Haggerty, J.A., Premoli Silva, I., Rack, F., and McNutt, M.K. (Eds.), 1995
Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 144

54. *DATA REPORT:* MASS ACCUMULATION RATE CALCULATIONS AND LABORATORY DETERMINATIONS OF CALCIUM CARBONATE AND EOLIAN MATERIAL IN NEOGENE SEDIMENTS FROM THE MARSHALL ISLANDS, SITES 871, 872, AND 873[1]

Frank R. Rack,[2] Horst W. Bohrmann,[3] and Peter R.N. Hobbs[4]

ABSTRACT

The pelagic sediment caps on guyots in the Marshall Islands record the accumulation of biogenic and lithogenic (eolian) particles in the northwestern region of the tropical Pacific Ocean throughout the Neogene. These guyots are located in a remote geographic region, far from continental sources of eolian input. Nonetheless, the fine-grained lithogenic component of the bulk sediment should record changes in the atmospheric transport of eolian grains to these sites as the Marshall Island guyots were moved across the equatorial region during the Neogene.

The weight percentages of calcium carbonate, noncarbonate, and lithogenic (eolian) sedimentary components have been determined from samples in the upper 50 m of pelagic sediment at Ocean Drilling Program Sites 871, 872 and 873. For each site, two versions of modified shipboard biostratigraphic age models have been used to calculate mass accumulation rates for the bulk sediment and for each of the primary sedimentary components. These data are used to demonstrate the correspondence between temporal changes in biogenous and eolian sediment accumulation rates and the fluctuations in mass sediment physical properties observed in the upper 50 m of the pelagic caps on these guyots. These comparisons may help identify the effects of climatically induced changes in the position and intensity of equatorial wind systems and the resulting variations in ocean current effects (erosion and winnowing) on the pelagic cap at each of these three sites as they moved northward during the Neogene.

INTRODUCTION

The Marshall Islands are located in the northwestern region of the tropical Pacific Ocean (see site map preceding title page). The drill sites located on Limalok, Lo-En, and Wodejebato guyots (Sites 871–877) have been transported northwestwardly, across the equatorial system of atmospheric wind belts and ocean currents to their present-day locations, by the motion of the Pacific Plate during the Neogene.

The guyots in the Marshall Islands region have pelagic caps that range in thickness from virtually 0 to 150 m. The thickness of an individual pelagic cap appears to be strongly correlated with both the depth of the guyot (related to the length of the depositional history) and the size of the guyot (less erosion occurs near the perimeter of the summit; van Waasbergen and Winterer, 1993). A southeast-to-northwest transect of three different Marshall Island guyots was drilled during Ocean Drilling Program (ODP) Leg 144. The drill sites on these three guyots are geographically distributed along different chains of seamount lineations (Site 871, Ratak Chain; Site 873, Ralik Chain; and Site 872, furthest westward; see Fig. 1).

The objectives of this study were to determine the abundances (weight percentage) and accumulation rates of the calcium carbonate, noncarbonate, and lithogenic ("eolian") components of the total sediment flux to the pelagic caps of three guyots in the Marshall Islands (Limalok, Lo-En, and Wodejebato guyots) from the early middle Miocene to the Holocene, and to compare the temporal variations in these sedimentary fluxes to changes in mass physical properties.

[1] Haggerty, J.A., Premoli Silva, I., Rack, F., and McNutt, M.K. (Eds.), 1995. *Proc. ODP, Sci. Results,* 144: College Station, TX (Ocean Drilling Program).

[2] Ocean Mapping Group, Department of Geodesy and Geomatics Engineering, University of New Brunswick, Fredericton, New Brunswick, Canada E3B 5A3.

[3] GEOMAR, Forschunszentrum fuer Marine Geowissenschaften, Wischofstrasse 1-3, D-24148 Kiel, Federal Republic of Germany.

[4] British Geological Survey, Engineering Geology and Geophysics Group, Keyworth, Nottingham NG125GG, United Kingdom.

BACKGROUND AND OBJECTIVES

Geologic Setting

Site 871

Site 871 is located at 5°33.43′N, 172°20.66′E in 1255 m water depth, in the south central portion of Limalok Guyot, in the Ratak Chain of the southern Marshall Islands (Fig. 1). This site is the southernmost of the north-south transect of sites drilled by Leg 144 and is considered to be the youngest of the guyots in the Marshall Island region (Lincoln et al., 1993).

The sediment in the pelagic cap on Limalok Guyot at Site 871 (0–133.7 m below seafloor [mbsf]) consists of foraminifer nannofossil ooze and foraminifer ooze of Pleistocene to early Miocene age. The pelagic cap is divided into two subunits at 26.5 mbsf, where light gray nannofossil foraminifer ooze of Pleistocene to latest Miocene age above changes to white homogeneous foraminifer ooze of middle to early Miocene age below. The transition between the two subunits is marked by a hiatus that spans the late middle to latest Miocene. The sediment in the lower portion of the pelagic cap is well-sorted and winnowed, with a medium sand texture. A prominent disconformity, spanning the late middle Miocene through most of the late Miocene (approximately 6 m.y.), marks a major change in sediment accumulation on this guyot (Premoli Silva, Haggerty, Rack, et al., 1993).

Site 872

Site 872 is located at 10°05.85′N, 162°51.96′E in 1084 m water depth, on the central portion of Lo-En Guyot (Fig. 1). This site is located approximately 148.2 km southeast of Anewetak Atoll in the northern Marshall Islands. The long-range atmospheric transport of soil dust from Asia to the tropical oceanic region near Anewetak Atoll has been the subject of several recent investigations by groups of atmospheric chemists (Duce et al., 1980, 1983; Ueumatsu et al., 1983; Arimoto et al., 1985) and paleoceanographers (Janecek and Rea, 1983).

The pelagic cap on Lo-En Guyot consists of an upper lithologic subunit of white to very pale brown nannofossil foraminifer ooze and

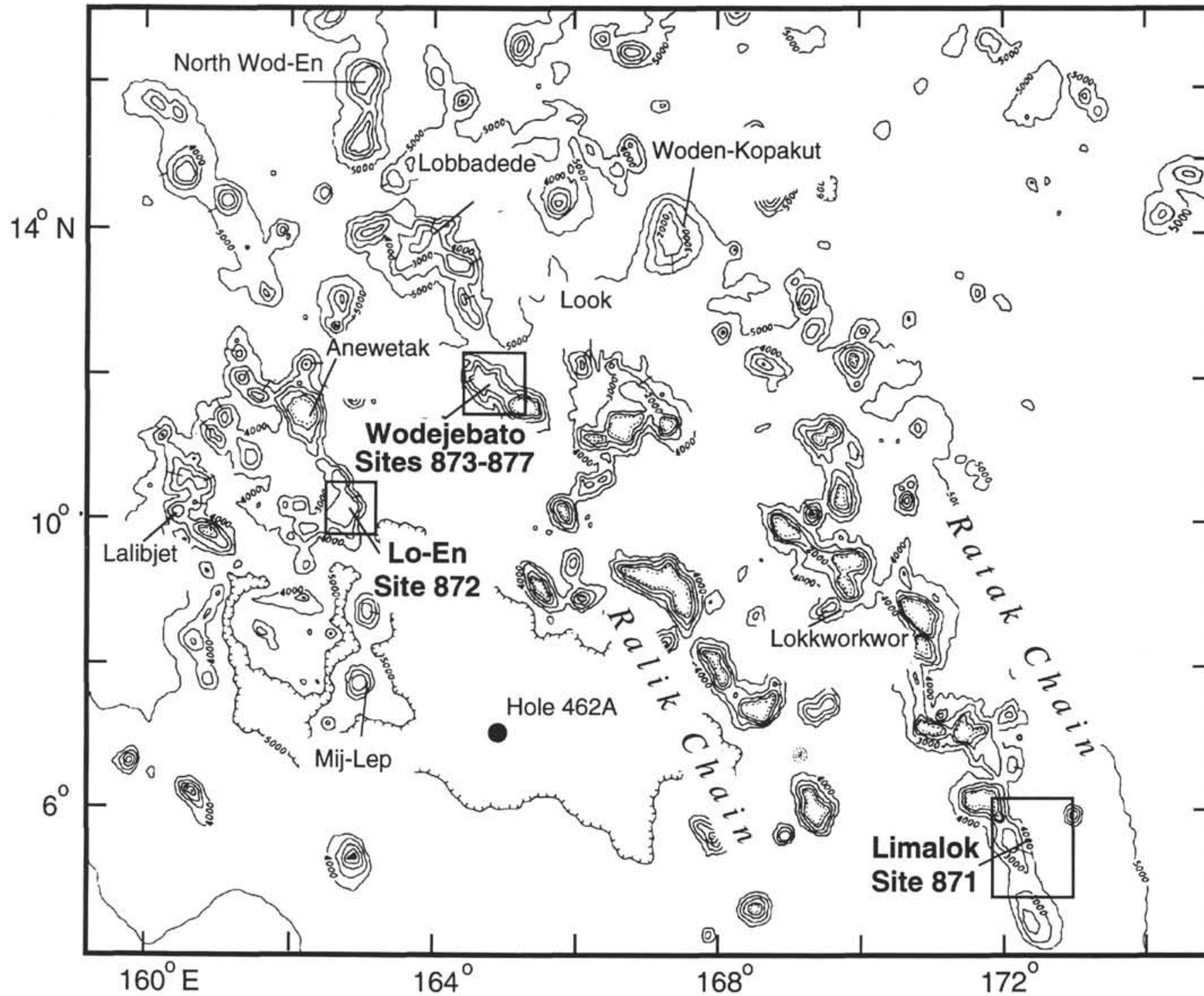

Figure 1. Location map of atolls and guyots in the Marshall Islands. Boxes enclose the location of ODP sites drilled on Limalok (871), Lo-En (872), and Wodejebato (873–877) guyots (Premoli Silva, Haggerty, Rack, et al., 1993).

intercalated foraminifer ooze of Pleistocene to late Miocene age (30–32 m thick), and a lower subunit of very pale brown homogeneous foraminifer ooze, which is well sorted and winnowed, with a medium sand texture and of a late Miocene to late Oligocene age. The transition between the two subunits is marked by a physically mixed and incomplete interval of nannofloras and faunas of different zones, which spans the late middle to early late Miocene, overlain by a disconformity (Premoli Silva, Haggerty, Rack, et al., 1993).

Site 873

Site 873 is situated on the south central summit of Wodejebato Guyot, at 11°53.84′N, 164° 55.20′E, in the Ralik Chain of the northern Marshall Islands (Fig. 1). The pelagic cap on Wodejebato Guyot consists of an upper lithologic subunit of light gray nannofossil foraminifer ooze of Pleistocene to latest Miocene age; whereas, the lower subunit is composed of a well-sorted and winnowed, very pale brown, mainly homogeneous foraminifer ooze with medium sand texture, and of middle to early Miocene age. The transition between the two subunits is marked by a disconformity spanning most of the late and late middle Miocene (Premoli Silva, Haggerty, Rack, et al., 1993).

Past and Future Research Questions

A detailed evaluation of the similarities and differences in the accumulation of pelagic sediment on the summits of Limalok, Lo-En, and Wodejebato guyots should provide insight into the evolution of the equatorial ocean-atmosphere system during the Neogene.

Changes in physical properties (bulk density, porosity, water content) of the pelagic cap sediments reflect changes in the depositional environment (e.g., winnowing, erosion) during accumulation of these biogenic oozes and changes in sedimentary inputs (e.g., relative abundance of foraminifers vs. nannofossils, and eolian fluxes). An improved understanding of the onset, duration, and continuity (both laterally and temporally) of the major hiatus(es) in sediment accumulation within the pelagic cap at each of these sites, especially during the late-middle Miocene to late Miocene (major unconformity at Sites 871 and 873, less at Site 872), can be used to identify past changes in the intensity and relative latitudinal position of the various equatorial paleocurrents. These currents, which are influenced by changes in atmospheric wind belts, have surely influenced, and may have controlled, the depositional environments on these guyots lying at intermediate water depths.

METHODS

The sediment samples used in this study were collected during Leg 144 on board the *JOIDES Resolution*. Samples with a volume of approximately 10 cm^3 were collected at a regular sample spacing of 50–75 cm, in cores from the upper 60 mbsf at Holes 871A, 872A, 872C, and 873B. The samples were sealed in bags during the cruise. Onshore, they were freeze-dried and weighed immediately before processing.

Carbonate Analyses

The inorganic carbon content of each sample was determined using a Coulometrics carbon dioxide coulometer. Freeze-dried samples weighing between 10 and 20 mg were reacted in 2N HCl solution at 60°C. Evolved carbon dioxide was titrated in a monoethanolamide solution with a coulometric indicator over a period of 5–20 min, depending on the carbonate reactivity. Calibration was performed using pure calcium carbonate as a standard. The percentage of carbonate was calculated from the inorganic carbon (IC) content, assuming that all carbonate was in the form of calcite: $CaCO_3 = IC \times 8.332$.

Duplicate analyses of 30 samples indicate a reproducibility of 0.7% with this method. The percentage of noncarbonate material was determined by subtracting the weight percentage of calcium carbonate from 100%.

Procedures for Eolian Extractions

Following the determination of inorganic carbon, the remaining portion of each sample from Holes 871A and 873B was weighed and then processed according to a lithogenic extraction procedure, as described in Rea and Janecek (1981) and in the appendix to Clemens and Prell (1990).

The fine-grained lithogenic ("eolian") component of the bulk sediment was isolated by a series of selective extractions to remove calcium carbonate, opaline silica, Fe and Mn oxides, and hydroxides and zeolites. The <63-μm-sized material remaining after the completion of the extraction procedure was weighed to determine the "eolian" weight percentage of the total sample. The eolian fraction was dominated by clays and fine-grained quartz.

Because of the very low amounts of detrital minerals anticipated in these sediments from the western equatorial Pacific, pairs of successive samples were combined to conduct the extraction procedure. This process degraded the overall temporal resolution of the eolian flux determinations, but improved the accuracy of the analytical measurements.

Accumulation Rate Calculations

For each site, a slightly modified, "comprehensive" version of the biostratigraphic age model (see Premoli Silva, Haggerty, Rack, et al., 1993) was produced. An attempt was made to reduce, as much as possible, the temporal uncertainty created by the use of multiple and often conflicting biostratigraphic datums (e.g., first appearance [FAD] and last appearance [LAD] datums from both calcareous nannofossil and foraminifer species) in this model. A "simplified" age model, based on only a few commonly observed biostratigraphic datums, was generated for each site to minimize any extreme fluctuations in calculated linear sedimentation rates.

