12. SITE 880[1]

Shipboard Scientific Party[2]

HOLE 880A

Date occupied: 18 July 1992

Date departed: 19 July 1992

Time on hole: 1 hr, 20 min

Position: 34°12.53′N, 144°18.74′E

Bottom felt (rig floor, m; drill-pipe measurement): 1536.6

Distance between rig floor and sea level (m): 11.8

Water depth (drill-pipe measurement from sea level, m): 1524.8

Total depth (rig floor, m): 1536.6

Penetration (m): 18.4

Total length of cored section (m): 18.40

Total core recovered (m): 18.70

Core recovery (%): 101

Principal results: Site 880 is located at 34°12.53′N, 144°18.74′E at 1525 m water depth, in the center of the Takuyo-Daisan (Seiko) Guyot, about 2 nmi north of Site 879. Coring began at Site 880 on 18 July 1992 and was completed on 19 July 1992 after 1.3 hr of drilling. Seismic profiles show that pelagic sediments, up to about 60 m thick, infill the depressions. Contrary to what was expected, no prominent reflector marks the contact between the pelagic cap and the substratum on the 3.5-kHz profile.

A preliminary evaluation of the material recovered at Site 880 yielded one lithologic unit. This is based upon a combination of data from the visual core descriptions and smear slides. The age of this unit is based on the identification of calcareous nannofossils, planktonic foraminifers, and diatoms in the uppermost layers. One lithologic unit was recognized.

Unit I (0–18.4 mbsf) consists of a sequence of interlayered volcaniclastic sand and foraminifer sand with nannofossil foraminifer ooze and volcanic ash of late Pleistocene to late Pliocene age. Unit I ranges in color from shades of yellow green and grayish brown to very dark gray. As the percentage of volcanic material increases, the ooze darkens in color. Noncalcareous components include feldspars, opaques (possibly manganese nodules), vesicular lava fragments, volcanic lapilli, scoriaceous basalt grains, and pyrite. Diatoms, sponge spicules, and silicoflagellates are frequent in the uppermost layers.

BACKGROUND AND OBJECTIVES

Site 880 is located at 34°12.53′N, 144°18.74′E, at 1525 m water depth, in the center of the Takuyo-Daisan (Seiko) Guyot. Sea Beam data show that the Takuyo-Daisan Guyot has a central volcano, which is surrounded by small depressions (van Waasbergen and Winterer, in press). Seismic profiles show that pelagic sediments, up to about 60 m thick, infill these depressions. Contrary to what was expected, no prominent reflector marks the contact between the pelagic cap and the substratum on the 3.5-kHz profile. For more details on the geology of Takuyo-Daisan Guyot, see "Background and Objectives" section, "Site 879" chapter (this volume).

Drilling plans for Site 880 were to core the pelagic cap close to proposed Site Seiko-1 with the advanced hydraulic piston corer (APC). Site 880 is located on the center of Takuyo-Daisan Guyot; it was selected based on a seismic line shot obtained during the Leg 144 survey of the guyot.

The scientific objectives at Site 880 were (1) to recover APC cores of pelagic sediments from this northernmost site in completion of the north-south pelagic cap transect of guyots, and (2) to date the interface between the pelagic cap and the underlying platform or volcaniclastic sequence.

Drilling at Site 880, on Takuyo-Daisan Guyot, recovered only two APC cores of foraminifer sand and volcaniclastic sand because drilling operations were terminated to prepare for departure to Yokohama, Japan. Limited core recovery at this site will prevent the completion of the primary objectives at Site 880; however, the first objective is addressed with the preliminary shipboard studies and additional shore-based studies of the recovered cores.

OPERATIONS

Hole 880A

After the drill string was pulled clear of the seafloor and the beacon was recovered at Site 879, the vessel began to offset by global positioning satellite (GPS) and precision depth recorder (PDR) navigation to Site 880. Site 879 is located on the southern rim, whereas Site 880 is located on the central summit region of Takuyo-Daisan Guyot in the Japanese Seamounts. The positioning beacon was redeployed about 2 nmi north of Site 879 at 1627L (L = local time), 18 July 1992, as magnaflux inspection of the bottom-hole assembly (BHA) continued. The PDR profile indicated at least 41 m of pelagic sediments. Hole 880 was cored with the APC in a water depth of 1525 m. Two APC cores were recovered at Site 880 with nearly 100% recovery of nannofossil foraminifer ooze and volcaniclastic and ash layers (Table 1). The last core was on deck by 0050L, 19 July 1992. Drilling operations ended to prepare for our departure to Yokohama, Japan.

LITHOSTRATIGRAPHY

The APC system was used to drill one hole (Hole 880A) at Takuyo-Daisan Guyot (Site 880). Total depth of penetration was 18.4 mbsf, and overall recovery was 100% (see "Operations" section, this chapter). Four different lithologies were distinguished that constitute one single lithologic unit. In order of decreasing abundance, these lithologies are (1) volcaniclastic sand, (2) foraminifer sand, (3) nannofossil foraminifer ooze, and (4) volcanic ash. These different lithologies are closely associated and usually are interlayered.

