IODP EXPEDITION 304 DAILY SCIENCE REPORTS
17 November 2004–6 January 2005

TO: Tom Davies
FM: Jay Miller

JA Daily Science Report for Expedition 304, 17 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -1 hr UTC, +5 hr CST.

SCIENCE UPDATE:
Due to airline schedule most Expedition 304 scientists will be arriving in Ponta Delgada early. All scientists expected to check in tomorrow.

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JA Daily Science Report for Expedition 304, 18 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -1 hr UTC, +5 hr CST.

SCIENCE UPDATE:
All EXP304 scientists present and accounted for. Safety indoctrination underway. Organizational meetings underway.

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JA Daily Science Report for Expedition 304, 19 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -1 hr UTC, +5 hr CST.

SCIENCE UPDATE:
Safety indoctrination for all shipboard scientists completed. Disciplinary organizational meetings underway.

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JA Daily Science Report for Expedition 304, 20 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -1 hr UTC, +5 hr CST.

SCIENCE UPDATE:
Last line released at 2012 hr, underway for Site AMFW-01A.

The *Statsraad Lehmkuhl* docked next to the *JOIDES Resolution* in Ponta Delgada. The *Statsraad Lehmkuhl* is billed as the world's largest three-masted barque, currently under contract as a training vessel for the Norwegian Naval Academy.

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JA Daily Science Report for Expedition 304, 21 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -1 hr UTC, +5 hr CST.

SCIENCE UPDATE: Disciplinary organizational and laboratory usage and safety meetings underway.

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JA Daily Science Report for Expedition 304, 22 November 2004.

LOCATION: Ponta Delgada, Azores. Local time -2 hr UTC, +4 hr CST.

SCIENCE UPDATE: Underway at full speed for Site U1309 (prospectus site AMFW-01A), ETA 0800 24 November. Disciplinary organizational and laboratory usage and safety meetings underway.

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JA Daily Science Report for Expedition 304, 23 November 2004.

LOCATION: Underway at full speed for Site U1309 (prospectus site AMFW-01A). Local time -2 hr UTC, +4 hr CST.

SCIENCE UPDATE: ETA on site ~0800 24 November. Disciplinary organizational and laboratory usage and safety meetings underway. Prespud meeting with ODL, IODP-USIO, and EXP304 Science staff outlined site operational strategies.

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JA Daily Science Report for Expedition 304, 24 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642.3 mbsl

SCIENCE UPDATE: Water sample recovered from just above seafloor for chemistry and microbiology. Bottom water temperature 5.2°C. Core U1309A-1R (0-2 mbsf; 96% recovery) is tacky to soupy, light tan, carbonate ooze with abundant microfossils and sand to centimeter-sized fragments of basalt and mineral grains.

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JA Daily Science Report for Expedition 304, 25 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: No core today, After recovery of the push core at Hole U1309A, we started Hole U1309B at the same location. Coring is very slow and steady, but rate of penetration is less than 1 m/hr.

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JA Daily Science Report for Expedition 304, 26 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: Cores 304-U1309B-1R to 4R (0-29.5 mbsf, 26% recovery) returned a couple of meters of soupy, light tan calcareous ooze from the top of the massif. Underneath the mud we recovered fine to medium grained, plagioclase-phyric diabase.

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JA Daily Science Report for Expedition 304, 27 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: Cores 304-U1309B-5R to -8R (29.5-47.5 mbsf, 38% recovery, average 30% recovery for hole) are moderately to pervasively altered plagioclase-phyric diabase with sporadic, thin brecciated intervals, yielding with depth to a brecciated gabbroic rock and medium-grained gabbro.

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JA Daily Science Report for Expedition 304, 28 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: Cores 304-U1309B-9R to -13R (47.5-71.1 mbsf, 50% recovery, average 37% recovery for hole) are moderately to pervasively altered gabbro, with an intrusive contact against serpentinized peridotite in the lower part of Core U1309-11R (>57 mbsf). Below the serpentinized peridotite is more fine- to medium-grained diabase (lower contact between peridotite and diabase not recovered). The effects of both high and low temperature alteration have been recognized, however high temperature deformation features are rare. Many intrusive contacts logged are at a high angle in the core reference frame.

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JA Daily Science Report for Expedition 304, 29 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: Cores 304-U1309B-14R to -20R (71.1 to101.8 mbsf, 67% recovery, 46% recovery for hole) are moderately altered diabase and olivine gabbro. Centimeter scale compositional layering in gabbroic rocks dipping at ~45°in the core reference frame is common in the lower part of the section. No evidence of plastic deformation has been described in the interval below the serpentinized peridotite at ~57 mbsf. Visual estimates indicate alteration is somewhat less pervasive in the lower part of the section as compared to the upper part. Hole U1309B was terminated at 101.8 mbsf when the bit would not rotate in the bottom of the hole.