The simplified age model was based on five (foraminifer or nannofossil) datums found at two of the three sites (three datums were common to all three sites; see Premoli Silva, Haggerty, Rack, et al., 1993) and which avoided the intervals of major regional hiatuses in sediment accumulation. The five datums used to generate the simplified age model for each site were: (1) the LAD of *H. sellii* (1.37 Ma), (2) the FAD of *P. primalis* (5.8 Ma), (3) the LAD of *G. fohsi lobata* (11.5 Ma), (4) the LAD of *S. heteromorphous* (14.4 Ma), and (5) the FAD of *S. heteromorphous* (17.10 Ma).

Because of the presence of a condensed late Miocene sequence at Site 873, it was necessary to substitute the LAD of T. rugosus (~5.0 Ma) for the FAD of *P. primalis,* and the LAD of *C. floridanus* (11.60 Ma) for the LAD of *G. fohsi lobata* in the simplified age model.

The two age models (i.e., the comprehensive and simplified models) generated for each site were used to calculate successive linear sedimentation rates (LSR) relative to the midpoint depth (mbsf) of each biostratigraphic datum. At each site, this procedure was repeated to calculate linear sedimentation rates using both the complete and the simplified age models. Dry density values were determined for each sample using a regression between laboratory measurements of dry density and the wet bulk density data collected by the GRAPE (gamma ray attenuation porosity evaluator) at each site.

The product of the linear sedimentation rate (LSR = cm/k.y., where k.y. = thousand years) and the dry bulk density (DBD = g/cm^3) equals the mass accumulation rate (MAR = g/cm^2/k.y.). The product of the mass accumulation rate and the relative percentage of each sedimentary component gave the mass accumulation rates for the carbonate (CAR), noncarbonate (NCAR), and eolian (EAR) components of the total flux at each site.

DISCUSSION

The data collected during this study are presented in a series of tables for each of the guyots drilled during Leg 144. For each guyot, we present the results of the analyses of samples from a specific drillhole in the following order:

First, laboratory determinations of the weight percentage of calcium carbonate and the fine-grained lithogenic (eolian) component of the bulk sediment are given. Accompanying these tables are one or two summary figures for each site. These figures summarize the shipboard measurements of physical properties, shipboard examinations of smear slides (Premoli Silva, Haggerty, Rack, et al., 1993), and the results of laboratory analyses (presented in corresponding tables) for the upper 50 m in each hole. Next, the two age models developed for each site are given in a common table for each hole. The age models are listed for the individual holes from which they were developed rather than by site, because the "soupy" nature of the sediment recovered by drilling and the changes in core curation procedures that occurred during Leg 144 may have produced major differences between holes.

Finally, the calculations of mass sediment accumulation rates are presented for each guyot (based on the comprehensive and simplified age models) and in corresponding figures that summarize the results of these calculations.

The data and calculations for Limalok Guyot (Hole 871A) are given in Table 1 (laboratory measurements of the weight percentages of calcium carbonate, noncarbonate, and fine-grained lithogenic [eolian] material), Table 2 (two age models used), and Table 3 (sediment accumulation rate calculations using each of the two age models for Hole 871A). Figure 2 illustrates the downhole measurements of bulk physical properties and the comprehensive age model for the upper 50 m in Hole 871A. Figure 3 provides a summary of the bulk sediment composition, fossil content, and texture of the upper 50 m in Hole 871A. Figure 4 illustrates the differences in linear sedimentation and calculated sediment accumulation rates for Hole 871A using the comprehensive and the simplified age models.

The laboratory results from Lo-En Guyot are given in Table 4 (determinations of the weight percentage of calcium carbonate for samples in Holes 872A and 872C), Table 5 (age models for Hole 872A), and Table 6 (accumulation rates calculated for Hole 872A using the comprehensive and simplified age models). Figures 5 and 6 illustrate the downhole measurements of bulk physical properties and the weight percentage of calcium carbonate for the upper 50 m of Holes 872A and 872C, respectively. Figure 7 illustrates the differences in linear sedimentation and calculated sediment accumulation rates for Hole 872A using the comprehensive and the simplified age models.

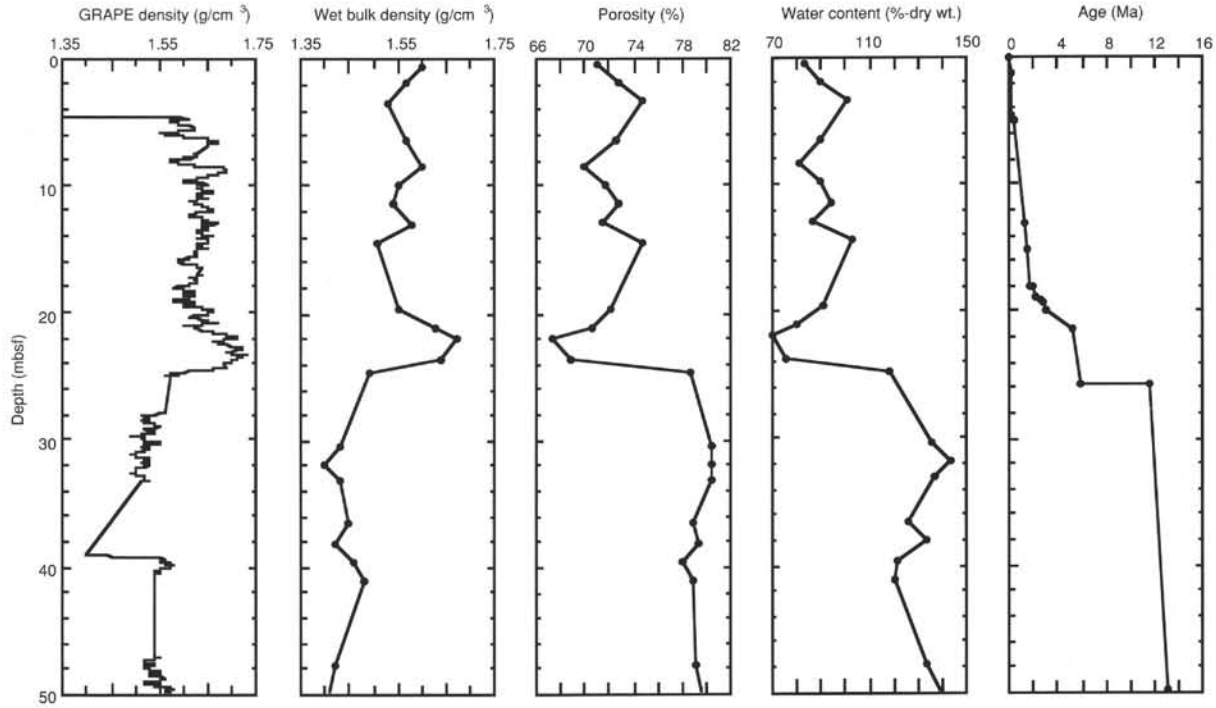

Figure 2. Summary plots of GRAPE density and index properties vs. depth (mbsf), Hole 871A. The comprehensive age model derived from calcareous nannofossil and foraminifer datums (Premoli Silva, Haggerty, Rack, et al., 1993) is also shown.

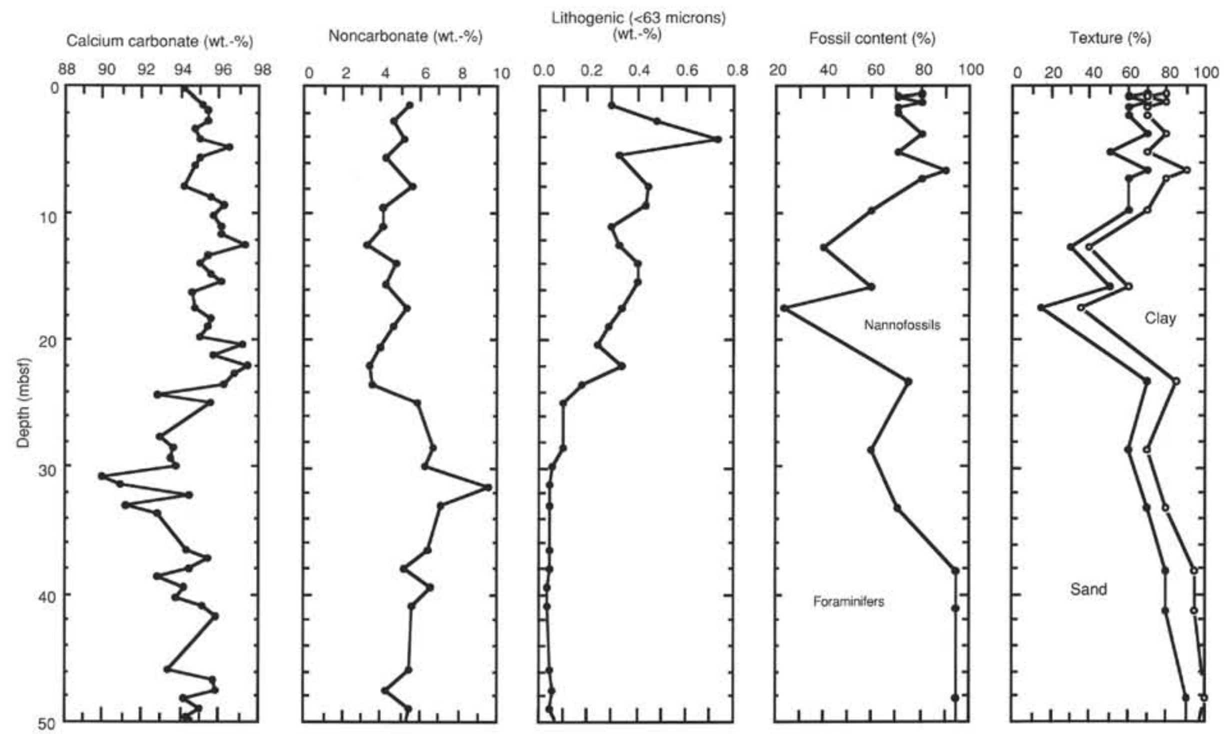

Figure 3. Summary plots of bulk composition, fossil content, and texture (cumulative percentages of sand, silt, and clay) vs. depth (mbsf), Hole 871A. Fossil content and texture are from shipboard smear slide estimates (Premoli Silva, Haggerty, Rack, et al., 1993).

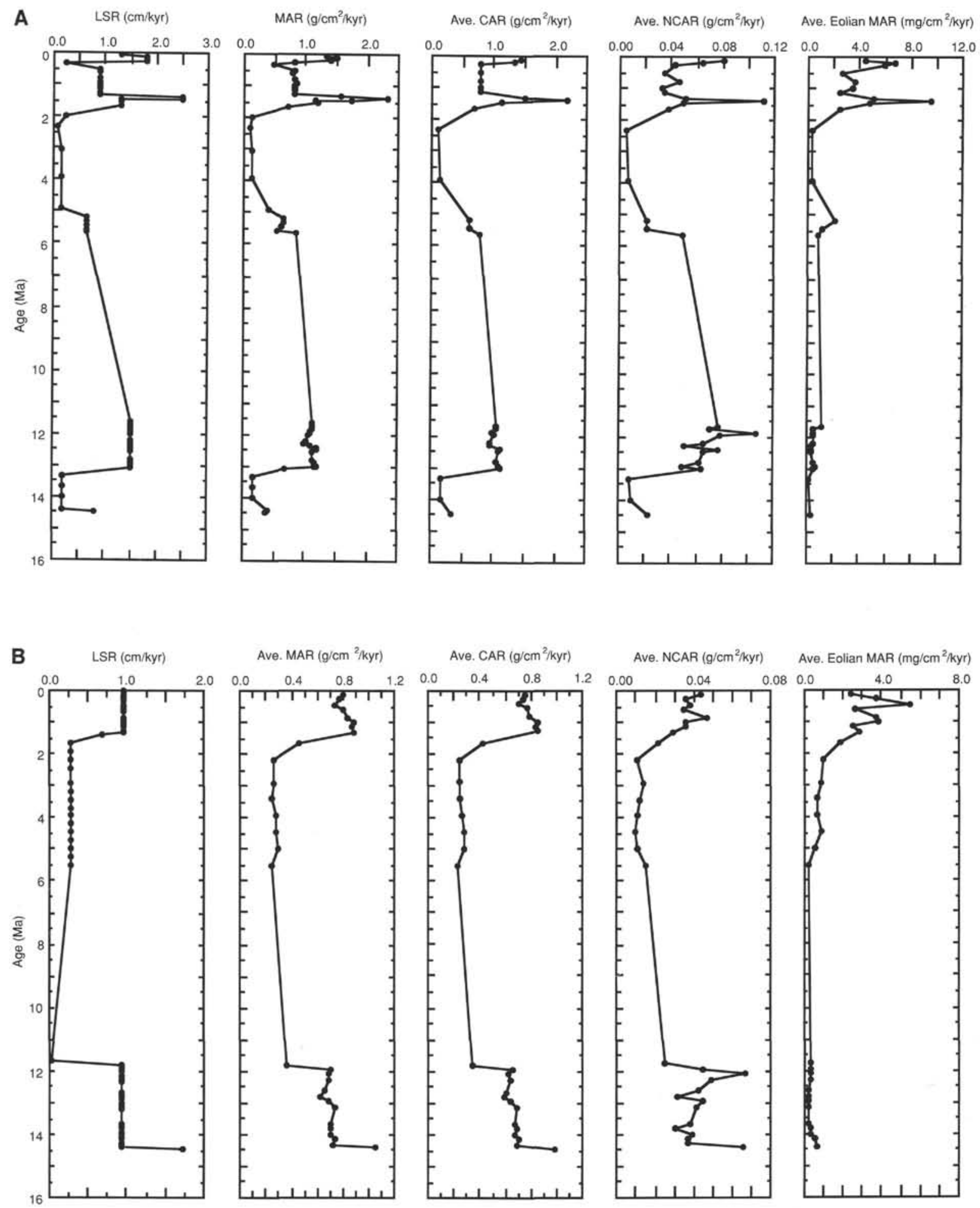

Figure 4. **A.** Plots of linear sedimentation (LSR), mass (bulk) accumulation (MAR), carbonate accumulation (CAR), noncarbonate accumulation (NCAR), and eolian mass accumulation (Eolian MAR) rates vs. age (Ma), Hole 871A. Calculations are based on the comprehensive age model. Note the change in units for eolian accumulation. **B.** Plots of linear sedimentation and mass accumulation rates for Hole 871A, calculated using the simplified age model. Note the change in units for eolian accumulation.

