
MEDUSA
Expedition
AT 15-17
March 24-April 27, 2007
Manzanillo, Mexico to San Diego, CA
R/V Atlantis
ROV Jason II
DSL-120a
Cruise Participants:
Science:
Dr. Emily Klein
Dr. Scott White
Dr. Michael Perfit
Dr. Karen Von Damm
Dr. Daniel Fornari
Dr. Adam Soule
Dr. Ian Ridley
Dr. Sarah Carmichael
Ms. Allison Fundis
Ms. Elizabeth Goehring
Ms. Jennifer Laliberte
Ms. Frances Mansfield
Ms. Jessica Mason
Ms. Karen Neeley
Mr. John O'Brien
Ms. Laura Preston
Ms. Dorsey Wanless
Mr. Christopher Waters
Ms. Anne Zaino
DSL:
Mr. Anton Zafereo
Mr. James Brennan
Mr. William Sellers
Ms. Cynthia Sellers
Mr. Alberto Collasius, Jr.
Mr. Stephen Gegg
Mr. Scott Hansen
Mr. Akel Kevis-Stirling
Mr. James Varnum
Mr. Robert Waters
HMRG:
Mr. Paul Johnson
Mr. Roger Davis
Mr. Todd Ericksen
Photograph of staromedusae from Jason Lowering J2-265, April 9, 2007

We are grateful to Captain Gary Chiljean and the crew of the R/V Atlantis and to the Jason II and DSL 120 groups for their tireless efforts to make this program a success.

Contents

1. Executive Summary

AT15-17 (the MEDUSA cruise) investigated seafloor spreading processes at two locations within the Ridge2000 Integrated Study Site on the East Pacific Rise (EPR). The main program on this cruise was the investigation of the overlapping spreading center at 9°03'N. This area was surveyed with *DSL-120A* for two lowerings over six days, followed by 16 days of mapping and sampling with ROV *Jason II* and WHOI *TowCam* lowerings during operational turnarounds of *Jason II*. We discovered one high-temperature hydrothermal vent (named the Medusa Vent to highlight the presence of unusual pink *Stauromedusae*) and an associated diffuse-flow hydrothermal field. We found no evidence of widespread recent eruptions, although loci of recent volcanism were identified on each limb of the overlapping spreading center. Most lavas observed and recovered were pillow basalts with fresh glass. In addition, 12 samples had a bluish or waxy glass aspect suggesting that they may be andesites (subject to confirmation by on-shore analysis). Samples recovered included ~300 rock samples, four double majors vent water samples, and biologic samples including riftia, tevnia, alvinella.

The second part of the program consisted of two add-on projects to investigate the recent (2005-06) seafloor eruption centered near 9°50'N. Two days of *DSL-120A* surveying covered the areas of known and suspected lava flows from the eruption. This survey revealed extensive landscape changes since the previous side-scan survey in 2001. Three days of *Jason II* time were used to conduct several types of activities to provide baseline data and infrastructural support to a broad cross-section of multidisciplinary investigations at the EPR Integrated Study Site. During this program, high resolution, near-bottom multibeam and magnetic data over the benchmark areas and axial summit trough were collected; sampling and observations were conducted along lava channels; two ocean-bottom seismometers that were trapped by lava from the 2005-2006 eruptions were recovered; and a lost compliance meter from the Webb/Cormier experiment was released and recovered.

2. Introduction

An over-riding goal in the study of mid-ocean ridges is to understand the linkages in the magmatic system from bottom to top (see, e.g., Ridge2000 Science Plan). In broad terms, this includes the melting and melt focusing processes occurring in the deep mantle melting regime (~100 km depth); the accumulation and crystallization of melt in the sub-crustal mush zone (~6 km) and over-riding melt sill (~2 km); the vertical and lateral transport of magma from the melt sill through dikes; the eruption of magma on the surface; and the hydrothermal activity and biota associated with magmatism. While we currently have information on pieces of the system in disparate areas, the goal of linking these processes has remained elusive. The overall goal of this program is to use the overlapping spreading center (OSC) at 9 03'N on the East Pacific Rise (EPR; Fig. 3.a-1) as a natural laboratory to explore the linkages between geochemical, geological, and hydrothermal variations on the seafloor and the magma supply system at depth. The unprecedented seismic and tomographic results that already exist for this area present a

detailed window into a highly variable melt supply and storage system that allows these connections to be made.

To address this over-riding goal, we undertook a 35-day cruise on the R/V Atlantis from March 24 to April 27, 2007 (Manzanillo, Mexico to San Diego, CA). The bulk of the ship time (22 science days) was devoted to studying the 9°03'N OSC. An additional five science days, funded under separate grants, was devoted to work at the site of the 2005-06 eruption at 9°50'N on the EPR as part of the Integrated Study Site effort of RIDGE2000. All work was funded by the RIDGE2000 program of the National Science Foundation (Ocean Science, Marine Geology and Geophysics).

The primary research tools used during the cruise were the DSL-120A side-scan sonar system and the ROV Jason II, both operated by the National Deep Submergence Facility (NDSF) at Woods Hole Oceanographic Institution (HMRG will take over operation of the DSL-120a system following the cruise). Although our proposal did not call for the use of the WHOI TowCam system [Fornari, 2003], the vehicle proved to be enormously valuable during Jason II downtime and for surveying long distances quickly. We also collected a small number of wax cores in areas we did not intend to visit with Jason II. The following summarizes our work:

Activities and data products from the 9°03N OSC on AT15-17

- DSL-120A
  - Collected close to full side-scan backscatter coverage of the overlapping spreading center region, representing 235 km^2.
  - Collected 50% bathymetry coverage from phase bathymetry and SM2000 from 500 m wide N-S oriented swaths spaced 1000 m apart.
  - Collected three-component magnetic data using two deep-towed flux-gate magnetometers mounted on the 120a side-scan towfish.
  - CTD mounted on the vehicle and 4 MAPRs mounted on the wire, throughout survey
- Jason II
  - Conducted four Jason II lowerings (J2-264, J2-265, J-266, J2-267) for a total of 234 hrs deployed (one lowering lasted a record-breaking 100 hours).
  - Approximately 7000 digital photographs and 213 hrs continuous video for each of the three video streams.
  - 282 individual rock samples recovered, described and archived.
  - 4 double majors hydrothermal vent waters sampled.
  - Vent biota - consisting of tubeworms, mussels, clams, limpets and a crab were processed and frozen at -70°C (and stored in ethanol for the limpets)
- TowCam
  - Seven TowCam lowerings, covering 29.3 km
  - Produced approximately 10,000 digital photographs.
  - Both vehicle-mounted CTD and four MAPRs for water column hydrothermal surveying.

- Collected three-component magnetic and total field magnetic data using a vehicle-mounted deep-towed flux-gate magnetometer on 4 tows.
- Wax core
  - Collected nine wax cores (eight recovered glass).

Activities and data products from 9°50'N (ISS site)

- **DSL-120a**
  - Collected four tracklines over 85 km, obtaining full side-scan backscatter coverage over the interpreted boundaries of the 2005-06 eruption, and 90% bathymetric coverage with phase bathymetry from the side-scan along with multibeam from SM2000.
  - Collected three-component magnetic and total field magnetic data using a vehicle-mounted deep-towed mounted flux-gate
  - CTD mounted on the vehicle and 4 MAPRs mounted on the wire, throughout survey
- **Jason II**
  - Successfully freed and recovered two OBSs and one compliance meter that had been stuck since the 2005 eruption.
  - Collected 23 lava samples, described and archived.
  - Surveyed ~ 15 line-km using SM2000 near-bottom multibeam.

Section 3: 9°03'N Overlapping Spreading Center Site

Section 3.a.
Transponder Array at OSC

On this cruise we deployed a long-baseline acoustic transponder net comprising 6 transponders in order to permit both DSL-120a sidescan and Jason II operations to collect various kinds of data in the same navigational framework. Initially we deployed 4 transponders on 200 m tethers. These 4 were deployed along the east limb of the OSC, in order to provide optimal coverage along the ridge crest of the East Limb and through the OSC basin. The transponders proved useful for navigation on the West Limb as well during *JasonII* lowering 267, and several Tow-Cam lowerings. Transponder locations were surveyed with full-circle tracks around individual transponders with RMS errors of ~<1 m. As the details of *JasonII* lowerings were planned, another 2 transponders were dropped along the east limb to expand the baseline coverage of acoustic navigation. Overall, long-baseline navigation was excellent with *JasonII* all along the east limb, and was marginal across the overlap basin ~8 km away from the nearest baseline. While we had long-baseline navigation for the *DSL-120A* survey, jumps across the baselines and large numbers of bad fixes made using the transponder navigation impractical. The transponders were all released and recovered without incident.

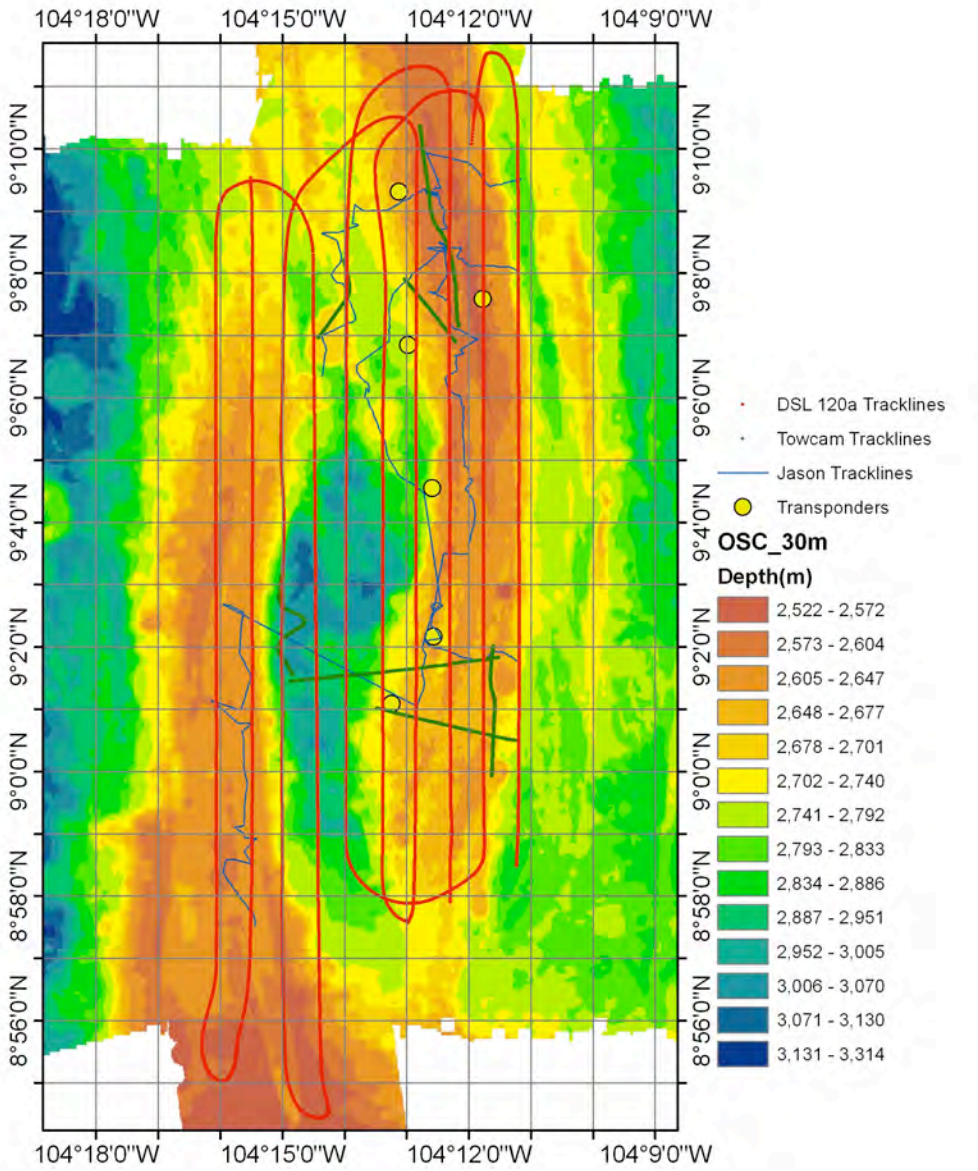


Figure 3.a-1. Locations of transponders at the OSC with the tracklines of all near-bottom vehicles deployed during the cruise.

Section 3.b.
DSL-120A Survey at OSC

The broadest scale data set collected was a *DSL-120A* side-scan sonar survey that covered an area of 20 x 10 km. The data were collected on 10 north-south oriented lines each ~20 km long that had slightly overlapping side-scan backscatter coverage and 400-500m gaps in bathymetric coverage between swaths. Hardware issues in the port transducer on the *120A* resulted in an asymmetric swath, narrower to port than starboard.

The DSL-120a system for this site was configured with the SM2000 multibeam system, 300 kHz doppler sonar, two fluxgate magnetometers, a CTD, and a series of MAPRs, in

addition to the usual sensors providing side-scan and phase bathymetry. No problems emerged with any of these sensors, except that noise from the Doppler electronics introduced horizontal stripes to the side-scan image. The DSL fluxgate magnetometer was mounted on the starboard wing and run through the j-box into the telemetry system. A self-logging fluxgate, borrowed from WHOI Tow-Cam, was mounted on the port wing. MAPRs were put on the tow wire at 50, 125, and 200 m above the clump and hung 25 m below the clump.

We adjusted towing altitude to 115-120 m during the survey to maximize swath width. We found that towing higher than 120-125 m did not yield a wider usable swath. The SM2000 multibeam sonar was mounted on the towfish to improve the bathymetry quality, and complete the bathymetry through the nadir gap. Initial navigation for the survey was run under layback mode. The layback calculator uses ship speed, course, and wire out to calculate the position of the towfish in real time. The side-scan and bathymetry were mosaicked in real-time using the uncorrected layback positions by the HMRG and put on a display unit in the ship's main lab. Appendix **X** contains the sonar interpretations logged from the real-time mosaic. Long-baseline navigation was recorded, but was not found to be useful for the mosaicking process. Future cruises would benefit from being able to utilize the LBL data to place the side-scan data in a global reference frame. Resolving how to integrate LBL with layback navigation into the mosaic would improve the end product. Attempts to use of the 300 kHz Doppler during the DSL-120A operations resulted in electrical noise propagating through the side-scan return, and it was quickly decided to leave the Doppler turned off during the rest of the survey.

Operations commenced in the area with lowering 120a-51 on March 29, 2007 at 10:03Z. A magnetometer calibration spin was done from 10:50Z-12:15Z. This lowering obtained one line (~20 km) of data from 8°59'N to 9°10'N along 104°11.2'W (Figure 3.b-1), with an unusually large amount of pitching on the towfish before a fuse blew in the sub-box. Upon recovery, it was found that the MAPR hung below the clump weight had tangled with the tether. Fixing the sub-box problem involved diagnosing several other problems. Repairs to the towfish electronics took up most of March 30, 2007. Lowering 120a-52 began on March 30, 2007 at 23:00Z.

Lowering 120a-52 comprises the bulk of the sonar survey at the OSC site. We completed 9 lines over the course of this 4 day long lowering (Figure 3.b-1). Lines were spaced at 900m to optimize side-scan coverage. We covered 197 km of trackline, excluding turns. The ensonified area extends from 9°11'N to 8°56'S to match the ARAD 3d seismic latitude bounds, and over 104°05.5-11'W to cover the ridge axes on either limb plus the central overlap basin. The sonar lines are numbered in chronological order, with a pattern determined by the ship's ability to only make left turns while under tow from the port hydroboom. No persistent problems were seen with the vehicle attitude during this lowering. The average tow speed was 1.5 knots (2.78 kph) at 110-120 m altitude. This slightly increased the useful swath width for side-scan, although we found that the *useful* swath did not increase at altitudes higher than ~120 m.

Final side-scan mosaics with 2 m pixels were produced using edited layback navigation in time for *JasonII* lowerings. Initial bathymetry grids were produced shipboard. Processing to remove spurious soundings and intelligently merge the *120A* phase bathymetry and SM2000 multibeam will be completed on shore. We anticipate that a high-precision bathymetric map can be derived from the data.

The preliminary backscatter map permitted us to target *Jason II* study areas optimally, and develop detailed objectives for mapping and sampling prior to the lowering. The backscatter data were gridded at 2 m interval and plotted at 1:10,000 scale. Five main backscatter patterns were mapped visually and interpreted on the basis of past experience as follows: 1) Sinuous areas of low backscatter intensity = sheet flow lava channels, 2) Smooth to mottled areas of medium backscatter intensity = flat lava flows of lobate or pillow, 3) Hummocky areas with high backscatter intensity = pillow lava, 4) Smooth to mottled areas of very low backscatter intensity = sediment ponds, and 5) Linear patterns of alternating high backscatter intensity and shadows = fissures/scarps. Subsequent visual observations confirmed and refined these interpretations. Navigational offsets between the *DSL-120A* mosaic and *JasonII* locations were <30 m where distinctive landmarks could be identified by both systems.

Overall the side-scan survey revealed an OSC basin filled with large, constructional mounds that is bounded to either side by rifted and tectonically dissected ridge axes. Hummocky volcanic terrain was mapped nearly continuously through the OSC nodal basin. The backscatter pattern suggests two large sediment ponds in the basin. The slope up to the ridge axes bounding either side of the basin were also revealed as volcanic constructional slopes, devoid of scarps or fissures. The West and East limbs are broadly similar, consisting of tectonically dissected terrain. Undissected hummocky (pillow) ridges characterize the ridge axis farther away from the ridge tips on either axis. No distinct areas of particularly high backscatter intensity that might suggest younger flows were seen in the side-scan mosaic. Differences between the east and west ridge include the degree of tectonism (higher on the west), and presence of extensive volcanic collapse troughs (only on the east). It may be possible to define a “ridge tip” province from a more typical spreading ridge on the basis of morphology along the east limb. We tentatively map this transition near 9°03’N where the axial summit graben disappears or becomes a zone of large fissures without a readily definable ridge axis. A similar transition is not apparent on the west limb, where fissure density remains fairly high throughout. More sophisticated interpretation of the side-scan, and incorporation of the bathymetry data from the *120A*, will take place on shore.

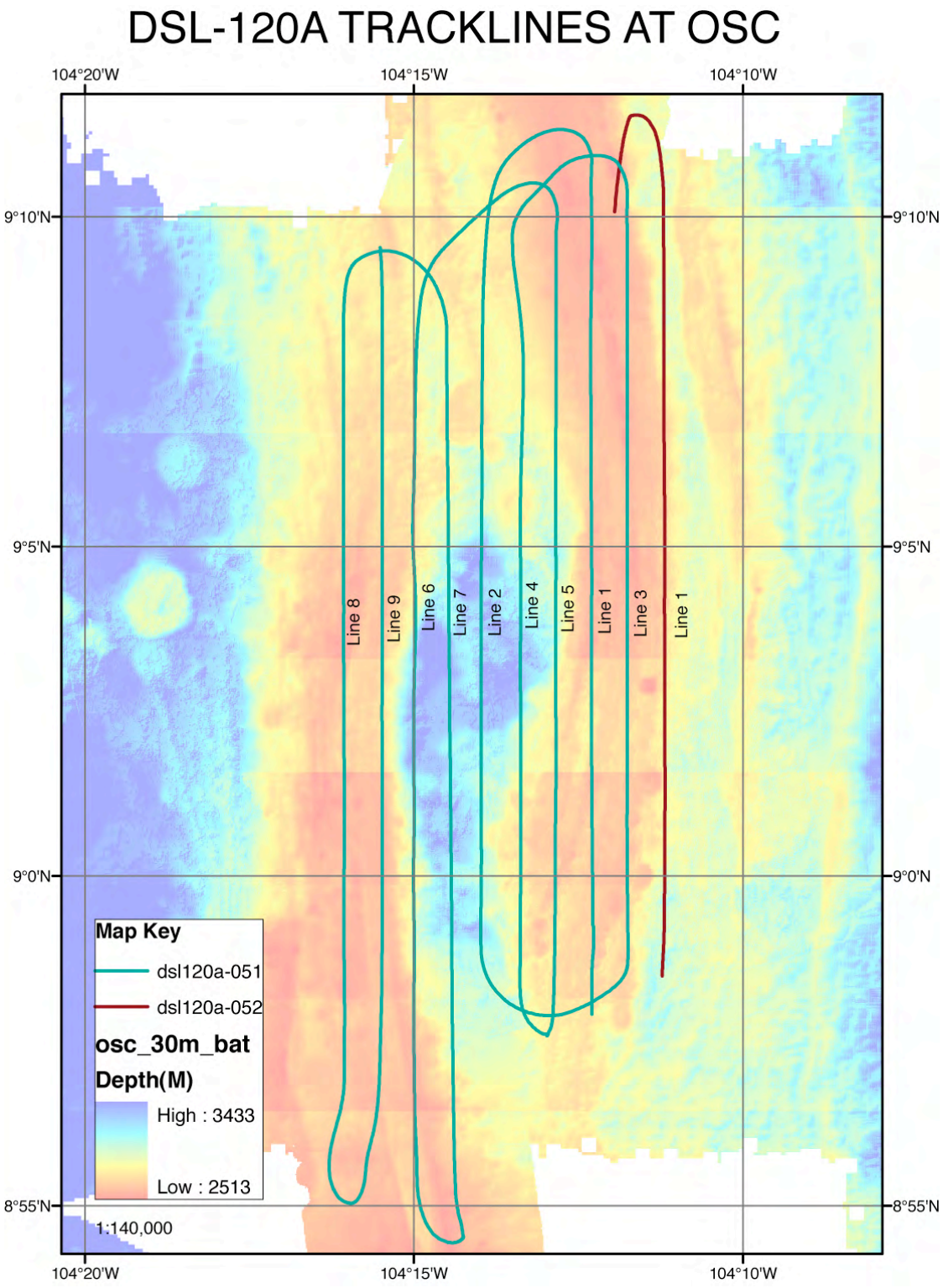


Fig. 3.b-1. DSL-120a track lines.

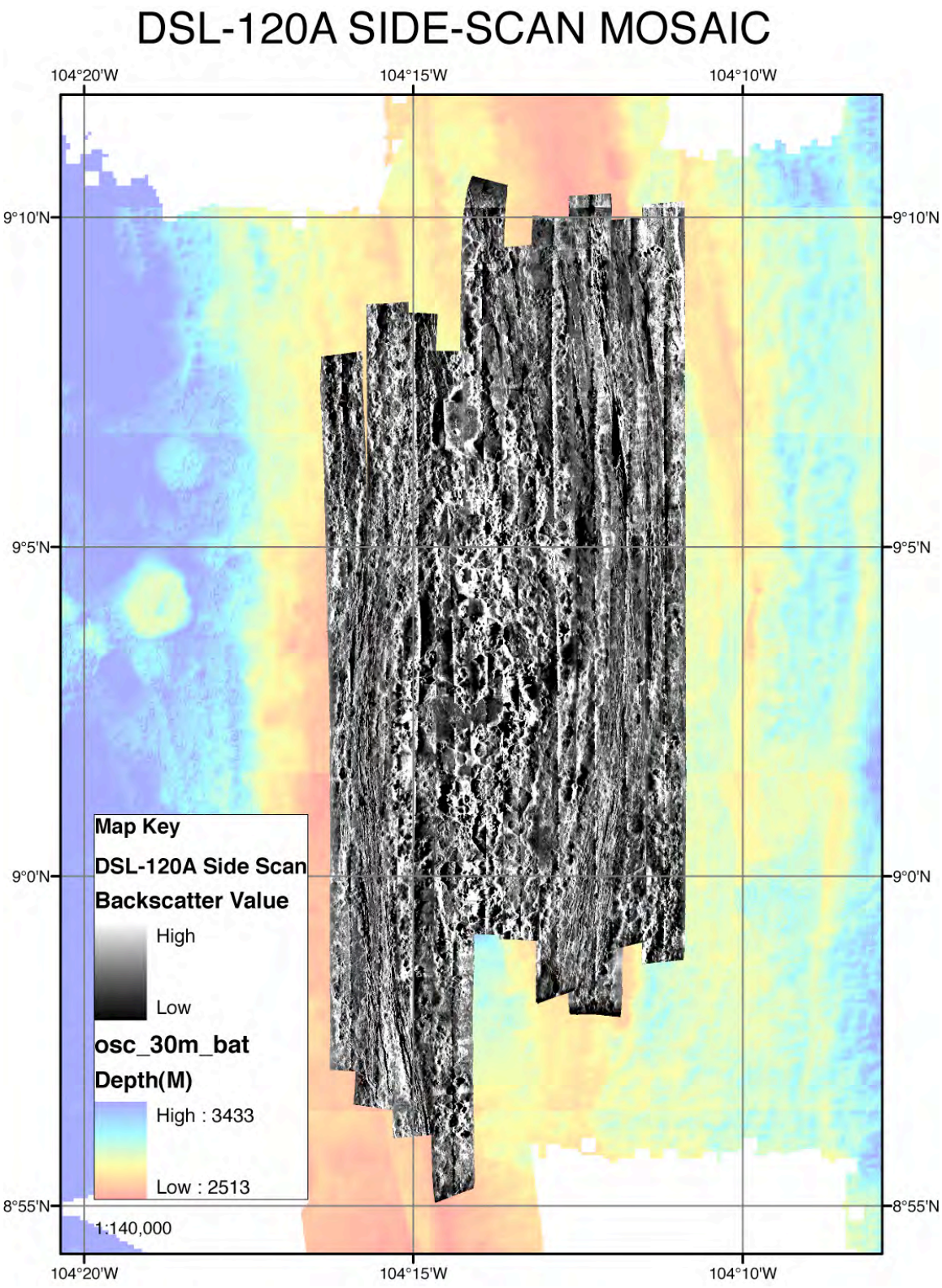


Fig. 3.b-2. DSL-120a side scan mosaic.

Section 3.c.
ROV Jason II Operations at OSC

Four Jason II lowerings were conducted in the area of the OSC (J2-264, J2-265, J-266, J2-267) for a total of 234 hrs deployed (one lowering lasted a record-breaking 100 hours). Approximately 7000 images of the ocean floor were collected using a 3.3 megapixel digital still camera and 300 watt/sec strobes pointed forward, triggered either automatically at pre-set intervals or manually when desired. Three video streams (so called, pilot's camera; lightbar; and 3-chip) were continuously recorded for a total of 213 hrs. In addition, a high resolution digital video recorder ("DVCam") could be turned on to record intervals of the 3-chip video stream. 282 individual rock samples were recovered (see Appendix); 4 double majors samplers were used to sample vent waters (see Section 3h); and various biota were collected (see Section 3i).

During Jason lowerings, four watch standers were typically on duty. The "watch leader "directed overall operations, kept track of where samples were collected and stowed, and wrote a brief watch summary of operations on each watch (See Appendix). A second watch stander was assigned to the role of "event logger, " who manned the Virtual Van. In addition to recording specific activities, such as course changes, samples collected, etc., the event logger recorded at regular intervals (approximately every 5 minutes) descriptive characteristics of the ocean floor according to a pre-set category menu that will be used to inform the Geographic Information System (GIS) analysis of the data (See Appendix for categories). In addition, during our cruise, we beta tested some of the categories proposed for RIDGE2000 data archiving. A third watch stander served as "mapper", plotting our position on a mylar map overlay. The fourth watch stander served as "data logger," changing and labeling DVDs where video data were recorded.

The following is a summary of operations during each of the four Jason II lowerings in the OSC area.

Lowering Id	Start/Launch	Start Data	End Data	End/On Deck
J2-264	2007/04/05 20:31:53	2007/04/05 22:11:40	2007/04/06 13:33:00	2007/04/06 18:29:00
J2-265	2007/04/07 01:40:00	2007/04/07 04:07:00	2007/04/11 04:19:00	2007/04/11 06:12:00
J2-266	2007/04/11 18:37:00	2007/04/11 22:52:00	2011/04/14 22:10:00	2011/04/15 00:34:00
J2-267	2007/04/15 03:19:00	2007/04/15 04:47:00	2007/04/17 10:51:00	2007/04/17 12:42:00

Lowering	Event Log # in Virtual Van; start (approx)	Event Log # in Virtual Van; end (approx)
J2-264	1440	4153
J2-265	4253	18746
J2-266	18787	25852
J2-267	25960	33419

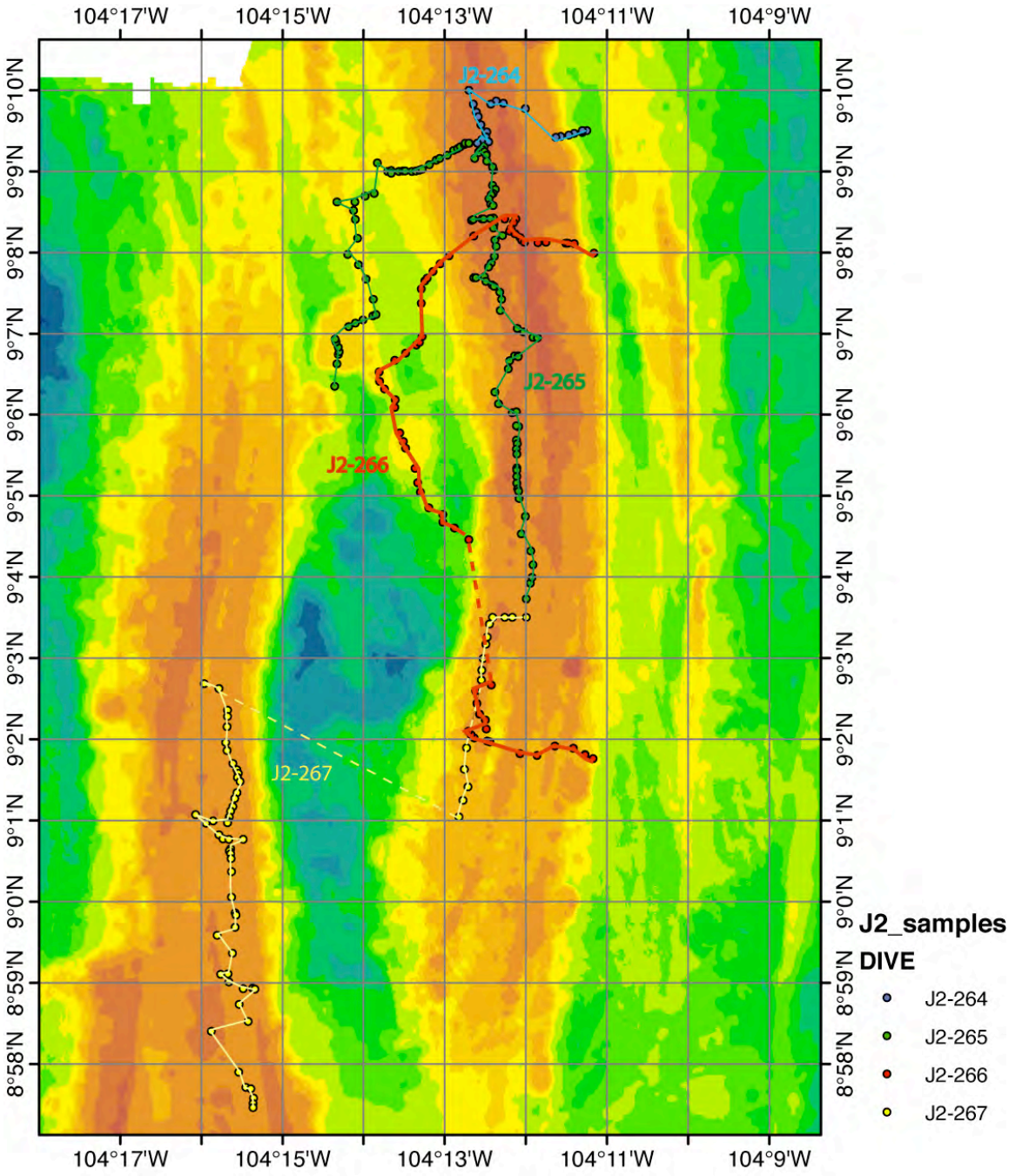


Fig. 3.c-1. Jason II tracks and sampling sites (four lowerings).

Dive Synopses

Dive J2-264

The goals of this dive were to characterize the geochemical variability of lavas erupted across axis above the robust part of the melt lens, to identify the location of the neovolcanic zone, most recent lavas, and to obtain samples both spatially across the ridge and from distinct morphologic features identified in the side-scan imagery. Many features sampled during this traverse continue south along the rift and can be compared to lavas collected and features observed along the second across-axis traverse 2-2.5 km to the south (J2-266). One sample collected from a dome west of the axial graben may be andesitic. If so, it is the northern most andesite sampled.

This traverse began east of the East Limb and moved westward, sampling a heavily sedimented cluster of cones off-axis. The traverse then crossed over a series of large faults composed of pillows and hackly flows draped in sediment. No young lavas were observed in this region. At the edge of the axial graben large domes composed of pillows were sampled and can be compared to similar features south along the ridge. Inside the axial graben, the pillow lavas and sheet flows contained more glass and were covered by little to no sediment.

Dive J2-265

The goal of dive 265 was to provide a detailed investigation of volcanism over the robust portion of the melt lens, both on-axis and off-axis to the west of the East Limb. It began on the western margin of the melt lens and followed a ridge of domes to the north. Samples collected along this traverse were generally sediment-covered pillows but several areas appeared to have relatively young lavas. The dive then turned east to explore volcanism across the melt lens. The seafloor in this area was highly tectonized and samples were collected from sedimented pillow lavas. No or few young lavas were observed until reaching theelevated East Limb. Traversing south along the crest of the East Limb revealed young glassy lobates, sheet flows, collapse features, pillow lavas and hydrothermal venting. Samples collected on axis ranged from basalts to andesites with varying phenocryst populations. This traverse provides a data set that will help answer questions regarding the volcanism over the anomalously large melt lens, off axis volcanism, and chemical variability both across and along axis.

Dive J2-266

This dive included an across-axis transect to the west of the southern portion of the East Limb, a northwest traverse of an elevated ridge through the nodal basin that marks the outer edge of the melt zone, and then an easterly traverse to complete a second across-axis transect across the East Limb. The southern transect was made to help answer several questions about the amount of volcanic activity in the meltstarved portion of the East Limb. It will help determine the nature of volcanism to the south of the robust melt lens and to determine how the geochemistry of the lavas may change along-axis. Although some of the lavas sampled during this traverse appeared to be relatively young, none appear as young as the lavas sampled within the axial graben to the north along the

East limb. Sedimented pillows were the dominant morphology in the region. During the northward traverse along the bathymetric high, several domes were sampled to determine the geochemical relationship between lavas erupted near the outer melt lens. Observations revealed sedimented pillows and faults throughout the outer melt zone region. A second transect across the East Limb was carried out to help characterize the geochemical variability of lavas erupted across axis beneath the robust part of the melt lens. Those samples will provide a basis for comparison (both geochemically and morphologically) to the northern and southern across-axis traverses and will permit a more detailed understanding of changes occurring across axis.

Dive J2-267

This dive began with a short cross-axial traverse of the East Limb, then a a southerly traverse along the neovolcanic zone on the East Limb, and a transit west across the OSC basin. The latter portion of the dive was a southward along-axis traverse of the west limb. The southern part of the east Limb was dominated by pillow lavas draped in sediment. No recent volcanism was observed. The west axis traverse provides data for comparison between the propagating east limb and the dying west limb. Samples collected from the west limb can be compared to those collected from the east limb to provide insight into questions about magma source, fractionation, and the relative age of volcanism. The western axis was dominated by lobate flows and pillow lavas. Sediment cover varied along axis, but was generally less south of 9°00'N. Meter- wide fissures were observed within portions along the western limb.

Figures 3.c.2-5 below: Tracklines and framegrab photographs for Jason II lowerings J2-264 through J2-267. Positions shown are from unedited navigation

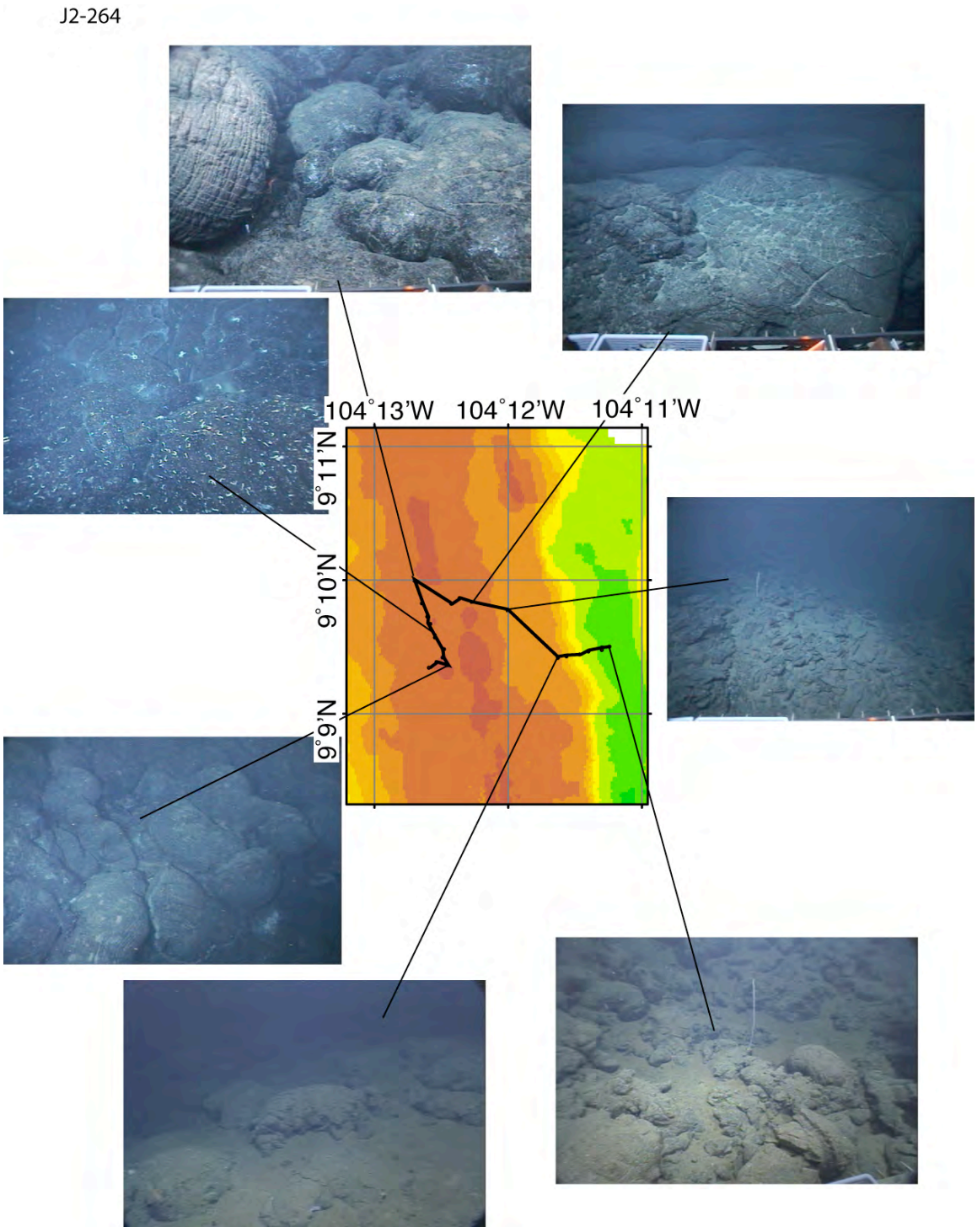
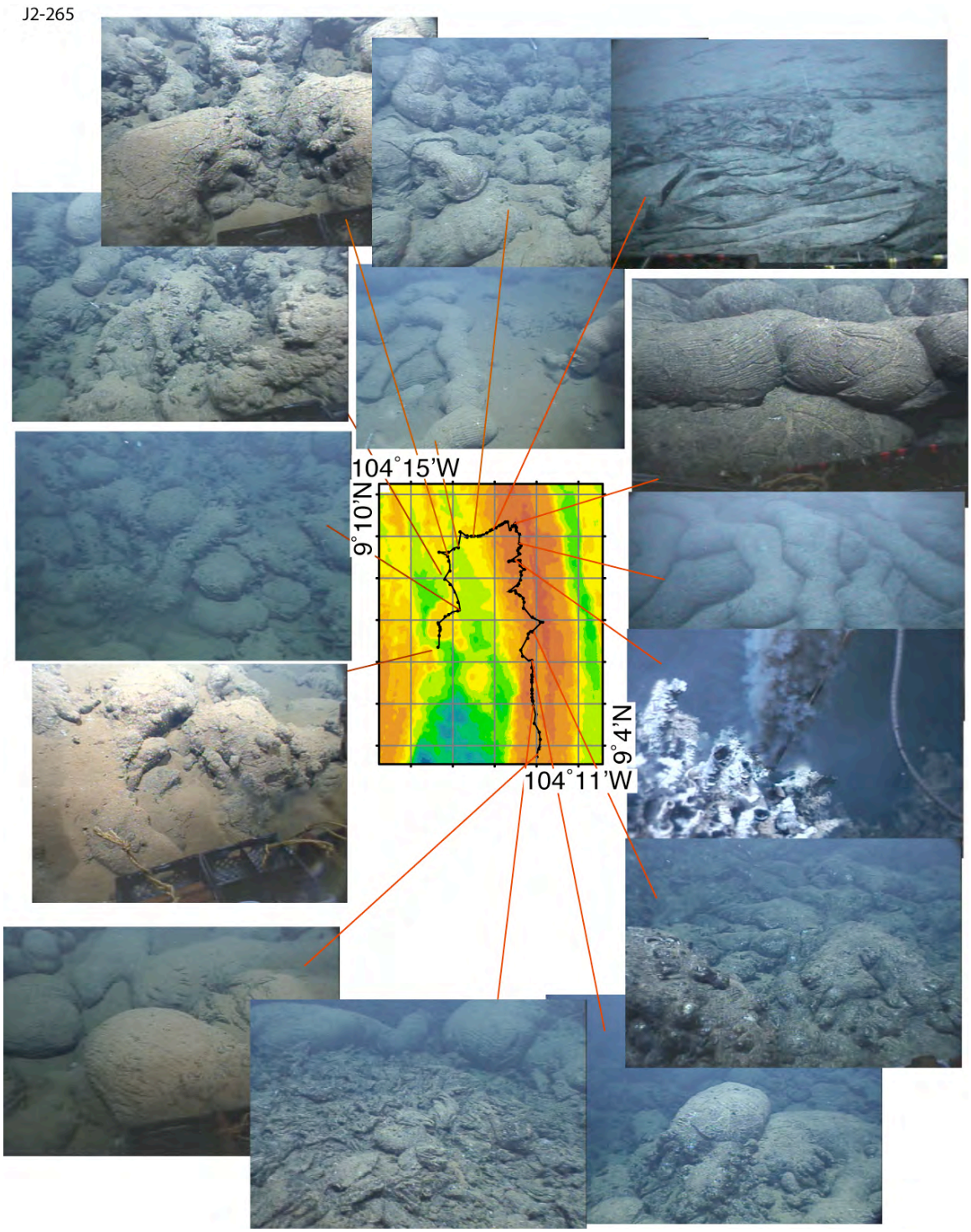


Figure 3.c-2.



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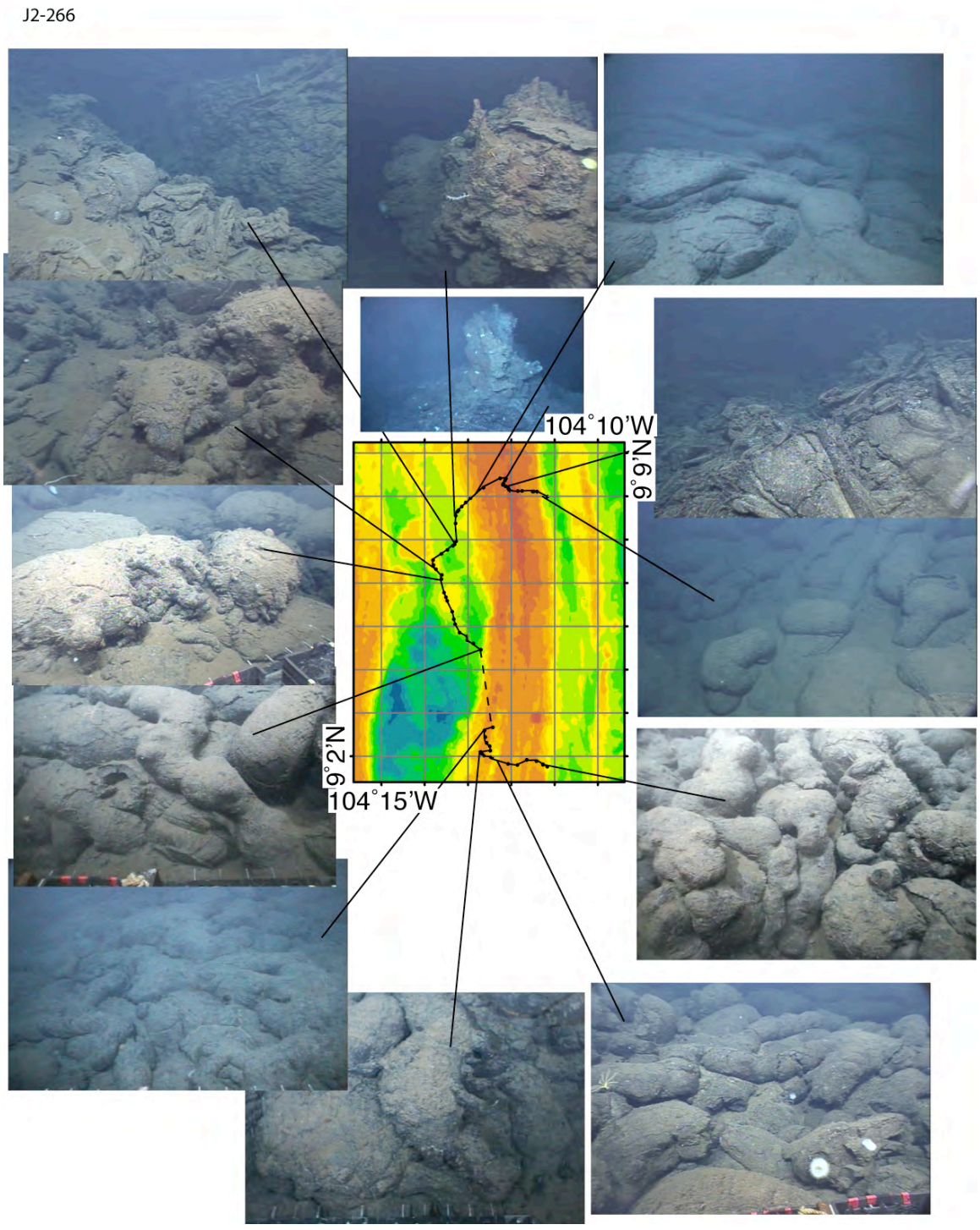


Figure 3.c-4.

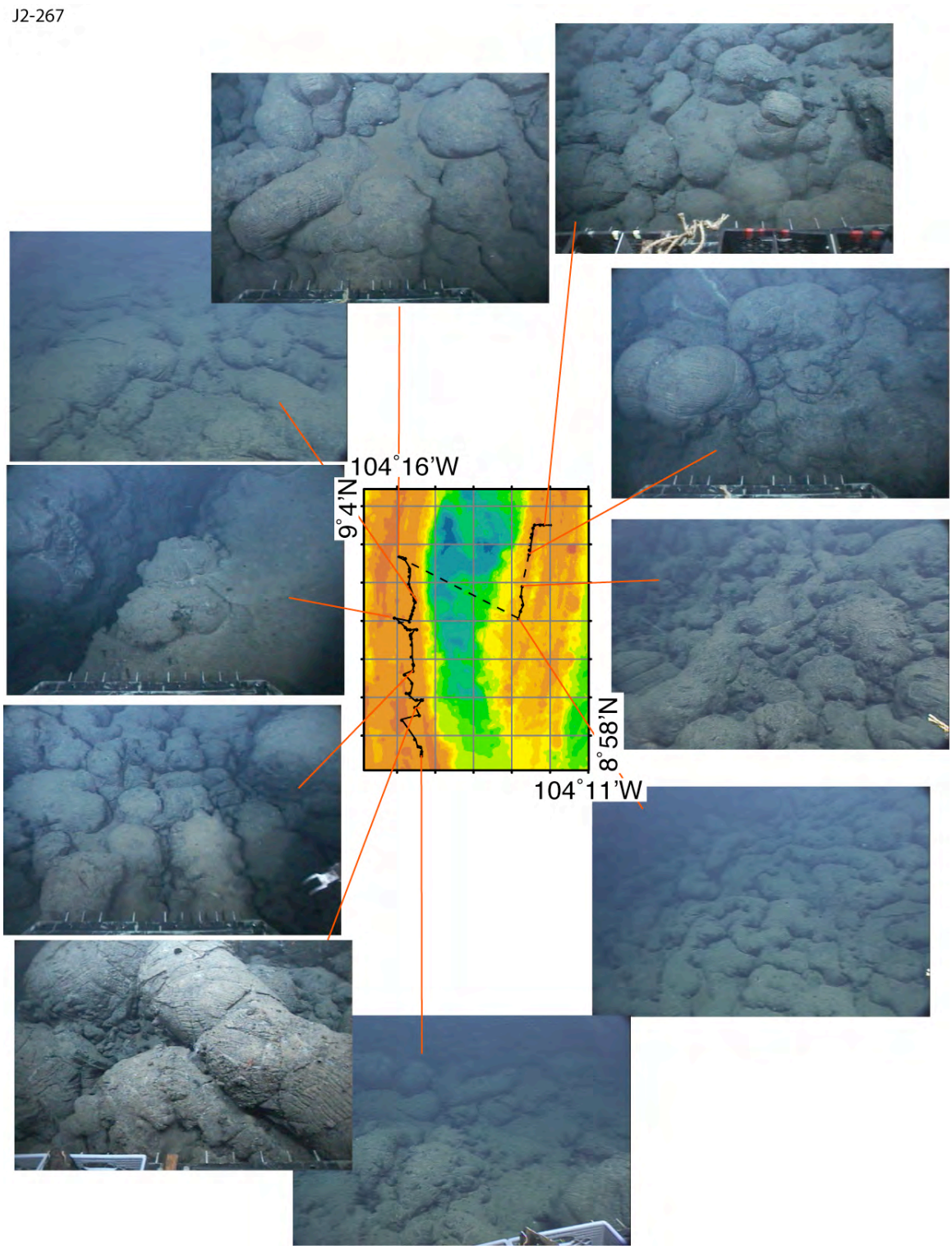


Figure 3.c-5.

Section 3.d.
TowCam Operations and Camera Tow Synopses

Operational Summary

The WHOI – MISO (Multidisciplinary Instrumentation in Support of Oceanography) Facility TowCam [Fornari, 2003] was used for 7 lowerings during the AT15-17 cruise. The system was configured to collect digital photographic and CTD data only, as a problem with the electronics in the winch junction box prevented implementing the wax-ball samplers. Camera s/n6006 was used for all lowerings with a delay time of 90-100 minutes and photo interval that varied between 10-15 sec. Towing speed was usually _ kt for most lowerings. A relay transponder (14.0 kHz receive / 9.0 transmit) was placed 100-200 m above the camera system to collect long baseline (LBL) navigation data during the tow. In addition, four MAPRs were placed at 4 set distances above the TowCam to record water properties data during each tow to help locate hydrothermal plumes (see MAPR section). For tows where the magnetometer was on the TowCam, we did a partial turn at the end of the lowering when the system was at ~1200 m depth by turning the ship ~ 90-180° so that the system turned through part of a full circle to provide calibration data used to process the magnetics. One important operational issue related to the CTD winch system is that the tensiometer was not operational for any of the tows. The sensor was broken and there were not spares on board. All attempts to repair it were unsuccessful. In the future, a spare tensiometer sensor for the hydrographic winches should be onboard at all times.

The TowCam system was used to ground truth the DSL-120A sidescan sonar imagery in areas with distinct acoustic textures to augment observational coverage provided by the *JasonII* ROV system as well as help plan ROV dives to optimize logistics and areas to be observed and sampled by *JasonII*. Approximately 10,000 3.3 megapixel digital color photographs of the seafloor were collected. In addition to the processed, date/time stamped images, files were made of CTD data and processed navigation data that was based on both long baseline (LBL) as well as layback information calculated using the camera depth and wire out. Near-bottom magnetic data were collected using the WHOI self-recording 3-axis fluxgate magnetometer on 4 of the tows that went across the EPR axis. HTML webgalleries and QT movies were also produced from the imagery and made available via the shipboard network within a few hours of the end of each lowering for use by the science party for dive planning.

Camera Tow Synopses

TowCam #1 30 March, 2007 (14:57Z – 21:14Z) 15 sec rep rate
[Relay xponder at 50 m, no Maggie, 4 MAPRs at 75m, 150m, 225m, 300 m]

The first tow investigated a large constructional dome and elongate ~ N-S ridges in the western portion of the northern OSC basin that overlie the western margin of the melt lens. The tow traversed the SW portion of the dome and continued up the southern end of one of the ridges during the ~4 hr on-bottom tow. Abundant evidence of relatively recent constructional volcanism was observed on the dome and the constructional ridge, including folded sheet flows on the flat-topped dome summit and constructional pillow lava escarpments on the ridge.

TowCam #2 4 April, 2007 (04:14Z – 13:42Z) 15 sec rep rate
[Relay xponder at 50 m, Maggie on, 4 MAPRs at 75m, 150m, 225m, 300 m]

Tow#2 was a E-W line that crossed the eastern EPR OSC limb at ~ 9° 1.5'N to investigate the across-axis distribution of volcanism along this portion of the ridge axis. The tow provides a detailed across axis profile of the axial terrain from the east flank of the limb into the eastern portion of the OSC basin.

TowCam #3 5 April, 2007 (04:23Z – 14:00Z) 15 sec rep rate
[Relay xponder at 100 m, Maggie on, 4 MAPRs at 75m, 150m, 225m, 300 m]
Tow#3 provided an along axis tow within the axial graben of the eastern EPR OSC limb between ~9° 7-10'N to help define the nature of the axial pillow mounds and walls of the graben. Part of the tow was planned to investigate a narrow linear fissure on top of one of the mounds near 9° 8'N for possible hydrothermal activity. Several images of small tubeworms were seen at that location within fissures. Overall the imagery from this survey suggests that volcanic terrain along this tow is very young.

TowCam #4 6-7 April, 2007 (18:34Z – 01:00Z) 10 sec rep rate
[Relay xponder at 100 m, Maggie on, 4 MAPRs at 75m, 150m, 225m, 300 m]
Tow#4 covered a SE to NW oriented track covering terrain along the west flank of the eastern OSC limb to characterize features in the DSL-120a sidescan data.

TowCam #5 11 April, 2007 (07:05Z – 14:30Z) 10 sec rep rate
[Relay xponder at 100 m, no Maggie, no MAPRs]
Tow#5 was a S to N traverse located ~1 km east of the EPR axis on the eastern OSC limb between ~ 9° 0-2'N to investigate features at the terminus of the eastern limb and relative ages of volcanic terrain compared to further north on the eastern limb and within the axial graben.

TowCam #6 14April, 2007 (01:14Z – 09:30Z) 10 sec rep rate
[Relay xponder at 50 m, Maggie on, 4 MAPRs at 75m, 150m, 225m, 300 m]
Tow#6 was a E to W crossing of the southern tip of the eastern OSC limb along ~9° 0.5'N between 104° 11-13'W to determine the E-W extent of younger volcanism and relationship to the underlying melt lens. This area overlies a zone where the melt lens tapers out. The youngest volcanics, largely pillow mounds and escarpments and some possible eruptive fissures are found in the western portion of the flow, suggesting that the inside ridge tip is the site of younger volcanism.

TowCam #7 14April , 2007 (14:28Z – 22:30Z) 15 sec rep rate
[Relay xponder at 50 m, no Maggie, 4 MAPRs at 75m, 150m, 225m, 300 m]
Tow#7 was dedicated to investigating sonar targets and areas where there MAPRs plume signals were observed during DSL-120a sidescan tows on the west flank of the deep overlap basin. Unfortunately, no hydrothermal signals were seen in the CTD data during the survey and no hydrothermal vents or indicators were observed in the images. The terrain consisted of heavily sedimented pillow and occasional lobate flows.

Approximate distances covered by TowCam are as follows:

TowCam1: 2.66 km
TowCam2: 6.20 km
TowCam3: 6.13 km
TowCam4: 2.36 km
TowCam5: 3.87 km
TowCam6: 4.25km
TowCam7: 3.84 km

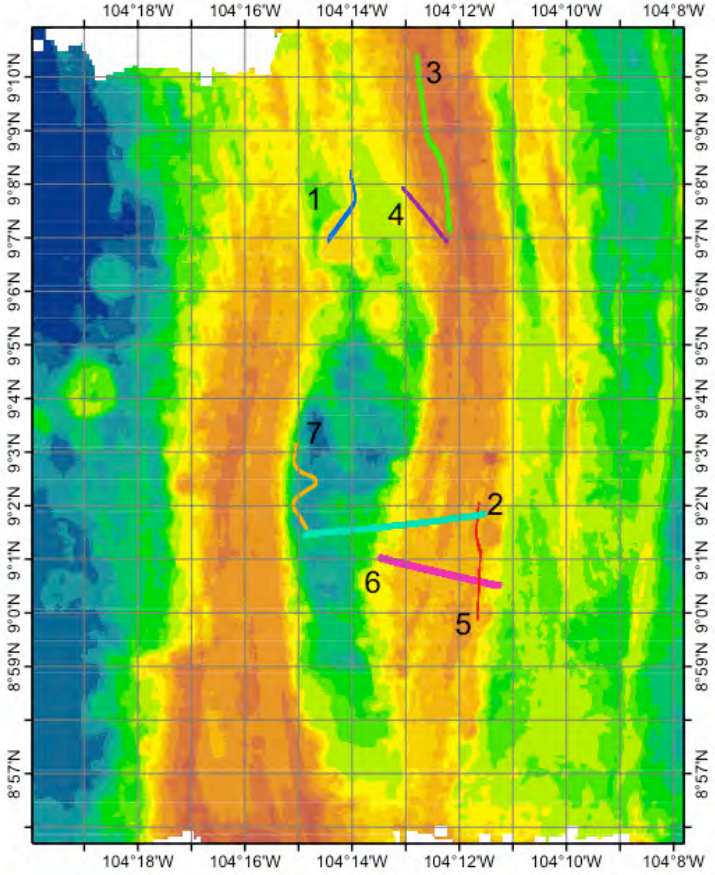


Figure 3.d-1 (above). AT15-17 TowCam tracks labeled with lowering numbers.

Figures 3.d-2 through 3.d-8 (below). Selected photographs from TowCam lowerings 1-7.

