault is heavily sedimented
 22:10 Doing a calibration/comparison of resolution of the two downward-looking sonar
 systems
 22:31 Test completed
 22:33 Moving 223° for 50 m to bottom of depression
 22:38 Pillowed flow front over sedimented terrain
 22:46 Steep wall to SW with unsedimented talus at its base, climbing up that wall
 22:58 Top of hill is littered with m-sized lava blacks. Sampling (12-R1)
 23:08 Crossing central rift, heading 100°, fault wall clearly exposed
 23:20 Moving 036° to knoll
 23:22 Crossing central graben
 23:28 Moving up fault wall littered with talus
 23:45 Moved to the NW to location of SM2k calibration test. Crossed central graben once more
 23:47 Dropped weight
 23:50 Off bottom. **END OF DIVE 222.**

DIVE 223 – Needs preliminary data

08:58 Jason in water
09:01 Medea in water
09:22 Begin Tivey twist
09:28 finished Tivey twist
09:55 on bottom, steep wall of volcanoclastic rock
10:00 going 60 m west to black smoker sites through steep walls and pillars of volcanoclastic rocks
10:06 white smoker vent 30 m SE of black smoker vents
10:10 having problems finding chimney
10:20 found flange with diffuse flow
10:22 go 30 m south to black smoker
10:30 10 m tall multispired chimney venting from base, half-way up and top
10:35 trying to sample chimney from halfway up the structure
offset in nav is 14 m to the NW
10:50 T probe = 288°C
10:56 IGT8 bottle fires Tmax = 299°C
11:05 IGT7 bottle fired Tmax = 300°C
11:13 major sampler 2 fired
11:20 leave Marker 19 at site
11:25 heading 20 m 040° to west in map????? Then 20 m NW. White smoke everywhere
11:43 westernmost part of summit has hundreds of eels, more white smoke to SE of here;
decide to go around the summit to the NE
11:53 got to pavement crust, other side of the feature that was sampled in dive 221. Measure T of clear fluid venting from a hole underneath the pavement/flange.
12:08 steep cliff to N, clear water there
12:15 everywhere else is whiteout; come up with J2, radar range is 50 m; do not see any major edifices
12:20 go ENE along rim of a crater with mainly ash and occasional volcanic bombs
12:26 further down the ENE ridge sediments prevail
12:28 outcrops, pillows here
12:30 peek around ridge at eastern flank, everything is whiteout
12:45 following ENE ridge down slope; dike outcrops and hyaloclastite deposits
12:52 went down flank to the north; a dike with microbial mats, annelids, crabs forms a marked outcrop with some diffuse venting
13:00 diffuse venting, relict tiny chimneys with lots of macrofauna, in hyaloclastite field; crabs, tubeworms, alviniconcha, barnacles, limpets. T=32°C max.
13:24 about 6 m E and 2 m N of that site is venting from a talus pile with shrimp, snails, scaleworms, tiny tubeworms, barnacles, etc. T=23°C
13:30 continuing to SE we find more springs with more S bacterial mats, less snails, no tubeworms, no fish
13:39 further to the SE, more diffuse vent sites are heavily coated with white mats. Few shrimp, crabs, very few snails (including pink shrimp seen on SW flank during dive 221).
14:03 moving south around the cone. Moving past talus slopes, occ. white staining
14:08 altered zone of rocks
14:14 coming into a large zone of white bacterial mats, staining, snails, etc.
14:17 reached large outcrop of jutting rock looks orangy and volcanoclastic similar to previous samples – a megabreccia of ??? blocks
14:25 J2-223-5-R1; x3893 y3667 z 1198, target #26

climbing up slope at this main steep sided cliff. Come across very steep to overhanging cliff faces. Some white areas look like sulfur. Sheet of cemented debris forming a coating on slope.

Block of native sulfur in this cemented flow.

These outcrops form a major east-west faulted surface cutting into the volcano

- 14:36 smoke – last visual of scarp and bottom
- 14:37 now back in view; extreme white staining on outcrop
- 14:40 lots of small crabs on rock outcrop; twirl to remove wrap
- 14:43 256°, 41 m
- 14:47 seafloor has smooth appearance here; looks like windswept volcanoclastic material – up close made up of many different sizes of grains
- 14:49 getting to larger blocks of talus; area of white bacterial mats
- 14:49 lots of fish, 1163 m around this area
- 14:54 stop at white staining – no other obvious megafauna other than bacterial mat. Try to get a temperature measurement from crack at center of white zone. DVCam on. 24°C in black crack.
- 15:08 T= 58.6°C
J2-223-6-T1; x3845 y3672 z1166; target #27
- 15:11 DVCam off
- 15:15 get a rock sample from shimmering crack
J2-223-6-R1
- 15:20 now continue on course 301 for 15 m
- 15:22 see sulfur flows down face of cliff. Climbing a big knob of volcanic material – native sulfur flows on its side
- 15:24 more shimmering water; white stained stacks of lava, large amount of shimmering water
- 15:25 at top of volcanic knob white bacterial mats with shimmering water
- 15:21 continue on 310° 20 m
J2-223-7-R1; small friable sample, x3818 y3688 z1159, target #28
- 15:50 come into smoke at summit heading west – can't see anything
- 15:51 decide to turn north and head out on that rift zone
- 15:52 white covered outcrop, field of chimneys, black smokers; x3807 y3690 z1153
- 15:56 continue driving on, white covered flows sloping downhill; large flat sheet of consolidated flow breccia with shimmering water abundant
- 15:59 stop to get a sample; lots of fish. Very friable – totally disintegrates when touched.
223-8-R1 – thin platy oxide from surface at breccia flow; x3796 y3709 z1162, target #29
Try for sample of clasts from deeper within the flow. Cannot get anything, it is too friable.
- 16:20 move off to the north. Large massive blocks and pillars of consolidated volcanoclastic material; lots of crabs on surface of outcrop
- 16:42 stop to look at then try to sample small fan of cemented debris that has formed on outcrop. Could be native sulfur.
J2-223-9-R1 – very friable gray crust on volcanics; x3812 y3764 z1190
J2-223-9-R2 – vesicular lava
- 17:01 reset Doppler; Moving parallel to slope over to the east. Moving to waypoint 25 of previous watch. Come into hydrothermal staining, snails, chimneys. Shimmering water. Alvinconcha snails, tubeworms, shrimp. Chimneys are actually volcanic pile of cemented clasts.
Field is on a small ridge
- 17:23 deploy Marker 17 near the 2 small “chimneys”
x3858 y3771 z198
move around field, stop to get a sample

J2-223-10-R1 – three pieces from shimmering mounds. Talus covered with clams. Next marker 17

17:39 begin heading west parallel to slope course 285° 40 m

17:44 crab gradient, white bacterial mats, sedimented talus

17:50 Vanko watch

17:52 shimmering water

17:54 going to measure T of this shimmering water coming out of platy rock. A yellowish crust coats the hillside in the background – sulfur?