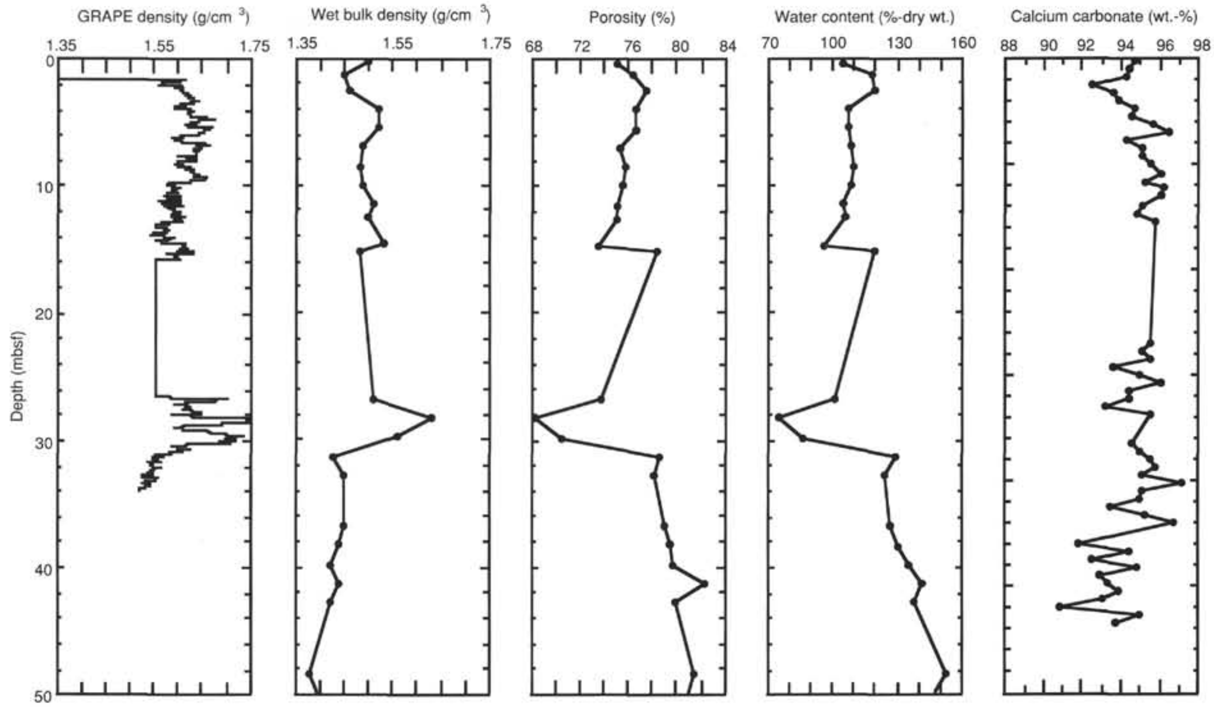

Figure 5. Summary plots of GRAPE density, index properties, and weight percentage of calcium carbonate vs. depth (mbsf), Hole 872A.

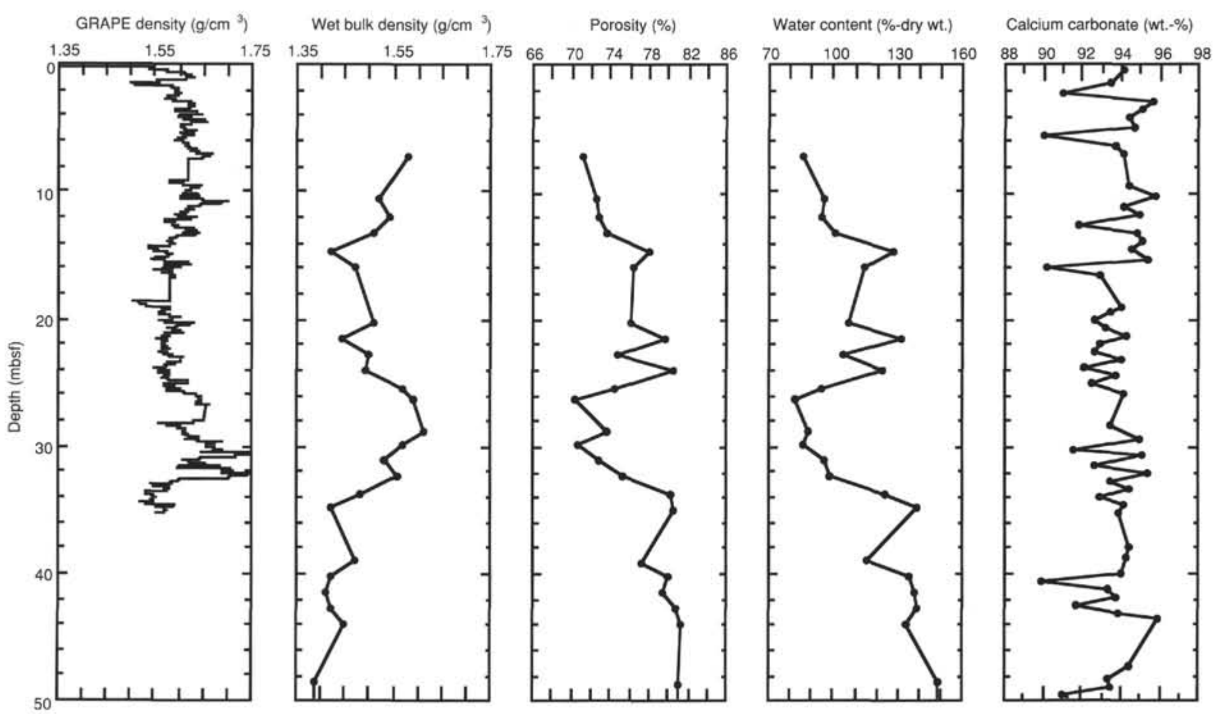

Figure 6. Summary plots of GRAPE density, index properties, and weight percentage of calcium carbonate vs. depth (mbsf), Hole 872C.

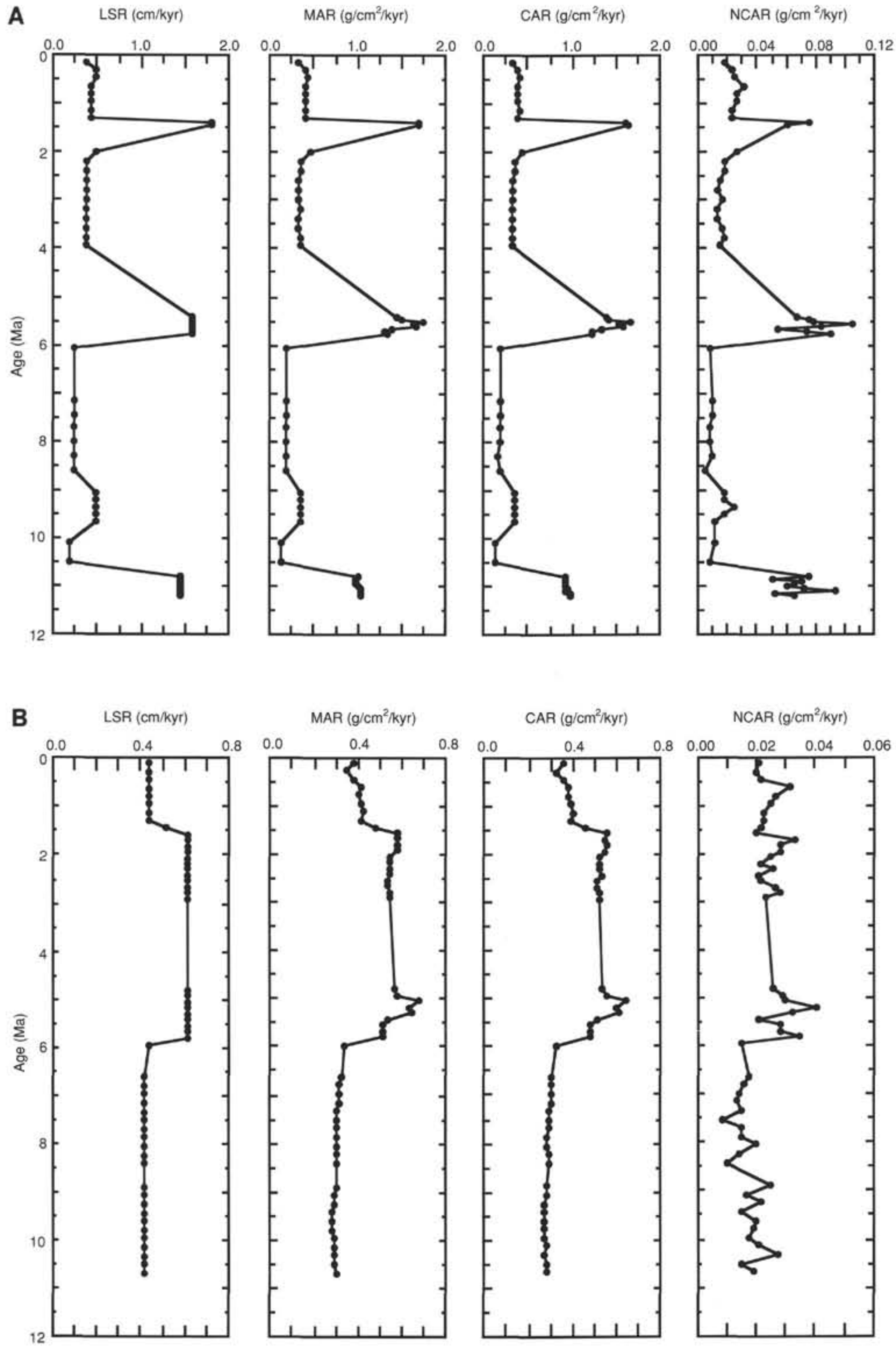

Figure 7. **A.** Plots of linear sedimentation (LSR), mass (bulk) accumulation (MAR), carbonate accumulation (CAR), and noncarbonate accumulation (NCAR) rates vs. age (Ma), Hole 872A. Calculations are based on the comprehensive age model. **B.** Plots of linear sedimentation and mass accumulation rates calculated for Hole 872A, using the simplified age model.

Table 1. Calcium carbonate determinations and chemical extractions of fine-grained lithogenic material, Hole 871A.

Core, section, interval (cm)	Depth (mbsf)	$CaCO_3$ (wt%)	$CaCO_3$ (ave.) (wt%)	Noncarbonate (ave.) (wt%)	Eolian (ave.) (wt%)	%Eolian carb-free
144-871A-						
1H-1, 24–26	0.24	94.19				
1H-1, 139–141	1.39	95.07	94.63	5.37	0.30	5.6
1H-2, 32–34	1.82	95.38				
1H-2, 117–119	2.67	95.43	95.40	4.60	0.48	10.5
1H-3, 32–34	3.32	94.66				
1H-3, 115–117	4.15	95.02	94.84	5.16	0.73	14.1
1H-4, 20–22	4.70	96.50				
1H-4, 104–106	5.54	94.98	95.74	4.26	0.33	7.7
1H-5, 22–24	6.22	94.72				
2H-1, 44–46	7.94	94.22	94.47	5.53	0.45	8.1
2H-1, 120–122	8.70	95.57				
2H-2, 44–46	9.44	96.26	95.92	4.08	0.43	10.5
2H-2, 120–122	10.20	95.71				
2H-3, 44–46	10.94	96.09	95.90	4.10	0.29	7.1
2H-3, 120–122	11.70	96.06				
2H-4, 44–46	12.44	97.33	96.69	3.31	0.32	9.7
2H-4, 120–122	13.20	95.38				
2H-5, 44–46	13.94	95.04	95.21	4.79	0.41	8.5
2H-5, 120–122	14.70	95.58				
2H-6, 44–46	15.44	96.09	95.83	4.17	0.41	9.8
2H-6, 120–122	16.20	94.53				
3H-1, 46–48	17.46	94.75	94.64	5.36	0.34	6.3
3H-1, 121–123	18.21	95.54				
3H-2, 45–47	18.95	95.34	95.44	4.56	0.29	6.3
3H-2, 121–123	19.71	94.99				
3H-3, 45–47	20.45	97.19	96.09	3.91	0.24	6.0
3H-3, 121–123	21.21	95.69				
3H-4, 45–47	21.95	97.48	96.59	3.41	0.34	9.9
3H-4, 121–123	22.71	96.82				
3H-5, 45–47	23.45	96.18	96.50	3.50	0.18	5.1
3H-5, 121–123	24.21	92.77				
3H-6, 45–47	24.95	95.59	94.18	5.82	0.10	1.7
4H-1, 120–122	27.70	92.98				
4H-2, 45–47	28.45	93.62	93.30	6.70	0.09	1.4
4H-2, 120–122	29.20	93.55				
4H-3, 45–47	29.95	93.82	93.68	6.32	0.05	0.8
4H-3, 120–122	30.70	89.95				
4H-4, 45–47	31.45	90.87	90.41	9.59	0.04	0.5
4H-4, 120–122	32.20	94.47				
4H-5, 45–47	32.95	91.24	92.85	7.15	0.05	0.7
4H-5, 120–122	33.70	92.77				
5H-1, 45–47	36.45	94.35	93.56	6.44	0.04	0.6
5H-1, 120–122	37.20	95.33				
5H-2, 45–47	37.95	94.46	94.90	5.10	0.04	0.8
5H-2, 120–122	38.70	92.80				
5H-3, 45–47	39.45	94.20	93.50	6.50	0.03	0.5
5H-3, 120–122	40.20	93.75				
5H-4, 45–47	40.95	95.12	94.43	5.57	0.03	0.6
5H-4, 120–122	41.70	95.77				
6H-1, 44–46	45.94	93.32	94.54	5.46	0.04	0.8
6H-1, 120–122	46.70	95.70				
6H-2, 44–46	47.44	95.86	95.78	4.22	0.05	1.3
6H-2, 120–122	48.20	94.18				
6H-3, 44–46	48.94	94.98	94.58	5.42	0.05	0.9
6H-3, 120–122	49.70	94.32				
6H-4, 44–46	50.44	95.62	94.97	5.03	0.08	1.6
6H-4, 120–122	51.20	94.77				
6H-5, 44–46	51.94	94.96	94.86	5.14		
6H-5, 120–122	52.70	91.03				
6H-6, 44–46	53.44	96.55	93.79	6.21	0.07	1.1

Notes: $CaCO_3$ = weight percentage of calcium carbonate in bulk sample; Noncarbonate = percentage of noncarbonate in bulk sample (calculated as 100% − wt.%$CaCO_3$); Eolian = weight percentage of the extracted "eolian," or fine-grained (<63 µm) lithogenic fraction of the bulk sediment; %Eolian (carb-free) = weight percentage of the extracted "eolian" fraction relative to the noncarbonate weight percentage, rather than to the total bulk sample. Average values are given where two successive samples were used to conduct the chemical extraction procedure.

The laboratory results from Wodejebato Guyot are given in Table 7 (determinations of the weight percentages of calcium carbonate and fine-grained lithogenic [eolian] material for samples in Hole 873B), Table 8 (age models for Hole 873B), and Table 9 (accumulation rates calculated for Hole 873B using the comprehensive and simplified age models).

Figure 8 illustrates the downhole measurements of bulk physical properties and the comprehensive age model for the upper 50 m in Hole 873B. Figure 9 provides a summary of the bulk sediment composition, fossil content and texture of the upper 50 m in Hole 873B. Figure 10 illustrates the differences in linear sedimentation and calculated sediment accumulation rates for Hole 873B using the comprehensive and the simplified age models.

