Overview of sites[1]

Expedition 310 Scientists[2]

Chapter contents

Introduction

During Integrated Ocean Drilling Program (IODP) Expedition 310, cores were recovered from 37 holes at 22 sites (Sites M0005–M0026) (Table T1), with an overall conventionally calculated recovery of 57.47%. Water depths at the sites ranged from 41.6 to 117.5 m, and cores were recovered from 41.6 to 161.8 meters below sea level (mbsl). The initial strategy of coring along profiles was applied, although the location of some proposed drill sites was slightly changed because of difficulties in locating and operating at some sites. Three transects were drilled in two regions: Tiarei (inner ridge and outer ridge sites) and Maraa (eastern and western transects). Other drilling areas include marginal sites at Tiarei and Faaa sites. All new sites were drilled within areas approved by the IODP Environmental Protection and Safety Panel (EPSP). Logging was conducted in 10 holes at 7 sites.

Operations up to Site M0005

Mobilization of the *DP Hunter*

Mobilization of the *DP Hunter* took place in two stages; the first stage was in Tampa, Florida (28 August–5 September 2005), and the second stage was during the port call in Papeete, Tahiti (5–6 October).

The first stage involved shipping of contractor drilling equipment and European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) laboratory and ancillary equipment from Europe to Tampa. After all equipment had arrived and cleared customs, the vessel came on charter and was converted into a drilling vessel in just over 6 days. The Tampa Bay Shipyard Company provided port services, welders, and crane drivers. Seacore engineers carried out all engineering work and rig building and certified the load testing of key structures. During the period of rig construction, ESO staff from the British Geological Survey (BGS) unloaded equipment from containers, set up a shipboard computer network, and connected power and water to laboratories. They also made safe the walkways and core inspection areas on board with the drilling contractor. The ESO Operations Superintendent was also responsible for overseeing the entire load testing of key structural components of the rig. Verification of these milestone points were required to trigger contract stage payments. During this period of mobilization, we were pleased to re-

[1] Expedition 310 Scientists, 2007. Overview of sites. *In* Camoin, G.F., Iryu, Y., McInroy, D.B., and the Expedition 310 Scientists. *Proc. IODP,* 310: Washington, DC (Integrated Ocean Drilling Program Management International, Inc.). doi:10.2204/iodp.proc.310.104.2007
[2] Expedition 310 Scientists' addresses.

ceive a visit from Dr. Manik Talwani, President of IODP Management International, Inc. (IODP-MI), and Dr. Jamie Allan of the U.S. National Science Foundation (NSF).

Transit to Papeete, Tahiti

Mobilization work continued during the passage to Panama (5–13 September 2005), where ESO personnel disembarked. Some Seacore personnel continued on the passage to Tahiti, completing their mobilization en route (13 September–5 October).

Port call in Papeete, Tahiti

The second stage of mobilization took place on 5–6 October 2005 during the port call in Papeete. Some airfreight items for the expedition were taken on board during the port call; winches for logging and some equipment for the microbiology laboratory were loaded on deck. For this stage of mobilization, the complete ESO team was available. All laboratories and office spaces were networked with computers, the Offshore Drilling Information System (OffshoreDIS) was set up, onboard equipment was laid out, and a satellite-based e-mail system was installed.

At 0900 h on 6 October, the expedition scientists joined the *DP Hunter*. A visit to the *DP Hunter* was arranged for local schoolchildren and the press for 1 h in the morning. In the afternoon, a project-specific safety briefing was held by the Operations Superintendent and Seacore Offshore Manager. Following this, a science meeting was held to discuss the core work flow in detail. By 1830 h, mobilization was complete, and the vessel commenced day rate operations. The *DP Hunter* departed for the first site (Site M0005) at 1930 h on 6 October after spending 36 h in port.

Sedimentology and biological assemblages

Sequences recovered at the Tahiti sites comprise carbonate and volcaniclastic sediments and rocks that are described below.

Modern reef sediments

Modern reef sediments consist of several decimeters of skeletal sands and gravels composed of rhodoliths, bioclasts rich in *Halimeda* segments, mollusk fragments, benthic foraminiferal tests, and nongeniculate coralline algal thalli. They include clasts of *Halimeda* packstone and coral clasts (especially branching and encrusting colonies) that are commonly encrusted with nongeniculate coralline algae and worms. The surfaces of some clasts are extensively bored and display brown staining. Cores of the rhodoliths generally correspond to coral fragments that in many instances exhibit traces of bioerosion.

Carbonate sequences

Two major carbonate sequences were identified based on their lithological features. Although dating results were not available before the writing of this chapter, the upper carbonate sequence is suspected to correspond to the last deglaciation (referred to as the last deglacial sequence [lithologic Unit I]), whereas the lower sequence is likely to be of older Pleistocene age (referred to as the older Pleistocene sequence [lithologic Unit II]).

The top of the last deglacial carbonate sequence is characterized by an abundance of thin crusts of nongeniculate coralline algae. Extensive bioerosion, black to brown staining, and hardgrounds are common within the top 2–3 m of the sequence.