The sand and ooze deposits contain calcareous nannofossils and planktonic foraminifers, with ages ranging from the late Pliocene to the late Pleistocene (see "Biostratigraphy" section, this chapter).

Volcaniclastic sand is widespread throughout the two cores. The color of the sediment is mostly olive gray (5Y 5/2), grayish

[1] Premoli Silva, I., Haggerty, J., Rack, F., et al., 1993. *Proc. ODP, Init. Repts.*, 144: College Station, TX (Ocean Drilling Program).

[2] Shipboard Scientific Party is as given in the list of participants preceding the contents.

Table 1. Coring summary, Site 880.

Core no.	Date (July 1992)	Time (Z)	Depth (mbsf)	Cored (m)	Recovered (m)	Recovery (%)
144-880A-						
1H	18	1515	0–8.9	8.9	8.85	99.4
2H	18	1550	8.9–18.4	9.5	9.85	103.0
Coring totals				18.4	18.70	101.6

brown (10YR 5/2), grayish green (10GY 5/2), to very dark gray (10YR 3/1). A pale yellow green (10GY 7/2) and gray (5Y 6/2) banding was observed in Interval 144-880A-1H-2, 110–122 cm. This volcaniclastic sand is mostly composed of clear glass, but it also includes feldspars and brown grains. Opaque grains compose up to 25% of the cores recovered (Interval 144-880A-1H-2, 122–143 cm); some may be manganese oxides. Grain size is fine sand; fine silt and clay content is appreciable and may reach 40%. Foraminifers are rare to abundant; calcareous nannofossils compose up to 15%. Few sponge spicules were observed in Interval 144-880A-1H-3, 70–88 cm. Rock fragments compose up to 40% of the total grains in Interval 144-880A-1H-3, 54–57 cm, and consist of lava with elongate vesicles. Volcanic lapilli occur throughout Section 144-880A-2H-1 and in Interval 144-880A-2H-2, 90–115 cm. Rounded pebbles, 2–15 mm in diameter, occur in Interval 144-880A-1H-5, 0–79 cm.

Foraminifer sand is abundant in Section 144-880A-1H-1 and Interval 144-880A-1H-2, 0–54 cm. The colors are brown (10YR 4/3), grayish black (N2), grayish brown (10YR 5/2), and light olive gray (5Y 6/2). A vague band of very dark gray (10YR 3/1) is present in Intervals 144-880A-1H-1, 52–54 cm, and -1H-2, 92–110 cm. Two pairs of broad, gradational bands of grayish brown (10YR 5/2) and gray (10YR 5/1) sediment occur in Interval 144-880A-1H-1, 54–130 cm. An irregular contact inclined at 40° occurs in Interval 144-880A-1H-1, 126–132 cm. This foraminifer sand includes calcareous nannofossils and clay. Opaque grains compose 25%–30% of this sand. Many appear to be composite, black, and brown aggregates or rock fragments; some are probably single crystals; and a few are pyrite. Some foraminifer tests are filled with a silvery gray material that has a submetallic luster. These grains probably have varied origins. Lenses of sediment occur in Interval 144-880A-1H-1, 130–147 cm, that appear to be beds disrupted by burrows. The concentration of foraminifers is high in the olive-gray portion of the interval and very low in the grayish black lenses.

Nannofossil foraminifer ooze is a minor lithology present in Interval 144-880A-1H-3, 88–105 cm, and in Section 144-880A-1H-4. This ooze contains 10% sand-sized lithoclasts and opaque grains. A scoriaceous basalt clast occurs at Section 144-880A-1H-4, 43 cm; and rounded light gray pebbles with sparse dark phenocrysts are present in Interval 144-880A-1H-4, 48–57 cm. The colors of these sediments are olive gray (5Y 5/2) to dark grayish brown (2.5Y 4/2) with darker splotches. The distribution of colors is patchy in Interval 144-880A-1H-4, 62–140 cm.

Layers of soft vitric ash (from a few centimeters up to 10 cm thick) are reported in Intervals 144-880A-1H-3, 50–54 cm; -1H-3, 68–70 cm; and -1H-6, 36–46 cm. The colors are pinkish gray (5YR 6/2) to pale yellow green (10GY 7/2). Grain size is fine sand. Possible burrows are present in Interval 144-880A-1H-3, 50–54 cm.

The two cores recovered at Site 880 were the last ones taken on Leg 144. They constitute a late Pliocene to Holocene accumulation of pelagic sediments on the surface of the Takuyo-Daisan Guyot and are still under study.

BIOSTRATIGRAPHY

Introduction

Site 880 was drilled to recover the pelagic cap on Takuyo-Daisan Guyot. Two cores of pelagic sediments were recovered from Hole 880A. Core-catcher samples and various other samples within the cores were examined to establish the biostratigraphy (Fig. 1).

Calcareous Nannofossils

Calcareous nannofossils were investigated in the core-catcher samples, the top of Core 144-880A-1H, and one sample from the bottom of each section.