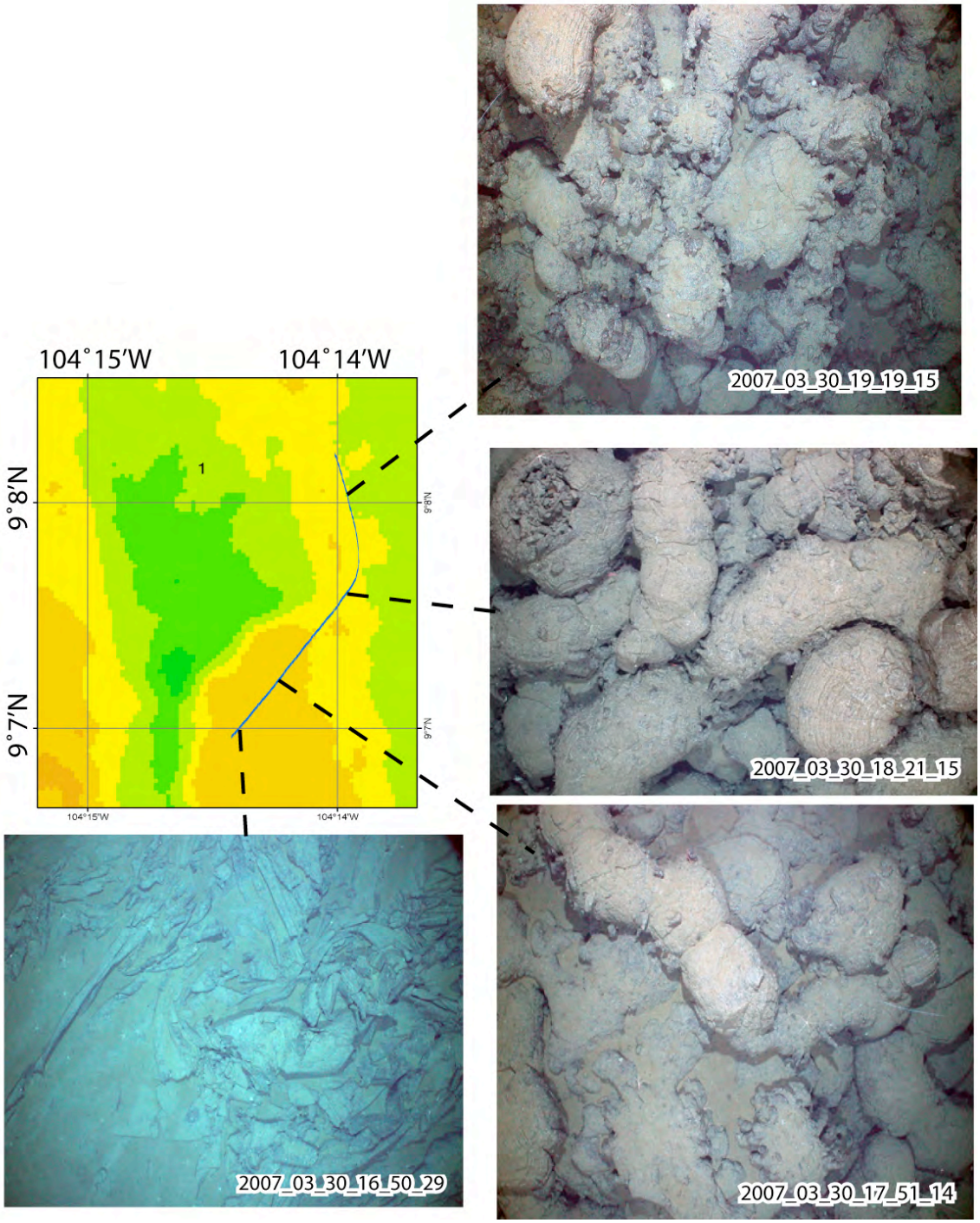

TowCam 1
104°15'W
104°14'W
9°8'N
9°7'N
1
2007_03_30_19_19_15
2007_03_30_18_21_15
2007_03_30_16_50_29
2007_03_30_17_51_14

Fig. 3.d-2.

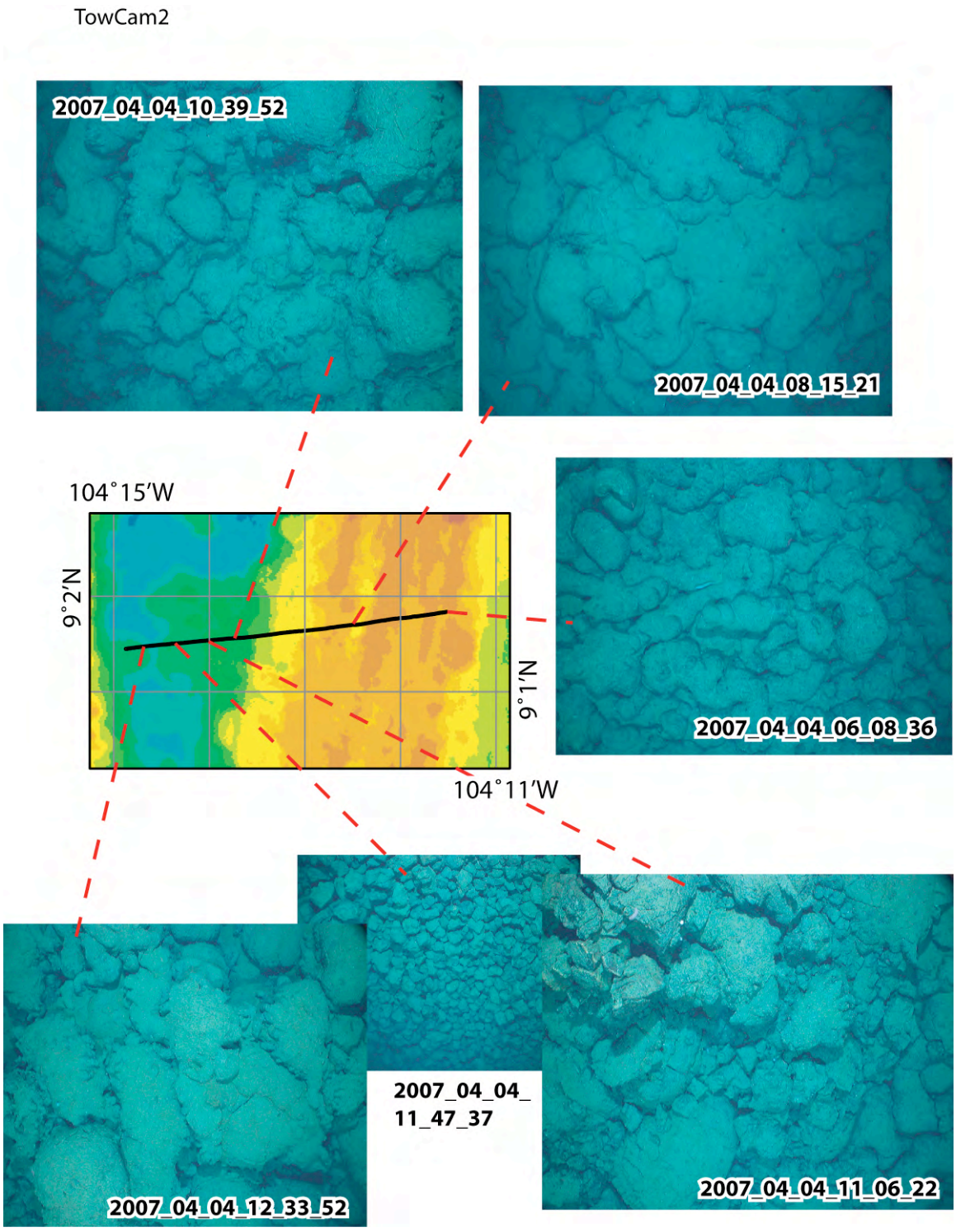

TowCam2
2007_04_04_10_39_52
2007_04_04_08_15_21
104˚15'W
9˚2'N
9˚1'N
104˚11'W
2007_04_04_06_08_36
2007_04_04_
11_47_37
2007_04_04_12_33_52
2007_04_04_11_06_22

Fig. 3.d-3.

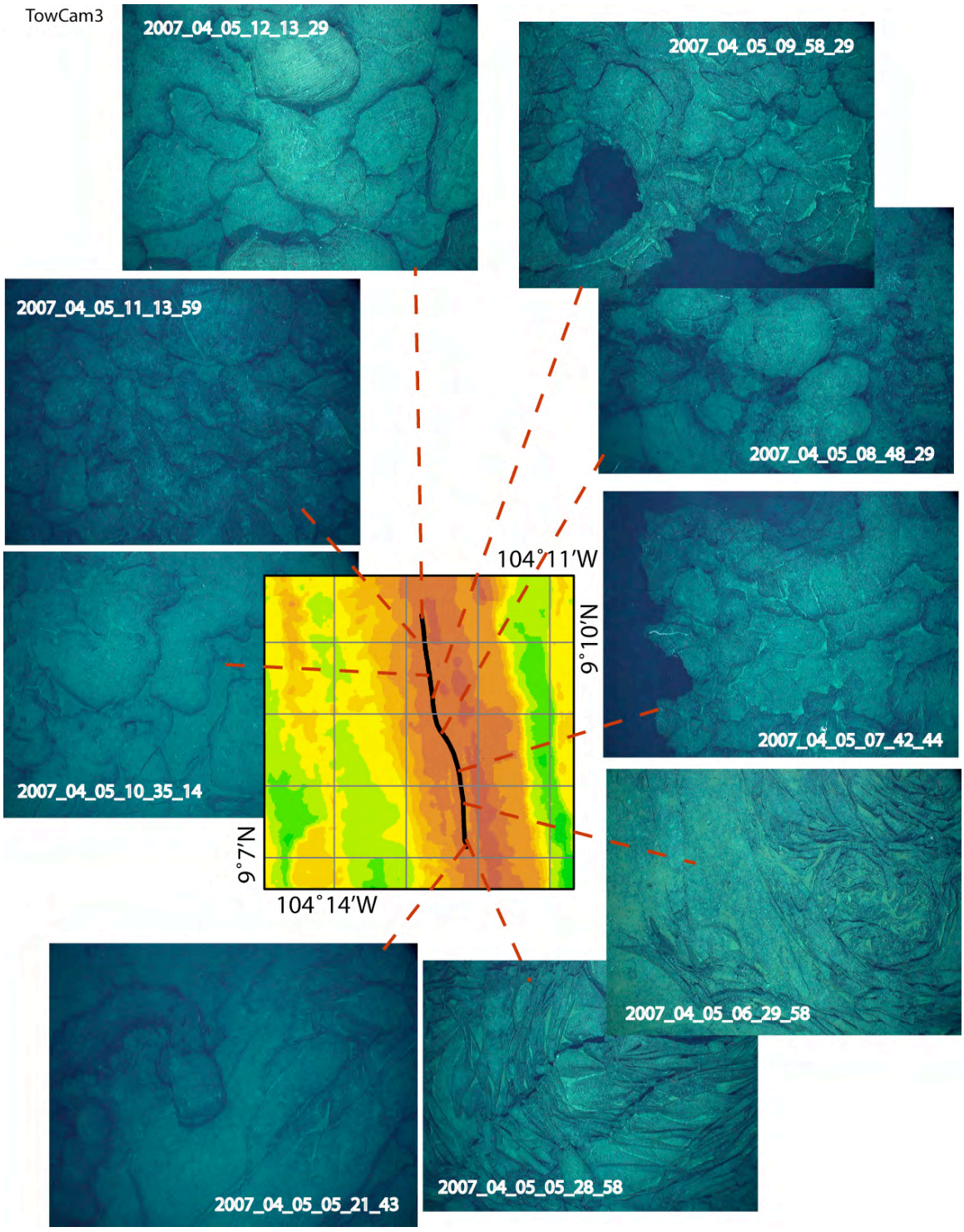

TowCam3
2007_04_05_12_13_29
2007_04_05_09_58_29
2007_04_05_11_13_59
2007_04_05_08_48_29
104°11′W
9°10′N
2007_04_05_07_42_44
2007_04_05_10_35_14
9°7′N
104°14′W
2007_04_05_06_29_58
2007_04_05_05_28_58
2007_04_05_05_21_43

Fig. 3.d-4.

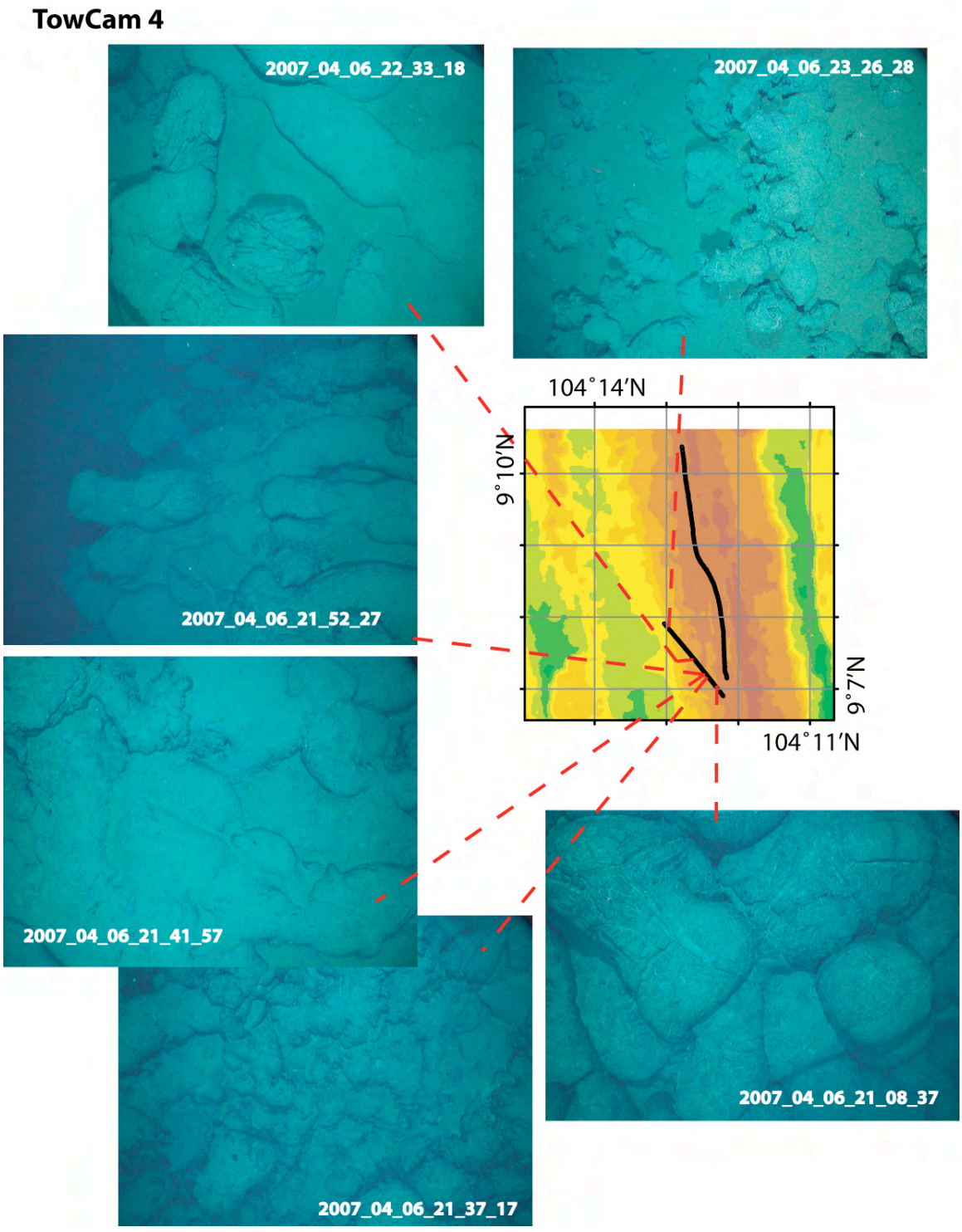

TowCam 4
2007_04_06_22_33_18
2007_04_06_23_26_28
2007_04_06_21_52_27
104˚14′N
9˚10′N
9˚7′N
104˚11′N
2007_04_06_21_41_57
2007_04_06_21_08_37
2007_04_06_21_37_17

Fig. 3.d-5.

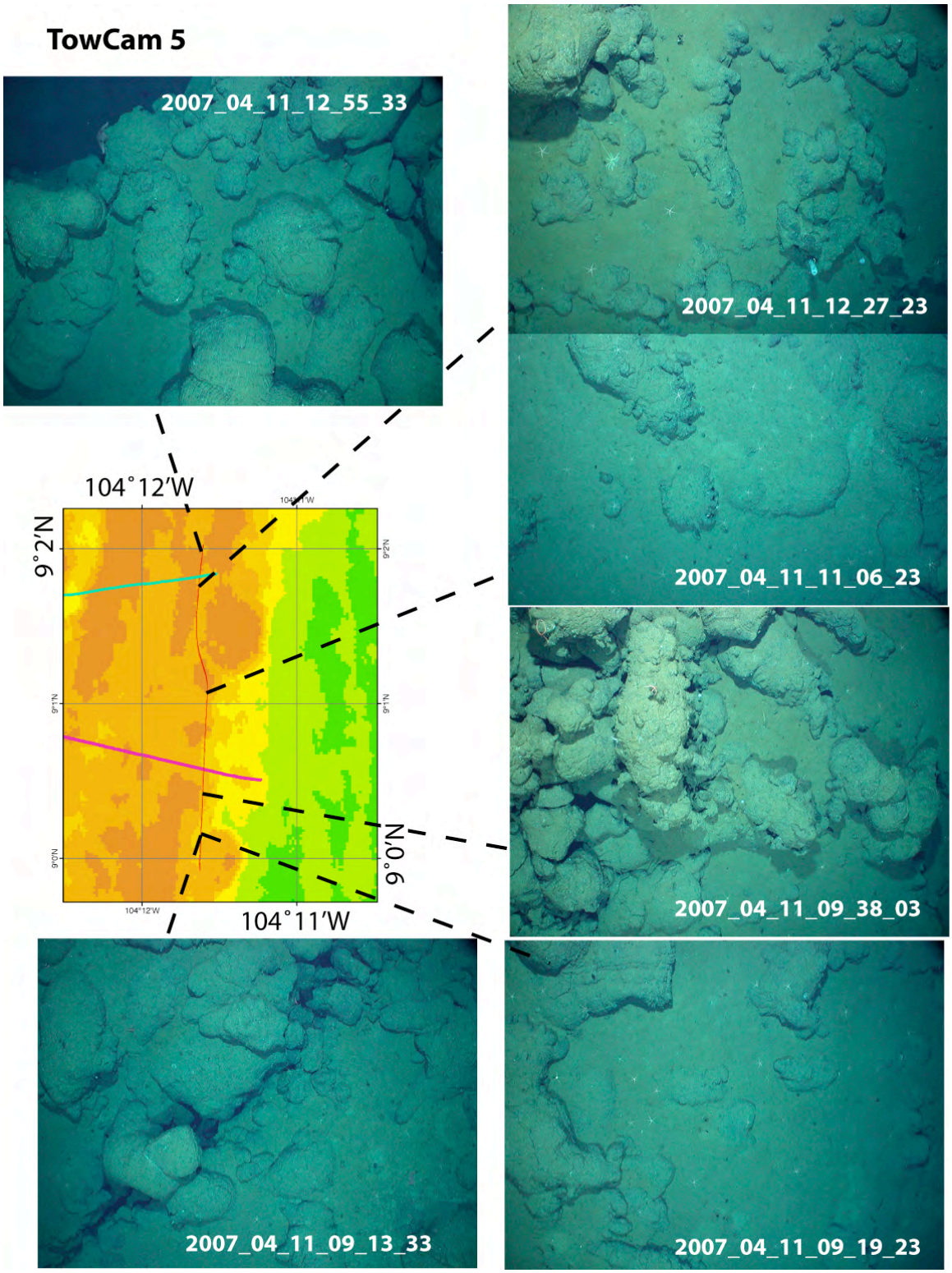

TowCam 5
2007_04_11_12_55_33
2007_04_11_12_27_23
2007_04_11_11_06_23
2007_04_11_09_38_03
2007_04_11_09_13_33
2007_04_11_09_19_23
104°12′W
104°11′W
9°2′N
9°0′N

Fig. 3.d-6.

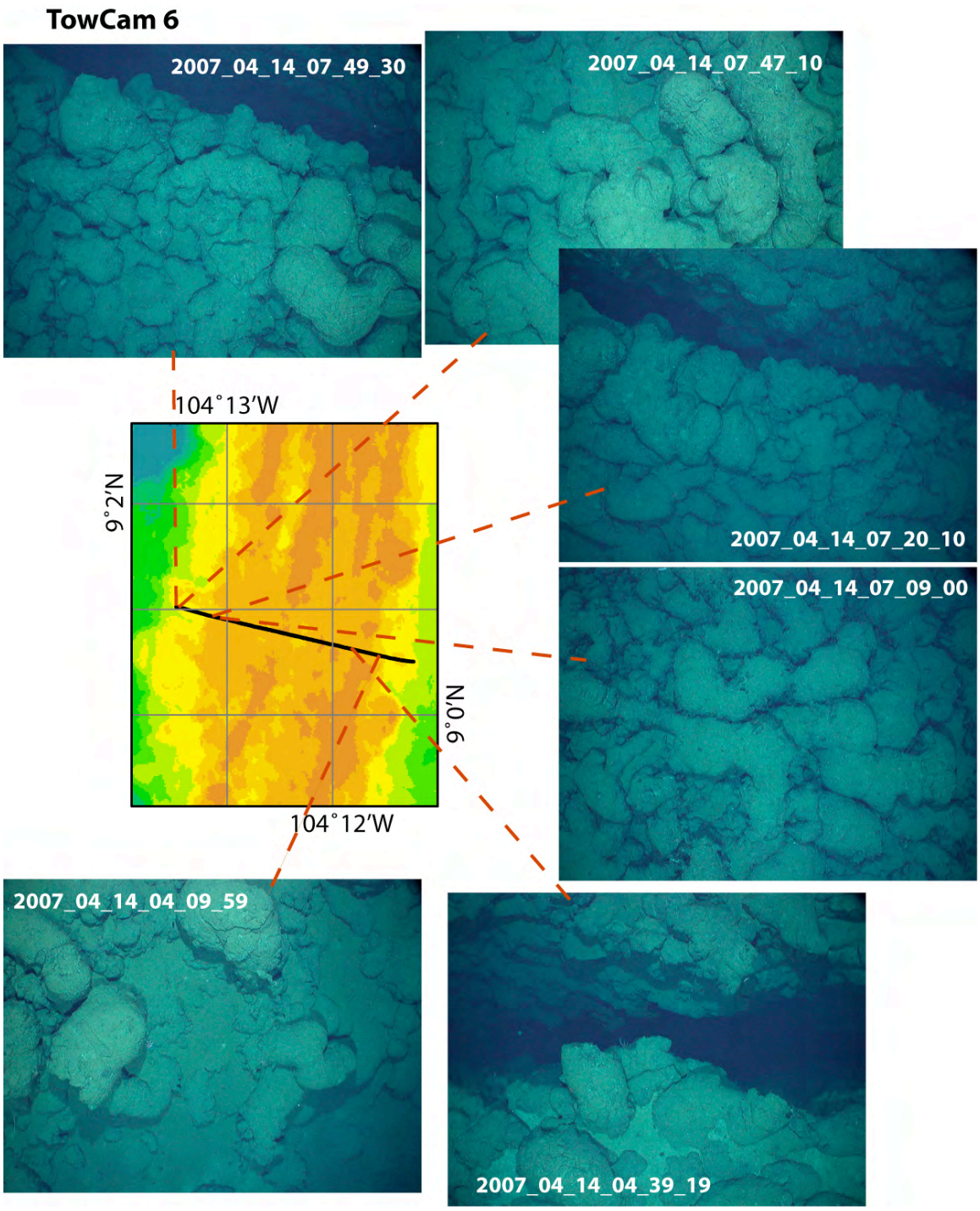

TowCam 6
2007_04_14_07_49_30
2007_04_14_07_47_10
2007_04_14_07_20_10
2007_04_14_07_09_00
2007_04_14_04_09_59
2007_04_14_04_39_19
104°13′W
104°12′W
9°2′N
9°0′N

Fig. 3.d-7.

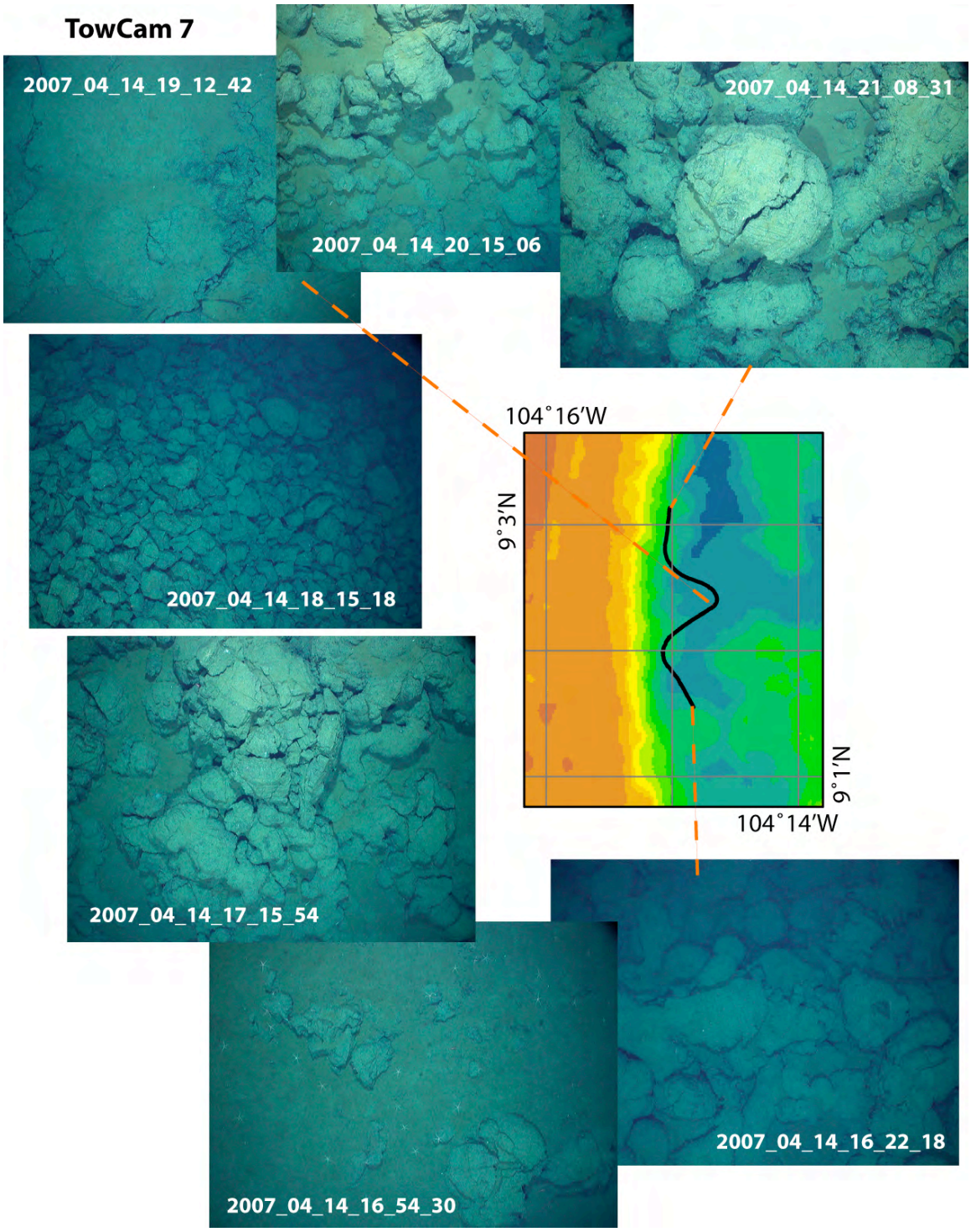

TowCam 7
2007_04_14_19_12_42
2007_04_14_20_15_06
2007_04_14_21_08_31
2007_04_14_18_15_18
2007_04_14_17_15_54
2007_04_14_16_54_30
2007_04_14_16_22_18
104°16'W
9°3'N
9°1'N
104°14'W

Fig. 3.d-8.

Section 3.e.
Hydrothermal Surveying

Summary of MAPR and CTD data

The water column at the OSC was mapped during the DSL-120A sidescan survey using both a CTD (conductivity - temperature - depth) recorder and MAPRs (Miniature Autonomous Plume Recorders) from the VENTS Program of the NOAA Pacific Marine Environmental Laboratory. MAPRs record data internally from temperature (°C), pressure, and nephelometer (LBSS) sensors. These data may be accessed after recovery through the MAPR terminal program and an Excel macro which converts the binary data file into a spreadsheet. This macro also converts the pressure measurements into depth and the LBSS voltage measurements into nephelometric turbidity units (NTUs). The CTD data was recorded but was of limited use as the lateral motion of the DSL-120A towfish did not allow the CTD detector to flush properly.

MAPRs were set at 75 m intervals along the wire in order to record data at approximately 75, 150, 225, and 300 m above the ocean floor. Background values for each MAPR were calculated by averaging the values for temperature and NTUs at depths of 1800-1850 m (the area above the plume but below the thermocline). These background values were then subtracted from the total temperature and NTUs for each MAPR.

Data from each MAPR were organized according to the corresponding DSL sidescan lines, and contoured using SigmaPlot's Transform 3D data function, using a Running Average contouring method and a sampling proportion of 0.1. Data were also contoured according to 100 m depth intervals for depths >2400 m, using the same contouring method described above. Temperature data did not show any significant anomalies, but light attenuation data showed definite areas of increased turbidity in the water column. Figures 3.e-1 to -6 show the 100 m depth intervals and their associated light attenuation anomalies, which correspond to hydrothermal plumes in the water column. Most of the intense plumes (>20,000 counts in excess of the background) are associated with DSL-120A lines 5 and 6, located adjacent to the east and west limbs of the OSC, respectively. It is likely that the newly discovered hydrothermal vent- Medusa -is the source of the nearest plume at 9°8.0'N and 104°11.5'W in Figures 3.e-2 and -3 (2400-2500 m depth and 2500-2600 m depth, respectively), but as only one vent was found, it is possible that the plume may have originated elsewhere. A TowCam photographic and CTD survey of the basin-facing slope of the western limb between 9°1.5'N-9°3.5'N and 104°14.9'W, where significant light attenuation anomalies were recorded (Fig. 3.e-6), did not show any evidence of hydrothermal activity.

The following figures show plume locations according to depth. The colors correspond to nephels counts above the background, where dark areas show locations with no light attenuation anomalies and bright areas show locations with very high nephels counts, indicating the presence of hydrothermal plumes. Figure 3.e-1 (2300-2400 m depth) shows a plume at approximately 8°57.0'N and 104°15.0'W. Figure 3.e-2 (2400-2500 m

depth) shows several intense plumes, at approximately 8°57.8'N and 104°15.0'W, 9°5.6'N and 104°15.0'W, 9°2.0'N and 104°13.0'W, and 9°8.0'N and 104°13.0'W. Figure 3.e-3 (2500-2600 m depth) also shows intense plumes, at 8°59.5'N and 104°15.0'W, 8°59.0'N and 104°13.5'W, 9°4.5'N and 104°15.0'W, 9°8.5'N and 104°15.0'W, 9°6.5'N and 104°14.5'W, and 9°3.5'N and 104°14.5'W. Figure 3.e-4 (2600-2700 m depth) shows a large plume from 9°3.0'to 9°6.0'N at 104°14.5'W, a smaller plume at 9°0.5'N and 104°15.0'W, and other minor plumes. Figures 3.e-5 and -6 (2700-2800 m depth and 2800-2900 m depth, respectively) both show a plume from 9°1.5'to 9°4.0'N at 104°15.0'W.

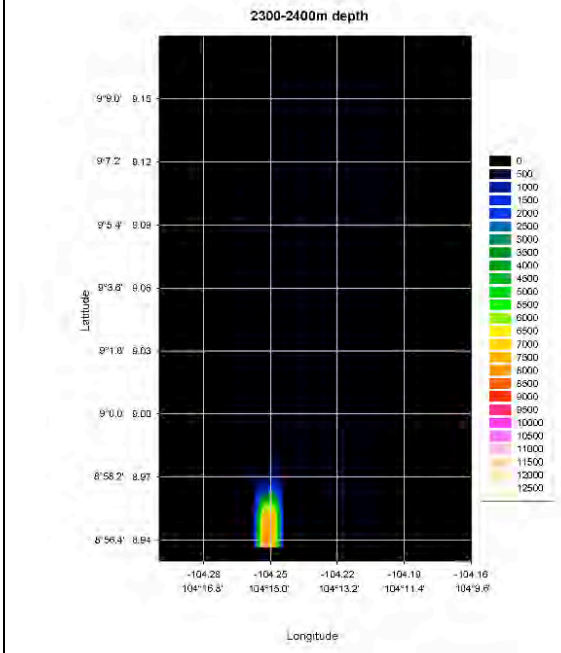


Figure 3.e-1. 2300-2400 m depth

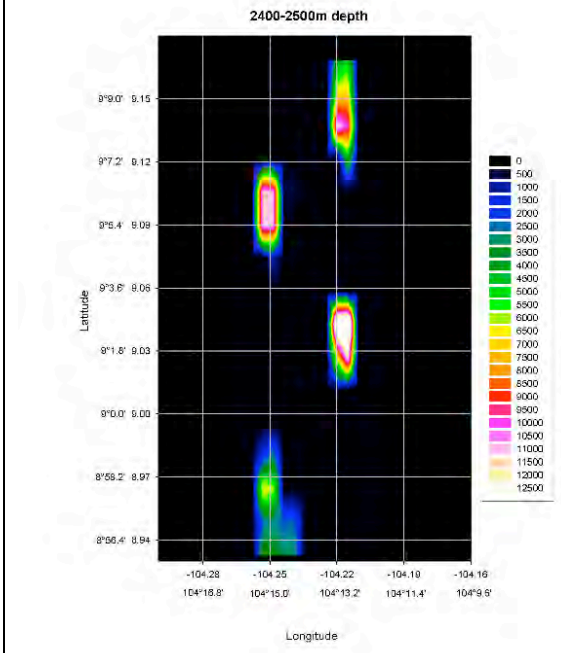


Figure 3.e-2. 2400-2500 m depth

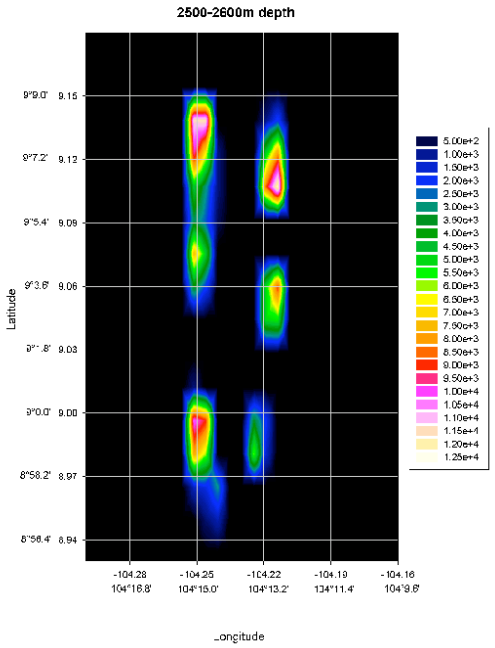


Figure 3.e-3. 2500-2600 m depth

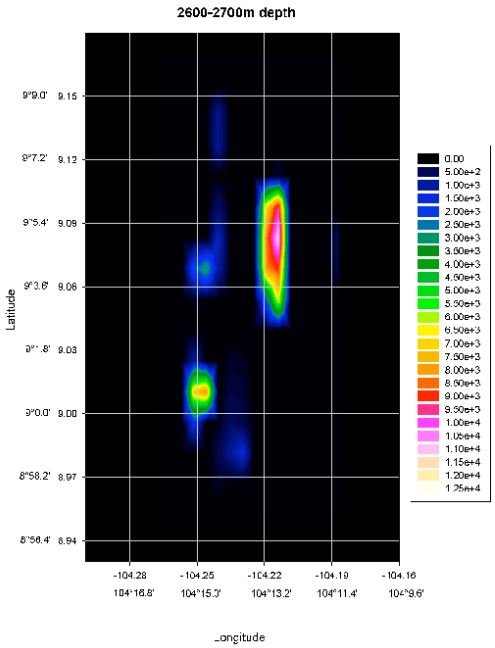


Figure 3.e-4. 2600-2700 m depth

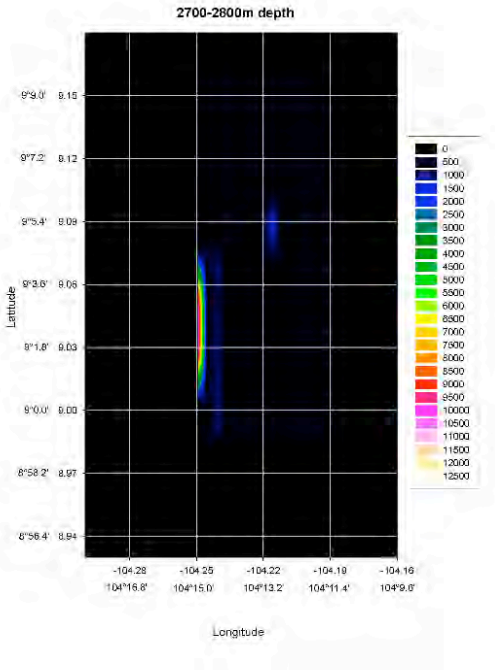


Figure 3.e-5. 2700-2800 m depth

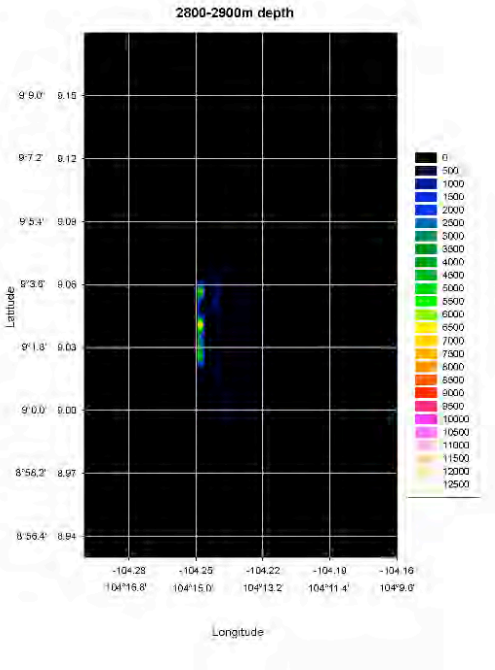


Figure 3.e-6. 2800-2900 m depth

Section 3.f.
Magnetics

Data were collected by two three-component fluxgate magnetometers that were mounted to the wings of the DSL-120A towfish. One was recorded within the sonar data stream and the other was the WHOI self-recording magnetometer. The sensors are identical. MatLab codes were used to make corrections to the magnetic data that were collected. First, heading corrections were made to account for the variability in total field that arises based on the azimuth heading of the ship. Next, the International Geographic Reference Field (IGRF) corrections were applied to the data. Once this calculation is performed, the values are then subtracted out and what is left is the local magnetic anomaly field caused by magnetization of the rocks. 3-D inversions of the magnetic field in the presence of topography will be done on-shore to produce magnetization maps of the OSC. Rock samples for magnetic analysis were also collected which provide for a broad coverage of the OSC's eastern and western limbs. Small scale variations in the magnetic anomalies found in the layer 2a basalts of the OSC can give clues and aid in making interpretations as to the nature and variability of the magma network beneath the limbs and overlap basin of the region.

The following are plots (Figs 3.f-1 through 3.f-10) created for each of the 10 track lines conducted with the DSL-120a over the OSC. The plot displayed in blue shows the pitch of the vehicle as the data was collected. Red displays roll of the vehicle and green displays the altitude above the seafloor as each of the track lines was conducted. Finally, the plot displayed in black shows the total field anomaly in nT left over after making heading and IGRF corrections. A strong correlation between pitch of the vehicle and the noise (spikes) indicates the need for additional filtering. Aside from the 10,000 nT spikes associated with vehicle pitching, the data appears well behaved.

Figs 3.f-1 through 3.f-10 (below). Magnetic results for each DSL-120a track line as described in text.

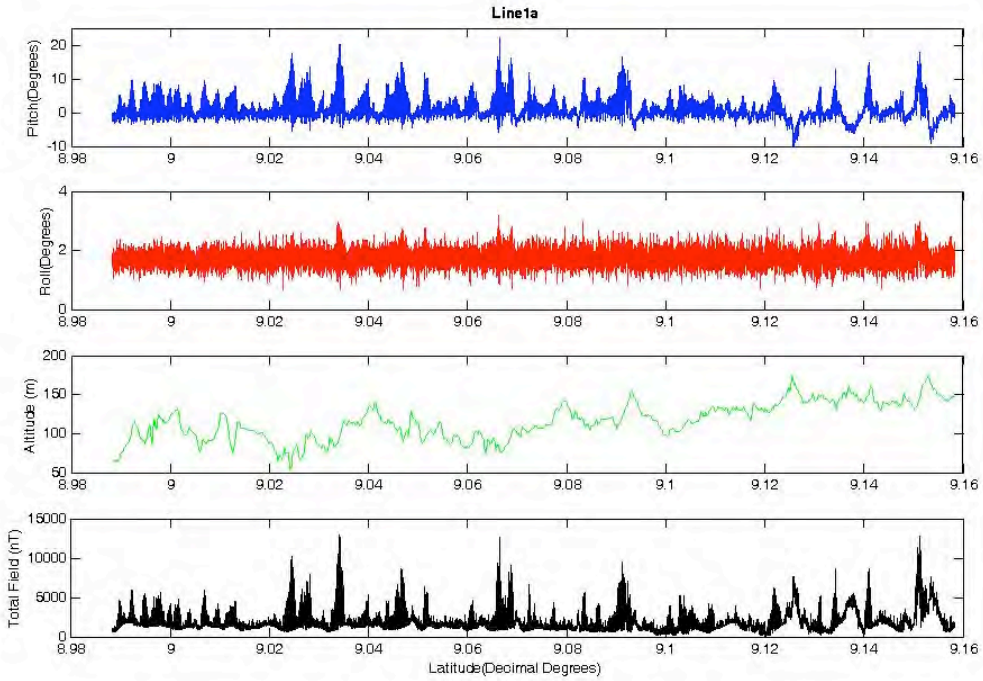


Figure 3.f-1.

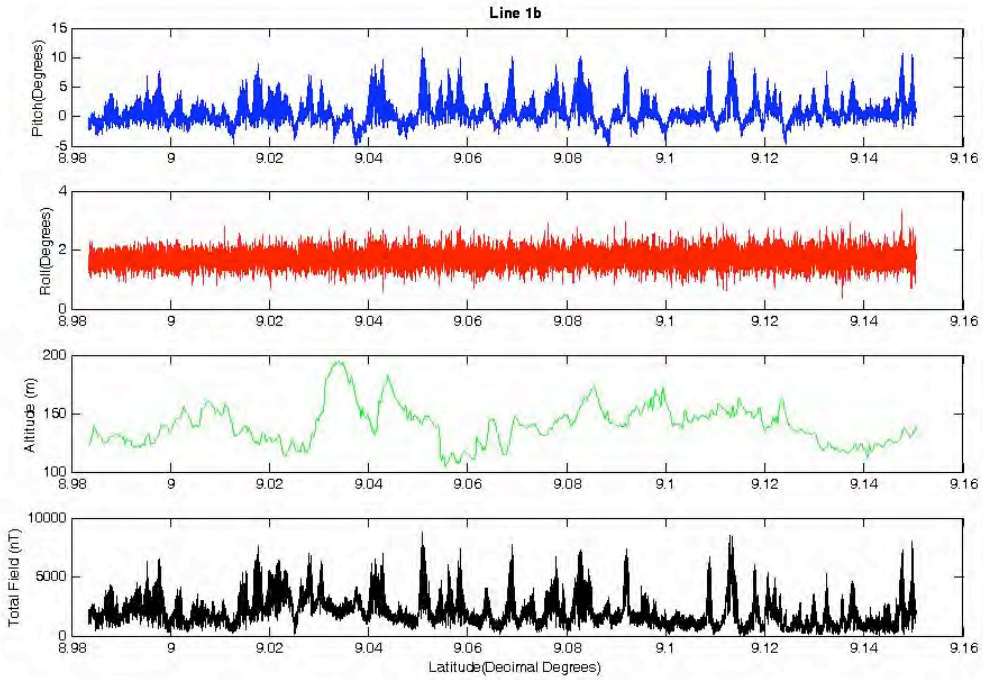


Figure 3.f-2.

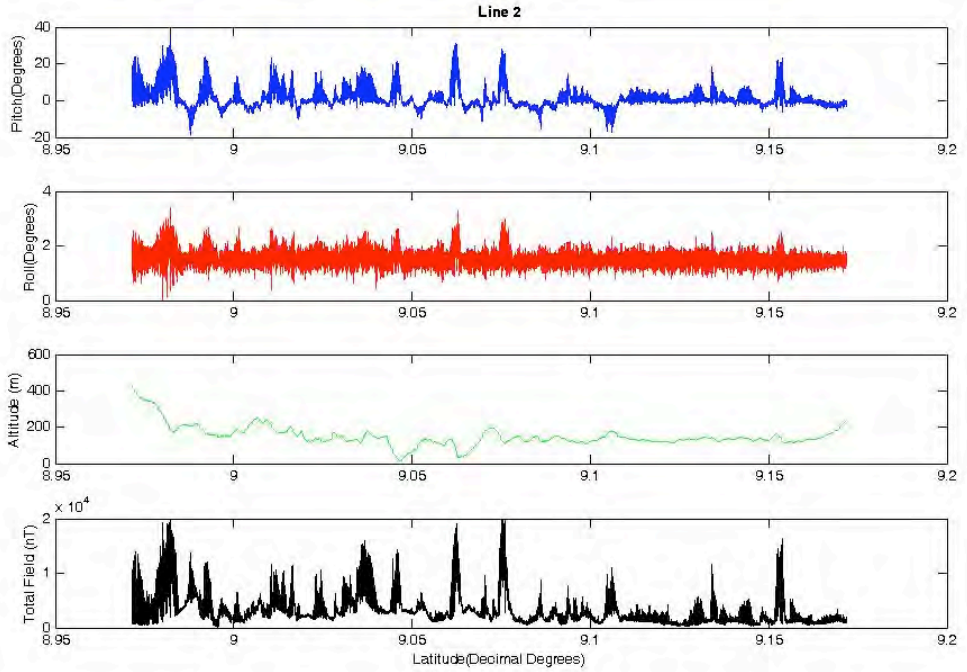


Figure 3.f-3.

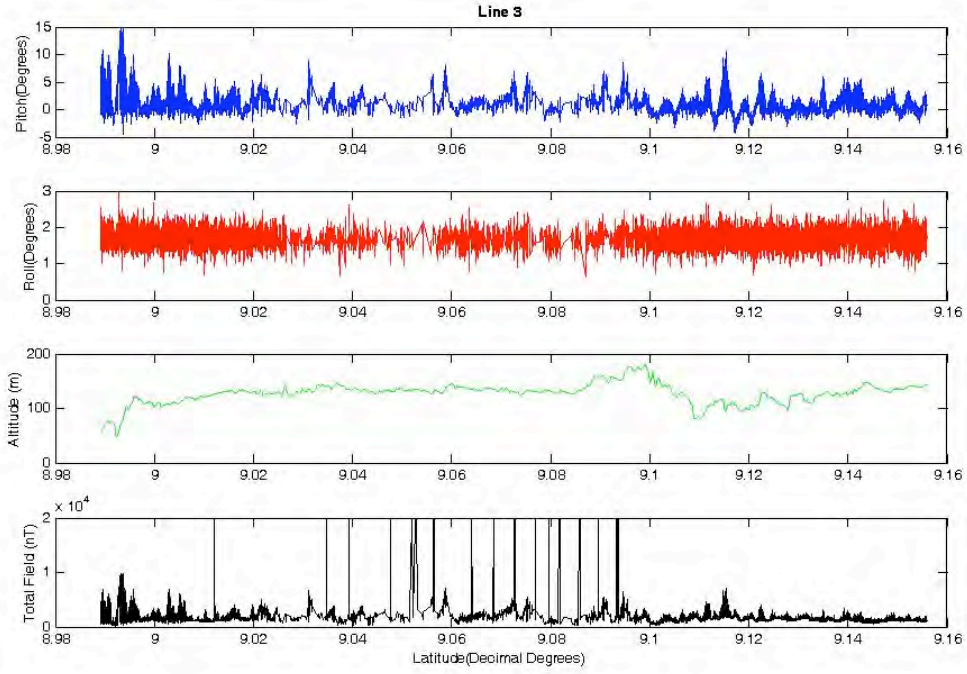


Figure 3.f-4.

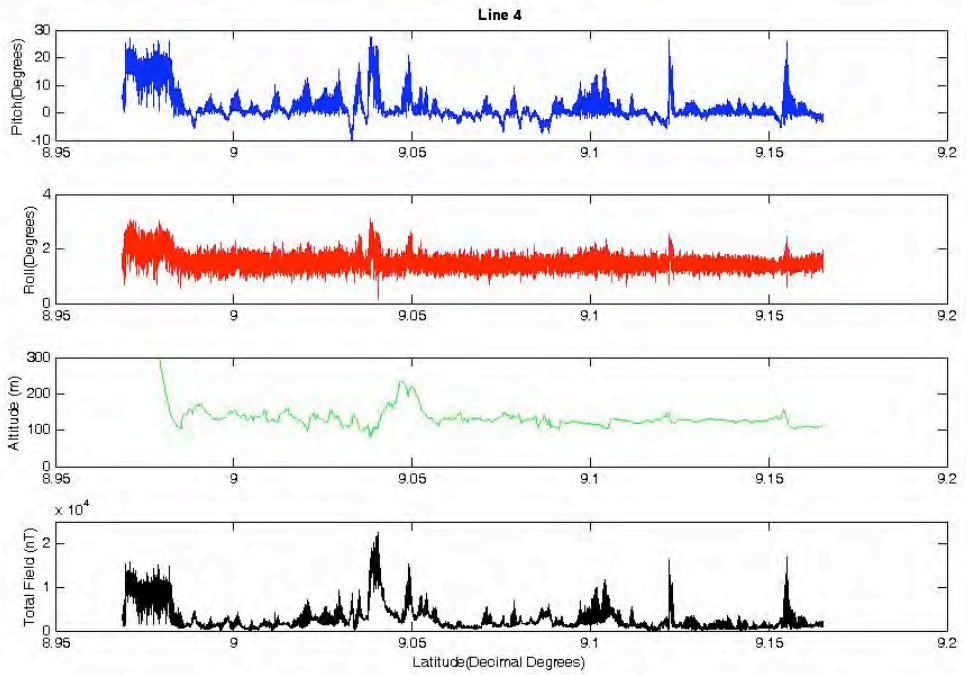


Figure 3.f-5.

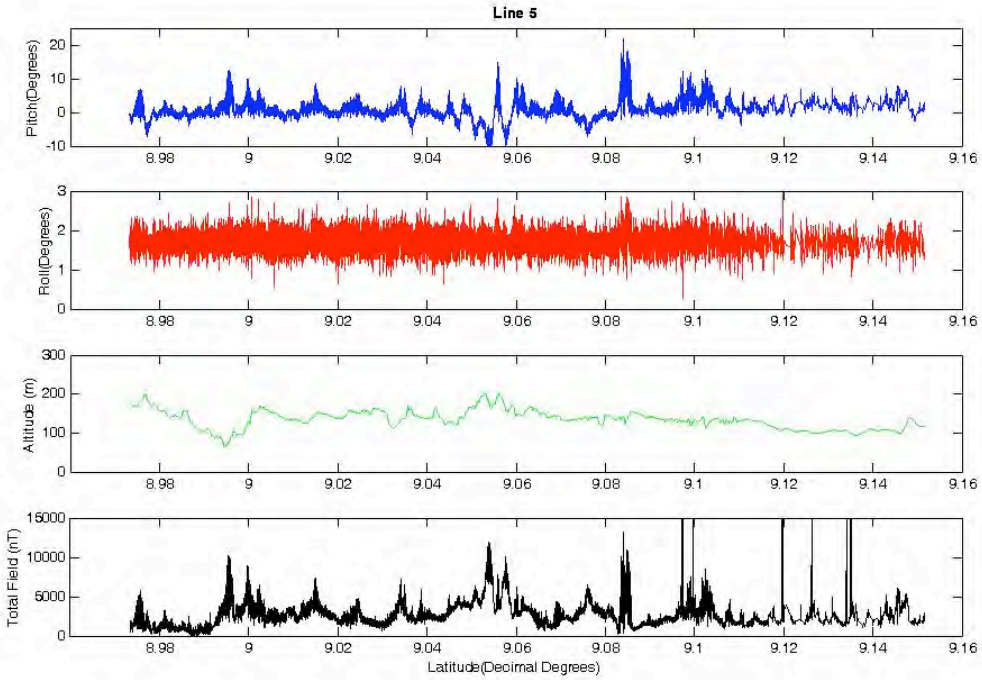


Figure 3.f-6.

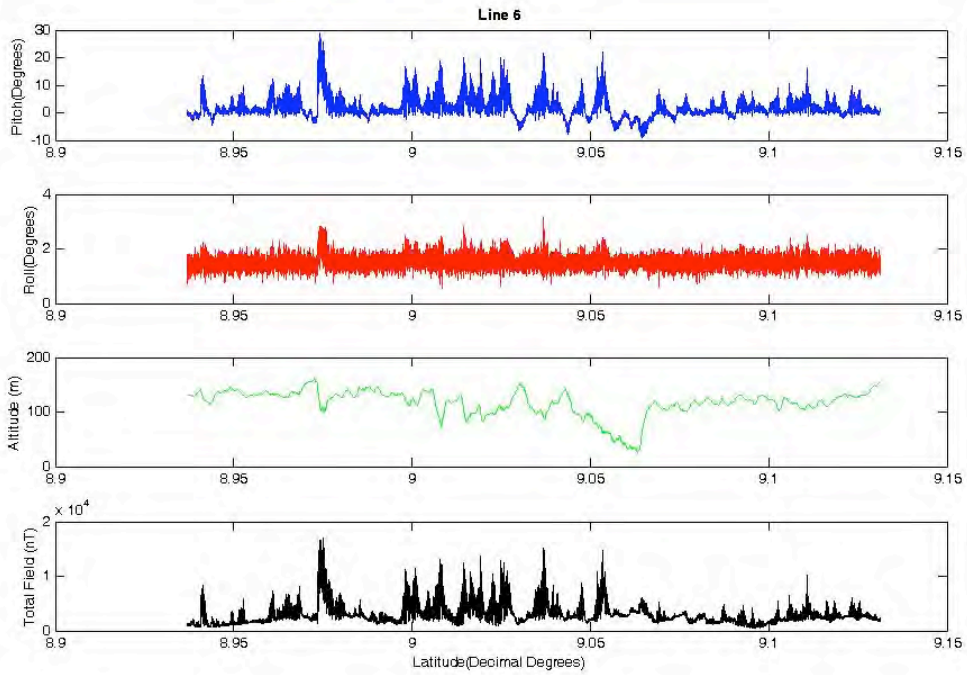


Figure 3.f-7.

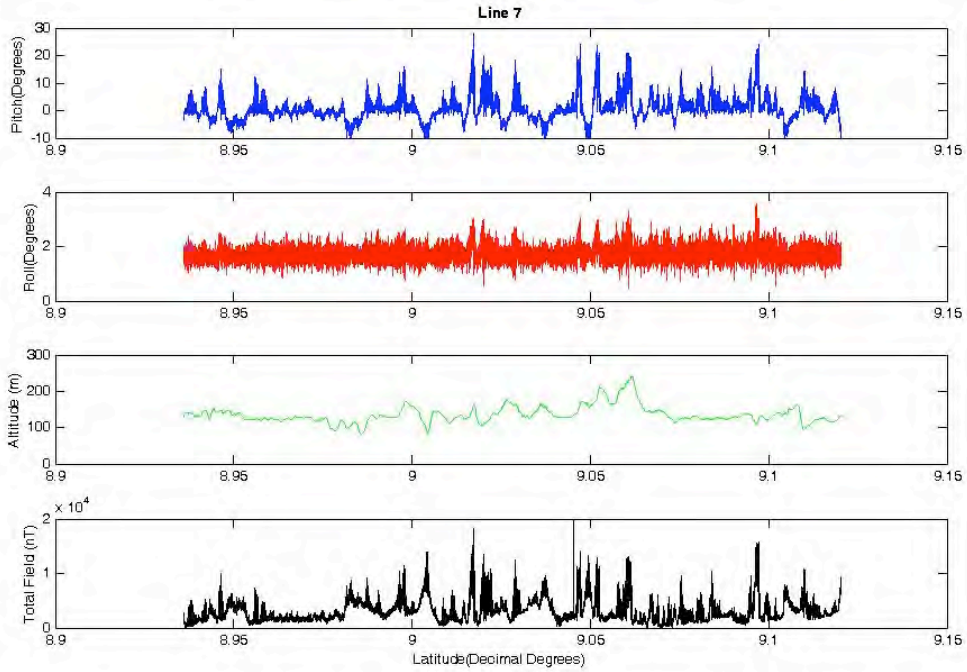


Figure 3.f-8.

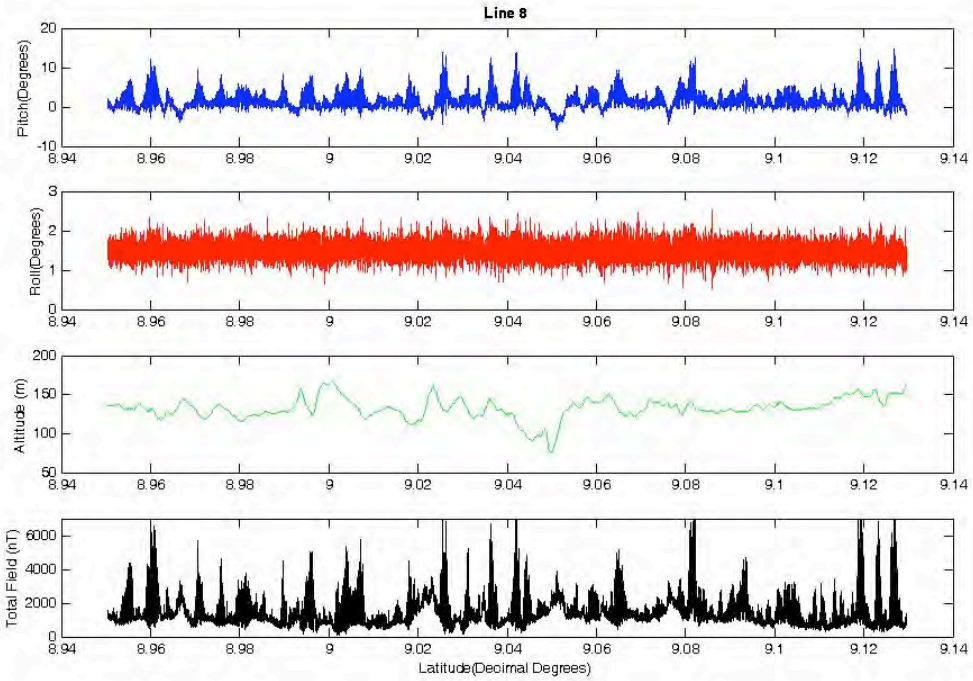


Figure 3.f-9.