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JA Daily Science Report for Expedition 304, 30 November 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.1086'N Longitude: 42°07.1115'W Water depth: 1642 mbsl

SCIENCE UPDATE: After termination of coring operations in Hole U1309B, downhole logging operations started with the triple combo tool string. Prior to logging, the hole was circulated with fresh water since previous logging operations in gabbroic rock indicated improved resistivity data were acquired with fresh water in the borehole as compared to seawater. This is likely due to the reduction in resistivity contrast between the formation and the circulating fluid when fresh water is used. Two passes with the triple combo indicated a clear, nearly gauge hole and continuous data were recorded from near the bottom of the hole to within about 30 m of the seafloor. Two passes were recorded with the FMS tool string as well, and excellent quality images were recorded. Downhole measurements indicate the hole is deviated ~7°to the northeast. During preparations for wireline heave compensation testing, the loggers noted anomalously high wireline tension. When the FMS tool was extracted a pad had been damaged. A short tool string was assembled and wireline heave compensation tests were completed.

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JA Daily Science Report for Expedition 304, 1 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.108'N Longitude: 42°07.110'W Water depth: 1642 mbsl

SCIENCE UPDATE: Preparing for hard rock reentry system deployment in Hole U1309C, 20 m west of Hole U1309B.

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JA Daily Science Report for Expedition 304, 2 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.108'N Longitude: 42°07.110'W Water depth: 1642 mbsl

SCIENCE UPDATE: Hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 3 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1642 mbsl

SCIENCE UPDATE: Hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 4 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1642 mbsl

SCIENCE UPDATE: Hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 5 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1640 mbsl

SCIENCE UPDATE: Hard rock reentry system deployment complete. Rotary coring in Hole U1309D to commence after pipe trip.

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JA Daily Science Report for Expedition 304, 6 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1645 mbsl

SCIENCE UPDATE: Core 304-U1309D-1R (20.5 to 26.8 mbsf, 45% recovery) is a moderately altered diabase.

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JA Daily Science Report for Expedition 304, 7 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores 304-U1309D-2R to -8R (26.8 to 55.3 mbsf. 60% recovery) are a sequence of diabase and gabbro with evidence of brittle deformation and multiple episodes of hydrothermal alteration. The gabbros appear to be more hornblende rich and pyroxene poor than the gabbroic rocks from the upper part of the core at Hole U1309B. However, the overall similarity between the material recovered from Hole U1309B and Hole U1309D provides encouragement for the potential of lithologic unit correlation between the holes.

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JA Daily Science Report for Expedition 304, 8 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores 304-U1309D-9R to -15R (55.3 to 89.0 mbsf, 62% recovery, average recovery for Hole U1309D is 61%) are a complex, interleaved series of gabbro, troctolite, and diabase. The coarse-grained intervals in places exhibit a steeply dipping, high-temperature, foliated and lineated mylonitic fabric. Serpentinized peridotite was recovered from approximately the same depth (~60 mbsf) as in Hole U1309B showing a sharp upper contact with gabbro. No lower contact was recovered, and subsequent cores yielded another sequence of moderately altered diabase and gabbro, with rare, thin intrusive intervals of aphyric basalt.

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JA Daily Science Report for Expedition 304, 9 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Latitude: 30°10.120'N Longitude: 42°07.114'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores 304-U1309D-16R to 22R (89.0 to 131.0 mbsf, 40% recovery, average recovery for Hole U1309D is 51%) continue the series of interfingering intrusions of diabase and gabbro, with rare aphyric to sparsely plagioclase phyric basalt. Alteration is generally less pervasive than in intervals upsection. The interval cored between 108 and 117 mbsf yielded only one small piece of gabbro (hence the decrease in overall recovery), with no indication from coring parameters of poor hole conditions. Speculation as to the cause of poor recovery ranges from a jammed bit to intersection of a faulted interval; we await logging data to provide more information. Recovery in Hole U1309D, discounting the 10 m interval of low recovery, averaged 56%. Throughout the coring process there were no indications of any material falling into the hole, and consistent coring parameters suggest a clean, gauge hole. We move to our hanging wall target (Site AMHW-01A) leaving behind a borehole cased to 20.5 mbsf with a hard-rock reentry assembly and open to >130 mbsf awaiting future efforts for deep penetration at Hole U1309D.