Sediments from the top and bottom of Section 144-880A-1H-1 (0–1.5 mbsf) contain *Emiliania huxleyi, Gephyrocapsa oceanica,* and *Gephyrocapsa caribbeanica. Emiliania huxleyi* dominates the assemblage, indicating the *E. huxleyi* Acme Zone of latest Pleistocene age. The bottom layers of Sections 144-880A-1H-2 and -1H-3 yield nicely preserved nannofloras including *E. huxleyi,* small *Gephyrocapsa, G. caribbeanica,* and *G. oceanica* attributed to the *Emiliania huxleyi* Zone of late Pleistocene age. *Pseudoemiliania lacunosa* is common at the bottom of Sections 144-880A-1H-4 through -1H-6, where *E. huxleyi* was not ob-

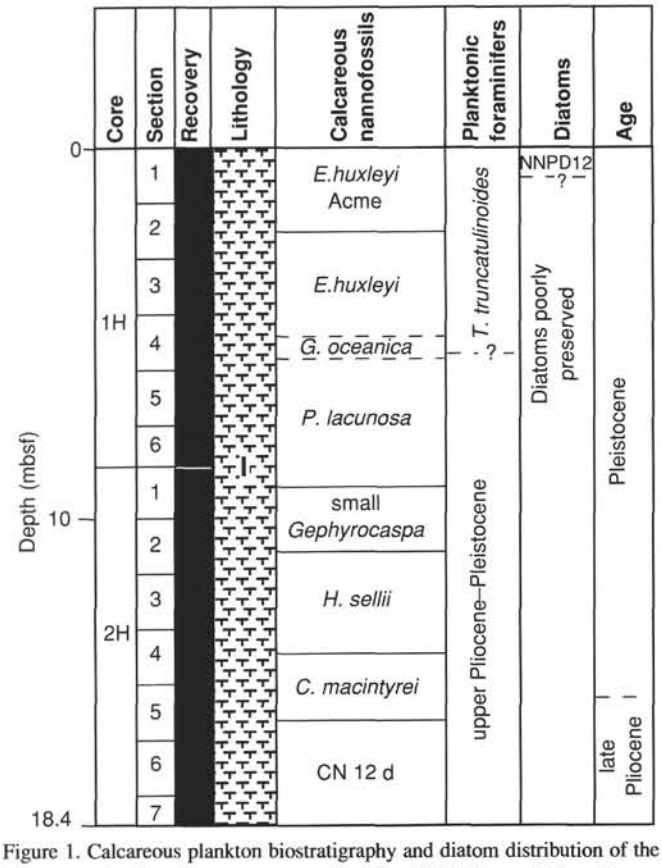

Figure 1. Calcareous plankton biostratigraphy and diatom distribution of the Neogene pelagic sediments recovered at Site 880, Takuyo-Daisan Guyot. Samples were examined from the base of each section; zonal boundaries were placed halfway between sample horizons.

served. This nannofossil assemblage, including abundant *G. caribbeanica* and *G. oceanica*, is indicative of the *Pseudoemiliania lacunosa* Zone of middle to early Pleistocene age. The *Gephyrocapsa oceanica* Zone of mid-Pleistocene age probably occurs within Section 144-880A-1H-4. Sediments from the bottom of Section 144-880A-2H-1 contain a nannofossil assemblage, including *Pseudoemiliania lacunosa* and extremely abundant small *Gephyrocapsa* without *Helicosphaera sellii*. This identifies the small *Gephyrocapsa* Zone of early Pleistocene age. The nannofloras from the bottom of Sections 144-880A-2H-2 and -2H-3 include *Helicosphaera sellii, P. lacunosa* without *Calcidiscus macintyrei*. This assemblage indicates the *Helicosphaera sellii* Zone of early Pleistocene age. The occurrence of *Calcidiscus macintyrei* at the bottom of Section 144-880A-2H-4 identifies the early Pleistocene *Calcidiscus macintyrei* Zone.

Sediments from Sections 144-880A-2H-5, -2H-6, and -2H-7 and from Sample 144-880A-2H-CC contain *Calcidiscus macintyrei, Discoaster brouweri*, and *Helicosphaera sellii* without *Discoaster pentaradiatus*, indicating Subzone CN12d of late Pliocene age.

Planktonic Foraminifers

Three samples from Hole 880A were studied for planktonic foraminifers.

Planktonic foraminifers are common and moderately preserved in Sample 144-880A-1H-1, 0–2 cm, at the top of the hole. *Truncorotalia truncatulinoides* occurs in the absence of *T. tosaensis* and in association with *Globorotalia inflata, G. hirsuta, G. tumida, Neogloboquadrina dutertrei, N. pachyderma* (dextral), *Globigerina bulloides*, and *Globigerinoides trilobus*. This assemblage indicates the *Truncorotalia truncatulinoides* Zone (late Pleistocene to Holocene).

Preservation in Sample 144-880A-1H-CC is poor to moderate. Most specimens are fragmented. The genus *Truncorotalia* is absent in this sample, but the presence of *Globorotalia inflata* indicates a late Pliocene to Holocene age. The assemblage includes *Globorotalia hirsuta, Globigerina bulloides, Globigerinita glutinata*, and *Neogloboquadrina* sp. Benthic foraminifers, radiolarians, and sponge spicules also occur.