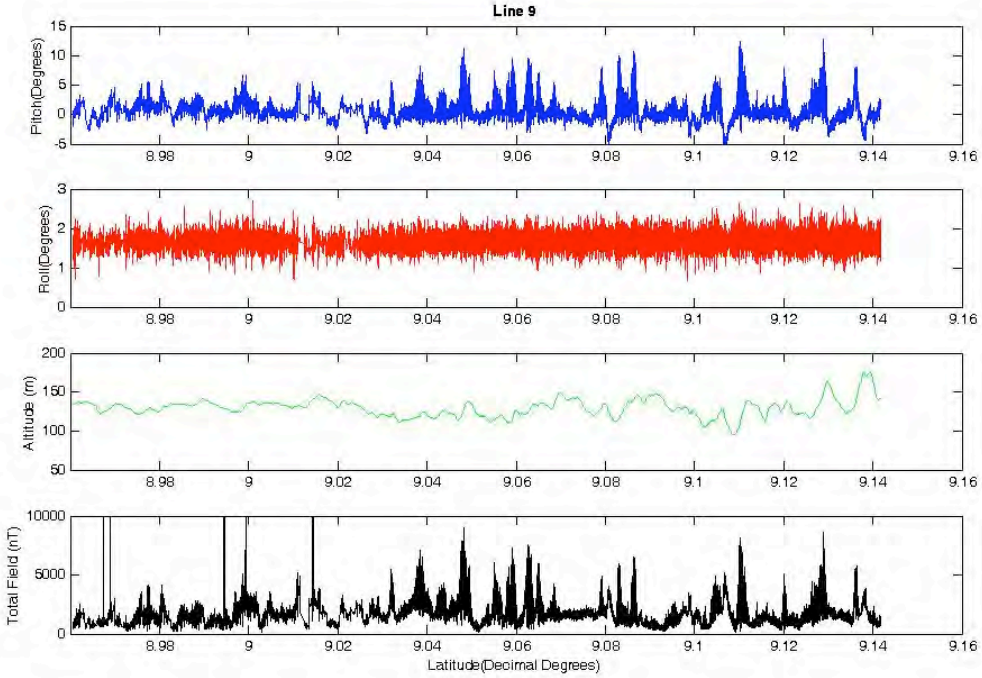


Figure 3.f-10.

Section 3.g.
Rock Sample Collection, Description and Archiving

During our OSC study, 284 individual rocks samples were recovered with Jason II, and eight wax cores that recovered at least some glass were performed (see Fig. 3g-1). Our sampling effort focused most heavily on- and off-axis on the East Limb (~80% of samples) with fewer samples collected along the axis of the West Limb. All samples were described, using the attributes listed on the Rock Description Table (see Appendix). The majority of samples were basaltic pillow fragments, >90%with at least some fresh glass. In addition to the obvious basaltic lavas, a subset of lavas had either a bluish tint or a waxy glass aspect, suggesting that they may be andesites (to be confirmed by shore-based analysis). These samples are:

Andesite	Andesite (likely)
041007-0213	040907-2130
040907-2358	041007-0425
041007-2247	041007-0147
041307-1751	040907-2314
041307-1225	
041007-1618	Andesite (probable)
040807-0848	041307-2033
	Basalt or basaltic andesite
	040907-1804

All samples were archived; glass, when present, was spalled off; thin section billets and whole rock slabs were cut; and the resulting sample subsets and splits were distributed to Klein, Perfit, Sims and Ridley, as indicated in the Rock Description Table (see Appendix).

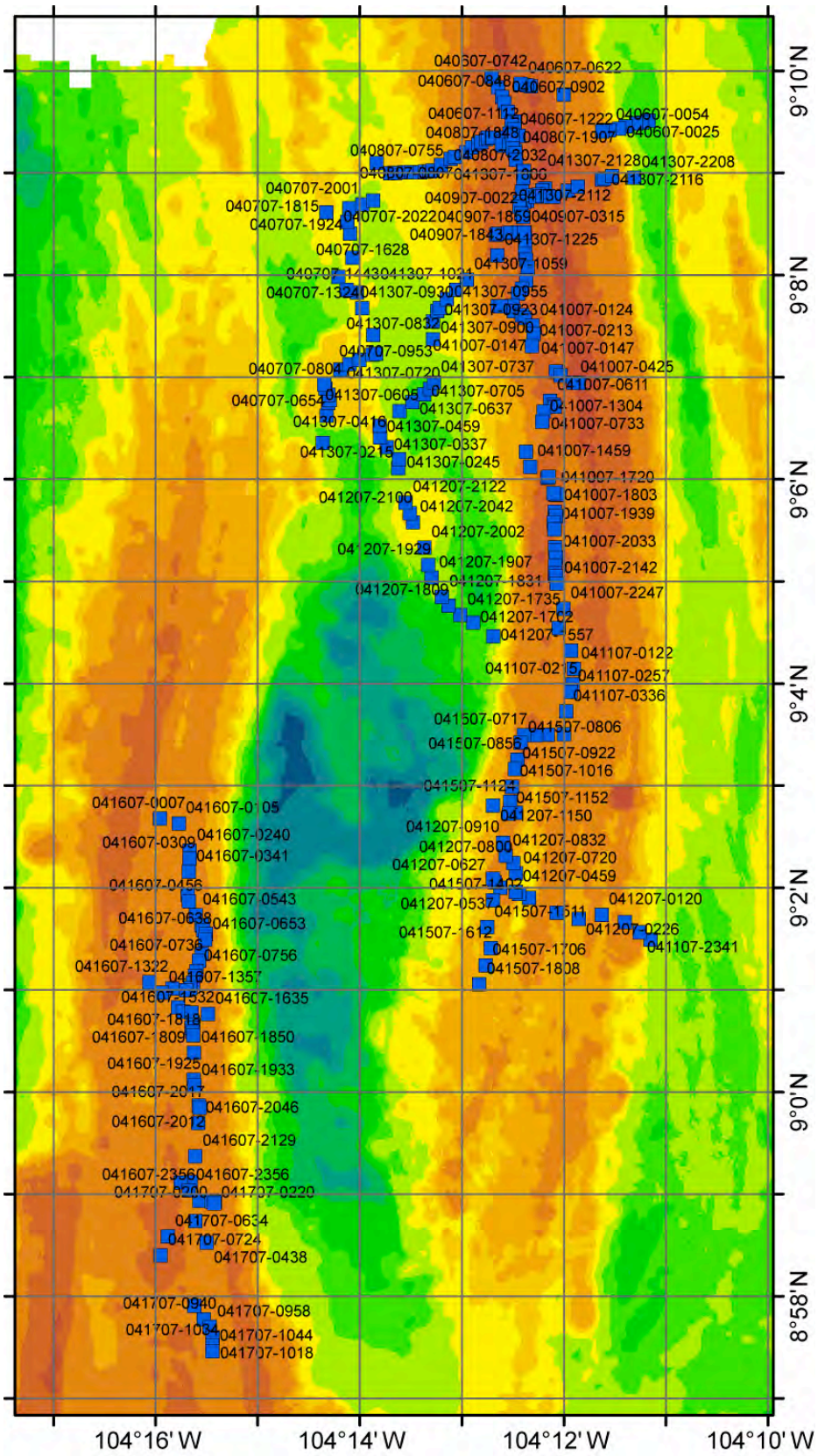


Fig. 3.g-1. Rock samples collected during Jason II dives.

Section 3.h.
Hydrothermal vent waters: Sampling and Analysis

The 'Medusa' vent fluids have a measured maximum exit temperature of 335°C. As the total chlorinity of the fluids from this vent are ~60% of that in seawater (based on their refractive index), this demonstrates the fluids have phase separated. Typical 'black smoker' fluids have measured 25°C 1 atm pH values in the 3-3.5 range, and the Medusa fluids are within this range. The hydrogen sulfide concentration are relatively (but not unusually) high at 10-20 mmoles/kg. A total of 8 fluid samples were collected from 1 orifice, and while all contain variable admixtures of seawater, overall sample quality is very good.

Section 3.i.
Biological Sampling and Preservation

Biological samples were collected opportunistically at the OSC site. Some organisms were attached to sample rocks and removed during rock processing. Others were collected intentionally from the Medusa vent site and processed immediately upon arrival at the surface. Collected phyla included Mollusca (2 *Calyptogena* clams, 6 *Bathymodiolus* mussels, 100+ limpets), Cnidaria (1 hydoid colony, 2 anemones), Porifera (3 sponges), Echinodermata (2 brittle stars), Arthropoda (1 brachyuran crab), and Annelida (3 *Riftia*, 14 *Tevnia*, 1 *Alvinella*, 1 *Branchipolynoe*, 2 unknown polychaetes). With a few exceptions, organisms were placed directly into plastic bags and frozen at -70ºC. Preceding this freezing process, the bivalve shells were separated, and pieces of the foot and gill of the *Calyptogena* were cut off and preserved independently. One of the *Riftia* worms was first pressed between two frozen weights before being bagged and frozen. Limpets were stored in a vial of 99% ethanol and kept at room temperature. All samples were sent to Dr. Tim Shank at WHOI. *Riftia* samples will be distributed to Dr. Pete Girguis at Harvard University, and mussel samples will be sent to Josh Osterberg at Duke University.

A catalog of biological samples collected is presented in the Appendix.

Section 4: EPR Eruption Response and Ridge2000 ISS site

4.a. DSL-120A lowering 50 Summary (S.M. White & S.A. Soule).
We conducted two days of DSL-120a system operations during AT15-17 in support of the project which seeks to do a before/after comparison of side-scan and bathymetry from the most recent eruption of the EPR at 9°50'N (~1 yr ago). One DSL-120a lowering was made and 2 transponders were recovered. This add-on project was successfully completed despite some early delays related to equipment malfunctions.

We arrived on station at 1330Z on March 26. We stopped at 3 waypoints to activate the existing transponder network. The DSL Benthos 455 box was unable to hear replies from any of the transponders, but the portable DS-7000 did awaken all of the transponders. The survey track was navigated entirely in layback mode. The Alvin DSOG Benthos box was used to obtain LBL navigation files during the later tracklines. These files will have to be merged in post-processing. The Doppler sonar produced interference and inconsistent navigation, so we turned it off as well.

We arrived at the DSL-120a launch point at 1630Z on March 26. Problems with the sonar electronics delayed the deployment until 2200Z. Four MAPRs we put on the tow wire and below the clump weight. Relative to the clump (z=0), MAPR-6 was at 200 m, MAPR-8 was at 125 m, MAPR-31 was at 50 m, and MAPR was at -25 m. A fluxgate magnetometer was deployed on each wing of the 120a tow body, one from the DSL group and one self-logging instrument ordinarily used for the WHOI Tow-Cam. The SM 2000 multibeam sonar was also mounted on the towfish frame to fill the bathymetric nadir gap. The sonar was towed at 120 m altitude during most of the survey. We towed at 1.6 knots and set the acquisition to 0.8 sec rep rate to match this speed.

The survey collected approx 80 km of trackline centered around 9°50'N and extending 9°58'N to 9°45'N (Figure 4.a-1). The survey width varies from ~1 km (one swath width) up to 3.5 km. Trackline separation was designed to give full bathymetric coverage.

The side-scan immediately revealed a number of new features. Most prominent are a large number of lava channels that did not exist in the 2001 vintage side-scan. These features show up as low backscatter areas in the new data (Figure 4.a-2). The shape of the axial trough has changed markedly in some areas as well, although the extent of these changes is still under investigation. Comparison of new and old flow fronts and bathymetric differencing will be carried out after the cruise. Preliminary interpretation thus corroborates the idea that this recent eruption created a large amount of new terrain around the EPR, making it a major eruption.

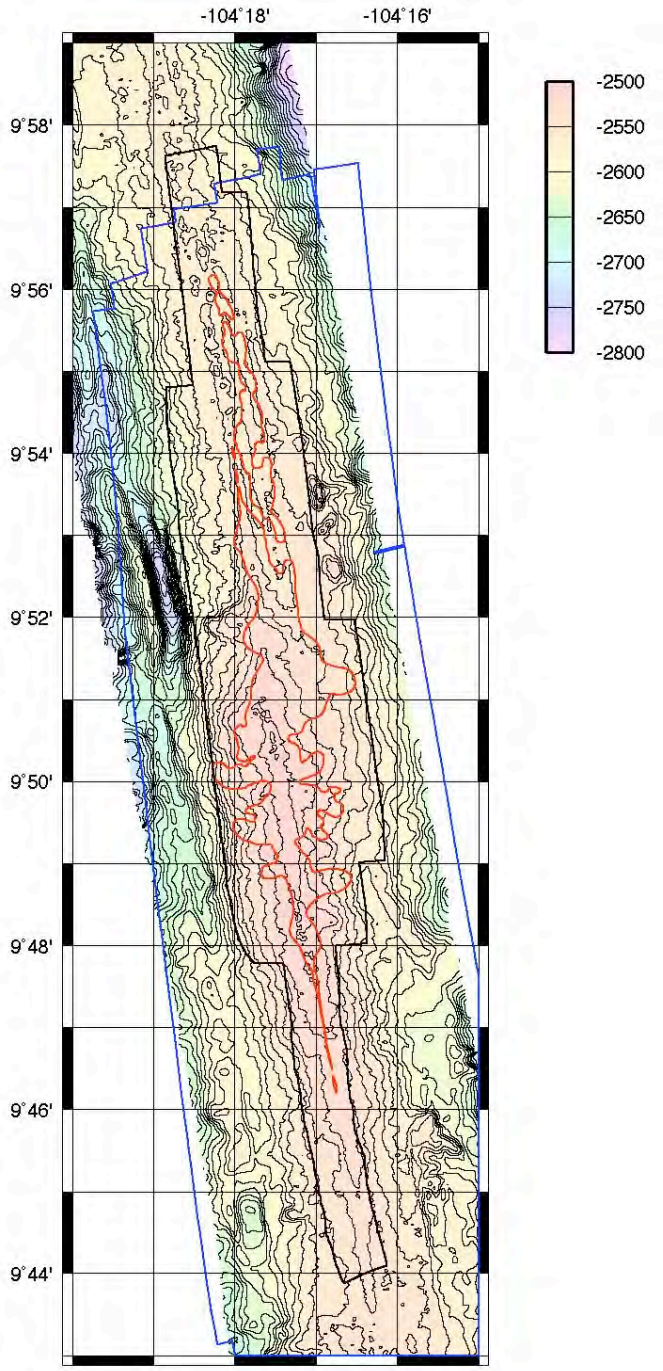


Figure 4a-1. Extent of DSL-120A lowering 50 (black line) over the eruption (red line) inferred from earlier mapping by S.A. Soule and D. J. Fornari. Blue line shows the extent of a DSL-120A side-scan survey from 2001 (AT7-4) by Schouten and others. Underlying bathymetry is the EM300 swath collected in 2005 (White et al., 2006).

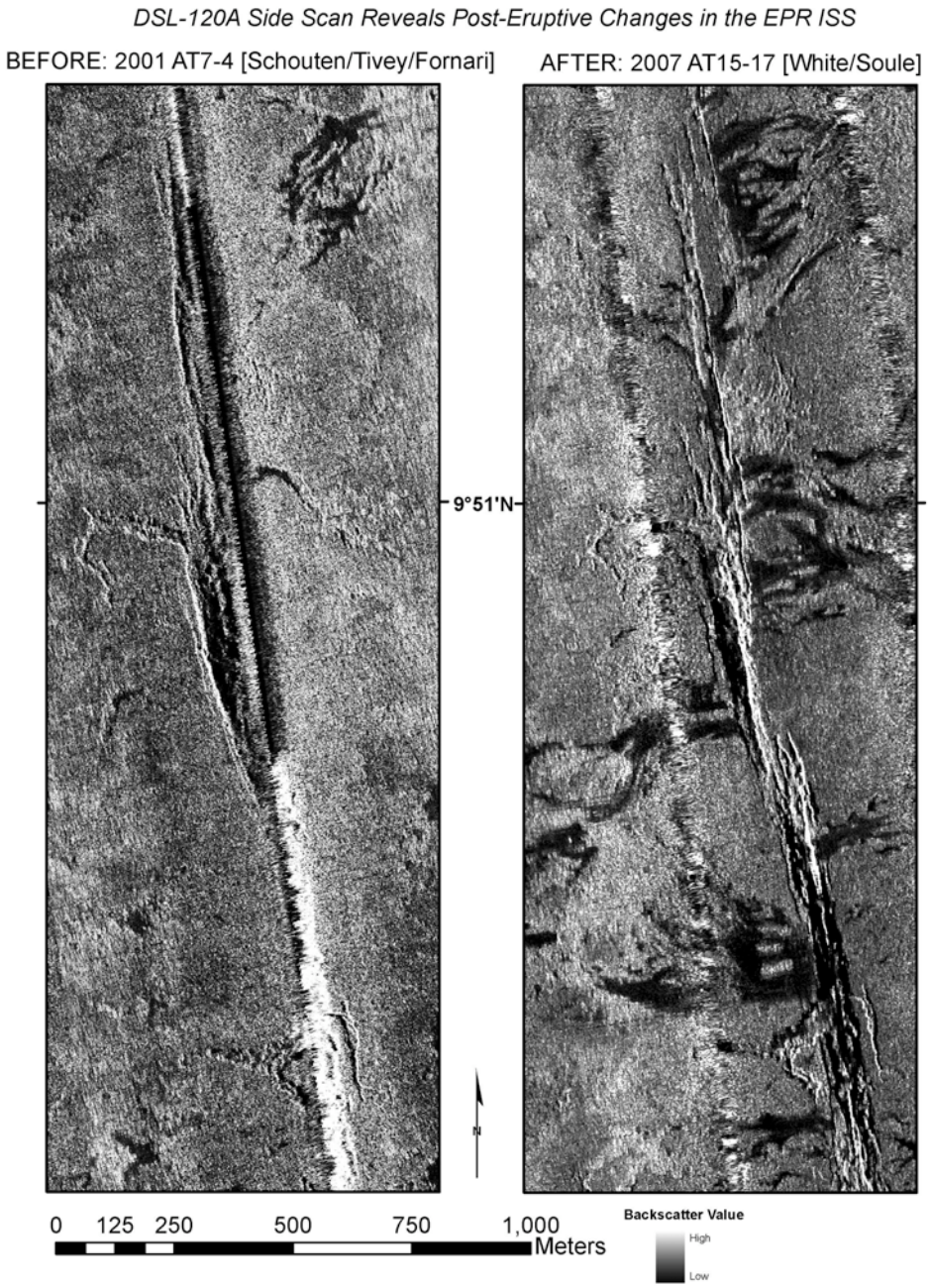


Figure 4a-2. Comparison of changes in the seafloor as revealed by side-scan survey from before (left panel) and after (right panel) the eruption of the EPR. Extensive changes in the local seafloor as a result of the eruption are highlighted by the numerous new low-backscatter lava channels (black areas) seen on the new image.

4.b. Jason Dive 268 Summary – EPR ISS Infrastructure Dive (D.J. Fornari & S.A. Soule)

The objectives of Dive 268 were to conduct several types of surveys to provide baseline data that would be useful to a broad cross-section of multidisciplinary investigations at the EPR ISS. The primary tasks were to: 1) install navigational benchmarks at key areas where experiments and

high- and low-temperature vents are located (Fig. 4.b-1); 2) survey-in the benchmarks using long-baseline (LBL) acoustic data and reference them to the experiment sites and high-temperature vent sites; 3) conduct low altitude (3-4 m) surveys across the axial summit trough (AST) over the benchmark areas; 4) collect high resolution, near-bottom multibeam and magnetic data over the benchmark areas and attempt to survey between benchmark areas to provide a broader context of AST morphology and bathymetry for current and future EPR ISS experiments; 5) attempt recovery of three ocean-bottom seismometers (OBSs) that were trapped by lava from the 2005-2006 eruptions; 6) collect additional samples and observations of the 2005-2006 lava flow, especially in areas where the flow advanced within lava channels and extended furthest from the source vents in the AST, and 7) recover a lost compliance meter from the Webb/Cormier et al. experiment that failed to acoustically release during AT15-16 (Fig. 4.b-2).

Figure 4b-1. Photos of *JasonII* and elevator prior to Dive 268. Upper left photo shows benchmark design, upper-right photo shows arrangement of Benchmarks 1&2 on basket along with sample basket prior to launch. Lower left shows syntactic float packs rigged on swing arms. The float packs were attached to the OBSs to provide additional buoyancy. Lower right photo shows elevator rigged with additional benchmarks (foreground) and sample basket in wooden box (background).

Given the along axis area to be covered during the dive, between ~ 9° 49'-51'N (Fig. 4b-2), the logistics for Dive 268 required deploying an elevator to the seafloor to carry additional benchmarks that were to be installed after Benchmarks 1&2, as well as additional sample bins to collect lava samples. The elevator was deployed prior to the dive and surveyed in using LBL from the ship; it landed ~ 200 m west of the Tica vent site. The start of operations were advanced by ~12 hours by the generous donation of ship time by the PIs of the 9° 03'N OSC program - Klein, White, Perfit, Von Damm - who had completed their survey work 12 hrs early.

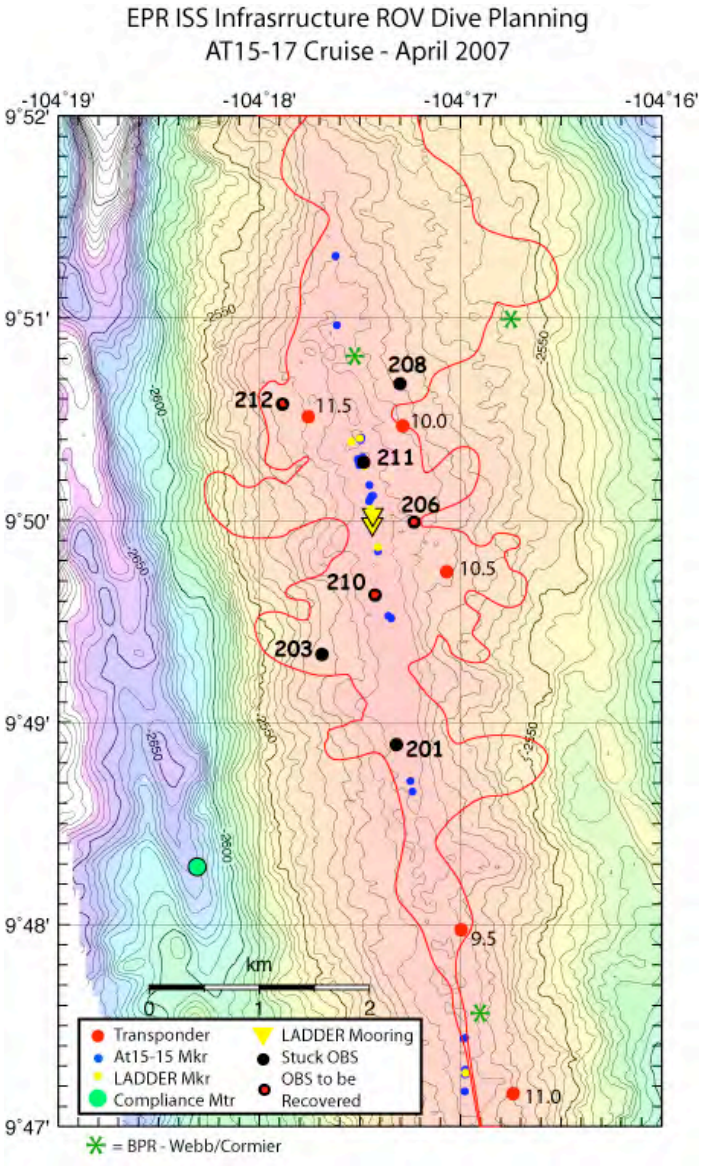


Figure 4.b-2. Summary of locations of key experiments and instruments, as well as 5 of the 6 permanent acoustic transponders currently deployed at the EPR ISS (another transponder, 11.5 kHz - is ~2 km south of the 11.0 kHz near 9 46'N). The red line on the map is the most recent limit of the 2005-2006 EPR lava flows from an analysis of ~150,000 TowCam images collected since May 2006 to Jan. 2007 [Soule et al., submitted].

An operational summary for Dive 268 is shown in Table 4b-1. We started in the northern portion of the field area and worked south, given the locations of OBS212 and the compliance meter to be recovered. The main tasks for the dive are discussed in five separate sections and include: Benchmark surveys, SM2000 near-bottom multibeam surveys and low-altitude transects, OBS and compliance meter recoveries, hiT vent observations, lava channel mapping and sampling.

---

18 April, 2007 Z

0600	Launched *JasonII* for Dive 268
0745	On bottom searching for OBS 212
0820-0834	SM2000 Calibration lines
1220	Located OBS212
1415	OBS212 on deck
1517-1628	Traverse & sampling up lava channel west of AST from OBS212 site
1748	Benchmark 1 deployed
1756-1821	Benchmark 1 LBL survey
1823-2005	Benchmark 1 across AST SM2000 surveying
2009	Transit from Benchmark 1 to OBS206 site
2200	Located OBS206
2250	OBS 206 released

19 April, 2007 Z

0015	OBS 206 on deck
0020	Heading to Benchmark 2 site
0204	Benchmark 2 deployed
0209-0224	Benchmark 2 LBL survey
0302	At elevator to switch baskets and get other benchmarks
0702	Benchmark 3 deployed
0714-0730	Benchmark 3 LBL survey
0743-1259	Benchmark 2&3 across AST SM2000 surveying
1302	Transit to Benchmark 4 site
1423	Benchmark 4 deployed
1440-1455	Benchmark 4 LBL survey
1531-1745	Benchmark 4 across AST SM2000 surveying
1747	Start transit to OBS 210 site
1850	At OBS210, attempting excavation of instrument
2015	Leaving OBS210 site, not recoverable
2025	Start of long N-S AST SM2000 surveying between 9° 50’-51’N– 6 lines

20 April, 2007 Z

0831	End of long N-S AST SM2000 surveying
0902-1850	Mapping and sampling of long lava channel east of AST at 9° 51’N
1900-2200	Transit from end of lava channel to elevator, switch baskets and release
2220	Elevator released
2305-2320	Resurvey of Benchmark 2 using LBL

21 April, 2007 Z

0030	Elevator on deck
0030-0230	Visual observations at Bio9, P and Ty/Io high-T vent areas
0325-0358	Resurvey of Benchmark 4 using LBL, 2 collections using 2 transponder pairs
0419	Setting up for SM2000 survey of AST between 9 49.5'-49.8'N, south of LADDER moorings
0437-0749	SM2000 survey of AST south of LADDER mooring
0757	Start of transit to compliance meter
1025	At compliance meter
1053	Compliance meter released
1302	Compliance meter on deck, *JasonII* coming up.
1353-1411	Magnetometer spins at 1200 m – 3 turns each in both CW and CCW directions
1518	Jason 2 on deck, commence transit to San Diego

Table 4b-1. Operational summary of *JasonII* Dive 268**.**

Benchmarks

Four benchmarks were installed and surveyed-in during Dive 268. The locations were determined based on proximity to high-T vent sites and ongoing biological experiments at diffuse flow vents in the area (Figs. 4.b-3 and 4.b-4). The procedure for installing the benchmarks involved locating the associated vent sites and then determining which side of the AST rim to best place the benchmark based on the terrain. Areas of extensive collapse proximal to the AST wall were avoided. Benchmarks were deployed by *JasonII*; the milk crates that form the base of the benchmark were weighted with additional rocks from the surrounding flow. The ROV was positioned with the benchmark at the front of the basket and the vehicle heading 000°. Once Jason LBL navigation was consistent we commenced 15 minutes of LBL data collection with the vehicle sitting on the bottom and not moving (Table 4b-2).

Benchmark #1 LBL Survey – April 18, 2007

1756 Start recording LBL data while sitting at Benchmark #1 for 15 min with Jason heading 000° and benchmark at middle of basket

1821 End recording LBL at Benchmark #1, reset Doppler to Jason LBL
Preliminnary position from renav is: 9° 50.981'N 104° 17.666'W,

X=4274 Y=79225, Depth 2504m

Benchmark #2 LBL Survey – April 19, 2007

0209 Start collecting 15 minutes of LBL fixes at Benchmark #2.
0224 End LBL data collection for 15 minutes at Benchmark #2
Preliminnary position from renav is: 9° 50.401'N 104° 17.473'W,

X=4627 Y=78157, Depth 2501m

Benchmark #2 LBL Survey – April 20, 2007

2305 Jason1 LBL nav back on and collecting data while in position at Benchmark #2
2320 End LBL nav collection at Benchmark #2
Preliminnary position from renav is: 9° 50.409'N 104° 17.478'W,
X=4619 Y=78171, Depth 2501m

Benchmark #3 LBL Survey – April 19, 2007

0714 Start collecting LBL data while sitting at Benchmark #3 site with J2 at 000 heading and benchmark at front of basket

0730 End LBL data collection at Benchmark #3 site.
Preliminnary position from renav is: 9° 50.308'N 104° 17.464'W,
X=4643 Y=77986, Depth 2501m

Benchmark #4 LBL Survey – April 19, 2007

1440 Start 15 min LBL recording at Benchmark #4 with *JasonII* oriented 000 and benchmark at front of basket.

1455 End recording of LBL at Benchmark #4
Preliminnary position from renav is: 9° 50.126'N 104° 17.428'W,
X=4710 Y=77650, Depth 2503m

Benchmark #4 LBL Survey – April 21, 2007

0325 Started collecting LBL data at Benchmark #4 using B/C pair (10.0/10.5)
0342 End LBL data collection at Benchmark #4 with B/C pair
0343 Started collecting LBL data at Benchmark #4 using A/B pair (11.5/10.0)
0358 End LBL data collection at Benchmark #4 with A/B pair

Table 4b-2. EPR ISS benchmark survey times and preliminary locations. *These data should **NOT** be used for final positions of the benchmarks.* Post-cruise processing/analysis of the data are required to establish final surveyed positions for each benchmark that is integrated with SM2000 bathymetry.

Navigation data, including raw travel times from the three primary transponders used for all the Dive 268 operations, are included in the original data disks for the AT15-17 cruise. The information includes raw travel time data for the transponder surveys that were done in 2006 on the AT15-6 and AT15-13 cruises in June and November, respectively. Post processing of LBL data for the Benchmark surveys and analysis of the data will be required to properly calculate the best positions for each benchmark. **The positions listed in Table 4b-2 should be considered preliminary.**

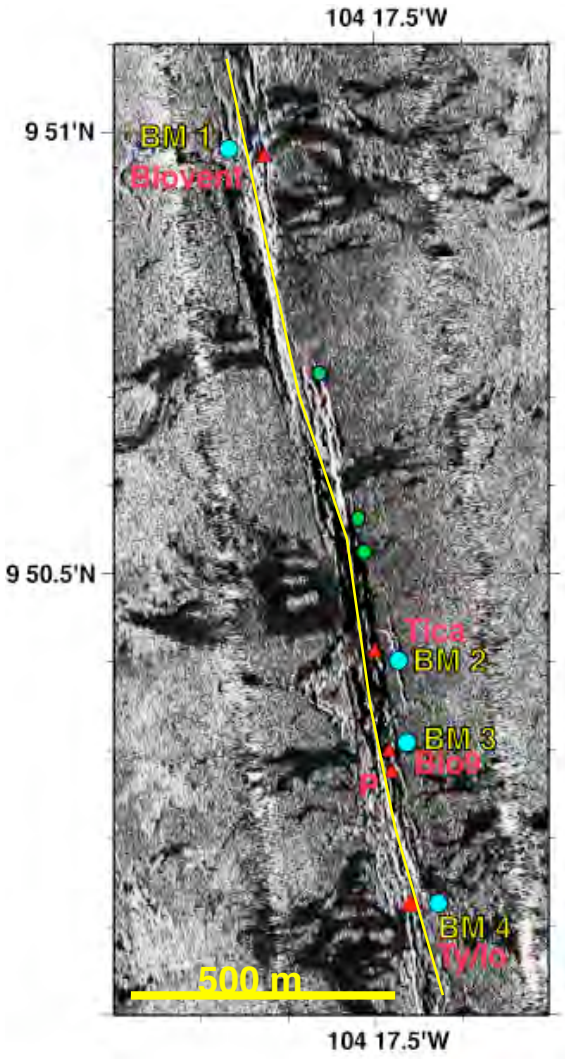
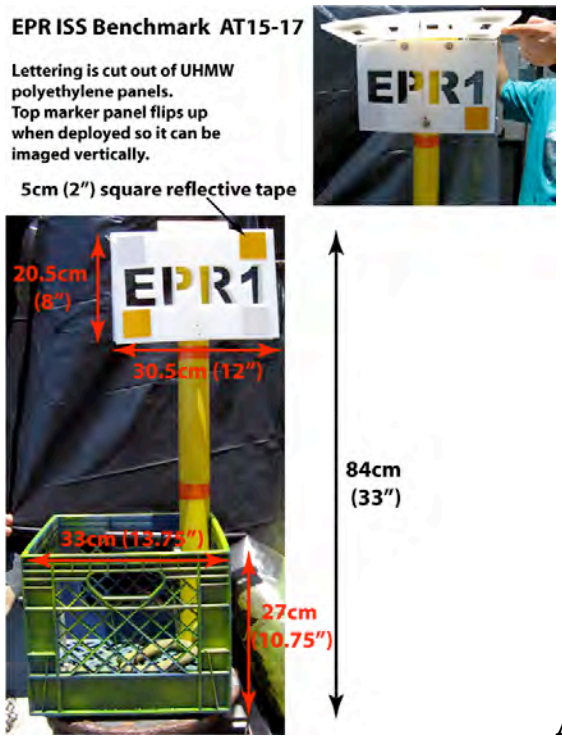


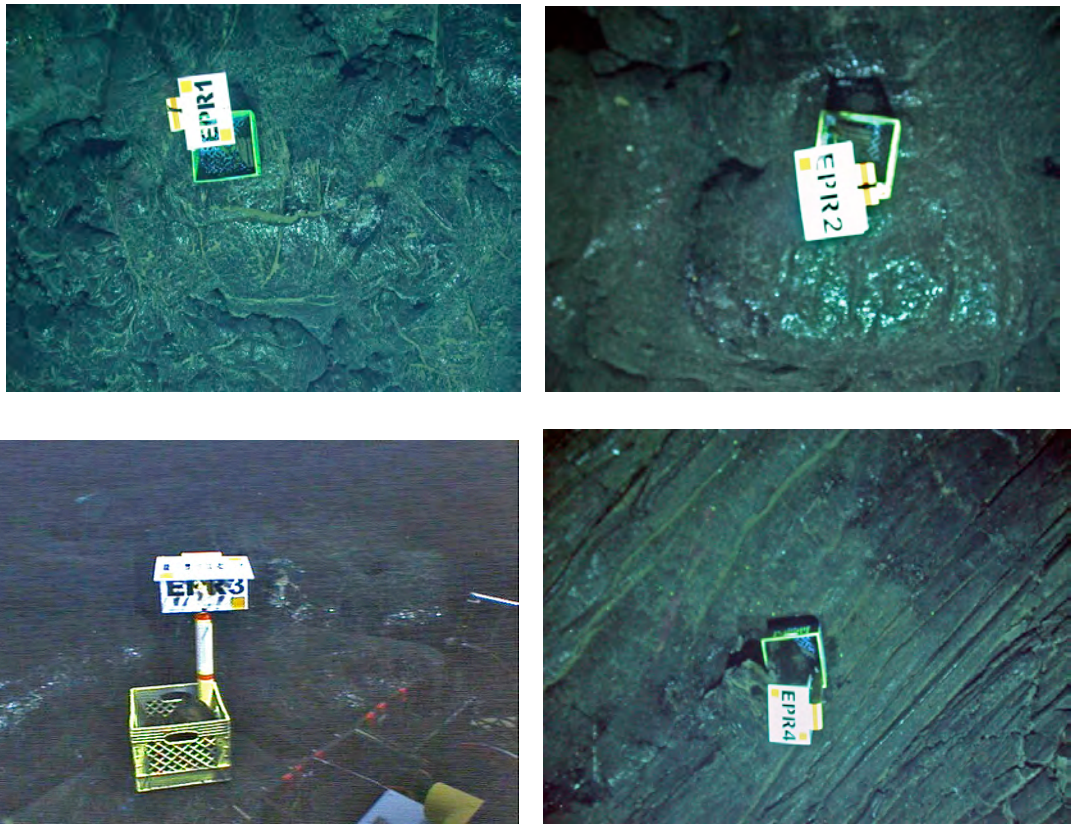
Figure 4.b-3. Map showing locations of EPR ISS benchmarks and high-T vents (red triangles) and low-T diffuse flow areas (green dots) overlaid on new DSL-120a sidescan sonar collected during AT15-17, March, 2007 (S. White and S.A. Soule). Dark, dendritic patterns on sidescan image are low reflectivity lava channels emanating from the AST (thin yellow line shows trace) that formed during the 2005-2006 eruptions.

SM2000 surveying

Surveying using the 200 kHz near-bottom multibeam system on *JasonII* (SM2000) was conducted to produce detailed topographic maps that could be used for establishing digital elevation models of the AST, and specific experiment areas where studies at the ISS are being carried out (Figure 4.b-4). Once processed, these data can provide a topographic baseline along the AST to be used to measure changes caused by subsequent eruptions or tectonic events. These data will augment the physical benchmarks deployed and surveyed during the dive.



A



B

Figure 4.b-4. A) Dimensions of EPR ISS Benchmarks. B) Digital photographs taken from *JasonII* of the four EPR ISS Benchmarks installed during Dive 268.

The SM2000 sensor was calibrated soon after arriving on bottom by running 3 lines over the same terrain on reciprocal headings at 5, 10 and 15 m altitudes. For all of the across-AST and along-AST surveys, the ROV was run in 'constant depth' closed-loop control –meaning the vehicle depth was kept at 2490 m and the seafloor allowed to rise and fall beneath it while traversing the seafloor. This depth was determined after several crossings of the AST and establishing that we would not loose bottom-lock with the 1200 kHz DVL Doppler on *JasonII* that has a maximum range of 30 m, but a practical range of ~ 20-25 m. Throughout the surveys, bottom lock was maintained except for very sporadic intervals when there were only 3 beams or momentary loss of bottom lock. This occurred when we recovered OBSs and the elevator during the dive, the ROV had to rise off the bottom by ~100 m to permit the ship to maneuver safely during recovery operations and when samples were collected and we were too close to the seafloor. During those times bottom lock was lost but it was re-established prior to commencing subsequent surveys.

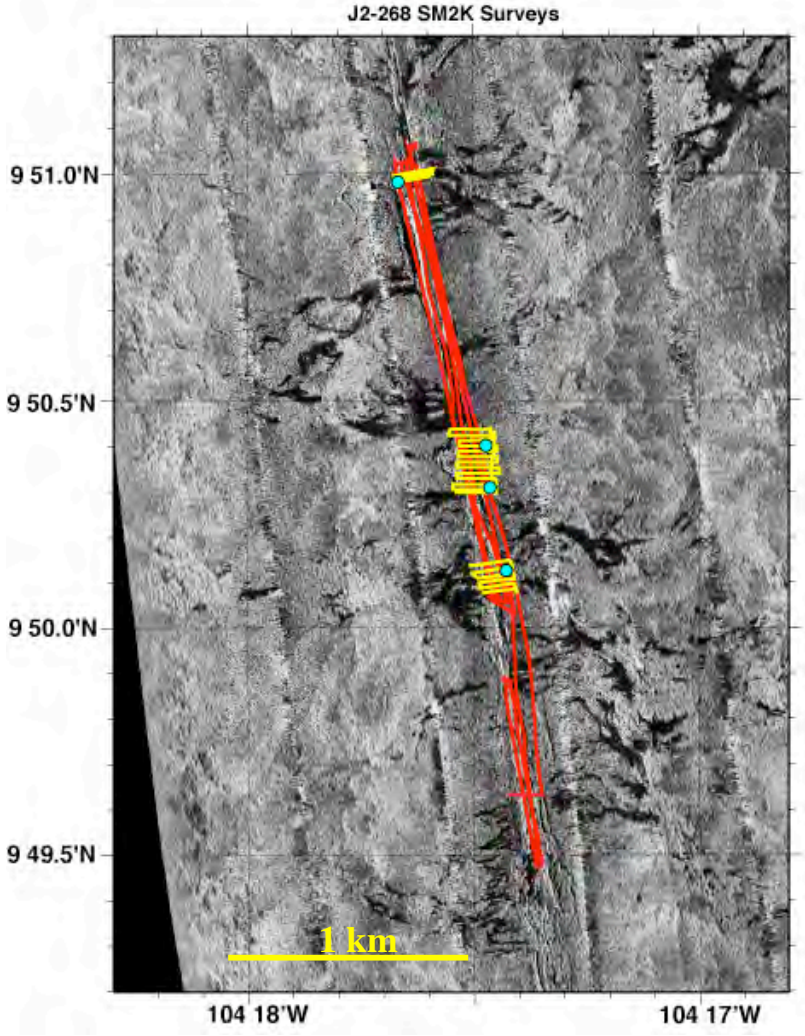


Figure 4b-5. Map showing locations of EPR ISS benchmarks (blue dots) and SM2000 near-bottom bathymetry surveys (yellow and red tracks) overlaid on new DSL-120a sidescan sonar collected during AT15-17, March, 2007 (S. White and S.A. Soule). Dark, dendritic patterns on sidescan image are low reflectivity lava channels emanating from the AST that formed during the 2005-2006 eruptions.

Figure 4b-5 shows the locations of primary SM2000 surveys. Within each benchmark site across-AST areas each ~150 m wide by ~100-200 m long (N-S) were surveyed. The across-AST survey between Benchmark 2 and 3 was done continuously as these two areas are prime sampling and observational sites. In order to tie together the 4 benchmark areas, long N-S oriented SM2000 survey lines were run to completely map the AST over ~ 2 km. Data density and control should be excellent within the benchmark areas given the multiple crossings.

OBS and compliance meter recoveries

An important objective of the dive was to attempt recovery of the 3 OBSs that were still communicating acoustically but found to be trapped in the 2005-2006 lava flows [Tolstoy et al., 2006; Cowen et al., 2007] based on direct observations from the fiber optic TowCam during the June 2006 AT15-6 event response cruise and Alvin during AT15-15. Figure 4.b-6 shows a map of the OBS locations over the new sidescan imagery. Figure 4.b-7 shows *JasonII* video camera frame grabs of the recovery operations for OBSs 212 and 206, and the attempted recovery of OBS 210. Figure 4b-8 shows photographs of the recovered OBSs on deck, and Figure 4.b-9 shows images of the compliance meter.

The two recovered OBSs were both trapped by hackly lava flows that clearly compromised the anchors and release assemblies, and partially buried the floatation sphere hard-hats. Because the hackly flow was quite broken up in both cases, the OBSs were easily pulled from the flow after each syntactic float pack was attached to the lift bail. For OBS 212 the frame was partially buried and a large rock was wedged between the pressure housings. Once that was cleared and the frame shaken so that the lava rubble fell off, it was clearly observed to be buoyant and was released. The same was true for OBS 206, which also was easily pulled from the hackly flow, shaken to be sure no large pieces of lava were trapped inside the base, and then released. The additional ~12# of syntactic floatation helped the OBSs rise quickly at ~ 35 m/min. In all cases the ship was used to recover the instruments. Given the calm weather and rapid ascent speed, minimal time was lost in having *JasonII* off the bottom during recoveries. In some cases sampling or other operations were done during portions of the OBS ascent. The OBSs were washed with fresh water after recovery and placed under a tarp for offloading in San Diego at SIO-MARFAC. The acoustics were disabled when they were on the surface using the ORE deck box left by the WHOI buoy group.

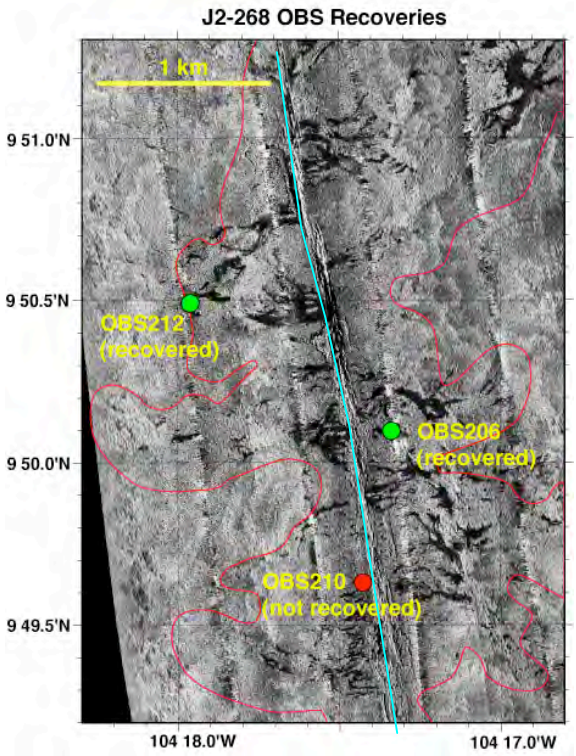
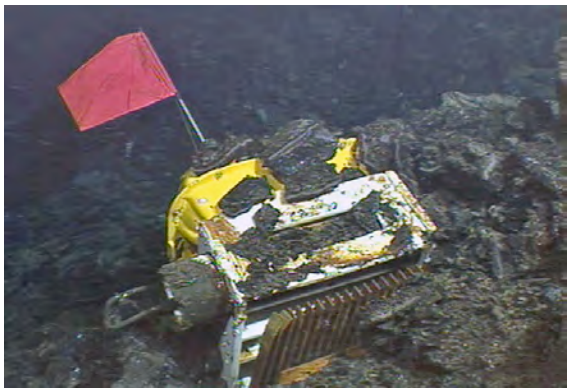


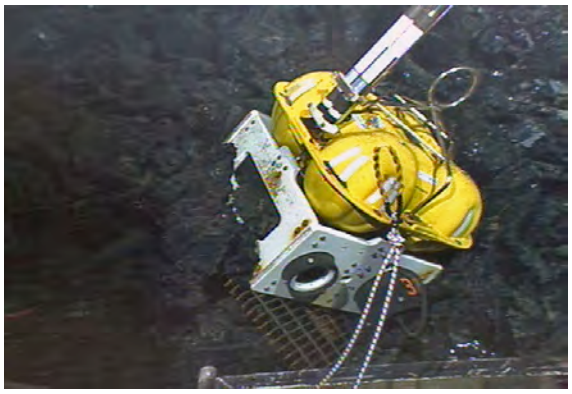
Figure 4.b-6. Map showing locations of OBS recoveries on AT15-17, *JasonII* Dive 268 plotted over the new DSL-120a sidescan sonar data collected during AT15-17, March, 2007 (S. White and S.A. Soule). Thin red line is the limit of the 2005-2006 lava flows mapped using TowCam data [Soule et al., submitted]. Thin blue line shows trace of AST. Dark, dendritic patterns on sidescan image are low reflectivity lava channels emanating from the AST that formed during the 2005-2006 eruptions.



OBS212 site

OBS212 rock on pressure housings

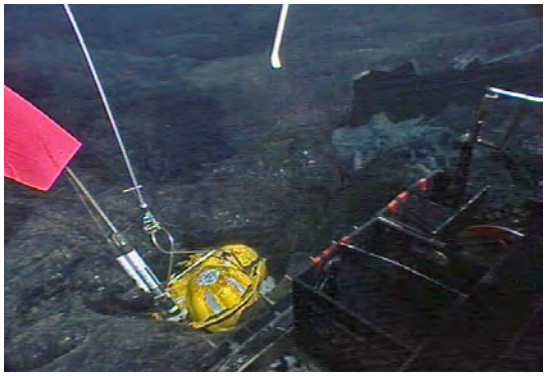
OBS212 released



OBS206 site

OBS206 scorched plastic frame

OBS206 anchor buried in lava - after release



OBS210 site
clear lava flow

OBS210 after trying to

Figure 4.b-7. *JasonII* photographs of OBS recovery operations undertaken during dive 268.

OBS210 was considerably more buried by the new lava and the flow around it was a lobate flow rather than the hackly lava found at OBS 212 and 206 sites. While the area to either side of OBS210 was partially collapsed lobate crust , the OBS itself was situated over what appeared to be a small lava pillar. The base of the OBS was completely buried and proved impossible to dislodge, despite considerable effort to break through the surrounding lava using *JasonII* and clear the debris using the manipulators. It may be possible with a dedicated 24-36 hr dive and

the proper manipulator tools to clear enough rubble away from the OBS to dislodge it, but it was clearly not possible within the time we had available, and the manipulator capabilities. In addition, the seismometer pressure housing appeared to be filled with lava, although it was difficult to determine whether it was fragmental debris or in-place lava, suggesting that of the three OBSs, 210 is the most likely to have been compromised by the eruption.


A

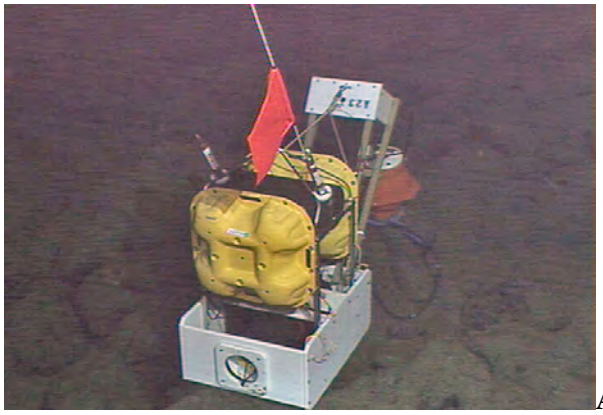

B


C

D

Figure 4.b-8. Photographs of recovered OBS 212 on deck. A) OBS 212 on the surface. Syntactic float block is at right. B) OBS 212 being landed on deck. C) Recovering glass from inside OBS 212. D) Electronics housing of OBS 212 showing partially melted plastic cowling and frayed cable.

The compliance meter lost on AT15-16 (Webb/Cormier et al.) had been well surveyed when it failed to return to the surface so was easily located at the end of Dive 268. It was found on sediment covered lobate lava flows in a normal attitude. On inspection, neither weight had released so both burn wires were cut using a knife tool and the ROV manipulator. One weight was observed to fall out and the other weight was not observed when we turned the instrument partly on its side. The instrument appeared to be buoyant so it was released. In hindsight, we should have cleared the other weight cover to ensure that the weight had in fact dropped as the instrument surfaced very slowly and took over 2 hrs to reach the surface. It was recovered normally and washed down. With instructions from Webb, the instrument was dismantled, the sensor disconnected from the electronics and packed for shipment. The Li batteries were removed from the electronics case and the acoustics were turned off. All cables were washed and the unit was readied for shipment on arrival in San Diego. Figure 4.b-9 shows the instrument on the seafloor and recovered on deck.


A


B


C

Figure 4.b-9. A) Compliance meter on the seafloor as observed by Jason on Dive 268. B) Manipulating instrument frame to release weights. C) Compliance meter on deck on R/V Atlantis.

Hi-Temperature hydrothermal vent observations

Time was spent during the dive making observations at four high-T vent sites within the ISS bull's eye – Bio9, P, Ty and Io vents. This was done in order to locate the benchmarks as well as to collect images for use in characterizing the vent areas. Some of the time was also spent making observations immediately surrounding the vents in the AST to characterize the terrain and establish relative distances between vents like Ty and Io, which are only ~8 m apart, and the surrounding structure in the AST floor and adjacent walls. In addition, we conducted low-altitude imaging over the vents where possible although the downlooking digital still camera on *JasonII* did not focus properly at times and the strobe used was only 300 watt/sec output so some of the images are dark. Hopefully, further downlooking imaging can be done on subsequent Alvin dives in late 2007-2008 to collect additional data that can be merged with the high-resolution SM2000 bathymetry.

Lava channel mapping and sampling

We conducted two transects along lava channels occupied by the 2005-06 flowwith the objectives of gathering photographic data corresponding to the acoustic textures in the DSL-120a sidescan sonar imagery and collecting samples that reflect a temporal sequence of the down-flow progression of the lava (Figure 4.b-10). Transect locations were selected to cover the most interesting features observed in the new sonar data and were coordinated with the surveying objectives of the infrastructure dives. We used lava channels imaged in the AT15-17 DSL-120a sidescan data to constrain flow pathways and to ensure that sampling was conducted along unique flow paths. Samples were collected at ~250 m spacing along each transect.

Transect A, west of the AST, began at 9˚50.5'N and followed a bearing of ~050˚ for ~0.9 km, from near OBS212 to the AST (Figure 4.b-10). We started the transect at the location of OBS212, which was trapped in a hackly flow. The channel, which defines the path of the lava flow, is discontinuous, and often times interrupted by areas of hackly, broken lava crusts within which remnants of the smooth sheet flows can be seen. The lava channel itself comprised flat sheet flows that contained lineations striking NE. The channel margins comprised hackly flow that graded into lobate flows along either margin. A total of five samples were collected along the transect from a variety of flow morphologies. The total elevation change along the transect was 15 m.

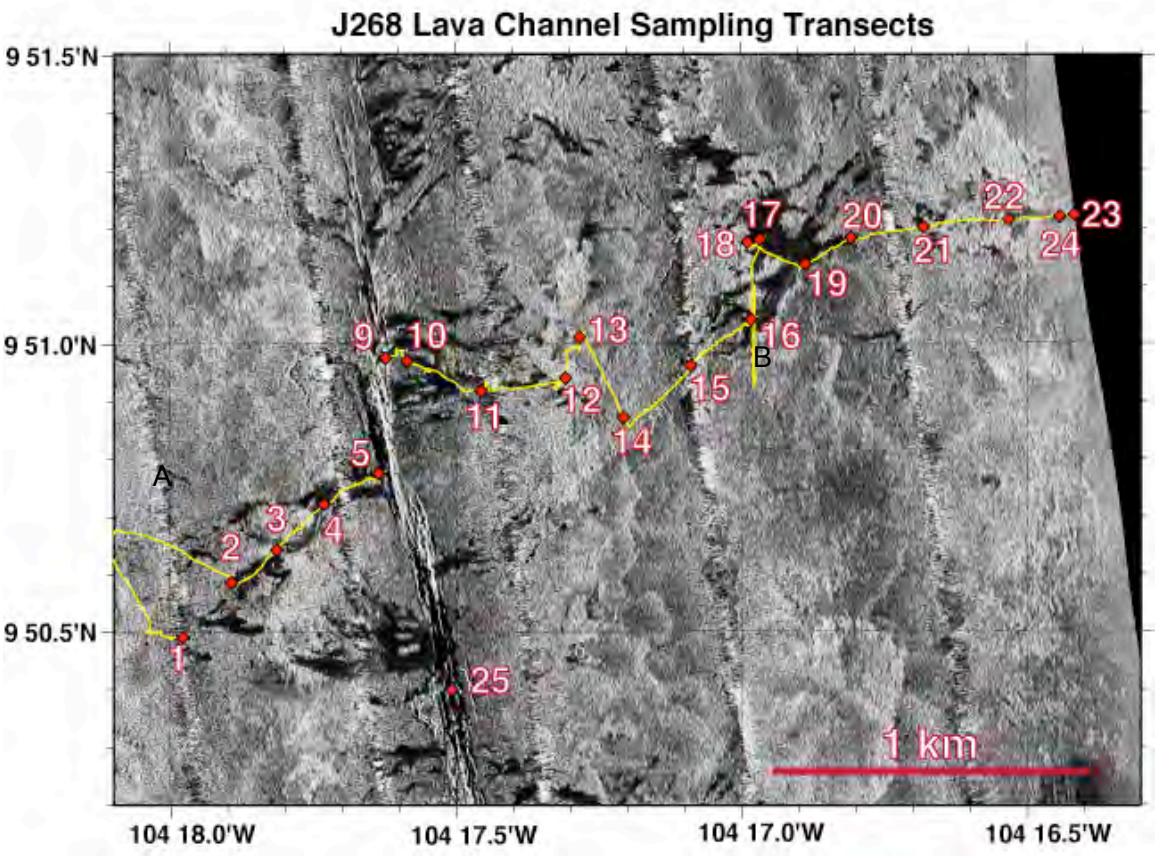


Figure 4.b-10. Map showing locations of lava samples collected during Jason Dive 268 from two lava channels between 9° 50.5'-51.3'N, west (Transect A) and east (Transect B) of the AST. Sample 1 was collected ~1 m from OBS212 and Samples 6 and 8 (not shown) were collected next to OBS 206 and 210 respectively. Samples 7 was not recovered. In addition, glass was collected from inside OBS212. Samples from OBS 212 and OBS206 have been processed and will be sent to K. Rubin (U. Hawaii) and M. Perfit (U. Florida) for geochemical analyses and Po dating.

Transect B, on the east ridge flank, began at the AST at 9°51'N and followed a bearing of ~080° for ~2 km. We initiated the transect by traveling due south through a lava channel to orient ourselves relative to the sidescan imagery. Between the multiple channel strands that originate at the AST, hackly crusts of broken lobate are present and correspond with highly specular acoustic textures in the DSL-120a data. We followed the channel down-flow to an area where several channel strands are abruptly terminated. The channels appear to have been covered, at this location, by a ridge of hackly material ~2-3 m in height. The ridge is reminiscent of levees that are sometimes present at the edges of channels and parallel to the flow direction, but the observed feature is oriented orthogonal to the flow direction. Two SM2000 survey lines were run at 10 m altitude in order to image the hackly ridge. We traversed to the north for ~300 m in order to investigate an acoustic contact between highly specular terrain that we had identified as hackly flow and smoother terrain that we interpreted as lobate flows. We found the contact ~40 m north of its location in the sidescan imagery, indicating a southward navigation shift is required in the sidescan data. Across the contact, we found very low relief lobate flows. The lobate flows were unequivocally produced during the new eruption and had numerous *kipukas* of older lava poking through. A sample was collected within the lobate terrane. There is no channel visible in the sidescan imagery for the next 500 m down-flow, and we found hackly sheet flows covering this area. Upon reentering the lava channel we conducted two N-S oriented photo surveys to further constrain navigational error in the side-scan data. These surveys crossed three channel strands, each separated by hackly flows. At the southern extent of the photo survey we observed 2005-06 lobate flows, which allowed us to determine that the acoustic contrast between new and old lava in lobate lava flows is quite difficult to determine in the sidescan imagery without correlative bottom observations. We followed the lava channel to the easternmost extent of the sidescan survey, which was coincident with our mapped extent of the eruption. Here, it was difficult to determine where the new flow ended. It appears that the distal ends of the flows are more sedimented than the proximal portions. We identified two possible locations where the flow ended, each marked by a hackly ridge (flow toe?) ~3 m high, overlying a more heavily sedimented sheet flow. Samples were collected at each ridge. A total of 16 samples were collected on transect B over a distance of ~2 km and an elevation change of 53 m.

Acknowledgments

We thank the *JasonII* operations group of the WHOI National Deep Submergence Facility (NDSF) and the officers and crew of R/V Atlantis for their excellent support during the survey and recovery operations on AT15-17 in general, and specifically for Dive 268. Program managers at the National Science Foundation and shore-based support personnel at WHOI Marine Operations and NDSF were instrumental in funding and organizing the logistics for the 3 day EPR ISS survey, and we are grateful for this opportunity to collect data that will benefit both the Ridge2000 program and the EPR ISS community of researchers.

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Tolstoy, M., Cowen, J.P., Baker, E.T., Fornari, D.J., Rubin, K.H., Shank, T.M., Waldhauser, F., Bohnenstiehl, D., Forsyth, D.W., Holmes, R.C., Love, B., Perfit, M.R., Weekly, R.T., Soule, S.A., and Glazer, B., 2006, A sea-floor spreading event captured by seismometers: *Science*, v. 314, p. 1920-1922.