18:00 on station 11 – taking the T of a clear-flowing crack
T of clear flow from crack = 102°C
T of ground beneath the yellow crust in the immediate background = 125°C
Drifted over the “sulfur” crust – rock outcrop, water from beneath crust, T up to 230°C
Will take sample W1-IGT in the flow from beneath the crust where the T probe was stuck, and which is now producing brown-gray smoke

18:38 having trouble getting the snorkel to find the same high temperature; the crust is breaking and there's poor visibility

18:45 fire the samples
Sample J2-223-11-W1-IGT5; Tmax = 240°C (varied from 230-240)
Vvan 58532

19:12 have not been able to get the second bottle up to T>150°C, so we are shifting 1 m to try another place along the edge of this crust (sketch inserted in logbook).

19:26 Sample 223-11-W2-IGT6 – Tmax = 202°C
this was 1-2 m away from the first one in an attempt to reproduce it. Not even smoking. Stealth fluid!
Sample 223-11-R1 – rock overlying flow sampled by W2-IGT5

19:45 Sample 223-11-R2 – underlying sediment plus crust from water sample site. Every time we break through this white/yellow crust we seem to generate some flow.

19:52 underway west along contour

19:56 the lower lip of this slope is a 1-m plus ledge, with lots of water shimmering coming out from under it and from orifices on top

20:01 Station 12
12-T1 – from flow coming out under shelf (dropped the T probe at 20:04)

20:09 12-T1 = 89°C
12-T2 – fluid temperature from a crack up on top of the ledge

20:30 trying to sample

20:38 Sample 223-12-R1 and 12-R2 – two nearly identical pieces from hard rock on the ground just off the edge of the ledge = ledge material

20:47 underway 290° 20 m or so

20:53 nice tall rock ridge and pillar structure. To the west is more shimmering water, coming out of two levels with horizontal flanges

21:02 Sample 223-13-R1 – a nice piece of the hydrothermal flange. Lots of black dust created as this was sampled. Is it sulfide?

21:13 13-T1 = 212°C = flow temperature of flange after rock sampling

21:22 decide we can't get a good enough flow to use the major sampler. Will go on.

21:32 Lost bottom for a few minutes. Now we see bottom, volcanic scree slope, and we can see station 13 to the left.

21:34 heading 138° up slope

21:38 up the scree slope, a brown rock with shimmering water and T=82°C, up to 102°C

21:48 Sample 223-14-R1 – white coated rock here

21:56 Bach continues: checking on mound 50 SW of station 14; going through talus field with patches of white sulfur mats.

22:08 big boulders with diffuse venting around them
 22:15 fault walls exposing volcanoclastic poorly sorted material
 22:20 flange with black smokers
 22:25 stacks of black smokers belching flashing fluid
 22:35 T probe gives T= 319°C; pulling major fluid bottle
 22:40 major bottle sampling; piece of chimney orifice broke off prior to sampling; good tell tale!
 23:10 took sulfide chimney sample. Many pieces fell into the basket from chimney above; biota = shrimp and crabs
 23:30 20 m south of station 15 are only dead chimneys
 23:35 hdg SE 20 m – clear fluidventing
 23:40 hdg N for 35 m and out of hydrothermally active area, no chimneys here. Going 40 m south: dead chimneys
 23:55 headed SE for 50 m; no chimneys, diffuse venting; sampling piece of tallus from base of fault
 24:00 dropping weight; 3° 48.02'S 152° 06.02'E 1200m
 00:06 white smoker at x3707 y3693.
 00:10 Off Bottom. **END OF DIVE 223.**

Dive 224 (Needs header material)

08:07 Jason in water
08:19 Medea in water
08:57 begin the Tivey twist
19:04 end the Tivey twist
09:07 depth of Jason is 815 m; begin Eh plot, Eh = 126
09:18 smoke in cameras at about 1185 m; Eh starts to drop to 199.6; top of South Su is about 1300 m plus, so smoke has come up >100m.
09:22 Eh steps down to 117 at around 1280 m or so
09:26 40 m from bottom, Eh still 117
09:29 bottom in sight at a distance – old rock, sediment
09:30 sand pile – very weird; rocks below but sand up on the top
09:31 this becomes a ridge oriented ~240°C; sediment on top.
09:34 rutted terrane
09:36 old rock, no young volcanic morphology; looking up hill toward S. Su, scree slopes with oxide and white crust exposed. Looks barren – these are white rocks, not bio films. Breccia (a rock with breccia texture was laying there.)

09:41 large dead clam shells
09:42 rock with constructional oxide features
09:45 shift change, much discussion
10:00 going through rough terrain with steep wall exposing bleached, gray and red rocks
10:10 picked up a bleached brecciated rock from crest of a ridge
10:15 got to NW ridge, Eh problems; ship control problems
10:20 have to leave bottom
10:40 got control of ship again
10:41 N facing wall of NW ridge features mussels, crabs
10:43 big massif, dike or dome with columnar jointing
10:50 resetting Doppler
11:00 dealing with tether wraps now
11:10 navigation issues causing further delays
11:28 back in control moving west along N face of NW ridge
11:33 small mussel bed, few crabs
11:35 larger mussel colony along cracks; tube worms
11:37 over sedimented area now
11:39 white patch, Eh dropped a bit
11:43 starting search grid 20 m spacing, E-W lines
12:09 Eh has dropped into the 20s as went up slope hdg 090
12:11 ship took control again
12:22 back in control, going up a heavily sedimented slope now
12:36 shimmering water, crabs, shrimp
12:55 sampled bleached rock from gully on inward facing wall
12:56 hdg 25 m south, then west to continue search pattern
12:57 hdg 220
13:10 Eh dropped around peak of NW ridge area, heavily sedimented
13:15 only diffuse activity here
13:30 surveyed peak area but find only seeps and mats, some gently shimmering water; many crabs and rare small mussel beds
13:32 heading 212 for 70 to WP2; stop at mussel beds with white staining
13:54 next target x 4040 y2738; mainly sedimented talus; Tambient = 2.7-2.8

13:59 T meas between outcrop/sediment with white color; steep talus – rock looks
hyaloclastite
T° in clay-rich sediment covered by white
2.8 surface