The last deglacial carbonate sequence is mostly composed of coralgal frameworks heavily encrusted with microbialites locally interlayered with skeletal sand and rubble rich in coral and algal fragments and volcanic grains. In a few cases, coral colonies and algal-coated coral clasts are embedded in a skeletal grainstone/packstone rich in *Halimeda* segments associated with benthic and encrusting foraminifers, bryozoans, echinoids, and mollusks.

Corals are well preserved and form distinctive associations characterized by various morphologies determining distinctive framework internal structure: branching, robust branching, massive, tabular, foliaceous, and encrusting (see descriptions in the “Sedimentology and biological assemblages” sections in the individual site chapters). Robust branching (e.g., *Pocillopora* and *Acropora*) and, to a lesser extent, tabular (e.g., *Acropora*) corals are usually thickly encrusted with nongeniculate coralline algae and microbialites to form dense and compact frameworks; vermetid gastropods and serpulids are locally associated with coralline algae. Foliaceous and encrusting coral colonies (e.g., *Montipora*, *Porites*, *Pavona*, *Leptastrea*, *Psammocora*, *Astreopora*, and agariciids and faviids) are thinly coated with nongeniculate coralline algae and microbialites to form loose frameworks. Large primary cavities in coralgal frameworks are partially filled with skeletal sands and gravels, including coral and coralline algal fragments, and with *Halimeda* segments; volcanic elements are generally subordinate. Cavity walls are commonly veneered with microbial dendritic fabrics.

Microbialites are abundant and represent the major structural and volumetric component of the reef rock. They develop within the primary cavities of the reef framework, where they generally overlie coralline algal crusts to form dark gray massive crusts as thick as 20 cm; they also develop in bioerosion cavities. Microbialites generally comprise a suite of fabrics, including two end-members represented by laminated fabrics and thrombolitic to dendritic accretions; thrombolites usually represent the last stage of encrustation.

Coralgal frameworks are commonly associated or interlayered with skeletal limestone and/or loose skeletal sediments, including coral and algal rubble and skeletal silt to sand.

Skeletal limestone is composed of skeletal packstone to floatstone rich in *Halimeda* segments and fragments of corals, coralline algae, and mollusks.

Skeletal sand is composed of fragments of corals, coralline and green (especially *Halimeda*) algae, and, to a lesser extent, bryozoans, echinoids, mollusks, and foraminifers (*Amphistegina* and *Heterostegina*).

Rubble consists mostly of gravels, pebbles, and cobbles of coral fragments (mostly of branching colonies and, to a lesser extent, tabular colonies) usually displaying encrustations with coralline algae and microbialites, crusts of nongeniculate coralline, chunks of microbialite crusts, and clasts of coralgal-microbialite frameworks. *Halimeda* segments, fragments of bivalves and gastropods, and rhodoliths also occur. Fragments are generally well rounded to subangular and display abundant traces of bioerosion. Some intraclasts display bioeroded surfaces and encrusting worm tubes. Volcanic pebbles are locally mixed with carbonate elements.

The contact between lithologic Units I and II is characterized by an irregular unconformity typified by abundant solution cavities that are partly filled with unconsolidated skeletal and volcanic sand, including coralline algal branches, coral gravels, and *Halimeda* segments; some cavities are partly filled with stalagmite crusts. The top of the older Pleistocene sequence (Unit II) is locally characterized by multiple bored and encrusted surfaces (hardgrounds). Several successive unconformities occur in the upper part of the older Pleistocene sequence.

The older Pleistocene carbonate sequence mostly comprises three major distinctive lithological subunits that are usually closely associated:

- Subunit IIA: Well-lithified skeletal packstone/grainstone to floatstone/rudstone rich in nongeniculate coralline algal crusts, coral fragments (e.g., branching colonies of *Pocillopora* and *Porites,* encrusting colonies of *Montipora* and *Porites,* and massive colonies of *Porites*), and *Halimeda* segments; the abundance of volcanic elements and limestone lithoclasts is variable. Abundant centimeter-sized cavities, as well as the dissolution of skeletal grains (*Halimeda* segments, fragments of mollusks, and corals that form the core of rhodoliths) and the recrystallization of coral skeletons, indicate that these limestones were subject to subaerial diagenetic processes.
- Subunit IIB: Well-lithified coralgal frameworks associated with skeletal packstone/grainstone to floatstone including *Halimeda* segments, shell fragments, scarce bryozoan skeletons, and volcanic elements ranging from fine sand-sized grains to pebble-sized gravels. Coral assemblages include branching *Pocillopora, Acropora, Porites,* and *Pavona;* tabular *Acropora;* encrusting *Montipora, Porites, Leptastrea,* and agaricids; and massive *Porites* and faviids. Coral colonies are usually encrusted with nongeniculate coralline algae, locally associated with vermetid gastropods and serpulids, and with microbialites (massive laminated fabrics overlain by thrombolitic accretions). In situ corals and coral clasts usually exhibit bioerosion features and are thickly encrusted with nongeniculate coralline algae, vermetid gastropods, and microbialites. Corals are diagenetically altered, indicating episodic subaerial exposure. Abundant solution cavities are filled with several generations of infillings, some of them displaying a geopetal pattern, consisting of well-lithified pale brownish limestone, weakly lithified dark brown skeletal sand, and dark gray volcaniclastic skeletal sand and silt overlain by microbialite crusts. Some cavities are locally rimmed with multiple generations of cement crusts.
- Subunit IIC: Beds mostly composed of rubbles and gravels primarily composed of coral clasts, limestone clasts, basalt pebbles, and reworked coral colonies (*Porites* and robust branching *Acropora*). Coral clasts include robust branching or tabular colonies of *Acropora* (*A. humilis*?), robust branching colonies of *Pocillopora*, branching colonies of *Acropora* and *Porites*, encrusting colonies of *Montipora,* and encrusting and submassive *Porites*. Associated skeletal grains include *Halimeda* segments and bryozoans. Clasts usually display abundant traces of bioerosion; some clasts are encrusted with coralline algae, whereas other clasts are partly embedded in *Halimeda* packstone.