Section 5. Outreach Activities

5.a. Web Site: Dispatches from Sea

http://www.nicholas.duke.edu/OSCexpedition/

On our cruise, a daily web log with pictures was posted on the Duke University server, as an outreach to the community. The log was a portion of a web page explaining the background, intention, and cruise participants of the expedition. Included in the web log were daily updates of collection of data and samples, technology used to procure these data, initial scientific interpretation of evidence as it became available, and life experiences upon the ship for the thirty-seven day journey. In addition to reporting on the research conducted, the log addressed a K-12 grade educational pilot forum for four of the five weeks, during which students were in communication with the scientists. Dispatches from sea were written and posted by Laura Preston, a high school science teacher from New Hampshire.

5.b. FLEXE Project

As part of the NSF Criterion II activities associated with this grant, the PIs hosted the Ridge2000 FLEXE education team (Goehring and Preston) during the April '07 research cruise. The FLEXE team used the opportunity to pilot the student-to-scientist FLEXE Forum and develop ideas for future learning activities (curriculum) for the FLEXE project.

FLEXE Project Summary

FLEXE ("From Local to Extreme Environments") is a 4-year NSF collaborative project between the Ridge 2000 research community, Pennsylvania State University College of Education, and the GLOBE (www.GLOBE.gov) program. The FLEXE project involves middle and high school students in systematic, facilitated investigations of data they collect from their local environment and comparable data from an "extreme environment" – in particular deep-sea environments that include tectonic spreading centers and hydrocarbon seeps. Students' understanding of scientific inquiry and of earth systems are developed through: **data-oriented fieldwork and analysis** (including analytical comparisons with data from the deep-sea and partner schools); **structured, web-based interactions** with professional scientists and with students in partner schools; and **culminating activities**, including reporting and peer review. FLEXE involves ridge scientists in a variety of roles, including a core group of US researchers (representing a range of disciplines) advising on the scientific content of FLEXE materials. Evaluation is focused on formative and summative measures to gauge and improve achievement of project goals. FLEXE is an outreach project of the Ridge 2000 research community.

Cruise Activities:

The FLEXE project is in its first year of funding, and from March to mid-May 2007, FLEXE investigators are piloting key components of the full program. Seven schools (14 middle school science classes) already familiar with GLOBE agreed to participate in the

pilot. One critical component tested during the spring pilot is the FLEXE Forum, a web-based facilitated interaction between students and scientists, focused on analysis of data. To enable access to scientists as well as to feature the deep-sea environment, the Forum was designed to run during the April '07 EPR research cruise. Goehring sailed with the science party to facilitate student-scientist interaction via the Forum, and post material to the FLEXE website, sending text and images from the ship to programming staff at PSU. Each week of the cruise, participating students accessed the FLEXE system to examine a new dataset and engage in a structured Q&A with scientists. Pilot content centered on the concept of energy transfer between components of the earth system. Featured on-board scientists included Scott White of USC and Karen Von Damm of UNH, as well as Peter Rona of Rutgers University, not on the cruise. In addition to running the Forum, FLEXE team educators (Goehring and Preston) worked with the science party to understand current research questions and develop ideas for FLEXE learning activities.

Next Phase:
In mid-May, at the end of the pilot, FLEXE evaluators will collect feedback from teachers, including interviews and questionnaires, for formative evaluation of all pilot activities. During the summer, the full suite of learning activities for the Temperature Unit will be developed. During the 2007-08 academic school year, the full FLEXE system will be tested with 30-40 GLOBE schools, including schools from one other English-speaking country.

5.c. Ridge2000 Metadata

In addition to cataloguing the data from the cruise in various spreadsheets for our own use, we also compiled the data into seven different official Ridge2000 metadata forms. Times and locations of the Jason II dives were collected in real time and recorded into the vehicle dive form (B13). During the cruise the DSL120A and the Towcam were towed behind the ship. Locations and times of these tows were collected and logged into the towed instruments form (B14). After surveying the transponders for navigation purposes, data from the navigator's log was used to complete the transponder form (B04). Both the rock wax core and the dive sample forms (B03 and B10) were completed by taking data from the watch leader's log, the virtual van, and from rock description forms. The four bio-markers that were set down were also logged into the bottom instruments form (B06) by using data from the virtual van.

6. AT15-17 Operational Issues

Overall the ship and vehicle facilities used during AT15-17 performed very well and both the DSOG personnel and Atlantis officers and crew were exceptional in their dedication and execution of the ship and vehicle operations. The galley crew and meals were superb as usual. That said, there were some important issues that came up that should be mentioned so that the operator can take corrective action. Based on the experience on this leg, are some suggestions for improvements to some of the capabilities of the DSL-120a sidescan and Jason II system that should be considered by the operator and the UNOLS Deep Submergence Science Committee.

R/V Atlantis

Atlantis sailed from Manzanillo without it's full compliment of generators. Apparently this is a situation that has been going on for some time and is due to be corrected during the yard period after this leg. It would have been appropriate for this status to have been communicated to the Chief Scientist as it happened during the cruise that we experienced situations where were there could have been insufficient power to operate all the required systems (i.e., traction winch, Jason II, Effer crane, ship's propulsion, and hotel load).

During initial operations of the hydro winches the tensiometer failed and no spare was available. There was considerable uncertainty as to why it failed and how it had been wired. The TowCam and rock coring operations were done for most of the leg without the tensiometer. The operations were successful but this situation is not recommended and the ship should carry sufficient spares for this key sensor on the hydro winches.

The port drain in the main lab continues to be a problem in that it does not drain. The engineering department was very accommodating in working to clear it every few days, but it appears that there has been no routine clearing of the drains at each port stop. We understand that the drainage system on the ship, as delivered was inadequate, however some measure of protective maintenance (ie – routine reaming of the pipe or onboard industrial drain snake) is recommended. This is also true for some of the science cabins that experienced waste line drain problems.

The SSSG technicians provided excellent support in all over the side operations and in maintaining the shipboard computing system. Because of the nature of the ROV operations and the volume of data acquired in general on deep submergence cruises, we believe it would very advisable for the operator to increase it's onboard mass storage capacity. 1 terabyte drives are routinely available for very modest cost (~$500 each). Purchasing a few of these so that there are not issues related to storage and transfer of data is recommended.

The Effer – knuckle crane – used to launch and recover both the sidescan and ROV systems failed early in the cruise. The hydraulics in the winch that reels in the recovery line failed. While the shorebased DSOG responded very quickly and positively to this problem and a repair was effected within ~8 hrs, this single point failure should be backed up by a ready spare motor or adequate hydraulics seals rebuilding kits. In addition, the ship had a similar type crane that was partially dismantled on the starboard quarter. It is our understanding that this crane is incapable of serving the needs of the DSOG ROV/sidescan systems. The operator should remedy this and ensure that standard shipboard facilities can handle the ROV systems without having to ship duplicate infrastructure.

ROV Jason II and DSL-120a sidescan

The sidescan and ROV system are a powerful suite of survey vehicles that permitted us to map and sample a large area of seafloor efficiently and to excellent advantage in terms of being able on the same cruise to both map and acquire key samples from specific seafloor features. The NDSF should be sure that with the transfer of the DSL-120a sonar to the U.

Hawaii HMRG group, that the collaboration between the two groups is well-structured so that the US research community continues to have access to these systems both in tandem as well as individually. The comments below are specific to each system.

DSL-120a sidescan

The sidescan system performed well after the first lowering, which had problems with unequal power/output from the two arrays causing problems with signal to noise and poor phase bathymetry. It appears that little was done to solve existing problems with the sidescan system since it was last used on the Haymon Galapagos cruise over 18 months ago. DSOG and now HMRG should better maintain and prep the systems to try to minimize startup problems like we encountered. After the repairs were done after the first sidescan lowering the system performed much better with more and equivalent power to each ducer array. The sidescan data are excellent and were processed very well by the HMRG group. The navigation data stream continues to be problematic for the sidescan system. An LBL navigation network was established and provided good LBL data that was acquired during the sidescan surveys. However, no routine software had been developed to accept the LBL input and merge it systematically with the layback data. Further to the issue of navigation data for the sidescan system, the 300 kHz bottom-lock Doppler introduced too much noise into the sidescan data and was not used except for a few intervals to demonstrate that when on –it was negatively impacting the data acquisition. The SM2000 trigger appeared to work and data were acquired normally, however, not processed in real time. The near-bottom multibeam (SM2000) is a standard sensor provided by DSOG and data from it should be routinely processed and made available.

ROV Jason II

The navigation system for Jason LBL tracking was excellent but was the old system that had been in use for a long time. A new, prototype navigation system was installed prior to the cruise but it appeared that it was not fully operational. In order to survey in transponders and collect LBL data during the sidescan surveys, we used the Alvin top-lab Benthos 455 acoustic command box and the computing resources of top lab to collect LBL data and survey the transponders. We hope that continued effort will be put into the new LBL hardware and that DSOG communicates between the ROV and Alvin group about how the LBL and DVLNav systems are set up as it appeared that some functionality on the Alvin system was not similar to that present in the ROV system.

Data were handled extremely well by the group and C. Sellers the data engineer. Data collection and recording during Jason cruises is challenging and one could make the case for additional support for data tasks. Also, DSOG should consider implementing routine, real-time display/plotting of the SM2000 data when being collected by the ROV or sidescan as this would help in real-time planning of surveys as well as providing a measure of quality control. HMRG personnel seemed confident that software they are developing could do this. In addition, having real-time plotting of the Jason2 track on a ~

12hr basis, or as part of the virtual van data stream (NB – the plotting function in the virtual van is not operational) would also be helpful.

The digital still camera (Scorpio- Insite) worked well, but the strobe output is only 300 watts and the image quality as well as range could be improved by carrying a 600 watt/sec. strobe. The weight difference between these two housings is only ~ 10# so is well worth the extra payload. When used in downlooking mode on D268, the camera did not always focus well so many of the images are out of focus. Perhaps this was also a lighting issue but it should be better set up so that when in fixed focus the downlooking digital camera acquires in-focus images.

There was considerable discussion at the end of the cruise between Fornari and DSOG personnel regarding the Virtual Van and the fact that the data written to the DVDs is not functional in a stand-alone mode- like it is for Alvin framegrabber data. These two real-time integrated data display systems have proven to be critically useful for both real-time data analysis, cruise planning, and post-cruise data processing. DSOG must make these systems functional equivalents, within the context of each vehicle type, and provide the data on a dive-by-dive basis such that it can be played on any computer, and not restricted to being accessed only over the WWW. Further, the real-time virtual van system should not be physically tied to the control van. This will ensure that the data can be used until the science party arrives in port so they can complete metadata requirements and writing of the cruise report.

7. APPENDICES
(see attached)

Appendices

A. Cruise Participants
B. Time Line
C. ISS and OSC x, y origins
D. Transponder positions
E. Event logger categories
F. Sampling Sites- table
G. Biological Sampling sites and description
H. Rock Description table- OSC –PDF file
I. Rock Description table- ISS-PDF file
J. Jason II watch summaries
K. Media interest

Appendix A. Cruise Participants and Contact Information

Name	University	Email address
Science		
Dr. Emily Klein	Duke University – Ch. Sci.	ek4@duke.edu
Dr. Daniel Fornari	WHOI	dfornari@whoi.edu
Dr. Karen Von Damm	University of New Hampshire	kvd@eos.sr.unh.edu
Dr. Scott White	University of South Carolina	swhite@geol.sc.edu
Dr. Sarah Carmichael	University of New Hampshire	sarah.carmichael@unh.edu
Ms. Allison Fundis	Universit of Florida	allisonfundis@gmail.com
Ms. Elizabeth Goehring	RIDGE	jrl14@duke.edu
Ms. Jennifer Laliberte	Duke University	exg15@psu.edu
Ms. Frances Mansfield	Duke University	francesmansfield@gmail.com
Ms. Jessica Mason	University of South Carolina	jlmason@coastal.edu
Ms. Karen Neeley	Duke University	kln3@duke.edu
Mr. John O'Brien	University of South Carolina	jobrien@geol.sc.edu
Ms. Laura Preston	NH K-12 teacher	lpreston@salem.k12.nh.us
Dr. Ian Ridley	USGS	iridley@usgs.gov
Dr. Adam Soule	WHOI	ssoule@whoi.edu
Ms. Dorsey Wanless	University of Florida	dorseyw@ufl.edu
Mr. Christopher Waters	WHOI	cwaters@whoi.edu
Ms. Anne Zaino	Duke University	ajz20@duke.edu
DSL:		
Mr. Anton Zafereo	WHOI	azafereo@atlantis.whoi.edu
Mr. James Brennan	WHOI	jbrennan@atlantis.whoi.edu
Mr. William Sellers	WHOI – Expedition Leader	wsellers@whoi.edu
Ms. Cynthia Sellers	WHOI	csellers@whoi.edu
Mr. Alberto Collasius, Jr.	WHOI	tito@whoi.edu
Mr. Stephen Gegg	WHOI	sgeeg@whoi.edu
Mr. Scott Hansen	Contractor	SHANSEN@LEVELCOMPONENTS.com
Mr. Akel Kevis-Stirling	Contractor	akel@kevis-stirling.com
Mr. James Varnum	Contractor	jimv@drizzle.net
Mr. Robert Waters	Contractor	b_waters@CHARTER.NET
HMRG:		
Mr. Paul Johnson	University of Hawaii	paul@hawaii.edu
Mr. Roger Davis	University of Hawaii	rbd@soest.hawaii.edu
Mr. Todd Ericksen	University of Hawaii	ericksen@ocees.com

Appendix B. Daily Log

Mar. 24	Leave port 9 am local time. Transit to ISS site.
25	transit
26	Arrive ISS site morning; turned on transponders; launched DSL120 ~10am; technical problems, recovered.
	Redeployed DSL120 with 4 MAPRS at 2200 GMT (~3 pm local) and began survey.
27	Continued with DSL-050; ran lines 3 and 4
28	ended sonar survey at 9 50'N; recovered 2 transponders (9 54.318' -104 17.748 and 9 54.498 -104 18.75); deployed 4 transponders (WPT-T1 9 09.4' -104 13.0'; WPT-T2 9 06.9' -104 12.9'; WPT-T3 9 04.6' -104 12.5'; WPT-T4 9 02.2' -104 12.5')
29	Launched DSL120-051 at 0400; lost communication with the DSL120, so 3 wax cores were launched (WC-01 at 0435; WC-02 at 0552; WC-03 at 0857)
30	continued with 2 more wax cores (WC-04 at 1100 and WC-05 at 1307) and launched TowCam (at 14:57) until the DSL120 was fixed; launched DSL120-052 (at 1:16)
31	continued with DSL120-052 (completed lines 2 and 3)
Apr. 1	continued with DSL120-052 (lines 4 and 5)
2	continued with DSL120-052 (lines 6 and 7)
3	completed DSL120-052 (line 8); deployed 2 transponders; Towcam 2 (at 4:14)
4	2 wax cores (WC-06 at 1623 and WC-07 at 1843); Towcam 3 (at 4:23); started transit back to Manzanillo for technical problems, but returned to study site to fix problems
5	1 wax core (WC-08 at 1611); spent the afternoon troubleshooting engine problems; launched Jason II (J2-264)
6	recovered J2-264 to work on technical problems; launched 4th TowCam (at 19:47) ; launched J2-265 (at 1:40)
7	continued with J2-265; launched (2046) and recovered elevator (2255)
8	continued with J2-265; launched (1300) and recovered (1747) elevator
9	continued with J2-265; discovered new black smoker; launched (0411) and recovered (1710) elevator
10	continued with J2-265; launched (0730) and recovered (1115) another elevator
11	recovered J2-265 (at 06:12); Towcam 5 (at 7:30)
12	launched J2-266 (at 18:36) (had a problem with the fiber optic cable, so the launch was delayed); launched an elevator (2135)
13	recovered elevator (0130); continued with J2-266
14	recovered J2-266
15	deployed J2-267
16	continued J2-267; launched elevator (0857) recovered (1200)
17	recovered J2-267; transitted to ISS site; launched elevator (-104 17.55'W 9 50.27'N at about 1600 local)
18	launched J2-268 (0600 gmt); recovered OBS212 (1420)
19	continued with J2-268; recovered OBS210 (1745)
20	continued with J2-268; recovered final elevator (2220)
21	recovered J2-268 (0830); recovered compliance meter; began transit (1000)
22-27	transit
27	arrive in San Diego

Appendix C. OSC and ISS Origins

	X origin	Y origin
OSC area	8°50'N	104°20'W
ISS area	9°08'N	104°20'W

Appendix D. OSC Transponder Information

AT15-17 TRANSPONDER SURVEY DATA

OSC Site/9° 03'N EASTERN RIDGE AXIS NET

Files:

A-D: _903A.txt, _903B.txt, _903C.txt, _903D.txt

G-H: _903BSurvey.txt, 903CSurvey.txt

					Surveyed Coordinates							
NET ID	**S/N**	**455 Slot**	**FREQS.**	**REL.**	**X**	**Y**	**Z**	**Latitude***		**Longitude***	**RMS**	**POINTS**
A	54374	7.5	13.0	G	12602.4	35592.4	2449.2	9	9.30981	-104 -13.12653	0.63	149
B	67675	9.5	10.5	H	12873.3	31051.8	2555.3	9	6.84642	-104 -12.97878	0.42	151
C	34989	10.5	11.5	F	13585.2	26821.3	2487.7	9	4.55126	-104 -12.59051	0.37	127
D	67310	8.5	10.0	C	13620.4	22420.7	2436.7	9	2.16382	-104 -12.57131	0.37	129
G	34826	8.0	9.5	B	12386.0	20434.0	2531.3	9	1.08598	-104 -13.24456	0.42	167
H	54180	8.5	10.0	A	15072.4	32416.1	2361.4	9	7.58659	-104 -11.77937	0.32	141
LDR	(na)	(na)	(na)	(na)	13787.8	35021.3	**173****	9	9.00000	-104 -12.48000	(na)	(na)

Transponders A-D deployed on March 28, 2007

Transponders G-H deployed on April 4, 2007

Origin: 8° 50'N and 104° 20'W

*** - Lat/Lon positions converted from X/Y's**

**** - Height of mooring in meters above bottom**

All transponders recovered prior to departing the OSC work site

Appendix E. Event Logger (Virtual Van) Categories

VOL – Volcanic
SED- Sediment Cover
SUR- Rock Surface
STR-Volcanic
STR-Tectonic
HYD – Hydrothermal
BIO: MOB– Mobile Biological
BIO: SESS- Sessile Biological
SMP- Sample taken
MISC-
ERR - Error
COM – Comments

1. VOL – Volcanic
    a. Pillows-large
    b. Pillows-small
    c. Lobate
    d. Sheet-ropey
    e. Sheet-lineated
    f. Hackly
    g. Tubes/Drips/Entrails
    h. Talus
    i. Massive
    j. Intrusive
    k. Other

2. SED
    a. No sediment cover
    b. Light dusting
    c. Sed in pockets
    d. Heavy sed cover
    e. Full, w/ rk shapes
    f. Sediment Blanket
    g. Other

3. SUR
    a. All fresh glass
    b. Partial intact glass
    c. Possible glass
    d. Fresh crystal. rk
    e. Weathered rock
    f. Coated rock
    g. Other

4. STR-Volcanic
    a. Flow edge
    b. Erupt Fiss. Lt 1
    c. Erupt Fiss. Gt 1
    d. Channel
    e. Pillar
    f. Haystack
    g. Other

5. STR-Tect/Physical
    a. Fiss-non-erup Lt 1
    b. Fiss-non-erup Gt1
    c. fault
    d. Scarp
    e. Collapse-wide
    f. Collapse-small
    g. Columnar jointing
    h. Other

6. HYD
    a. Black Smoker
    b. White Smoker
    c. Cloudy water
    d. Murky water
    e. Diffuse flow
    f. Extinct chimney
    g. Hydrotherm. Sed.
    h. Other

7. BIO-MOBILE
    a. Crabs
    b. Shrimp
    c. Lobsters
    d. Sea Stars/Crinoid
    e. Urchins
    f. Sea Cucumbers
    g. Scallop
    h. Octopus/Squid
    i. Fish
    j. Other

8. BIO-SESSILE
    a. Worms
    b. Mussels
    c. Clams
    d. Snails
    e. Barnacles
    f. Anemones
    g. Bacterial Mats
    h. Bacteria Flocs
    i. Other

9. SMP
    a. Rock samples
    b. Water Sample
    c. Biological Smp
    d. Glass Core Smp
    e. Other

10. MISC
    a. Elevator release
    b. Elevator recover
    c. Elevator deploy
    d. Change watch
    e. Equip.Malfunction
    f. Other

11. ERR
    a. Provide comment

12. COM
    a. Provide comment

Appendix F. Sample location sites (rock and water)

Sample locations (with renav)										
SAMPLE ID	VEHICLE	TIME COLLECTED (GMT)	DATE COLLECTED	DIVE NUMBER	LATI. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	VVAN EVENT #
040507-2239	Jason II	2239	4/5/07	J2-264	9	9.510675	-104	11.168881	2783	1519
040507-2302	Jason II	2302	4/5/07	J2-264	9	9.495775	-104	11.233404	2792	1593
040507-2329	Jason II	2329	4/6/07	J2-264	9	9.482587	-104	11.292504	2783	1666
040607-0006	Jason II	0000	4/6/07	J2-264	9	9.456668	-104	11.393394	2743	1766
040607-0025	Jason II	0000	4/6/07	J2-264	9	9.434465	-104	11.459890	2705	1817
040607-0054	Jason II	0000	4/5/07	J2-264	9	9.419680	-104	11.561209	2641	1938
040607-0120	Jason II	0120	4/6/07	J2-264	9	9.407580	-104	11.623546		2042
040607-0408	Jason II	0408	4/6/07	J2-264	9	9.768061	-104	12.001804	2595	2515
040607-0546	Jason II	0546	4/6/07	J2-264	9	9.848340	-104	12.321820	2571	2804
040607-0602	Jason II	0602	4/6/07	J2-264	9	9.861318	-104	12.364814	2585	2849
040607-0829	Jason II	0829	4/6/07	J2-264	9	9.837937	-104	12.646026	2577	3343
040607-0848	Jason II	0848	4/6/07	J2-264	9	9.745203	-104	12.606707	2580	3417
040607-0902	Jason II	0902	4/6/07	J2-264	9	9.686753	-104	12.582451	2583	3461
040607-0922	Jason II	0922	4/6/07	J2-264	9	9.597540	-104	12.548459	2582	3524
040607-1009	Jason II	1009	4/6/07	J2-264	9	9.504762	-104	12.484292	2567	3656
040607-1040	Jason II	1040	4/6/07	J2-264	9	9.491191	-104	12.513877	2567	3721
040607-1112	Jason II	1112	4/6/07	J2-264	9	9.426855	-104	12.487501	2554	3803
040607-1135	Jason II	1135	4/6/07	J2-264	9	9.364153	-104	12.446695	2551	3866
040607-1303	Jason II	1303	4/6/07	J2-264	9	9.385528	-104	12.533788	2573	4075
040607-1327	Jason II	1327	4/6/07	J2-264	9	9.346009	-104	12.589888	2539	4142
040707-0413	Jason II	0413	4/7/07	J2-265	9	6.357985	-104	14.361997	2783	4303
040707-0520	Jason II	0520	4/7/07	J2-265	9	6.625784	-104	14.327485	2687	4508
040707-0604	Jason II	0604	4/7/07	J2-265	9	6.748644	-104	14.310665	2684	4666
040707-0617	Jason II	0617	4/7/07	J2-265	9	6.776237	-104	14.295052	2681	4708
040707-0631	Jason II	0631	4/7/07	J2-265	9	6.827158	-104	14.307981	2688	4754
040707-0646	Jason II	0646	4/7/07	J2-265	9	6.889924	-104	14.337836	2680	4819
040707-0654	Jason II	0654	4/7/07	J2-265	9	6.926977	-104	14.349756	2680	4847
040707-0743	Jason II	0743	4/7/07	J2-265	9	7.078318	-104	14.191559	2688	5003
040707-0804	Jason II	0804	4/7/07	J2-265	9	7.126571	-104	14.102674	2704	5070
040707-0826	Jason II	0826	4/7/07	J2-265	9	7.171059	-104	14.006510	2703	5145
040707-0858	Jason II	0858	4/7/07	J2-265	9	7.220366	-104	13.875181	2756	5239
040707-0909	Jason II	0909	4/7/07	J2-265	9	7.232988	-104	13.841080	2757	5280
040707-0953	Jason II	0953	4/7/07	J2-265	9	7.414609	-104	13.868230	2742	5406
040707-1042	Jason II	1042	4/7/07	J2-265	9	7.676459	-104	13.976377	2694	5540
040707-1120	Jason II	1120	4/7/07	J2-265	9	7.830754	-104	14.028449	2689	5645
040707-1231	Jason II	1231	4/7/07	J2-265	9	7.854862	-104	14.130293	2737	5818
040707-1324	Jason II	1324	4/7/07	J2-265	9	7.982612	-104	14.210595	2744	5955
040707-1443	Jason II	1443	4/7/07	J2-265	9	8.170909	-104	14.072846	2701	6169
040707-1628	Jason II	1628	4/7/07	J2-265	9	8.405660	-104	14.096395	2724	6488
040707-1718	Jason II	1718	4/7/07	J2-265	9	8.520924	-104	14.120650	2700	6652

040707-1815	Jason II	1815	4/7/07	J2-265	9	8.615941	-104	14.328722	2710	6823
040707-1924	Jason II	1924	4/7/07	J2-265	9	8.652974	-104	14.103651	2716	7003
040707-2001	Jason II	2001	4/7/07	J2-265	9	8.694961	-104	13.978930	2748	7117
040707-2022	Jason II	2022	4/7/07	J2-265	9	8.730673	-104	13.866964	2735	7172
040807-0228	Jason II	0228	4/8/07	J2-265	9	9.098359	-104	13.836093	2721	7677
040807-0351	Jason II	0351	4/8/07	J2-265	9	8.996740	-104	13.700818	2706	7910
040807-0451	Jason II	0451	4/8/07	J2-265	9	9.003901	-104	13.656903	2713	8068
040807-0525	Jason II	0525	4/8/07	J2-265	9	8.999047	-104	13.653323	2717	8175
040807-0602	Jason II	0602	4/8/07	J2-265	9	9.004324	-104	13.560059	2711	8287
040807-0616	Jason II	0616	4/8/07	J2-265	9	9.008825	-104	13.516930	2709	8335
040807-0624	Jason II	0624	4/7/07	J2-265	9	9.008032	-104	13.490619	2409	8366
040807-0643	Jason II	0643	4/8/07	J2-265	9	9.006854	-104	13.410354	2703	8435
040807-0652	Jason II	0652	4/8/07	J2-265	9	9.012709	-104	13.363093	2700	8471
040807-0704	Jason II	0704	4/8/07	J2-265	9	9.017266	-104	13.313381	2694	8508
040807-0710	Jason II	0710	4/8/07	J2-265	9	9.026050	-104	13.288987	2688	8535
040807-0735	Jason II	0735	4/8/07	J2-265	9	9.078848	-104	13.204014	2668	8632
040807-0755	Jason II	0755	4/8/07	J2-265	9	9.136946	-104	13.107824	2655	8712
040807-0807	Jason II	0807	4/8/07	J2-265	9	9.158146	-104	13.066030	2649	8755
040807-0828	Jason II	0848	4/8/07	J2-265	9	9.202732	-104	12.957241	2613	8832
040807-0848	Jason II	0848	4/8/07	J2-265	9	9.250346	-104	12.897955	2601	8892
040807-0858	Jason II	0858	4/8/07	J2-265	9	9.283241	-104	12.840620	2598	8930
040807-0907	Jason II	0907	4/8/07	J2-265	9	9.302956	-104	12.808575	2586	8965
040807-0935	Jason II	0935	4/8/07	J2-265	9	9.331565	-104	12.762340	2587	9061
040807-0949	Jason II	0949	4/8/07	J2-265	9	9.346518	-104	12.743539	2598	9096
040807-1023	Jason II	1023	4/8/07	J2-265	9	9.343528	-104	12.692731	2589	9191
040807-1037	Jason II	1037	4/8/07	J2-265	9	9.346629	-104	12.700087	2595	9225
040807-1043	Jason II	1043	4/8/07	J2-265	9	9.344540	-104	12.698536	2593	9240
040807-1157	Jason II	1157	4/8/07	J2-265	9	9.304438	-104	12.600868	2587	9427
040807-1228	Jason II	1228	4/8/07	J2-265	9	9.304007	-104	12.507191	2573	9510
040807-1307	Jason II	1307	4/8/07	J2-265	9	9.216478	-104	12.479963	2569	9605
040807-1307	Jason II	1307	4/8/07	J2-265	9	9.216478	-104	12.479963	2569	9605
040807-1638	Jason II	1638	4/8/07	J2-265	9	9.267109	-104	12.588847	2589	10084
040807-1652	Jason II	1652	4/8/07	J2-265	9	9.284350	-104	12.608929	2589	10118
040807-1654	Jason II	1654	4/8/07	J2-265	9	9.285218	-104	12.609332	2589	10125
040807-1839	Jason II	1839	4/8/07	J2-265	9	9.266113	-104	12.534606	2584	10256
040807-1848	Jason II	1848	4/8/07	J2-265	9	9.240835	-104	12.500909	2573	10289
040807-1907	Jason II	1907	4/8/07	J2-265	9	9.194734	-104	12.476134	2569	10345
040807-1925	Jason II	1925	4/8/07	J2-265	9	9.130162	-104	12.470194	2572	10397
040807-2018	Jason II	2018	4/8/07	J2-265	9	9.019574	-104	12.396749	2576	10558
040807-2032	Jason II	2032	4/8/07	J2-265	9	9.018775	-104	12.393475	2576	10607
040807-2058	Jason II	2058	4/8/07	J2-265	9	8.956468	-104	12.397378	2586	10664
040807-2135	Jason II	2136	4/8/07	J2-265	9	8.820134	-104	12.412506	2575	10773
040807-2229	Jason II	2229	4/8/07	J2-265	9	8.726504	-104	12.361209	2590	10920
040807-2257	Jason II	2257	4/8/07	J2-265	9	8.717822	-104	12.389428	2591	10989
040807-2317	Jason II	2317	4/8/07	J2-265	9	8.715586	-104	12.431288	2586	11041
040807-2346	Jason II	2346	4/8/07	J2-265	9	8.672446	-104	12.435452	2576	11130
040907-0022	Jason II	0022	4/9/07	J2-265	9	8.600536	-104	12.418133	2578	11228
040907-0044	Jason II	0044	4/9/07	J2-265	9	8.570533	-104	12.401855	2581	11280
Red major water sampler	Jason II	1038	4/9/07	J2-265	8	59.869183	-104	15.581444	2612	

Blue major water sampler	Jason II	1121	4/9/07	J2-265	8	59.869183	-104	15.581444	2612	
Purple major water sampler	Jason II	1138	4/9/07	J2-265	8	59.869183	-104	15.581444	2612	
Black major water sampler	Jason II	1221	4/9/07	J2-265	8	59.869183	-104	15.581444	2612	
040907-1237	Jason II	1237	4/9/07	J2-265	9	8.418962	-104	12.387085	2574	
040907-1804	Jason II	1804	4/9/07	J2-265	9	8.394509	-104	12.665244	2567	13245
040907-1814	Jason II	1814	4/9/07	J2-265	9	8.404634	-104	12.648496	2562	13273
040907-1838	Jason II	1838	4/9/07	J2-265	9	8.412521	-104	12.546010	2587	13365
040907-1843	Jason II	1843	4/9/07	J2-265	9	8.414039	-104	12.523363	2597	13380
040907-1859	Jason II	1859	4/9/07	J2-265	9	8.417123	-104	12.440854	2597	13436
040907-2023	Jason II	2023	4/9/07	J2-265	9	8.355000	-104	12.381127	2578	13683
040907-2033	Jason II	2033	4/9/07	J2-265	9	8.305323	-104	12.381042	2583	13720
040907-2051	Jason II	2051	4/9/07	J2-265	9	8.205266	-104	12.380213	2590	13774
040907-2112	Jason II	2112	4/9/07	J2-265	9	8.147446	-104	12.372604	2590	13839
040907-2130	Jason II	2130	4/9/07	J2-265	9	8.075460	-104	12.356428	2583	13897
040907-2157	Jason II	2157	4/9/07	J2-265	9	7.949287	-104	12.369683	2598	13985
040907-2225	Jason II	2225	4/9/07	J2-265	9	7.866842	-104	12.412552	2593	14076
040907-2245	Jason II	2245	4/9/07	J2-265	9	7.819619	-104	12.448063	2529	14144
040907-2314	Jason II	2314	4/9/07	J2-265	9	7.699386	-104	12.502666	2589	14236
040907-2358	Jason II	2358	4/9/07	J2-265	9	7.694899	-104	12.648469	2601	14361
041007-0006	Jason II	0000	4/10/07	J2-265	9	7.694905	-104	12.616727	2603	14390
041007-0036	Jason II	0000	4/10/07	J2-265	9	7.646718	-104	12.490606	2597	14473
041007-0055	Jason II	0000	4/10/07	J2-265	9	7.608275	-104	12.411467	2600	14532
041007-0101	Jason II	0101	4/10/07	J2-265	9	7.580314	-104	12.383014	2600	13555
041007-0124	Jason II	0124	4/10/07	J2-265	9	7.507252	-104	12.307049	2590	14624
041007-0147	Jason II	0147	4/10/07	J2-265	9	7.419451	-104	12.295255	2565	14689
041007-0213	Jason II	0213	4/10/07	J2-265	9	7.304362	-104	12.312389	2567	14759
041007-0337	Jason II	0000	4/10/07	J2-265	9	7.055810	-104	12.080602	2591	14983
041007-0350	Jason II	0000	4/10/07	J2-265	9	7.018526	-104	12.032705	2588	15019
041007-0425	Jason II	0000	4/10/07	J2-265	9	6.948769	-104	11.909198	2528	15127
041007-0459	Jason II	0459	4/10/07	J2-265	9	6.945093	-104	11.855530	2528	15206
041007-0611	Jason II	0611	4/10/07	J2-265	9	6.771157	-104	12.136839	2593	15318
041007-0635	Jason II	0635	4/10/07	J2-265	9	6.731876	-104	12.102802	2594	15397
041007-0640	Jason II	0640	4/10/07	J2-265	9	6.712861	-104	12.090443	2589	15423
041007-0733	Jason II	0000	4/10/07	J2-265	9	6.664516	-104	12.198175	2592	15570
041007-1304	Jason II	1304	4/10/07	J2-265	9	6.565268	-104	12.211478	2591	16058
041007-1424	Jason II	2624	4/10/07	J2-265	9	6.270473	-104	12.372490	2624	16276
041007-1459	Jason II	1459	4/10/07	J2-265	9	6.124634	-104	12.329989	2600	16379
041007-1618	Jason II	1618	4/10/07	J2-265	9	6.015367	-104	12.160902	2598	16597
041007-1632	Jason II	1632	4/10/07	J2-265	9	6.025163	-104	12.149803	2597	16646
041007-1735	Jason II	1735	4/10/07	J2-265	9	5.851282	-104	12.082139	2583	16861
041007-1751	Jason II	1751	4/10/07	J2-265	9	5.849765	-104	12.080973	2584	16920
041007-1803	Jason II	1803	4/10/07	J2-265	9	5.854303	-104	12.072571	2585	16954
041007-1857	Jason II	1857	4/10/07	J2-265	9	5.683260	-104	12.090600	2586	17112
041007-1908	Jason II	1908	4/10/07	J2-265	9	5.639902	-104	12.081247	2587	17153
041007-1925	Jason II	1925	4/10/07	J2-265	9	5.576061	-104	12.100345	2600	17212
041007-1939	Jason II	1939	4/10/07	J2-265	9	5.509467	-104	12.094354	2589	17254

041007-2014	Jason II	2014	4/10/07	J2-265	9	5.333768	-104	12.086641	2593	17358
041007-2018	Jason II	2018	4/10/07	J2-265	9	5.308887	-104	12.086083	2593	17372
041007-2033	Jason II	2033	4/10/07	J2-265	9	5.236435	-104	12.080930	2594	17423
041007-2051	Jason II	2051	4/10/07	J2-265	9	5.154547	-104	12.086814	2595	17473
041007-2120	Jason II	2120	4/10/07	J2-265	9	5.077524	-104	12.088732	2611	17551
041007-2128	Jason II	2128	4/10/07	J2-265	9	5.055352	-104	12.080510	2607	17571
041007-2142	Jason II	2142	4/10/07	J2-265	9	4.981352	-104	12.070522	2609	17618
041007-2247	Jason II	2247	4/10/07	J2-265	9	4.732856	-104	12.004400	2616	17786
041007-2352	Jason II	2352	4/10/07	J2-265	9	4.545434	-104	12.051037	2620	17957
041107-0047	Jason II	0000	4/10/07	J2-265	9	4.324481	-104	11.927804	2601	18116
041107-0122	Jason II	0122	4/11/07	J2-265	9	4.144502	-104	11.904099	2599	18206
041107-0215	Jason II	0215	4/10/07	J2-265	9	3.994137	-104	11.914762	2601	18346
041107-0257	Jason II	2033	4/10/07	J2-265	9	3.921000	-104	11.934540	2598	18465
041107-0336	Jason II	0336	4/11/07	J2-265	9	3.728473	-104	11.979433	2613	18600
041107-2302	Jason II	2302	4/11/07	J2-266	9	1.490591	-104	11.152681	2702	18813
041107-2341	Jason II	2341	4/11/07	J2-266	9	1.563807	-104	11.255794	2678	18920
041207-0022	Jason II	0022	4/12/07	J2-266	9	1.666651	-104	11.403816	2649	19049
041207-0120	Jason II	0120	4/12/07	J2-266	9	1.736695	-104	11.630423	2633	19201
041207-0226	Jason II	0226	4/12/07	J2-266	9	1.695893	-104	11.854658	2635	19388
041207-0318	Jason II	0318	4/12/07	J2-266	9	1.757009	-104	12.072679	2630	19555
041207-0428	Jason II	0428	4/11/07	J2-266	9	1.901119	-104	12.342476	2678	19793
041207-0451	Jason II	0451	4/12/07	J2-266	9	1.942518	-104	12.441392	2668	19881
041207-0537	Jason II	0537	4/12/07	J2-266	9	2.003052	-104	12.623710	2649	20036
041207-0610	Jason II	0610	4/12/07	J2-266	9	2.053289	-104	12.677714	2630	20130
041207-0627	Jason II	0627	4/12/07	J2-266	9	2.090096	-104	12.695939	2603	20183
041207-0720	Jason II	0720	4/12/07	J2-266	9	2.142863	-104	12.469547	2667	20321
041207-0800	Jason II	0800	4/12/07	J2-266	9	2.245361	-104	12.496685	2679	20440
041207-0832	Jason II	0832	4/12/07	J2-266	9	2.314144	-104	12.571691	2635	20530
041207-0910	Jason II	0910	4/12/07	J2-266	9	2.442895	-104	12.596433	2626	20635
041207-1009	Jason II	1009	4/12/07	J2-266	9	2.737821	-104	12.469538	2641	20791
041207-1150	Jason II	1150	4/12/07	J2-266	9	2.808251	-104	12.696705	2620	20955
041207-1557	Jason II	1557	4/12/07	J2-266	9	4.465607	-104	12.694002	2773	21153
041207-1702	Jason II	1702	4/12/07	J2-266	9	4.597654	-104	12.889520	2842	21306
041207-1735	Jason II	1735	4/12/07	J2-266	9	4.674428	-104	13.016836	2795	21387
041207-1809	Jason II	1809	4/12/09	J2-266	9	4.764468	-104	13.132671	2795	21472
041207-1831	Jason II	1831	4/12/07	J2-266	9	4.848118	-104	13.195357	2752	21534
041207-1907	Jason II	1907	4/12/07	J2-266	9	5.038118	-104	13.296616	2769	21632
041207-1929	Jason II	1929	4/12/07	J2-266	9	5.161920	-104	13.330046	2775	21696
041207-2002	Jason II	2002	4/12/07	J2-266	9	5.332411	-104	13.368526	2700	21783
041207-2042	Jason II	2042	4/12/07	J2-266	9	5.579608	-104	13.479895	2699	21892
041207-2100	Jason II	2100	4/12/07	J2-266	9	5.667839	-104	13.511069	2690	21946
041207-2122	Jason II	2122	4/12/07	J2-266	9	5.774125	-104	13.552066	2701	22006
041307-0215	Jason II	0215	4/13/07	J2-266	9	6.111158	-104	13.623683	2769	22509
041307-0245	Jason II	0245	4/13/07	J2-266	9	6.198119	-104	13.613722	2780	22610
041307-0337	Jason II	0337	4/13/07	J2-266	9	6.315823	-104	13.736722	2702	22775
041307-0416	Jason II	0416	4/13/07	J2-266	9	6.410297	-104	13.799674	2692	22901
041307-0459	Jason II	0459	4/13/07	J2-266	9	6.523861	-104	13.805867	2693	23053
041307-0605	Jason II	0605	4/13/07	J2-266	9	6.670743	-104	13.611289	2718	23252
041307-0637	Jason II	0637	4/13/07	J2-266	9	6.757829	-104	13.486609	2775	23327
041307-0709	Jason II	0705	4/13/07	J2-266	9		-104		2795	23419

041307-0720	Jason II	0720	4/13/07	J2-266	9	6.884727	-104	13.310942	2794	23447
041307-0737	Jason II	0737	4/13/07	J2-266	9	6.948708	-104	13.275983	2782	23496
041307-0832	Jason II	0832	4/13/07	J2-266	9	7.371461	-104	13.282768	2727	23660
041307-0900	Jason II	0900	4/13/07	J2-266	9	7.545668	-104	13.282084	2745	23732
041307-0923	Jason II	0923	4/13/07	J2-266	9	7.646840	-104	13.240943	2748	23794
041307-0930	Jason II	0930	4/13/07	J2-266	9	7.679437	-104	13.218274	2750	23822
041307-0955	Jason II	0955	4/13/07	J2-266	9	7.764951	-104	13.147394	2739	23880
041307-1021	Jason II	1021	4/13/07	J2-266	9	7.856878	-104	13.055732	2706	23940
041307-1059	Jason II	1059	4/13/07	J2-266	9	7.954491	-104	12.950345	2680	24031
041307-1225	Jason II	1225	4/13/07	J2-266	9	8.193369	-104	12.652673	2550	24232
041307-1712	Jason II	1712	4/13/07	J2-266	9	8.781087	-104	12.301403	2596	25019
041307-1751	Jason II	1751	4/13/07	J2-266	9	8.848892	-104	12.187085	2563	25138
041307-1806	Jason II	1806	4/13/07	J2-266	9	8.831931	-104	12.209429	2549	25175
041307-1826	Jason II	1826	4/13/07	J2-266	9	8.787905	-104	12.249773	2592	25230
041307-1835	Jason II	1835	4/13/07	J2-266	9	8.767095	-104	12.274729	2587	25259
041307-1855	Jason II	1855	4/13/07	J2-266	9	8.775227	-104	12.211475	2550	25316
041307-1918	Jason II	1918	4/13/07	J2-266	9	8.775607	-104	12.157582	2547	25380
041307-1927	Jason II	1927	4/13/07	J2-266	9	8.767612	-104	12.134095	2551	25413
041307-1938	Jason II	1938	4/13/07	J2-266	9	8.767727	-104	12.103475	2528	25441
041307-2016	Jason II	2016	4/13/07	J2-266	9	8.827141	-104	11.961982	2585	25528
041307-2033	Jason II	2033	4/13/07	J2-266	9	8.865218	-104	11.863541	2604	25581
041307-2112	Jason II	2112	4/13/07	J2-266	9	8.936297	-104	11.628674	2612	25688
041307-2116	Jason II	2116	4/13/07	J2-266	9	8.946052	-104	11.605324	2615	25699
041307-2128	Jason II	2128	4/13/07	J2-266	9	8.967949	-104	11.529917	2656	25731
041307-2208	Jason II	2208	4/13/07	J2-266	9	8.954974	-104	11.309731	2783	25837
041507-0504	Jason II	0504	4/15/07	J2-267	9	3.503216	-104	11.998689	2624	25974
041507-0604	Jason II	0604	4/15/07	J2-267	9	3.499290	-104	12.159235	2615	26122
041507-0639	Jason II	0639	4/15/07	J2-267	9	3.496427	-104	12.273126	2603	26218
041507-0717	Jason II	0717	4/15/07	J2-267	9	3.497080	-104	12.392160	2597	26311
041507-0806	Jason II	0806	4/15/07	J2-267	9	3.421919	-104	12.423449	2605	26427
041507-0856	Jason II	0856	4/15/07	J2-267	9	3.258327	-104	12.456065	2605	26551
041507-0922	Jason II	0922	4/15/07	J2-267	9	3.165457	-104	12.479848	2605	26620
041507-1016	Jason II	1016	4/15/07	J2-267	9	2.990090	-104	12.506404	2602	26735
041507-1124	Jason II	1124	4/15/07	J2-267	9	2.844291	-104	12.527497	2601	26898
041507-1152	Jason II	1152	4/15/07	J2-267	9	2.726085	-104	12.538058	2612	26959
041507-1402	Jason II	1402	4/15/07	J2-267	9	1.879925	-104	12.696706	2638	27062
041507-1511	Jason II	1511	4/15/07	J2-267	9	1.613883	-104	12.752159	2652	27240
041507-1612	Jason II	1612	4/15/07	J2-267	9	1.409569	-104	12.715203	2661	27394
041507-1706	Jason II	1706	4/15/07	J2-267	9	1.241762	-104	12.768265	2672	27525
041507-1808	Jason II	1808	4/15/07	J2-267	9	1.054984	-104	12.829747	2656	27691
041607-0007	Jason II	0007	4/16/07	J2-267	9	2.679960	-104	15.959409	2633	27740
041607-0105	Jason II	0105	4/16/07	J2-267	9	2.630966	-104	15.774934	2619	27923
041607-0240	Jason II	0240	4/16/07	J2-267	9	2.364305	-104	15.667138	2625	28207
041607-0309	Jason II	0309	4/16/07	J2-267	9	2.288716	-104	15.668211	2623	28287
041607-0341	Jason II	0341	4/16/07	J2-267	9	2.160319	-104	15.674600	2630	28390
041607-0431	Jason II	0431	4/16/07	J2-267	9	1.932553	-104	15.688036	2617	28546
041607-0456	Jason II	0456	4/16/07	J2-267	9	1.868639	-104	15.676274	2624	28639
041607-0543	Jason II	0543	4/16/07	J2-267	9	1.733410	-104	15.608704	2624	28790
041607-0616	Jason II	0616	4/16/07	J2-267	9	1.635438	-104	15.551166	2628	28882
041607-0627	Jason II	0627	4/16/07	J2-267	9	1.587380	-104	15.535711	2627	28918

041607-0638	Jason II	0638	4/16/07	J2-267	9	1.547004	-104	15.509665	2621	28950
041607-0653	Jason II	0653	4/16/07	J2-267	9	1.495283	-104	15.515257	2622	28988
041607-0724	Jason II	0724	4/16/07	J2-267	9	1.353370	-104	15.551900	2627	29072
041607-0736	Jason II	0736	4/16/07	J2-267	9	1.285531	-104	15.577906	2622	29115
041607-0756	Jason II	0756	4/16/07	J2-267	9	1.184322	-104	15.601058	2617	29178
041607-0808	Jason II	0808	4/16/07	J2-267	9	1.136552	-104	15.617173	2627	29216
041607-0819	Jason II	0819	4/16/07	J2-267	9	1.069343	-104	15.637359	2631	29256
041607-0831	Jason II	0831	4/16/07	J2-267	9	1.018398	-104	15.662172	2629	29284
041607-0842	Jason II	0842	4/16/07	J2-267	9	0.996568	-104	15.702019	2629	29328
041607-1038	Jason II	1038	4/16/07	J2-267	9	1.014373	-104	15.837164	2611	29566
041607-1322	Jason II	1322	4/16/07	J2-267	9	1.077629	-104	16.059770	2596	29859
041607-1357	Jason II	1307	4/16/07	J2-267	9	0.973894	-104	15.942158	2633	29940
041607-1450	Jason II	1450	4/16/07	J2-267	9	0.831271	-104	15.779072	2611	30082
041607-1507	Jason II	1507	4/16/07	J2-267	9	0.785968	-104	15.730142	2630	30136
041607-1532	Jason II	1532	4/16/07	J2-267	9	0.776209	-104	15.650210	2625	30214
041607-1635	Jason II	1635	4/16/07	J2-267	9	0.765050	-104	15.488667	2613	30395
041607-1736	Jason II	1736	4/16/07	J2-267	9	0.659785	-104	15.633092	2631	30576
041607-1758	Jason II	1758	4/16/07	J2-267	9	0.632396	-104	15.650575	2632	30641
041607-1809	Jason II	1809	4/16/07	J2-267	9	0.595332	-104	15.638895	2632	30671
041607-1818	Jason II	1818	4/16/07	J2-267	9	0.557187	-104	15.632681	2629	30692
041607-1850	Jason II	1850	4/16/07	J2-267	9	0.384883	-104	15.624379	2620	30775
041607-1925	Jason II	1925	4/16/07	J2-267	9	0.122710	-104	15.627146	2017	30881
041607-1933	Jason II	1933	4/16/07	J2-267	9	0.065808	-104	15.623281	2617	30916
041607-2012	Jason II	2012	4/16/07	J2-267	8	59.869183	-104	15.581444	2612	31004
041607-2017	Jason II	2017	4/16/07	J2-267	8	59.847284	-104	15.567800	2606	31021
041607-2046	Jason II	2046	4/16/07	J2-267	8	59.696794	-104	15.583551	2623	31092
041607-2129	Jason II	2129	4/16/07	J2-267	8	59.373184	-104	15.612686	2625	31223
041607-2217	Jason II	2217	4/16/07	J2-267	8	59.117779	-104	15.655376	2617	31348
041607-2254	Jason II	2254	4/16/07	J2-267	8	59.112421	-104	15.754485	2606	31458
041607-2356	Jason II	2356	4/16/07	J2-267	8	59.039366	-104	15.676585	2633	31601
041707-0108	Jason II	0108	4/17/07	J2-267	8	58.936763	-104	15.570601	2614	31740
041707-0139	Jason II	0139	4/17/07	J2-267	8	58.930248	-104	15.450391	2618	31841
041707-0200	Jason II	0200	4/17/07	J2-267	8	58.922114	-104	15.418996	2602	31903
041707-0220	Jason II	0220	4/17/07	J2-267	8	58.910644	-104	15.428645	2601	31962
041707-0340	Jason II	0340	4/17/07	J2-267	8	58.736837	-104	15.609668	2616	32188
041707-0438	Jason II	0438	4/17/07	J2-267	8	58.525182	-104	15.502487	2620	32358
041707-0634	Jason II	0634	4/17/07	J2-267	8	58.587060	-104	15.882134	2586	32703
041707-0724	Jason II	0724	4/17/07	J2-267	8	58.401928	-104	15.953015	2585	32848
041707-0909	Jason II	0909	4/17/07	J2-267	8	57.907010	-104	15.622218	2612	33150
041707-0940	Jason II	0940	4/17/07	J2-267	8	57.775344	-104	15.529713	2620	33242
041707-0958	Jason II	0958	4/17/07	J2-267	9	57.701579	-104	15.469504	2620	33288
041707-1018	Jason II	1018	4/17/07	J2-267	8	57.597604	-104	15.441242	2617	33342
041707-1034	Jason II	1034	4/17/07	J2-267	8	57.519229	-104	15.445672	2623	33384
041707-1044	Jason II	1044	4/17/07	J2-267	8	57.464451	-104	15.445612	2627	33407
WC-040607-0622	Jason II/wax core	0622	4/6/07	J2-264	9	9.875700	-104	12.422100	2577	2910
WC-040607-0742	Jason II/wax core	0742	4/6/07	J2-264	9	9.942420	-104	12.710820	2581	3210
WC-040607-1222	Jason II/wax	1222	3/5/11	J2-264	9	9.372300	-104	12.503000	2563	3803

	core									
WC-040907-0315	wax core	0315	4/9/07	J2-265	9	8.419440	-104	12.390000		
WC-041007-1720	Jason II/wax core	1720	4/10/07	J2-265	9	5.866224	-104	12.101400	2586	16803
WC-041207-0459	Jason II/wax core	0459	4/12/07	J2-266	9	1.961480	-104	12.473310	2653	19904
WC-041607-2356	Jason II/wax core	2356	4/16/07	J2-267	9	59.038800	-104	15.676560	2633	31601
WC-1	wax core	0435	3/30/07		9	7.999	-104	12.307	2590	
WC-2	wax core	0552	3/30/07		9	6.941	-104	12.179	2602	
WC-3	wax core	0857	3/30/07		9	5.820	-104	12.149	2601	
WC-4	wax core	1100	3/30/07		9	5.198	-104	12.256	2576	
WC-5	wax core	1307	3/30/07		9	2.900	-104	11.400	2556	
WC-6	wax core	1623	4/4/07		8	59.700	-104	11.390	2820	
WC-7	wax core	1843	4/4/07		8	58.746	-104	12.498	2668	
WC-8	wax core	0001	4/5/07		9	9.119	-104	11.380	2695	
J268-01	Jason II	1305	41807	J2-268	9	50.491	-104	17.977	2519	
J268-02	Jason II	1517	41807	J2-268	9	50.586	-104	17.893	2512	
J268-03	Jason II	1541	41807	J2-268	9	50.642	-104	17.814	2511	
J268-04	Jason II	1604	41807	J2-268	9	50.723	-104	17.759	2506	
J268-05	Jason II	1625	41807	J2-268	9	50.775	-104	17.635	2504	
J268-06	Jason II	2242	41807	J2-268	9	49.985	-104	17.239	2505	
J268-08	Jason II	0321	41907	J2-268	9	50.359	-104	17.635	2501	
J268-09	Jason II	1952	41907	J2-268	9	49.630	-104	17.427	2500	
J268-10	Jason II	0908	42007	J2-268	9	50.975	-104	17.623	2503	
J268-11	Jason II	0922	42007	J2-268	9	50.970	-104	17.585	2504	
J268-12	Jason II	0959	42007	J2-268	9	50.918	-104	7.456	2511	
J268-13	Jason II	1044	42007	J2-268	9	50.940	-104	17.308	2515	
J268-14	Jason II	1138	42007	J2-268	9	51.011	-104	17.283	2519	
J268-15	Jason II	1214	42007	J2-268	9	50.872	-104	17.207	2522	
J268-16	Jason II	1251	42007	J2-268	9	50.961	-104	17.088	2527	
J268-17	Jason II	1324	42007	J2-268	9	50.041	-104	16.983	2532	
J268-18	Jason II	1553	42007	J2-268	9	51.181	-104	16.967	2536	
J268-19	Jason II	1608	42007	J2-268	9	51.176	-104	16.989	2533	
J268-20	Jason II	1642	42007	J2-268	9	51.137	-104	16.888	2538	
J268-21	Jason II	1710	42007	J2-268	9	51.183	-104	16.808	2539	
J268-22	Jason II	1739	42007	J2-268	9	51.202	-104	16.681	2539	
J268-23	Jason II	1809	42007	J2-268	9	51.214	-104	16.532	2554	
J268-24	Jason II	1834	42007	J2-268	9	51.223	-104	16.417	2558	
J268-25	Jason II	1849	42007	J2-268	9	51.220	-104	16.442	2558	

Appendix G. Biological Sampling Sites and Descriptions

Bio Sample #	Type of organism	Date/Time Collected (GMT)	Date/Time Surfaced (GMT)	Date/Time Processed (GMT)	Virtual Van Log #	Lat Coord	Lon Coord	Depth
BIO-1	Vent clam (Calyptogena)	4/9/07 2010	4/10I/07 1100	4/10/07 1230	13639	9 8.41	104 12.39	2580
BIO-2	Vent clam (Calyptogena)	4/9/07 2010	4/10/07 1100	4/10/07 1230	13639	9 8.41	104 12.39	2580
BIO-3	Alvinellid worm	4/9/07 1219	4/10/07 1100	4/10/07 1230	12676	9 8.42	104 12.388	2574
BIO-4	Dead sponge	4/10/07 0006	4/10/07 1100	4/10/07 1500	14390	9 7.686	104 12.608	2603
BIO-5	Tube worm	4/10/07 0006	4/10/07 1100	4/10/07 1500	14390	9 7.686	104 12.608	2603
BIO-6	Brittle star	4/7/07 0909		4/7/07	5280	9 7.233	104 13.843	2757
BIO-7	Tube worm	4/9/07 0044		4/9/07	11280	9 8.574	104 12.399	2581
BIO-8	Brittle star	4/8/07 2317		4/9/07	11041	9 8.709	104 12.422	2586
BIO-9	Anemone	4/9/07 0044		4/9/07	11280	9 8.574	104 12.399	2581
BIO-10	Sponge (?)	4/9/07 0044		4/9/07	11280	9 8.574	104 12.399	2581
BIO-11	Hydroid (?)	4/7/07 0804		4/7/07	5070	9 7.126	104 14.097	2706
BIO-12	Tevnia worm	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-13	Anemone	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-14	Branchipolynoe worm	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-15	Brachyuran crab	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-16	Tevnia worm (7 ind)	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-17	Tevnia worm (6 ind)	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-18	Riftia worm (animal and tube)	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-19	Riftia worm (animal and tube)	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-20	Sponge	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-21	Riftia tube	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO-22	Riftia tube	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M1	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M3	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M4	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M5	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M6	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
M21	Bathymodiolus Mussel	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO 23	Limpets	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74
BIO 24	Limpets	4/9/07 0930	4/11/07 0600	4/11/07 0700	13553	9 8.417	104 12.390	2579.74

***Continued on following page**

Bio Sample #	Photos?	Weight	Length	Width	Height	Samples Taken	Processing Method	Comments
BIO-1	Y -Dan's camera	1.1 kg	22.5 cm	9.45 cm		piece of foot. 2 pieces of gill	Frozen dry	(Jason sample #80). Weighed after cutting (fluid/blood loss)
BIO-2	Y -Dan's camera	2.2 kg	28.5 cm	11.69 cm	8.15 cm	piece of foot. Piece of gill	Frozen dry	(Jason sample #80)
BIO-3	Y -Dan's camera		8.43 cm	1.63 cm			Frozen dry	
BIO-4	N		3.95 cm	2.7 cm	.94 cm		Frozen dry	On rock 041007-0006
BIO-5	Y-Ian's camera						Pulled out. Frozen dry	On rock 040907-2023
BIO-6	N						Frozen dry	On rock 040707-0909
BIO-7	N						Frozen dry	On rock 040907-0044. Sample #69
BIO-8	N						Frozen dry	On rock 040807-2318. Sample #66
BIO-9	N						Frozen dry	On rock 040907-0044. Sample #69
BIO-10	N						Frozen dry	
BIO-11	Y-Ian's camera						Frozen dry	On rock 040707-0804
BIO-12			33 cm	1.5 cm			Frozen dry	
BIO-13							Frozen dry	
BIO-14							Frozen dry	
BIO-15							Frozen dry	
BIO-16	Y-Dan's camera						Frozen dry	7 indivuals in 1 bag
BIO-17	Y-Dan's camera						Frozen dry	6 individuals in 1 bag
BIO-18							Frozen dry	Worm and tube bagged separately, both labeled BIO-18
BIO-19							Cold plated	
BIO-20							Frozen dry	
BIO-21							Frozen dry	
BIO-22							Frozen dry	
M1							Frozen dry	Butterflied open, frozen
M3							Frozen dry	Butterflied open, frozen
M4							Frozen dry	Butterflied open, frozen
M5							Frozen dry	Butterflied open, frozen
M6							Frozen dry	Butterflied open, frozen
M21							Frozen dry	Butterflied open, frozen
BIO 23							99% ethanol	Many grouped into a vial
BIO 24							99% ethanol	Many grouped into a vial