14:06 6.8 deeper inside; outcrop looks like sedimentary

14:09 course 25 m 217 toward WP2; Eh = 51 going down

14:15 mussels, worms, white staining on dense mussel beds; try to get T° inside mussel bed
2.6 min → 3.6 contact with rock
→ 4.0 in rock cracks
x4012 y2715 z 1359; target 42

14:26 reset Doppler; more mussel bed along outcrop

14:36 looking around for more hydroth – low Eh clue; going ESE – following ridge. Altered
rocks but heavily sedimented flank talus

14:38 Eh = 49; little crabs; now heading 180. Eh = 65 – now we are uphill relative to WP2;
Eh = 62

14:45 find more worms but no T° anomalies

14:45 decided to go further south along the ridge heading 187(?) 30 m. Eh = 67

14:50 more white staining of rocks with small mussel beds

14:51 talus; now 10 m above sea floor – make way down

14:57 brecciated outcrop with altered clasts (look bleached)

15:00 waiting ship repositioning before sampling fissured outcrop with thin rusty coating

15:03 putting back T° probe

15:10 x4016 y2690 z1368, target 43

15:16 heading 138, 31 m; topography suggests collapsed that needs to be further explored
(specially with brecciated rocks here)
very steep talus – could be fault breccia

15:23 now sediments at base of talus

15:27 checking gauge, depth 1349

15:32 heading 236 going base of talus – sediments

15:37 heading 025 for 39 m, now facing slope – flank – quite flat now and sedimented

15:40 outcrop – volcanic rocks, variably altered; Eh = 34

15:41 big fish passing by; not much crabs but clam shells (empty)

15:42 now facing wall – may be deep sea corals

15:43 flying over outcrop with breccia – fault wall with offset of 15 m

15:45 133, 9 m – still brecciated altered rocks; maybe more altered; x 4023 y2689; could be
another sample of breccia

15:47 top of the ridge – more sediments on flat surface; more white staining on the east;
4023 2684

15:49 heading W toward target near WP2 for low Eh, Eh = 62

15:50 volcanoclastite; heading 350 – close up on altered breccia

15:52 reset Doppler

15:54 033 for 25 m: going uphill to find hopefully low Eh. Depth 1334

15:56 more sedimented – Eh up to 68 – rocks, talus

15:59 white staining on sediments with more crabs here; Eh = 51

16:02 065 for 40 m; going uphill following top of ridge

16:03 look more white staining as patches; 1329 m depth; found mussels, sediments with
minor scattered white patches

16:11 heading 87 @ 20 m; going top of the ridge. Strange biota – worms? with crabs on
volcanic rocks; new target – following ridge east-SE

16:18 heading 120 for 53 m; mussels, shrimps, crabs, but no shimmering water

16:22 shimmering water x4109 y2710 z1315, around mussel bed with ?????

J2-224-4-T1, T = 7.2, 12.5, 17

16:29 lot of white staining on sediments, not on volcanic rock; target 44
T° deeper in sediment between, T = 24.7 (6-T2); Eh down to 0 during T measurement)

16:34 reset Doppler

16:41 course 116 for 30 m

16:44 purple jellyfish, mainly sediment with white patches, heading 94 for 94 m

16:50 polygonal staining pattern

16:58 mussels along fissure but still more of the same sediments

17:01 more mussels; heading 140° - fault system at ??? affecting east side of the mount; heading ??? for 33 m toward bump on SE flank where low Eh

17:04 dead chimneys here on small mount; group of 4 to 5 chimneys – shimmering water around

17:16 J2-224-5-R1 – complete piece of inactive chimney – light color. Now sampling darker sulfides about 1 m away from 5-R1

17:20 galathea crabs and shrimps, mussels

17:22 J2-224-5-R2

17:25 probably active chimney behind Jason; turning around to heading 186; shimmering water from mount with flange; white smoke from chimney

17:29 station 6. Snails, shrimp; tall chimney venting, 6 m tall; VERY BIG PIECE taken in basket J and I. 6-R1, x4260(?) y2680 z1300; 5 m away from 5-R1 and R2.

17:40 6-T1, T_{meas} = 267 (same place than 6-R1)

17:50 we decided to take fluid sample here – difficult to clearly see orifice but good venting. IGT4

18:00 Vanko watch

18:04 Sample J2-224-6-W1-IGT4. T_{max} = 264, dropped at end to 225°C

18:18 Sample J2-224-6-W2-IGT3, T_{max} = 271°C; T_{steady} = 270°C

18:26 majors sampling J2-224-6-W3-M2 (can't see telltale with this setup).

18:33 Phil excavated the chimney to prove it would have been better to break the chimney and create a better orifice. He was apparently correct.

18:36 flange – good shape, mirror pool of water beneath. See PilotCam. There are several flanges here – fluid is sampleable. Also a toadstool chimney made of flanges (Sketch in original log book). The one we're focusing on looks like half of a Vietnamese hat, with a stubby pillar on top, and a bud on top off-center foreground.

18:39 Station 7, T1 = 11°C (outside of flange, on top, 10 cm from edge)
T2 = 14°C (outside flange, on top, 5 cm from edge)
T3 = 25°C (at edge of flange)
T4 = 241°C (reflective pool under flange)

18:52 had no luck so far sampling flange. Pulled off the off-centered bud on the top and that initiated gentle flow. Kept the sample: J2-224-7-R1.

18:57 reposition to use port (Schilling) manipulator. Two tries – no go. Third time – yes! J2-224-7-R2
[Measured temperature of flow coming from the pulled-off bud = 293°C]
two theories for why this is so hot: (1) pool has conductively cooled; (2) initiated flow has pulled up hotter water.

Deploy MARKER 16

19:15 underway 10 m SE to knob – sedimented saddle, then chimneys. Ancient mound, with spindly old relics, many snails. Some black smoke – active beehives.

19:23 Station 8, T of one of the beehives. Knocked it off, T1 = 284°C in orifice

19:32 J2-224-8-R1 – piece of orifice. Navigation target #49

19:36 decide to label this for possible return at end of dive, Drop a weight here to help with location

19:46 more sulfide mound at slope leading up to the knoll from the SE – this is the little knoll 10 m SE of our first water sample

19:48 2 old massive chimney stumps, dead, surrounded by fields of smaller newer chimneys, venting gentle shimmer now.

19:52 the top of the knoll is sediment to the saddle over to marker 16

19:53 fly by marker 16 – the white flanges really stand out against background

19:54 see “Phil’s hot hole” and weight; u/w north

19:57 10 m north of hot hole – mound of volcanic rubble with sulfide chimneys – this is the other side of the hot hole. Dozens of skinny pipes at top, mostly relict

20:04 rough topography, old sulfide continues unabated

20:07 drop into the gulley – massive volcanic rock plus old outcrops and fallen pieces. Sed.