CONCLUSIONS

The data and figures presented in this report are intended to help in the development of a regional paleoceanographic synthesis for this region of the tropical northwest Pacific Ocean during the Neogene. There are distinct similarities in the downhole profiles of sediment physical properties (GRAPE density, bulk density, porosity, and water content) at each of the three guyots in the Marshall Islands, which surely reflect changes in depositional conditions at intermediate water depths. The timing and ultimate cause of these changes remain uncertain at present, but these issues may be resolved through a synthesis with other data sets.

Table 2. Age models for Hole 871A.

Depth top (mbsf)	Depth bottom (mbsf)	Depth middle (mbsf)	Age (Ma)	Code	Datum
0.00	0.00	0.00	0.000		
0.83	1.44	1.13	0.085	C1	FAD *E. huxleyi* acme
4.41	4.71	4.56	0.275	C2	FAD *E. huxleyi*
4.71	5.30	5.01	0.474	C3	LAD *P. lacunosa*
12.80	13.35	13.08	1.370	C4	LAD *H. sellii***
14.80	15.35	15.08	1.450	C5	LAD *C. macintyrei*
17.80	18.35	18.08	1.680	C6	FAD *G. oceanica*
17.80	18.35	18.08	1.900	C7	LAD *D. brouweri*
18.75	19.00	18.87	2.200	C8	LAD *D. asymmetricus*
19.00	19.30	19.15	2.600	C9	LAD *D. tamalis*
19.11	19.61	19.36	2.900	C10	LAD *D. variabilus*
19.10	20.60	19.85	3.100	F2	FAD *G. tosaensis*
20.60	22.10	21.35	5.100	F3	FAD *S. dehiscens*
25.10	26.50	25.80	5.800	F4	FAD *P. primalis***
25.10	26.50	25.80	11.500	F5	LAD *G. fohsi lobata***
49.10	50.60	49.85	13.100	F6	FAD *G. fohsi lobata*
52.00	53.50	52.75	14.400	C11	LAD *S. heteromorphus***

Notes: Age models were generated using the midpoint depth (mbsf) for each datum. Double asterisks (**) indicate the datums that were used to generate the "simplified" version of the age model. FAD = first appearance datum, and LAD = last appearance datum. Codes are taken from Premoli Silva, Haggerty, Rack, et al. (1993). C = nannofossil datum, and F = foraminifer datum.

ACKNOWLEDGMENTS

This research was supported by a grant from JOI-USSAC and a Canadian JGOFS post-doctoral fellowship to the first author. We thank Isabella Premoli Silva, Janet Haggerty, and the Leg 144 Scientific Party for discussions and cooperation related to this study. We also thank Monty Lawer and Tanya Shank of the Department of Geology and Geophysics, Texas A&M University, for their assistance with data collection. Finally, we thank the Ocean Drilling Program shipboard technicians and staff for their help and encouragement during Leg 144.

REFERENCES*

Arimoto, R., Duce, R.A., Ray, B.J., and Unni, C.K., 1985. Atmospheric trace elements at Enewetak Atoll: 2. Transport to the ocean by wet and dry deposition. *J. Geophys. Res.*, 90:2391–2408.

Clemens, S.C., and Prell, W.L., 1990. Late Pleistocene variability of Arabian Sea summer monsoon winds and continental aridity: eolian records from the lithogenic component of deep-sea sediments. *Paleoceanography,* 5:109–145.

Duce, R.A., Arimoto, R., Ray, B.J., Unni, C.K., and Harder, P.J., 1983. Atmospheric trace elements at Enewetak Atoll: 1. Concentrations, sources, and temporal variability. *J. Geophys. Res.,* 88:5321–5342.

Duce, R.A., Unni, C.K., Ray, B.J., Prospero, J.M., and Merrill, J.T., 1980. Long-range atmospheric transport of soil dust from asia to the Tropical North Pacific: temporal variability. *Science,* 209:1522–1524.

Janecek, T.R., and Rea, D.K., 1983. Eolian deposition in the northeast Pacific Ocean: Cenozoic history of atmospheric circulation. *Geol. Soc. Am. Bull.,* 94:730–738.

Lincoln, J.M., Pringle, M.S., and Premoli-Silva, I., 1993. Early and Late Cretaceous volcanism and reef-building in the Marshall Islands. *In* Pringle, M.S., Sager, W.W., Sliter, W.V., and Stein, S. (Eds.), *The Mesozoic Pacific: Geology, Tectonics, and Volcanism.* Geophys. Monogr., Am. Geophys. Union, 77:279–305.

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

Rea, D.K., and Janecek, T.R., 1981. Mass-accumulation rates of the nonauthigenic inorganic crystalline (eolian) component of deep-sea sediments from the western mid-Pacific Mountains, Deep Sea Drilling Project Site 463. *In* Theide, J., Vallier, T.L., et al., *Init. Repts. DSDP,* 62: Washington (U.S. Govt. Printing Office), 653–659.

Uematsu, M., Duce, R.A., Prospero, J.M., Chen, L., Merrill, J.T., and McDonald, R.L., 1983. Transport of mineral aerosol from Asia over the North Pacific Ocean. *J. Geophys. Res.,* 88:5343–5352.

van Waasbergen, R.J., and Winterer, E.L., 1993. Summit geomorphology of Western Pacific guyots. *In* Pringle, M.S., Sager, W.W., Sliter, W.V., and Stein, S. (Eds.), *The Mesozoic Pacific: Geology, Tectonics, and Volcanism.* Geophys. Monogr., Am. Geophys. Union, 77:335–366.

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

Date of initial receipt: 1 February 1994
Date of acceptance: 15 September 1994
Ms 144SR-059

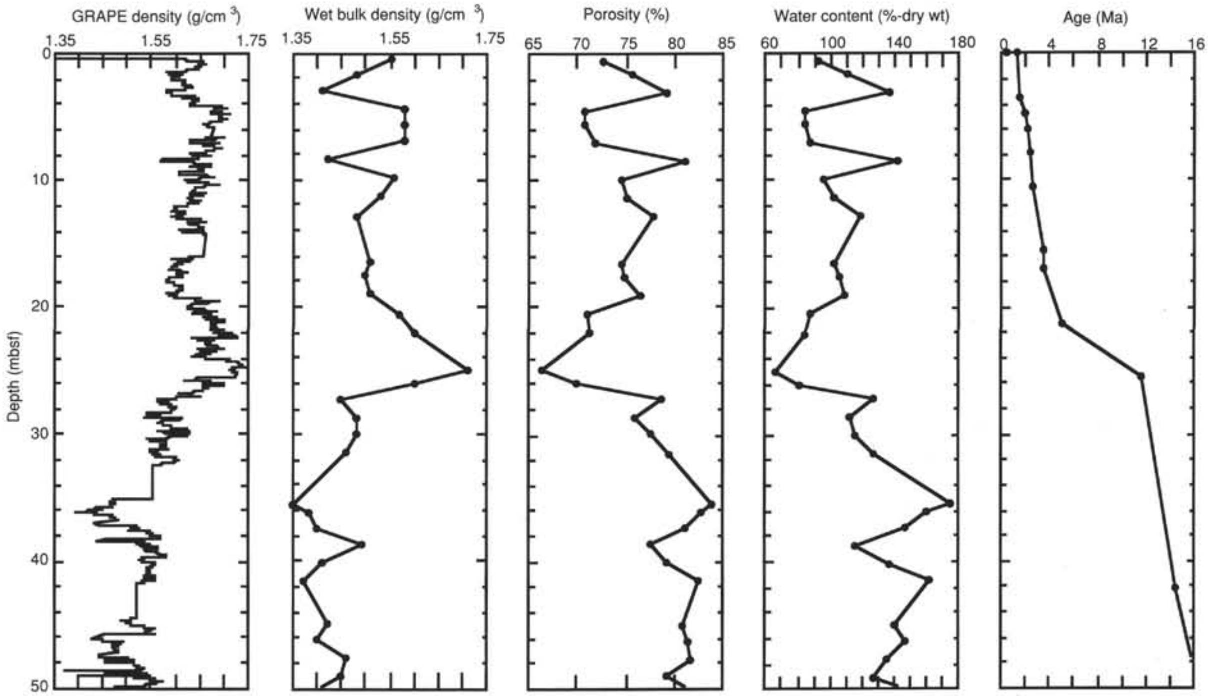

Figure 8. Summary plots of GRAPE density and index properties vs. depth (mbsf), Hole 873B. The comprehensive age model derived from calcareous nannofossil and foraminifer datums (Premoli Silva, Haggerty, Rack, et al., 1993) is also shown.

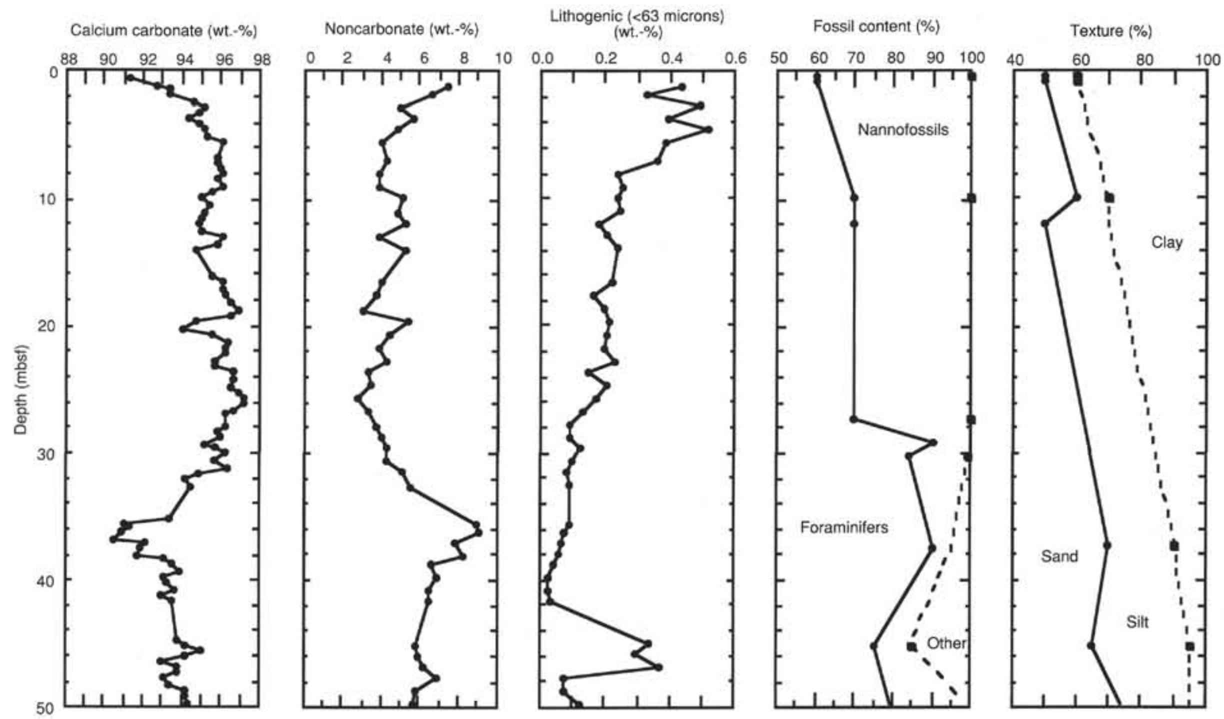

Figure 9. Summary plots of bulk composition, fossil content, and texture vs. depth, Hole 873B. Fossil content and texture are from shipboard smear-slide estimates (Premoli Silva, Haggerty, Rack, et al., 1993).

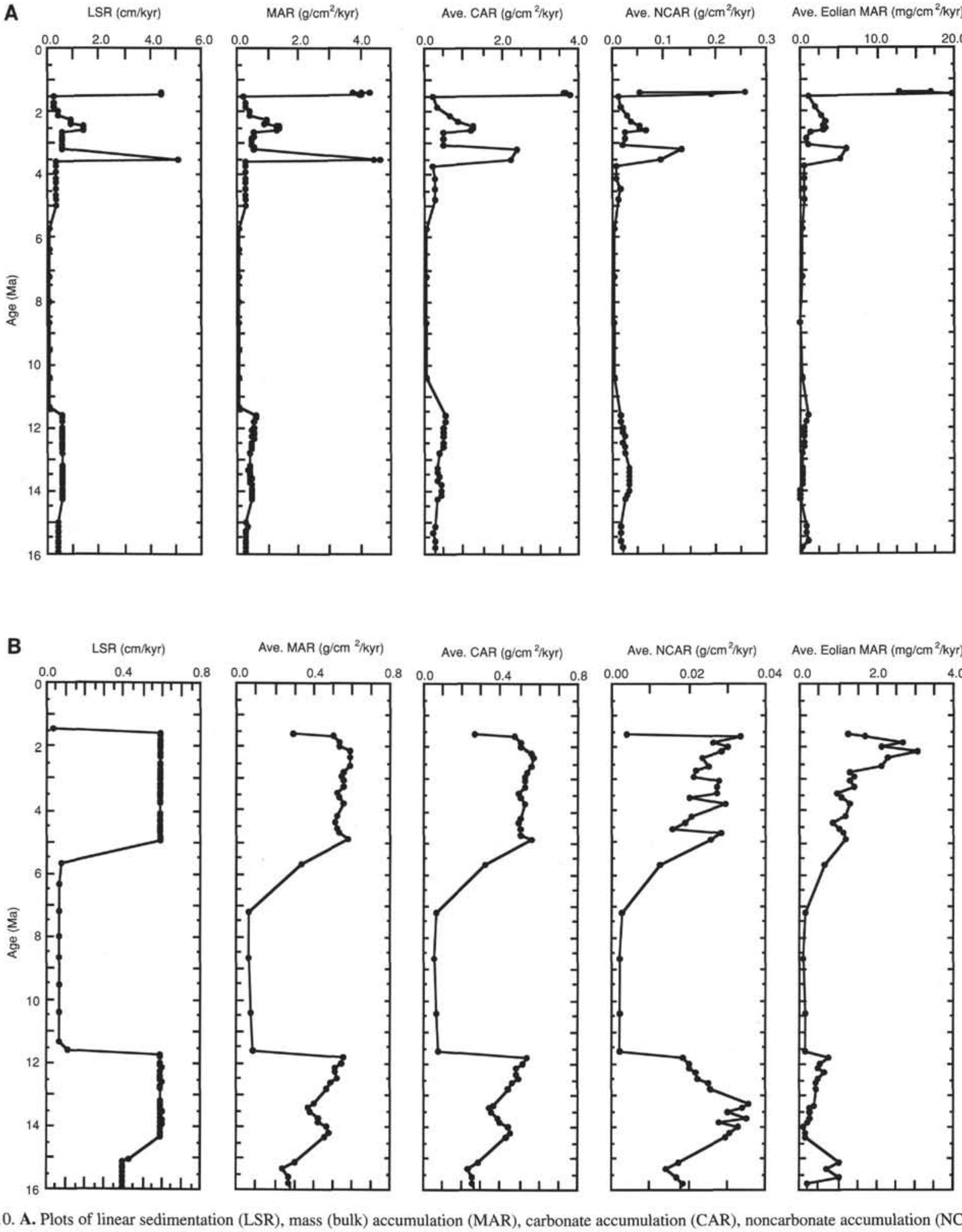

Figure 10. **A.** Plots of linear sedimentation (LSR), mass (bulk) accumulation (MAR), carbonate accumulation (CAR), noncarbonate accumulation (NCAR), and eolian mass accumulation (Eolian MAR) rates vs. age (Ma), Hole 873B. Calculations are based on the comprehensive age model. Note the change in units for eolian accumulation. **B.** Plots of linear sedimentation and mass accumulation rates for Hole 873B, calculated using the simplified age model. Note the change in units for eolian accumulation.