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	K SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
040507-2239	Jason II	2239	4/5/07	J2-264	CLW	9	9.510675	-104	11.168881	2783	small wedge	y	(unknown?)		basalt	.75kg	wedge	8
040507-2302	Jason II	2302	4/5/07	J2-264	JRL	9	9.495775	-104	11.233404	2792	9oN EPR	y	PL		basalt	<.5kg	rind	14
040507-2329	Jason II	2329	4/6/07	J2-264	FM	9	9.482587	-104	11.292504	2783	9oN EPR	y	PL - bud		basalt	0.4kg		3
040607-0006	Jason II	0000	4/6/07	J2-264	JRL	9	9.456668	-104	11.393394	2743	9oN EPR	y	LF		basalt	4kg	and lobey	19
040607-0025	Jason II	0000	4/6/07	J2-264	JRL	9	9.434465	-104	11.459890	2705	9oN EPR	y	other - pillar		basalt	<1kg	round	10
040607-0054	Jason II	0000	4/5/07	J2-264	JO	9	9.419680	-104	11.561209	2641	9oN EPR	y	PL		basalt	6.5kg	pillow toe	9
040607-0120	Jason II	0120	4/6/07	J2-264	JO	9	9.407580	-104	11.623546		9oN EPR	y	LF			1kg	tube	6
040607-0408	Jason II	0408	4/6/07	J2-264	FM	9	9.768061	-104	12.001804	2595	9oN EPR	y	SF		basalt	1kg	square slab	5
040607-0546	Jason II	0546	4/6/07	J2-264	JO	9	9.848340	-104	12.321820	2571	9oN EPR	y	LF			2kg	clump	
040607-0602	Jason II	0602	4/6/07	J2-264	JRL	9	9.861318	-104	12.364814	2585	9oN EPR	y	LF		basalt			32.5
040607-0829	Jason II	0829	4/6/07	J2-264	CLW	9	9.837937	-104	12.646026	2577	W traverse	y	SF		basalt	0.9kg	ropy glass	9
040607-0848	Jason II	0848	4/6/07	J2-264	CLW	9	9.745203	-104	12.606707	2580	W traverse	y	broken up		basalt	1.2kg	broken-up	10
040607-0902	Jason II	0902	4/6/07	J2-264	FM	9	9.686753	-104	12.582451	2583	9oN EPR	y	PL		basalt	0.7kg	slab	5
040607-0922	Jason II	0922	4/6/07	J2-264	JO	9	9.597540	-104	12.548459	2582	9oN EPR	y	LF			5kg	turtle shell	6
040607-1009	Jason II	1009	4/6/07	J2-264	Carmicha	9	9.504762	-104	12.484292	2567	9oN EPR	y	PL		basalt	8kg	oblong	11in
040607-1040	Jason II	1040	4/6/07	J2-264	SKC	9	9.491191	-104	12.513877	2567	9oN EPR	y	PL		basalt	1.5kg	bud,	31
040607-1112	Jason II	1112	4/6/07	J2-264	Laliberte	9	9.426855	-104	12.487501	2554	crust	y	SF	cusps	basalt	<.5kg	flat	16
040607-1135	Jason II	1135	4/6/07	J2-264	SKC	9	9.364153	-104	12.446695	2551	9oN EPR	y	PL		basalt	1kg	claw-like	17
040607-1303	Jason II	1303	4/6/07	J2-264	Mansfiel	9	9.385528	-104	12.533788	2573	9oN EPR	y	PL (?)		basalt	1.5kg	bulbous	10
040607-1327	Jason II	1327	4/6/07	J2-264	JRL	9	9.346009	-104	12.589888	2539	9oN EPR	y	SF (?)		basalt	3kg		18.5
040707-0413	Jason II	0413	4/7/07	J2-265	IR	9	6.357985	-104	14.361997	2783	limb of OSC	y	pillow bud		pillow	.5kg	rounded	8
040707-0520	Jason II	0520	4/7/07	J2-265	IR	9	6.625784	-104	14.327485	2687	9oN EPR	y	PL		basalt	1kg	toe	7
040707-0604	Jason II	0604	4/7/07	J2-265	JO	9	6.748644	-104	14.310665	2684	9oN EPR	y	LF	drips	basalt	5.5kg	crust	10
040707-0617	Jason II	0617	4/7/07	J2-265	CLW	9	6.776237	-104	14.295052	2681	crust	y	hackley flow		basalt	1.2kg	flow crust	16
040707-0631	Jason II	0631	4/7/07	J2-265	CLW	9	6.827158	-104	14.307981	2688	contact of	y	LF		basalt	3kg	block	15
040707-0646	Jason II	0646	4/7/07	J2-265	IR	9	6.889924	-104	14.337836	2680	limb of OSC	y	LF		surface of	1kg	rounded	9
040707-0654	Jason II	0654	4/7/07	J2-265	JO	9	6.926977	-104	14.349756	2680	9oN EPR	y	SF		glass	1.5kg	flat	6
040707-0743	Jason II	0743	4/7/07	J2-265	JO	9	7.078318	-104	14.191559	2688	9oN EPR	y	LF		basalt	1kg	toe	2
040707-0804	Jason II	0804	4/7/07	J2-265	JO	9	7.126571	-104	14.102674	2704	9oN EPR	y	LF		basalt	1.5kg	bud	6
040707-0826	Jason II	0826	4/7/07	J2-265	CLW	9	7.171059	-104	14.006510	2703	on flank of	y	PL		basalt	2.5kg	bulbous	13
040707-0858	Jason II	0858	4/7/07	J2-265	JO	9	7.220366	-104	13.875181	2756	9oN EPR	y	PL		basalt	1kg	spherical	5
040707-0909	Jason II	0909	4/7/07	J2-265	JRL	9	7.232988	-104	13.841080	2757	9oN EPR	y	LF		basalt	5kg	ginger root	25
040707-0953	Jason II	0953	4/7/07	J2-265	IR	9	7.414609	-104	13.868230	2742	9oN EPR	y	LF		basalt	3.5kg	lobate toe	8
040707-1042	Jason II	1042	4/7/07	J2-265	CLW	9	7.676459	-104	13.976377	2694	9oN EPR	y	PL, bud		basalt	2.3kg	canine	25
040707-1120	Jason II	1120	4/7/07	J2-265	IR	9	7.830754	-104	14.028449	2689	limb of OSC	y	SF		sheet -	7kg	rectangular	24
040707-1231	Jason II	1231	4/7/07	J2-265	JRL	9	7.854862	-104	14.130293	2737	9oN EPR	y	LF?		basalt	4.2kg	broken	13
040707-1324	Jason II	1324	4/7/07	J2-265	JO	9	7.982612	-104	14.210595	2744	9oN EPR	y	PL		basalt	35kg	pillow toe	12
040707-1443	Jason II	1443	4/7/07	J2-265	CLW	9	8.170909	-104	14.072846	2701	9oN EPR	y	PL		basalt	1.25kg	pillow bud	13
040707-1628	Jason II	1628	4/7/07	J2-265	JO	9	8.405660	-104	14.096395	2724	9oN EPR	y	PL		basalt	5.5kg	toe	12
040707-1718	Jason II	1718	4/7/07	J2-265	IR	9	8.520924	-104	14.120650	2700	limb of OSC	y	PL		pillow	3kg	and broken	12
040707-1815	Jason II	1815	4/7/07	J2-265	CLW	9	8.615941	-104	14.328722	2710	9oN EPR	y	PL, bud		basalt	2.5kg	broken arm	15
040707-1924	Jason II	1924	4/7/07	J2-265	JO	9	8.652974	-104	14.103651	2716	9oN EPR	y	PL		basalt	6kg	pillow bud	12

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
040507-2239	8	6	None	x	A	crystal clots	F	1	2mm									0	
040507-2302	8	2	None	x	SP		F	<1	1mm									0	
040507-2329	2	5	R 2mm	VP	SP	plagioclase		1	1mm	1	<1mm					0		1	w/ brown
040607-0006	11	10	R <1mm	PD	A	none	F												
040607-0025	10	12.5	R 2mm	VP	A		F	<1	1mm	<1	2mm								
040607-0054	6	5	R 3mm	PD	A	none	F	1								0		1	<1mm
040607-0120	2.5	3	R 10mm	F	Ph	none	F	percent								0		0	
040607-0408	10	15	V	F	A	crystal clots		<1	<1mm	<1	<1mm					0		<1	filled w/
040607-0546			R 20mm	F	A	none	F									0		0	
040607-0602	15	11	R 5mm	PD	A	none													
040607-0829	7	5	R 10mm	F	SP	plagioclase	F	<1	1	<1	2					1	unfilled	1-2%	unfilled
040607-0848	6	5	GG	F	A					unspecifie						1	unfilled		
040607-0902	20	2	None	x	SP	mostly olivine	F	2	3mm									3-5%	unfilled
040607-0922	6	5	8mm	F	A	none	F									0		0	
040607-1009	6in	5in	R 5-10mm	F	SP	none	F	1	2mm							0		0	
040607-1040	10	8	R 5-10mm	F	SP	and plag (very	F	<1	<1mm	<1	<1mm					0		<1	unfilled
040607-1112	19	6	R 5mm	F	A		F												
040607-1135	8	7	R 5mm	F	A		F			3	<1mm					1	unfilled	1	<1mm
040607-1303	10	10	5mm	patina where	SP		F	<1	1mm	1	3mm					0		1-2%	<1mm
040607-1327	9.5	8.5	R 25mm	surface glass	SP		F	1	1mm	<1	1					0		0	
040707-0413	7	5	R 0.3mm	F	SP	cpx clots?				<0.1		1-2%				0		0	
040707-0520	3	3	R 6mm	F	A	none	F			<1	<.1mm					0		1-2%	1
040707-0604	6	3	None	palagonite	SP	glomerophyric	F			2								2	unfilled
040707-0617	12	7	R 3+mm	surface	A											0		0	
040707-0631	14	7	R 1-5mm	VP	A			<1	<.5mm							5	unfilled		
040707-0646	8	5	R 0.4mm	F	crystals in		F			unspecifie	<0.5mm					<1		<1	
040707-0654	4	3	R	F	SP	small gabbro	F									0		1	unfilled
040707-0743	2.5	3.5	R 10mm	PD	A	none	F	1	5mm	1	5mm					0		1	1mm
040707-0804	4	3	R 10+mm	PD	SP	none	F	1	3mm	1	3mm					0		<1	unfilled
040707-0826	11	11	R 2-3mm	F	SP		F	2	1mm	?		?						1	<1mm
040707-0858	3	2	R*	F	A	none	F			<1	<0.1mm			,	sulfide?	0		0	
040707-0909	10	10	R 4mm	F	SP	look	F	<1	<1mm	<1	<1mm					0		2	.5-1mm
040707-0953	3	4	R 6mm	F	A	none	F			1	3mm					0		0	
040707-1042	8	7	R ~4mm	surface	SP		M	<1	3mm	<1	3mm					0			
040707-1120	12	8	R 0.5mm	PD	SP		F	1	2mm	1	1mm							1	unfilled
040707-1231	11.5	10	R 1-4mm	F	SP	xenoliths - lots	F			2-3%						0		center	
040707-1324	7	8	R 8mm	F	SP	sized gabbro?										0		1	unfilled
040707-1443	9	7	R 10mm	dulled	SP		F	1	<1mm	1	<1mm					0		1	unfilled
040707-1628	5	5	V 8mm	PD	SP	xenoliths	F									0		0	
040707-1718	12	8	R 0.1mm	PD	SP	gabbro? Clots	F			1	<1mm					<1	unfilled	<1	unfilled
040707-1815	11	10	R 5mm	F	SP	Xenoliths	F	1	<1mm	1	<1mm					0		<1	unfilled
040707-1924	4	4	V*	F	SP	crystal clots	F	<1	<1mm	<1	<1mm					0		1	unfilled

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
040507-2239	OX, MC <1mm	none	X				x	x	x		
040507-2302	EA, MC <.5mm	none	X				x	x	x		thickness
040507-2329	OX, MC <0.1	(amygdaloid	X	x	X		x	samp	x		
040607-0006	OX, MC <1mm	none	X	X	X		x	x	x		
040607-0025	EA, MC <.5mm	none	X	X	X	X	x	x	x		collapsed
040607-0054	MC 1-2mm			X	X	X	x	x	x		
040607-0120	OX, MC <.5mm		X	X	X	X	x	x	x		
040607-0408	<.5mm	(amygdaloid	X	X	X		x	x	x		
040607-0546	VF		X	X	X		x		x		
040607-0602	OX, MC <.5mm		X	X	X	X	x	x	x		
040607-0829	VF	none	X	X	X	X	x	x	x		
040607-0848	OX, MC .1mm		X	x	X	X	x	x	x		quality: F,
040607-0902	OX	none	X				x	x	x		mal
040607-0922	VF	none	X	X	X	X	x	x	x		
040607-1009	OX in cracks	none	X	X	X	X	x	x	x		
040607-1040	VF	none	X	x	X	X	x	x	x		
040607-1112	OX, MC 1mm		X	X	X	X	x	x	x		
040607-1135	VF	none	X	X	X	X	x	x	x		
040607-1303	VF	none	X	X	X	X	x	x	x		
040607-1327	EA	none	X	X	X	X	x	x	x		from
040707-0413	VF		X	x	X		x	x	x		
040707-0520	OX		X	X	X	X	x	x	x	1	
040707-0604	MC 8MM, OX		X	x	X		x	x	x		
040707-0617	surface w/ slight		X	X	X	X	x	x	x		
040707-0631	0.5mm(?)		X	X	X		x	x	x		glass, but
040707-0646	slight patina		X	x	X	X	x	x	x		no leftover
040707-0654	no hs*			X	X	X	x - 2	x	x		
040707-0743	VF		X	x	X	X	x	x			
040707-0804	alteration		X	X	X	X	x	x	x		
040707-0826	VF	none	X	X	X	X	x	x	x	1	
040707-0858	VF		X	X	X		x	x	x		
040707-0909	OX, MC 6-8mm		X	X	X	X	x	x	x		
040707-0953	VF		X	X	X	X	x	x	x		
040707-1042	<.25mm			x	X	X	x	x	x	1	
040707-1120	OX	none	X	X	X	X	x	x	x		lined pipe
040707-1231	surface glass	none	X	X	X		x	x	x		
040707-1324	(biological?)		X	x	X		x	x	x		
040707-1443	VF	none	X	X	X	X	x	x	x	noted	dulled
040707-1628	OX		X	X	X		x	x	x		
040707-1718	fracture surfaces		X - 2	X	X		x	x	x		
040707-1815	VF, slight MC		X	X	X	X	x	x	x	1	quality:
040707-1924	OX		X	X	X	X	x	x	x		

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	K SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
040707-2001	Jason II	2001	4/7/07	J2-265	JO	9	8.694961	-104	13.978930	2748	9oN EPR	y	PL		basalt	4kg	toe	8
040707-2022	Jason II	2022	4/7/07	J2-265	CLW	9	8.730673	-104	13.866964	2735	9oN EPR	y	PL	1	basalt	9.5kg	pillow	27
040807-0228	Jason II	0228	4/8/07	J2-265	CLW	9	9.098359	-104	13.836093	2721	9oN EPR	y	PL		basalt	1.25kg	covered	13
040807-0351	Jason II	0351	4/8/07	J2-265	FM	9	8.996740	-104	13.700818	2706	9oN EPR	y	SF		basalt	4kg		
040807-0451	Jason II	0451	4/8/07	J2-265	JO	9	9.003901	-104	13.656903	2713	9oN EPR	y	PL		basalt	10kg	toe	20
040807-0525	Jason II	0525	4/8/07	J2-265	CLW	9	8.999047	-104	13.653323	2717	9oN EPR	y	PL		basalt	1.2kg	block	11
040807-0602	Jason II	0602	4/8/07	J2-265	JO	9	9.004324	-104	13.560059	2711	9oN EPR	y	SF		basalt	9.5kg	massive	30
040807-0616	Jason II	0616	4/8/07	J2-265	JO	9	9.008825	-104	13.516930	2709	9oN EPR	y	SF, hackley	cusps	basalt	5.5kg	sheet	18
040807-0624	Jason II	0624	4/7/07	J2-265	FM	9	9.008032	-104	13.490619	2409	9oN EPR	y	PL bud		basalt	2kg		10
040807-0643	Jason II	0643	4/8/07	J2-265	CLW	9	9.006854	-104	13.410354	2703	9oN EPR	y	PL bud		basalt	.75kg	tooth bud	12
040807-0652	Jason II	0652	4/8/07	J2-265	JO	9	9.012709	-104	13.363093	2700	9oN EPR	y	SF		basalt	1kg	rectangle	12
040807-0704	Jason II	0704	4/8/07	J2-265	CLW	9	9.017266	-104	13.313381	2694	9oN EPR	y	PL crust		basalt	g	crust block	16
040807-0710	Jason II	0710	4/8/07	J2-265	JO	9	9.026050	-104	13.288987	2688	9oN EPR	y	PL		basalt	1.5kg	cylindrical	23
040807-0735	Jason II	0735	4/8/07	J2-265	CLW	9	9.078848	-104	13.204014	2668	9oN EPR	y	hackley flow	drips	basalt	1.5kg	two larger	12
040807-0755	Jason II	0755	4/8/07	J2-265	CLW	9	9.136946	-104	13.107824	2655	9oN EPR	y	PL				(pillow	16
040807-0807	Jason II	0807	4/8/07	J2-265	FM	9	9.158146	-104	13.066030	2649	9oN EPR	y	SF, hackley	cusps	basalt	1kg		
040807-0828	Jason II	0848	4/8/07	J2-265	JO	9	9.202732	-104	12.957241	2613	9oN EPR	y	PL		basalt	1kg	small toe	10
040807-0848	Jason II	0848	4/8/07	J2-265	FM	9	9.250346	-104	12.897955	2601	9oN EPR	y	PL		cryptocrys	1kg	prism	5
040807-0858	Jason II	0858	4/8/07	J2-265	CLW	9	9.283241	-104	12.840620	2598	9oN EPR	y	PL bud		basalt	1.3kg	shaped bud	16
040807-0907	Jason II	0907	4/8/07	J2-265	FM	9	9.302956	-104	12.808575	2586	9oN EPR	y	PL tube crust		basalt	1kg	slab	3
040807-0935	Jason II	0935	4/8/07	J2-265	JO	9	9.331565	-104	12.762340	2587	9oN EPR	y	LF	drips	basalt	4kg	cuspate	22
040807-0949	Jason II	0949	4/8/07	J2-265	FM	9	9.346518	-104	12.743539	2598	9oN EPR	y	GP (?)		basalt	4kg		10
040807-1023	Jason II	1023	4/8/07	J2-265	JO	9	9.343528	-104	12.692731	2589	9oN EPR	y	PL		basalt	16kg	toe	30
040807-1037	Jason II	1037	4/8/07	J2-265	JO	9	9.346629	-104	12.700087	2595	9oN EPR	y	SF	drips	basalt	.5kg	slab	7
040807-1043	Jason II	1043	4/8/07	J2-265	FM	9	9.344540	-104	12.698536	2593	9oN EPR	y	SF		basalt	1kg	slab	5
040807-1157	Jason II	1157	4/8/07	J2-265	JO	9	9.304438	-104	12.600868	2587	9oN EPR	y	PL		basalt	.5kg	small toe	8
040807-1228	Jason II	1228	4/8/07	J2-265	JO	9	9.304007	-104	12.507191	2573	9oN EPR	y	PL		basalt		toe	33
040807-1307	Jason II	1307	4/8/07	J2-265	FM	9	9.216478	-104	12.479963	2569	9oN EPR	y	PL bud		basalt	4kg	slab	20
040807-1307	Jason II	1307	4/8/07	J2-265	IR	9	9.216478	-104	12.479963	2569	limb of OSC	y	PL, M		pillow	7kg	rectangular	20
040807-1638	Jason II	1638	4/8/07	J2-265	IR	9	9.267109	-104	12.588847	2589	limb of OSC	y	PL	none	pillow	27kg	solid tube,	37
040807-1652	Jason II	1652	4/8/07	J2-265	IR	9	9.284350	-104	12.608929	2589	limb of OSC	y	PL		basalt	1kg	sized	10
040807-1654	Jason II	1654	4/8/07	J2-265	IR	9	9.285218	-104	12.609332	2589	limb of OSC	y	LF	cusps	basalt	2.5kg	flat plate	17
040807-1839	Jason II	1839	4/8/07	J2-265	AZ	9	9.266113	-104	12.534606	2584	graben flow	y	LF	flanges	basalt	2.3kg	y-shaped	14
040807-1848	Jason II	1848	4/8/07	J2-265	AZ	9	9.240835	-104	12.500909	2573	WP1 top of	y	PL		basalt	1.6kg	3 chunks	7.5
040807-1907	Jason II	1907	4/8/07	J2-265	AZ	9	9.194734	-104	12.476134	2569	fissure	y	LF		basalt	.8kg	irregular	9
040807-1925	Jason II	1925	4/8/07	J2-265	IR	9	9.130162	-104	12.470194	2572	limb of OSC	y	LF	cusps	basalt	(Fornari	flat slab	57
040807-2018	Jason II	2018	4/8/07	J2-265	AZ	9	9.019574	-104	12.396749	2576	pillow crust	y	PL	flanges	basalt	3.2kg	plate	23
040807-2032	Jason II	2032	4/8/07	J2-265	IR	9	9.018775	-104	12.393475	2576	limb of OSC	y	PL	none	pillow	1kg	pillow bud	10
040807-2058	Jason II	2058	4/8/07	J2-265	AZ	9	8.956468	-104	12.397378	2586	bud fragment	y	PL bud		basalt	3.9kg	off toe	21
040807-2135	Jason II	2136	4/8/07	J2-265	AZ	9	8.820134	-104	12.412506	2575	bud	y			basalt	.8kg	irregular	9
040807-2229	Jason II	2229	4/8/07	J2-265	AZ	9	8.726504	-104	12.361209	2590	9oN EPR	y			basalt	2.7kg	(x2)	12.5
040807-2257	Jason II	2257	4/8/07	J2-265	IR	9	8.717822	-104	12.389428	2591	limb of OSC	y	LF?, other		basalt	4kg	fragments	

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
040707-2001	5	4	R 6mm	F	A	none	F	<1	<.5mm	<1	<.5mm					1	unfilled	1	unfilled
040707-2022	25	12	R 2mm	palagonite	POR	and less		maybe		~10						0		0	
040807-0228	9	7	GG	PD	SP		F			3 in glass	<1mm					0			
040807-0351			R 3mm	VP	SP		F	1	2mm	1	2mm					0		~10	.5-1mm
040807-0451	22	16	None	palagonite	A		F											0	
040807-0525	8	7	V	palagonite	SP (barely)	crystal clots	F	<1	.5mm	<1	.5mm					0		0	
040807-0602	18	12	None	palagonite	SP		F											0	
040807-0616	12	10	V	palagonite	SP		F	1	1mm	2	4mm					0		2	unfilled
040807-0624	10	20	R 3mm	F	SP	y	F	3	3mm	<1	<1mm					0		2	unfilled
040807-0643	6	5	R 5mm	outermost	PH		F	2	3mm	3	3mm					0		1	unfilled
040807-0652	8	5	R 3mm	F	A		F	2-3%	<1mm	1-2%	<1mm					0		5	<.1mm, a
040807-0704	14	7	side, R (1-	palagonite	PH		F	2	3mm	3	3mm	1	2mm	0.1	2mm	0		3-5%	unfilled
040807-0710	6	4	R 3mm	F	PH	olivine	F	<1	2mm		6mm					0		<1	0.2mm
040807-0735	10	7	10mm	PD	SP		F	1	2mm	5	3mm					2	2mm	2	2mm
040807-0755	14	7	R 5mm	F	borderline	xenoliths	F	2	10mm	1	3mm					0		0	
040807-0807			R 10mm	F	SP	~2%rock,	F	2	2mm	2	2mm					0		2	unfilled
040807-0828	7	6	R 6mm	PD	SP		F	1	2mm	<1	1mm							1	unfilled
040807-0848	10	15	(cryptocryst	devitrified	A													2	mostly
040807-0858	7	6	R 10mm	F	A											0		0	
040807-0907	10	15	GG	F	see comment	see comment	comme	comme								com			
040807-0935	12	12	R 3mm	PD	A		F	<1	<1mm	<1	<1mm					0		1	unfilled
040807-0949	15	25	2% whole	F	A	y				whole	<.5mm					0			
040807-1023	20	20	R 5mm	PD	SP		F	<1	1mm	<1	1.5mm					0		0	
040807-1037	7	4	R 7mm	patina	SP	glomerocrysts	F	<1		<1						0		1	unfilled
040807-1043	4	25	R 8mm	F	PH		F	4%	2mm	2	2mm					0		0	
040807-1157	8	4	V	VP	SP		F			3	2mm							1	unfilled
040807-1228	14	14	R 4mm	F	A		F									<1		1	
040807-1307	10	30	R 5mm	F	PH	section slabs	F	2	1mm	4	1mm					1	1mm	3	unfilled
040807-1307	8	8	V	F	SP			1		1						0		2	unfilled
040807-1638	17	17	R 12mm	F	A	none	F			rare	m					rare	m	v.rare	unfilled
040807-1652	8	7	R 5mm	F	SP	no	F	2	1mm	2	1.5mm					0			
040807-1654	15	3	V, <.1mm	F	phen)		F	<1	1mm	1-2%	1mm					0			
040807-1839	17	10	R 11mm	PD	SP		F			2	<1mm					0		0	
040807-1848	8	5	R 25mm	F	SP		F	<1	1.5mm	<1	.5mm					0		0	
040807-1907	8	9	R 17mm	F	SP		F			3	1mm					0		3	unfilled
040807-1925	34	9	R 15mm	F	SP ~1%		F			crystals						<1	round	2	round
040807-2018	16	9	R 17mm	PD	essentially A		F			<1	<.5mm					0		0	
040807-2032	12	7	R 20mm	F	SP	crystal clots	F	1	1.5mm	2	.5mm					0		0	
040807-2058	14	10	R 5mm	PD	A		F			<.5	<.5mm					0		20	1mm
040807-2135	8.5	9.5	R 6mm	F	A		F			0.1	.5mm					0		80	unfilled
040807-2229	7.5	7	R 4.5mm	PD	SP		F	<1	1mm	<1	2mm					0		0	
040807-2257			R 10mm	F	A	oliv and plag	F									1	<.1	5	round and

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
040707-2001	VF		X	x	X	X	x	x	x	1	
040707-2022	EA, MC 1-2mm	clay	X	X	X		x	x	x		: R hard to
040807-0228	OX, MC 1-2mm		X	X	X	X	x	x	x		glass has
040807-0351	OX, MC .5mm	none	X	X	X		x	x	x		covered w/
040807-0451	EA, MC 3mm			X	X		x	x	x		
040807-0525	EA, MC 1mm	clay	X	x	X		x	x	x		clay and
040807-0602	EA, MC 2mm		X	x	X		x	x	x		
040807-0616	EA, MC 4mm		X	X	X	X	x	x	x		
040807-0624	VF		X	X	X	X	x	x	x		
040807-0643	surface glass			x	X	X	x	x	x		
040807-0652	VF		X	X	X	X	x	x	x		
040807-0704	<0.1mm		X	X	X	X	x	x	x		section ID -
040807-0710	VF		X	x	X	X	x	x	x		
040807-0735	<1mm		X	X	X	X	x	x	x		
040807-0755	glass is dull,		X	X	X	X	x	x	x	1	and pretty
040807-0807	OX, MC 0mm		X	x	X		x	x	x		
040807-0828	VF		X	X	X	X	x	x	x		
040807-0848	OX	none	X	X	X		x	x	x		gray in
040807-0858	glass on surface;		X-2	x	X	X	x	x	x		
040807-0907	EA, MC 2mm			x	X	X					covered in
040807-0935	OX		X	X	X	X	x	x	x		
040807-0949	VF, MC 0.1mm		X	X	X	X	x	x	x		
040807-1023	OX		X	X	X	X	x	x	x	1	
040807-1037	VF		X	X	X		x	x	x		
040807-1043	OX		X	X	X		x	x	x		
040807-1157	EA	none	X	X	X	X	x	x	x		
040807-1228	VF		X	x	X	X	x	x	x		
040807-1307	OX	none	X	X	X	X	x	x	x		same rock
040807-1307	fracture surface		X	enou	X		x	x	x		same rock
040807-1638	VF		X	x	X	X	x	x	x		
040807-1652	VF			X	X	X	x	x	x		
040807-1654	OX		X	X	X	X	x	x	x		
040807-1839	VF, MC 2mm		X	X	X	X	x	x	x		
040807-1848	VF		X	X	X	X	x	x	x		
040807-1907	OX		X	X	X		x	x	x		
040807-1925	VF		X	x	X	X	x	x	x		
040807-2018	EA, MC 2mm		X	X	X	X	x	x	x		
040807-2032	VF		X	X	X	X	x	x	x	1	twice
040807-2058	OX		X	x	X	X	x	x	x	1	
040807-2135	OX		X	X	X		x	x	x		
040807-2229	OX		X	X	X	X	x	x	x		
040807-2257	OX	none	X	X	X		x	x	unexp		

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
040807-2317	Jason II	2317	4/8/07	J2-265	IR	9	8.715586	-104	12.431288	2586	limb of OSC	y	LF or SF	none	basalt	(large	flat plate	34
040807-2346	Jason II	2346	4/8/07	J2-265	IR	9	8.672446	-104	12.435452	2576	limb of OSC	y	PL		basalt	1.5kg	plate	14
040907-0022	Jason II	0000	4/9/07	J2-265	IR	9	8.600536	-104	12.418133	2578	limb of OSC	y	SF, folded	none	basalt	7.5kg	flat slab	23
040907-0044	Jason II	0000	4/9/07	J2-265	IR	9	8.570533	-104	12.401855	2581	limb of OSC	y	LF		crust	8kg	rounded	21
040907-1237	Jason II	1237	4/9/07	J2-265	IR	9	8.418962	-104	12.387085	2574	axis at east	y	LF		basalt	5kg	crust	16
040907-1804	Jason II	1804	4/9/07	J2-265	FM	9	8.394509	-104	12.665244	2567	OSC	y	PL bud		basaltic	3kg	slab	10
040907-1814	Jason II	1814	4/9/07	J2-265	FM	9	8.404634	-104	12.648496	2562	OSC	y	PL crust		basalt	1kg		5
040907-1838	Jason II	1838	4/9/07	J2-265	FM	9	8.412521	-104	12.546010	2587	OSC	y	LF crust	drips	basalt	10kg	thick slab	20
040907-1843	Jason II	1843	4/9/07	J2-265	LG/IR	9	8.414039	-104	12.523363	2597	limb of OSC	y	SF		basalt	2.5kg	tube	19
040907-1859	Jason II	1859	4/9/07	J2-265	AZ	9	8.417123	-104	12.440854	2597	pillow bud	y	PL		basalt	.7kg	2 oblong	10
040907-2023	Jason II	2023	4/9/07	J2-265	JRL	9	8.355000	-104	12.381127	2578	OSC	y	SF	none	basalt	10kg	large and	29
040907-2033	Jason II	2033	4/9/07	J2-265	IR	9	8.305323	-104	12.381042	2583	limb of OSC	y	PL bud		basalt	26kg	tube	34
040907-2051	Jason II	2051	4/9/07	J2-265	FM	9	8.205266	-104	12.380213	2590		y	SF		basalt	1.5kg	slab	5
040907-2112	Jason II	2112	4/9/07	J2-265	FM	9	8.147446	-104	12.372604	2590	OSC	y	PL bud		basalt	0.3kg	bud	3
040907-2130	Jason II	2130	4/9/07	J2-265	Goehring	9	8.075460	-104	12.356428	2583	limb of OSC	y	SF - ropy?	cusps	andesite?	.25kg	small slab	10
040907-2157	Jason II	2157	4/9/07	J2-265	AZ	9	7.949287	-104	12.369683	2598	pillow bud	y	PL		basalt	3.6kg	broken-off	15
040907-2225	Jason II	2225	4/9/07	J2-265	AZ	9	7.866842	-104	12.412552	2593	collapse	y	LF	drips		5kg	triange	21
040907-2245	Jason II	2245	4/9/07	J2-265	IR	9	7.819619	-104	12.448063	2529	limb of OSC	y	SF, folded		basalt	17kg	fold	33
040907-2314	Jason II	2314	4/9/07	J2-265	IR	9	7.699386	-104	12.502666	2589	limb of OSC	y	PL crust		andesite?	0.5kg	rectangular	8
040907-2358	Jason II	2358	4/9/07	J2-265	IR	9	7.694899	-104	12.648469	2601	limb of OSC	y	PL	none	andesite	7.5kg	block	18
041007-0006	Jason II	0000	4/10/07	J2-265	AZ	9	7.694905	-104	12.616727	2603	hackly crust	y	SF		basalt	1.1kg	cauliflower	10
041007-0036	Jason II	0000	4/10/07	J2-265	AZ	9	7.646718	-104	12.490606	2597	folded-over	y	SF		basalt	2.2kg	irregular	16
041007-0055	Jason II	0000	4/10/07	J2-265	LG	9	7.608275	-104	12.411467	2600	limb of OSC	y	SF		this	3.75kg	wedge	18
041007-0101	Jason II	0101	4/10/07	J2-265	AZ	9	7.580314	-104	12.383014	2600	pillow bud	y	PL		basalt	.9kg	toe	14
041007-0124	Jason II	0124	4/10/07	J2-265	FM	9	7.507252	-104	12.307049	2590	OSC	y	PL bud	none	basalt	0.5kg	bud	3
041007-0147	Jason II	0147	4/10/07	J2-265	IR	9	7.419451	-104	12.295255	2565	limb of OSC	y	LF crust		andesite?	11kg	and	23
041007-0213	Jason II	0213	4/10/07	J2-265	IR	9	7.304362	-104	12.312389	2567	limb of OSC	y	PL		andesite	3.5kg	small	
041007-0337	Jason II	0000	4/10/07	J2-265	AZ	9	7.055810	-104	12.080602	2591	sheet flow	y	SF		basalt	.5kg	chunky	12
041007-0350	Jason II	0000	4/10/07	J2-265	FM	9	7.018526	-104	12.032705	2588		y	bud		(probably)	2kg	prism	5
041007-0425	Jason II	0000	4/10/07	J2-265	IR	9	6.948769	-104	11.909198	2528	limb of OSC	y	PL crust		andesite?	5kg	block	17
041007-0459	Jason II	0459	4/10/07	J2-265	JO	9	6.945093	-104	11.855530	2528	OSC	y	PL		andesite?	2.5kg	triangular	18
041007-0611	Jason II	0611	4/10/07	J2-265	IR	9	6.771157	-104	12.136839	2593	limb of OSC	y	PL bud		basalt	13kg	tubular bud	21
041007-0635	Jason II	0635	4/10/07	J2-265	AZ	9	6.731876	-104	12.102802	2594	OSC	y	LF		basalt	6.5kg	keystone	19
041007-0640	Jason II	0640	4/10/07	J2-265	AZ	9	6.712861	-104	12.090443	2589	hole in the	y	SF	flanges	basalt	6.5kg	chunk	23
041007-0733	Jason II	0000	4/10/07	J2-265	AZ	9	6.664516	-104	12.198175	2592	ridge --	y	PL		basalt	.4kg	irregular	7
041007-1304	Jason II	1304	4/10/07	J2-265	AZ	9	6.565268	-104	12.211478	2591	OSC	y			basalt	0.4	2 plates	9
041007-1424	Jason II	2624	4/10/07	J2-265	IR	9	6.270473	-104	12.372490	2624	limb of OSC	y	LF?		andesite?	5	block	23
041007-1459	Jason II	1459	4/10/07	J2-265	IR	9	6.124634	-104	12.329989	2600	limb of OSC	y	PL crust	flanges	basalt	3	2 pieces	19
041007-1618	Jason II	1618	4/10/07	J2-265	IR	9	6.015367	-104	12.160902	2598	limb of OSC	y	PL	none	fine mm-	2	reef block	12
041007-1632	Jason II	1632	4/10/07	J2-265	IR	9	6.025163	-104	12.149803	2597	limb of OSC	y	PL toe		basalt	2	toe	16
041007-1735	Jason II	1735	4/10/07	J2-265	IR	9	5.851282	-104	12.082139	2583	limb of OSC	y	PL, toe		basalt	1.5	toe	13
041007-1751	Jason II	1751	4/10/07	J2-265	AZ	9	5.849765	-104	12.080973	2584	edge flow	y	PL		basalt	16	many	26

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
040807-2317	24	10	R 10mm	F	A to SP	none	F	<.5	2mm	~1	<.5mm					<1	unfilled,	2-3%	unfilled,
040807-2346	10	5	R 1mm	F	A		F	1		2						1-2%		2-3%	
040907-0022	21	8	R 15mm	F	SP		F			3	<1mm					1	round	5	round and
040907-0044	16	12	R 10mm	F	SP					2						1-2%	round	2-5%	glass-filled
040907-1237	14	9	R 10mm	F	A		F			<1	<1mm					<0.1	round	1	10mm,
040907-1804	20	25	GG	F	A		glass											10	unfilled,
040907-1814	10	15	GG	F, PD	A		grains;									5	1-3mm		
040907-1838	20	30	R 5-8mm	F	SP		F	1		2	3mm					0		0	
040907-1843	12	13	R 5-15mm	F	accumulate		F			5	<0.2mm					<1		<1	donut hole,
040907-1859	5	4.5	R 8mm	F	SP		F	1	2mm	<1	.5mm					0		0	
040907-2023	17	23	None	x	A	none	F			1-2%	2mm							15	unfilled
040907-2033	13	13	R 10mm	F	SP	xenoliths	F	1.5	1mm	1.5	1mm					<1	round	<1	round,
040907-2051	10	15	R 15mm	F	SP		F	0.1	1mm	1	1mm					2	.5-1mm	3	unfilled
040907-2112	5	10	R 10mm	F	SP	olivine	F	1	.5mm	1	1mm					0		5	unfilled
040907-2130	7	3	R 10mm	F	A		F	<1	1mm							<1		<5	unfilled
040907-2157	15	13	R 5mm	F	A		F			1	1mm					0		5	1mm
040907-2225	16	9.5	R 3mm	VP	A			1	<1mm	1	<1mm					0		10	.1mm
040907-2245	18	10	R 7mm	F	SP ~1%	none	F			<1	.2mm					0		0	
040907-2314	4	5	R 10mm	F	A		F							rystalli		1	rounded	5	flattened,
040907-2358	12	11	R 30mm	F	A		cryptocr									1	rounded,	5	up to
041007-0006	12.5	9	basically	F	A		F			0.5	<1mm					5	2mm	0	
041007-0036	11	10	R 10mm	F	A		F	1	1mm	1	1mm					0		0	
041007-0055	15	6	R 5-10mm	F	A		F												
041007-0101	9	7	R 8mm	F	A		F			1	1mm					0		0	
041007-0124	5	10	R 2mm	F	A, SP		F	1	0.5mm	1	0.5mm					0		5	unfilled
041007-0147	13	13	R 5mm	F	A	ne banded	cryptocr			2	1mm					1	unfilled	1	unfilled
041007-0213			R 10mm	F	A	spherulite in	cryptocr									<1	round,	<1	round,
041007-0337	6	5	R 2mm	PD	PH	plag xenoliths		<5	1.5	10	1mm					0		2	unfilled
041007-0350	10	20	R 1-2mm	VP	PH		F	2	2mm	5	2mm					0		3-5%	some
041007-0425	9	10	GG	F	A		cryptocr									1	and	5	to
041007-0459	11	8	R	palagonite	SP		F									5	1mm	5	unfilled
041007-0611	12	12	R 5mm	F	A		F			1	1mm					0		1	round,
041007-0635	12	15	V	PD	PH		F	0.1	3mm	7	1mm					0			
041007-0640	14	16	R 8mm	F	A		F			1	1mm					0		0	
041007-0733	6	5.5	R 6mm	F	A		F									0		5	1mm
041007-1304	6.5	2.5	GG	F, PD	SP	xenoliths		1	2mm	2	2mm					0			
041007-1424	12	8	top, 20mm	F	SP		F			1						0		1	round and
041007-1459	12	9	R 10 mm	F	A		F			<0.5						<0.5	round	1	round
041007-1618	8	9	R 20mm	F	A		F									0		0	
041007-1632	12	6	R 0.4mm	F	SP ~1%	clots	F	1	2mm	<1	2mm					0		5	unfilled
041007-1735	9	7	crystalline	F	A											0		0	
041007-1751	15	17	R 5mm	F	SP	present	F	<1		<1						0		0	

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
040807-2317	F, MC 1mm		X	X	X	X	x	x	x		into 1
040807-2346	VF		X	x	X		x	x	x		
040907-0022	VF		X	X	X	X	x	x	x		
040907-0044	deposition on		X	X	X		x	x	x		
040907-1237	OX	none	X	x	X		x	x	x		
040907-1804	VF, MC 1mm		X	X	X	X	x	x	x		smells
040907-1814	OX, MC 1-5mm	none	X	X	X	X					
040907-1838	on drip surface		X	X	X	X	x	x	x		
040907-1843	VF	none	X	X	X	X	x	x	x		
040907-1859	VF		X	X	X	X	x	x	x		
040907-2023	HR 40+mm		X				x	x	x		mal
040907-2033	VF	none	X	X	X	X	x	x	x		staining on
040907-2051	MC 1(?)mm		X	X	X		x	x	x		
040907-2112	VF		X	X	X	X	x	x	x		
040907-2130	MC <1mm	none	X	X	X	X	x	x	x		
040907-2157	OX		X	X	X	X	x	x	x		
040907-2225	MC 1mm	clay	X	X	X		x - 2	x - 2	x		
040907-2245	VF	none	X	X	X	X	x	x	x	1	open 5cm
040907-2314	<0.1mm		X	X	X	X	x	x	x		coating on
040907-2358	OX, MC 0.1mm	none	X	X	X	X	x	x	x		fracture,
041007-0006	VF, MC 3mm	none	X	x	X	X	x	x	x		
041007-0036	F, OX	none	X	x	X	X	x	x	x		
041007-0055	coloration on		X	x	X	X	x	x	x		"watermar
041007-0101	VF		X	x	X	X	x	x	x		
041007-0124	VF		X	x	X	X	x	x	x		
041007-0147	staining on	none	X	x	X		x	x	x		staining on
041007-0213	VF	none	X	x	X		x	x	x		
041007-0337	OX	none	X	x	X		x	x	x		
041007-0350	OX		X		X		x	x	x		
041007-0425	OX, MC 1mm	none	X	x	X	X	x	x	x		glass
041007-0459	1mm		X				x	x	x		smell of
041007-0611	VF --> OX	none	X	x	X	X	x	x	x		
041007-0635	EA	none	X	X	X	X	x	x	x		
041007-0640	OX		X	x	X	X	x	x	x		
041007-0733	VF		X	x	x	X	x	x	x		
041007-1304	VF		X	x	X	X					smell
041007-1424	<0.5mm thin		X	x	X		x	x	x		a hackly
041007-1459	VF	none	X	x	X		x	x	x		
041007-1618	VF	none	X	x	X		x	x	x		
041007-1632	VF	none	X	x	X	X	x	x	x		concentrat
041007-1735	VF		X	x	X	X	x	x	x		samples in
041007-1751	OX		X	x	X		x	x	x	1	

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	K SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
041007-1803	Jason II	1803	4/10/07	J2-265	AZ	9	5.854303	-104	12.072571	2585	OSC	y	LF		basalt	8.0kg	oblong	26
041007-1857	Jason II	1857	4/10/07	J2-265	IR	9	5.683260	-104	12.090600	2586	limb of OSC	y	LF		basalt	0.5	small	
041007-1908	Jason II	1908	4/10/07	J2-265	IR	9	5.639902	-104	12.081247	2587	limb of OSC	y	PL crust		basaltic	1	pieces	13
041007-1925	Jason II	1925	4/10/07	J2-265	AZ	9	5.576061	-104	12.100345	2600	OSC	y	LF		basalt	7.2kg	oblong	15
041007-1939	Jason II	1939	4/10/07	J2-265	AZ	9	5.509467	-104	12.094354	2589	OSC	y			basalt	2.5kg	broken	12
041007-2014	Jason II	2014	4/10/07	J2-265	AZ	9	5.333768	-104	12.086641	2593		y	PL		basalt	0.4	block	6
041007-2018	Jason II	2018	4/10/07	J2-265	AZ	9	5.308887	-104	12.086083	2593	OSC	y	PL		basalt	1.2	oblong	12
041007-2033	Jason II	2033	4/10/07	J2-265	AZ	9	5.236435	-104	12.080930	2594	OSC	y	PL		basalt	2.8	lumpy	17.5
041007-2051	Jason II	2051	4/10/07	J2-265	IR	9	5.154547	-104	12.086814	2595	limb of OSC	y	Looks like a	flanges	basalt	0.5	irregular	8
041007-2120	Jason II	2120	4/10/07	J2-265	AZ	9	5.077524	-104	12.088732	2611	hackly flow	y	hackly flow		basalt	3.1	oblong --	21
041007-2128	Jason II	2128	4/10/07	J2-265	IR	9	5.055352	-104	12.080510	2607	limb of OSC	y	PL crust	none	basalt	0.1	2 pieces	8
041007-2142	Jason II	2142	4/10/07	J2-265	IR	9	4.981352	-104	12.070522	2609	limb of OSC	y	LF, bud		basalt	1	bud	10
041007-2247	Jason II	2247	4/10/07	J2-265	IR	9	4.732856	-104	12.004400	2616	limb of OSC	y	PL bud		andesite	2.5	round bud	13
041007-2352	Jason II	2352	4/10/07	J2-265	AZ	9	4.545434	-104	12.051037	2620	OSC	y			basalt	4.6	oblong	23
041107-0047	Jason II	0000	4/10/07	J2-265	IR	9	4.324481	-104	11.927804	2601	limb of OSC	y	PL crust	flanges	basalt	2	thin slab	18
041107-0122	Jason II	0122	4/11/07	J2-265	AZ	9	4.144502	-104	11.904099	2599	OSC	y	PL		basalt	12.3	keystone	31
041107-0215	Jason II	0215	4/10/07	J2-265	IR	9	3.994137	-104	11.914762	2601	limb of OSC	y	PL, older	none	basalt	9.5	block	23
041107-0257	Jason II	2033	4/10/07	J2-265	IR	9	3.921000	-104	11.934540	2598	limb of OSC	y	PL crust	drips,	basalt	2	flate plate	18
041107-0336	Jason II	0336	4/11/07	J2-265	AZ	9	3.728473	-104	11.979433	2613						2.4	vulcan ear	18
041107-2302	Jason II	2302	4/11/07	J2-266	JO	9	1.490591	-104	11.152681	2702	limb of OSC	y	PL bud		basalt	1	small bud	10
041107-2341	Jason II	2341	4/11/07	J2-266	JRL	9	1.563807	-104	11.255794	2678	limb of OSC	y	PL bud, older	none	basalt	0.5	reef fish	19
041207-0022	Jason II	0022	4/12/07	J2-266	IR	9	1.666651	-104	11.403816	2649	limb of OSC	y	unknown	none	basalt			
041207-0120	Jason II	0120	4/12/07	J2-266	JRL	9	1.736695	-104	11.630423	2633	OSC	y	PL	none	basalt	0.5	round	13
041207-0226	Jason II	0226	4/12/07	J2-266	IR	9	1.695893	-104	11.854658	2635	limb of OSC	y	(according to	flanges	basalt	5	flat plate	23
041207-0318	Jason II	0318	4/12/07	J2-266	JRL	9	1.757009	-104	12.072679	2630	OSC	y	PL crust	n/a	basalt	<.5	vulcan ear	11.5
041207-0428	Jason II	0428	4/11/07	J2-266	JO	9	1.901119	-104	12.342476	2678	limb of OSC	y	PL		basalt	6.5	pillow	21
041207-0451	Jason II	0451	4/12/07	J2-266	JRL	9	1.942518	-104	12.441392	2668	limb of OSC	y	PL	none	basalt	2.8	of angel-	13
041207-0537	Jason II	0537	4/12/07	J2-266	JRL	9	2.003052	-104	12.623710	2649	OSC	y	(glassy)	n/a	basalt	1.5	broken	10
041207-0610	Jason II	0610	4/12/07	J2-266	JRL	9	2.053289	-104	12.677714	2630	OSC	y	PL nub	none	basalt	2.5	triangle	17
041207-0627	Jason II	0627	4/12/07	J2-266	JRL	9	2.090096	-104	12.695939	2603	limb of OSC	y	PL	n/a	basalt/and	1	small toe	10
041207-0720	Jason II	0720	4/12/07	J2-266	JRL	9	2.142863	-104	12.469547	2667	OSC	y	PL bud	n/a	basalt	2.5 total	pieces	12.5
041207-0800	Jason II	0800	4/12/07	J2-266	AZ	9	2.245361	-104	12.496685	2679	pillow bud	y	PL bud	n/a	basalt	1.3	finger	14
041207-0832	Jason II	0832	4/12/07	J2-266	JO	9	2.314144	-104	12.571691	2635	limb of OSC	y	PL		basalt	3.5	finger, 2	11
041207-0910	Jason II	0910	4/12/07	J2-266	JRL	9	2.442895	-104	12.596433	2626	limb of OSC	y	PL bud	n/a	basalt	4	gnome hat	18
041207-1009	Jason II	1009	4/12/07	J2-266	JO	9	2.737821	-104	12.469538	2641	limb of OSC	y	PL		basalt	3.5	bud	21
041207-1150	Jason II	1150	4/12/07	J2-266	JRL	9	2.808251	-104	12.696705	2620	limb of OSC	y	PL bud	n/a	basalt	1	round	10
041207-1557	Jason II	1557	4/12/07	J2-266	IR	9	4.465607	-104	12.694002	2773	limb of OSC	y	PL	none	basalt	3	block	15
041207-1702	Jason II	1702	4/12/07	J2-266	JO	9	4.597654	-104	12.889520	2842	limb of OSC	y	PL		basalt	1.5	fragments	n/a
041207-1735	Jason II	1735	4/12/07	J2-266	IR	9	4.674428	-104	13.016836	2795	limb of OSC	y	PL	none	basalt	11.5	slab	22
041207-1809	Jason II	1809	4/12/09	J2-266	JO	9	4.764468	-104	13.132671	2795	limb of OSC	y			basalt	5	toe	23
041207-1831	Jason II	1831	4/12/07	J2-266	JO	9	4.848118	-104	13.195357	2752	limb of OSC	y	PL		basalt	1	finger	11
041207-1907	Jason II	1907	4/12/07	J2-266	JO	9	5.038118	-104	13.296616	2769	limb of OSC	y	PL		basalt	1	finger	10

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
041007-1803	15	15	R 3mm	F	A to SP	spherulites!	F	1	1mm	1	2-3mm					0		3	unfilled
041007-1857			GG	F	SP			1	2-3mm	2	2-3mm					<0.1	rounded		
041007-1908	6	2	R 5-10mm	F	SP ~1%	olivine clots	F	1								0		<1	rounded
041007-1925	13	9	R 4mm	PD	PH	clots, plag	F	1	1mm	5	3mm					0		5	.5mm
041007-1939	10	8	R 4mm	F	A		F			1	1mm					0		10	.5mm
041007-2014	8	5.5	R 10mm	F	SP		F			1	1mm					0		0	
041007-2018	9.5	8	R 4mm	F	SP		F	percent	1mm	unspecifie	1mm					0		2	1mm
041007-2033	8.5	9.5	R 10mm	F	A		F			2	1mm					1	<1mm	0	
041007-2051	8	4	top and	F	SP			1	2mm	2	3mm					<1	round,	2	round and
041007-2120	9	9.5	GG	PD	SP	glomerocryst		1	2mm	2	2mm					0			
041007-2128	4	4	R 2mm	F	SP	xenoliths		2	3mm	2	2mm					0		<1	round,
041007-2142	7	6	R 5mm	F	SP		F	1	0.5mm	1	1mm					0		1	rounded
041007-2247	10	8	GG	F	A		F			1	1mm					0		1	unfilled
041007-2352	10	11.5	R 15mm	F, mostly	SP		F			3	3mm					0		4	4mm
041107-0047	11	14	R 5-10mm	PD	PH	xenoliths!!	F	2	2mm	2	2-3mm					0		5	rounded,
041107-0122	23	27	R 10mm	VP	PH	xenoliths	F	1	1mm	4	2mm					0		0	
041107-0215	21	9	None	VP, if any?	A														
041107-0257	12	7	R 5mm	VP	A		F									0		0	
041107-0336	14	9	R 10mm	PD	POR	clots of olivine	M	5	5mm	10	5mm					0		5	1mm
041107-2302	8	7	R 5mm	PD	A		F									0		1	unfilled
041107-2341	12.5	6	R 2mm	PD	SP	couple of good	F	0.5	1mm	2	5mm					0		5	unfilled
041207-0022			V <1mm	VP	SP		F	1	3mm	1	1mm							3	unfilled
041207-0120	8	8.5	V, R 2mm	surface glass	SP ~1%		F			<1	1mm					0		2	unfilled
041207-0226	20	6	V	VP	SP <1%	No	F			<1	~0.2							<1	unfilled
041207-0318	9	6	GG	F-->PD	A	xenoliths	F	5	8mm	3	2mm					0		n/a	
041207-0428	18	13	R 1mm	VP	PH		F			5	1mm					0		1	unfilled
041207-0451	12.5	11	R 0-3mm	PD	SP		F			5-10%	<1mm					0		50	<.1-1mm
041207-0537	11.5	7	R 0-5mm	F	SP <1%		F	comme		4	al large					0		1	unfilled
041207-0610	11	11.5	V, R 3mm	F --> PD	SP	(small)	F	4	1mm	3-4%	1mm					0		5	unfilled
041207-0627	8	6	R 10mm	F	PH		F			5	1mm					0		1	unfilled
041207-0720	9	9.5	R 1-6mm	PD	PH	crystals, plag	F			5	3mm					0		0	
041207-0800	7.5	8	R 12mm	F	PH	present	F									0		0	
041207-0832	11	11	R 4mm	F	SP		F			2						0		1	
041207-0910	15.5	10.5	R 1-2mm	F	A	no	F	1	3mm	3	2mm					0		none?	
041207-1009	7	7	R 10mm	F	A		F	2	1mm	3	1mm					0		0	
041207-1150	8	7	R 5-15mm	F	A	oliv and plag	F	5	4mm	4	4mm					0		<1	round,
041207-1557	14	9	V, maybe	VP	A	density	F	2	2mm	6	8mm					0		20	round,
041207-1702			V	VP	SP		F			3	2mm					0		2	unfilled
041207-1735	20	14	R 15mm	F	SP		F			2	1mm					0		5	ed
041207-1809	15	11	R 8mm	F --> PD	SP	(4cm) clot in	F			1						0		1	unfilled
041207-1831	7	6	R 10mm	F	A		F			1	1.5mm					0		1	unfilled
041207-1907	9	6	R 6mm	F	SP		F			2	<1mm					0		<1	unfilled

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
041007-1803	VF		X	x	X	X	x	x	x		large
041007-1857	VF	none	X	x	X	X					
041007-1908	OX	none	X	x	X		x	x	x		
041007-1925	OX		X	x	X	X	x	x	x		
041007-1939	OX	none	X	x	X	X	x	x	x		s only near
041007-2014	OX, slightly	none	X	x	X		x	x	x		
041007-2018	OX, mildly	none		x	X	X	x	x	x		
041007-2033	VF, slightly OX	none	X	x	X	X	x	x	x		
041007-2051	VF	none	X	x	X	X	x	x			
041007-2120	VF	none	X	X	X	X			x		samples in
041007-2128	OX, VF	none	X	x	X	X	x	x	x		coating on
041007-2142	VF	none	X	x	X	X	x	x	x		
041007-2247	VF	none	X	x	X	X	x	x	x		
041007-2352	VF	none	X	x	X	X	x	x	x	1	
041107-0047	OX		X	X	X	X	x	x	x		WIR as
041107-0122	EA, MC 1mm	none	X	X	X	X	x	x	x		
041107-0215	MC 1mm		X	X	X		x	x	x		
041107-0257	top and bottom	none	X	x	X		x	x	x		
041107-0336	EA, MC 2mm		X	X	X	X	x	x	x		
041107-2302	OX, MC <1mm		X	X	X		x	x	x		remaining
041107-2341	OX, MC 1-2mm	none	X	X	X	X	x	x	x		
041207-0022	MC <1mm	none	X	X	X		x	x	x		
041207-0120	VF	none	X	X	X	X	x	x	x		
041207-0226	HR, MC 1mm	none	X	X	X	X	x	x	x		coating on
041207-0318	VF-->OX, MC?	none	X	X	X	X	x	x	x		of rock in
041207-0428	OX, EA		X	X	X	X	x	x	x		
041207-0451	may be present	none	X	X	X	X	x	x	x		vesicles
041207-0537	VF	none	X	X	X	X	x	x	x		
041207-0610	VF-->OX	none?	X	X	X	X	x	x	x		on whole
041207-0627	VF		X	X	X	X	x	x	x		remaining
041207-0720	OX, MC <.5mm	none	X	X	X	X	x	x	x		
041207-0800	VF	none	X	X	X	X	x	x	x		
041207-0832	OX		X	X	X		x	x	x		stains on
041207-0910	VF	none	X	X	X	X	x	x	x		
041207-1009	VF			x	X	X	x	x	x		plag and
041207-1150	VF	none	X	X	X	X	x	x	x		remaining
041207-1557	on top and		X	X	X		x	x	x		
041207-1702	OX		X	X	X		x	x	x		
041207-1735	<0.5mm	none	X	X	X	X	x	x	x		staining on
041207-1809	OX		X-2	X	X	X	x	x	x	1	
041207-1831	VF --> OX	none	X	X	X	X	x	x	x		run
041207-1907	VF		X	X	X	X	x	x	x		