Preservation in Sample 144-880A-2H-CC is poor. Of the few specimens that occur in this core-catcher sample, most are fragmented. *Globorotalia inflata, G. tumida, Neogloboquadrina* sp., and *Globigerinita glutinata* are present, again indicating a late Pliocene to Holocene age.

Siliceous Microfossils

Siliceous microfossils were examined in smear slides of various samples taken through Cores 144-880A-1H and -2H. Although preservation generally deteriorated with depth, some siliceous microfossils were found in all samples examined. Rare radiolarians and sponge spicules, although poorly preserved, occurred as low as Samples 144-880A-1H-CC and -2H-CC. Large archaeomonadaceae were also found in Sample 144-880A-1H-CC.

Diatoms, silicoflagellates, and *Actiniscus* sp. are very well preserved only in Sample 144-880A-1H-1, 0–2 cm, but they are present down to Sample 144-880A-1H-1, 66 cm. In these samples, the diatom assemblage includes *Nitzschia marina, Hemidiscus cuneiformis, Pseudoeunotia doliolus, Denticulopsis seminae* var. *fossilis*, and *Thalassiosira oestrupii*, indicating a Pleistocene age. Based on the absence of *Rhizosolenia curvirostris, R. barboi*, and *Thalassiosira nitidus*, the upper 66 cm are attributed to the *Denticulopsis seminae* Zone (NNPD12). The Holocene to latest Pleistocene planktonic species, *Rhizosolenia bergonii* and *Roperia tesselata*, occur only down to Sample 144-880A-1H-1, 34 cm.

The high abundance of resting spores and valve bristles of species belonging to the genus *Chaetoceros*, as well as the common occurrence of *Thalassionema nitzschioides* var. *parva* and other *Thalassionema* species suggests high productivity over Takuyo-Daisan Guyot during the latest Pleistocene.

Palynology

Core-catcher samples from Cores 144-880A-1H and -2H were treated with HCl and sieved at 20 µm. The residue was found to contain abundant glass shards, making it difficult to concentrate the organic fraction. However, it was possible to determine amorphogen (probably fragments of fecal pellets) as the dominant organic constituent, with infillings of foraminifer chambers and foraminifer linings occurring sporadically. Two pollen grains, one of *Tsuga* in Sample 144-880A-1H-CC, and one of *Pinus*-type in Sample 144-880A-1H-CC, were also seen. No dinoflagellates were encountered, and it will be necessary to use hydrofluoric acid (HF) onshore to determine if they are present in low numbers in these samples.

Summary

In contrast to the other pelagic caps drilled during Leg 144, the sediment at Site 880 was relatively well consolidated and undisturbed by the drilling process. Consequently, it is more promising for detailed biostratigraphic investigation. Planktonic foraminifers and siliceous microfossils are in a good state of preservation at the surface, but they are less well preserved with depth. However, calcareous nannofossils are abundant and very well preserved throughout the sequence. All the Pleistocene to latest Pliocene nannofossil biozones are present. These show that the short hole that was drilled at Site 880 provides an apparently complete record of pelagic and volcanogenic sedimentation on Takuyo-Daisan Guyot from the late Pliocene to the Holocene.

PALEOMAGNETISM

Initial magnetic susceptibility was measured at 5-cm intervals on all sections of the two ash-rich carbonate sediment cores recovered at Site 880. Magnetic susceptibility values range from 10^{-4} to 10^{-3} cgs, with some intervals possibly exceeding the maximum value (999×10^{-6}) on the most sensitive setting of the Bartington susceptibility meter. Individual peaks are probably related to ash-rich intervals, although no detailed shipboard correlation was attempted (Fig. 2).

The natural remanent magnetization (NRM) and remanence after 15-mT alternating-field (AF) demagnetization were measured on the archive half cores of both cores from Hole 880A (Fig. 3). Remanent intensity values before demagnetization are very high (1 Am^{-1}), and the magnetization is uniform and directed vertically upward (Fig. 3A). After demagnetization at 15 mT, the remanent intensity is lower by approximately 2 orders of magnitude (10 mAm^{-1}) and the directions are more variable (Fig. 3B). The vertical orientation and large decrease in intensity following demagnetization suggest that the sediments have been completely remagnetized during the drilling/coring process. The onset of this problem coincides with the ill-advised "magnaflux" treatment of the drill string immediately before coring at Site 880. Certain features of the declination data after demagnetization suggest that a magnetostratigraphic signal may be recovered. Detailed sampling and shore-based demagnetization in excess of the 15 mT available with the present 2G coils are necessary before a magnetostratigraphic interpretation can be attempted.