Volcaniclastic sediments

One of the unexpected results of Expedition 310 is the recovery of relatively large amounts of volcaniclastic sediments. The entire ~36 m rock sequence drilled in Tiarei marginal Hole M0008A consists of volcaniclastic sediments. Volcaniclastic sediments were also recovered at several other sites, but the amounts are highly variable, from mere sand and silt impurities in the carbonate rock units to minor components (<50 vol%) in carbonate sand units to major components (50 vol%) in sand/silt (or sandstone/siltstone) interbedded with carbonate units beds. As discussed earlier (see **"Sedimentology and biological assemblages"** in the "Methods" chapter), despite their clear volcanogenic origin, volcanic lithic fragments were considered epiclastics, and the lithologic names used were therefore based on grain size (see Table **T1** in the "Methods" chapter) instead of lithologic names for pyroclastic deposits (e.g., Fisher and Schmincke, 1984). Using this nomenclature, the predominant type of volcaniclastic sedimentary units drilled during Expedition 310 are mixed volcanic sand/silt or volcaniclastic sandstone/siltstone units. Individual volcanic granules, pebbles, and minor cobbles are major components in the rubble between some rock units and occur as inclusions in the reefal carbonates.

Volcaniclastic sediments consist of seven principal components:

1. Silt- to cobble-size lithic volcaniclasts,
2. Various "carbonate fragments,"
3. Crystal fragments (pyroxenes and undifferentiated feldspars/feldspathoids [foids]/quartz),
4. Clays (mud),
5. Iron oxides/oxyhydroxides that occur either as coatings around grains or as individual grains,
6. Matrix and/or cement in lithified rocks, and
7. Occasional reworked or rip-up clasts of carbonate sedimentary rocks.

Rare wood fragments and fine, delicate plant roots were observed at Site M0008 only. Two texturally very similar rock pieces recovered in Section 310-M0008A-7R-CC and interval 8R-1, 0–80 cm, were considered parts of a single, large (65 cm recovered) basalt "boulder." Together, the pieces do not show systematic grain-size variation (e.g., coarse-grained interior grading to fine-grained to glassy top and/or bottom) and other textural features (e.g., horizontal flow or trachytic texture; vesicle concentration at the top) indicative of a lava flow, and their upper and lower contacts, which may have indicated baking/chilling of the country rocks, were not recovered. Consequently, the two pieces were considered a single, unlithified volcaniclastic component, and together with the underlying round and polished granules and pebbles and a cobble they compose a relatively thick rubble unit. However, it must be noted that the chemical compositions of the pore waters above and below this particular rubble unit are different, which necessitates the presence of an impervious layer (e.g., a dense lava flow) above or in the rubble section (see **"Geochemistry"**). Moreover, seismic data indicate a continuous and distinct reflective layer at this particular drilled horizon that is consistent with a prominent lava flow (see Fig. **F5** in the "Site surveys related to Expedition 310" chapter). Therefore, it is possible that the boulder is part of a lava flow unit overlying a thinner rubble unit.

As noted earlier, the most distinctive volcaniclastic sedimentary intervals are unlithified mixed sand and silt. It is important to note, however, that the sandstone and siltstone are only weakly to moderately lithified, and thus some of the sand and silt intervals could be drilling artifacts. This phenomenon is clearly illustrated by the presence of sand and silt in some of the core catchers immediately below lithified sandstone and siltstone units (e.g., Sections 310-M0008A-8R-1, 8R-CC, 10R-1, and 10R-CC). Structurally, the mixed sand/silt and sandstone/siltstone intervals are massive, although faint stratifications indicated by relatively more sandy layers alternating with more silty layers were observed. Moreover, elongate carbonate fragments (e.g., shell and coral fragments) are occasionally weakly imbricated. Sharp layer boundaries within units and distinct cross-stratifications were not observed. Boundaries, however, were generally not recovered intact; the majority of the observed boundaries in volcaniclastic intervals are defined by the abrupt occurrences of rubble beds.