Table 3. Linear sedimentation and mass accumulation rates, Hole 871A, calculated using the comprehensive and simplified age models.

Core, section interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	MAR (ave.)	CAR	CAR (ave.)	NCAR (ave.)	EAR (ave.)
Comprehensive model:										
144-871A-										
1H-1, 24	0.24	0.018	1.330	0.85	1.131		1.065			
1H-1, 139	1.39	0.099	1.805	0.83	1.498	1.314	1.424	1.244	0.071	0.0039
1H-2, 32	1.82	0.123	1.805	0.83	1.498		1.429			
1H-2, 117	2.67	0.170	1.805	0.80	1.444	1.471	1.378	1.403	0.068	0.0071
1H-3, 32	3.32	0.206	1.805	0.76	1.372		1.299			
1H-3, 115	4.15	0.252	1.805	0.80	1.444	1.408	1.372	1.335	0.073	0.0103
1H-4, 20	4.70	0.337	0.226	0.84	0.190		0.183			
1H-4, 104	5.54	0.533	0.901	0.86	0.775	0.482	0.736	0.426	0.021	0.0016
1H-5, 22	6.22	0.608	0.901	0.92	0.829		0.785			
2H-1, 44	7.94	0.799	0.901	0.83	0.747	0.788	0.704	0.744	0.044	0.0035
2H-1, 120	8.70	0.884	0.901	0.99	0.892		0.852			
2H-2, 44	9.44	0.966	0.901	0.87	0.784	0.838	0.755	0.804	0.034	0.0036
2H-2, 120	10.20	1.050	0.901	0.93	0.838		0.802			
2H-3, 44	10.94	1.132	0.901	0.91	0.820	0.829	0.788	0.795	0.034	0.0024
2H-3, 120	11.70	1.217	0.901	0.94	0.847		0.814			
2H-4, 44	12.44	1.299	0.901	0.91	0.820	0.834	0.798	0.806	0.028	0.0027
2H-4, 120	13.20	1.375	2.500	0.92	2.300		2.194			
2H-5, 44	13.94	1.404	2.500	0.93	2.325	2.312	2.210	2.202	0.111	0.0094
2H-5, 120	14.70	1.435	2.500	0.92	2.300		2.198			
2H-6, 44	15.44	1.478	1.304	0.89	1.161	1.730	1.115	1.658	0.072	0.0070
2H-6, 120	16.20	1.536	1.304	0.91	1.186		1.121			
3H-1, 46	17.46	1.633	1.304	0.90	1.174	1.180	1.112	1.117	0.063	0.0040
3H-1, 121	18.21	1.949	0.263	0.88	0.231		0.221			
3H-2, 45	18.95	2.314	0.070	0.85	0.060	0.145	0.057	0.139	0.007	0.0004
3H-2, 121	19.71	3.043	0.158	0.95	0.150		0.143			
3H-3, 45	20.45	3.900	0.158	0.92	0.145	0.148	0.141	0.142	0.006	0.0003
3H-3, 121	21.21	4.913	0.158	0.94	0.149		0.142			
3H-4, 45	21.95	5.194	0.636	1.00	0.636	0.392	0.620	0.379	0.013	0.0013
3H-4, 121	22.71	5.314	0.636	1.01	0.642		0.622			
3H-5, 45	23.45	5.430	0.636	1.02	0.648	0.645	0.624	0.623	0.023	0.0011
3H-5, 121	24.21	5.550	0.636	0.93	0.591		0.549			
3H-6, 45	24.95	5.666	0.636	0.81	0.515	0.553	0.492	0.521	0.032	0.0006
4H-1, 120	27.70	11.626	1.503	0.77	1.157		1.076			
4H-2, 45	28.45	11.676	1.503	0.75	1.127	1.142	1.055	1.066	0.077	0.0011
4H-2, 120	29.20	11.726	1.503	0.77	1.157		1.083			
4H-3, 45	29.95	11.776	1.503	0.75	1.127	1.142	1.058	1.070	0.072	0.0006
4H-3, 120	30.70	11.826	1.503	0.74	1.112		1.000			
4H-4, 45	31.45	11.876	1.503	0.75	1.127	1.120	1.024	1.012	0.107	0.0005
4H-4, 120	32.20	11.926	1.503	0.72	1.082		1.022			
4H-5, 45	32.95	11.976	1.503	0.75	1.127	1.105	1.029	1.026	0.079	0.0005
4H-5, 120	33.70	12.026	1.503	0.71	1.067		0.990			
5H-1, 45	36.45	12.208	1.504	0.69	1.037	1.052	0.978	0.984	0.068	0.0004
5H-1, 120	37.20	12.258	1.503	0.68	1.022		0.974			
5H-2, 45	37.95	12.308	1.503	0.65	0.977	0.999	0.923	0.948	0.051	0.0004
5H-2, 120	38.70	12.358	1.503	0.67	1.007		0.935			
5H-3, 45	39.45	12.408	1.503	0.80	1.202	1.105	1.133	1.033	0.072	0.0004
5H-3, 120	40.20	12.458	1.503	0.79	1.187		1.113			
5H-4, 45	40.95	12.508	1.503	0.79	1.187	1.187	1.129	1.121	0.066	0.0004
5H-4, 120	41.70	12.558	1.503	0.77	1.157		1.108			
6H-1, 44	45.94	12.840	1.503	0.74	1.112	1.135	1.038	1.073	0.062	0.0005
6H-1, 120	46.70	12.890	1.503	0.77	1.159		1.109			
6H-2, 44	47.44	12.940	1.503	0.76	1.142	1.151	1.095	1.102	0.049	0.0006
6H-2, 120	48.20	12.990	1.503	0.77	1.157		1.090			
6H-3, 44	48.94	13.040	1.503	0.76	1.142	1.150	1.085	1.087	0.062	0.0006
6H-3, 120	49.70	13.090	1.503	0.81	1.217		1.148			
6H-4, 44	50.44	13.365	0.223	0.78	0.174	0.696	0.166	0.661	0.035	0.0006
6H-4, 120	51.20	13.705	0.223	0.77	0.172		0.163			
6H-5, 44	51.94	14.037	0.223	0.78	0.174	0.173	0.165	0.164	0.009	
6H-5, 120	52.70	14.378	0.223	0.80	0.178		0.162			
6H-6, 44	53.44	14.485	0.810	0.79	0.640	0.409	0.618	0.384	0.025	0.0003
Simplified model:										
144-871A-										
1H-1, 24	0.24	0.025	0.956	0.85	0.813		0.766			
1H-1, 139	1.39	0.146	0.954	0.83	0.792	0.802	0.753	0.759	0.043	0.0024
1H-2, 32	1.82	0.191	0.956	0.83	0.793		0.756			
1H-2, 117	2.67	0.280	0.954	0.80	0.763	0.778	0.728	0.742	0.036	0.0037
1H-3, 32	3.32	0.348	0.956	0.76	0.726		0.688			
1H-3, 115	4.15	0.435	0.954	0.80	0.763	0.745	0.725	0.706	0.038	0.0054
1H-4, 20	4.70	0.492	0.955	0.84	0.802		0.774			
1H-4, 104	5.54	0.580	0.955	0.86	0.821	0.811	0.780	0.777	0.035	0.0027
1H-5, 22	6.22	0.651	0.955	0.92	0.879		0.832			
2H-1, 44	7.94	0.832	0.955	0.83	0.793	0.836	0.747	0.789	0.046	0.0038
2H-1, 120	8.70	0.911	0.955	0.99	0.945		0.903			
2H-2, 44	9.44	0.989	0.955	0.87	0.831	0.888	0.800	0.852	0.036	0.0038
2H-2, 120	10.20	1.068	0.955	0.93	0.888		0.850			
2H-3, 44	10.94	1.146	0.954	0.91	0.868	0.878	0.834	0.842	0.036	0.0025
2H-3, 120	11.70	1.225	0.955	0.94	0.897		0.862			
2H-4, 44	12.44	1.303	0.955	0.91	0.869	0.883	0.846	0.854	0.029	0.0029
2H-4, 120	13.20	1.412	0.287	0.92	0.643		0.613			
2H-5, 44	13.94	1.669	0.287	0.93	0.267	0.455	0.254	0.433	0.022	0.0019
2H-5, 120	14.70	1.934	0.287	0.92	0.264		0.252			
2H-6, 44	15.44	2.192	0.287	0.89	0.256	0.260	0.246	0.249	0.011	0.0011
2H-6, 120	16.20	2.457	0.287	0.91	0.261		0.247			
3H-1, 46	17.46	2.895	0.287	0.90	0.258	0.260	0.245	0.246	0.014	0.0009

Table 3 (continued).

Core, section interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	MAR (ave.)	CAR	CAR (ave.)	NCAR (ave.)	EAR (ave.)
3H-1, 121	18.21	3.157	0.287	0.88	0.253		0.241			
3H-2, 45	18.95	3.414	0.287	0.85	0.244	0.248	0.233	0.237	0.011	0.0007
3H-2, 121	19.71	3.679	0.287	0.95	0.273		0.259			
3H-3, 45	20.45	3.937	0.287	0.92	0.264	0.268	0.257	0.258	0.010	0.0006
3H-3, 121	21.21	4.201	0.287	0.94	0.270		0.258			
3H-4, 45	21.95	4.459	0.287	1.00	0.287	0.279	0.280	0.269	0.010	0.0009
3H-4, 121	22.71	4.724	0.287	1.01	0.290		0.281			
3H-5, 45	23.45	4.982	0.287	1.02	0.293	0.291	0.282	0.281	0.010	0.0005
3H-5, 121	24.21	5.246	0.287	0.93	0.267		0.248			
3H-6, 45	24.95	5.504	0.287	0.81	0.233	0.250	0.222	0.235	0.015	0.0002
4H-1, 120	27.70	11.705	0.929	0.77	0.034		0.032			
4H-2, 45	28.45	11.785	0.929	0.75	0.697	0.366	0.653	0.341	0.024	0.0003
4H-2, 120	29.20	11.866	0.929	0.77	0.716		0.669			
4H-3, 45	29.95	11.947	0.929	0.75	0.697	0.706	0.654	0.662	0.045	0.0004
4H-3, 120	30.70	12.027	0.929	0.74	0.688		0.619			
4H-4, 45	31.45	12.108	0.929	0.75	0.697	0.692	0.633	0.626	0.066	0.0003
4H-4, 120	32.20	12.189	0.929	0.72	0.669		0.632			
4H-5, 45	32.95	12.269	0.929	0.75	0.697	0.683	0.636	0.634	0.049	0.0003
4H-5, 120	33.70	12.350	0.929	0.71	0.660		0.612			
5H-1, 45	36.45	12.646	0.929	0.69	0.641	0.651	0.605	0.609	0.042	0.0003
5H-1, 120	37.20	12.727	0.929	0.68	0.632		0.602			
5H-2, 45	37.95	12.807	0.929	0.65	0.604	0.618	0.571	0.586	0.032	0.0002
5H-2, 120	38.70	12.888	0.929	0.67	0.623		0.578			
5H-3, 45	39.45	12.969	0.929	0.80	0.743	0.683	0.700	0.639	0.044	0.0002
5H-3, 120	40.20	13.050	0.929	0.79	0.734		0.688			
5H-4, 45	40.95	13.130	0.929	0.79	0.734	0.734	0.698	0.693	0.041	0.0002
5H-4, 120	41.70	13.211	0.929	0.77	0.716		0.685			
6H-1, 44	45.94	13.667	0.929	0.74	0.688	0.702	0.642	0.663	0.038	0.0003
6H-1, 120	46.70	13.749	0.929	0.77	0.715		0.685			
6H-2, 44	47.44	13.829	0.930	0.76	0.707	0.711	0.677	0.681	0.030	0.0004
6H-2, 120	48.20	13.910	0.929	0.77	0.715		0.674			
6H-3, 44	48.94	13.990	0.930	0.76	0.707	0.711	0.671	0.672	0.039	0.0003
6H-3, 120	49.70	14.072	0.929	0.81	0.753		0.710			
6H-4, 44	50.44	14.151	0.930	0.78	0.725	0.739	0.693	0.702	0.037	0.0006
6H-4, 120	51.20	14.233	0.929	0.77	0.715		0.678			
6H-5, 44	51.94	14.313	0.930	0.78	0.725	0.720	0.689	0.683	0.037	
6H-5, 120	52.70	14.395	0.929	0.80	0.743		0.677			
6H-6, 44	53.44	14.437	1.733	0.79	1.369	1.056	1.322	0.991	0.066	0.0007

Notes: LSR = linear sedimentation rates (cm/k.y.), DBD = dry bulk density, MAR = mass (bulk) sediment accumulation rate, CAR = carbonate accumulation rate, NCAR = noncarbonate accumuation rate, and EAR = eolian (e.g., fine-grained lithogenic material, <63 µm in size) accumulation rate. Accumulation rates are given in units of g/cm^2/k.y. Average values are used when two successive samples were used to conduct the chemical extraction procedure.

Table 4. Calcium carbonate determinations, Holes 872A and 872C.