SEDIMENTATION RATES

Rates of sediment accumulation of the pelagic sediments at Site 880 have been approximated using calcareous nannofossil datums. These datums have been estimated after the examination

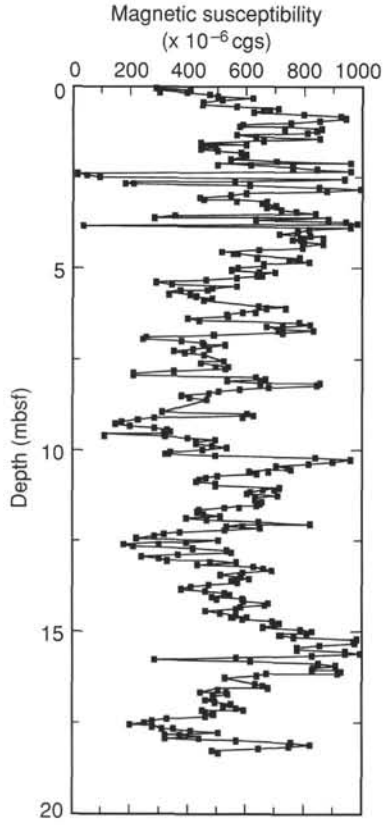

Figure 2. Magnetic susceptibility variations of the ash-rich cores from Site 880.

of one sample from the bottom of each section (see "Biostratigraphy" section, this chapter). Age assignments for calcareous nannofossils are taken from Gartner (1977) and Berggren et al. (1985). The biohorizons and their age assignments are given in Table 2. The graphic plot of the sediment accumulation rates is illustrated in Figure 4.

The bottom of the pelagic sequence was not recovered at this site. The oldest sediments, in Sample 144-880A-2H-CC, are late Pliocene in age. Sediment accumulation occurred at a rate of approximately 10 m/m.y. through the late Pliocene to the Holocene, with no evidence of hiatuses. However, further detailed biostratigraphy is necessary to estimate changes in accumulation rate better.

INORGANIC GEOCHEMISTRY

Interstitial Waters

Interstitial waters were squeezed from two core samples in Hole 880A. Both of these samples were squeezed from pelagic sediments. These samples were processed according to the methods outlined in the "Explanatory Notes" chapter (this volume); however, time limitations restricted shipboard analyses to the measurement of pH, alkalinity, and salinity in Samples 144-880A-1H-5, 142–150 cm, and -2H-6, 142–150 cm. These data are presented in Table 3.

PHYSICAL PROPERTIES

Introduction

The objectives of the physical properties measurement program at Site 880 (Takuyo-Daisan) were (1) to measure standard shipboard physical properties and (2) to differentiate the downhole lithology by means of physical properties. Before cores were