20:17 rise up to see the top – the peak is sulfide. Underlay is about 10 m off. Dropped a new target called “highest point”

20:20 u/w NE along crescent of volcano

20:29 pass a lone sentinel, a 2 m-diameter tall chimney of volcanic or sulfide, then it drops down. Following N side of ridge – sedimented scree

20:35 sed. saddle ridge. Then volcanic outcrop – flinty and whitish-bluish look to it. Therefore, weakly altered.

20:37 massive pillar of altered rock – pause for a sample

20:40 we are at the NE part of the South Su croissant, just before it falls off in a final plunge to the NE. Eroded volcanic pillars here. Sample J2-224-9-R1.

20:49 u/w to NE end, but now we are stopped to unwrap tether. Can see nothing.

20:50 switched to “KO” baseline

21:00 eroded altered rock outcrop – finally see the bottom

21:03 altered rock – keep hitting it with out butt. Will is driving.

21:07 still seeing nothing. New course to waypoint 4, 37 m south

21:10 asked Will to get a look at the bottom – sedimented old outcrop

21:12 ascending scree slope. No staining or any hydrothermal stuff

21:20 fire the Niskin bottle – 10-N1

21:24 sample a rock because it’s there: J2-224-10-R1

21:34 ascending the talus/scree slope – some white rocks, but otherwise no indication of anything hydrothermal

21:40 beautiful sculpted ridge – a volcano-fluid-dynamic bedform

21:41 2 meter squared oxide patch. OK, it’s $> 2\text{m}^2$. Chris says about 2 m wide and 10 m long.

21:44 patch of rocks, dead snails, crabs. Not extensive.

21:47 field of patchy oxide mounds, flat, some shimmering water

21:55 shimmering water, patch of small chimneys in the background. Snail beds

21:58 have to catch up with Medea

22:02 back at little chimney field on E-facing slope

22:10 large colonies of barnacles, mussels, and ifremeria

22:15 chimney fields extends to SE for > 30 m and up the slope

22:26 crossing ridge with diffuse flow and mussel beds

22:29 patchy chimney fields to the NW

22:30 crest of main field is sedimented

22:35 got to Marker 16 site. The field is +/- continuous from 4250/2600 to 4300/2630

22:40 we go back to southernmost extension of the field and sample fluids

23:03 measure $T = 279^\circ\text{C}$ for fluid venting from very fragile black beehive that cannot be sampled

23:13 knocked over beehive and took sample (12-R1) of lower trunc???

23:25 IGT bottle 1 T = 288°C

23:29 T on outside of relict chimney wall, T = 11°C

23:34 IGT bottle 2 T = 286°C

23:45 major bottle, good tell tale

23:53 dropped weight

23:56 3° 48.57'S, 152° 06.32'E

Off bottom. **END OF DIVE 224.**

Jason Dive 225

Return to Suzette for sediment trap and ADCP deployment

09:16GMT	Jason in water
09:19	Medea in water
09:47	begin Tivey twist
09:58	Tivey twist completed
10:24	all stop
10:29	on bottom, sediments 3° 47.37'S, 152° 05.72'E
10:34	at site of ADCP location x3185 y4852 z1494
10:37	deploying ADCP, failed because of slope
10:42	moving up slope to flat area
10:59	deployed ADCP in flat area on top of mound x3183 y4867 z1489; vvan #62140
11:05	moving to sample site x3226 y4916
11:15	have to come up; dive aborted. END OF DIVE 225.

J2-226, August 21, 2006 – Suzette sediment trap deployment

02:25 (GMT); 12:25 (Local)

02:25 Jason in water
02:30 On the way down
02:52 stop for Maggie spin “Tivey Twist” 761 m depth
03:01 start Tivey twist to CW
03:07 finished Tivey twist mag spin
03:08 continue going down
03:28 stop @ 37 m altitude; having nav problems
03:30 21 m altitude approaching bottom
03:33 ~7 m altitude bottom in sight, sediment
03:34 elevator to southeast range 94.7 m; going over there
03:44 elevator on sonar
start DVCam
03:46 at elevator x3146 y4594
03:53 stop DVCam; waiting for Medea before doing manip. Operations
04:03 lifting sed traps out of elevator
04:07 DVCam on; pick off #3, 4, 2 sed traps from elevator
04:12 picked all sed traps out. Have #3 in basket, #2 in Kraft manip. We will go around and pick up #1
04:14 drop 2 weight plates x3136 y4598
04:16 DVcam stop; to Sed #1 329° - 479 m range
04:20 J2 come up to 1350 before we drag over to sed site #1 (DVL target #4)
05:02 going back to bottom
05:11 reset Doppler on bottom
05:20 arrived at sed trap station #1 x2886 y5011 z1537
sedimented slope, sed trap #1 in position
05:22 vvan 62253, sed trap in position and deployed
05:26 leave for next station – no, wait
05:30 OK really leave now; bearing 050° 244 m @ 0.4
06:00 at site for sed trap #2. Came up to get good nav fix. Navigation at this spot is not the greatest. The two transponders are BOTH on the other side of the volcano, so we had to ascend for a fix, and are now descending and shielded from any new fixes. The navigator suggests that our position is probably good to +/- 15 m.
06:10 touchdown! Too much of a slope here and we’ve created a cloud, so we move toward a flatter spot NNW about 10 m or so
06:22 flat site vvan62266; sed cloud from settling Jason drifts off to the west pretty quickly
06:22 trap #2 set, but it has mud on the top! How did that get there?
Turn it upside down to try to clean it out
06:32 good clean-out – set it – d=1533.5
x3063 y5200 based on position of ship’s stern
06:34 coming up to get LBL fix on Medea, plus sharps fix on J2
x3059.1 y5195.8 Use this – it’s good
06:36 will come down to see if we are still over trap #2. It’s there! Vvan 62294
06:39 u/w 120° 314 m to site to deploy #3
06:58 sediment, <1% rock
07:00 sed sculpted into subtle dunes
07:01 some talus in sediment single piece
07:03 some sporadic talus in thick sediments; large blocks of talus