Texturally, sand and silt components range in shape from angular to rarely round but are predominantly angular to subangular. In contrast, the larger-sized granules, pebbles, and cobbles are subround to round. Grains are unsorted, and in general, size grading within individual units is rarely observed. As will be described in detail below, however, pronounced downhole variation in the color and composition of the volcanic sand/silt units was observed at Site M0008.

Compositionally, volcanic lithic components are several varieties of basalt and occasional hawaiite/alkalic andesite. Alkalic diorite pebbles were also observed. No detailed examination of silts, sands, and granules was done, but visual and hand lens/binocular microscope observation of the boulder, cobbles, and representative pebbles show that lithic clasts are fine grained or essentially aphanitic (grain size = <1 mm) basalts. Grain-size variation within a fine-grained basalt clast is imparted by the presence of phenocrysts, which vary in size from ~1 to >5 mm (i.e., from aphanitic basalt to fine- to coarse-grained basalt). Phenocrysts also vary in abundance from <1 to ~20 vol%, giving aphyric to highly phyric textured basalts. The main phenocryst phases are subhedral to euhedral pyroxenes (many are augite) and olivine. Many of the pyroxenes show sieve texture, possibly due to either postmagmatic mineral reaction or alteration of glass/mineral inclusions. Many of the olivine crystals are altered along margins and fractures to brown clay (iddingsite), but a few are surprisingly fresh. Feldspars and/or feldspathoids also occur as phenocrysts but are not as dominant and distinctive as the ferromagnesian minerals. Some phenocrysts cluster together or are glomerophyric, whereas others are oriented subparallel, indicating flow direction, or are trachytic.

The majority of the lithic basalt clasts are nonvesicular, but some are slightly to highly vesicular. In fact, a few basalt pebbles appear scoriaceous, but they are too dense to be classified as scoria. A few vesicles are lined with amygdules of iron oxides and carbonates, but as a whole the vesicular variety of the basalt clasts is nonamygdaloidal. The unfilled nature of the vesicles and the fresh-looking nature of some olivine phenocrysts suggest that many of the basalt cobbles and pebbles are only slightly altered. Visual observation suggests that many of these larger sized basalt clasts are not heavily weathered and altered. In contrast, some of the basalt granules and particularly the sand and silt grains are angular to subangular fragments intermixed with clays and iron oxides/oxyhydroxides.

Petrophysics

The last deglacial sequence (lithologic Unit I) comprises coralgal frameworks heavily encrusted with microbialites that are locally interlayered with coarse skeletal sands and gravels rich in coral and algal fragments. Large primary cavities in the coralgal framework are open or partially filled with skeletal sands and gravels, including coral and coralline algal fragments, and with *Halimeda* segments. Microbialites are abundant and represent the major and structural and volumetric component of the reef rock. The open framework and centimeter- to decimeter-sized pores result in a highly variable physical system. Physical properties change on a centimeter scale and may range from low porosity, high density and velocity to 100% open pore space. In situ corals, microbialites, and skeletal sands all have a distinct petrophysical signature (acoustic velocity, porosity, grain density, and color reflectance L* values) but cannot be correlated easily from hole to hole.

The last deglacial sequence at Tiarei has a greater volcaniclastic component than the one at Maraa; this difference is observed on digital image scans and quantified by diffuse color reflectance spectrophotometry and magnetic susceptibility core logs. Minor amounts of noncarbonate material, clay, and/or quartz silt/sand can dramatically change acoustic velocities (Stafleu et al., 1994; Kenter et al., 1997; Anselmetti and Eberli, 2001). Magnetic susceptibility values are lower in the last deglacial sequence (Unit I) at Maraa than at Tiarei.

The contact between lithologic Units I and II is characterized by an irregular unconformity; abundant solution cavities at the top of the underlying limestone are partly filled with unconsolidated skeletal and volcanic sand, including coralline algal branches, coral gravels, and *Halimeda* segments. The change in physical properties at this contact is sharp and abrupt. Density, velocity, and magnetic susceptibility increase, and porosity decreases.

The older Pleistocene sequence (lithologic Unit II) is composed of (1) well-lithified skeletal packstone/grainstone to floatstone/rudstone, (2) well-lithified coralgal frameworks abundant in coated corals and coral clasts (corals are diagenetically altered, indicating subaerial exposure, and solution cavities have several generations of infilling), and (3) rubbles and gravels primarily composed of coral clasts, limestone clasts, basalt pebbles, and reworked coral colonies. All three subunits are well compacted and have undergone several phases of diagenetic alteration. This results in tight, low-porosity, high-velocity limestones with much less variation of physical properties than observed for the younger sequence. Volcanic pebbles and sands are locally interlayered and/or mixed with carbonate and are associated with an increase in magnetic susceptibility values.