Core, section, interval (cm)	Depth (mbsf)	Carbonate (wt%)
144-872A-		
1H-1, 45–47	0.45	94.61
1H-1, 120–122	1.20	94.34
1H-2, 45–47	1.95	94.23
1H-2, 120–122	2.70	92.43
1H-3, 45–47	3.45	93.53
1H-3, 120–122	4.20	93.91
1H-4, 45–47	4.95	94.63
1H-4, 120–122	5.70	94.59
1H-5, 45–47	6.45	95.56
1H-5, 120–122	7.20	96.47
2H-1, 45–46	7.95	94.28
2H-1, 120–121	8.70	95.06
2H-2, 45–46	9.45	95.06
2H-2, 120–121	10.20	95.47
2H-3, 45–46	10.95	96.01
2H-3, 120–121	11.70	95.25
2H-4, 45–46	12.45	96.15
2H-4, 120–122	13.20	95.99
2H-5, 45–46	13.95	95.10
2H-5, 120–122	14.70	94.87
2H-6, 44–46	15.44	95.75
4H-1, 45–47	26.95	95.44
4H-1, 119–121	27.69	95.02
4H-2, 45–47	28.45	95.53
4H-2, 119–121	29.19	93.63
4H-3, 45–47	29.95	95.01
4H-3, 119–121	30.69	96.08
4H-4, 45–47	31.45	94.41
4H-4, 119–121	32.19	94.42
4H-5, 45–47	32.95	93.21
4H-5, 119–121	33.69	95.55
5H-1, 44–46	36.44	94.58
5H-1, 119–121	37.19	94.95
5H-2, 44–46	37.94	95.51
5H-2, 119–121	38.69	95.78
5H-3, 44–46	39.44	95.04
5H-3, 119–121	40.19	97.07
5H-4, 44–46	40.94	95.06
5H-4, 119–121	41.69	95.00
5H-5, 44–46	42.44	93.48
5H-5, 119–121	43.19	95.24
5H-6, 44–46	43.94	96.66
6H-1, 45–47	45.95	91.81
6H-1, 119–121	46.69	94.40
6H-2, 45–47	47.45	92.45
6H-2, 119–121	48.19	94.82
6H-3, 45–47	48.95	92.93
6H-3, 119–121	49.69	93.35
6H-4, 45–47	50.45	93.90
6H-4, 119–121	51.19	93.04
6H-5, 45–47	51.95	90.88
6H-5, 119–121	52.69	94.97
6H-6, 45–47	53.45	93.70
144-872C-		
1H-1, 45–47	0.45	94.20
1H-2, 45–47	1.45	93.51
1H-2, 118–120	2.18	90.94
1H-3, 45–47	2.75	95.61
1H-3, 118–120	3.48	95.07
1H-4, 45–47	4.16	94.41
1H-4, 118–120	4.89	94.69
1H-5, 45–47	5.55	90.09
1H-5, 118–120	6.28	93.71
1H-6, 45–47	6.93	94.19
2H-1, 45–47	9.45	94.47
2H-2, 45–47	10.41	95.76
2H-2, 119–121	11.15	94.20
2H-3, 45–47	11.77	94.90
2H-3, 119–121	12.51	91.79
2H-4, 45–47	13.15	94.79
2H-4, 119–121	13.89	95.11
2H-5, 45–47	14.47	94.62
2H-5, 119–121	15.21	95.36
2H-6, 45–47	15.84	90.14
2H-6, 119–121	16.58	92.89
3H-1, 45–47	18.95	94.04
3H-1, 97–99	19.47	93.44
3H-2, 45–47	20.01	92.58
3H-2, 111–113	20.67	93.13
3H-3, 45–47	21.22	94.26
3H-3, 116–118	21.93	92.86
3H-4, 45–47	22.52	92.60
3H-4, 115–117	23.22	94.00
3H-5, 45–47	23.83	92.09
3H-5, 115–117	24.53	93.67
3H-6, 45–47	25.15	92.52
3H-6, 117–119	25.87	94.12
4H-1, 45–47	28.45	93.49
4H-2, 45–47	29.47	94.94
4H-2, 113–115	30.15	91.57
4H-3, 45–47	30.73	95.15
4H-3, 113–115	31.41	92.65
4H-4, 45–47	32.06	95.34
4H-4, 113–115	32.74	93.48
4H-5, 45–47	33.36	94.40
4H-5, 113–115	34.04	92.93
4H-6, 45–47	34.57	94.14
4H-6, 113–115	35.25	93.82
5H-1, 45–47	37.95	94.38
5H-2, 45–47	38.81	94.27
5H-3, 45–47	39.96	93.99
5H-3, 116–118	40.67	89.94
5H-4, 45–47	41.22	93.31
5H-4, 116–118	41.93	93.72
5H-5, 45–47	42.41	91.64
5H-5, 116–118	43.12	93.93
5H-6, 45–47	43.61	95.95
6H-1, 30–32	47.30	94.43
6H-2, 30–32	48.19	93.27
6H-2, 105–107	48.94	93.51
6H-3, 30–32	49.45	91.00
6H-3, 105–107	50.20	92.14
6H-4, 30–32	50.74	94.36
6H-4, 105–107	51.49	92.93
6H-5, 30–32	52.01	94.10
6H-5, 105–107	52.76	93.20
6H-6, 30–32	53.32	92.77

Note: Carbonate = weight percentage of calcium carbonate.

Table 5. Age models for Hole 872A.

Depth top (mbsf)	Depth bottom (mbsf)	Depth middle (mbsf)	Age (Ma)	Code	Datum
0.00	0.00	0.00	0.000		
0.85	1.35	1.10	0.280	C1	FAD *E. huxleyi*
1.75	2.35	2.05	0.470	C2	LAD *P. lacunosa*
5.85	6.25	6.05	1.370	C3	LAD *H. sellii***
7.50	7.50	7.50	1.450	C4	LAD *C. macinteyrei*
7.50	7.75	7.62	1.900	C5	LAD *D. brouweri*
17.00	30.09	23.55	5.200	F4	FAD *G. tumida*
30.09	36.00	33.04	5.800	F5	FAD *P. primalis***
36.00	45.50	40.75	8.850	C7	LAD *D. hamatus*
36.00	45.50	40.75	9.000	C8	LAD *C. coalitus*
45.50	46.00	45.75	10.000	C9	FAD *D. hamatus*
47.00	47.50	47.25	10.800	C10	FAD *C. coalitus*
57.09	57.72	57.40	11.500	F6	LAD *G. fohsi lobata***
68.00	70.00	69.00	14.400	C11	LAD *S. heteromorphus***

Notes: Age models were generated using the midpoint depth (mbsf) for each datum. Double asterisks (**) indicate the datums that were used to generate the "simplified" version of the age model. FAD = first appearance datum, and LAD = last appearance datum. Codes are taken from Premoli Silva, Haggerty, Rack, et al. (1993). C = nannofossil datum, and F = foraminifer datum.

Table 6. Linear sedimentation and mass accumulation rates for Hole 872A, calculated using the comprehensive and simplified age models.

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	CAR	NCAR
Comprehensive model:							
144-872A-							
1H-1, 45	0.45	0.11	0.393	0.86	0.338	0.320	0.018
1H-1, 120	1.20	0.30	0.500	0.79	0.395	0.373	0.022
1H-2, 45	1.95	0.45	0.500	0.85	0.425	0.400	0.025
1H-2, 120	2.70	0.62	0.444	0.93	0.413	0.382	0.031
1H-3, 45	3.45	0.79	0.444	0.92	0.408	0.382	0.026
1H-3, 120	4.20	0.95	0.444	0.94	0.417	0.392	0.025
1H-4, 45	4.95	1.12	0.444	0.95	0.422	0.399	0.023
1H-4, 120	5.70	1.29	0.444	0.93	0.413	0.391	0.022
1H-5, 45	6.45	1.39	1.813	0.93	1.686	1.611	0.075
1H-5, 120	7.20	1.43	1.813	0.94	1.704	1.644	0.060
2H-1, 45	7.95	1.99	0.483	0.95	0.459	0.433	0.026
2H-1, 120	8.70	2.18	0.382	0.95	0.363	0.345	0.018
2H-2, 45	9.45	2.38	0.382	0.94	0.359	0.341	0.018
2H-2, 120	10.20	2.58	0.382	0.89	0.340	0.324	0.015
2H-3, 45	10.95	2.77	0.382	0.89	0.340	0.326	0.014
2H-3, 120	11.70	2.97	0.382	0.89	0.340	0.324	0.016
2H-4, 45	12.45	3.16	0.382	0.90	0.344	0.330	0.013
2H-4, 120	13.20	3.36	0.382	0.87	0.332	0.319	0.013
2H-5, 45	13.95	3.56	0.382	0.88	0.336	0.320	0.016
2H-5, 120	14.70	3.75	0.382	0.90	0.344	0.326	0.018
2H-6, 44	15.44	3.95	0.382	0.90	0.344	0.329	0.015
4H-1, 45	26.95	5.41	1.582	0.92	1.455	1.389	0.066
4H-1, 119	27.69	5.46	1.582	0.95	1.503	1.428	0.075
4H-2, 45	28.45	5.51	1.582	1.11	1.756	1.678	0.078
4H-2, 119	29.19	5.56	1.582	1.04	1.645	1.540	0.105
4H-3, 45	29.95	5.60	1.582	1.06	1.677	1.593	0.084
4H-3, 119	30.69	5.65	1.582	0.88	1.392	1.338	0.055
4H-4, 45	31.45	5.70	1.582	0.83	1.313	1.240	0.073
4H-4, 119	32.19	5.75	1.582	0.83	1.313	1.240	0.073
4H-5, 45	32.95	5.79	1.582	0.84	1.329	1.239	0.090
4H-5, 119	33.69	6.06	0.253	0.78	0.197	0.189	0.009
5H-1, 44	36.44	7.14	0.253	0.77	0.195	0.184	0.011
5H-1, 119	37.19	7.44	0.253	0.76	0.192	0.182	0.010
5H-2, 44	37.94	7.74	0.253	0.75	0.190	0.181	0.009
5H-2, 119	38.69	8.04	0.253	0.75	0.190	0.182	0.008
5H-3, 44	39.44	8.33	0.253	0.73	0.185	0.175	0.009
5H-3, 119	40.19	8.63	0.253	0.72	0.182	0.177	0.005
5H-4, 44	40.94	9.04	0.500	0.72	0.360	0.342	0.018
5H-4, 119	41.69	9.19	0.500	0.72	0.360	0.342	0.018
5H-5, 44	42.44	9.34	0.500	0.73	0.365	0.341	0.024
5H-5, 119	43.19	9.49	0.500	0.73	0.365	0.348	0.017
5H-6, 44	43.94	9.64	0.500	0.73	0.365	0.353	0.012
6H-1, 45	45.95	10.11	0.188	0.73	0.137	0.126	0.011
6H-1, 119	46.69	10.50	0.188	0.70	0.131	0.124	0.007
6H-2, 45	47.45	10.81	1.451	0.69	1.001	0.926	0.076
6H-2, 119	48.19	10.86	1.451	0.68	0.987	0.936	0.051
6H-3, 45	48.95	10.92	1.451	0.68	0.987	0.917	0.070
6H-3, 119	49.69	10.97	1.451	0.68	0.987	0.921	0.066
6H-4, 45	50.45	11.02	1.451	0.69	1.001	0.940	0.061
6H-4, 119	51.19	11.07	1.451	0.71	1.030	0.958	0.072
6H-5, 45	51.95	11.12	1.451	0.71	1.030	0.936	0.094
6H-5, 119	52.69	11.18	1.451	0.71	1.030	0.978	0.052
6H-6, 45	53.45	11.23	1.451	0.72	1.045	0.979	0.066
Simplified model:							
144-872A-							
1H-1, 45	0.45	0.102	0.442	0.86	0.380	0.359	0.021
1H-1, 120	1.20	0.272	0.442	0.79	0.349	0.329	0.020
1H-2, 45	1.95	0.442	0.442	0.85	0.375	0.354	0.021
1H-2, 120	2.70	0.611	0.442	0.93	0.411	0.380	0.031
1H-3, 45	3.45	0.781	0.442	0.92	0.406	0.380	0.026
1H-3, 120	4.20	0.951	0.442	0.94	0.415	0.390	0.025
1H-4, 45	4.95	1.121	0.442	0.95	0.420	0.397	0.023
1H-4, 120	5.70	1.291	0.442	0.93	0.411	0.389	0.022
1H-5, 45	6.45	1.436	0.609	0.93	0.481	0.460	0.021
1H-5, 120	7.20	1.559	0.609	0.94	0.573	0.552	0.020
2H-1, 45	7.95	1.682	0.609	0.95	0.579	0.546	0.033
2H-1, 120	8.70	1.805	0.609	0.95	0.579	0.550	0.029
2H-2, 45	9.45	1.928	0.609	0.94	0.573	0.544	0.028
2H-2, 120	10.20	2.051	0.609	0.89	0.542	0.518	0.025
2H-3, 45	10.95	2.174	0.609	0.89	0.542	0.521	0.022
2H-3, 120	11.70	2.297	0.609	0.89	0.542	0.516	0.026
2H-4, 45	12.45	2.421	0.609	0.90	0.548	0.527	0.021
2H-4, 120	13.20	2.544	0.609	0.87	0.530	0.509	0.021
2H-5, 45	13.95	2.667	0.609	0.88	0.536	0.510	0.026
2H-5, 120	14.70	2.790	0.609	0.90	0.548	0.520	0.028
2H-6, 44	15.44	2.911	0.609	0.90	0.549	0.525	0.023
4H-1, 45	26.95	4.800	0.609	0.92	0.561	0.535	0.026
4H-1, 119	27.69	4.922	0.609	0.95	0.579	0.550	0.029
4H-2, 45	28.45	5.047	0.609	1.11	0.677	0.646	0.030
4H-2, 119	29.19	5.168	0.609	1.04	0.633	0.593	0.040
4H-3, 45	29.95	5.293	0.609	1.06	0.646	0.614	0.032
4H-3, 119	30.69	5.414	0.609	0.88	0.536	0.515	0.021
4H-4, 45	31.45	5.539	0.609	0.83	0.506	0.478	0.028
4H-4, 119	32.19	5.661	0.609	0.83	0.506	0.477	0.028
4H-5, 45	32.95	5.785	0.609	0.84	0.512	0.477	0.035
4H-5, 119	33.69	5.956	0.418	0.78	0.339	0.324	0.015
5H-1, 44	36.44	6.613	0.418	0.77	0.322	0.305	0.017
5H-1, 119	37.19	6.793	0.418	0.76	0.318	0.302	0.016
5H-2, 44	37.94	6.972	0.418	0.75	0.314	0.299	0.014
5H-2, 119	38.69	7.151	0.418	0.75	0.314	0.300	0.013
5H-3, 44	39.44	7.331	0.418	0.73	0.305	0.290	0.015
5H-3, 119	40.19	7.510	0.418	0.72	0.301	0.292	0.009
5H-4, 44	40.94	7.689	0.418	0.72	0.301	0.286	0.015
5H-4, 119	41.69	7.869	0.418	0.72	0.301	0.286	0.015
5H-5, 44	42.44	8.048	0.418	0.73	0.305	0.285	0.020
5H-5, 119	43.19	8.227	0.418	0.73	0.305	0.291	0.015
5H-6, 44	43.94	8.407	0.418	0.73	0.305	0.295	0.010
6H-1, 45	45.95	8.887	0.418	0.73	0.305	0.280	0.025
6H-1, 119	46.69	9.064	0.418	0.70	0.293	0.276	0.016
6H-2, 45	47.45	9.246	0.418	0.69	0.289	0.267	0.022
6H-2, 119	48.19	9.423	0.418	0.68	0.284	0.270	0.015
6H-3, 45	48.95	9.605	0.418	0.68	0.284	0.264	0.020
6H-3, 119	49.69	9.782	0.418	0.68	0.284	0.265	0.019
6H-4, 45	50.45	9.964	0.418	0.69	0.288	0.271	0.018
6H-4, 119	51.19	10.141	0.418	0.71	0.297	0.276	0.021
6H-5, 45	51.95	10.322	0.418	0.71	0.297	0.270	0.027
6H-5, 119	52.69	10.499	0.418	0.71	0.297	0.282	0.015
6H-6, 45	53.45	10.681	0.418	0.72	0.301	0.282	0.019

Notes: LSR = linear sedimentation rates (cm/k.y.), DBD = dry bulk density, MAR = mass (bulk) sediment accumulation rate, CAR = carbonate accumulation rate, NCAR = noncarbonate accumuation rate, and EAR = eolian (e.g., fine-grained lithogenic material, <63 µm in size) accumulation rate. Accumulation rates are given in units of $g/cm^2/k.y.$ Average values are used when two successive samples were used to conduct the chemical extraction procedure.