07:11 too steep for sed trap station – will head off 050
 07:25 we are here – some nasty outcrop here, poking thru sediment. Still steep, so we'll look around
 07:27 ascending 100% sed slope
 07:28 volcanic boulders
 07:34 going to try placing it on rock
 07:36 vvan 62315 – d=1548.6 Set #3 nicely (in sediment)
 x3365 y5062 based on ship's stern
 rising up to try to get a fix. No go. Use the x-y-z above
 07:41 u/w 181° ~200 m for chimney sample
 07:57 heavily sedimented terrain
 07:59 some chimneys coming out of sediment
 08:02 shimmering water
 08:24 have a 2 m-long chimney
 08:27 bag it – it's risky – the big one we had fell and almost hit the basket
 08:38 J2-226-1-R1 – float, chalco rock; vvan 62459, x3312 y4864 z1517
 08:42 u/w again to elevator – see more chimneys
 08:49 sediment 100%
 08:55 ditto. Passed some rocks a few minutes ago
 09:04 elevator in view at 20 m
 09:10 set up at elevator. Rock sample needs to be transferred to elevator
 09:18 have transferred the rock and picked up trap #4 – stowed on basket
 09:24 going for second trap, but need to rise to 20 m off the seafloor in order to let the ship launch ABE
 09:34 going back down to resume
 09:45 shift change, got all three traps
 09:50 moving to deploy sediment trap #6
 10:13 arrived in target area and look for flat area to deploy x2883 y4701 z1527
 vvan #62688 in heavily sedimented area, no hydrothermal activity
 10:58 back at elevator site looking for flat area to deploy sediment trap #5
 11:07 deployed in sedimented area, x3173 y4597 z1524; vvan #62800
 11:28 at elevator, picking up weight that was dropped there earlier
 11:30 going to deploy trap #4
 12:15 in area of sediment trap #4 target looking for a flat area
 12:30 deployed trap #4 in highly sedimented area x3418 y4764 z1542; vvan #62980
 12:35 transiting to sampling site with turtle back crust
 12:40 crossing sedimented area hdg 307
 12:42 fallen chimney on slope of sedimented mound
 12:44 dead snails littering sedimented surface; dredge scars in sediment
 12:48 more fallen chimneys and red & white staining of sediments coming up next mound
 12:50 steep slope completely covered with sulfide debris. Standing chimneys on top of mound
 12:55 several isolated small chimney complexes in sedimented area mostly inactive, some diffuse venting and life snails
 12:57 coming up slope of major volcanic edifice. Sediments and chimney debris first, then tall inactive structure
 12:59 arrived at Marker 9 site
 13:14 T = 147°C at small chimney complex; clear fluid, no orifice
 13:35 226-W1-IGT6; T = 157°C, dropped to 60°C during sampling
 13:48 226-W2-IGT5; T = 189°C, increased to 250°C during sampling
 13:58 hard to tell if major sampler tell-tale is leaking fluid – take the sample anyway; ram is in, the spring is moving

14:01 done with sampler – stow it; x=3245 y=4911 z=1500
 14:03 look for a sampling place for getting a piece of “turtle” pavement. The pavement material is very hard to break.
 14:06 DVCam on. Try to break a piece with Schilling manip.
 J2-226-2-R1; x3245 y4911 z1500
 14:22 beginning to traverse across top of mound
 14:23 DVCam off
 14:25 drive off over mound to west. Continue over featureless sediment cover with sporadic blocks sticking out.
 14:38 sediment cover 100%, lightly rippled
 14:39 dead snails in a random pattern; not associated with anything. Reach a steep sedimented slope.
 14:41 more talus – sulfide chimney talus pieces
 14:44 chimneys rise up in front – active smokers. Drive past them on our way west.
 14:46 large field of snails – more tall sulfide. Inactive – into a forest of chimneys covered with snails.
 Out of field now.
 14:50 snail colony – more compact little snail colonies in sediment and sporadic large talus – broken sulfide chimneys
 moving 30 m south
 14:58 sulfides sitting on a consolidated sheet-like surface – platy
 14:58 try to sample this. Stopped. X3019 y4938
 platy material looks like a cemented sulfide sand
 15:12 J2-226-3-R1 sulfide cement crust plate at base of chimneys
 x=3018 y=4938 z=1506
 basket C DVL target 18
 15:15 begin to south and west by 20 m
 15:17 in a field of chimneys these are inactive and sitting on large sloping sheets of sulfide sand
 15:25 driving past some dead chimneys – inactive in thick sediment cover
 15:28 dredge track
 15:32 course 204° 72 m to next waypoint. Traverse across sedimented terrain.
 15:35 some oxide staining
 15:41 at WP 8, mottled sediment, continuing south to small topographic high R30m @ 186°
 15:49 head bearing 303° 54m
 15:58 almost entirely sediment cover; occ. outcropping talus
 16:04 oxide patches sporadic talus
 16:16 now @ 1553 m depth and in thick sediment cover, we have zigged and zagged across the seafloor looking for any sign of activity
 16:26 come across EW ridge – looking like a flow or faulted landslide
 16:35 100% sediment
 16:45 stop at some boulders in the sediment. Looks like some of the rock is old sulfide. The biggest talus piece is also probably sulfide.
 16:53 trying to sample – but rock is very hard. Rock has quite a thick >1 cm Fe-oxide crust on a more gray matrix. Could not get a sample – leave.
 17:19 head 221° 91 m
 17:21 100% sediments – climbing gentle slope
 17:22 rocks forming a steeper slope heavily covered in sediment
 17:27 into sediment again after reaching a small plateau
 17:29 Fe-staining on some blocks in sediment; more Fe-staining
 17:31 more Fe-staining in sed; white bact. Mats
 17:33 small chimney with shm. Water

“Liliput”
 17:34 will take a temperature; x2673 y4753 z1570
 17:36 DVcam on
 17:41 several small ledges – flanges with small chimneys; area is about 1m – 2m across
 shrimp, white bact. Mat, snail
 T - 210°C x2672 y4753 z1570; DVL target #19
 18:00 Vanko: vvan 63876 – sampling chimney
 Dropped. Need to try to pick up
 3 little orifices now – first is 220°C. 2nd one - 226°C. 3rd one - 221°C
 [these are samples 4-R1 thru R3]
 18:15 going to take fluid samples
 226-4-W1-IGT7, Tmax = 226°C, jumping around ~10°C
 worms, snails, crabs, etc., all over this sulfide chimney/flange complex. Also scale
 worms, shrimp.
 18:43 226-4-W2-IGT8, Tmax = 224°C, steady
 18:55 226-4-W3-M4; clear flow and hose clamp in the way = no view of telltale
 19:10 sample of the flange; 4-R4
 4-T5 → t = 58°C on broken surface of outcrop
 19:18 u/w 290° for 160 m
 19:28 mostly sediment. James is driving – does he have a learner’s permit?
 19:48 at the shite shelf outcrop from dive 219, the 52°C outcrop
 5-R1 – sample of nub of rock below flange
 19:58 moved slightly uphill – going for some cruddy old sulfide for comparison
 20:07 another flange site a few meters up and away from the last one. Looks older, but there’s
 still some shimmering water.
 6-R1 – sample ~ 5 m south of last sample
 20:14 taking out wraps
 20:17 outcrop that looks like blocky-jointed massive rock, yet it has a flange (old relic) sticking
 out.
 20:33 7-R1 – rock – sulfide? Broke off another piece and call it the same thing – 7-R2
 20:40 u/w 127° for 500 m to see some new area
 20:45 mottled mud
 20:46 a little bit of rock
 20:51 sediment
 21:28 white/light-colored rock on scree slope. Sample 8-R1. Close up, it has bright green in it,
 too. Sample 8-R2 – black volcanic talus from slope
 21:39 moving uphill to see if there’s more of this white stuff. Big piece of it looks like old
 chimney?
 21:40 sulfide mound, fallen white massive chimney
 21:45 scree slope, slightly indurated with white crust in one spot
 22:00 sampling that crust failed, have to move J2 to catch up with ship
 22:30 at elevator site
 22:33 coming up to 500 mbsl
 23:15 at 500 mbsl
 Elevator did not release acoustically
 00:22 down at elevator to pull pin
 00:28 elevator released
 00:30 J2 coming up; 3° 47.52’S 152° 05.72’E
 01:15 on deck. **END OF DIVE 226.**