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JA Daily Science Report for Expedition 304, 10 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2584 mbsl

SCIENCE UPDATE: A subsea camera survey of the Site U1310 area (Prospectus Site AMHW-01A) revealed about 2000 square meters of smooth, featureless sediment on a local high sloping gently east to west, with rare meter-sized outcrops of breadcrust-textured rock interpreted to be basalt. The location of this site is at the coordinates of the final position of a submersible dive that recovered pillow basalt fragments and documented 1-2 m high scarps of pillow basalt.

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JA Daily Science Report for Expedition 304, 11 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2584 mbsl

SCIENCE UPDATE: Hole U1310A hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 12 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2584 mbsl

SCIENCE UPDATE: Hole U1310A hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 13 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2584 mbsl

SCIENCE UPDATE: Hole U1310A hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 14 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2584 mbsl

SCIENCE UPDATE: Hole U1310A hard rock reentry system deployment.

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JA Daily Science Report for Expedition 304, 15 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2588 mbsl

SCIENCE UPDATE: HRRS installation at Hole U1310A terminated. Sparsely plagioclase phyric and vesicular basalt pieces with some adhering glass recovered from HRRS assembly. RCB coring at Hole U1310B initiated with reentry attempt to follow if hole conditions permit.

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JA Daily Science Report for Expedition 304, 16 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2588 mbsl

SCIENCE UPDATE: RCB coring at Hole U1310B. As at Site U1309, our initial penetration is agonizingly slow owing to low weight on bit and slow rotation, complicated here by poor hole conditions (specifically material falling into the borehole).

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JA Daily Science Report for Expedition 304, 17 December 2004.

LOCATION: Site U1310 (prospectus site AMHW-01A)
Latitude: 30°11.481'N Longitude: 42°03.926'W (survey position) Water depth: 2588 mbsl

SCIENCE UPDATE: Core 304-U1310B-1R (0.0 to 18.5 mbsf, 7% recovery) contained 1.3 m of sparsely plagioclase phyric basalt with glassy rinds on a few pieces. While coring the subsequent interval, the bit parted from the drillstring and the hole was abandoned without additional recovery. Since drilling conditions at this site were so poor, we are moving to alternate site AMHW-02A (Latitude: 30°10.61'N, Longitude 42°04.21' W, 2539 mbsl), a new alternate site developed during this expedition from existing site survey data. This site is along the lower eastern slope of the dome (along seismic line MEG-10), where the D-reflector (interpreted to be either a serpentinization front or a detachment fault) is interpreted to surface before diving back beneath the hanging wall. We interpret this location (Site AMHW-02A) to be a possible klippe of hanging wall material, stranded on the detachment surface (or at least the surface expression of the D-reflector). At worst (if this target is not a klippe but either the detachment surface or late volcanic cover), we should be able to address the objectives related to penetration through the D-reflector and into the footwall and this site represents the easternmost extension of our approved alternate sites along a flow line across the top of the dome (Prospectus Alternate Sites AMFW-02A to AMFW-04A). If this drilling target is a klippe, by definition it should be armoring the detachment surface so we could intersect the surface at some tens of meters below the seafloor (rather than at the seafloor where recovery is notoriously poor). Even a single bit penetration at Alternate Site AMHW-02A might define variations in the magnitude of footwall rotation by comparison to the cores we have from the central dome, possible hanging wall rotation, and potentially allow recovery of core from the fault zone.

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JA Daily Science Report for Expedition 304, 18 December 2004.

LOCATION: Site U1311 (alternate site AMHW-02A)
Latitude: 30°10.610'N Longitude: 42°04.192'W (preliminary position) Water depth: 2541 mbsl

SCIENCE UPDATE: A subsea camera survey of the seafloor in the area of our drilling target revealed a smooth to ripple-textured sediment cover sloping to the south. Small (<1 m) subangular rocks embedded in the sediment cover were rare, but slightly more abundant to the north of our survey starting position. Two 1-3 m high east-facing scarps of subangular to subrounded blocks were encountered in the southeastern and southwestern corners of our survey area (~ 50 m apart), both tapering into the slope to the north. The accumulation of rocks above the scarps was more expansive on the southwestern exposure, so we continued our survey upslope to the northeast. At ~80 m NE of our survey start position, we encountered a steep (>20 m high—we did not see the top), south-facing scarp with thin sediment cover. We selected a drilling location 70 m south of the scarp, in the largest part of our survey area devoid of visible debris. RCB coring at Hole U1311A started at 2040 hr (local).

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JA Daily Science Report for Expedition 304, 19 December 2004.