The sequence drilled in Tiarei marginal Hole M0008A consists entirely of volcaniclastic sediments and rocks: clays, un- to semilithified sandstones, basalt gravels, pebbles, and cobbles. Sandstones are commonly moderately lithified and have high densities compared to relatively low velocities. Basalts are high in density and velocity. Magnetic susceptibility in this unit is generally high.

In the "Sedimentology and biological assemblages" section in each site chapter, Units I and II and their subdivisions are defined using lithological and biological assemblage criteria. Intervals characterized by particular physical properties were recognized and can usually be correlated with lithologic Units I and II and their subdivisions. Hole-to-hole correlation of physical properties was possible in some cases.

Geochemistry

Most importantly, the interstitial water (IW) data from Expedition 310 demonstrate the ability to obtain geochemical signals (significant deviations from seawater chemistry) from fossil reef material. The use of Rhizon sampling enabled IW samples to be taken where traditional whole-round squeezing was not possible and undesirable. For these reasons alone, IW data from Expedition 310 are successful. Lack of ubiquitous metallic enrichments compared to Tahitian seawater indicate that no significant contamination resulted from using seawater as the drilling fluid.

Microbiology

All microbiology results have been treated together, and the results for the entire expedition are presented in the **"Microbiology"** chapter. Therefore, there are no "Microbiology" sections in the site chapters.

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Table T1. Expedition 310 coring summary. (See table notes. Continued on next three pages.)

Faaa area (Site TAH-01A)

Hole M0019A
- Latitude: 17°32.0799′S
- Longitude: 149°35.9195′W
- Water depth (drill pipe measurement from sea level, m): 58.75
- Total depth (drill pipe measurement from sea level, m): 125.71
- Total penetration (meters below seafloor, mbsf): 66.96
- Total length of cored section (m): 65.81
- Total core recovered (m): 27.06
- Core recovery (%): 41.12
- Total number of cores: 34
- Operations: drill in DART, core to TD

Hole M0020A
- Latitude: 17°32.0414′S
- Longitude: 149°35.9277′W
- Water depth (drill pipe measurement from sea level, m): 83.3
- Total depth (drill pipe measurement from sea level, m): 125.46
- Total penetration (mbsf): 42.16
- Total length of cored section (m): 41.83
- Total core recovered (m): 29.47
- Core recovery (%): 70.45
- Total number of cores: 25
- Operations: drill in DART, core to TD

Tiarei area (Site TAH-02A)

Hole M0008A
- Latitude: 17°29.6207′S
- Longitude: 149°24.4310′W
- Water depth (drill pipe measurement from sea level, m): 62.65
- Total depth (drill pipe measurement from sea level, m): 102.85
- Total penetration (mbsf): 40.2
- Total length of cored section (m): 38.7
- Total core recovered (m): 9.49
- Core recovery (%): 24.52
- Total number of cores: 19
- Operations: drill in DART, core to TD

Hole M0009A
- Latitude: 17°29.3174′S
- Longitude: 149°24.2064′W
- Water depth (drill pipe measurement from sea level, m): 99.71
- Total depth (drill pipe measurement from sea level, m): 122.75
- Total penetration (mbsf): 23.04
- Total length of cored section (m): 21.54
- Total core recovered (m): 9.29
- Core recovery (%): 43.13
- Total number of cores: 18
- Operations: drill in DART, core to TD

Hole M0009B
- Latitude: 17°29.3153′S
- Longitude: 149°24.2044′W
- Water depth (drill pipe measurement from sea level, m): 100.31
- Total depth (drill pipe measurement from sea level, m): 127.43
- Total penetration (mbsf): 27.12
- Total length of cored section (m): 26.29
- Total core recovered (m): 17.42
- Core recovery (%): 66.26
- Total number of cores: 18
- Operations: drill in DART, core to TD, hole logged using downhole tools

Hole M0009C
- Latitude: 17°29.3126′S
- Longitude: 149°24.2086′W
- Water depth (drill pipe measurement from sea level, m): 99.85
- Total depth (drill pipe measurement from sea level, m): 125.51
- Total penetration (mbsf): 25.66
- Total length of cored section (m): 24.41
- Total core recovered (m): 12.66
- Core recovery (%): 51.86
- Total number of cores: 21
- Operations: drill in DART, core to TD

Hole M0009D
- Latitude: 17°29.3153′S
- Longitude: 149°24.2011′W
- Water depth (drill pipe measurement from sea level, m): 103.18
- Total depth (drill pipe measurement from sea level, m): 147.77
- Total penetration (mbsf): 44.59
- Total length of cored section (m): 43.31
- Total core recovered (m): 23.62
- Core recovery (%): 54.54
- Total number of cores: 25
- Operations: drill in DART, core to TD