J2-227, August 22, 2006 – Surprise / North Su III

07:54(GMT) 17:54(Local)

07:54 GMT Jason in water
07:56 Medea in water
08:36 begin Tivey twist
08:42 finished
08:50 smoke in the water at 1100 mbsl, coincides with an Eh drop from 197 to 150
08:53 still see smoke @ 1200 mbsl
09:00 have been watching for more smoke, but not with rapt attention. Eh is recovering as if we are out of the smoke
09:06 d=1620, alt=100 – Sm2000 shows flat bottom
09:08 d=1686, alt=21, z=1707m
09:14 on bottom – flat, sed and few % volcanic rock
09:15 reset Doppler; Eh = 170 recovering from plume; no sonar targets
09:20 stowing scoop bags that tried to escape during the launch
09:22 u/w 128°. Lava tube piece on bottom. Some streaky oxide stains. Orange. Fe.
09:25 ~10% rocks, most look volcanic; no biology evident
09:35 ditto; very monotonous; Eh flat; no sonar targets
09:41 sheet flow outcrop?
09:46 mostly sediment and scree, streaky downhill (we are going slowly uphill)
09:48 some volcanics, some lobate and elongate, most flattish
09:57 Bach: see a fault with <1m offset running SE-NW
10:00 drove by a mound exposing sheet lava
10:04 another fault with <1 m offset striking SW-NE, now in heavily sedimented area
10:07 crossing ridge w/ pillow lava, 3428, 2061
10:10 another fault ~1 m offset, trending E-W, in heavily sedimented terrain
10:20 turning NE, traverse for 80 m
10:23 travelling along on ESE sloping hillside of dome
10:35 sampling rock exposed in furrow on ESE slope of dome; 1-R1
10:40 scoop sampling sediment with volcanic clasts overlying volcanic basement; 1-R2
10:44 off bottom for ABE launch
11:07 back on bottom, hdg 310
11:10 up hill, slumps in sediments, occasional outcrops of bulbous lava flow
11:20 moved over dome, need to offset now but wait until we get to a landmark
11:30 going down slope, deep furrows exposing pillowed lava
11:40 crossing rounded blocks of lava, could be bombs
11:50 finding bleached rock in debris fields we have traversed, stopping ship
11:58 following ship a few 10s of m, we find a turtle-back shaped lava ridge. There are bleached rocks here, too
12:17 sampling piece of bleached lava from top of lava flow; 2-R1
12:33 sampling fresh lava from flow; 2-R2
12:38 sampling another piece of altered rock; this one appears cream-colored; 2-R3
12:52 going 266° following side of flow
13:02 moving up slope hdg 042° to examine upper slope of SW flank
13:13 moving through sedimented terrain with rock talus, mostly dark, fresh rocks, occasional bleached rocks
13:24 in thickly sedimented terrain now
13:28 outcrops created by land slide
14:00 transit over to south flank of South Su to x4167 y2398; course 106 @ 0.4 kts

14:08 traverse over sedimented terrain slope
 14:13 cemented slope deposit – occ. eroded by downslope debris flow chutes
 14:30 o/c of lava – broken talus field of white colored rock
 14:35 over a small domal feature, large talus blocks several meters in size
 14:40 small mound like features, sedimented rubble hills a few meters across and a meter or more tall
 14:45 gravel zone
 14:51 sediment 100%
 14:56 small boulder field
 15:00 1 white rock among field of talus, oxide staining in sed
 15:01 back into sediments
 15:03 broken clam shells on talus, mostly sediment however
 15:09 turn and head north towards the South Su summit
 15:12 clam shells in sporadic talus field
 15:15 gravelly material– not so thick sediment here
 15:19 more clam shells, darker volcanic talus and sporadic white looking rocks
 15:20 more coarser gravel debris 10 cm grain size, gravel debris flow, no change in Eh
 15:23 finer gravels, more sediment
 15:24 crabs on o/c with some worm like things; black lava o/c / flow talus rubble/talus debris slide with crabs
 15:38 volcanic o/c – moving to east across a small dome-like finger on south flank of S. Su
 15:41 off into sediment on summit
 15:43 stop and return back to west
 15:49 white staining
 15:51 mound of rocks covered in crabs; shimmering water on steep slope; mussels, shrimp, sm. Clams
 15:54 stop to take a temperature meas. - 18°C, 45°C (J2-227-3-T1)
 16:03 move on uphill
 16:05 large 'erratic' boulder
 16:12 moved west and stop at broken face of lava
 16:13 pick a sample from here; mussel beds, crabs, shrimp
 J2-227-4-R1 from outcrop rock; x=4219 y=2531 z=1365; DVLtarget #43
 16:22 reset Doppler
 16:24 stop to sample flange-like white mottled
 5-R1; lava
 5-R2; crust – polymict breccia
 x=4218 y=2543 z=1363; DVL target #44
 16:28 move on; more of the white breccia talus
 16:31 now into sediment slope
 16:34 lots of dead clam shells in sediment; white mound like flow seemingly flowed into hole/depression – covered with crabs and white staining
 16:38 white bacterial mat patch very extensive
 16:43 mussels, crabs – looks like some cruddy old sulfide – consolidated sediments
 wait for ship/medea, then move in to sample; stop to sample
 16:49 6-R1 – soft chimney-like material
 6-R2 – harder chimney-like sample
 x4276 y2563 z1366
 move north – larger area of white staining and bacterial mat
 16:54 Jason unwraps turn
 16:55 driving north; extensive white staining/mats
 16:57 into crab terrain, mussel beds