LOCATION: Site U1311 (alternate site AMHW-02A)
Latitude: 30°10.610'N Longitude: 42°04.192'W (preliminary position) Water depth: 2541 mbsl

SCIENCE UPDATE: Core 304-U1311A-1R (0.0 to 12.0 mbsf, 13% recovery) contained fresh, vesicular, moderately plagioclase-olivine phyric basalt with glassy rinds on a few pieces.

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JA Daily Science Report for Expedition 304, 20 December 2004.

LOCATION: Site U1311 (alternate site AMHW-02A)
Hole U1311A
Latitude: 30°10.609'N Longitude: 42°04.190'W Water depth: 2541 mbsl

SCIENCE UPDATE: Coring was abandoned at Hole U1311A after >8 hr of rotation without getting back to the bottom of a 12 m deep hole. A single core barrel from the redrilled interval was curated as 304-U1311A-2G, containing a few cobbles of fresh, vesicular, moderately plagioclase-olivine phyric basalt. A brief subsea camera survey established the location for Hole U1311B ~100 m NNW of Hole U1311A.

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JA Daily Science Report for Expedition 304, 21 December 2004.

LOCATION: Site U1311 (alternate site AMHW-02A)
Hole U1311B
Latitude: 30°10.6595'N Longitude: 42°04.217'W Water depth: 2505 mbsl

SCIENCE UPDATE: Hole U1311B was abandoned at 2030 hr, 20 December when we could not advance to the bottom of the hole. We expect to spend the rest of this expedition deepening Hole U1309D at the footwall site.

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JA Daily Science Report for Expedition 304, 22 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Return to footwall Site U1309 and continue to deepen Hole U1309D. Cores U1309D-23R and -24R (131.0 to 142.7 mbsf, 35% recovery, 49% average recovery for hole) recovered a 60 cm interval of diabase and 70 cm of medium-grained, moderately altered gabbro. Below this we recovered ~1.3 m of

serpentinized peridotite, followed by 2.5 m of coarse-grained, moderately altered gabbro.

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JA Daily Science Report for Expedition 304, 23 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D 25R to- 32R (142.7 to 181.1 mbsf, 69% recovery, 54% average recovery for hole) are moderately altered olivine-bearing gabbro, with rare intervals of orthopyroxene-bearing gabbro, troctolite, and serpentinized peridotite.

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JA Daily Science Report for Expedition 304, 24 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-33R to -40R (181.1 to 219.5 mbsf, 71% recovery, 57% average recovery for hole) are moderately altered olivine-bearing gabbro with medium- to coarse-grained oxide gabbro and rare intervals of orthopyroxene-bearing gabbro, troctolite, and serpentinized peridotite. Evidence of deformation is rare and localized, and alteration is almost exclusively greenschist facies.

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JA Daily Science Report for Expedition 304, 25 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-41R to -47R (219.5 to 252.4 mbsf, 60% recovery, 58% average recovery for hole) are intimately interfingered gabbro and troctolitic gabbro, with intervals of orthopyroxene-bearing gabbro, troctolite, and oxide gabbro. Grain size is generally coarse, although finer grained intervals are not uncommon. Evidence of deformation continues to be rare and localized, and alteration is predominantly greenschist grade.

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JA Daily Science Report for Expedition 304, 26 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-48R to -49R (252.4 to 262.0 mbsf, 43% recovery, 57% average recovery for hole) are medium- to coarse-grained, moderately greenschist facies altered gabbro and olivine-bearing gabbro.

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JA Daily Science Report for Expedition 304, 27 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-50R to -57R (262.0 to 300.4 mbsf, 81% recovery, 60% average recovery for hole). Cores U1309D-50R through -53R are predominantly coarse-grained, moderately greenschist facies altered, olivine gabbro and olivine-bearing gabbro. Although mostly coarse-grained, thin (few tens of cm) intervals are medium coarse-grained. Continuing down section, the core contains oxide gabbro then medium coarse-grained troctolite. A thin interval of gabbro has a sharp contact with dunite that grades into medium- to coarse-grained, modally layered troctolite. There is another sharp contact between troctolite and coarse-grained, olivine-bearing gabbro near the base of the cored interval. Our general impression is that the intensity of alteration continues to diminish down section, and intervals with strong deformational fabrics are rare and localized.