Hole M0009E
- Latitude: 17°29.3143′S
- Longitude: 149°24.2121′W
- Water depth (drill pipe measurement from sea level, m): 94.94
- Total depth (drill pipe measurement from sea level, m): 115.44
- Total penetration (mbsf): 20.5
- Total length of cored section (m): 19.4
- Total core recovered (m): 14.11
- Core recovery (%): 72.73
- Total number of cores: 12
- Operations: drill in DART, core to TD

Hole M0010A
- Latitude: 17°29.3978′S
- Longitude: 149°24.167917′W
- Water depth (drill pipe measurement from sea level, m): 89.53
- Total depth (drill pipe measurement from sea level, m): 124.13
- Total penetration (mbsf): 34.6
- Total length of cored section (m): 33.25
- Total core recovered (m): 10.02
- Core recovery (%): 30.14
- Total number of cores: 20
- Operations: drill in DART, core to TD

Hole M0011A
- Latitude: 17°29.3697′S
- Longitude: 149°24.1606′W
- Water depth (drill pipe measurement from sea level, m): 101.34
- Total depth (drill pipe measurement from sea level, m): 118.99
- Total penetration (mbsf): 17.65
- Total length of cored section (m): 16.08
- Total core recovered (m): 7.89
- Core recovery (%): 49.07
- Total number of cores: 12
- Operations: drill in DART, core to TD

Hole M0012A
- Latitude: 17°29.4291′S
- Longitude: 149°24.1104′W
- Water depth (drill pipe measurement from sea level, m): 77.05
- Total depth (drill pipe measurement from sea level, m): 111.15
- Total penetration (mbsf): 34.1
- Total length of cored section (m): 32.3
- Total core recovered (m): 8.37
- Core recovery (%): 25.91
- Total number of cores: 19
- Operations: drill in DART, core to TD

Hole M0013A
- Latitude: 17°29.4119′S
- Longitude: 149°24.111′W
- Water depth (drill pipe measurement from sea level, m): 90.55
- Total depth (drill pipe measurement from sea level, m): 102.65
- Total penetration (mbsf): 11.7
- Total length of cored section (m): 9.55
- Total core recovered (m): 1.1
- Core recovery (%): 11.52
- Total number of cores: 5
- Operations: drill in DART, core to TD

Hole M0014A
- Latitude: 17°29.3697′S

Table T1 (continued).

Longitude: 149°24.1237′W
Water depth (drill pipe measurement from sea level, m): 99.25
Total depth (drill pipe measurement from sea level, m): 102.65
Total penetration (meters below sea floor, mbsf): 21.81
Total length of cored section (m): 18.61
Total core recovered (m): 8.65
Core recovery (%): 46.48
Total number of cores: 14
Operations: drill in DART, core to TD

Hole M0021A
Latitude: 17°29.3409′S
Longitude: 149°24.1689′W
Water depth (drill pipe measurement from sea level, m): 82.3
Total depth (drill pipe measurement from sea level, m): 116.53
Total penetration (mbsf): 34.23
Total length of cored section (m): 33.58
Total core recovered (m): 25.14
Core recovery (%): 74.87
Total number of cores: 22
Operations: drill in DART, core to TD

Hole M0021B
Latitude: 17°29.3427′S
Longitude: 149°24.1692′W
Water depth (drill pipe measurement from sea level, m): 81.7
Total depth (drill pipe measurement from sea level, m): 114.51
Total penetration (mbsf): 32.81
Total length of cored section (m): 32.21
Total core recovered (m): 21.12
Core recovery (%): 65.57
Total number of cores: 20
Operations: drill in DART, core to TD

Hole M0022A
Latitude: 17°29.2713′S
Longitude: 149°24.2691′W
Water depth (drill pipe measurement from sea level, m): 117.54
Total depth (drill pipe measurement from sea level, m): 126.34
Total penetration (mbsf): 8.8
Total length of cored section (m): 7.7
Total core recovered (m): 4.4
Core recovery (%): 57.14
Total number of cores: 4
Operations: drill in DART, core to TD

Hole M0023A
Latitude: 17°29.4169′S
Longitude: 149°24.2770′W
Water depth (drill pipe measurement from sea level, m): 67.98
Total depth (drill pipe measurement from sea level, m): 99.34
Total penetration (mbsf): 31.36
Total length of cored section (m): 31.36
Total core recovered (m): 24.21
Core recovery (%): 77.20
Total number of cores: 16
Operations: drill in DART, core to TD

Hole M0023B
Latitude: 17°29.4191′S
Longitude: 149°24.2786′W
Water depth (drill pipe measurement from sea level, m): 67.58
Total depth (drill pipe measurement from sea level, m): 98.70
Total penetration (mbsf): 31.12
Total length of cored section (m): 31.12
Total core recovered (m): 21.13
Core recovery (%): 67.90
Total number of cores: 16
Operations: drill in DART, core to TD

Hole M0024A
Latitude: 17°29.2918′S
Longitude: 149°24.2358′W
Water depth (drill pipe measurement from sea level, m): 90.44
Total depth (drill pipe measurement from sea level, m): 122.74
Total penetration (mbsf): 32.3
Total length of cored section (m): 31.85
Total core recovered (m): 26.67
Core recovery (%): 83.74
Total number of cores: 16
Operations: drill in DART, core to TD