16:59 still in crab terrain, white staining
 17:00 now into less intense staining – only in networks on sediment
 17:01 back into extensive white staining on rocks, 1332 m
 17:04 waiting for the ship
 17:06 crabs on o/c again – continued extensive white staining on sediments
 17:07 white staining on lava
 17:08 sediment
 17:09 back into crab terrain
 17:12 snails – some shimmering terrain; sulfide chimneys – old
 17:13 chimneys on top of ridge – we have been here before on dive 224
 17:18 move up to 1160 m and move to 3750, 3700
 334° 1160 m
 moving to WP2 water sample site on North Su
 17:22 start transit ~ 50 minutes @ 0.7 kts
 17:52 inky deepness
 17:58 1100 mbsl, seeing smoke in water, Eh
 18:10 lots of smoke in Medea cam
 18:27 see the bottom – scree; rocks, crabs, limpets, eels, bio floc
 18:30 shimmering water
 18:35 d=1189, top of very rugged pillars or irregular jagged ridge
 18:37 pillar is like a hoodoo, is capped with hydrothermal-looking crust. Is this pillar cemented relative to the rocks around it?
 18:39 chimneys! There is black smoke coming out of this pillar lower down
 Looking 056°, this pillar is volcanic/volcaniclastic rock
 Logbook next shows a sketch: top of pillar is shown sprouting chimneys, labeled 1185 (m); scree slope off to the right; half way down the pillar labeled “1190 m” is emission of black smoke and the inscription “group of three little chimneys, each with black “cigar ash” or “beehives” on top – each producing black smoke”; beneath those is another emitter labeled “little hole with smoke”
 18:53 setting up for T probe
 Tambient = 3.5°C; T = 299°C
 Fragment has chalcopyrite – try to pick up; sample 7-R1 – chimney sample
 Sample 7-R2 – rock from the pillar – it looks like it might be some of the cement that holds larger volcanic rocks of the pillar together.
 19:18 the “flamers” are at the top of this structure! At 1183 mbsl, setting up for water sampling – called Jeff Seewald
 19:22 deploying IGT4, T began stable at ~324°C, then climbed up to a reading of 334, and even 340, but that may not be real
 J2-227-8-W1-IGT4
 19:39 IGT3 T = 324°C, shoot it
 J2-227-8-W2-IGT3, Tsteady = 324°C
 19:53 major bottle 4, good telltale
 20:12 getting ready for a scoop sample of orifice(s) – 8-R1
 20:25 Jeff can’t decide on nect sample so we’ll go look at black smokers on the summit
 Moving up sharp chimney-topped ridge toward summit
 20:31 sampled inactive conical-shaped white coated sulfide spire tip – 9-R1
 20:36 continuing E along chimney-topped ridge
 20:40 white smoke getting thicker – Will is driving – he gets lost; Eh still 0
 20:44 brief view of seafloor – white-covered ridge, some relict chimney, ledge in background

20:58 setting up on a chimney. Will is driving/destroying things. We are at the summit shelf, just off the edge of the shelf, where small chimlets are venting clear fluid through cigar ash tops.

21:01 Sample 10-R1 – crumbs of destroyed chimney – bugger-all

21:06 re-setup for IGT sampling

21:21 shooting IGT2
J2-227-10-W1-IGT2, T_{max} = 298°C

21:29 227-10-W2-IGT1, T_{max} =

21:35 Major bottle #2 – the bottle seems to be irregular – the spring is compressed but the plunger that the ram pushes on is already all the way (almost) in. Deployed the bottle – couldn't see telltale. Shot ram anyway and the bottle fired. May be OK [Note added later- video of an earlier part of the dive showed that both major bottles had their plungers fully out (normal cocked position), so this bottle must have had the plunger depressed during an encounter with outcrop either here at station 10 or earlier at station 8.]

21:44 sample of chimney – 10-R1 continued

21:45 sampling a relict one here – shift change

21:52 10-R2 – relict spire tip

22:00 going E to mounds on E side of summit

22:06 mound material is exposed on N side; sample suspected volcanic rock here – 11-R1

22:23 went back to black smoker site on west flank to sample a piece of volcanic rock that is incorporated in the structure

22:42 after sampling outcrop failed, we picked up a piece of talus that might represent volcanic basement hosting the chimneys; 12-R1

22:45 going south to look at scarps/mounds on SW flank; nav is off by -12 m E, 6 m S

22:53 white-outs going off bottom

22:58 continuous white-outs moving SE to suspected landslide feature

23:05 severe whiteout coming up 30 m

23:11 billowing white smoke

23:22 on bottom at N slope of sedimented, white mats everywhere

23:28 looking at wall (N-facing); looks like volcanoclastites and angular talus, but thick white mats cover everything

23:41 tried sampling rock near crest of ridge but everything is soft, crumbly sediment

23:47 pick up piece of volcanic clast in sediment

23:51 shot Niskin bottle

23:54 dropped weight

23:55 3° 48.090'S 152° 06.09'E 1230m
coming up. **END OF DIVE 227.**

Jason Dive J2-228, August 23, 2006 (GMT) East Umbo

12:00(GMT) 22:00(Local)

12:00 Jason in water
12:27 Tivey twist at 564 mbsl
12:34 Tivey twist done
13:17 at 1900 mbsl still no Eh hits; are the currents going N?
13:21 all stop
13:25 on bottom x7434 y6048 z2080
 no plume anywhere on the way down; Eh is 185
 terrain is a steep SSE facing slope littered with talus, no sediments here
13:32 steep, near vertical wall is fault exposing uniform pillow basalt, 2049 m
13:35 over sedimented pillow terrain now
13:37 checking currents, J2 drifts SSE
13:41 less sedimented pillow flow
13:47 more sedimented here; lava outcrops in place – truncated pillows in place
13:55 pillow lava – tubular pillow flow; lobate flows – sediment covered
13:59 near crest of ridge – lobate flows lightly sedimented
14:06 at top of ridge 1966 m; more hackly lava on top; cracked open pillow
14:12 crested hill and now turning to head east southeast. Heading 107, 134 m, sedimented
 rubbly/knobby lava
14:23 rough talus with sed cover
14:27 climb talus ramp; less sediment cover here
14:33 little to no obvious seds
14:33:33 now back to more seds
14:37 rough shaped pillow lava, relatively unsedimented
14:43 nice pillow tubes
14:47 back into talus lg blocks; Jason is zig-zagging across top of ridge (sketch in logbook)
14:57 only occasional sessile deep sea fauna
15:00 course 065° 228 m traverse along crest of ridge
15:03 sediment cover increased substantially
15:07 lobate flow again – thick sediments
15:15 thick sediment cover, Eh flat lined at 178
15:23 climbing outcrop of lava with sed cover
15:40 pillow lava, intact lobate flows
15:44 talus field
15:49 nothing at the saddle point, move east up the northeastern peak
16:07 decide to head downslope to south
16:10 “bassomatic” on a squid. Waiting on Medea
16:19 going downhill finally
16:53 reached base of slope 2135 m; now more westward and start a climb of the ridge
16:56 course 282° 286 m
 climb the ridge; bottom of slope is thickly sediment
17:05 begin ascending slope, talus appears heavily sedimented
17:06 pillow lava constructional; heavy sediments
17:08 truncated pillows, talus
17:14 100% talusslope; some in-place pillows – truncated downhill
17:17 talus chute
17:18 outcrop 2037; talus ramp below
18:20 100% rocky talus; turning south to check out ridge