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JA Daily Science Report for Expedition 304, 28 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-58R to -66R (300.4 to 343.6 mbsf, 60% recovery, 60% average recovery for hole). Serpentinized olivine-rich gabbro continues throughout most of this cored interval with common sharp, dipping contacts with coarse-grained olivine-bearing gabbro. Individual clinopyroxene oikocrysts in the coarse-grained gabbro can exceed 10 cm in long dimension. The gabbro is also characterized by subtle modal variations (manifested as changes in olivine abundance) and grain size changes. Thin (few cm to tens of cm) seams of oxide gabbro were also recovered. Below Core U1309D-60R we pass through an interval, at least 30 m thick (310-340 mbsf) that is predominantly olivine-rich gabbro separated at sharp, moderately steeply dipping contacts with intervals (50 cm to 1 m thick) of varitextured coarse-grained gabbro. Some intervals in the olivine-rich gabbro approach wehrlitic and even dunitic compositions (very low plagioclase abundance). While the olivine-rich gabbro has a dark, mottled appearance imparted by the serpentinization of the abundant olivine, fresh kernels of olivine are common.

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JA Daily Science Report for Expedition 304, 29 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-67R to -73R (343.6 to 377.2 mbsf, 85% recovery, 63% average recovery for hole). Core U1309D-67R recovered moderately altered, medium-coarse grained, olivine-rich gabbro to coarse-grained olivine gabbro (no contact recovered). The coarse olivine gabbro continues through Core U1309D-69R, followed by coarse-grained oxide gabbro. A sharp contact juxtaposes the oxide gabbro with medium-grained, olivine-rich gabbro near the base of Core U1309D-69R. The olivine-rich gabbro grades down section into coarse-grained olivine gabbro, which continues to the bottom of the cored section.

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JA Daily Science Report for Expedition 304, 30 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Cores U1309D-74R to -78R (377.2 to 401.2 mbsf, 87% recovery, 64% average recovery for hole). These cores are a complex series of predominantly olivine-bearing and olivine gabbros. In the upper part of the cored interval, medium-coarse grained olivine gabbros have sutured igneous contacts with thin (10 cm to a few tens of cm thick) intervals of coarser grained, olivine-bearing to olivine-poor gabbros and oxide gabbros. Olivine abundance generally increases down section; the last few cored intervals are medium-coarse grained olivine gabbro. Evidence of deformation is rare, and alteration intensity appears to decrease down section.

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JA Daily Science Report for Expedition 304, 31 December 2004.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309E
Latitude: 30°10.121'N Longitude: 42°07.106'W Water depth: 1644 mbsl
Hole U1309F
Latitude: 30°10.200'N Longitude: 42°07.252'W Water depth: 1644 mbsl

SCIENCE UPDATE: Cores U1309E-1R (0.0 to 3.8 mbsf) and U1309F-1R (0.0 to 4.8 mbsf) are soupy, severely drilling disturbed, light tan calcareous ooze with small fragments of pervasively altered basalt and basalt breccia.

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JA Daily Science Report for Expedition 304, 1 January 2005.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309G
Latitude: 30°10.538'N Longitude: 42°06.318'W Water depth: 1873 mbsl

SCIENCE UPDATE: Core U1309G-1X (0.0 to 3.5 mbsf) is dark tan, clayey silt with sand sized rock fragments and mineral grains. Two, 2-3 cm thick intervals of carbonate-free hyaloclastite bracket a 4 cm thick interval of light tan calcareous ooze with abundant sub-cm sized fragments of gray-green metabasalt. A thin (<0.5 cm) layer of calcareous ooze with sharp, subhorizontal contacts separates the lower hyaloclastite layer from a 3 cm thick layer of densely packed gray-green silty clay. Below the clay interval is a clayey silt matrix-supported conglomerate of rounded, mostly metabasalt fragments. This material was packed into the XCB shoe and appears to be drilling reworked sedimentary deposit.

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JA Daily Science Report for Expedition 304, 2 January 2005.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: Logging at Hole U1309D. To avoid the constricted section (~45-50 mbsf) in Hole U1309D, we replaced the XCB bit with a logging bit, which easily passed through. We ran the triple combo tool, and made two passes with the FMS/sonic tool between ~48 mbsf and the bottom of the hole (401 mbsf). The data quality is very good, hole deviation is minor, and the lower portion of the hole is gauge.

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JA Daily Science Report for Expedition 304, 3 January 2005.

LOCATION: Site U1309 (prospectus site AMFW-01A)
Hole U1309D
Latitude: 30°10.1195'N Longitude: 42°07.1311'W Water depth: 1645 mbsl

SCIENCE UPDATE: The final core from Expedition 304 (Core U1309H-1R, 0-4.0 mbsf) recovered hyaloclastite-cemented microfossil ooze, talc-tremolite schist, and greenschist altered basalt breccia.

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JA Daily Science Report for Expedition 304, 4–6 January 2005.

Underway to Ponta Delgada.