Hole M0025A
Latitude: 17°29.2815′S
Longitude: 149°24.2420′W
Water depth (drill pipe measurement from sea level, m): 105.4
Total depth (drill pipe measurement from sea level, m): 126.33
Total penetration (mbsf): 20.93
Total length of cored section (m): 20.33
Total core recovered (m): 15.09
Core recovery (%): 74.23
Total number of cores: 13
Operations: drill in DART, core to TD

Hole M0025B
Latitude: 17°29.2862′S
Longitude: 149°24.1679′W
Water depth (drill pipe measurement from sea level, m): 100.84
Total depth (drill pipe measurement from sea level, m): 121.34
Total penetration (mbsf): 20.5
Total length of cored section (m): 19.4
Total core recovered (m): 13.81
Core recovery (%): 71.19
Total number of cores: 13
Operations: drill in DART, core to TD

Hole M0026A
Latitude: 17°29.3587′S
Longitude: 149°24.1509′W
Water depth (drill pipe measurement from sea level, m): 107.3
Total depth (drill pipe measurement from sea level, m): 119.7
Total penetration (mbsf): 12.4
Total length of cored section (m): 11.0
Total core recovered (m): 6.43
Core recovery (%): 58.45
Total number of cores: 8
Operations: drill in DART, core to TD

Maraa area (Site TAH-03A)
Hole M0005A
Latitude: 17°45.9897′S
Longitude: 149°33.0525′W
Water depth (drill pipe measurement from sea level, m): 59.13
Total depth (drill pipe measurement from sea level, m): 75.48
Total penetration (mbsf): 16.35
Total length of cored section (m): 16.35
Total core recovered (m): 5.37
Core recovery (%):32.84
Total number of cores: 12
Operations: drill in DART, core to TD

Hole M0005B
Latitude: 17°45.9897′S
Longitude: 149°33.0525′W
Water depth (drill pipe measurement from sea level, m): 59.13
Total depth (drill pipe measurement from sea level, m): 75.48
Total penetration (mbsf): 21.75
Total length of cored section (m): 12.35
Total core recovered (m): 9.24
Core recovery (%): 74.82
Total number of cores: 8
Operations: reenter Hole M0005A, core to TD

Hole M0005C
Latitude: 17°45.9915′S
Longitude: 149° 33.0476′W
Water depth (drill pipe measurement from sea level, m): 59.63
Total depth (drill pipe measurement from sea level, m): 87.54
Total penetration (mbsf): 27.91

Table T1 (continued).

Total length of cored section (m): 27.91
Total core recovered (m): 14.81
Core recovery (%): 53.06
Total number of cores: 16
Operations: drill in DART, core to TD

Hole M0005D
Latitude: 17°45.9915′S
Longitude: 149°33.0476′W
Water depth (drill pipe measurement from sea level, m): 59.63
Total depth (drill pipe measurement from sea level, m): 161.8
Total penetration (mbsf): 102.17
Total length of cored section (m): 79.17
Total core recovered (m): 51.35
Core recovery (%): 64.86
Total number of cores: 36
Operations: reenter Hole M0005C, core to TD

Hole M0005E
Latitude: 17°45.9921′S
Longitude: 149°33.0454′W
Water depth (drill pipe measurement from sea level, m): 61.34
Total depth (drill pipe measurement from sea level, m): 63.34
Total penetration (mbsf): 2.0
Total length of cored section (m): 2.0
Total core recovered (m): 1.6
Core recovery (%): 80
Total number of cores: 4
Operations: drill in DART, core to TD

Hole M0006A
Latitude: 17°46.0151′S
Longitude: 149°33.0515′W
Water depth (drill pipe measurement from sea level, m): 81.58
Total depth (drill pipe measurement from sea level, m): 83.58
Total penetration (mbsf): 2.0
Total length of cored section (m): 2.0
Total core recovered (m): 1.55
Core recovery (%): 77.5
Total number of cores: 4
Operations: drill in DART, core to TD

Hole M0007A
Latitude: 17°45.9553′S
Longitude: 149°33.0411′W
Water depth (drill pipe measurement from sea level, m): 44.45
Total depth (drill pipe measurement from sea level, m): 88.85
Total penetration (mbsf): 44.4
Total length of cored section (m): 44.4
Total core recovered (m): 30.74
Core recovery (%): 69.23
Total number of cores: 36
Operations: drill in DART, core to TD

Hole M0007B
Latitude: 17°45.9462′S
Longitude: 149°33.0682′W
Water depth (drill pipe measurement from sea level, m): 41.65
Total depth (drill pipe measurement from sea level, m): 89.88
Total penetration (mbsf): 48.23
Total length of cored section (m): 47.93
Total core recovered (m): 27.02
Core recovery (%): 56.37
Total number of cores: 36
Operations: drill in DART, core to TD