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
041207-1929	Jason II	1929	4/12/07	J2-266	JO	9	5.161920	-104	13.330046	2775	limb of OSC	y	PL, M	cusps	basalt	7	circular	22
041207-2002	Jason II	2002	4/12/07	J2-266	JRL	9	5.332411	-104	13.368526	2700	OSC	y	PL bud	none	basalt	4	miter	20
041207-2042	Jason II	2042	4/12/07	J2-266	JRL	9	5.579608	-104	13.479895	2699	limb of OSC	y	PL crust	drips	basalt	3	3D triangle	12
041207-2100	Jason II	2100	4/12/07	J2-266	IR	9	5.667839	-104	13.511069	2690	limb of OSC	y	LF	nubby	basalt	9	block	21
041207-2122	Jason II	2122	4/12/07	J2-266	JRL	9	5.774125	-104	13.552066	2701	limb of OSC	y	LF?	none	basalt	<.1	finger	15
041307-0215	Jason II	0215	4/13/07	J2-266	JO	9	6.111158	-104	13.623683	2769		y	PL		basalt	4.5	toe	22
041307-0245	Jason II	0245	4/13/07	J2-266	JO	9	6.198119	-104	13.613722	2780	limb of OSC	y	PL		basalt	4	toe	18
041307-0337	Jason II	0337	4/13/07	J2-266	AZ	9	6.315823	-104	13.736722	2702	limb of OSC	y	LF	cusps,	basalt	6.5	keystone	22
041307-0416	Jason II	0416	4/13/07	J2-266	JO	9	6.410297	-104	13.799674	2692		y	LF		basalt	4	2 toes	12
041307-0459	Jason II	0459	4/13/07	J2-266	JO	9	6.523861	-104	13.805867	2693		y	LF	no	basalt	3	toe	15
041307-0605	Jason II	0605	4/13/07	J2-266	DW	9	6.670743	-104	13.611289	2718	pillow	y	PL		basalt	2	toe	15
041307-0637	Jason II	0637	4/13/07	J2-266	JO	9	6.757829	-104	13.486609	2775	limb of OSC	y	PL		basalt	2	toe	12
041307-0709	Jason II	0705	4/13/07	J2-266	AZ	9		-104		2795	E limb OSC	y	SF, hackly		basalt	1.2	slice of pan	23
041307-0720	Jason II	0720	4/13/07	J2-266	FM	9	6.884727	-104	13.310942	2794		y	LF	cusps	basalt	5	segments	20
041307-0737	Jason II	0737	4/13/07	J2-266	DW	9	6.948708	-104	13.275983	2782		y	PL		basalt	4.5	triangular	15
041307-0832	Jason II	0832	4/13/07	J2-266	FM	9	7.371461	-104	13.282768	2727	E limb OSC	y	PL	prickly	basalt	3	slab	10
041307-0900	Jason II	0900	4/13/07	J2-266	FM	9	7.545668	-104	13.282084	2745		y	LF		basalt	12	40cm	10-15
041307-0923	Jason II	0923	4/13/07	J2-266	JO	9	7.646840	-104	13.240943	2748		y	LF		basalt	3	rhombus	14
041307-0930	Jason II	0930	4/13/07	J2-266	DW	9	7.679437	-104	13.218274	2750		y	flow	flanges	basalt	1.75	rectangular	16
041307-0955	Jason II	0955	4/13/07	J2-266	FM	9	7.764951	-104	13.147394	2739	E limb OSC	y	EK		basalt	15	triangle	8
041307-1021	Jason II	1021	4/13/07	J2-266	AZ	9	7.856878	-104	13.055732	2706		y	PL	drips	basalt	3.4	broken up	13
041307-1059	Jason II	1059	4/13/07	J2-266	AZ	9	7.954491	-104	12.950345	2680	limb of OSC	y	crenulated		(possible	0.3	bread and a	7
041307-1225	Jason II	1225	4/13/07	J2-266	JO	9	8.193369	-104	12.652673	2550		y	PL crust		andesite	8.5	squarish	20
041307-1712	Jason II	1712	4/13/07	J2-266	JO	9	8.781087	-104	12.301403	2596	limb of OSC	y	SF		basalt	11	flat slab	36
041307-1751	Jason II	1751	4/13/07	J2-266	FM	9	8.848892	-104	12.187085	2563		y	PL crust		andesite	1	slab	5
041307-1806	Jason II	1806	4/13/07	J2-266	AZ	9	8.831931	-104	12.209429	2549		y	PL crust		basalt	2	5 cubes	10
041307-1826	Jason II	1826	4/13/07	J2-266	FM	9	8.787905	-104	12.249773	2592		y	PL bud		(probably)	1	2x bud	
041307-1835	Jason II	1835	4/13/07	J2-266	FM	9	8.767095	-104	12.274729	2587		y	LF bud		basalt	3	buds	
041307-1855	Jason II	1855	4/13/07	J2-266	AZ	9	8.775227	-104	12.211475	2550		y	PL		basalt	0.6	many	8
041307-1918	Jason II	1918	4/13/07	J2-266	IR	9	8.775607	-104	12.157582	2547	of e limb of	y	PL crust	none	basalt	2	block	18
041307-1927	Jason II	1927	4/13/07	J2-266	JO	9	8.767612	-104	12.134095	2551		y	LF		basalt	2	flat plate	21
041307-1938	Jason II	1938	4/13/07	J2-266	AZ	9	8.767727	-104	12.103475	2528		y	LF		basalt	0.5	wedge	7.5
041307-2016	Jason II	2016	4/13/07	J2-266	JO	9	8.827141	-104	11.961982	2585	limb of OSC	y	PL				glass	
041307-2033	Jason II	2033	4/13/07	J2-266	IR	9	8.865218	-104	11.863541	2604	graben	y	LF crust	none	andesite	1.5	plate	13
041307-2112	Jason II	2112	4/13/07	J2-266	IR	9	8.936297	-104	11.628674	2612		y	LF or SF	none	basalt		plate	21
041307-2116	Jason II	2116	4/13/07	J2-266	JO	9	8.946052	-104	11.605324	2615	E limb OSC	y	PL?		basalt	~.25	tiny	small
041307-2128	Jason II	2128	4/13/07	J2-266	DW	9	8.967949	-104	11.529917	2656	limb of OSC	y	PL	none	basalt	2.3	rectangular	17
041307-2208	Jason II	2208	4/13/07	J2-266	DW	9	8.954974	-104	11.309731	2783	E limb OSC	y	LF		basalt		rectangle	33
041507-0504	Jason II	0504	4/15/07	J2-267	IR	9	3.503216	-104	11.998689	2624	limb of OSC	y	PL		basalt	65	block	19
041507-0604	Jason II	0604	4/15/07	J2-267	FM	9	3.499290	-104	12.159235	2615		y	PL bud		basalt	3.5	wedge	15
041507-0639	Jason II	0639	4/15/07	J2-267	Neely	9	3.496427	-104	12.273126	2603	limb of OSC	y	PL bud		basalt	0.6	irregular	10
041507-0717	Jason II	0717	4/15/07	J2-267	IR	9	3.497080	-104	12.392160	2597	limb of OSC	y	PL bud	none	basalt	1	finger	17

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
041207-1929	17	11	R 2mm	PD	SP		F	1		2						0		<1	unfilled
041207-2002	11.5	11.5	2mm	F --> PD	SP <1%	?	F			1	2mm					0		2-3%	unfilled
041207-2042	11	12.5	thin layer of	PD-->VP	POR		F/M			?						0		10	unfilled
041207-2100	17	12	R <1mm	VP	SP	no	F	1	1mm	3	1mm					0		~1	round,
041207-2122	5	6	R>10mm	F --> PD	A											0			
041307-0215	12	10	R 5mm	F	A		F			<1						0		2-3%	unfilled
041307-0245	18	13	R*	F	A to SP		F									0		3	unfilled
041307-0337	13	9	R 9mm	PD	SP		F	1	1mm	2	long and					0		5	1.5mm
041307-0416	12	12	R 10mm	F	SP	glass and rock	F	1	1mm	3	2mm					0		2	unfilled
041307-0459	12	9	R 7mm	F	SP	glass and	F	1	1mm	2	2mm					0		1	unfilled
041307-0605	11	10	R 4mm	F	A	one	F			1.5	1.5mm					0		1	unfilled
041307-0637	12	8	R 3mm	F	A		F									0		<1	unfilled
041307-0709	9	8	R 3mm	F	A		F									0		0	
041307-0720	25	25	R, 25mm?	PD-->VP	A		F			<0.5						0		3	round
041307-0737	13	10	V	palagonite	A		F			1	1mm					0		10	unfilled
041307-0832	35	20	R 2mm	PD	SP		F	1	1mm	3	1mm					2	unfilled	5	unfilled
041307-0900	40	30	R	PD-->VP	PH		F	2?	1mm	5	1mm					1-2%	0.5mm	5	unfilled
041307-0923	12	10	None	x	SP			0		1-2%	1mm					n/a		20	unfilled
041307-0930	11	4	R 4mm	F	A		F											2	
041307-0955	20	10	None	color	A	plag small	n/a			<1	<1mm					0		<1	elongate,
041307-1021	10	7.5	R 11mm	F-->PD	A		F	1	1mm	3	3mm					0		5	.5mm
041307-1059	7	7.5	GG	F --> PD	A		F									5	2mm		
041307-1225	20	16	R	PD	SP		F			3	10mm					2	unfilled	4	unfilled
041307-1712	25	9	R*	F --> PD	A		F	0.5	1mm	1.5	4mm							1	
041307-1751	10	20	V	PD-->VP	A					<.5%	<.5mm							15	<0.5-2mm
041307-1806	8	7	GG	F	A					<1	1mm					5	elongate	0	
041307-1826			R 3mm	F	SP	plag in glass	F	1	2mm	3	1mm							1	unfilled,
041307-1835			R 8-20mm	F	SP	glomerocrysts	F	2	0.5mm	1	1.5mm					0		2	concentrate
041307-1855	10	7	GG	F	A					v. rare	1mm					5	3mm		
041307-1918	9	9	GG	PD	A		F									0		<2	elongate,
041307-1927	13	8	R 6mm	F-->PD	A			0		0						0		2	unfilled
041307-1938	11.5	6	R ?mm	PD	A	no	F			<1						0		<1	round
041307-2016			GG	F --> PD	A		F									2	1mm		
041307-2033	10	6	R 15mm	F	A		F									0.1	round	1	ed
041307-2112	15	3	R 10mm	F	A		F												
041307-2116	small	small	R 2mm	X	A		F									0		<1	unfilled
041307-2128	12	3.5	R 10mm	F	SP	olivine	F	2	1mm							2	<1.5mm	2	<1.5
041307-2208	13	4	V	VP	A		F			1.5	2mm					0		0	
041507-0504	17	15	R 10mm	VP	plagphyric			2	<1mm	5	few up					0		3	round,
041507-0604	15	25	R 3mm	F	POR	<1cm long,	F, M	10	2mm	5	4mm					0		5	<1.5mm
041507-0639	8.5	8	R 10mm	F	A		F			2	1mm					0		2	1mm
041507-0717	6	5	at tip	F	A		F			<1	<0.1mm					0		<1	unfilled

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
041207-1929	OX, MC 0.1mm	none	X	X	X		x	x	x	1	
041207-2002	OX	none	X	X	X	X	x	x	x	1	staining on
041207-2042	HR?	none	X	X	X		x	x	x		double-
041207-2100	top and bottom	none	X	X	X		x	x	x		on top of
041207-2122	VF	none	X	X	X	X	x	x			mostly
041307-0215	MC .1mm		X	X	X		x	x	x	1	
041307-0245	VF		X	X	X	X	x	x	x	1	
041307-0337	OX	none	X	X	X	X	x	x	x		
041307-0416	VF	none	X	X	X	X	x	x	x		
041307-0459	OX		X	X	X	X	x	x	x	1	
041307-0605	hydrothermal	none	X	X	X	X	x	x	x		
041307-0637	VF		X	X	X	X	x	x	x		
041307-0709	MC 2mm	none	X						x		fragmente
041307-0720	OX, MC 1mm		X		X		x	x	x		
041307-0737	OX, MC 1mm		X	X	X		x	x	x		
041307-0832	OX, MC 5mm		X	X	X		x	x	x		black rusty
041307-0900	OX, MC 2mm		X	X	X		x	x	x	1	
041307-0923	MC 0.2mm		X				x	x	x		staining in
041307-0930	OX, MC 2mm	none	X	X	X		x	x	x		poor
041307-0955	2mm	none	X				x	x	x		
041307-1021	MC 1.5mm	none	X	X	X	X	x	x	x		
041307-1059	MC 1mm	none	X	X	X	X	x	x	x		
041307-1225	OX, MC 1mm		X	X	X	X	x	x	x		rock from
041307-1712	OX		X	X	X	X	x	x	x	1	vesicles
041307-1751	OX, MC 1-2mm	none	X	X	X		x	x	x		be of very
041307-1806	F, MC 2mm	none	X	X	X	X	x	x	x		
041307-1826	OX	none	X	X	X	X	x	x	x		
041307-1835	VF		X	X	X	X	x	x	x		
041307-1855	VF, MC 2mm	none	X	X	X	X	x	x	x		
041307-1918	and bottom	none		X	X	X	x	x	x - 2		
041307-1927	OX		X	X	X	X	x	x	x		
041307-1938	MC 4mm		X	X	X			x	x		sample
041307-2016	no hs*			X	X	X	x	x	x		
041307-2033	top and bottom	none	X	X	X	X	x	x	x		those
041307-2112	MC 0.5mm	none	X	X	X	X	x	x	x		
041307-2116	F, OX		X					x			small
041307-2128	VF, MC 1mm		X	X	X		x	x	x		chips
041307-2208	MC 2mm	none	X		X	X	x	x	x		
041507-0504	5mm	none	X	X	X		x	x	x		
041507-0604	OX		X	X	X	X	x	x	x		WIR as
041507-0639	VF	none	X	X	X	X	x	x	x		
041507-0717	VF	none	X	X	X	X	x	x	x		

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	K SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
041507-0806	Jason II	0806	4/15/07	J2-267	JO	9	3.421919	-104	12.423449	2605		y	PL		basalt	10	pillow toe	23
041507-0856	Jason II	0856	4/15/07	J2-267	KN	9	3.258327	-104	12.456065	2605	limb of OSC	y	PL		basalt	1.1	cone	13.5
041507-0922	Jason II	0922	4/15/07	J2-267	FM	9	3.165457	-104	12.479848	2605		y	PL bud		basalt	1	donut	12
041507-1016	Jason II	1016	4/15/07	J2-267	IR	9	2.990090	-104	12.506404	2602	limb of OSC	y	PL bud		basalt	2.5	bud,	
041507-1124	Jason II	1124	4/15/07	J2-267	IR	9	2.844291	-104	12.527497	2601	limb of OSC	y	PL bud	none	basalt	1	finger	18
041507-1152	Jason II	1152	4/15/07	J2-267	FM	9	2.726085	-104	12.538058	2612		y	PL		basalt	7.5	h)	
041507-1402	Jason II	1402	4/15/07	J2-267	IR	9	1.879925	-104	12.696706	2638	limb of OSC	y	PL toe		basalt	5	toe	30
041507-1511	Jason II	1511	4/15/07	J2-267	IR	9	1.613883	-104	12.752159	2652	OSC	y	PL crust	none	basalt	2.5	round	15
041507-1612	Jason II	1612	4/15/07	J2-267	IR	9	1.409569	-104	12.715203	2661	limb of OSC	y	PL bud	none	basalt	2	round bud	13
041507-1706	Jason II	1706	4/15/07	J2-267	IR	9	1.241762	-104	12.768265	2672	OSC	y	PL toe	none	basalt	4	toe	20
041507-1808	Jason II	1808	4/15/07	J2-267	IR	9	1.054984	-104	12.829747	2656	limb of OSC	y	PL finger		basalt	1.5	finger	17
041607-0007	Jason II	0007	4/16/07	J2-267	FM	9	2.679960	-104	15.959409	2633		y	PL		(andesite?	2.5	prism	25
041607-0105	Jason II	0105	4/16/07	J2-267	IR	9	2.630966	-104	15.774934	2619	OSC	y	PL bud		basalt	2	bud	20
041607-0240	Jason II	0240	4/16/07	J2-267	IR	9	2.364305	-104	15.667138	2625	OSC	y	PL toe	none	basalt	0.5	stubby toe	14
041607-0309	Jason II	0309	4/16/07	J2-267	JRL	9	2.288716	-104	15.668211	2623	OSC	y	LF crust	cusps	basalt	1	triangular	19
041607-0341	Jason II	0341	4/16/07	J2-267	FM	9	2.160319	-104	15.674600	2630		y	PL bud		basalt	1.5	claw-like	25
041607-0431	Jason II	0431	4/16/07	J2-267	IR	9	1.932553	-104	15.688036	2617	OSC	y	PL crust		basalt	2	plate	16
041607-0456	Jason II	0456	4/16/07	J2-267	IR	9	1.868639	-104	15.676274	2624	OSC	y	LF	,	basalt	2.5	square	12
041607-0543	Jason II	0543	4/16/07	J2-267	IR	9	1.733410	-104	15.608704	2624	OSC	y	LF	none	basalt	6	round	21
041607-0616	Jason II	0616	4/16/07	J2-267	IR	9	1.635438	-104	15.551166	2628	OSC	y	LF finger	none	basalt	1.5	finger	16
041607-0627	Jason II	0627	4/16/07	J2-267	JRL	9	1.587380	-104	15.535711	2627	OSC	y	PL root?	none	basalt	7	wedge	29
041607-0638	Jason II	0638	4/16/07	J2-267	IR	9	1.547004	-104	15.509665	2621	OSC	y	PL finger	none	basalt		finger	21
041607-0653	Jason II	0653	4/16/07	J2-267	IR	9	1.495283	-104	15.515257	2622	OSC	y	LF	none	basalt	4.5	block	20
041607-0724	Jason II	0724	4/16/07	J2-267	IR	9	1.353370	-104	15.551900	2627	OSC	y	SF		basalt	0.7	flat plate	14
041607-0736	Jason II	0736	4/16/07	J2-267	IR	9	1.285531	-104	15.577906	2622	OSC	y	PL finger			4.5	finger	17
041607-0756	Jason II	0756	4/16/07	J2-267	FM	9	1.184322	-104	15.601058	2617		y	PL bud		basalt	1	cake	
041607-0808	Jason II	0808	4/16/07	J2-267	IR	9	1.136552	-104	15.617173	2627	OSC	y	crust		basalt	0.8	plate	21
041607-0819	Jason II	0819	4/16/07	J2-267	IR	9	1.069343	-104	15.637359	2631	OSC	y	SF	none	basalt	1.5	plate	22
041607-0831	Jason II	0831	4/16/07	J2-267	FM	9	1.018398	-104	15.662172	2629	OSC?	y	SF crust	flanges	basalt	2	slab, hole	20
041607-0842	Jason II	0842	4/16/07	J2-267	IR	9	0.996568	-104	15.702019	2629	OSC	y	crust		basalt	1.5	irregular	23
041607-1038	Jason II	1038	4/16/07	J2-267	IR	9	1.014373	-104	15.837164	2611	OSC	y	PL	none	basalt	9	finger	28
041607-1322	Jason II	1322	4/16/07	J2-267	CLW	9	1.077629	-104	16.059770	2596	western limb	y	PL		basalt	2.25	bud	19
041607-1357	Jason II	1307	4/16/07	J2-267	DW	9	0.973894	-104	15.942158	2633	osc	y	PL	flanges	basalt	0.9	elongate	15
041607-1450	Jason II	1450	4/16/07	J2-267	CLW	9	0.831271	-104	15.779072	2611	w limb of osc	y	PL		basalt	1.5	slab, 2	15
041607-1507	Jason II	1507	4/16/07	J2-267	IR	9	0.785968	-104	15.730142	2630	osc	y	SF	none	basalt	4	block	20
041607-1532	Jason II	1532	4/16/07	J2-267	CLW	9	0.776209	-104	15.650210	2625	western limb	y	top of pillar		basalt	0.25	"ruboid"	7
041607-1635	Jason II	1635	4/16/07	J2-267	AZ	9	0.765050	-104	15.488667	2613	western limb	y	PL		basalt	11.2	wedge	26
041607-1736	Jason II	1736	4/16/07	J2-267	CLW	9	0.659785	-104	15.633092	2631	western limb	y	LF		basalt	0.5	bearclaw	12
041607-1758	Jason II	1758	4/16/07	J2-267	DW	9	0.632396	-104	15.650575	2632	osc	y	SF		basalt	1.5	tubular	
041607-1809	Jason II	1809	4/16/07	J2-267	DW	9	0.595332	-104	15.638895	2632	OSC	y	SF		basalt	2	rectangular	13
041607-1818	Jason II	1818	4/16/07	J2-267	DW	9	0.557187	-104	15.632681	2629	osc	y	PL	drips	basalt	7	pillow	23
041607-1850	Jason II	1850	4/16/07	J2-267	IR	9	0.384883	-104	15.624379	2620	w limb of osc	y	PL		basalt	11.5	plate	32

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
041507-0806	20	17	R 5mm	F	A		F			8						0		5	unfilled
041507-0856	11.3	7.5	R 3mm	F	PH		F	5	5mm	2	3mm					1	1mm	1	2mm
041507-0922	12	8	R 20mm	F	SP		F	5	5mm	3	2mm					0		1	1MM
041507-1016			GG at tip	F	PH	maybe	F	3	1mm	4	1mm					0		2	round,
041507-1124	8	8	GG at tip	F	A	oliv and plag	F			<1	0.5mm					0		1-2%	unfilled
041507-1152			R 5mm	F	PH	Loads of them	F	3-5%	1mm	5-10%	1-3mm					1	<0.5mm	5	unfilled
041507-1402	10	10	R 12mm	F	A		F			2	2mm					0		2	round and
041507-1511	13	12	R 1mm	F	A		F	3	1mm	4	2mm					<1		1	unfilled
041507-1612	10	8	slight	F	A		F	<1	1mm							0		~1	1mm
041507-1706	10	8	R 5mm	F	A		F	<1		3						0		<1	round
041507-1808	5	5	R 15mm	F	A	present		<1		3						0		<1	unfilled
041607-0007	10	10	V*	VP	POR	oliv and plag		3	3mm	10	10mm					0			
041607-0105	7	7	at tip	F	A		F	1	3							0		1	round,
041607-0240	6	6	GG at	F	A		F			3						0		1	v.rare,
041607-0309	10	5	R 0-10mm	F	A	none	F												
041607-0341	5	5	R 20mm	F	PH	5mm in	F	2	1mm	5	4mm							2	unfilled
041607-0431	11	3	R 10-20mm	F	SP	xen	F	1		1						0		<1	round,
041607-0456	13	12	bottom,	F	A	none	F	1	1mm	1	1mm					0		0	
041607-0543	15	13	V <1mm	VP	A		F			1	1mm					0		0	
041607-0616	10	6	R 15mm	surface	A		F	0.5	1mm	1	6mm					0			rare, round
041607-0627	11.5	11	very small	VP	A	no	F			1	3mm					0		0	
041607-0638	6	6	GG at tip	surface	SP		F	<1	0.5mm	1	1mm					0		<1	unfilled
041607-0653	14	9	V <1mm	PD	SP											0		2-Jan	round,
041607-0724	13	3	None	x	A			1	1mm	4	3mm							3	
041607-0736	10	10	R*	PD	A		F			1	1mm					0		0	
041607-0756			R 5mm	F	PH	and plag --	F	1	1mm	4	very					2	filled w/	5	unfilled
041607-0808	13	2	none	x	A		F			2								3	
041607-0819	10	4	R 15mm	F	A	none	F			<0.5						0		0	
041607-0831	20	5	on top and	F	POR		F	v.rare	1mm	1-2%	1mm					0		<1	unfilled,
041607-0842	9	9	glass, small	F	SP			2	2mm							0		0	
041607-1038	13	12	R 10mm	F-->PD	A	yes	F	5	4mm	1	1mm					<1	unfilled	1	round,
041607-1322	12	10	R 20mm	PD	SP		F			2	0.5mm					0		~2	irregular,
041607-1357	7	5	GG	PD	SP		F			1						0		0	
041607-1450	15	7	GG	PD	SP-->PH	plag and cpx?	F	1	2mm	2	3mm					>10	sample		
041607-1507	19	18	R 20-30mm	F	A	none	F			1	2mm					0		<1	unfilled
041607-1532	7	5	V	PD	A		F	<1	1mm	1	1mm					0		<1	unfilled
041607-1635	20	16	Mn	VP	A		F			5	<0.1mm					0		3	round and
041607-1736	9	4	R 2mm	PD	A		F			1	2mm					0		<1	1mm
041607-1758			GG	surface, F on	A		F												
041607-1809	11	8	V	VP	A		F			<1	1mm					0		0	
041607-1818	13	15	R 5mm	PD	A			0.5	1mm	0.5	1mm					0		0	
041607-1850	23	5	2mm	F, dull	A		F									0		0	

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
041507-0806	VF		X	X	X	X	x	x	x	1	
041507-0856	VF	none	X	X	X		x	x	x		
041507-0922	VF		X	X	X	X	x	x	x		left
041507-1016	VF	none	X	X	X	X	x	x	x		
041507-1124	VF	none	X	X	X	X	x	x	x	(glass)	
041507-1152	OX		X	X	X	X	x	x	x - 2	(glass),	
041507-1402	VF	none	X	X	X	X	x	x	x		
041507-1511	OX	none	X	X	X	X	x	x	x		staining on
041507-1612	VF	none	X	X	X	X	x	x	x	(glass),	
041507-1706	surface patina	none	X	X	X	X	x	x	x		
041507-1808	VF	none	X	X	X	X	x	x	x		
041607-0007	3mm		X	x	X	X	x	x	x		has
041607-0105	VF	none	X	X	X	X	x	x	x		
041607-0240	VF	none	X	X	X		x	x	x		left
041607-0309	VF, MC coating	none	X	x	X	X	x	x	x	(glass)	
041607-0341	OX		X	X	X	X	x	x	x		
041607-0431	VF	none	X	x	X		x	x	x		
041607-0456	VF	none	X	X	X	X	x	x	x	1	
041607-0543	covers all	none	X	x	X	X	x	x	x	(glass)	
041607-0616	VF	none	X	X	X	X	x	x	x	(glass)	s in glass
041607-0627	surface	none	X	x	X		x	x	x		
041607-0638	VF	none	X	x	X	X	x	x	x		
041607-0653	<1mm	none	X	X	X		x	x	x		
041607-0724	covers sample		X				x	x	x		
041607-0736	0.5mm	none	X	X	X	X	x	x	x	(glass)	
041607-0756	OX, MC 1mm	none	X	X	X	X	x	x	x		WIR as
041607-0808	over entire		X				x	x	x		
041607-0819	VF	none	X	X	X	X	x	x	x		
041607-0831	VF		X	x	X	X	x	x	x	(glass)	
041607-0842	VF	none	X	X	X	X	x	x	x		pockets
041607-1038	<0.1mm	none	X	X	X	X	x	x	x		staining
041607-1322	completely	clay	X	x	X		x	x	x	(glass)	in archive;
041607-1357	MC 1mm		X	X	X	X	x	x	x	(glass)	
041607-1450	MC 1mm		X	x	X		x	x	x		"looks like
041607-1507	VF	none	X	x	X	X	x	x	x	(glass),	folded-
041607-1532	OX	none	X		X		x	x	x		
041607-1635	OX, MC 4mm	none	X		X	little	x	x	x	?	
041607-1736	OX, light MC	none	X	X	X		x	x	x	1	leftover
041607-1758	VF		X	X	X	X	x	x		(glass)	to cut
041607-1809	OX, EA		X		X		x	x	x		
041607-1818	OX	none	X	x	X	X	x	x	x	(glass,	
041607-1850	OX	none	X	X	X		x	x	x	1	shell, glass

						LOCATION (with renav)												DIM
SAMPLE ID	VEHICLE	TIME (GMT)	DATE	DIVE #	DESCRIBE BY	LAT. (DEG)	LAT. (MIN)	LONG. (DEG)	LONG. MIN	DEPTH	GEOGRAPHIC/GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	K SURFACE FEAT	ROCK NAME	Wt.	SHAPE	L
041607-1925	Jason II	1925	4/16/07	J2-267	DW	9	0.122710	-104	15.627146	2017	osc	y	PL		basalt	15	pillow	27
041607-1933	Jason II	1933	4/16/07	J2-267	IR	9	0.065808	-104	15.623281	2617	OSC	y	PL		basalt	3	finger	24
041607-2012	Jason II	2012	4/16/07	J2-267	DW	8	59.869183	-104	15.581444	2612	osc	y	chimney		piece -		tubular	6
041607-2017	Jason II	2017	4/16/07	J2-267	DW	8	59.847284	-104	15.567800	2606	osc	y	PL		basalt	1.25	bud	12
041607-2046	Jason II	2046	4/16/07	J2-267	AZ	8	59.696794	-104	15.583551	2623	west limb	y	LF	, nubby	basalt	4.4	thick plate	18
041607-2129	Jason II	2129	4/16/07	J2-267	CLW	8	59.373184	-104	15.612686	2625	western limb	y	PL finger/bud		basalt	3.5	finger	19
041607-2217	Jason II	2217	4/16/07	J2-267	DW	8	59.117779	-104	15.655376	2617	osc	y	PL		basalt	1.5	large finger	21
041607-2254	Jason II	2254	4/16/07	J2-267	CLW	8	59.112421	-104	15.754485	2606	western limb	y	PL?		basalt	0.5	small fist	10
041607-2356	Jason II	2356	4/16/07	J2-267	IR	8	59.039366	-104	15.676585	2633	osc	y	PL		basalt	2.5	large bud	20
041707-0108	Jason II	0108	4/17/07	J2-267	CLW	8	58.936763	-104	15.570601	2614	osc	y			basalt	0.25	chunk	8
041707-0139	Jason II	0139	4/17/07	J2-267	DW	8	58.930248	-104	15.450391	2618	w limb of osc	y	M		basalt	10	rectangle	25
041707-0200	Jason II	0200	4/17/07	J2-267	CLW	8	58.922114	-104	15.418996	2602	western limb	y	SF, ropy		basalt	0.25	plate	10
041707-0220	Jason II	0220	4/17/07	J2-267	CLW	8	58.910644	-104	15.428645	2601	western limb	y	PL		basalt	0.5	wedge	10
041707-0340	Jason II	0340	4/17/07	J2-267	AZ	8	58.736837	-104	15.609668	2616	OSC	y	LF	cusps	basalt	2.5	chunk	16.5
041707-0438	Jason II	0438	4/17/07	J2-267	IR	8	58.525182	-104	15.502487	2620	West OSC	y	PL		basalt	1.7	no neck,	11
041707-0634	Jason II	0634	4/17/07	J2-267	AZ	8	58.587060	-104	15.882134	2586	OSC	y	LF	drips	basalt	1.3	chunk	15
041707-0724	Jason II	0724	4/17/07	J2-267	AZ	8	58.401928	-104	15.953015	2585	western osc	y	LF		basalt	0.6	block	13
041707-0909	Jason II	0909	4/17/07	J2-267	IR	8	57.907010	-104	15.622218	2612	w limb of osc	y	PL		basalt	2.5	pieces	
041707-0940	Jason II	0940	4/17/07	J2-267	CLW	8	57.775344	-104	15.529713	2620	western limb	y	PL		basalt	6	pillow	34
041707-0958	Jason II	0958	4/17/07	J2-267	AZ	9	57.701579	-104	15.469504	2620	osc	y	PL finger		basalt	2.7	cylinder	20
041707-1018	Jason II	1018	4/17/07	J2-267	SW	8	57.597604	-104	15.441242	2617	w limb osc	y	PL	cusps,	(named	7	thick plate	14
041707-1034	Jason II	1034	4/17/07	J2-267	IR	8	57.519229	-104	15.445672	2623	w limb of osc	y	PL bud		basalt	0.2	square bud	9
041707-1044	Jason II	1044	4/17/07	J2-267	IR	8	57.464451	-104	15.445612	2627	w limb of osc	y	PL		basalt	0.5	finger	16
WC-040607-0622	II/wax	0619	4/6/07	J2-264	IR	9	9.875700	-104	12.422100	2577	9oN EPR				glass			
WC-040607-0742	II/wax	0742	4/6/07	J2-264	Fundis	9	9.942420	-104	12.710820	2581	9oN EPR				glass			
WC-040607-1222	II/wax	1222	4/6/07	J2-264	DW	9	9.372300	-104	12.503000	2563								
WC-040907-0315	wax core	0315	4/9/07	J2-265	DW		8.419440		12.390000						glass			
WC-041007-1720	Jason II	1720	4/10/07	J2-265	IR	9	5.866224	-104	12.101400	2586	OSC	y			basalt			
WC-041207-0459	II/wax	0459	4/12/07	J2-266	IR	9	1.961480	-104	12.473310	2653		y			glass			
WC-041607-2356	Jason II	2356	4/16/07	J2-267	IR	9	59.038800	-104	15.676560	2633	osc				basalt			
WC-1	wax core	0435	3/30/07		Ridley	9	7.999	-104	12.307	2590	ridge to west	no			glass	1-2g	fragments	
WC-2	wax core	0552	3/30/07		IR	9	6.941	-104	12.179	2602	W of main	no			glass	1-2g	fragments	
WC-3	wax core	0857	3/30/07		IR	9	5.820	-104	12.149	2601	of WC-2	no			glass	1-2g	fragments	
WC-4	wax core	1100	3/30/07		IR	9	5.198	-104	12.256	2576	on ridge W	no			glass	2-3g	fragments	
WC-5	wax core	1307	3/30/07		IR	9	2.900	-104	11.400	2556	seamount in	no			glass	<1g	fragments	
WC-6	wax core	1623	4/4/07		Zaino	8	59.700	-104	11.390	2820	of eastern	no			glass	cruddy	fragments	
WC-7	wax core	1843	4/4/07		IR	8	58.746	-104	12.498	2668	of eastern	no			glass		fragments	
WC-8	wax core	0001	4/5/07		IR	9	9.119	-104	11.380	2695	launch point	no			glass		fragments	

	ENSIONS							PHENOCRYSTS								VESIC. GL		VESIC WR	
SAMPLE ID	W	Ht	GLASS	GLASS QUALITY	CRYSTAL LINITY	CLOTS/ XENOLITHS	GRAIN SIZE	% OL	SIZE OL	% PLAG	SIZE PLAG	% CPX	SIZE CPX	% OTHER	SIZE OTHER	%	SIZE	%	SIZE
041607-1925	20	15	V	VVP	POR		F, M	>5	2mm	10	2mm					0		2	round,
041607-1933	8	8	15mm, GG	F	A	none	F			2						0		<0.1	unfilled
041607-2012	4	4	None	x															
041607-2017	11	9.5	R 20mm	F	A		F			<1	<1mm					0		2	1mm
041607-2046	29	9	R 4mm	PD	A		F	0.5	1.5mm	1	1.5mm					0		0	
041607-2129	13	10	R 5mm	PD	Sp		F	1	1mm	3	<1mm					0		4	concentrati
041607-2217	9	4	R 18mm	F	SP	x	F	1		5	5mm					0		2	
041607-2254	6	6	R 3mm	PD	SP		F			2	1mm					0		1	round,
041607-2356	8	7	GG at tip	F	PH	ol and plag	F	2	<1mm	5	m					0		<0.5	round,
041707-0108	6	5	V	F	SP		F	1	1mm	3	3mm					0		1	unfilled
041707-0139	16	13	V	VP	A		F									0		10	unfilled
041707-0200	9	4	GG	PD	POR			5	2mm	10	2mm					10	large,		
041707-0220	8	5	R 2-10mm	PD	SP		F			2	1mm					0		5	4mm
041707-0340	17	13.5	R 3mm	Poor	PH	mostly plag	F	1	1mm	6	higher					0		0	
041707-0438	9.5	7.5	R 5mm	F	A		F			2	1mm					0		0	
041707-0634	9	8.5	R 11mm	VP	POR	xenoliths	F	3	2mm	8	4mm					0		0	
041707-0724	10	8	V	VP	POR		F	2	1mm	20	glass is					0		2	round,
041707-0909			R 10mm	VP	A	none	F			<1						<1	unfilled	<1	round,
041707-0940	13	11	R 10mm	PD	SP	decent number		1	1mm	3	5mm					0		5	unfilled,
041707-0958	8	9	R 7mm	F	A	F				0.5	2.5mm					0		0	
041707-1018	19	4	R 10mm	PD	A-->SP	none	F			2	<0.5mm					0		2-3%	round,
041707-1034	7	5	GG at tip	F	A	none	F			<0.5	<0.5mm					0		few	unfilled
041707-1044	5	5	R 20mm	F	A		F			1	<1mm					0		0	
WC-040607-0622																			
WC-040607-0742																			
WC-040607-1222																			
WC-040907-0315																			
WC-041007-1720			GG	F	A														
WC-041207-0459				F															
WC-041607-2356																			
WC-1				F															
WC-2				F															
WC-3				F															
WC-4																0			
WC-5				F												0			
WC-6				VP		none	F									0			
WC-7							F									0			
WC-8																0			

			HS	GLASS			THIN X		SL		COM.
SAMPLE ID	ALTERATION (MM)	SECONDARY MINERALS	EK	EK	MP	KS	EK	MP	EK	Maggie (JO)	
041607-1925	OX, MC 1mm		X		X		x	x	x	1	tied up w/
041607-1933	patina	none	X	x	X	X	x	x	x	(glass)	
041607-2012	EA-SULFIDE										sample
041607-2017	OX		X	X	X	X	x	x	x	(glass)	
041607-2046	OX		X	X	X	X	x	x	x	1	
041607-2129	VF, MC 0.1mm	none	X	X	X	X	x	x	x	(glass),	
041607-2217	OX		X	X	X	X	x	x	x	(glass)	sample
041607-2254	OX	none	X	x	X		x	x	x		
041607-2356	patina	none	X	x	X	X	x	x	x	(glass)	
041707-0108	OX	none	X		X		x	x	x		
041707-0139	EA, MC 1mm		X	X	X	X	x	x	x	(glass)	
041707-0200	MC 1mm	none	X	x	X		x	x			rich glass
041707-0220	OX	none	X	X	X	X	x	x	x		sample
041707-0340	HR 17mm		X	X	X		x	x	x		
041707-0438	OX	none	X	x	X	X	x	x	x		
041707-0634	MC 3mm		X	X	X	X	x	x	x		
041707-0724	MC 2mm		X		X		x	x	x		sample --
041707-0909	MC 1mm covers	none	X	X	X	X	x	x	x	(glass)	
041707-0940	MC <1mm	none	X	x	X	X	x	x	x	(glass)	WIR also
041707-0958	VF	none	X	X	X	X	x	x	x	1(glass	phenocryst
041707-1018	MC <0.1mm	none	X	x	X		x	x	x	1	
041707-1034	surface patina	none	X	x	X		x	x	x		remaining
041707-1044	OX		X	X	X	X	x	x		(glass)	small for a
WC-040607-0622				X	X						
WC-040607-0742				X	X						
WC-040607-1222				X	X						
WC-040907-0315					X						
WC-041007-1720				X	X						
WC-041207-0459				X	X						- just glass
WC-041607-2356											
WC-1				X	X						
WC-2	VF			X	X						
WC-3	VF			X	X						
WC-4	.8VF, .2OX			X	X						
WC-5	.3VF,OX,MC			X	X						was
WC-6	.3VF, .7OX			X	X						
WC-7	VF			X	X						
WC-8	.4mildlyOX			X	X						

KEY	
Morphology	
	PL = pillow lava LF = lobate flow SF = sheet flow M = massive GP = glassy plate other -- describe
Lower surface features	
	drips cusps flanges
Glassiness	
	None = no glass V = glass veneer R = glass rind GG = all glass
Glass Quality	
	F = fresh PD = partially devitrified VP = very poor PAL = palagonite
Crystallinity	
	A = aphyric SP = sparsely phyric PH = phyric POR = porphyritic
Crystal clots/xenoliths	
	None = none CC = crystal clots X = xenoliths
Grain size	
	F = fine M = medium C = coarse
Rock alteration	
	VF = very fresh OX = oxidized surfaces HR = hydration rind (note thickness) EA = extensively altered MC = manganese crust (note thickness)

Secondary minerals
None = none
Ca = calcite
Q = quartz
Ch = chlorite
Ep = epidote
Act = actinolite
Cl = clay

						LOCATION					
SAMPLE	VEHICLI	TIME CO	DATE CO	DIVE NU	DESCRIP	LATI. (	LAT. (MI	LONG. (I	LONG. M	DEC LAT	DEC LON
J268-01	JasonII	1305	4-18-2007	J2-268	SAS	9	50.490	-104	17.97349	9.841492	-104.3
J268-02	JasonII	1517	4-18-2007	J2-268	SAS	9	50.588	-104	17.8858	9.843134	-104.298
J268-03	JasonII	1541	4-18-2007	J2-268	SAS	9	50.642	-104	17.81304	9.844027	-104.297
J268-04	JasonII	1604	4-18-2007	J2-268	SAS	9	50.722	-104	17.73046	9.845367	-104.296
J268-05	JasonII	1625	4-18-2007	J2-268	SAS	9	50.777	-104	17.63405	9.846279	-104.294
J268-06	JasonII	2242	4-18-2007	J2-268	SAS	9	49.985	-104	17.23942	9.833082	-104.287
J268-07	JasonII	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
J268-08	JasonII	1952	4-19-2007	J2-268	SAS	9	49.630	-104	17.42755	9.827166	-104.29
J268-09	JasonII	0908	4-20-2007	J2-268	SAS	9	50.979	-104	17.61832	9.849652	-104.294
J268-10	JasonII	0922	4-20-2007	J2-268	SAS	9	50.971	-104	17.58406	9.849525	-104.293
J268-11	JasonII	0959	4-20-2007	J2-268	SAS	9	50.917	-104	17.45793	9.848622	-104.291
J268-12	JasonII	1044	4-20-2007	J2-268	SAS	9	50.940	-104	17.30863	9.849	-104.288
J268-13	JasonII	1138	4-20-2007	J2-268	SAS	9	51.011	-104	17.28323	9.850187	-104.288
J268-14	JasonII	1214	4-20-2007	J2-268	SAS	9	50.873	-104	17.20754	9.847882	-104.287
J268-15	JasonII	1251	4-20-2007	J2-268	SAS	9	50.961	-104	17.0879	9.849351	-104.285
J268-16	JasonII	1324	4-20-2007	J2-268	SAS	9	51.039	-104	16.98289	9.850655	-104.283
J268-17	JasonII	1553	4-20-2007	J2-268	SAS	9	51.177	-104	16.96694	9.852958	-104.283
J268-18	JasonII	1608	4-20-2007	J2-268	SAS	9	51.169	-104	16.98913	9.852815	-104.283
J268-19	JasonII	1642	4-20-2007	J2-268	SAS	9	51.137	-104	16.88798	9.852284	-104.281
J268-20	JasonII	1710	4-20-2007	J2-268	SAS	9	51.180	-104	16.80935	9.852997	-104.28
J268-21	JasonII	1739	4-20-2007	J2-268	SAS	9	51.202	-104	16.68124	9.853361	-104.278
J268-22	JasonII	1809	4-20-2007	J2-268	SAS	9	51.213	-104	16.53296	9.853558	-104.276
J268-23	JasonII	1834	4-20-2007	J2-268	SAS	9	51.224	-104	16.41643	9.853737	-104.274
J268-24	JasonII	1849	4-20-2007	J2-268	SAS	9	51.219	-104	16.44157	9.853653	-104.274
J268-25	JasonII	2135	4-20-2007	J2-268	SAS	9	50.401	-104	17.49749	9.84001	-104.292

								DIMENSIONS			
DEPTH	X	Y	GEOGRAPHIC/ GEOLOGIC LOCATION	PHOTO	MORPHOLOGY	LOWER	ROCK N	WEIGHT	SHAPE	LENGTH	WIDTH
2519	3712.166	78319.23	EPR ISS E	Y	Hackly	N/A	basalt	1.5	fold	12	12
2512	3872.795	78500.82	EPR ISS E	Y	Hackly	N/A	basalt	2.3	fold	17	16
2511	4006.092	78599.52	EPR ISS E	Y	Lobate	flange	basalt	0.8	fold	10	9
2506	4157.378	78747.81	EPR ISS E	Y	Hackly	flange,cus	basalt	1.7	plate	18	12
2504	4334.008	78848.64	EPR ISS E	Y	Lobate	drips	basalt	5.5	plate	18	12
2505	5056.962	77389.16	EPR ISS E	Y	Hackly	N/A	basalt	8.5	fold	24	16
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2500	4712.312	76734.87	EPR ISS E	Y	Lobate	N/A	basalt	1.6	wedge	9	10
2503	4362.817	79221.7	EPR ISS E	Y	Lobate	drips	basalt	2.3	plate	20	10
2504	4425.585	79207.6	EPR ISS E	Y	Sheet	N/A	basalt	5.5	fold	25	12
2511	4656.652	79107.76	EPR ISS E	Y	Sheet	N/A	basalt	7	fold	26	24
2515	4930.174	79149.53	EPR ISS E	Y	Hackly	N/A	basalt	1.4	fold	14	11
2519	4976.694	79280.88	EPR ISS E	Y	Lobate	flange	basalt	0.6	fold	10	8
2522	5115.359	79025.94	EPR ISS E	Y	Hackly	N/A	basalt	3	fold	15	10
2527	5334.534	79188.35	EPR ISS E	Y	Hackly	N/A	basalt	3	fold	14	12
2532	5526.921	79332.62	EPR ISS E	Y	Hackly	flange	basalt	1	fold	12	12
2536	5556.139	79587.34	EPR ISS E	Y	Sheet	N/A	basalt	2.2	fold	15	10
2533	5515.482	79571.52	EPR ISS E	Y	Hackly	N/A	basalt	1.7	fold	14	10
2538	5700.779	79512.76	EPR ISS E	Y	Sheet	drips	basalt	5	plate	18	14
2539	5844.826	79591.6	EPR ISS E	Y	Hackly	N/A	basalt	10.4	fold	33	21
2539	6079.529	79631.92	EPR ISS E	Y	Hackly	N/A	basalt	1	fold	8	7
2554	6351.165	79653.69	EPR ISS E	Y	Hackly	N/A	basalt	13.5	fold	24	23
2558	6564.645	79673.46	EPR ISS E	Y	Hackly	N/A	basalt	3.3	fold	19	16
2558	6518.597	79664.12	EPR ISS E	Y	Hackly	N/A	basalt	13.7	fold	18	14
2514	4584.182	78155.35	EPR ISS E	Y	Sheet	flange	basalt	19	plate	36	20

						PHENOCRYSTS					
HEIGHT	GLASSINESS	GLASS Q	CRYSTALLINITY	CLOTS/XENOLITHS	GRAIN S	% OLIVI	SIZE OL	% PLAG	SIZE PLA	%CPX	SIZE CPX
8	rind	fresh	A	Xeno	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	rind	fresh	SP	none	F	0	0	2	2	0	0
3	rind	fresh	A	none	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	rind	fresh	A	none	F	0	0	1	2	0	0
4	rind	fresh	A	Xeno	F	0	0	0	0	0	0
11	rind	fresh	SP	Clots	M	1	2	4	2	2	1
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	rind	fresh	SP	none	F	0	0	1.5	1	1.5	1
4	rind	fresh	SP	Clots	F	0	0	2	1	1	1
8	rind	fresh	SP	none	F	1	1	2	1	0	0
8	rind	fresh	A	none	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	rind	fresh	SP	none	F	0	0	2	1	0	0
2	all glass	fresh	A	none	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	rind	fresh	SP	none	F	2	1.5	0	0	0	0
8	all glass	fresh	A	none	F	0	0	0	0	0	0
6	all glass	fresh	SP	none	F	0.5	1	2	1	1	1
4	rind	fresh	SP	none	F	0	0	3	1.5	1	1.5
5	rind	fresh	SP	none	F	1	0.5	2	1	1	0.5
8	rind	fresh	A	none	F	0.5	1	0.5	1	0.5	1
8	rind	fresh	SP	Clots	F	1	1	4	2	2	1.5
4	rind	fresh	SP	none	M	1	1.5	2	2	1	1.5
17	rind	fresh	SP	Xeno	F	2	1	4	1	2	1
8	rind	fresh	SP	none	F	0	0	2.5	1	0	0
12	rind	fresh	SP	Xeno	F	0	0	2	1.5	2	1.5
9	rind	fresh	A	none	F	0	0	0.5	1	0	0

ESICLES IN GLAS		CLES IN WHOLE I					COMMENTS		
% OTHE	SIZE OT	PERCEN	SIZE	PERCEN	SIZE	ALTERATION(MM)	SECONDARY MINERALS		
1	1	0	0			MC < 1mr	none		
5	0.5	0	0			VF	none		
2	1	0	0			VF	none		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
0	0	0	0			VF	none		
2	1	0	0			VF	none		
0	0	0	0			VF	none		
2	1	0	0			VF	none		
2	2	0	0			VF	none		
0	0	0	0			VF	none		
0	0	2	6			VF	none		
0	0	2	4			VF	none		
0	0	2	0.5			VF	none		
0	0	0	0			VF	none		
3	1.5	0	0			VF	none		
1	0.5	0	0			VF	none		
0	0	0	0			VF	none		
2	1	1	1			VF	none		

Jason lowering J2-264; Began April 5, 2007 (2039), ended April
6, 2007 (0200)
2039 Jason in water – first lowering this cruise. Watches begin.
Target is northeast portion of East Limb, where side-scan record shows
a series of SW-NE-trending mounds (in the vicinity of a minor
hydrothermal signal determined by MAPRs on side-scan wire).
2211 On bottom. Event record begins at ~#1450. Depth 2789 m.
Position: 9°9.499 N, 104°11.268 W. We begin traverse on a heading of
255, range 0.5 nm.
2212 Heavily sedimented terrane with lobate pillow forms visible.
2239 Sample collected at first decent outcrop (flat surface): **040507-2239**; 9° 9.515N 104° 11.179 W (use this position from Doppler). Dept 2792m. Basket B2b.
2242 Scarp trending ~345 exposing pillow fragments.
2246 Continued heavy sediment cover overlying pillow forms
2252 More rock (talus, rubble) exposed than previously
2302 Sampled broken pillow fragment: 040507-2302; 9
9.501N 104 11.23W; 2792m. Basket B2b
2322 Less sediment, more rock exposed
2329 Sampled pillow outcrop: 040507-2329: 9 9.494 104
11.299 2783 m. Basket B2a
2330 Significant pillow outcrops, some with delicate appendages, less
sediment cover.
2335 Fissure- apparently non-eruptive, trending ~350.
0006 **Sampled pillow fragment: 040607-0006**; 9 9.465 104
11.400; 2743 m. Basket B2c
0025 **Sampled upper rind of collapsed pillow: 040607-0025**;
9 9.443 104 11.464; 2705 m; basket B4a.
0054 **Sampled pillow fragment: 040607-0054**; 9 9.429 104
11.564; 2641m, bin B4b.
1000 Talus
1001 Scarp, trending ~30, exposing pillow fragments
1003 Lost video images.
1004 Regained video.
1005 Series of Fissures cutting pillows, trending ~325-010°.
1006 Turned vehicle to orient along fissure – trend is determined to
be ~343.
0120 **Sampled pillow fragment: 040607-0120**; 9 9.417 104
11.628; 2603 m; bin B4b.
0121-2000 Heavy sediment cover over pillow outcrops to end of watch.

April 6 – 0600-1000Z Watch – Jason2 Dive 264

0530 Came on watch going over a series of scarps, facing west with pillow and
lobate exposures, depth 2573m.
0546 SAMPLE #9, 2571 m Blue 3a basket
0602 SAMPLE #10, Blue 3d basket, hackly flow, 2858 m, possible andesite
0609-0610 DVCAM of hackly flow
0612 Lobate flow over hackly flow
0615 SAMPLE #11, yellow wax corer, DVCam of operation
0619-0622 more sampling a few meters away with yellow wax core
0640 c/speed to 0.4 kts to transit to 'pillar of mystery' sonar target,
same acoustic terrain so no need to sample. Terrain is glassy lobates
0656 pillow and lobate terrain, only little sediment, still transiting
0701 DVCAM of spaghetti worms (enteropneusts) on new looking pillow flow
0709 160 m from pillar target
0720 traversing glassy lobates and pillows
0726 DVCAM of pillow/lobate terrain
0731 contact between younger and older lobated flows at 2579 m depth
0742 SAMPLE#12, red wax corer, 2581 m 9 9.944'N 104 12.70'W on new lobate flow
0747 DOPPLER RESET, dropped steel plate
0754 on older elongate pillow flow at pillar of mystery site, nothing special
in the area, no animals suggesting nearby hyx vent… moving south
0756 heading south towards WP16
0801 heading towards WP16, now 750 m away bearing 154°, bypassed WP15 as it
is on the young pillow mound crossed by TowCam#3 and we will sample it on the way to WP16
0823 heading 154°, still going over fresh, black, glassy lobate flow of the
pillow mound
0829 SAMPLE #13, in Blue 3c basket, crust of new flow, eggshell pillow, DVCAM
snip of sampling op and site.
0846 traversed into hackly flow, contact, hackly flow looks more viscous,
looks like possible andesite, more silica rich flow
0848 SAMPLE #14, 2580 m, stopped to take sample of hackly flow, white 3c
basket, DVCAM snip of sampling and flow character
0854 lost Jason video – low fiber power… will troubleshoot, stopped ship
0855 video now back, but power still low
0856 ship u/w again after video outage, traversing elongate pillow flow with
dusting of sediment, older than sample#13 for sure
0902 SAMPLE#15, 2583 m elongate pillow flow, older
0922 SAMPLE #16, lobate bud, in White basket 1A, at WP#16, about 40m west of
it with Jason, 2582 m
0930 heading towards WP#17, change of watch

Continued Jason lowering J2-264; April 6, 2007; 1000-1400Z

1000 Arrived on watch. Jason is in an area of fresh glassy
pillow lavas covered with cerpulids (worms). Because these worms can
indicate the outer reaches of hydrothermal venting, we spent approximately one half hour searching for increased evidence of
hydrothermal activity, to no avail. These worms can also simply
indicate diffuse hyrothermal flow.
1009 Sampled fresh basalt bud: 040607-1009: 9 9.484 104
12.488; 2567, Bin W1b. Proceeded to follow pre-set way points
generally toward the southwest.

1030-1100 Fresh pillow lavas with glass, little sediment cover, but
apparently not quite as fresh as that where the worms were.
1105 Fresh pillow lavas with glass but a dusting of sediment.
1112 Sampled pillow crust 40607-1112, 9 9.419 104 12.489,
depth 2558m (difficult to get a sample that didn't shatter) ; Bin W2a
1115 Continued in terrane of glassy pillows with light sediment
dusting.
1135 Sampled glass bud: 40607-1135, 9 9.362 104 12.454,
2551m, Bin W4a.
1210 Entering terrane of larger pillows, fresh glass, sediment
dusting. **Sampled glass from pillow fragment with wax core:**
40607-1222, 9 9.371 104 12.507, 2563 m. (difficult to break off
an intact piece)
1303 Sampled glass pillow fragment: 40607-1303, 9 9.386
104 12.536, 2573m.
1322 Volcanic edge noted (younger on top of older lavas)
1327 Entered area where pillows were more fragmented and older
looking. **Sampled 40607-1327**, 9 9.343 104 12.592, 2589m
1331 Rose off bottom to try to fix a technical problem, lost power to
vehicle, terminated launch.
1829 Jason on deck.
Jason lowering J2-265; April 7, 2007; 0200-0600Z

0145 Arrived on watch; lowering through the h_2o column
0345 doppler lock on bottom; altitude 30 m
0346 SEAFLOOR IN SIGHT; start recording video; pillow lava with a sediment blanket and accumulation of sediments in pockets
0348 reset Doppler to 9°06.351'N 104°14.537'W based on ship position; landed on target SSW of plateau volcano
0410 SAMPLE 1; pillow bud cracked through the center and highly friable – roughly same size as Kraft claw – goes into white basket compartment 2A – sample representative of the base of plateau volcano
0410-0450 traversing the valley between landing point and the side of the plateau volcano. Moving NNE at 0.3 knots. Regular size pillows, with sediment blanket, and bevy of brittle stars along with miscellaneous other gooey invertebrates
0450-0505 talus ramp, angle of repose, very little sed cover, lower slope of the plateau volcano
0505 talus ramp ends, now encountering near-vertical scarp with truncated pillow lava exposed on the wall, pillows are elongate to 5m or more.
0512 Reset DVL to Medea position, about 32 m offset from previous position, LBL available at the top of the plateau volcano
0515 Pillows on top of the plateau as far as the camera can see. Pillows are meter-size and well rounded. Sediment pockets.
0520 SAMPLE 2 – top of plateau, near edge of the plateau, pillow toe with thick glassy rind and crystalline interior, sample is roughly cylindrical with a length of ~20 cm and diameter of ~10 cm. Put in white basket compartment 2B.
0530 Under way again across the top of the plateau. Eventlogger has been variously entrails or pillows, but the terrain is pillows under heavy sediment cover.
0540 Facies shift from pillows to lobates. No suggestion of a flow contact so this is probably the same flow that we previously sampled.
April 7 – 0600-1000Z Watch – Jason2 Dive 265
0550 started watch on top of flat top mound at western edge of ARAD melt
lens, DOP nav 9° 6.721'N 104° 13.309'W, 2581 m depth
0553 DVCAM of sediment covered lobate terrain
0604 SAMPLE #3 (of Jason 265) 2684 m, 9 6.742'N 104 14.307'W, basket
space white 4b.
0607 reset Doppler to medea LBL
0615 reset time on digital still camera – scorpio- to accurate GMT as time
was not set on the camera on predive
0616 going over hackly flow with sediment
0617 SAMPLE #4, hackly pillow, 2681 m, 9 6.775'N 104 14.295'W, at margin
of small depression on top of large flat topped mound, in white3C basket
0624 continuing over hackly flow on top of mound
062748 contact between hackly flow to the south and elongate pillows with
sediment to the north
0628 terrain is lobate flows continuing north of the hackly terrain just
crossed to the south
0631 SAMPLE #5, 2688 m, lobate flow north of hackly flow- appears perhaps
older than the hackly flow?, 9 6.828'N 104 14.305'W
0633 going over ~ 9m high wall, margin of the summit crater
0636 following along margin of the collapse area/crater to the north –
there is hackly flow in the collapse
0639 DVCAM snip of fracture in lobate flows.
0641 heading 330 towards WP#3 over sediment covered lobates
0646 SAMPLE #6, 2680 m, small piece of lobate flow, DVCAM snip in white 3b
basket, 9 6.892'N 104 14.336'W
0649 now over curtain folded sheet flow with sediment cover, like what was
seen on TowCam #1 line
0650 pilot switch, off bottom for a few minutes
0652 DVCAM snip of curtain folded sheet flow
0654 SAMPLE #7, 2680 m, sheet flow with curtain folds and stalked sponge, 9
6.930 104 14.348'W, basket white 4a
0657 DVCAM snip of massive part of sheet flow
0658 now over all sediment, with brittle stars, no exposure of volcanic flows
0701 now seeing folds in sheet flow surface sticking out of sediment, DVCAM
snip
0704 changed speed to 0.4 kts.
0725 o/c 040 to WP#4, LBL not great
0738 continuing traverse across summit of flat topped mound in 060 direction
0741 DVCAM snip of lobates at NE corner of mound
0743 SAMPLE #8, 2688 m, lobate crust at NE edge of flat topped mound, 9
7.08'N, 104 14.18'W in white basket 2c
0745 doppler reset to Medea LBL
0750 reset Doppler again to Medea LBL, good this time
0752 now traversing elongate pillows and tubes snaking across lobate terrain
0756 continuing over lobate terrain with elongate tubes and pillows on top of
older lobate surface

0800 going down constructional slop on NE flank of mound, ~ 400 m from WP#4,
o/c 070, 2704 m depth
0804 SAMPLE #9, 2706 m, pillow bud from pillows (NB in same bin with sample
#7 that has stalked sponge on the rock), white 4a bin, DVCAM snip of sampling
0810 now going up W flank of the pillow ridge that extends north of the flat
topped mound
0811 o/c 070, 2690 m going over sed. covered lobates with small pillows
0816 2697 m in sedimented pillows and elongate pillows, continuing to NE
0824 2701 m, on west flank of pillow ridge
0826 SAMPLE #10, 2703 m, lobate bud from west flank of pillow ridge, at ase
of constructional flow fronts, 9 7.168'N 104 14.005'W
0830 o/c 070, 0.3 kts, 2695 m depth going up pillow ridge constructional flank
0832 DVCAM snip of sponge
0833 now going down east flank of pillow ridge
0838 o/c 070, headed to WP 5 across the pillow ridge, 2707 m
0843 DVCAM of swimming holothurian
0846 2725 m o/c 075, 0.3 kts, going down east flank of pillow ridge, ~ 40 m
more in depth to go to reach base
0854 2751 m, in terrain of small sed. covered pillows
0856 tested lasers, work OK, 10 cm dot spacing, turned off
0858 SAMPLE #11, 2756 m, pillow bud from base of pillow ridge, east side,
DVCAM snip, basket position white 2d, 9 7.214'N 104 13.880'W
0903 on terrain east of pillow ridge, flat, sediment covered with occasional
pillows, 2757 m depth
0905 DVCAM of flat terrain east of pillow ridge 2756 m depth, sed. covered
with occasional pillow sticking out.
0907 reset Doppler to Jason LBL
0909 SAMPLE #12, 2757 m, large pillow bud/finger from flat area of pillows
in sediment east of pillow ridge, 9 7.233'N 104 13.843'W
0912 c/c to head for WP#7 to NNW, crossing small N-S, apparent eruptive
fissures in sed. covered lobate terrain
0917 N-S fissures continue, parallel to trend of pillow ridge, c/s increase
to 0.4 kts.
0921 following small NNW – trending fissures, suggest eruptive fissures as
they have well formed pillows/lobes along them, terrain is partly sed. covered
0930 SAMPLE #13, green push core of tulip sponge and red/ brown sediment,
animal on top of core, 2749 m, 9 7.288'N 104 13.831'W
0936 2749 m, crossing sed. with occasional pillow and lobate outcrops
0945 following eruptive fissure, 2750 m depth, DVCAM snip

Jason lowering 265, April 7, 2007,
watch 1000-1400Z; E. Klein

0947 Watch began with Jason in a field of eruptive fissues, oriented
~340. Driving north along elevated ridge.
953 Sampled pillow bud; 040707-0953; Bin B2a
1000 Very fresh pillow terrane, sediment dusting at most, glassy.
1030 Getting into a slightly older terrane, more sediment, less fresh
glass.
1042 Sampled bud. 040707-1042. bin B2b
1100 Much more sediment, still pillow forms, still buds (locally more
sediment).
1114 Big lava collapse pit; tried to sample but could not – too think
and competent.
1120 Sampled lower crust of collapse pillow crust; **040707-1120**, big, it broke into two pieces. Bin B2c (2 pieces)
1126 Continuing northwest along elevated ridge, more ornamented.
1158 Flow contact, pillow/lobate edge.
1231 Sampled bud 040707-1231, from elevated mound, on side of ridge. Bin B3a
1245 Proceeding NW; large pillow mounds, with buds, sed in pockets.
1305 Fissure eruptive, narrow, oriented 350.
1315 Fault; hard to see on video.
1318 Eruptive fissure, oriented 330.
1324 Sampled pillow fragment: 040707-1324; broke into two
pieces, put in B4b and B4a, broke up over B2a-d.
1345 End of watch in heavily sedimented terrane with pillow outcrops.