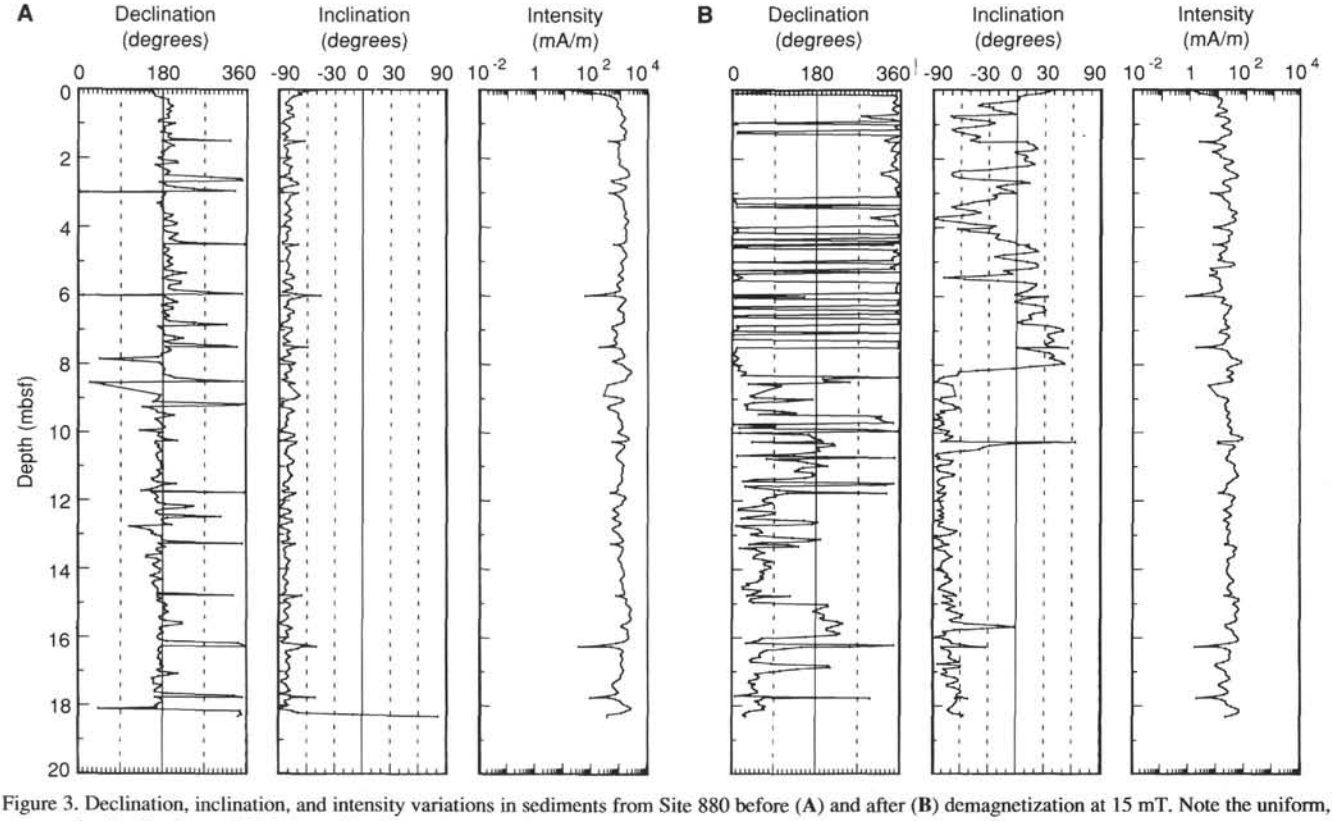

Figure 3. Declination, inclination, and intensity variations in sediments from Site 880 before (**A**) and after (**B**) demagnetization at 15 mT. Note the uniform, near-vertical inclination and high intensities before demagnetization.

Table 2. Biohorizons used to compute accumulation rates for the pelagic sediments in Hole 880A.

Code	Datum	Age (Ma)	Top depth (mbsf)	Base depth (mbsf)
Calcareous nannofossils:				
C1	*E. huxleyi* acme begins	0.07	1.50	3.00
C2	FAD *E. huxleyi*	0.27	4.50	6.00
C3	LAD *P. lacunosa*	0.44	4.50	6.00
C4	End small *Gephyrocapsa*	0.92	8.90	10.27
C5	LAD *H. sellii*	1.22	10.27	10.77
C6	LAD *C. macintyrei*	1.51	13.27	14.77
C7	LAD *D. brouweri*	1.90	14.77	16.27

Note: FAD = first appearance datum, and LAD = last appearance datum.

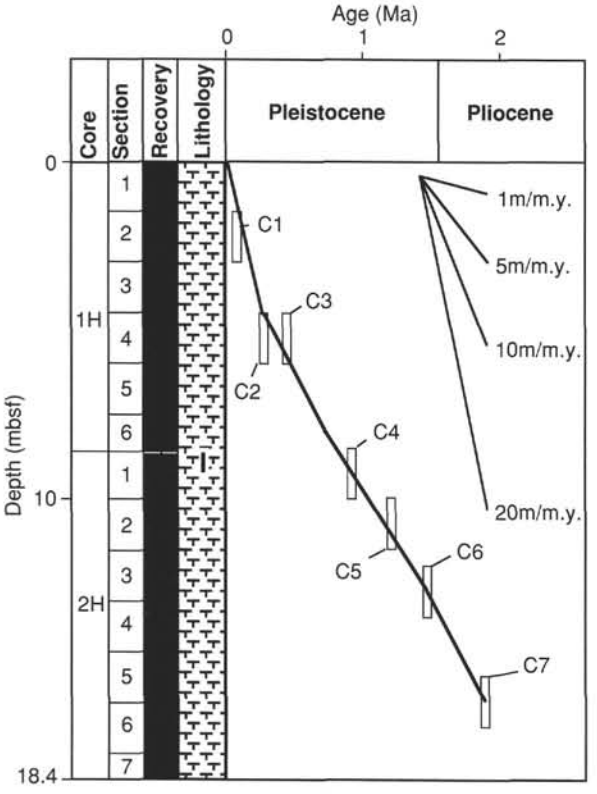

Figure 4. Sediment accumulation rates for the pelagic sediments in Hole 880A. Bars represent the upper and lower limits of a biohorizon as constrained by sampling. Codes for biohorizons are keyed to Table 2.

Table 3. Surface seawater and interstitial water geochemical data, Hole 880A.

Core, section, interval (cm)	Depth (mbsf)	pH	Alkalinity (mM)	Salinity (g/kg)
Surface seawater	0	8.07	2.375	35
144-880A-				
1H-5, 142–150		—	—	—
2H-6, 142–150		7.61	2.509	34

split, nondestructive measurements of magnetic susceptibility and wet-bulk density were made, using sensors mounted on the multisensor track (MST) (see "Paleomagnetism" section, this chapter). Whole-round samples for shore-based investigations were first cut from either end of the cores before they were passed through the MST. Shipboard investigations on discrete samples

Table 4. Index properties data, Hole 880A.

Core, section, interval (cm)	Depth (mbsf)	Wet-bulk density (g/cm^3)	Dry-bulk density (g/cm^3)	Grain density (g/cm^3)	Porosity (%)	Water content (% dry wt)	Void ratio
144-880A-							
1H-1, 60–62	0.61	1.72	1.09	2.72	61.14	57.35	1.57
1H-2, 80–82	2.31	1.76	1.15	2.75	59.31	52.69	1.46
1H-3, 60–62	3.61	1.79	1.22	2.65	55.40	46.45	1.24
1H-4, 65–67	5.16	1.71	1.08	2.67	61.44	58.19	1.59
1H-5, 60–62	6.61	1.66	1.01	2.67	63.95	65.03	1.77
1H-6, 55–57	8.06	1.66	1.00	2.69	63.91	65.30	1.77
2H-1, 60–62	9.51	1.58	0.88	2.66	68.17	79.03	2.14
2H-2, 60–62	10.88	1.68	1.03	2.68	63.20	62.79	1.72
2H-3, 60–62	12.38	1.68	1.06	2.54	60.30	58.31	1.52
2H-4, 60–62	13.88	1.66	1.03	2.57	61.61	61.39	1.60
2H-5, 60–62	15.38	1.71	1.09	2.70	60.75	57.00	1.55
2H-6, 65–67	16.93	1.63	0.96	2.61	64.90	69.14	1.85
2H-7, 50–52	18.28	1.64	0.99	2.59	63.74	65.89	1.76