18:29 more sedimented farther down ridge – mostly sed-covered. As we are descending, we're not keeping bottom in view all the time (rookie pilot).
 18:34 contact with bottom – 100% blocky talus
 18:35 <=100% talus, sediment-dusted
 18:37 ~80% talus
 18:38 mound of talus – 100% sediment plains to E
 18:41 saw a sonar hit 10 m off the edge of Medea's camera but Will would not (says he could not) reach it. I'm sure it was just rock.
 18:43 now turning back up slope to top of ridge, moving obliquely. Much sediment on rocks
 18:46 E-W fault scarp, or at least a steep drop-off in talus
 18:52 pillow flow front, good radial fracturing, <1 m pillows
 18:57 top of ridge, more sedimented, now following ridge W to local summit
 19:01 some wrinkly lava, mostly sediment
 19:02 encounter with a headless purple chicken (jelly fish?). Chris Yeats says it's a holothurian.
 19:08 a few galatheids on a piece of wood
 19:15 still sedimented ridge top with sporadic rock formations
 19:20 same; nothing hydrothermal
 19:25 d=1882 alt=1 z=1883 – nearing top of this summit and mostly sediment, few rocks
 19:34 rocky talus. Z=1858 m, but J2 location on display is 1925 m, and ship's location is 1880 m. So we need to both reset Doppler and move the underlay
 19:42 nearing the top of this feature – still just sediment and sporadic rocks, volcanic. Biology is sparse – once in a while we see a: holothurian, fish, brittle star, soft coral. But not much.
 19:49 nearing summit, more pillow lava, fragmented, sedimented; z=1828. 1842 is the shallowest SeaBeam sounding in Fledermause.
 19:59 at the top – depth of bottom = 1820m
 20:12 1-R1 – rock from summit
 20:31 we've wasted 20 minutes trying to get a second more robust rock sample but no go
 20:33 testing slurp gun for Jason crew. About a 50+ m Doppler reset
 20:35 begin ship move off summit to NNE
 20:41 u/w 034° off summit – sedimented pillows
 20:58 all sediment plus a few rocks; all in the aft-facing camera
 21:14 ditto. Z=1975
 21:17 adjust hdg to 090 and contour along at 1987 m
 21:22 d-2005, contouring +/- along a pretty steep talus slope
 21:31 contouring east at 2000 – varies back and forth between sediment-rich and talus-rich; talus = pillow fragments. No bio. No hydrothermal features.
 21:40 same sed plus some rocks. Have crept up to 1975 depth. Nearing flat ridge crest.
 21:44 shift change
 22:00 decided to come up 100 m and tow to mound S of Umbo Ridge
 22:57 pillow lava and talus
 23:00 crossing over fault exposing pillow basalt trying to sample but have to abort due to movement of the ship
 23:08 came back to the base of the fault and sample piece of talus
 23:16 stop to check currents – they go NW
 23:28 crossed terrain of steep pillow mounds and ridge to a fault wall exposing pillow basalt
 23:30 lobate flow with good amount of sediments
 23:40 firing major bottle for deep sea water sample
 J2-228-3-W1-M4
 23:43 off bottom; 3° 43.08'S 151° 54.43'E. **END OF DIVE 228.**

Jason Dive J2-229, August 24, 2006 (GMT) East UmboII

06:36(GMT) 16:36(Local)

06:36 Jason in water
06:38 Medea in water
 There shall be no Tivey twist tonight
06:55 d=500m; Eh=192
07:18 d=1413m Eh=188
07:23 d=1630m Eh=187
07:31 d=1960m Eh=184
07:34 all stop, d=2055m, Eh=184
07:40 d=2057m, J2 now under Medea; driving down
07:42 see the bottom – MUD
07:43 beginning move north – mud, fish
07:46 mud, cocoanut, brittle stars, long-armed star
07:49 low amplitude bedform – dune crest (single) oriented downslope
07:50 u/w North @ 0.35 kts – mud, d=2084
07:51 cusplate sediment ridge – low amplitude – bedform or mass wasting?
07:54 seeing occasional rocks, flat lava pieces?
07:56 sediment layers in eroded step, as if something collapsed below it
07:58 seeing more sediment disruption, every 5 m or so
08:00 Eh=181, nearly flat
08:03 shrimp, mud, lots of infauna evident from tracks
08:07 another low amplitude “dune crest” oriented uphill/downhill
08:16 mud, occasional pieces and even boulders of young lava – ropey/wrinkly
08:24 ditto to everything above – 1 galatheid on a piece of wood
08:30 avoiding ABE, we are going SW for a while. The most abundant organisms we see are
 the long-armed stars – 1 or 2 on most of the solitary rocks that we pass
08:35 another erosional scallop, and a downhill dune crest. Second most abundant animal is
 brittle stars.
 Holothurian
08:44 more galatheids on wood
08:49 still all mud with solitary boulders of lava
08:58 sponge, turning left for 100 m (west)
09:00 pillow boulders on mud
09:03 headed south on next transect – downhill
09:10 slurp gun test – had to move and now flying off bottom
09:15 heading south – usual view in the butt cam
09:20 heading south, getting ready to turn – all sediment
09:33 heading NE along ABE’s first track
09:41 mud only
09:50 hdg 310 for 500 m to check out N flank
10:04 crossed lobate lava flow field
10:05 hackly lava here, still lots of sediments
10:30 nice pillows
10:40 moving W, nothing WSW of edifice
11:00 decided to pull up and tow to small morphological feature on N flank of ridge at the appr.
 longitude of the plume
11:46 ship is at destination point
12:05 back on bottom, heavily sedimented, occasional pillows recognized

12:24 coming up, x7292, y5495, z2092
 3° 42.48'S, 151° 56.84'E. **END OF DIVE #229.**

CONCLUSION OF CRUISE MGLN06MV.