04/07/2007 1400-1800Z Jason lowering 265

1345 On watch, Jason position based on Medea Nav 9 08.024'N, 104 14.183'W, E side of the North-Central Basin Ridge [NCBR], in decorated pillows, sediment coating with accumulation in pockets.
1350 Heading almost due N, sort of sliding sideways up the NCBR, slope of about 20-30 deg
1400 Still climbing upslope, decorated pillows blanketed with sediment, no glass visible but probably there underneath the seds
1415 at top of the NCBR, lobates are found at the tippy-top, pillows on the sides
1423 reset doppler to J2 LBL, 20 m west offset after reset
1430 headed downhill again, pillows only with pretty heavy sediment
1434 headed slightly uphill again, in a swale along the top of the NCBR
1441 stopping to sample at 9 08.17'N, 104 14.07'W, pillows here
1443 Sample 19 an angular chunk of pillow with some glass on the rind, sized about 10 cm square. put into BLUE basket compartment 2d
1500 off we go again, at 0.2 knots due north
1516 small collapse, ~2 m wide and possibly bottomless, lobate flows with a heavy dusting of sediment
1520 moving N again after exploring the collapse, we are going in and out of lobate flows in a gently undulating topography on the top of the ridge. sediment obscures any contact relationship between pillows and sediments but it appears to be facies changes with the same flow.
1600 decended about 40 m over the last hour, sliding into pillows and losing the lobate flows, sediment cover remains heavy.
1607 a small, steep-sided pillow mound with decorated pillows. a little too big to be a haystack
1615 stopping to sample along a pillow ridge on the NCBR
1628 Sample 20 the toe from a pillow just east of the crest of the NCBR. this piece hung up on the divider in the basket and spilled glass all over the adjoining boxes.
1635 reset doppler to LBL on Jason, 6-7 m offset
1640 starting our move to the north, trying to stay on the

crest of the NCBR, lava is variably lobates and pillows with sediment cover and a lot of accumulation in pockets
1718 Sample 21 a cube of pillow take from near the base of a larger outcrop of pillows and buds. Some alteration, not clear how much glass is present. Put into white basket, compartment 3a.
1721 Under way again to WP14B, west of the ridge to see if things look younger over there
1730 closer to the top of the NCBR the pillows are again transitioning into lobates, terrain overall is probably best described as lobates but some pillows still crop out
1747 back into pillows as we start sliding off the west side of the ridge
1750 End of Watch

April 7 – 1800-2200Z Watch – Jason2 Dive 265

1800 started watch while traversing pillow ridge, headed towards the base of the W.
flank of the pillow ridge to see if there is evidence of young volcanism, then will turn
and head Eaast, 2707 m heading 289°, 0.3 kts, 9 8.602'N 104 14.299'W
1813 a bit less sediment now on the pillows, lots of buds, DVCAM snip
1815 SAMPLE #22, 2710 m, pillow bud, outcrop of pillow from terrain that
looks younger than the pillow ridge, in Blue 1a basket, 9 8.617'N 104 14.325'W.
1820 terrain west of pillow ridge is a bit younger, less sediment on and in
between the lava forms. Now at WP#14b, heading east to WP#15
1821 heading east at 0.3 kts
1824 c/s, increase to 0.4 kts headed to WP#15
1825 DVCAM snip of budded pillows on west ridge, younger ridge, west of
pillow ridge – where sample #22 came from
1904 about 40 m from WP#15, ship is nearly at WP#15, 2711 m, sed covered
elongate tubes in sediment, definitely older terrain than that sampled at Sample 22
site, west of here, Medea LBL good
1910 2719 m, tried to sample but no luck, moving ahead
1918 stopped to sample older flows in sediment
1924 SAMPLE #23, 2716 m, pillow bud, large, in White 1a basket (with
volunteers going into 1b basket behind it) 9 8.651'N 104 14.101'W
1941 continuing east
1943 SAMPLE #24, 2719 m, in Blue 3c basket, pillow bud, 9 8.666'N 104 14.056'W
1947 c/s increase to 0.4 kts, traversing sediment covered elongate
pillows/tubes, headed towards WP #16
1952 now heading to WP#18 at 0.4 kts, going over sedimented lobates and
elongate pillows with some larger pillows
1954 at bottom of main pillow ridge, east flank base, consists of sedimented
elongate pillows and lobates.
1958 doppler reset to Jason LBL
2001 SAMPLE #25, 2748 m, in Blue 3d basket, 9 8.689'N 104 13.975'W
2012 o/c 065° towards WP #18 at 0.4 kts, traversing sedimented pillow terrain
2017 about 50 m from WP #18 with ship, will launch elevator soon to switch
out sample baskets, will take a sample at WP#18 site
2018 DVCAM of sedimented pillow terrain just west of WP#18 site
2022 SAMPLE #26, 2735 m, in Blue 1a basket, 9 8.722'W 104 13.866'W,
elongate pillow crust, DVCAM snip of sampling
2025 at WP#18, removing excess ballast plates from basket, getting ready to
launch elevator
2031 sample #26 stowed, launching elevator
2035 elevator launched, waiting for elevator to descend for rest of watch.

Jason lowering 265; April 7-April 8, 2007; 2200-0200Z; E. Klein

2146 Arrived on watch as empty elevator had just landed ~130 away from vehicle. Heading toward elevator through a field of pillows with heavy sediment.
2208 Arrived at elevator; begin to switch baskets.
2229 Blue rock basket with rocks on elevator in A wood box.
2245 White rock basket with rocks on elevator in B wood box.
2255 Pulled release, elevator lifts off.
2300 During ascent we headed 285 to look at terrane: pillow outcrops, heavy sediment.
2320 Greater than 1 meter fissure, deep, oriented ~340, exposing truncated pillows.
2324 Scarp ~4 m relief.
2325 Scarp oriented ~350
2330 Had to lift off bottom for recovery
0111 Elevator recovered; beginning to return to survey, heading toward WP20 to the east. Problems moving the ship
0145 Watch ends.

April 8, 2007 -- 0200-0600Z Watch -- J2-265 lowering

0145 On watch with J2 at 145 m altitude after elevator recovery
0207 Reset Doppler to LBL
0211 Start Videos / Bottom in Sight / Checking Ballast
0228 SAMPLE 27 collected at landing site near the base of a small pillow dome, this is a piece of elongate pillow / entrail lava that is somewhat glassy appearing 9 09.1'N 104 13.84'W
0238 now on the move to the first waypoint, pillows and entrail lavas in very heavy sediment
0248 Crossing a scarp with truncated pillows
0310-0320 headed upslope with heavy sediment the whole way. easily as much sediment as the off-axis traverse to the east of the eastern limb that we did a couple of nights ago
0324 poked a sponge or other soft critter...interesting
0330-0350 now at top of the little pillow mound, looking for collapse pit
0351 SAMPLE 28, slab of sheet from top of the little pillow mound from an area of flat sheets with 1-2cm sediment blanket. 9 08.99'N, 104 13.84'W
0351-0410 moving slowing across mound to look for collapse pit
0424 found the pit - really a scarp about 6 m high and down to the east followed by a fissure that is 1 m wide a few meters to the east of the scarp.
0451 SAMPLE 29 good sized chunk of pillow from lobate terrain at the top edge of the scarp
0508 positioned over summit fissure on the mound
0515 back to the scarp where we took the previous sample, excellent views of lava stratigraphy
0525 SAMPLE 30 from in situ near the base of the wall (5m stratigraphically below SAMP 29)
0530 End of Watch - Fornari on

April 8 – 0600-1000Z Watch – Jason2 Dive 265

0547 Came on watch going over sedimented seafloor with low relief outcrops of
lobates 9 8.997'N and 104 13.614'W, 2709m, About 1200 digital still images left in
Scorpio camera.
0558 going over sed. covered sheet flow

0601 DVCAM snip of sedimented sheet flow
0602 SAMPLE #31, 2711 m, in Red 1b basket, hackly sheet flow, DVCAM snip, 9
8.997'N 104 13.559'W
0605 continuing to WP#22 over curtain folded and hackly sheet flows in
sedimented terrain
0609 at small W facing scarp, 1m high, may be constructional rampart along a
fissure that is behind scarp that is 10 m deep, hackly flows at margin of the fissure
0614 on east side of fissure/scarp DVCAM snip
0616 SAMPLE #32, 2709m, of hackly crust from east side of fissure, in Red 2b
basket, 9 9.001'N 104 13.513'W, about 140 m to WP#22
**NOTE THAT FISSURE/SCARP FEATURE IS ABOUT 100M WEST OF POSITION
OF THIS FEATURE ON THE SS SONAR RECORD
0622 traversing lobate/small pillow flow, DVCAM snip
0624 SAMPLE #33, of pillow/lobate flow, in yellow 1a basket, 2708 m, 9
9.00'N and 104 13.484'W
0628 traversing lobate flow with lots of sediment, 2707 m
0633 traversing sed covered area with lobates sticking out near WP #22
0643 SAMPLE #34 of small pillowed flow, ~30 m east of WP #22, 2703 m, in red
2a basket, 9 8.988'N and 104 13.400'W
0648 2699 m depth traversing smooth sediment and sedimented lobate terrain
0651 2698 m, traversing hackly flow with sparse sediment, seems newer
0652 SAMPLE #35, hackly crust from the flow just traversed, 2700 m, in red2d
bin, 9 9.003'N and 104 13.353'W
0655 reset Doppler to Medea LBL
0656 traversing lobate flow with sediment, think the hackly flow has less
sediment on it, perhaps it is younger? Hard to tell from contacts between the two
0702 near WP#23, pillow flow with some sediment on it
0704 SAMPLE #36, 2694 m of pillow flow – bud, in yellow 1d bin, 9 9.012'N
104 13.307'W
0709 on top of small constructional feature, consists of pillowed flow with
buds
0710 SAMPLE #37, pillow bud, 2684 m, in yellow 1c bin, but **NB – another
bud fell into yellow 1b bin**, 9 9.025'N 104 13.274W
0730 traversed another small ~ 5 m high scarp
0735 SAMPLE #38 of a hackly flow without much sediment on it, in bin red 4b,
9 9.077'N 104 13.187'W
0739 now back into lobates with dusting of sediment
0741 DVCAM snip of hackly flows
0743 contact between hackly and lobate flow – hard to tell which is older
0745 stopped to sample lobates near the contact but too hard to sample and
ran out of leash to Medea
0754 SAMPLE #39, pillow bud, in red4a bin, 9 9.134'N 104 13.102'W near WP #25
0755 tossing out weight plate for trim
0759 complicated contacts between lobates with apparently more sediment and
hackly with less sediment, but from contacts between the two it's unclear which is
younger, but I'd guess the hackly is younger
0800 at 2655 m depth, o/c 062 at 0.3 kts, headed to WP #26
0803 small pillowed flow with dusting of sediment at 2651 m
0806 DVCAM snip of lobate and hackly contact
0807 SAMPLE #40, 2649 m, in red 4d bin, of hackly crust near lobate contact,
9 9.158'N 104 13.055'W
0810 LBL nav not great for either Jason or Medea
0813 small pillow flow, not much sediment, at 2635 m o/c 037 at 0.3 kts
heading to WP#26
0823 about 100 m from WP26 going over small pillowed flow, DVCAM snip
0828 SAMPLE #41, 2613 m, pillow bud, in red 4c bin, 9 9.197'N 104 12.964'W
0830 o/c 060 to WP #29 about 300 m away, going over small budded pillows
without much sediment
0835 very good medea LBL nav now
0841 reset Doppler to Medea LBL, 2608 m going over small pillowed flows
without much sediment
0845 now seeing large tubular elongate pillows snaking across terrain
0848 SAMPLE #42, crust of large elongate pillow/tube, in yellow 3a bin, 2601
m, 9 9.255'N 104 12.885'W
0857 pillowed flow near WP #29 at 2598 m
0858 SAMPLE #43, of pillow bud in yellow 3b bin, 2598 m at WP #29 site, 9
9.280'N 104 12.837'W
0902 now over older sedimeted elongate tubes, DVCAM snip
0904 NNW trending 1 m wide fissure at 2588 m depth, trend is parallel to
graben walls and axis
0907 SAMPLE #44, at 2586 m depth, crust of elongate tube about 70 m west of
WP #30, 9 9.297'N 104 12.806'W, in bin yellow 3c
0910 great LBL for Jason and Medea, Doppler is within a few meters of the LBL
position so not resetting
0912 o/c 060 near WP#30, just west of western boundary fault of axial graben,
going over a small pillowed flow
0915 stopped ship over position along west graben wall
0916 at west rim of axial graben, 2588 m depth, collapses at margin and
lobate flows along rim
0918 at west rim trying to sample lobate flow at rim, need to move the ship
back west
0927 DVCAM snip of west rim of graben at 2588 m depth
0935 SAMPLE #45, 2587 m, lobate crust from west rim of graben 9 9.329'N
104 12.756'W, in sample bin yellow 2b.
0939 moving ship east 50 m during watch change to get into floor of graben
and lava lake that forms along west margin of graben floor
0946 SAMPLE #46, 2598 m depth, curtain folded sheet flow is on the floor of
graben at west margin at this location, samples from this spot are in 2 bins – yellow
3d and red 3b, 9 9.341'n 104 12.741'W. graben wall is ~ 10 m high,
0950 watch change

Jason lowering 265; April 8, 2007;
watch 1000-1400Z; E. Klein

1010 In collapse feature
1020 Arrived at wall of layered lavas.
1023 Sampled lobate flow on top of wall; 040807-

1023;
depth 2589m. Bin R3a (huge). This sample, with the next two, form a
"stratigraphy" of the exposed wall along the collapsed lava lake or
drain-back feature.
1037 Sampled lower part of wall, lava flange; 040807-1037; depth 2595m; Bin R2a.
1043 Sampled mid-part of wall, flange, 040807-1043, depth
2593m; Bin Y3b.
1047 Moving slowly south, starting on top of wall, observing structure
of wall, with its embayments and protrusions. Approx. height of wall:
10-15m.
1053 Crapped south along wall, talus at base, lava flanges along face,
many recesses.
1059 Pillars, pit 4-5 m deep max.
1108 Collapse pit ~5 m deep.
1120 Heading south toward WP32.
1157 Sampled pillow fragment, small chunk, 040907-1157,
Bin Y1c.
1213 Flow edge: lobate to pillow.
1228 Sampled glass bud; 040807-1228, Bin Y4b.
1245 Transiting south toward WP1. Fresh large glassy pillows, little
sediment.
1257 Fissure oriented N-S.
1258 Deploying elevator.
1300 Fissure >1 m, oriented N-S, non-eruptive.
1307 Sampled pillow fragment from fissure surface, 040807-1307, bin R1a.
1311 Staying in vicinity while elevator descends.
1315 Tracing N-S fissure, non-eruptive <1m. Spent a long time
exploring fissure characteristics, lots of great photos and video.

April 8, 2007 -- 1400-1800Z -- J2-265 lowering

Came on watch as elevator was in descent. Spent majority of watch doing evelator ops rather than making science observations. No rocks were lost during the basket swap. Having all of the weights on one side of the handle makes it very difficult to change baskets and prolongs the period of not observing and sampling. We probably wasted 30 minutes because of bad basket configuration - a problem easily solved.
1422 - arrived at elevator
1541 - elevator released
1637 - SAMPLE 53 collecting lobate sample about 20-25 m west of a double fissure system which was 20-25 m west of the everlater drop location. A very glassy, elongate hunk of lobate.
1648 - Arrived at a small collapse that is part of the larger collapse system as seen on sidescan and with J2 imaging sonar. Collapse pit is 6 m deep, but notwide enough for J2. A few pillars and rubble on the floor.
1652 - SAMPLE 54 baseball size chunk of lobate from top of collapse lip dropped into White 2A while we were trying to sample another rock
1654 - SAMPLE 55 plate of lobate crust from one of the selvedges in the collapse pit. Plate is 10cm square by 4(?) cm thick. Has driplets on the bottom. Put into White 2A compartment to save space (different appearances should be obvious, both are at the same sample lat/lon)
1701 - off bottom for elevator recovery

April 8 – 1800-2200Z Watch – Jason2 Dive 265

1807 elevator #2 on deck, J2 at west wall of graben, on this watch we'll go
to the south along pillow ridges in the graben floor
1814 2587 m at W rim of graben moving 170 at 0.3 kts
1818 moving ship 10 m east to get more into floor of graben while heading to
WP#1
1822 lots of collapse along rim of graben wall, fresh lobates w/dusting of
sediment on the rim
1830 heading SW to WP#1 over elongate pillows with little sediment
1839 SAMPLE #56, lobate crust at base of northern pillow ridge in graben
floor seen on ss sonar record, 2584 m, 9 9.268'N 104 12.531'W, in white 3a bin
1843 going up constructional escarpment of elongate pillows, 2572 m, sample
#56 was collected at base of the escarpment, presumably on the lobates that form the
graben floor, over which the pillow ridge is constructed
1848 SAMPLE #57, 2573, 2 pieces of lobate bud from top of pillow ridge, very
glassy and fresh, in white 2c bin, 9 9.239'N 104 12.504'W
1853 traversing along pillow ridge in axial graben along summit of pillow
ridge, ridge is ~ 12 tall above graben floor at 2569m depth now
1855 going over narrow <0.5 m wise fissure trending 150, there are elongate
pillows and lobates on the summit of the pillow ridge, fissure may be eruptive –
seeing well-formed lava forms along the fissure margin
1902 DVCAM nip of fissure at 2571 m, moved WP33 150 m to east to avoid LADDER
mooring
1904 running along axial fissure of pillow ridge
1905 trying to sample lobate bud from eruptive fissure
1907 SAMPLE #58, lobate crust from margin of eruptive fissure at 2569 m, in
white 2b bin, 9 9.194'N 104 12.483'W
1912 running along SSE trending narrow likely eruptive fissure on top of
northern pillow ridge, 2574 m
1918 continuing along axis of pillow ridge at 2573 m depth
1920 terrain now lobate tubes, seems a bit newer, glassier?
1925 SAMPLE #59, 2572 to top of pillow ridge, southern end, LARGE PIECE –
ON TOP OF BASKET, 9 9.123'N 104 480W
1930 dropped sample, maneuvering to get it
1932 DVCAM of dropped sample #59 recovery
1944 recovered sample #59, large lobate crust, too large to fit in any bin,
will carry it on top of the baskets
1945 moving to WP3, new position to avoid LADDER mooring
1958 o/c 154, going along fissure that is likely eruptive, 2575 m
2008 DVCAM of anemone on pillow ridge axis at 2578 m, seems like the lobates
here are a bit younger/glassier?
2014 moving SE to WP3
2018 SAMPLE #60 some of the OLDER pillow crust at 2576 m, in blue 2a bin, 9
9.012'N 104 12.397'W
2022 have to move ship ~ 30 m to sample the younger lobate at this site,
we've seen several examples of contacts between older pillowed/lobate flows, and
newer, glassier lobate flow
2023 holding position for medea to move to allow us to

sample
2031 trying to sample newer glassy lobate flow
2032 SAMPLE #61, new glassy lobate bud – 2 PIECES, in blue 1a and blue 2d
bins, 9 9.016'N 104 12.398'W
2038 u/w at 0.3 kts to WP #4
2058 SAMPLE #62 of newer lobate flow, a bud, 2586m, 9 9.849'W, 104
12.407'W, in bin blue 2c
2106 traversing budded lobate and pillow flow at 2580 m headed to WP#4
2124 doppler reset to Jason LBL
2130 moving ship norther 30 mtrying to sample newer flow, fresh lobate
w/black glass
2135 SAMPLE #63, 2575 m, newer black glassy lobate bud, in blue 2b bin, 9
9.825'N 104 12.408'W
2139 heading to WP#5 at 0.3 kts, o/c 154, going over fresh glassy lobate flows
end of watch

Jason 265; April 8 – April 9, 2007; 2200-0200Z; E. Klein

2152 Collapse pit, with lava layers, 4-8 m deep.__
2200 Remarkable collapse structures: multiple collapse pits.__
2205 Lobates, collapse pits, sediment dusting.__
2211 Stopped to try to break up big rock Dan collected; could not,_placed sample it over B2a-d.__
2229 Sampled lobate fragment: 040807-2229; Bin W3b.__
2234 Transiting west, out of depression; lobate flows, collapse_features, fresh, little sediment cover.__
2240 Still moving west; collapse features, pillars.__
2241 Big pillows at base of collapse feature, looked like it dripped_over wall.__
2257 Sampled: 040807-2257; weird crenulated pillow from_top of scarp, dripping over edge of scarp.__
2301 Moving west over pillow terrane; little sediment cover.__
2305 Moving uphill: huge pillows, flocky water from west.__
2308 Terrane more jumbled and fragmented.__
2313 Large pillowsm, often broken and fractured, some thin fissures,_rough relief and terrane.__
2317 Sampled slab broken into three pieces: 040807-2317; Bin W4a, may have strewn over other bins, brown staining on slab/crust.__
2230 Bad nav fixes__
2340 Sampled piece of pillow crust, from pillow ridge,_040708-2340; large pillows that are somewhat flat.__
2352 Vent biota: serpulids, some mussels in large pillows; octopus.__
0001 Huge pillow lava; light sediment but somehow older looking,_fractured pillows.__
0005 Non-eruptive fissure; N-S orientation, ~1 m wide.__0017 Small fissure, large pillows.__
0022 **Sampled crust/slab: 040907-0022;** Bin 4b.__
0026 More serpulids; dead mussles.__
0029 Mussles, some dead; one live riftia; largely extinct hydrothermal_mound.__
0044 **Sampled rock with serpulids; 040907-0029**; Bin B3a.__
0047 Proceeding south, searching for fissures on sonar. Need to stop_to deal with Nav problem.__
0106 Dean mussles, shells, proceeding south, more serpulids.__
0108 Fissure, boulders, fragmented pillows, large.__
0116 Fissure, N-S, non-eruptive, 1-4 m wide, murky water from south.__
0128 **Sampled pillow fragment: 040907-0128;** Bin b4a.__0
130 Nav problems__
0140 Moving south again.

April 9 2007 -- 0200-0600Z -- J2 265 -- White

0145 - on watch, traversing the ridge axis N to S, mostly pillows and lobates, fresh glass with light sed dusting
0200 - spotted some serpulids and dead mussels in cracks. saw distinctive mound-like return in the scanning sonar at 20 m range to the west of the trackline (near WPT 8). moving to investigate.
0205 - Medusa Vent, hydrothermal vent mound complex about 4-5 m tall, including one active orofice with black smoke and possible diffuse flow from several points along the base of the mound. one spire off to the side seems totally dead. Dead worm tubes, a handful of live Alvinellids, live mussels, and brachyurans. Stauromedusae are relatively abundant here.
0218 - nice video of a big amphipod swarm
0228 - probing the orofice with a thermometer. highest recorded temp is 320C.
0312 - Reset DVL using Medea fix to improve position of vent. Medusa Vent is 9 08.4186'N, 104 12.3953'W
0320 - reconnoitering vent field. seems slightly longer N-S than the J2 tether with Medea parked over the smoker, and a little less wide E-W than long.
0350 - very wierd rock formation, maybe a push-up or pressure ridge
0356 - driving around the outcrop, lots of biota but no visible venting
0358 - releasing elevator and driving to recover
April 9 – 0600-1000Z Watch – Jason2 Dive 265
0610 maneuvering around elevator deployed with water bottles as previous
watch found a hiT vent at 9 8.4187'N 104 12.3954'W
2572 depth
0614 DVCAM of elevator/basket operations on lobate flows on the west margin
of the axial graben
0617 DVCAM of lobate terrain
0627 large #59 sample was put on top of B elevator bin
0633 putting the other water bottles on basket to clear elevator of stuff
0640 finished putting rocks in elevator, getting water basket on Jason basket
and then will pull release
0650 moving medea to SE 100 m to clear so elevator can surface
0657 elevator released, headed back to vent to scope it out, DVCAM of
elevator release and DVCAM of vent area
0743 moving back to NW to recover elevator with ship
0910 elevator on deck, sorting rocks and then re-rigging it, moving back to
vent site to set up for water sampling.
0920 karen up and on watch to direct water sampling

Jason 265; April 9: 1000-1400Z; E. Klein__

955 (Medusa hydrothermal vent discovered on previous watch). Came on watch with majors water sampler in baskets, taking temperature measurements._
1009 T= 326.6 C_**1010 Sampled small sulfide piece** from near mouth of vent; **040907-1011 (perhaps noted in event logger as 1010)**; Starboard bin 1._
1014 Getting red majors sampler._
1038 Sampled vent water with red majors sampler; T= 329 C_
1121 Sampled vent water with blue majors sampler: T= 329 C_
1127 Excavating to get a better orifice._

1138 Sampled vent water with Purple majors sampler: T= 334-342 C_
1211 Sampled vent water with Black majors sampler: (had difficulty getting good T; the two snorkels came apart)._
1218 Sampled tubeworm casings, possibly with sulfide._
1224 Sampled extinct chimney structure, large: **040907-1224**; Starboard bin 2._
1237 Sampled basalt that forms substrate for chimney: 040907- 1237; port bin1._
1247 Riftia observed_
1252 Moving southeast to deploy elevator; pillow lavas with serpulids._1
309 Deployed elevator_
1310 Rest of watch spent waiting for elevator and photographing staraemedusae.

J2-246, April 9 2007, 1400-1800Z watch, White et al.

1345Z - On watch. Must go to elevator, swap water bottles for rock boxes, and proceed down ridge axis as far as time allows.
1400 Z - waiting on elevator. proceeding to explore diffuse vent field. The lobes are very hemispherical sort of 2 m across.
1408Z - Diffuse flow vent with large tubeworms (Tevnia or Riftia?) along intersections in lobate terrain, more stauromedusae, anemones, and some sort of bivalves.
1415Z - At elevator: change out bottles for crates
1530Z - Elevator released and rising, tracking elevator with ship.
April 9 – 1800-2200Z Watch – Jason2 Dive 265
1725 #3 elevator on board, Jason is at 200 m altitude, now going back down
and getting medea position sorted out
1737 switching DP control from ship to van, position of medea is west of west
rim of graben
1740 100 m altitude heading down
1750 ~10 m altitude
1751 on lobate flows w/some sediment cover
1753 reset Doppler to Jason LBL
1759 DVCAM snip of landing site on lobates after elevator evolution
1804 SAMPLE #74, pillow crust west of west rim of graben 2567m, 9 8.395'N
104 12.664'W, in white 3d bin, large elongate pillows and tubes snaking downslope
1808 0/c 068 towards vent site
1813 at west graben fault step, outermost step
1814 SAMPLE #75, 2562m 9 8.405'N 104 12.643W, at step in west graben wall,
can see large tubular pillows, elongate, flowing into graben, in white 3a bin
1820 at west rim of graben, major fault 10-12 m tall
1823 on sedimented lobates in graben floor, appear older than further north
terrain, 2592 m depth
1827 looking to sample sed. covered lobates on floor of graben
1831 traversing ENE to sample sed. covered lobates
1838 SAMPLE #76, 2587 m, 9 8.412'N 104 12.539'W of collapsed lobate
terrain on floor of graben, with some sed. cover, in blue 4b bin
1841 just crossed into fresh sheet flow on graben floor
1843 SAMPLE #77, 2597m, 9 8.412'N 104 12.516'W, curtain folded sheet
flow, sampled a fold of the flow surface, in white 3c bin
1845 traversing large collapse features with pillars and remnants
1848 headed east to vent site over lobates and collapse features
1849 DVCAM of anemones on collapse in floor of graben, extensively collapsed
terrain
1856 VERY collapsed terrain
1857 at contact with pillow ridge flows in front of us, to the east, coming
off west flank of pillow ridge.
1859 SAMPLE #78, 2599 m, pillow bud from new flows coming off pillow ridge,
very glassy, in white 3b bin, 9 8.416'N 104 12.434'W
1901 going up constructional escarpment of pillow ridge, glassy lobates and
pillows
1902 DVCAM going up the const. escarpment of pillow ridge, 2591 m, starting
to see serpulids and elongate pillows
1904 DVCAM of anemone and serpulids
1905 lots more serpulids, 2581 m depth
1907 DVCAM of anemones
1910-18 DVCAM of vents sampled by fluid samplers last night, northern field
1936 sampling biology south of vents
1940 SAMPLE #79 in BIOBOX, riftia, tevnia, mussels, 9 8.412'N 104 12.386'W
2000 finished sampling
2005 doppler reset to Medea LBL
2009 SAMPLE #80 – 2 calyptogena clams, in white 4B bin 9 8.405'N 104 12.394'W
2016 DVCAM of anemones and flow surface
2019 DVCAM of anemones and flow
2023 SAMPLE #81, 2578 m, lobate pillow crust 9 8.345'N 104 12.390'W, in
blue 1a bin, large sample
2027 DVCAM of stauromedusae, 2578 m depth
2030 fresh lobates and pillows, lots of buds
2033 SAMPLE #82, 2582m, 9 8.299'W 104 12.392'W on fresh lobate budded
flow, in bin white 4a, 2 pieces
203745 reset Doppler to Jason LBL
2051 SAMPLE #83, 2590 m, from elongate lobate/pillows, not as glassy as
previous sample, older?, 9 8.207'N 104 12.283'W, in white 3b bin
2055 collapse in lobate terrain
2112 SAMPLE #84, lobate bud from newer flow, 2589 m, 9 8.148'N 104
12.378'W, in white 2C bin
2123 continuing south to WP 10, more serpulids on glassy lobates, 2582 m depth
2130 SAMPLE #85, from eggshell pillow crust, 2583, 9 8.072'N 104
12.363'W, in white 2c bin, serpulids on the sample from a glassy flow
2134 c/c to WP #11, moving at 0.3 kts to sSW to get off the serpulid glassy
flow
2135 DVCAM of budded flow, no serpulids now
2144 2585 m o/c200 to WP 11
2152 flows going over west facing scarp, can see scarp in the sonar, ~ 3-5 m
high, 2597 m
2157 SAMPLE #86 pillow bud from flow over scarp, in white 3d bin, 9
7.950'N 104 12.381'W
2200 end of watch

April 9-10 – 2200-0000Z Watch – Jason2 Dive 265
Adam's notes from part of Emily's watch

2206 arrived at W-facing fault scarp with multiple steps, lots of talus
2207 changed LBL baseline to BC (CCW)
2212 Talus is comprised of broken plates (lobate) and minor broken pillows
2216 Reset doppler to Medea
2217 Faults oriented N-S
2220 Another 2 m high fault scarp, W-facing, oriented N-S
2222 E facing fault with pillow x-sections, 13 m high, out of graben?
2223 Lobates on top of fault scarp w/ large, but shallow collapse
2227 Sampled lobate crust fragment in collapse pit of lobate flow (87, in
B4A)
2228 Large collapse, ~3-5 m deep with pillars
2233 Lobate flow, low relief, sed in pockets at bottom of graben
2235 Large, 30 m across collpase filled with broken lava ~2.5-5 m deep.
2240 Sheet, smooth at base of collapse
2241 Curtain folded sheet flow, flow direction is N-S based on lineations
and fold orientations
2245 Sample of ropey fold from sheet flow (88, in B1B).
2247 Came out of collapse back into sedimented lobate flow.
2250 Lots of small collapses ~1m across.
2254 Sedimented lobate
2302 Sedimented lobate, w ~2 m collapse
2308 Elongate pillows with corrugations
2314 Sample of elongate pillow crust (89 in B3C)
2318 Removing a plate
2323 Heading W up fault scarps
2334 Coming on E facing fault scarp oriented N-S
2337 Elongate pillows
2339 Reset doppler to Medea
2340 Small section of sheet flow
2344 Large elongate pillows, broken up pillows, highly variable terrane
2349 Sampling large pillow on top of E facing fault (90).

April 10 – 0000-0200Z Watch – Jason2 Dive 265
Stood part of Emily's watch

0002 going over sediment covered lobates at 2601 m
0005 gnarly folded hackly flow, stopping to sample it
0006 SAMPLE #91, 2603 m 9 7.686'N 104 12.608'W, in blue 3b bin
0010 contact between hackly and larger tubular flows
0012 Doppler reset to Medea LBL, previous fixes for a bit probably off by 30
m or so
0014 going over collapsed lobates with sed. cover
0015 going up constructional escarpment
0019 going up talus ramp with some pillows and sediment
0021 at 2579 m going up slope
0022 going over W. graben rim, 10-12 m of relief on step
0025 on floor of graben, inflated pillows and elongate tubes on the graben
floor
0029 traversing fissured terrain
0035 at 2592 m, 5 m altitude
0036 going over curtain folded sheet flow at 2597 m depth
0037 SAMPLE #92, hackly curtain folded flow, 9 7.640'N 104 12.489'W in
blue 3b bin **NOTE – SAMPLE 91 AND 92 IN SAME BIN, 91 SHOULD BE UNDER 92
0045 o/c for WP #14 ESE going over curtain folded sheet flow
0055 SAMPLE#93, at WP#13, hackly sheet flow, 2600 m, 9 7.596'N 104
12.413'W, in bin Blue3a
0056 now over smooth sheet flow w/some sediment
0100 budded pillow flow
0101 SAMPLE #94, budded pillow at 2600 m in blue2c bin 9 7.578'N 104 12.388'W
0118 slightly newer looking pillows
0123 budded pillows at 2591m
0124 SAMPLE #95, 2590 m, bud of pillow flow, 9 7.511'N 104 12.317'W
0131 doppler reset to Medea LBL
0142 2572m going up constructional escarpment
0145 seeing narrow, 0.5 m wide fissure in pillow ridge
0147 SAMPLE #96, sample from margin of fissure on top of pillow ridge, lobate
crust, in white 1a bin, 9 7.422'N 104, 12.295'W

April 10 0200-0600Z Watch Log

0150 - Watch handoff from Dan F to SW, in process of taking a sample of lobates from
fissure on top of small ridge centered in larger axial graben
0200-0212 - sliding off of the crest of the small ridge as we drive southeast into the
eastern half of the graben. large pillows, light sediment starting to fill pockets, maybe
glass present.
0212 - SAMPLE 97 piece of lighter lobate/pillow kind of feature, this rock has a somewhat
lighter color than others we have seen
0230 - c/c to move east, still in pillows and still unsure about glass
0245 - small collapse in lobates, 2-3 m in diameter
0254 - small fissure
0305 - on floor of the graben east of the axial pillow ridge, and the lava is much
fresher and glassier on the graben floor. pillows are small and with many glassy buds.
0315 - wax core taken with WHITE corer, logged as SAMPLE 98, got plenty of glass from
this flow. tried a few times to snag a pillow bud, but it was too friable.
0317 - suddenly out of the glassy pillowson onto more evenly sedimented lobates, flow
contact not obvious (need to review tapes)
0335 - flow contact clearly visible, toey lobates over sheets
0337 - SAMPLE 99 from sheets adjacent to the flow contact
0340 - reset doppler to LBL
0350 - SAMPLE 100 collected a few 10' m inboard of the flow contact but still within the
same flow as the lobates. flow has changed facies a few times but still presumed to be
same flow.
0350-0415 a series of four scarps all down to the west, first two are ~10 m, next is 8 m,
and last is 20 m. talus at the base followed by a near-vertical wall
0415 top of scarp is pretty big pillows, sediment pockets formed
0419 reset doppler fix after climbing walls
0420 - yet another scarp, this one is 5 m
0425 - SAMPLE 101 of the top of a knife-edged ridge. Sample is a part of the large
crusty lobates found there, continuing east to look for the end of the talus.
0459 - SAMPLE 102 from the outcrop at the edge of the talus field, a large kind of crusty
pillow.
0504 - starting water-column tow back to the axial graben (wpt 21) at 0.5 knot. should
take 1 hour to complete

0600 - watch change
April 10 – 0600-1000Z Watch – Jason2 Dive 265
0603 doppler reset to Jason LBL
0606 stopped at WP#21, budded pillow flow, looking to sample
0611 SAMPLE #103, bud from pillow flow, glassy, in bin Blue2a, 2593 m,
6.722'N 104 12.136'W
0614 at 2589 m depth, c/c to 135, SE to traverse ~ 150 m to go over sonar
feature, inflated, sagged flow
0622 o/c 130 to WP
0627 going over glassy lobate flow at 2592 m depth
0629 DVCAM of medusae on sed. lobate flow
0632 on older lobate flow now
0635 SAMPLE #104, in White 1b bin, 2594 m, older lobated crust, 9 6.724'N
104 12.094'W
0637 now over hackly flow, contact with lobate flow
0640 SAMPLE #105, in White 4b bin, 2589 m, from SE edge of tadpole sonar
feature w/sagged top, 9 6.714'N 104 12.091'W
0649 o/c WSE at 0.4 kts to WPR#22
0650 back in older lobate/pillow flow w/sediment
0652 newer looking pillow flow w/glassy buds, DVCAM snip
0702 2588 m, going up east side of axial pillow ridge
0715 east-facing scarp about 2-3 m high with budded flow ponded against it,
DVCAM snip
0718 2602 m depth, deployed elevator #4
0725 DVCAM of budded pillow flow on west side of axial pillow ridge
0733 SAMPLE #106, glassy lobate pillow bud, from top of pillow ridge east of
WP#22, 2591 m, 9 6.666'N 104 12.196'W
0828 at Elevator #4 drop site, transferring baskets
0833 white basket in A bin on Elevator #4
0845 maneuvering at elevator
0851 other basket stowed in B bin on elevator
0900 pulling elevator release pin
1100 elevator on surface and recovered

April 10, 2007; 1000-1400Z. Klein

1130 Arrived on watch late because elevator recovery took place over early part of watch._
1136 Repositioning to site 9 6.656N 104 12.201 W. We will move south along the elevated ridge we are currently on._
1221 On station; waiting for Medea to swing in under ship._
1232 Resetting Doppler_
1233 Bottom visible: pillow lavas with buds, light sediment dusting, glassy. Heading 250 m south at 0.3 kts._
1239 Delicate pillow buds_
1258 Huge pillow lavas, light sediment dusting._
1301 Different looking flow, decided to sample._
1304 Sampled glassy crust on pillow; 041007-1304, bin R2a._
1315 Coming down off platform to the south._
1319 Heading west toward WP24_
1328 Small scarp, oriented ~160._
1328 Lobate flows, glassy, sediment dusting. Heading southwest toward place where new flow overprints N-S scarp on side-scan._
1331 coming off ridge, less relief, older looking, more sedimented, sediment in pockers._
1337 Lobate flows, sediment in pockets.
Apr 10, 2007 -- 1400-1800z -- J2-246 -- White
1350 -- On watch, finishing a detour to west of the ridge axis begun on previous watch, speed 0.3 kt, heading 235.
1400 -- Going down a gradual slope, large pillows with slight sediment coating, some glass, only bio is sponge
1424 -- Sample 108 taken. Brick-sized block of older large pillow. An off-axis representative sample.
1438 -- slightly glassier, may be due to slope changes
1459 -- Sample 109 taken. Flat pieces from big 2m diameter pillow with little hairs of some kind of critter growing on the crust.
1510 -- A fish swam into the basket, checked out one of the samples, then swam away.
1530 -- Transition from pillows to lobates occurring about now. Some push-up blocks, ridges and tiny tumuli in the lobates.
1551 -- First glass seen since we moved off axis around 1500, possible contact with some sort of axis flows
1606 -- Now back into older stuff, no glassy reflections
1618 -- Sample 110 a cube-shaped block from a large older pillow just to the west of the contact with the younger/glassier flows
1632 -- Sample 111 glassy toe from the younger flows. Glassy flows of toey-lobates. Moving to explore exetent of the flow field.
1720 -- Sample 112. Blue wax core from glassy stuff just slightly off the younger looking flows. Only a few glass chips recoverd.
1735 -- Sample 113. Glassy toe of lobate from the younger-looking flow. Accidentally dropped into box Red 2A with another glassy pillow toe.
1741-- Reset Doppler to LBL nave on J2. Reset net to B-C-H
1757 -- Sample 114 older looking flow being covered by the fresher glass flow. Big cylindrical piece with glass intact.
1803 -- Sample 115 younger looking lobate. very fresh, thick glass that was hard to pick a sample
1809-1821 -- flying around younger flow. this flow is thin (10 cm thick?) and patchy with lots of kipukas.
1821-1845 -- flying south and traversing the flow E-W to image flow boundaries. Several contacts found in this manner. Flow is neither wide nor thick, but does extend along-axis quite a ways.
1840 -- good image of eruptive fissure, young flows within the fissure.
1845 -- turn over watch to Dan F

April 10 – 1800-2200Z Watch – Jason2 Dive 265

1852 2581 m on new flow, at contact with older lobates, most of new flow
appears to be east of Jason track
1857 SAMPLE #116, 2586 m, of new flow, glassy bud, in Red 2D bin, 9 5.683'N
104 12.111'W
1901 c/s increase to 0.3 kts, zig zagging east-west to see if we continue
crossing new budded lobate flow
1902 off new flow onto older sed. dusted lobates
1904 DVACM of new/old contact
1906 doppler and Medea LBL are good
1908 SAMPLE #117, large, older pillowed flow surrounded by younger budded
lobate glassy flow (sampled at #116 site), in red 2C bin, 2587 m, sample is from
eggshell collapsed pillow, DVCAM snip of it, 9 5.640'N
104 12.103'W
1913 reset Doppler to Medea LBL, no traversing older pillowed/lobate flows
with sediment cover
1921 continuing south over variably older lobate and some tongues of new
lobate budded flow
1925 SAMPLE #118, 2600 m, older lobate bud at contact

with new lobate flow,
in yellow 1c bin, 9 5.572'N 104 12.112'W
1937 going over older pillowed terrain
1939 SAMPLE #119, new flow, budded lobate, goes with Sample#118 for across
contact relationship, in yellow 3a bin, 2589 m, 9 5.513'N 104 12.109'W
2005 near WP#34 at 2592 m depth o/c 180 0.3 kts, going over sed. dusted
lobates
2007 at contact between young and old flows
2010 trying to sample at contact with new flow at 2596 m
2014 SAMPLE #120, older pillow crust near new/old flow contact, 2597 m, in
yellow 3B bin, 9 5.343'N 104 12.107'W
2017 young lobate flow with some orange staining in sediment adjacent to the
terminal lobes
2018 SAMPLE #121, new flow pillow bud, goes with Sample #120 in terms of
across contact relationship, in yellow 3b bin, 2593 m depth, 9 5.315'N 104 12.108'W
2033 SAMPLE #122, new flow pillow finger/bud, 2594, 9 5'239'N 104
12.106'W, DVCAM snip of sampling site
2038 now on older lobates
2046 traversing older bolster shaped pillowed flow
2050 nice eggshell pillow in DVCAM snip, trying to sample crust of it
2051 SAMPLE #123, eggshell pillow crust, 2595 m, in yellow 3c bin, 9
5.151'N 104 12.108'W
2108 now getting Medea LBL, for the last 30-45 min, we were not getting LBL
because of shadowing from adjacent ridge
2110 reset Doppler to Medea LBL
2118 traversing hackly flow with large pillow/tubes overlying it
2120 SAMPLE #124 of hackly flow surrounded by larger inflated pillows and
elongate pillows, 2611 m, samples is 2 pieces in red 4b bin, 9 5.079'N 104 12.095'W
2128 SAMPLE #125 of older pillow crust nearby where Sample #124 was taken, so
samples can be considered a contact pair, in red 4a bin, 2607 m, 9 5.055'N 104 12.085'W
2142 SAMPLE #126, pillow bud from older lobate flow, 2609m, in red 4d bin, 9
4.968'N 104 12.077'W, DVCAM snip

Jason 265 April 10-11, 2007; 2200-0200Z; Klein

Heading 168 on ridge (doesn't correspond well to bathymetry, but does correspond to side-san record of riddge.
Lobate flows, sediment dusting, somewhat older looking.
N-S oriented fissures; heading slightly east to determine if this is the spreading axis.
Looking a little younger in terms of buds, although sediment still significant, in pockets.
Pillow, mush, sediment in between, huge pillows.
Definately younger looking, less sediment.
Little sediment, cover on pillows.
Sampled pillow bud 041007-2247; placed in Bin R2a; there is another sample in there (a crust, very different).
Sediment accumulation in a local depression.
Heavily sedimented lobate.
Reset Doppler to Jason LBL.
Heading up hill into sedimented pillows.
NS scarp; unknown how deep.
NS oriented ridge.
Wide (6 m) fissure with some offset.
Sedimented pillows.
Sampled heavily sedimented pillow lava 041007-2352; Bin R4c. some fell in bin R3a.
0001 more ornamented pillows.
0009 large pillow lavas
0030 lobate, heavy sediment.
0034 Series of fissures, N-S, non-eruptive.
0037 Fissure, small N-S.
0039 The visible area appears to be increasing in number of pillows.
0047 Sampled pillow crust; **041107-0047;** Bin R3a – it's a slab.
0050 Reset Doppler to Jason LBL
0051 Small N-S fissure.
0122 **Sampled huge pillow fragment 041107-0122**; bin R3b.
0129 NS fissure.
0132 Oldish looking pillow lavas; draping to the east.
0136 Reset Doppler to Medea LBL
0146 Fissuree NS
0148 Hydrothermal staining.
End of Jason dive 265

<u>April 11– 1800-2200Z Watch – Jason2 Dive 266</u>

1837 J2 in the water and going down
1854 reset date/time on Scorpio digital still camera
1920 ALL STOP WITH THE WINCH – loose strand in the FO cable and wire
birdcaged in the winch room before traction wheels
1930 engineers cutting off strands in the winch room at 617 m wire out
2025 birdcage of loose strand removed, end taped, hauling in to find other
end and assess situation
2046 hauling in to find other end of strand
2101 other end of broken strand found at 214 m, taping it off
2107 bottom end of broken strand taped off, paying out at 20 m/min to go back
down and tape other end better, then continue with the lower. Assessment is that losing
1 strand will not negatively impact cable
2130 at 632 m and taping other end of broken strand
2140 headed down at 20 m/ min
Jason 266, April 11-12, 2007,_2200-0200Z; Klein__
Beginning of Jason_watch was delayed due to cable problem.__
2254 On bottom; pillows with sediment in pockets.__
2258 Trying to get LBL fix.__
2302 Sample collected, pillow bud 041107-2302; bin R2a.__
2305 Reset Doppler to ship's position.__
2306 Getting underway at 0.25 kts. Fairly young looking for this far_south and east.__
2323 Came into a somewhat more sedimented area.__
2326 Fissure – 360 orientation- narrow, non-eruptive.__
2337 Isolated pillows with lots of buds.__
2339 Came into more pillow coverage.__
2341 Sampled pillow bud 041107-2341; oldish. Bin R2b.__
2349 Fissure 010__
2352 Fissure, NS trending, pillow lavas, no LBL, switched baseline to_B-C.__2
2356 pillows, sediment in pockets, possible glass.__
2357 another fissure ~1m wide, NS trend.__
0003 Fissure swarm, wide fissures.__0012 Fissure swarm, possibly eruptive.__
0022 **Sampled pillow fragment next to eruptive fissure._041207-0022**. Bin R2d, wedge, old.__
0028 Reset Doppler to medea LBL.__
0029 Another big fissure; 5-6 m wide, 340 orientation.__
0035 Heavily sedimented pillows with buds.__

0037 Cahnged LBL baseline to AC CCW.__
0041 Fissure, non-eruptive.__
0046 ~7m wide non-eruptive fissure, NS.__
0047 LBL baseline to BC, CCW__
0051 Non-eruptive fissure.__
0053 NS non-erupt. fissure__
0055 NS non-erupt. Fissure, 10 m wide, 6 m deep.__
0105 NS fissure__
0107 NS fissure, 15 m across.__
0112 Heavily sedimented pillows (2638 m depth).__
0116 heading uphill __
0120 Sample 041207-0120; pillow bud on mound of_sedimented pillows, in R2c.__
0130 on mound, heavily sedimented.__
0140 Pillow lava with buds, heavily sedimented all around.

April 12 -- Watch Log & Summary -- 0200-0600Z -- J2-266

Summary: On this watch we crossed the ridge tip of the eastern OSC limb at lat 9 02'N. We completed ~2 km of track, including imaging several pillow mounds and zones of fissures. In general, the sediment cover decreases and the amound of "decor" on pillows increases toward the west, suggesting the locus of volcanism near the OSC nodal basin. 5 rocks and 1 wax core were collected.

0150 On watch at the coordinate 9 1.81'N, 104 11.72'W
0150-0200 Pillows, no glass visible, sediment ponds between individual pillows.
0204 two fissures, both trending 208deg ~1 m wide
0209 Scarp 8 m high, trending 010deg with fissure at the base of the scarp
0222 up two steps in the terrain, 8 m and 20 m respectively, good image of face on 2nd scarp. mostly pillows
0226 SAMPLE 5 slab of crust from older pillow near the top of scarp, no visible glass, nice texture on top
0233 Scarp
0245 Older pillows, patches of yellowish material like iron oxide weathering
0230-0245 A few low ridges of pillows that crop out among thicker sediment ponds, no glass seen
0318 SAMPLE 6, small triangular piece of crust from larger pillow
0340-0355 Passing over several fissures <1 m wide, and larger scarps, again the N-S or NNE-SSW orientation
0355 Wall of pillows cut by faulting on both sidess, ~7m tall only 1-2 m wide
0428 SAMPLE 7 piece off of tube draining out of older looking pillow
0430-0438 passing over several small tectonic fissures
0439 Pillows with lots of buds and probable glass, slightly less sediment, more of an even dusting than a coating or sed pockets
0459 wax core, SAMPLE 9, some confusion about either blue or green/white.
0518 Fissure
0530 the Axial Fissure at least as interpreted on side-scan. 10 m wide and 10 m deep.
0537 Pillow toe, cylinder shape with 10 cm diameter and some glass flaking off while in the manip
0545 end of watch

April 12– 0600-100Z Watch – Jason2 Dive 266

0551 o/c 300, 2646m, god medea and Jason LBL
1557 going up constructional escarpment, 2643 m
0600 2633 m, looking to sample pillows flows on this escarpment
0610 SAMPLE #11, pillow bud from the flow on the constructional escarpment
we've been ascending, in yellow 3b bin, 2630 m, 9 2.052'N 104 12.671'W
0611 switched to G – 9.5 and C-11.5 transponder pair for LBL nav
0623 at top of constructional escarpment at 2606 m depth, will sample here
and then proceed east to WP#14
0625 DVCAM of haystack of pillows, possible vent? Rooted or rootless?
0627 SAMPLE #12, 2603 m, pillow bud from haystack, in yellow 3a bin, 9
2.097'N 104 12.704'W
0632 u/w at 0.4 kts to transit east to WP14
0700 traversing to WP14, pillowed flows with sediment, now going up small
cone just south of WP13 on sonar record
0712 2652m, heading east
0715 switch xponder pair for Medea LBL to d&G 10.0 and 9.5
0716 crossed 1-2 m wide fissure in pillowed terrain w/ sediment dusting, 2662 m
0720 SAMPLE #13, 2667 m, pillow bud in yellow 3c bin BUT VOLUNTEER IN YELLOW
3A BIN TOO, 9 2.126'N 104 12.484'W
0725 now headed 320 to WP#15
0728 headed to NNW up pillowed constructional terrain/ escarpment
0741 reset Doppler to Medea LBL at 2659 m
0745 DVCAM of brittle stars on sponge? Snipped piece and put in yellow 2a bin
BUT DID NOT GIVE A SAMPLE NUMBER TO IT AS NOT SURE IT WILL SURVIVE
0752 2671 m, o/c 320, crossing pillowed flow terrain
0754 crossed narrow < 1 m wide fissure
0759 stopped to sample flows here
0800 SAMPLE #14, 2679 m, in yellow 3d bin, pillow bud, DVCAM of sampling, 9
2.232'N 104 12.495'W
0808 u/w at .25 kts o/c 340 going up slope, pillows w/ sediment
0823 2644m
0826 2641m, budded pillow flow dusted w/sediment
0831 now getting Medea LBL 9.5/11.5
0832 SAMPLE #15, 2635m, pillow finger from budded pillow flow, 2 pieces, in
yellow 1d bin, 9 2.306'N 104 12.567'W
0835 reset Doppler to Medea LBL
0840 u/w on 010 at 0.3 kts
0853 o/c 010, 2624 m, crossing pillowed flow dusted w/ sediment trying to find
fissure seen in sonar data
0856 glassy pillowed flow w/sed dusting at 2625 m depth
0901 heading NNE, sed. dusted lobates and pillows
0908 2628 m
0910 SAMPLE #16, 2626 m, pillow bud from newer glassy flow just traversed, in
red 4a bin, 9 2.441'N 104 12.597'W
0916 2612 at top of ridge
0918 c/c to 025 to explore area east off the flank of the ridge
0931 c/c to head for ss cone target and plume target 2621 m, traversing
pillowed flow with buds, glassy, w/dusting of sediment.

April 12 -- Watch Log & Summary -- 1400-1800z -- J2-266

Summary: On this watch, we completed the high-altitude fast transit to the intersection of the North Central Basin Ridge with the EPR east limb at ~9 04'N, and began the transect to the northwest. We actually spent most of this time between the two ridges, and did not see any indications of recent volcanism. Three rocks were collected.

1350 -- On watch. In water column ~100 m off and in tow

mode.
1530 -- tow mode. starting down.
1540 -- bottom sighted. pillow lava, sediment pockets, no glass visible. Doppler reset to LBL fix. On bottom point at 9 04.416'N 104 12.70'W
1557 -- SAMPLE 19. angular block of pillow from a somewhat weathered outcrop near landing site
1600 -- starting run WNW to waypoint 1 at south end of North Central Basin Ridge, pillows, heavy sediment, no visible glass
1620 -- pillow haystack
1625-1630 -- talus
1702 -- SAMPLE 20, large pillow bud from basin between EPR axis and N. Central Ridge
1720 -- Now on top of diagonal connector part of the N. Central Ridge. Geology looks pretty similar to the basin.
1735 -- SAMPLE 21 large sample of pillow rind from broken pillow.
1745 -- end of watch

April 12– 1800-2200Z Watch – Jason2 Dive 266

1755 o/c to WP#1 u/w at 0.3 kts
1800 c/c to go to WP#2 to sample that location, 2795 m, going up pillowed
escarpment with buds
1809 SAMPLE #22, stopping to sample at edge of const. escarpment with budded
pillows, 2783 m, in yellow 4b bin, 9 4.767'N 104 13.129'W
1811 resetting Doppler to Medea LBL
1822 ascending next constructional platform based on position and bathy,
going over sedimented pillow terrain, 2757 m
1825 at 2760 m, stopping to sample pillows
1831 SAMPLE #23, pillow bud at 2757 m, 9 4.850'N 104 13.192'W, in red4D bin
1835 o/c 330 to WP#4 at 0.4 kts going over sediment covered lobates
1838 reset Doppler to Jason LBL
1850 o/c 335 at 0.4 kts over sedimented pillow flows
1900 DVCAM of stalked crinoid
1907 SAMPLE #24, 2769 m, pillow finger, end of it, in red 4c bin, 9 5.041'N
104 13.295'W
1913 headed north over small pillow flow with buds at 2767 m
1922 2758 m
1929 SAMPLE #25, pillow flow, 2775 m in red 3a bin, 9 5.161'N 104 13.326'W
1945 2763 m, going up pillow and talus slope
1952 at 2745 m going up constructional escarpment
1954 2738 m, talus
1958 at 2701 m, pillow and tube escarpment, with sediment
2002 SAMPLE #26, 2700 m pillow bud, in yellow 1a bin, 9 5.334'N 104 13.361'W
2008 seeing collapse in lobate flows on top of a small mound, lots of
sediment, good Medea and Jason LBL fixes
2010 reset Doppler to Jason LBL
2026 at 2710 m, going downhill slightly, pillows and lobates with lots of
sediment cover
2027 c/s down to 0.3 kts
2039 going up escarpment at 2706 m
2042 SAMPLE #27, pillow crust at 2699 m, in yellow 4a bin, DVCAM, 9 5.584'N
104 13.479'W
2045 tossing out plate from basket for trim
2049 DVCAM footage
2100 SAMPLE #28, 2690 m large tube crust, in red 1b bin, 9 5.669'N 104
13.508'W
2106 o/c 330 at 0.3 kts
2116 at 2701 m
2122 SAMPLE #29, pillow finger at 2708 m, in red 3B bin, 9 5.775'N 104
13.551'N
2131 DVCAM panorama at elevator site, WP#11, 2723 m
2136 end DVCAM video - GREAT ANEMONE VIDEO
2140 elevator #5 deployed from ship
J266; April 12-13; 2200-0200Z; Klein_
2145 Came on watch when elevator was soon to be deployed._
2331 Elevator (with rocks) released from bottom, on its way up. Expected recovery 0120._
0012 Relatively fresh looking pillow lavas; light sediment._
0019 Pillow buds, light sediment,_
0130 Elevator on deck._
0135 Waiting for ship control._
0146 Heading toward WP13._
0149 Seeing bottom. Pillow lavas, buds, but a little oldish looking with sediment dusting._
0150 Reset doppler.