were limited because of lab clean-up procedures before the ship was to arrive in Yokohama, Japan. For this reason, standard index properties measurements could not be performed on board; therefore, one sample was taken from each core section and sealed in plastic containers for shore-based measurements. These samples were measured for index properties onshore, using an electronic balance and a Quantachrome Penta-Pycnometer that used helium as the inert gas. The measurement operations were the same as on board *JOIDES Resolution* (see "Explanatory Notes" chapter, this volume). Compressional wave velocities were measured with the digital sound velocimeter (DSV) apparatus on the first four sections of Core 144-880A-1H; these measurements were discontinued, however, because of sediment cracking, which resulted in meaningless data. Shear strength measurements, using the Wykeham-Farrance (WF) device, made up the major part of the shipboard analyses ("Explanatory Notes" chapter, this volume) at Hole 880A.

Coring in Hole 880A was accomplished with the APC from 0 to 18.4 mbsf. The recovered sediments are of late Pleistocene to late Pliocene age and consist of a sequence of greenish and grayish brown, interlayered volcaniclastic sand and foraminifer sand with nannofossil foraminifer ooze and volcanic ash (Lithologic Unit I).

Index Properties

Index property data (Table 4), plotted vs. depth, are given in Figure 5. Wet- and dry-bulk density values vary from 1.58 to 1.79 g/cm^3 (mean = 1.68 g/cm^3) and from 0.88 to 1.22 g/cm^3 (mean = 1.04 g/cm^3), respectively. Grain density values vary between 2.54 and 2.75 g/cm^3, with a mean of 2.66 g/cm^3; the lowest values were observed between 12 and 14 mbsf. Water content (% dry wt) is lowest between 3 and 4 mbsf and highest between 9 and 10 mbsf, with a mean of 61.22%. Porosity, with a mean of 62.44%, runs parallel to water content, ranging from 55.4% to 68.2%. Index properties show no trend related either to increasing overburden pressure with depth or to undrained vane shear strength.

Shear Strength

Vane shear strength data (Table 5), plotted vs. depth, are given in Figure 6. The scatter in the data is high, ranging from 10 to 51 kPa. The absolute vane shear strength values are the highest that were measured in any pelagic sediments recovered during Leg 144, thus providing evidence for the different composition of these pelagic sediments in contrast to those encountered from all other Leg 144 sites. Vane shear strength peak values correspond well to peak values in magnetic susceptibility (see "Paleomagnetism" section, this chapter), indicating sediment layers with a high amount of volcanic ash or other volcanic material. High vane shear strength values are probably a result of the presence of angular glass shards or related volcanic material. Obviously, differ-