Hole M0007C
Latitude: 17°45.9557′S
Longitude: 149°33.0128′W
Water depth (drill pipe measurement from sea level, m): 43.35
Total depth (drill pipe measurement from sea level, m): 75.6
Total penetration (mbsf): 32.25
Total length of cored section (m): 30.75
Total core recovered (m): 11.13
Core recovery (%): 36.2
Total number of cores: 22
Operations: drill in DART, core to TD

Hole M0015A
Latitude: 17°46.0445′S
Longitude: 149°32.8499′W
Water depth (drill pipe measurement from sea level, m): 72.15
Total depth (drill pipe measurement from sea level, m): 114.33
Total penetration (mbsf): 42.18
Total length of cored section (m): 41.08
Total core recovered (m): 29.87
Core recovery (%): 72.71
Total number of cores: 41
Operations: drill in DART, core to TD

Hole M0015B
Latitude: 17°46.0435′S
Longitude: 149° 32.846133′W
Water depth (drill pipe measurement from sea level, m): 72.3
Total depth (drill pipe measurement from sea level, m): 112.42
Total penetration (mbsf): 40.12
Total length of cored section (m): 40.12
Total core recovered (m): 28.83
Core recovery (%): 71.86
Total number of cores: 38
Operations: drill in DART, core to TD

Hole M0016A
Latitude: 17°46.0534′S
Longitude: 149°32.8565′W
Water depth (drill pipe measurement from sea level, m): 80.85
Total depth (drill pipe measurement from sea level, m): 119.16
Total penetration (mbsf): 38.31
Total length of cored section (m): 37.91
Total core recovered (m): 21.58
Core recovery (%): 56.92
Total number of cores: 36
Operations: drill in DART, core to TD

Hole M0016B
Latitude: 17°46.0534′S
Longitude: 149°32.8536′W
Water depth (drill pipe measurement from sea level, m): 80.35
Total depth (drill pipe measurement from sea level, m): 124.97
Total penetration (mbsf): 44.62
Total length of cored section (m): 27.62
Total core recovered (m): 14.31
Core recovery (%): 51.81
Total number of cores: 24
Operations: drill in DART, core to TD

Hole M0017A
Latitude: 17°46.0124′S
Longitude: 149°32.8433′W
Water depth (drill pipe measurement from sea level, m): 56.45
Total depth (drill pipe measurement from sea level, m): 97.01
Total penetration (mbsf): 40.56
Total length of cored section (m): 40.56
Total core recovered (m): 22.94
Core recovery (%): 56.56
Total number of cores: 21
Operations: drill in DART, core to TD

Hole M0018A
Latitude: 17°46.0416′S
Longitude: 149°32.8959′W
Water depth (drill pipe measurement from sea level, m): 81.8
Total depth (drill pipe measurement from sea level, m): 121.85
Total penetration (mbsf): 40.05
Total length of cored section (m): 40.05
Total core recovered (m): 24.63
Core recovery (%): 61.50
Total number of cores: 22
Operations: drill in DART, core to TD

Table T1 (continued).

Hole	Number of cores	Core Length (m)	Core Recovered (m)	Recovery (%)
M0005A	12	16.35	5.37	32.84
M0005B	8	12.35	9.24	74.82
M0005C	16	27.91	14.81	53.06
M0005D	36	79.17	51.35	64.86
M0005E	4	2	1.6	80.00
M0006A	4	2	1.55	77.50
M0007A	36	44.4	30.74	69.23
M0007B	36	47.93	27.02	56.37
M0007C	22	30.75	11.13	36.20
M0008A	19	38.7	9.49	24.52
M0009A	18	21.54	9.29	43.13
M0009B	18	26.29	17.42	66.26
M0009C	21	24.41	12.66	51.86
M0009D	25	43.31	23.62	54.54
M0009E	12	19.4	14.11	72.73
M0010A	20	33.25	10.02	30.14
M0011A	12	16.08	7.89	49.07
M0012A	19	32.3	8.37	25.91
M0013A	5	9.55	1.1	11.52
M0014A	14	18.61	8.65	46.48
M0015A	41	41.08	29.87	72.71
M0015B	38	40.12	28.83	71.86
M0016A	36	37.91	21.58	56.92
M0016B	24	27.62	14.31	51.81
M0017A	21	40.56	22.94	56.56
M0018A	22	40.05	24.63	61.50
M0019A	34	65.81	27.06	41.12
M0020A	25	41.83	29.47	70.45
M0021A	22	33.58	25.14	74.87
M0021B	20	32.21	21.12	65.57
M0022A	4	7.7	4.4	57.14
M0023A	16	31.36	24.21	77.20
M0023B	16	31.12	21.13	67.90
M0024A	16	31.85	26.67	83.74
M0025A	13	20.33	15.09	74.23
M0025B	13	19.4	13.81	71.19
M0026A	8	11	6.43	58.45
Totals:	726	1099.83	632.12	57.47

Notes: DART = drilling and seabed reentry template. TD = total depth.