April 13 -- 0200-0600Z watch -- J2 266 Summary & Watch Log

0200- start watch just after recovering elevator. proceeding back to planned transect at 9 6.07'N, 104 13.60'W on central ridge in north OSC basin. All bulbous pillows, decorations, heavy sediment
0215- SAMPLE 30 from a pillow toe in a long cylindrical piece 9 06.085'N 104 13.613'W
0245- SAMPLE 31 pillow bud, possibly glassy from a somewhat younger appearing outcrop 9 06.183'N 104 13.604'W
0256- temporarily lost visual of the bottom due to altitude
0300- back in visual contact with seafloor
0308- heading upslope in pillow talus
0318- talus now changed to intact pillows and entrail lava
0330- break in slope, pillows
0337- SAMPLE 32 on top of plateau volcano to SE of big flat-topped volcano. loose piece of lobate broken up in place. Mostly the top is pillows, pillow buds, and sed pockets
0414 - SAMPLE 33 of a lobate toe. Lobate lava flows dominate this part of the summit plateau 9 06.4'N 104 13.8'W
0415-0445 top of seamount is lobate lava flows, heavier sediment as we move northward. a few small meter-scale collapses are seen
0459- SAMPLE 34 lobate crust from the older lobate flows at the summit plateau 9 06.53'N, 104 13.8'W

April 13– 0600-100Z Watch – Jason2 Dive 266

0602 traversing sediment covered lobates and budded pillows at 2781 m
0604 reset Doppler to Jason LBL
0605 SAMPLE #35, 2781 m, pillow outcrop in sedimented area, in blue 2B bin, 9
6.670'N 104 13.612'W, DVCAM of sampling
0629 traversing sed. covered pillows 2764 m
0637 SAMPLE #36, 2775 m, pillow bud, in blue 2a bin, 9 6.759'N 104 13.476'W
0641 at 2798 m going down escarpment slope heading NE
0650 traversing sed. covered lobate flows
0701 now seeing hackly flow in heavy sediment cover
0707 Kraft manip. Jaw not functioning properly
0709 SAMPLE #37, 2795m, hackly crust in flat sedimented area, 9 6.856'N
104 13.346'W, in bin white 2b.
0718 at fault that also appears in sonar data near WP18
0720 SAMPLE #38, lobate crust from top edge of fault scarp seen in sonar data

at WP18, 2794 m, scarp is ~12m tall, in blue 3a bin, 9 6.888'N 104 13.309'W
0730 increase speed to 0.5 kts o/c north to WP19
0736 seeing broken pillow flows in heavy sediment cover, 2784 m
0739 SAMPLE #39, 2782m, pillow crust, DVCAM of octopus by sample site, in
blue 1d bin, 9 6.960'N 104 13.279'W
0742 hackly and pillowed flow in heavy sediment terrain
0744 to 0748 N-S trending fissures, eruptive? Could be, well formed pillows
long the fissure trace – DVCAM of scene
0748 switch xponders to 11.5 and 10.0
0750 pillows in heavy sed. cover
0755 narrow, N-S trending fissure at 2771 m
0802 doppler reset to Jason LBL at 2757 m, pillows in sediment
0822 2723 traversed small fissure
0823 c/s down to _ knot
0828 trying to sample but manip grip is still a problem
0832 SAMPLE #40, 2727 m pillows in sediment, in white 2a bin, 9 7.370'N
104 13.285'W
0845 2747 u/w at 0.4 kts to WP19, small pillows in heavy sediment cover
0848 DVCAM of small pillow mound at 2740 m, heading north at _ kt
0854 going over pillowed flow fronts at 2753 m
0857 at 12 m high E-facing scarp
0900 SAMPLE #41, from top edge of E facing scarp, 12 m high, large piece of
lobate crust, in white 3a bin, 2745 m 9 7.549'N 104 13.283'W
0905 2755 m in heavy sediment
0907 at WP19 seeing extinct sulfide structures, about 2-3 m wide nd 3-4 m
tall, a field of 2-3 of them, can see in fwd looking sorn, 9 7.601'N 104 13.265'W,
tried to sample but not successful. DVCAM of chimneys and broken off chimlet interior
0923 SAMPLE #42, edge of 1-2 m wide N-S trending fissure, lobate crust, in
blue 1c bin, DVCAM of fissure, 9 7.644'N 104 13.242, 2748 m
0930 SAMPLE #43, sample of hackly flow in sediment, in blue 1b bin, 2750 m, 9
6.678'N 104 13.219'W
0937 traversing hackly flow in heavy sediment cover.

April 13 -- Watch Log & Summary -- 1400-1800Z -- J2-266

Summary: First 3 hrs of this watch were spent looking for a second hydrothermal chimney at the Medusa vent site. Although no other smoker chimney was found, and is not believed to exist, we did complete a detailed visual mapping of the vent site. There are 3 foci of diffuse flow coming from a small roughly N-S trending fissure. The Medusa vent is located along the same fissure, about 100 m north of the southernmost diffuse flow site. After characterizing the vent site, we began a transect to the east. We spent most of the remaining hour on watch traversing a large collapse structure, ~10 m deep, with lava pillars and a hackly/lineated sheet flow at its base.

1400-1645 Looking at Medusa vent, driving around the venting site, diffuse flow vents to the south. Finalized nav coordinates for the vent field items of interest as verified by several cross-overs:
Medusa = 9 8.41877N, 104 12.39536 W (13943, 33950 DSL XY)
Diffuse 1 = 9 8.32111N, 104 12.3801W (13971, 33770)
Diffuse 2= 9 8.4025N, 104 12.38881W (13955, 33920)
Diffuse 3= 9 8.41117N, 104 12.39372W (13946, 33936)
1700 - large scale collapse feature, 10 m deep, unknown width (>40 m)
1712 - SAMPLE 48, hackly sheet flow crust from bottom of collapse, lots of glass on flow
1718 - hackly sheet facies change to lineated sheet
1725 - climbing up scarps on collapse edge. collapse is ponded against eastern edge of axial graben
1735 - still climbing, reset Doppler
April 13– 1800-2200Z Watch – Jason2 Dive 266
1751 heading SW to new WP #3, just outside E wall of graben
SAMPLE #49 at top edge of scarp, tabular pillow crust in white
2b in, 2563 m, 9 8.407' 104 12.118'w
1803 large tubes trending downslope. We are o/c SW at 0.3 kts DVCAM of large
inflated pillow tubes
1806 SAMPLE #50, 2549 m, pillow crust in white 1b bin (volunteer piece also
landed in W1A bin) 9 8.365'N 104 12143'W
1810 passing over N-S trending scarp on graben margin
1815 2550m depth, going down scarp steps
1820 2571 m
1823 2587 m
1826 SAMPLE #51, lobate flow in sediment at base of E wall of graben, 2592 m,
in white 4b bin, 9 8.293'N 104 12.177'W
1835 SAMPLE #52, lobate bud, flow at WP#3, 2587 m, in white 4a bin, 9
8.262'N 104 12.195'W
1845 ascending scarp
1852 2551 m
1855 SAMPLE #53, pillow crust at 2550 m, in white 4c bin, 9 .228'N 104
12.129'W
1858 u/w ESE to WP#5 at 0.3 kts, 2544m traversing collapsed lobate terrain
1900 2545, heading ESE over large collapse/fractured terrain, very
irregular/chaotic
1906 crossing another scarp
1918 SAMPLE #54, pillow crust 2547 m in inflated lobate and pillow flow
w/dusting of sediment, in white 4d bin, 9 8.185'N 104 12.068'W
1926 at scarp near WP#5 site, seeing large tubes going downslope
1927 SAMPLE #55, pillow crust at 2551 m on west edge of fault scarp, DVCAM of
sampling, in blue 2a bin, 9 8.152'N 104 12.048'W
1928 reset Doppler to Medea LBL
1937 SAMPLE #56 tabular/angular pillow crust along fault margin, 2528 m in
blue 2b bin, 9 8.124'N 104 12.012'W
1940 heading east to WP#7 at 0.5 kts
1959 2532 m o/c 090 at _ kt
2003 going down constructional slope on E face of escarpment
2016 SAMPLE #57, pillow crust at 2585 m in blue 3b bin, 9 8.118'W 104
11.847'W
2020 smooth acoustic terrain is heavily sedimented lobate flows at 2596 m
2021 now seeing somewhat younger lobate and collapse terrain
2024 2597 m DVCAM of lobate collapse terrain with less sediment cover
2033 SAMPLE #58, lobate crust from 2604 m placed in stbd tube core swing arm

crate, 9 8.123'N 104 11.746'W
2109 at 2619 m going over fissures and scarps, now seeing hackly flow buried
in sediment
2112 SAMPLE #59 pillow crust – placed behind basket, 2612 m 9 8.109'N
104 11.502'W
2116 SAMPLE #60, 2615 m, pillow crust, piece fell out of jaw, but fragments
fell into the orange wax corer tube in the stbd swing arm – 9 8.110'N 104 11.477'W
2128 SAMPLE #61, pillow crust at 2656 m, from east scarp near WP#9 in area of
large pillows in sediment, 9 8.105'N 104 11.40'W
2134 o/c SE to WP#10 at _ kt
2141 o/c SE over sedimented pillows at _ kt
2145 about 500 m from WP#10 with Jason, 2714 m in sedimented pillows
2148 DVCAM of sediment covered lobates at 2777 m
2158 stopped ship ~ 100 NE of WP#10
2204 trying to sample at 2780 m, pillows in sediment
2208 SAMPLE #62, lobate curved crust at 2783 m, in white 3b bin, 9 7.990'N
104 11.158'W

2210 END OF JASON DIVE 266
Watch Log and Summary; 4/15/07 0200-0800Z; J2-267; White
0200 - On watch, ground fault with manip arm delays lauch of J2
0445 - On bottom, start of data collection on J2-267, pillow lavas with sediment in pockets and a light dusting overall
0504 - SAMPLE 01 angular pillow fragment taken at the landing point
0511 - reset doppler to LBL on Jason
0527 - now entering talus field
0529 - climbed to top of scarp, 28 m high, lobates on top
0544 - transition from lobates to pillows, transition appears to be smooth facies change without an obvious flow contact
0603 - SAMPLE 02, pillow crust with some glass still attached from 9 03.5'N, 104 12.178'W
0610 - reset doppler to LBL on Medea
0620 - driving upward on constructional slope of pillow lava
0630 - tried to sample glassy pillows but manip had mechanical problem, may be a contact between here and the start of the slope as things seem more glassy.
0630-0700 - lots of staining between lobes but no animals, flow is glassy but not as young looking as 1991 flow
0717 - SAMPLE 04, pillow bud in a cone shape from glassy but sediment dusted flows at 9 03.5'N, 104 12.404'W
J267; April 15, 2007; Klein/Soule__
Note: I came on_watch early to let Dan sleep.__
0806 **Sampled large pillow chunk: 041507-0806**; we are in_very fresh-looking terrane: pillows with lots of buds and glass;_little sediment.__
0817 Huge pillows with delicate glassy buds (really beautiful).__
0827 Freshest stuff we've seen this cruise.__
0842 Very fresh, delicate buds.__
0856 **Sampled pillow fragment: 041507-0856**; Bin R2c.__
0922 **Sampled rounded bud; 041507-0922**; R2d.__
0923 Reset doppler to Medea LBL.__
0930 Continuing in extremely fresh pillow lava field.__
0948 Dorsey's Birthday present (deployed benchmark).__
1001 (Adam's notes from here): Fresh budded pillow lavas on ridge.__
1016 **Sampled 041507-1016** fresh pillow bud from ridge #8_in Red 3b.__
1018 Problem with DP, ship heading NW, following with Jason.__
1026 Regained control. Adjusted track to the east in order to get on_top of ridge.__
1031 Heading uphill, still in fresh looking pillows.__
1036 Large volcanic structure that looks like eruptive vent, high_relief (3 m tall).__
1040 Bit of hydrothermal staining between pillows. Pillows look_slightly older. Actually looks more like lobates.__
1043 Back into pillows, fresh and budded.__
1050 More sedimented pillows, light dusting.__
1059 Falling off e-side of ridge, adjusted heading to stay on top to_WP 3. In pillows, some large.__
1110 Funny looking crab (Dvcam).__
1111 More hydrothermal staining at pillow margins__
1123 Budded pillows__
1124 **Sampled pillow bud; 041507-1124**; in lighted_sedimented, large pillows.__
1131 Lots of hydrothermal staining between pillows.__
1133 DOP reset to Medea LBL__
1149 Lightly sedimented pillows with orange staining.__
1152 **Sample #10; 041507-1152**; big pillow bud. Altered on_broken face to whiteish-yellowish color.__
1156 Going into towmode to get south of location where we hunted for_the vent.__
1257 Ship arrived at WP, Jason swinging under__
1326 Staring descent (2539m)__
1330 On bottom (2647 m), sedimented, budded pillows.__
1332 Doppler reset to Medea LBL__
1340 More pillows, small.__
Fissure, non-erupt. Small.
J2-267 Watch Log, 4/15/07 1400-1800Z; White
1345 - change of watch, finished previous watch's transit, and settled for a sample
1402 - SAMPLE 11, long pillow toe with glassy crust on a relatively recent flow, 9 01.89'N, 104 12.73'W
1405-1500 - Pillows are losing buds as we move south along the axis, but sediment cover is about equal along the trackline. The fissure on sidescan is seen on the seafloor as 2 or sometimes 3 fissures 1-2 m wide.
1511 - SAMPLE 12, pillow taken from a flow without many buds, near the top of a pillow mound at 9 01.63'N, 104 12.76'W, top appears glassy in the sample
pillows all the way between sample sites, the top of the mounds may have slightly more pillow buds on the lavas than the area near the base
1612 - SAMPLE 13, pillow bud from near the summit of a pillow mound at 9 01.4'N, 104 12.71'W
1706 - SAMPLE 14, from small pillows on the summit of a pillow mound with few buds and sediment heavy across the outcrop and accumulating in pockets.

April 15– 1800-2200Z Watch – Jason2 Dive 267

1800 traversing sediment dusted pillows
1807 stopping to sample
1808 SAMPLE #15, pillow finger from pillowed terrain, 2656 m, 9 1.040'N
104 12.820'W in Red 3d bin
1814 coming off bottom to transit west at 0.9 knots, will take ~ 5-6 hrs for
transit to the western EPR axis limb at the northern end of the intended Jason traverse
to the south.
J267; April 15-16, 2007; 0000-0200; Klein_
Beginning West Limb survey. Will start at WP2 (toward center of axial region) then move east._
0000 Resetting doppler to medea LBL. Seeing bottom: medium-old pillows, seems a bit older, more broken up, moderate sediment._

0007 **Sampled oldish pillow fragment 041607-0007**; wedge: R4a._
0018 Heavily sedimented pillows._
0022 Large pillows, heavy sediment._
0028 More buds on pillows now, moderate sediment cover._
0031 fissure, NS_
0033 Wide fissure 2-4m wide, NS, very deep ~8m deep; getting younger looking,._
0034 Non-eruptive fissure, 3 m wide._
0035 Baseline change to BC clockwise._
0042 Back to oldish moderately sedimented pillows._
0048 Lobate, moderate sediment._
0051 Lobate, heavy sed._
0103 Heavy sediment on pillows with buds._
0104 Non-erupt. Small fissure, NS._
0105 **Sampled bud with glass; 041607-0105**. Bin Y4b._
0116 Fissure non-eruptive; <1m wide._
0117 Fissure swarm: many large, with scarps._
0123 Fissure NS._
0125 Wide deep fissure, non-eruptive. 6m deep._
0132 Fissures, pillow lavas._
0135 somewhat more delicate buds on pillows.

April 16, 2007 -- 0200-0600Z -- J2-267

Summary: longitudinal traverse down the west limb, axial expression seems to be 1 km long
pillow ridges. Ridges are formed of coalesed pillow mounds that have lobate facies flows
at their summit, pillows or talus on the slopes and flank.
0200 - Made turn to the south, and begin traverse along pillow ridges.
0210 - Haystack! 5 m high
0240 - SAMPLE 18, pillow toe from line of small mounds on the west limb axis (?) 9
02.36'N, 104 15.67'W
0309 - SAMPLE 19, platey crust of lobate flow from a circular shallow collapse ring
0341 - SAMPLE 20, angular pillow toe about 20 cm long on an older-looking pillow outcrop
near the base of the pillow ridge
0347-0407 - over a 20 m wide fissure, trending N-S
0432 - SAMPLE 21, piece of crust from collapsed pillow
0429 - moving a bit east to track younger seafloor, doppler reset shifted J2 nav by 10 m
to N
0452 - folded and ropy sheet flows, glassy under a veneer of sediment
0456 - SAMPLE 22, from a sheet flow at the top of a collapse remnant
0543 - SAMPLE 23, angular block from large pillows near the edge of a scarp
April 16– 0600-1000Z Watch – Jason2 Dive 267
0603 traversing pillows with sediment and fissures at 2627m
0606 DVCAM of pillow walls, 2627 m – looks like pillow walls on Puna Ridge
Hawaii, o/c to WP8A at .3 kts over lobates with some sediment cover
0616 SAMPLE #24, 2628 m, lobate finger, 9 1.1.621'N 104 15.555'W in Y1C bin
0620 D VCAM of lobate flow with occasional ropy sheet flow areas in it
0622 large fault/fissure
0627 SAMPLE #25, 2627m, sample of base of small scarp, 8 m tall, in situ,
base of local volcanic section, 9 1.576'N 104 15.541'W, in Y1C bin
0630 SAMPLE #26 pillow finger, 2621 m, 9 1.527'N 104 15.511'W
0644 DVCAM of terrain along fissure
0647 traversing older sed. lobates
0653 SAMPLE #27, 2622m, lobate chunk in Y3A bin, 9 1.479'N 104 15.519'W
0656 going along narrow fissure within pillow/lobate terrain, DVCAM, 2620 m
0719 2633 m, pillowed flows
0724 SAMPLE #28, selvage of pillow crust, DVCAM, 9 1.340'N 104 15.556'W
0736 SAMPLE #29, 2622 m, pillow finger, DVCAM, 9 1.267'N 104 15.582'W
0745 crossed 8 m deep fissure
0753 sed covered lobates and pillow west of scarp at 2617 m
0756 SAMPLE #30, 2617 , sample of lobate and pillowed terrain, in Red3D bin,
9 1.170'N 104 15.608'W
0807 traversing collapsed lobates
0808 SAMPLE #31, lobate crust from collapse terrain, fresher, glassy, in Y3B
bin, 9 1.111'N 104 15.633'W
0812 crossing sheet flow with folds at 2632m
0816 hackly sheet flow
0819 SAMPLE #32, 2631 m, sheet flow fold in collapsed terrain on floor of
active axial zone, in R4B bin, 9 1.042'N 104 15.648'W
0831 SAMPLE #33, sheet flow on top of collapse terrain? 2629 m, in R1A bin, 9
0.993'N 104 15.673'W
0835 moved ship 100 m west of target to get out of collapsed area to launch
elevator, now on older lobates with sed. cover just west of collapsed trough and active
axis.
0840 SAMPLE #34, sed covered ropy sheet flow outside of collapse trough at
2630 m, in Y4D bin 9 0.971'N 104 15.716'W
0855 Launched elevator
0945 heading to elevator drop site
0948 elevator landed ~ 100 m of us based on Homer directions
0957 traversing pillowed and fissured terrain heading west to elevator site
at 2618 m
1004 at elevator
1006 DVCAM of elevator
1010 opening lid and pulling out bins
1013 red basket in A bin on elevator
1020 sone w/bin A
1035 stowed basket and extra plates
1038 SAMPLE #35, pillow bud from elevator landing site, lobate and pillowed
terrin west of collapse trough, in elevator milk crate, 2611m
9 0.989'N 104 15.850'W
1041 elevator released to surface
J267; April 16, 2007;_1200-1400Z; Klein__
1215 Came on watch_late to catch some sleep. Elevator had just arrived on surface.__
1230 Trying to find our position – no LBL – decided to let the vehicle_settle under ship.__
1238 Seeing bottom, fissure non-eruptive, NS.__
1256 Fixed position to ship GPS. Heading toward WP10 at 0.3 kts. We_are in heavily sedimented terrane.__
1304 Small, possibly eruptive fissure.__
1306 Wide, non-eruptive fissure NS.__
1313 NS Fissure, non-eruptive, heavily sedimented, blanketed pillowPage 32 of 33s.__
1322 **Sampled sediment covered pillow with glass_041607-1322**; Bin B4d.__
1336 Wide, deep fissures, NS.

J267; April 16, 2007 1400-1800Z; White

Summary: Previous watch completed elevator cycle, so watch began a few 100s meters west
of the planned trackline. This watch completed one latitudinal xing of the ridge axis,
verifying its location and width of the neovolcanic zone, and collecting 6 rocks along
flowline transect.
1345 - Course is SE 135deg in large pillows, heavy sediment, clearly "off-axis"
1357 - SAMPLE 2, flat piece of rind from drained pillow. In an area with a lot of
pillows and heavy sed dusting.
1402 - Large pillows, coating of sediment, occassional low scarps 2-5 m high.
1451 - SAMPLE 3, another rind from a drained out pillow
1458 - small scale collapses
1500 - entering large-scale collapse structure
1505 - a few large pillars within the collapse, no hydrothermal activity or biota, intact
pillars >5 m tall
1507 - SAMPLE 4, folded ropy sheet flow from the base of the collapse
1510 - out of the collapse and into lobates
1523 - back into a large collapse, depth ~6 m
1532 - SAMPLE 5, from the top of a lava pillar, a small cube-shaped piece of lobate
1545-1600 climbing a tall scarp
1608 fissure, 10 m wide, 8-9 m deep
1615 - into older pillows, more sediment
1635 - SAMPLE 6, older crustal block from pillow on the east side of neovolcanic zone,
after sampling needed a few minutes to get a nav fix and reset position, drop weights,
and other vehicle stuff
1655 - change course to SW 230 to cross back into younger stuff
1725 - back in the large-scale collapses 9 0.68'N 104 15.6'W
1734 - lava pillars
1736 - SAMPLE 7 - small plate of lobate crust from within the large-scale collapse
1745 - end of watch

April 16– 1800-2200Z Watch – Jason2 Dive 267

1754 going down west wall of trough
1758 SAMPLE #8, 2632 m, hackly sheet flow, just inside W wall of active
trough area, in W4B bin, 9 0.623'N 104 15.648'W
1809 SAMPLE #9, sheet crust at 2632 m, in W2B bin 9 0.586'N 104 15.636'W
1818 SAMPLE #10, pillar top crust, pillar is surrounded by sheet flow sampled
in #9, could be same as this sample or could be older, prior flow surface, 2629 m, 9
0.527'N 104 15.628'W
1821 o/c 180 over lobate and hackly flows
1832 DVCAM of traverse along scarp and collapse terrain
1833 c/s to .5 kt o/c180° at 2622 m extensive collapse terrain
1837 traversing curtain folded sheet flow at 2628 m
1850 SAMPLE #11, large curved plate in B2a bin, 2620 m, top of a pillar 4 m
tall in collapse trough, 9 0.367'N 104 15.620'W
1852 now into sheet flow, curtain folded at 2627 m DVCAM
1858 DVCAM of pillar stumps – 4 pillars along rampart
1900 DVCAM of pillar with sponges/corals, GREAT VIDEO
1901 traversing along W margin of collapse trough floor, with sheets and
occasional lobates, curtain folded flows and pillars/ collapse structures 2626m
1906 DVCAM of pillar
1915 in lobate terrain , 2621 m
1919 now into older pillow/lobate terrain
1925 SAMPLE #12, older lobate crust, 2617 m, 9 0.108'N 104 15.626'W
1929 o/c 160, .3 kts over older collapsed lobate terrain w/ sed. dusting, DVCAM
1933 SAMPLE #13, 2617 m, pillow finger in W3b bin, 9 0.049'N 104 15.621'W
1941 o/c 160, .3 kts traversing budded pillow flows at 2615 m
2008 on older pillow flows on small mound
2012 SAMPLE #14, old sulfide structure along small scarp, 2612 m, in B2B bin,
8 59.855 104 15.577'W
2015 SAMPLE #15, pillow finger, DVCAM, in W1B bin, 2606m, 8 59.831'N 104
15.566'W
2029 crossing pillowed terrain, 2614 m
2030 o/c 190° at _ kt
2038 now into collapsed lobate terrain 2621 m
2040 coming into collapse trough
2046 SAMPLE #16, lobate crust in collapse trough, in W3B bin, DVCAM of
terrain, 8 59.680'N 104 15.581'W
2115 2624 m, in collapsed lobate and sheet terrain, going 180 at _ kt
2124 traversing sed. covered lobates at 2622 m, slowed to . 3 kt to sample
2129 SAMPLE #17, 2625 m, pillow finger piece from sed. dusted lobate/pillow
terrain in W1C bin, 8 59.361'N, 104 15.609'N
2133 into collapsed terrain with lobates and pillows, seems older
2136 seeing fissure splay in sonar, 5 m high scarp formed by wall of fissure,
2629m

Jason 267; April 16-17, 2007; Klein_

2145 Sediment covered pillows with buds, NS fissure._
2200 Decided to do a cross-section of the axis, will head west then come back east._
2205 Seems to be getting more sediment covered. Some fissures._
2208 Talus at base of east facing pillow wall. Wall is aprrox. 10 m high- all pillows._
2210 Fresher on top._
2212 13 m chasm_
2214 Pillow lobes, light sediment cover._
2217 **Sampled pillow bud 041607-2217**, large, broke up mostly; in B1c._
2228 Fissure_
2232 Heavy sediment cover on pillows with some buds._
2237 2630 m, medium sediment cover, intact pillows, near base of elevated plateau._
2240 Very large pillow lavas, moderate sediment cover._
2242 Talus_
2247 20 m wall, going up._
2248 Fissure on top of hill._
2252 Up on lip of plateau, elevation 2607 m, older looking._
2315 Returned from science meeting. Reset nav to ship LBL._
2328 Moving east working our way back down off the plateau, which seems to have older terrane than deeper to the east._
2339 Returning SE over fissure swarm_
2356 **Sampled big pillow bud 041607-2356**; Bin W2C._
0001 Hydrothermal staining on pillows, moderately old._

0008 Fissure wide._0056 Reset doppler to ship GPS._
0057 Coming off mound._0058 Pillow lavas, moderate sediment._
0108 **Sampled small pillow chunk 041707-0108**; Bin W2c._
0111 Fissure NS_
0119 Sediment covered fresh pillows._
0124 Rubbley in center of rift, talus._
0125 Coming up 1 m along scarp._
0126 Fissure 7 m deep._
0127 Series of fissures_
0132 Moderate sediment, pillows_
0133 Heavier sediment cover 2625 m._
0139 **Sampled pillow at base of wall, big chunk; 041707-0139**; bin W3a.

J2 lowering 267; April 17, 2007, 0200-0600Z watch

On the west limb of the OSC, starting at the crest of a ridge on the west side of that limb. We traverse south and west, xing the ridge axis, but not identifying a youngish looking neovolcanic zone.
0200 - SAMPLE 23 a small flate plate from a pillow crust near the crest of a ridge east of the ridge axis on the western limb.
0220 - SAMPLE 24 geographically similar location to the above, a large wedge of pillow from near a scarp edge
0220-0324 flying down several large scarps, up to >12 m high
0324-0340 a pillow field with several wide fissures cutting the otherwise flat surface
0340 - SAMPLE 25 fractured lobate crust from a field of tectonically cut and collapsed lobates, may represent the axial zone here
0400 - some impressive fissure dissection of the seafloor
0438 - SAMPLE 26 pillow toe from axial transect, although this area has heavy sediment and not much glass. Seems more likely that the axial zone is up near sample 25.
0443 - heading west again to see if the neovolcanic zone has shifted here onto flanking high to the west.
J267; April 17, 2007; 0500-0800Z; Soule/Klein_
0545 Heading west off ridge crest to WP23_
0547 Crossing heavily faulted pillow terrane, light sediment._
0550 Pillow talus at base of W-facing normal fault._
0554 E-W- facing fissure_
0601 West facing normal fault, talus at base, fixed location of WP23 in DVLNAV, moved to west. WP22 is good where it is._
0603 Broken pillows in fault scarp exposure and some massive flows. Scarp is ~30m._
0605 Sedimented pillows on the top of scarp._
0610 Down 6 m east-facing fault scarp bounding NS graven 20 m across. Scarp exposes flattened pillows and sheets._
0613 On top of scarp, heavily sedimented pillows with fissures (DVCAM)._
0625 Heavily sedimented pillows and lobates, near sediment blanket._
0630 Into ropey sheets, heavy sediment, with some collapse._
0634 **Sampled lobate crust, angular chunk; 041707-0634**; Fin B1a._
0644 Heavily sedimented pillows on pillow ridge west of axis, heading south._
0649 Heavily sedimented lobates._
0655 DVAM of heavy sedimented lobates, most have large crust plates spalling off._
0705 Heavily sedimented pillows._
0715 Pillow, slightly less sedimented._
0716 Back into heavily sedimented lobates._
0720 Looks like a collapsed laba tube with thick >2m crust and a 2-3m deep amphithearter-like collapse._
0724 **Sampled #28, 041707-0724; piece of crust from apparent lava tube collapse** in B1d._
0732 Towing to WP25 at 0.5 kts. Staying on bottom._
0740 Heavily sedimented pillows._
0752 EK came on watch; transiting to southeast over heavily sedimented terrane._
DF came on watch.

April 17– 0800-1100Z Watch – Jason2 Dive 267

0819 sediment covered budded pillows, transiting at _ kt to WP25
0826 2605 m crossing _ m wide fissure
0831 DVCAM of eruptive fissure with sed. covered pillow at 2600 m, west of
axis
0832 E facing scarp, 12 m high
0834 talus at base of scarp, DVCAM snip
0838 2601 m ~ 20 m high steps in scarps
0855 just passed large extinct hydrothermal chimney on W wall of axial graben
at 2617 m, some white staining and lots of sessile animals on it, no obvious venting –
position 8° 57.961'N 104° 15.589'W
0903 crossing 12-14 m high scarps at 2616 m as we move into west side of
axial graben
0909 SAMPLE #29, 2612 m, pillow bud, in B4c bin, 8 57.895'N 104 15.532'W
0924 2608, talus slope, going down W wall of graben
0931 crossing W wall of graben at 2600 m
0936 lobate and budded pillow flows abutting W wall of graben, DVCAM
0940 SAMPLE #30, large pillow finger, 2620 m, 8 57.765'N 104 15.443'W in
B3a bin
0953 budded pillow flows
0956 SAMPLE #31, budded pillow flow, 2620 m, in B3b bin, 8 57.693'N 104
15.383'W
1004 more budded pillow flows at 2618 m
1012 looking to sample another pillow bud
1018 SAMPLE #32, 2 pcs pillow crust, from eggshell pillow, in W4a&b bins,
2617 m, 8 57'577'N 104 15.353'W
1024 crossing budded pillow flow, 2627 m, DVCAM of terrain
1026 DVCAM on for rest of dive, small E facing scarp ~ 5 m high
1034 SAMPLE #33, pillow bud, 2623 m, in B1a bin, 8 57.509'N 104 15.359'W
1040 traversing budded pillow and lobate flow with sed. cover 2624 m
1044 SAMPLE #34, 2627 m, 2 small fingers, in B1b bin, 8 57.454'N 104 15.359'W
1045 END OF DIVE, pulling up.

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0530 Predive for Jason 2D268 on EPR crest near 9° 50'N for EPR ISS infrastructure work
0600 Launched Jason2 at site of OBS212
0727 Sent 'A' command to turn keep transponder net turned ON, at 12 m altitude making bottom approach
0731 Doppler reset to Jason LBL
0739 ~45 m from OBS212 surveyed site at 2508 m using the 10.0/10.5 (B/C) pair
0745 Start searching for OBS212
0810 Checked range on OBS212, says slant/range - depth of instrument is 2542 m (we are positioned directly over it so

SL should = depth), suggesting it is further to the west of the surveyed site
0812 Jason2 altimeter and Medea altimeters are OFF so as to not interfere with SM2000 data acquisition
0816 Setting up to do SM2000 calibration – 3 lines each at 5 m, 10m, 15m, on exact reciprocal courses in closed loop
0820 Reset Doppler to Jason LBL
SM2000 CALIBRATION
0821 SOL-1 SM2K Calibration line01 at 5 m alt, 0.5 m/sec speed (1 kt) heading west on 25 m long line in closed loop control
0822 EOL-1- SM2K calibration
0824 Turning to set up for line 2
0825 Turned off downlooking digital still camera
0826 SOL-2 SM2K Calibration line#2, heading 090 at 10 m alt
0828 EOL-2, turning to start line 3
0839 SOL-3 SM2K Calibration Line #3, at 15 m alt (~1 kt)
0831 EOL-3 SM2K Calibration Line#3, turning for line 4
083130 SOL-4 SM2K Calibration Line#4, at 15 m but at _ kt speed
083345 EOL-4 SM2K Calibration Line#4, finished with SM2K calibration runs.
0836 Heading back to bottom to search for OBS 212
0849 Moving ship 40 m to west
0911 DVL snap of screen, continuing to west of surveyed position, range on ORE deck box to OBS says 2541 m slant range
0928 Moving ship east to continue grid search
1000 Range on deck box opened (got larger) as we moved east, suggests OBS is to west of surveyed position, have turned on downlooking camera at 15 sec while doing search pattern at ~ 3-4 m alt.
1018 Continuing search to east to box out that terrain to make sure it's not east of us
1030 Tried ranging on OBS, still suggests to the west of surveyed position
1053 Set up toplab Benthos 455 to ping at 11 and listen at 13 kHz on Jason to try to box in OBS212, returned not synched but looking for difference in travel time to see when we are closing in on it, running N-S and E-W lines
1102 Moving ship to SW
1121 Continuing to move ship/vehicle to SW of surveyed position as that seems to be closing the range
1216 Continuing to move ship/J2/Medea to SW, now ~ 125 m SW of surveyed position
1220 Adam spotted OBS212, it is ~ 150m SW of surveyed position, setting up to inspect, release, recover it. Lots of DVCAM video of salvage operation
1305 Picked up sample (**J268-01**) from hackly sheet flow at site of OBS212 during recovery operations. Local flat sheet flows are 2-3 m across. Relief up to 1 m around OBS site.
1415 OBS212 on deck, washed down and secured
1433 In tow mode to ROKA1 sampling position at 0.9 kt
1512 On bottom, hackly flow.
1515 Sent A command to keep transponders turned on
1517 Sampled hackly/folded sheet (**J268-02**) at 1517. Sample in Y2A, but small fragments in Y2B and Y2C.
1532 In SS channel, ropey sheets on bottom with very little relief.
1538 Now in flat sheet. Slowed ship to 0.2 kt at 50 m range (Jason to target). Otherwise have been going at 0.4 kt.
1541 Sampled lobate crust (**J268-03**) at 1541. Flat sheet of crust in Y2D.
1543 Lobates with older lava sticking through (kipukas).
1548 Out of lobates, into hackly sheet.
1550 Coming into drained channel from S. Lineations oriented SW-NE.
1555 Following flat sheet (DVCAM).
1604 Sampled folded/hackly crust at N-margin of lava channel (**J268-04**) at 1604. Sample is in Y4B. Lost bottom lock, so Doppler position is bad. Cursor at actual position is more accurate: 9°50.7226'N 104°17.7307'W
1618 Lineated sheet with collapsed lobates at the margin.
1628 Sampled lobate crust (**J268-05**) at 1625. Sample in Y2C. Small fragments in Y2D.
1630 Starting AST photo survey. AST is ~17 m deep and 65 m wide.
1646 Setting up for AST SM2000 run at constant depth across AST
1648 Running SM2K line at 2500 m depth E to W at 9 50.79'N at ~1/2 kt across AST
1700 End of AST cross line, now heading NNW to install Benchmark #1 near Biovent area
1702 Heading 340 up West side of AST along rim.
1713 Continuing north at 342 heading
1726 ~100 m from Benchmark #1 site
1730 About 50 m from intended drop site for Benchmark #1
1735 End of traverse line to the north
1742 Reset Doppler to Jason LBL
1748 Benchmark #1 deployed on lobate 2005-06 lava flow at X=4207 Y=79088 (9° 50.9068'N 104 17.7035'W). NB- this position taken from virtual van and is NOT considered to be the final surveyed/calculated position based on LBL data collected, but it is within ~ 5-10 m of what I expect the surveyed position to be.
1754 Rock placed in milk crate of Benchmark #1 to weight it down
1755 Using A/B transponder pair (11.5/10.0) E-W baseline Benchmark #1 LBL Survey
1756 Start recording LBL data while sitting at Benchmark #1 for 15 min with Jason heading 000° and benchmark at middle of basket
1821 End recording LBL at Benchmark #1, reset Doppler to Jason LBL
Preliminnary position from renav is: 9 50.981'N 104 17.666'W,
X=4274 Y=79225
Depth 2504m
Benchmark #1 SM2000 Surveys
1823 Photo of Benchmark #1 in downlooking camera
1836 Start Running photo traverse at ~ 4 m altitude heading 080 to east AST rim
1843 End of photo traverse across AST at Benchmark #1 site
1850 SOL-1, Benchmark #1 across axis SM2000 survey at 2490 m constant depth at .4 kts speed, o/c 260
1908 EOL-1, Benchmark #1 across axis SM2000 survey, moving 10 m north to run next line to the east, expect ~ 40 m swath at 15-20 m altitude
1910 SOL-2, Benchmark #1 across axis SM2000 survey
1926 EOL-2, Benchmark #1 across axis SM2000 survey, stepping 10 m to north
1928 SOL-3, Benchmark #1 across axis SM2000 survey, heading 260
1945 EOL-3, Benchmark #1 across axis SM2000 survey
1946 SOL-4, Benchmark #1 across axis SM2000 survey, running tie line to cross west end of 1st two lines and go over benchmark #1 again at ~ 5 m altitude
1953 EOL-4, Benchmark #1 across axis SM2000 survey, just passed over Benchmark #1 and took downlooking digital photo of it
1955 SOL-5, Benchmark #1 across axis SM2000 survey, heading 080 on last line
2005 EOL-5, Benchmark #1 across axis SM2000 survey, now lining up for transit line down AST to OBS 206 site
2008 Ship/Jason/Medea lined up on AST axis and running at 0.6 kts at 2495 constant depth

2009 Start of transit line from Benchmark #1 survey area to OBS 206 site, heading 170
2015 Heading 170, just passed over Biovent
2135 Ended transit line to the south from Benchmark #1, now pulled off AST to east to find OBS 206 and recover.
2144 Changed autodepth to run 10 m off bottom to OBS site
2152 Had to stop ship because course changed was made at too fast ship speed
2210 changed basline to A/B clockwise
2200 Located OBS 206, commencing recovery operations – on DVCAM
2242 **Sample J268-06,** hackly crust ~ 1 m from OBS 206 site from on top of grate, in stbd swing arm, outboard crate
2250 OBS 206 released.
2301 Transiting north over lobates in new flow
2308 found book pages on seafloor, dropped Target 123 in DVLNAV

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0015 OBS 206 on deck
0119 Nearing end of SM2K survey line up E. Wall of AST
0122 Backing down to stop Medea
0124 End of SM2K line
0142 At Tica, going to head E to install benchmark#2
0147 Heading E to AST wall
0158 Landed at BM2 site.
0204 Reset doppler to Jason LBL (x=2501.2,y=78156.1).
0208 Added weight to BM2 basket

Benchmark #2 LBL Survey

0209 Start collecting 15 minutes of LBL fixes at Benchmark #2.

0224 End LBL data collection for 15 minutes at Benchmark #2

Preliminnary position from renav is: 9 50.401'N 104 17.473'W,
X=4627 Y=78157
Depth 2501m

0225 Starting photo transect at BM2/Tica. 10 second rep rate on images. Heading 270°T.
0234 DLOG2 (event logging machine) crashed. Restarting.
0239 Reached W wall of AST.
0240 Completed photo survey, end of survey shows channel (lineated sheet) extending W from the AST margin. I think it is at the breakout site.
0302 At elevator
0305 Sitting at elevator
0321 took a sample for Mark Kurz, NB - **THIS IS NOT THE SAMPLE RECOVERY SITE, IT WAS LEFT ON THE JASON BASKET – A LARGER SAMPLE WAS COLLECTED ON SUBSEQUENT ELEVATOR VISIT – FROM INSIDE AST NEAR TICA VENT**
0322 Sent A command to keep transponders turned on
0348 Turned elevator camera on – strobes not firing (on recovery it was determined that there was a failure in the strobe cable from the switch to the battery)
0351 Basket exchange at elevator. Yellow basket put on elevator. And picked up Benchmarks 3 and 4.
0355 Red basket on Jason.
0455 Heading to Tica vent to drop elevator
0512 ~ 50 m from Tica vent area
0530 Reset Doppler to Jason LBL
0547 u/w to Benchmark #3 site and Bio 9
0608 at Bio9 ventr, DVCAM of vent
0634 positioning west of Bio9 vent to establish W wall of AST – much too collapsed – will transit east now too deploy benchmark over east wall – but will do photo traverse across AST now to save time.
0649 Benchmark #3 photo traverse at 4 m from west to east across Bio9 vent site
0702 Deploying Benchmark #3 east of AST rim at latitude of Bio9 vent
0709 Getting rocks to put in benchmark milk crate to weight it down

Benchmark #3 LBL Survey

0714 Start collecting LBL data while sitting at Benchmark #3 site with J2 at 000 heading and benchmark at front of basket
0730 End LBL data collection at Benchmark #3 site.

Preliminnary position from renav is: 9 50.308'N 104 17.464'W,
X=4643 Y=77986
Depth 2501m

0736 Reset Doppler to Jason LBL

Benchmark 2&3 across axis SM2000 Survey

0743 SOL BM2-3 Line 1 , cross line at _ kt from E to W.
0820 reset Doppler and switched baselines to B/C (10.0/10.5) pair
0840 EOL BM2-3-1
0848 SOL BM2-3-2 (west to east)
0903 EOL BM2-3-2
0906 SOL BM2-3-3 (east to west)
0918 EOL BM2-3-3
0921 SOL BM2-3-4 (west to east)
0936 EOL BM2-3-4
0939 SOL BM2-3-5 (east to west)
0957 EOL BM2-3-5
1001 SOL BM2-3-6 (west to east)
1017 EOL BM2-3-6
1021 SOL BM2-3-7 (east to west)
1037 EOL BM2-3-7
1042 SOL BM2-3-8 (west to east)
1103 EOL BM2-3-8
1107 SOL BM2-3-9 (east to west)
1125 EOL BM2-3-9
1130 SOL BM2-3-10 (west to east)
1151 EOL BM2-3-10
1156 SOL BM2-3-11 (east to west)
1211 EOL BM2-3-11
1216 SOL BM2-3-12 (west to east)
1241 EOL BM2-3-12
1244 SOL BM2-3-13 (east to west)
1259 EOL BM2-3-13
1302 SOL transit between Benchmark 3 and Benchmark 4
1332 EOL transit line, now looking for Ty/Io vents to install Benchmark #4
1338 Coming into Ty/Io vent area
1342 DVCAM of Marker #12 (Ty vent) area
1350 DVCAM of hiT logger #30 at Io vent
1358 Moving between Ty and Io vents, distance between the two is ~ 8 m with Ty being north of Io. Ty is venting from basalt rubble on top of tumulus in AST floor, while Io is a small ~2m tall chimney with ~ _ m of chimney above the logger position that was inserted in Nov. 2006 on AT 15-13 (Von Damm) cruise.
1359-1401 W to E traverse over Marker #12 (Ty) vent
1413 at Benchmark #4 site ~ 20 m from east wall of AST at latitude of Ty vent
1414 Reset Doppler to Jason LBL
1423 Setting up at Benchmark #4 site
1439 Sent A command to transponders to keep them turned on

Benchmark #4 LBL Survey

1440 Start 15 min LBL recording at Benchmark #4 with Jason2 oriented 000 and benchmark at front of basket.
1455 End recording of LBL at Benchmark #4

Preliminnary position from renav is: 9 50.126'N 104 17.428'W,
X=4710 Y=77650
Depth 2503m

1457 Reset Doppler to Jason LBL
1459 Start photo traverse across from E to W wall of AST at 3-4 m altitude over Benchmark #4 site.

1518 End photo traverse at Benchmark #4 site
1529 Near start of Benchmark #4 across axis survey line 1 from W to E ~ 80 m north of Ty/Io area, will do surveying at 2490 m constant depth
Benchmark 4 across axis SM2000 Survey
1531 SOL BM4-1 (west to east) (Biomarker #4 area survey line 1)
1549 EOL BM4-1
1555 SOL BM4-2 (east to west)
1615 EOL BM4-2
1622 SOL BM4-3 (west to east)
1638 EOL BM4-3
1642 SOL BM4-4 (east to west)
1658 EOL BM4-4
1705 SOL BM4-5
1720 EOL BM4-5
1726 SOL BM4-6
1745 EOL BM4-6
1747 start transit to OBS 210 site from Benchmark #4 at 0.6 kts and 2490 m constant depth.
1845 End transit to OBS 210
1850 At OBS 210 site – very buried… going to attach float and then try to break through some of the lava crusts
1930 At OBS 210 site working on recovery – looks unlikey
2015 Giving up on recovery of OBS

2022 Doppler reset to Jason LBL. Will commence long N-S lines for survey to cover AST between 9 50-51'N. First line will start as a cross line from OBS 210 site to the west side of the AST, then line 2 will be first N-S line.
N-S SM2000 survey of the AST between ~ 9 50'51N
2025 SOL (AST1), W to E. 9°49.632'N, 104°17.403'W, 0.3 kt to start, auto depth at 2490.
2033 EOL (AST1), 9°49.632'N, 104°17.349
2036 SOL (AST2), E to W. 9°49.635'N, 104°17.350'W. Starting slow, getting up to 0.6 kt.
2136 Arrived at official start of survey, 9°50.069'N, 104°17.407'W
2138 2° heading correction to get back under Medea.
2152 Note: Turned off DVDs as we will be out of bottom visual range, so remember to start new DVD's for sampling transect.
2158 Changed baseline to BC clockwise.
2228 Switched to AB baseline CCW.
2230 Reset doppler to Jason LBL.
2313 EOL (AST2) 9°51.016'N, 104°17.626'W (1:45 total for first line).
2344 SOL (AST3) 9°51.016'N, 104°17.636'W (30 min for turn).

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0043 Changed LBL baseline to BC CW.
0117 Reset doppler to Jason LBL.
0129 EOL (AST3), 9°50.093'N, 104°17.429'W. Ended line early because heading straight for LDR mooring. Coming off bottom to avoid mooring.
0140 Stopping ship. Bridge is fixing heading for next line.
0154 getting lined up for start of AST4
0157 SOL AST4 (south to north)
0200 Sent A command to keep transponders on
0214 Jog to west in line, Jason getting pulled by Medea, throughout the survey there have been bottom currents that have been problematic in driving medea to where Jason needs to be for the line
0354 EOL EOL AST4, at north end of survey area, will set up to run line AST 5, will run it outboards- to the west- of all other AST long lines and then fill in with line 6, all lines run at constant depth of 2490 m, bottom lock excellent, only lost momentarily in a few instances.
0413 SOL AST 5 (north to south)
0609 EOL AST 5
0626 Doppler reset to Jason LBL
0625 Switched to A/B xponder baseline
0633 SOL AST 6 (south to north)
0831 EOL AST 6, now maneuvering to do lava channel work at 9 51'N lava channel east of AST
0840 Reset doppler to Jason LBL
0846 Heading to start of sampling transect in AST.
0850 Looking at AST collapse (DVCAM).
0857 Reset doppler to Jason LBL
0902 Sampling lobate crust (in place) from AST margin (**J268-09**) at 0908. Sample in R2A.
0910 Traversing channel, it appears to be properly aligned with sidescan.
0914 Reset doppler to Jason LBL.
0915 Edge of channel is hackly and folded.
0917 Outside of channel is rough, broken lobate.
0920 Sampling ropey folds at ROKB1 (**J268-10**). Sample placed in R2B, glass chunk fell in R2D at 0922.
0926 Reset doppler to Jason LBL.
0929 Lineations in sheet flow oriented 57°, lineations turn to 105°.
0941 Still in channel on SS, but we are moving through hackly flow.
0944 Watch change. Local area of lobate at edge of channel.
0948 Lineations oriented 157°T. We are probably following southern limb of channel (SS offset to south?). DVCAM.
0959 Sampled ropey fold in channel (**J268-11**) at 0959. Sample in R1A. Lineations in channel are E-W.
1003 Explore to the N. Found edge of channel. Appears to get hackly and high (1-2 m) relief.
1006 Small area of pillows and lobates. Catching edge of bright reflector between channels??
1013 More lobates. Lineations no longer present.
1019 Coming into channel. Hackly/folded lava at the margin. Lineations E-W.
1023 Lens of hackly material in channel is 2 m high.
1027 Back in channel (E-W lineations).
1036 At rise blocking channel. Appears to be a large pile of hackly material, striking 136. Possibly a levee from an earlier flow pulse? Looks like it is on top of sheets.
1042 Sampling hackly levee (**J268-12**) at 1044. Sample is in R3A.
1048 Going to run a couple of SM2K lines across hackly ridge.
1053 Heading 200, altitude of 10 m, Start of survey.
1058 SOL (Ridge1)
1105 EOL (Ridge1)
1107 SOL (Ridge2)
1115 EOL (Ridge2)
1116 On bottom, in fresh hackly flow. Heading towards acoustic contact (hackly/lobate?).
1118 There is a sheet flow N of the hackly ridge. Small in extent. Mostly hackly.
1123 Traversing hackly flow.
1129 Found hackly/lobate contact. Lobate flow is thin with many kipukas.
1132 Sampling lobates near kipuka (**J268-13**) at 1138. Sample in R3B. Sample broke in 3 pieces when placed in basket.
1155 Still in lobates. More pillow like lava forms though. Maybe a flow front?
1201 Surprisingly, not into hackly flows yet (SS offset). Still pillows.
1203 Pillow to lobate transition.
1204 Deep collapse (1-2 m).
1209 Into hackly flow. Lumpy, 1 m relief.
1214 Sampled hackly flow at 1214 (**J268-14**). Sample in R2C.
1217 Continuing through hackly flow at 0.4 kt to next sampling point.

1228 Still in hackly flow, slightly more sediment cover??
1234 Reset doppler to Jason LBL.
1234 DVCAM hackly flow.
1241 Hackly flow pile with steep sides (~1 m high).
1251 Sample (**J268-15**). Chunk of hackly flow at 1251. Sample place in R3C and small chunks fell in R3A and R3D.
1259 Hackly to sheet transition. Sheet is on top of hackly. It appears that hackly flow is bulldozing sheet and breaking it up in the process.
1304 In channel. Lineations oriented E-W.
1310 Back into hackly flow, skirting edge of channel?
1330 Collected sample (**J268-16**) of fold of hackly flow from edge of channel at 1324. Sample placed in R1B.
1353 Stopped Northern photo traverse, starting southernly photo traverse. In auto altitude at 3ish m.
1406 Coming into N channel (Tgt 138), out of channel (Tgt 139), back into channel (Tgt 140), end of channel (Tgt 141). Break in channel of hackly flow between 139-140.
1420 Coming into suther channel. Southern margin of channel bound by lobate. Cutting off photo survey without reaching end of flow. Flow extends to the south as lobate.
1451 Ending photo traverse and starting SM2K line to the north across channels.
1456 Reset doppler to Jason LBL.
1457 Started northerly SM2K line.
1534 Heading correction to 025˚T
1541 EOL in black patch.
1543 On bottom. In broad, flat sheet.
1556 Sampled fold in sheet flow (**J268-17**) at 1553. Sample in port swingarm, outboard box.
1559 Sheet flow lineations at 270˚ (E-W).
1601 DVCAM, contact between sheet and hackly flow (towards AST). Hackly flow bulldozing sheet.
1603 Sampling hackly flow with scoop.
1611 Sampled fold of hackly flow with triangular scoop (**J268-18**). Sample in port swingarm, outboard box.
1620 Going over hackly flow from what looks like bright backscatter mitten shaped promontory in SS.
1631 Very flat sheet.
1634 Swirl.
1645 Sampled from raised blister in sheet flow. Nice flat crust with white edges (**J268-19**). Sampled at 1642 and placed in R4A.
1648 Very flat sheet. Light, along-channel bands in SS are elongate piles of thin-crusted hackly flow.
1656 Following channel, very flat with lineations at 56˚.
1706 Out of channel into ropey folded sheet into hackly.
1713 Sampled crust from hackly flow at N-edge of channel (**J268-20**) at 1710. Sample placed in starboard swingarm, inboard basket.
1713 Reset doppler to Jason LBL.
1715 Moved weights from basket.
1720 Occasional push up ridge (small) oriented normal to flow direction.
1724 Occasional kipukas in hackly flow show sediment. Hackly flow must not be too thick, at least in places.
1728 Occasional intact sheet in hackly flow. Looks like a waterslide, i.e., curvy, narrow cylinder (see drawing in notes).
1739 Hackly crust sampled at 1739 (**J268-21**). Flattish, square plate from hackly flow placed in R2D. Crumbled a bit when placed in bin.
1744 Reset doppler to Jason LBL.
1748 DVCAM on over hackly flow with occasional sheet areas.
1751 Reset doppler to Jason LBL.
1755 End DVCAM segment. Going over hackly to small sheet area.
1807 Lobates with 1-m deep collapses.
1809 Sampled hackly crust (**J268-22**). Sample placed in R2B.
1817 In hackly flow, looks more sedimented, but is still new.
1837 Sampled hackly crust at end of flow (**J268-23**) at 1834. Sample in R2D. Broken in many pieces. Large pieces shoved behind basket.
1838 Reset doppler to Jason LBL.
1839 Turning around and heading back to first location of possible end of flow.
1849 Sampled hackly flow front (**J268-24**). Front is ~2 m high and sits on top of a sedimented sheet that looks older. Sample placed in port swingarm, inboard basket.
1850 End of lava channel sampling transect. Heading to elevator.
1900 getting set up to transit to elevator at ~ 15-20 m altitude and 0.7 kts
1910 SOL from end of channel to elevator site recording SM2000 data
2000 ~ 1500 m from elevator
2118 ~ 50 m from elevator, turned south and will cut top two BM2-3 cross axis survey lines for tie lines
2122 EOL from channel to elevator
2135 SAMPLE #25 (**J268-25**), a large lava crust from next to elevator was put in the Kurz sample chamber and scraped with the stbd manip so glass fell into the chamber, then it was sealed. The large sample was put into the Benchmark #10 milk crate that was not deployed and will be returned to the surface w/the elevator. 2514 m, 9 50.399'N 104 17.507'W
2142 Reset Doppler to Jason LBL
2220 Elevator released to surface
2245 At Benchmark #2 site to collect additional LBL data
2251 Problems with Jason 2 LBL, when shut down so we could track elevator
2305 Jason1 LBL nav back on and collecting data while in position at Benchmark #2
2320 End LBL nav collection at Benchmark #2
Preliminnary position from renav is: 9 50.409'N 104 17.478'W,
X=4619 Y=78171
Depth 2501m
*****note that this position is off by ~ 15-20 m from previous position – data from survey need to be processed prior to establishing a 'surveyed position' for each benchmark**
2312 Tracking elevator
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0030 Elevator on deck, heading to Bio9, P and Ty/Io vent areas for visual observations and imaging using DVCAM and 3-chip
0030 to 0230 – during visits to hiT vents the SM2000 was inadvertently turned off and when it came back on it was reversed – this was fixed at 0235
0235 SM2000 system now recording properly
0324 Reset Doppler to Jason LBL
0325 Started collecting LBL data at Benchmark #4 using B/C pair (10.0/10.5)
0342 End LBL data collection at Benchmark #4 with B/C pair
0343 Started collecting LBL data at Benchmark #4 using A/B pair (11.5/10.0)
0358 End LBL data collection at Benchmark #4 with A/B pair
0400 o/c 177 going 450 m to get past LADDER mooring to start survey box of the AST south of ladder moorings between ~ 9 49.5'-48'N
0402 Reset Doppler to Jason LBL
0405 Increase speed to 0.6 kt, running at 2490 m constant depth
0419 Adam coming on watch, setting up for SM2K survey.
0437 SOL (ASB-1) Heading 170˚

0524 EOL (ASB-1) 9˚49.483'N, 104˚17.350'W. 20 m west of intended target.
0537 Reset doppler to Jason LBL
0539 SOL (ASB-2) 9˚49.485'N, 104˚17.364'W
0552 Fixed SM2K. It was setup improperly (not using the external ducer) after crashing. As a result, less power and narrower swath width, although still covered the 90˚ swath we are using.
0641 EOL (ASB-2) 9˚49.878'N, 104˚17.418'W
0644 Changed survey plan due to poor line placement and ducer problem. Will run line to the south between first two lines to fill in gap at north of survey. Will cross over first line (crossing it to the east) in order to catch the E-edge of the AST.
0655 SOL (ASB-3) 9˚49.868'N, 104˚17.418'W
0658 Doppler reset to Jason LBL
0712 o/c 170 at 0.6 kts running ASB line 3
0749 EOL (ASB-3), start transit to compliance meter
0757 SOL transit to compliance meter at 2490 constant depth heading SW
0951 ~ 500 m from compliance meter with Jason2, 0.7 kts o/c 216
0955 Doppler reset to Jason LBL using 10.5 and 9.5 pair
1002 EOL transit to compliance meter
1005 3 m altitude ~ 200 m from compliance meter, taking ESCs
1015 ~ 50 m from compliance meter
1019 Reset Doppler to Jason LBL
1025 At compliance meter,
1040 Cutting weight burn wires
1053 Compliance meter released to surface
1302 Compliance meter recovered, Jason surfacing, End of Lowering
1353 Start Maggie spin at 1200 m depth, CCW, 3 spins through 360 deg at 3 min each
1404 Start Maggie spins CW (3 spins)
1411 End Maggie spins – continuing to surface
1518 Jason2 on deck.

APPENDIX K: Media Interest

http://www.dukenews.duke.edu/2007/04/smoker.html

http://media.www.dukechronicle.com/media/storage/paper884/news/2007/03/28/News/Dukies.Set.Out.To.Study.Pacific.Volcanoes-2809252.shtml

http://www.sciencedaily.com/releases/2007/04/070417150724.htm

http://www.popularmechanics.co.za/content/news/singlepage.asp?key=280

http://www.eurekalert.org/pub_releases/2007-04/du-nuv041707.php

http://www.physorg.com/pdf96125556.pdf

http://www.nsf.gov/news/news_summ.jsp?cntn_id=108741

http://www.unh.edu/news/cj_nr/2007/apr/ds17smoker.cfm

http://www.livescience.com/imageoftheday/siod_070419.html

http://www.earthtimes.org/articles/show/53071.html

http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20070417-15380600-bc-us-underseavent.xml