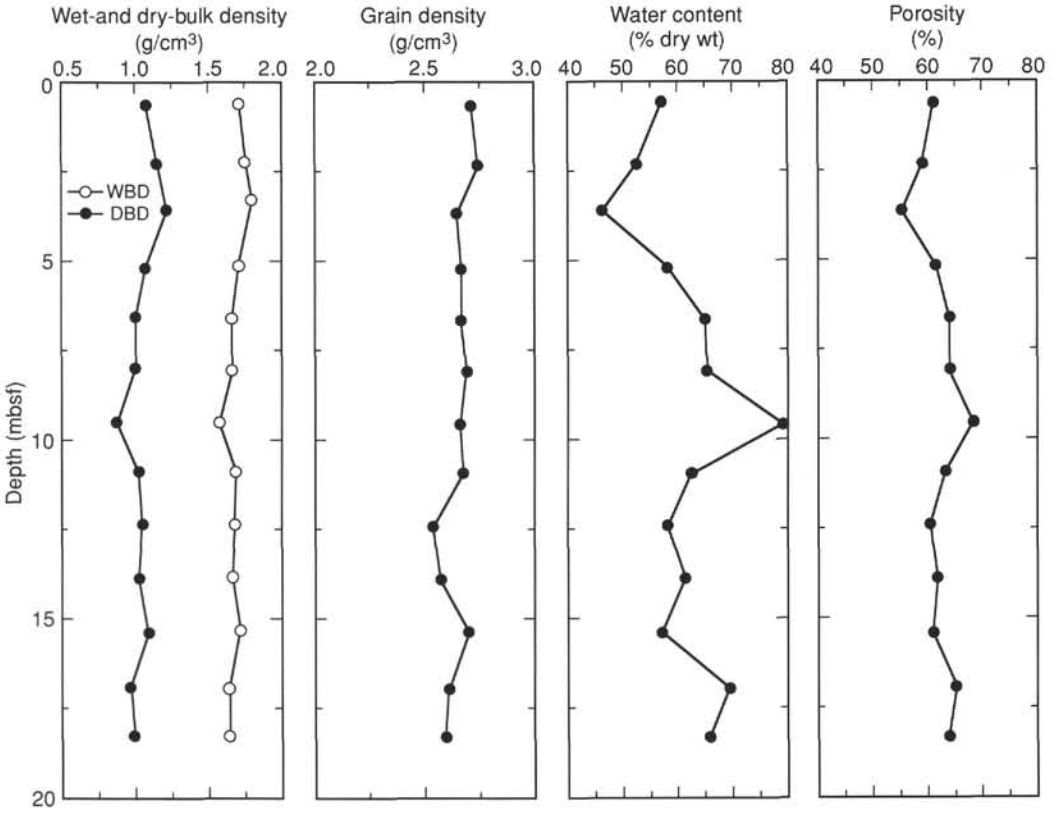

Figure 5. Measurements of index properties (wet- and dry-bulk density, grain density, water content, and porosity) vs. depth, Hole 880A.

ences in sediment composition influence the vane shear strength more than do the effects of downcore sediment compaction.

SUMMARY AND CONCLUSIONS

A preliminary evaluation of the cores obtained at Site 880 indicates that the recovered sediment sequence displays a variation of two end-members: volcaniclastic sand and nannofossil foraminifer ooze. These pelagic sediments were deposited under the varying influence of volcanic eruptions from the nearby convergent margin setting and the degree of winnowing that governs the removal of nannofossils.

Table 5. Wykeham-Farrance vane shear strength data, Hole 880A.

Core, section, interval (cm)	Depth (mbsf)	Test type	Spring constant	Vane constant	Torsion angle (degree)	Undrained shear strength (kPa)
144-880A-						
1H-1, 40–41	0.40	WF	31.27	0.23	16	11.15
1H-1, 80–81	0.80	WF	31.27	0.23	49	34.14
1H-1, 125–126	1.25	WF	31.27	0.23	15	10.45
1H-2, 77–78	2.27	WF	31.27	0.23	22	15.33
1H-3, 119–120	4.19	WF	31.27	0.23	72	50.17
1H-4, 90–91	5.40	WF	31.27	0.23	25	17.42
1H-5, 89–90	6.89	WF	31.27	0.23	45	31.36
1H-6, 70–71	8.20	WF	31.27	0.23	19	13.24
2H-1, 55–56	9.45	WF	31.27	0.23	25	17.42
2H-2, 70–71	10.97	WF	31.27	0.23	35	24.39
2H-3, 66–67	12.43	WF	31.27	0.23	28	19.51
2H-4, 68–69	13.95	WF	31.27	0.23	41	28.57
2H-5, 58–59	15.35	WF	31.27	0.23	64	44.59
2H-6, 72–73	16.99	WF	31.27	0.23	73	50.87
2H-7, 46–47	18.23	WF	31.27	0.23	43	29.96

Note: WF = Wykeham-Farrance vane.

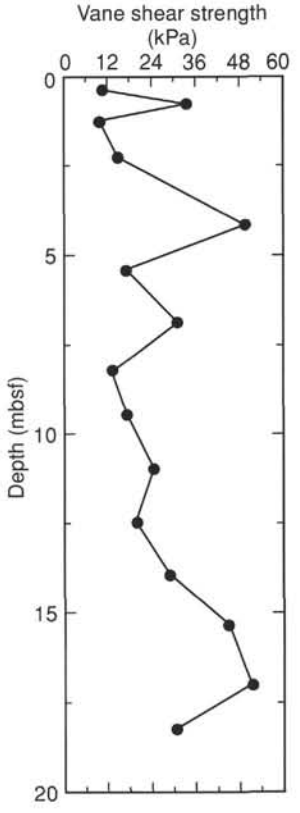

Figure 6. Wykeham-Farrance vane shear strength vs. depth, Hole 880A.

The recovered sequence contains a condensed, but apparently complete section that spans the entire Pleistocene and the Pleistocene/Pliocene boundary. At first sight, these sediments exhibit an apparent cyclic depositional pattern.

REFERENCES *

Berggren, W.A., Kent, D.V., and Van Couvering, J.A., 1985. The Neogene: Part 2. Neogene geochronology and chronostratigraphy. *In* Snelling, N.J. (Ed.), *The Chronology of the Geological Record.* Geol. Soc. London Mem., 10:211–260.

Gartner, S., 1977. Calcareous nannofossil biostratigraphy and revised zonation of the Pleistocene. *Mar. Micropaleontol.*, 2:1–25.

van Waasbergen, R.J., and Winterer, E.L., in press. Summit geomorphology of Western Pacific guyots. *In* Pringle, M.S., Sager, W.W., Sliter, W.V., and Stein, S. (Eds.), *The Mesozoic Pacific.* Am. Geophys. Union, Geophys. Monogr. Ser.

* Abbreviations for names of organizations and publication titles in ODP reference lists follow the style given in *Chemical Abstracts Service Source Index* (published by American Chemical Society).

Ms 144IR-113

NOTE: For all sites drilled, core-description forms ("barrel sheets") and core photographs can be found in Section 3, beginning on page 453. Forms containing smear-slide data can be found in Section 4, beginning on page 1017.