Table 7. Calcium carbonate determinations and chemical extractions of fine-grained lithogenic material, Hole 873B.

Core, section, interval (cm)	Depth (mbsf)	$CaCO_3$ (wt%)	$CaCO_3$ (ave.) (wt%)	Noncarbonate (ave.) (wt%)	Eolian (ave.) (wt%)	%Eolian carb-free
144-873B-						
1H-1, 60–62	0.60	91.31				
1H-1, 117–119	1.17	93.94	92.62	7.37	0.43	5.9
1H-2, 18–22	1.37	92.82				
1H-2, 60–62	1.79	93.93	93.38	6.62	0.33	5.0
1H-2, 118–122	2.37	95.34				
1H-3, 18–22	2.75	94.85	95.10	4.90	0.49	10.1
1H-3, 60–62	3.17	94.92				
1H-3, 118–122	3.75	93.81	94.36	5.64	0.40	7.0
1H-4, 18–22	4.15	95.94				
1H-4, 60–62	4.57	94.39	95.17	4.83	0.52	10.7
1H-4, 118–122	5.15	96.15				
1H-5, 18–22	5.54	95.91	96.03	3.97	0.38	9.7
2H-1, 18–22	6.68	95.80				
2H-1, 60–64	7.10	95.74	95.77	4.23	0.36	8.5
2H-1, 116–118	7.66	96.15				
2H-2, 18–22	8.10	95.96	96.06	3.94	0.24	6.0
2H-2, 60–64	8.52	95.55				
2H-2, 116–118	9.08	96.66	96.11	3.89	0.25	6.5
2H-3, 18–22	9.54	94.45				
2H-3, 60–64	9.96	95.46	94.96	5.04	0.24	4.7
2H-3, 116–118	10.52	95.24				
2H-4, 18–22	11.04	94.98	95.11	4.89	0.25	5.1
2H-4, 60–64	11.46	94.98				
2H-4, 116–118	12.02	94.66	94.82	5.18	0.18	3.5
2H-5, 18–22	12.54	95.41				
2H-5, 60–64	12.96	96.91	96.16	3.84	0.20	5.3
2H-5, 116–118	13.52	94.70				
2H-6, 18–22	13.96	94.71	94.71	5.29	0.23	4.4
3H-1, 18–20	16.18	96.43				
3H-1, 60–62	16.60	95.67	96.05	3.95	0.22	5.7
3H-2, 18–20	17.24	96.64				
3H-2, 60–62	17.66	95.96	96.30	3.70	0.17	4.5
3H-2, 116–118	18.22	96.92				
3H-3, 18–20	18.74	96.98	96.95	3.05	0.20	6.5
3H-3, 60–62	19.16	96.17				
3H-3, 116–118	19.72	93.16	94.67	5.33	0.21	3.9
3H-4, 18–20	20.24	94.80				
3H-4, 60–62	20.66	96.43	95.62	4.38	0.20	4.6
3H-4, 116–118	21.22	96.20				
3H-5, 18–20	21.74	96.15	96.18	3.82	0.20	5.2
3H-5, 60–62	22.16	96.35				
3H-5, 116–118	22.72	95.04	95.69	4.31	0.23	5.3
3H-6, 18–20	23.24	96.24				
3H-6, 60–62	23.66	96.99	96.61	3.39	0.15	4.4
3H-6, 116–118	24.22	96.32				
3H-7, 18–20	24.74	96.65	96.49	3.51	0.21	5.8
3H-0, 18–20	25.33	97.09				
4H-1, 18–20	25.68	97.27	97.18	2.82	0.17	6.1
4H-1, 60–62	26.10	97.04				
4H-1, 116–118	26.66	96.35	96.69	3.31	0.13	4.0
4H-2, 18–20	26.87	95.98				
4H-2, 116–118	27.85	96.50	96.24	3.76	0.09	2.5
4H-3, 18–20	28.34	95.25				
4H-3, 60–62	28.76	96.74	95.99	4.01	0.09	2.2
4H-3, 116–118	29.32	93.62				
4H-4, 18–20	29.66	97.76	95.69	4.31	0.13	2.9
4H-4, 60–62	30.08	94.58				
4H-4, 116–118	30.64	96.83	95.71	4.29	0.10	2.2
4H-5, 18–20	31.16	95.91				
4H-5, 60–62	31.58	93.77	94.84	5.16	0.08	1.6
4H-5, 116–118	32.14	94.62				
4H-6, 18–20	32.66	94.33	94.48	5.52	0.09	1.6
5H-1, 18–20	35.18	92.46				
5H-1, 61–63	35.61	89.66	91.06	8.94	0.09	1.0
5H-2, 18–20	35.81	93.01				
5H-2, 61–63	36.24	88.77	90.89	9.11	0.07	0.8
5H-2, 116–118	36.79	92.07				
5H-3, 18–20	37.08	92.28	92.18	7.82	0.07	0.8
5H-3, 66–68	37.56	91.30				
5H-3, 116–118	38.06	92.14	91.72	8.28	0.05	0.6
5H-4, 18–20	38.39	93.98				
5H-4, 61–63	38.82	92.90	93.44	6.56	0.04	0.6
5H-4, 116–118	39.37	94.84				
5H-5, 18–20	39.79	91.29	93.07	6.93	0.02	0.3
5H-5, 61–63	40.22	95.15				
5H-5, 116–118	40.77	91.99	93.57	6.43	0.02	0.4
5H-6, 18–20	41.18	93.96				
5H-6, 61–63	41.61	93.09	93.52	6.48	0.03	0.4
6H-1, 18–20	44.68	94.35				
6H-1, 60–62	45.10	94.11	94.23	5.77	0.34	5.8
6H-1, 116–118	45.66	95.97				
6H-2, 18–20	45.92	92.26	94.12	5.88	0.29	5.0
6H-2, 60–62	46.34	93.66				
6H-2, 116–118	46.90	93.81	93.74	6.26	0.37	5.9
6H-3, 18–20	47.33	93.93				
6H-3, 60–62	47.75	92.23	93.08	6.92	0.07	1.1
6H-3, 116–118	48.31	94.40				
6H-4, 18–20	48.71	94.04	94.22	5.78	0.07	1.2
6H-4, 60–62	49.13	94.35				
6H-4, 116–118	49.69	94.26	94.31	5.69	0.12	2.1
6H-5, 18–20	50.07	94.96				
6H-5, 60–62	50.49	94.05	94.51	5.49	0.12	2.2
6H-5, 116–118	51.05	91.13				
6H-6, 18–20	51.45	94.35	92.74	7.26	0.10	1.4

Notes: $CaCO_3$ = weight percentage of calcium carbonate in bulk sample, Noncarbonate = percentage of noncarbonate in bulk sample (calculated as 100% – wt%$CaCO_3$), Eolian = weight percentage of the extracted "eolian," or fine-grained (<63 μm) lithogenic fraction of the bulk sediment, and %Eolian (carb-free) = weight percentage of the extracted "eolian" fraction relative to the noncarbonate weight percentage, rather than to the total bulk sample. Average values are given where two successive samples were used to conduct the chemical extraction procedure.

Table 8. Age models for Site 873.

Depth top (mbsf)	Depth bottom (mbsf)	Depth middle (mbsf)	Age (Ma)	Code	Datum
0.00	0.05	0.03	0.470	C1	LAD *P. lacunosa*
0.00	0.05	0.03	1.370	C2	LAD *H. sellii***
3.07	4.02	3.55	1.450	C3	LAD *C. macintyrei*
4.45	4.95	4.70	1.900	C4	LAD *D. brouweri*
4.45	4.95	4.70	1.900	C5	LAD *D. triradiatus*
5.38	6.59	5.99	2.200	C6	LAD *D. aymmetricus*
7.12	8.57	7.84	2.400	C7	LAD *D. pentaradiatus*
9.88	11.38	10.63	2.600	C8	LAD *D. tamalis*
14.53	16.50	15.51	3.470	C10	LAD *S. abies* + *S. neoabies*
16.50	17.57	17.03	3.500	C11	LAD *R. pseudoumbilica*
20.56	22.06	21.31	5.000	C12	LAD *T. rugosus* **
25.48	25.55	25.51	11.600	C13	LAD *C. floridanus***
42.48	41.92	42.20	14.400	C14	LAD *S. heteromorphus***
51.82	54.01	52.92	17.100	C15	FAD *S. heteromorphus* **

Notes: Age models were generated using the midpoint depth (mbsf) for each datum. Double asterisks (**) indicate the datums that were used to generate the "simplified" version of the age model. FAD = first appearance datum, and LAD = last appearance datum. Codes are taken from Premoli Silva, Haggerty, Rack, et al. (1993). C = nannofossil datum, and F = foraminifer datum.

Table 9. Linear sedimentation and mass accumulation rates for Hole 873B, calculated using the comprehensive and simplified age models.

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	MAR (ave.)	CAR	CAR (ave.)	NCAR (ave.)	EAR (ave.)
Comprehensive model:										
144-873B-										
1H-1, 60	0.60	1.383	4.400	0.97	4.268		3.897			
1H-1, 117	1.17	1.396	4.400	0.92	4.048	4.158	3.803	3.851	0.055	0.0180
1H-2, 18	1.37	1.401	4.400	0.86	3.784		3.512			
1H-2, 60	1.79	1.410	4.400	0.86	3.784	3.784	3.554	3.533	0.251	0.0125
1H-2, 118	2.37	1.423	4.400	0.92	4.048		3.859			
1H-3, 18	2.75	1.432	4.400	0.90	3.960	4.004	3.756	3.808	0.196	0.0198
1H-3, 60	3.17	1.441	4.400	0.90	3.960		3.759			
1H-3, 118	3.75	1.528	0.256	0.92	0.236	2.098	0.221	1.980	0.118	0.0083
1H-4, 18	4.15	1.685	0.256	1.01	0.258		0.248			
1H-4, 60	4.57	1.849	0.256	1.00	0.256	0.257	0.241	0.244	0.012	0.0013
1H-4, 118	5.15	2.005	0.430	1.02	0.439		0.422			
1H-5, 18	5.54	2.095	0.430	1.00	0.430	0.435	0.413	0.417	0.017	0.0017
2H-1, 18	6.68	2.275	0.925	1.01	0.934		0.895			
2H-1, 60	7.10	2.320	0.925	1.00	0.925	0.930	0.886	0.890	0.039	0.0034
2H-1, 116	7.66	2.381	0.925	0.95	0.879		0.845			
2H-2, 18	8.10	2.419	1.395	0.96	1.339	1.109	1.285	1.065	0.044	0.0026
2H-2, 60	8.52	2.449	1.395	0.93	1.298		1.240			
2H-2, 116	9.08	2.489	1.395	0.94	1.311	1.304	1.268	1.254	0.051	0.0033
2H-3, 18	9.54	2.522	1.395	0.97	1.353		1.278			
2H-3, 60	9.96	2.552	1.395	0.91	1.270	1.311	1.212	1.245	0.066	0.0031
2H-3, 116	10.52	2.592	1.395	0.94	1.311		1.249			
2H-4, 18	11.04	2.673	0.561	0.96	0.539	0.925	0.512	0.880	0.045	0.0023
2H-4, 60	11.46	2.748	0.561	0.92	0.516		0.490			
2H-4, 116	12.02	2.848	0.561	0.87	0.488	0.502	0.462	0.476	0.026	0.0009
2H-5, 18	12.54	2.941	0.561	0.90	0.505		0.482			
2H-5, 60	12.96	3.015	0.561	0.90	0.505	0.505	0.489	0.485	0.019	0.0010
2H-5, 116	13.52	3.115	0.561	0.96	0.539		0.510			
2H-6, 18	13.96	3.194	0.561	0.93	0.521	0.530	0.494	0.502	0.028	0.0012
3H-1, 18	16.18	3.483	5.067	0.91	4.611		4.446			
3H-1, 60	16.60	3.491	5.067	0.88	4.459	4.535	4.266	4.356	0.179	0.0102
3H-2, 18	17.24	3.574	0.285	0.89	0.254		0.245			
3H-2, 60	17.66	3.721	0.285	0.86	0.245	0.250	0.235	0.240	0.009	0.0004
3H-2, 116	18.22	3.917	0.285	0.89	0.254		0.246			
3H-3, 18	18.74	4.099	0.285	0.88	0.251	0.253	0.244	0.245	0.008	0.0005
3H-3, 60	19.16	4.247	0.285	0.90	0.257		0.247			
3H-3, 116	19.72	4.443	0.285	0.91	0.260	0.258	0.242	0.244	0.014	0.0005
3H-4, 18	20.24	4.625	0.285	1.00	0.285		0.271			
3H-4, 60	20.66	4.772	0.285	0.98	0.280	0.283	0.270	0.270	0.012	0.0006
3H-4, 116	21.22	4.969	0.285	1.00	0.285		0.274			
3H-5, 18	21.74	5.676	0.064	1.02	0.065	0.175	0.063	0.169	0.007	0.0003
3H-5, 60	22.16	6.336	0.064	1.05	0.067		0.064			
3H-5, 116	22.72	7.216	0.064	0.98	0.062	0.065	0.059	0.062	0.003	0.0001
3H-6, 18	23.24	8.033	0.064	0.95	0.060		0.058			
3H-6, 60	23.66	8.693	0.064	0.98	0.062	0.061	0.060	0.059	0.002	0.0001
3H-6, 116	24.22	9.573	0.064	1.08	0.069		0.066			
3H-7, 18	24.74	10.390	0.064	1.06	0.067	0.068	0.065	0.066	0.002	0.0001
3H-0, 18	25.33	11.317	0.064	0.97	0.062		0.060			
4H-1, 18	25.68	11.628	0.596	0.98	0.584	0.323	0.568	0.314	0.009	0.0006
4H-1, 60	26.10	11.699	0.596	0.98	0.584		0.567			
4H-1, 116	26.66	11.793	0.596	0.89	0.531	0.557	0.511	0.539	0.018	0.0007
4H-2, 18	26.87	11.828	0.595	0.95	0.566		0.543			
4H-2, 116	27.85	11.993	0.596	0.87	0.519	0.542	0.500	0.522	0.020	0.0005
4H-3, 18	28.34	12.075	0.596	0.82	0.489		0.466			
4H-3, 60	28.76	12.145	0.596	0.88	0.524	0.507	0.507	0.486	0.020	0.0005
4H-3, 116	29.32	12.239	0.596	0.87	0.518		0.485			
4H-4, 18	29.66	12.296	0.596	0.84	0.501	0.510	0.490	0.488	0.022	0.0006
4H-4, 60	30.08	12.367	0.596	0.91	0.542		0.513			
4H-4, 116	30.64	12.461	0.596	0.84	0.501	0.522	0.485	0.499	0.022	0.0005
4H-5, 18	31.16	12.548	0.596	0.80	0.477		0.457			
4H-5, 60	31.58	12.618	0.596	0.83	0.495	0.486	0.464	0.461	0.025	0.0004
4H-5, 116	32.14	12.712	0.596	0.82	0.489		0.462			
4H-6, 18	32.66	12.800	0.596	0.74	0.441	0.465	0.416	0.439	0.026	0.0004
5H-1, 18	35.18	13.222	0.596	0.67	0.399		0.369			
5H-1, 61	35.61	13.294	0.596	0.66	0.394	0.396	0.353	0.361	0.035	0.0004
5H-2, 18	35.81	13.328	0.596	0.61	0.364		0.338			
5H-2, 61	36.24	13.400	0.596	0.63	0.376	0.370	0.334	0.336	0.034	0.0003
5H-2, 116	36.79	13.492	0.596	0.63	0.375		0.346			
5H-3, 18	37.08	13.541	0.596	0.65	0.387	0.381	0.357	0.352	0.030	0.0002
5H-3, 66	37.56	13.622	0.596	0.76	0.453		0.413			
5H-3, 116	38.06	13.705	0.596	0.66	0.393	0.423	0.362	0.388	0.035	0.0002
5H-4, 18	38.39	13.761	0.596	0.63	0.375		0.353			
5H-4, 61	38.82	13.833	0.596	0.80	0.476	0.426	0.443	0.398	0.028	0.0002
5H-4, 116	39.37	13.925	0.596	0.82	0.489		0.464			
5H-5, 18	39.79	13.996	0.596	0.76	0.453	0.471	0.413	0.438	0.033	0.0001
5H-5, 61	40.22	14.068	0.596	0.81	0.483		0.460			
5H-5, 116	40.77	14.160	0.596	0.79	0.471	0.477	0.433	0.446	0.031	0.0001
5H-6, 18	41.18	14.229	0.596	0.79	0.471		0.442			
5H-6, 61	41.61	14.301	0.596	0.75	0.447	0.459	0.416	0.429	0.030	0.0001
6H-1, 18	44.68	15.025	0.397	0.71	0.282		0.266			
6H-1, 60	45.10	15.130	0.397	0.78	0.310	0.296	0.291	0.279	0.017	0.0010
6H-1, 116	45.66	15.271	0.397	0.61	0.242		0.232			
6H-2, 18	45.92	15.337	0.397	0.60	0.238	0.240	0.220	0.226	0.014	0.0007
6H-2, 60	46.34	15.443	0.397	0.69	0.274		0.257			
6H-2, 116	46.90	15.584	0.397	0.68	0.270	0.272	0.253	0.255	0.017	0.0010
6H-3, 18	47.33	15.692	0.397	0.69	0.274		0.257			
6H-3, 60	47.75	15.798	0.397	0.66	0.262	0.268	0.242	0.249	0.019	0.0002
6H-3, 116	48.31	15.939	0.397	0.73	0.290		0.274			

Table 9 (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	MAR (ave.)	CAR	CAR (ave.)	NCAR (ave.)	EAR (ave.)
6H-4, 18	48.71	16.040	0.397	0.76	0.302	0.296	0.284	0.279	0.017	0.0002
6H-4, 60	49.13	16.145	0.397	0.77	0.306		0.288			
6H-4, 116	49.69	16.287	0.397	0.77	0.306	0.306	0.288	0.288	0.017	0.0004
6H-5, 18	50.07	16.382	0.397	0.62	0.246		0.234			
6H-5, 60	50.49	16.488	0.397	0.62	0.246	0.246	0.231	0.233	0.014	0.0003
6H-5, 116	51.05	16.629	0.397	0.72	0.286		0.261			
6H-6, 18	51.45	16.730	0.397	0.64	0.254	0.270	0.240	0.250	0.020	0.0003
Simplified age model:										
144-873B-										
1H-1, 60	0.60	1.467	0.586	0.97	0.568		0.519			
1H-1, 117	1.17	1.564	0.586	0.92	0.539	0.554	0.506	0.513	0.021	0.0013
1H-2, 18	1.37	1.599	0.587	0.86	0.504		0.468			
1H-2, 60	1.79	1.670	0.587	0.86	0.504	0.504	0.474	0.471	0.033	0.0017
1H-2, 118	2.37	1.769	0.586	0.92	0.539		0.514			
1H-3, 18	2.75	1.834	0.586	0.90	0.528	0.533	0.501	0.507	0.026	0.0026
1H-3, 60	3.17	1.906	0.587	0.90	0.528		0.501			
1H-3, 118	3.75	2.005	0.586	0.92	0.539	0.533	0.506	0.503	0.030	0.0021
1H-4, 18	4.15	2.073	0.587	1.01	0.592		0.568			
1H-4, 60	4.57	2.144	0.587	1.00	0.587	0.589	0.554	0.561	0.029	0.0030
1H-4, 118	5.15	2.243	0.586	1.02	0.598		0.575			
1H-5, 18	5.54	2.310	0.586	1.00	0.586	0.592	0.562	0.569	0.024	0.0023
2H-1, 18	6.68	2.504	0.586	1.01	0.592		0.567			
2H-1, 60	7.10	2.576	0.587	1.00	0.587	0.589	0.562	0.564	0.025	0.0021
2H-1, 116	7.66	2.671	0.586	0.95	0.557		0.536			
2H-2, 18	8.10	2.747	0.586	0.96	0.562	0.560	0.540	0.538	0.022	0.0013
2H-2, 60	8.52	2.818	0.587	0.93	0.546		0.521			
2H-2, 116	9.08	2.914	0.586	0.94	0.551	0.548	0.532	0.527	0.021	0.0014
2H-3, 18	9.54	2.992	0.587	0.97	0.569		0.538			
2H-3, 60	9.96	3.064	0.586	0.91	0.533	0.551	0.509	0.523	0.028	0.0013
2H-3, 116	10.52	3.159	0.586	0.94	0.551		0.525			
2H-4, 18	11.04	3.248	0.586	0.96	0.563	0.557	0.535	0.530	0.027	0.0014
2H-4, 60	11.46	3.320	0.586	0.92	0.539		0.512			
2H-4, 116	12.02	3.415	0.586	0.87	0.510	0.525	0.483	0.497	0.027	0.0009
2H-5, 18	12.54	3.504	0.586	0.90	0.528		0.503			
2H-5, 60	12.96	3.576	0.587	0.90	0.528	0.528	0.512	0.508	0.020	0.0011
2H-5, 116	13.52	3.671	0.586	0.96	0.562		0.533			
2H-6, 18	13.96	3.746	0.587	0.93	0.546	0.554	0.517	0.525	0.029	0.0013
3H-1, 18	16.18	4.125	0.586	0.91	0.533		0.514			
3H-1, 60	16.60	4.197	0.586	0.88	0.515	0.524	0.493	0.504	0.021	0.0012
3H-2, 18	17.24	4.306	0.587	0.89	0.522		0.505			
3H-2, 60	17.66	4.377	0.586	0.86	0.504	0.513	0.483	0.494	0.019	0.0008
3H-2, 116	18.22	4.473	0.586	0.89	0.522		0.506			
3H-3, 18	18.74	4.562	0.586	0.88	0.516	0.519	0.500	0.503	0.016	0.0010
3H-3, 60	19.16	4.633	0.587	0.90	0.528		0.508			
3H-3, 116	19.72	4.729	0.586	0.91	0.533	0.530	0.497	0.502	0.028	0.0011
3H-4, 18	20.24	4.818	0.586	1.00	0.586		0.556			
3H-4, 60	20.66	4.889	0.587	0.98	0.575	0.581	0.554	0.555	0.025	0.0012
3H-4, 116	21.22	4.985	0.586	1.00	0.586		0.564			
3H-5, 18	21.74	5.676	0.064	1.02	0.065	0.326	0.063	0.314	0.003	0.0001
3H-5, 60	22.16	6.336	0.064	1.05	0.067		0.064			
3H-5, 116	22.72	7.216	0.064	0.98	0.062	0.065	0.059	0.062	0.003	0.0001
3H-6, 18	23.24	8.033	0.064	0.95	0.060		0.058			
3H-6, 60	23.66	8.693	0.064	0.98	0.062	0.061	0.060	0.059	0.002	0.0001
3H-6, 116	24.22	9.573	0.064	1.08	0.069		0.066			
3H-7, 18	24.74	10.390	0.064	1.06	0.067	0.068	0.065	0.066	0.002	0.0001
3H-0, 18	25.33	11.317	0.064	0.97	0.062		0.060			
4H-1, 18	25.68	11.628	0.596	0.98	0.584	0.086	0.568	0.315	0.016	0.0001
4H-1, 60	26.10	11.699	0.596	0.98	0.584		0.567			
4H-1, 116	26.66	11.793	0.596	0.89	0.531	0.557	0.511	0.539	0.018	0.0007
4H-2, 18	26.87	11.828	0.595	0.95	0.565		0.542			
4H-2, 116	27.85	11.993	0.596	0.87	0.519	0.542	0.500	0.522	0.020	0.0005
4H-3, 18	28.34	12.075	0.596	0.82	0.489		0.466			
4H-3, 60	28.76	12.145	0.597	0.88	0.525	0.507	0.508	0.487	0.020	0.0005
4H-3, 116	29.32	12.239	0.596	0.87	0.518		0.485			
4H-4, 18	29.66	12.296	0.596	0.84	0.501	0.510	0.490	0.488	0.022	0.0006
4H-4, 60	30.08	12.367	0.596	0.91	0.542		0.513			
4H-4, 116	30.64	12.461	0.596	0.84	0.501	0.522	0.485	0.499	0.022	0.0005
4H-5, 18	31.16	12.548	0.596	0.80	0.477		0.457			
4H-5, 60	31.58	12.618	0.597	0.83	0.495	0.486	0.464	0.461	0.025	0.0004
4H-5, 116	32.14	12.712	0.596	0.82	0.489		0.462			
4H-6, 18	32.66	12.800	0.596	0.74	0.441	0.465	0.416	0.439	0.026	0.0004
5H-1, 18	35.18	13.222	0.596	0.67	0.399		0.369			
5H-1, 61	35.61	13.294	0.596	0.66	0.394	0.396	0.353	0.361	0.035	0.0004
5H-2, 18	35.81	13.328	0.595	0.61	0.363		0.338			
5H-2, 61	36.24	13.400	0.596	0.63	0.376	0.369	0.334	0.336	0.034	0.0003
5H-2, 116	36.79	13.492	0.596	0.63	0.375		0.346			
5H-3, 18	37.08	13.541	0.597	0.65	0.388	0.382	0.358	0.352	0.030	0.0002
5H-3, 66	37.56	13.622	0.596	0.76	0.453		0.413			
5H-3, 116	38.06	13.705	0.596	0.66	0.393	0.423	0.362	0.388	0.035	0.0002
5H-4, 18	38.39	13.761	0.597	0.63	0.376		0.353			
5H-4, 61	38.82	13.833	0.596	0.80	0.476	0.426	0.443	0.398	0.028	0.0002
5H-4, 116	39.37	13.925	0.597	0.82	0.489		0.464			
5H-5, 18	39.79	13.996	0.596	0.76	0.453	0.471	0.413	0.438	0.033	0.0001
5H-5, 61	40.22	14.068	0.596	0.81	0.483		0.460			
5H-5, 116	40.77	14.160	0.596	0.79	0.471	0.477	0.433	0.446	0.031	0.0001
5H-6, 18	41.18	14.229	0.596	0.79	0.471		0.442			
5H-6, 61	41.61	14.301	0.596	0.75	0.447	0.459	0.416	0.429	0.030	0.0001
6H-1, 18	44.68	15.025	0.397	0.71	0.282		0.266			

Table 9 (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	LSR (cm/k.y.)	DBD (g/cm^3)	MAR	MAR (ave.)	CAR	CAR (ave.)	NCAR (ave.)	EAR (ave.)
6H-1, 60	45.10	15.130	0.397	0.78	0.310	0.305	0.291	0.288	0.018	0.0010
6H-1, 116	45.66	15.271	0.397	0.61	0.242		0.232			
6H-2, 18	45.92	15.337	0.398	0.60	0.239	0.240	0.220	0.226	0.014	0.0007
6H-2, 60	46.34	15.443	0.397	0.69	0.274		0.257			
6H-2, 116	46.90	15.584	0.397	0.68	0.270	0.272	0.253	0.255	0.017	0.0010
6H-3, 18	47.33	15.692	0.397	0.69	0.274		0.257			
6H-3, 60	47.75	15.798	0.397	0.66	0.262	0.268	0.242	0.249	0.019	0.0002
6H-3, 116	48.31	15.939	0.397	0.73	0.290		0.274			
6H-4, 18	48.71	16.040	0.397	0.76	0.302	0.296	0.284	0.279	0.017	0.0002
6H-4, 60	49.13	16.145	0.397	0.77	0.306		0.288			
6H-4, 116	49.69	16.287	0.397	0.77	0.306	0.306	0.288	0.288	0.017	0.0004
6H-5, 18	50.07	16.382	0.397	0.62	0.246		0.234			
6H-5, 60	50.49	16.488	0.397	0.62	0.246	0.246	0.231	0.233	0.014	0.0003
6H-5, 116	51.05	16.629	0.397	0.72	0.286		0.261			
6H-6, 18	51.45	16.730	0.397	0.64	0.254	0.270	0.240	0.250	0.020	0.0003

Notes: LSR = linear sedimentation rates (cm/k.y.), DBD = dry bulk density, MAR = mass (bulk) sediment accumulation rate, CAR = carbonate accumulation rate, NCAR = noncarbonate accumulation rate, and EAR = eolian (e.g., fine-grained lithogenic material, <63 µm in size) accumulation rate. Accumulation rates are given in units of g/cm^2/k.y. Average values are used when two successive samples were used to conduct the chemical extraction procedure.