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34. LONG-TERM CHANGES IN THE ACCUMULATION OF ORGANIC CARBON IN NEOGENE SEDIMENTS, ONTONG JAVA PLATEAU[1]

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ABSTRACT

Organic geochemical investigations were performed on sediments of Leg 130 to reconstruct the depositional environment of the Ontong Java Plateau. The Miocene to Quaternary sediments collected during the drilling campaign are characterized by extremely low organic carbon contents. As indicated by C/N ratios and Rock-Eval data, most of the organic matter is probably of marine origin. Based on mass-accumulation rates of organic carbon, the paleoproductivity for the Miocene-Pliocene and the late Pliocene-Pleistocene time intervals as well as the modern surface-water production were estimated. The productivity values of the surface sediments (25–59 $gC/m^2/yr$) reflect the various influences of the equatorial upwelling cell on the different sites. The accumulation rates of organic carbon are generally low; however, they show a distinct increase at 8 Ma and a decrease at 2 Ma.

INTRODUCTION

The Ontong Java Plateau, the world's largest mid-oceanic submarine plateau, extends across an area of about $1000 \cdot 1500\ km^2$ in the western equatorial Pacific. It rises from the deep seafloor at about 4500 to 1700 m below the surface on top of the plateau. The volcanic plateau built up rapidly in about 3.5 m.y. (Tarduno et al., this volume), probably 113 m.y. ago, and moved northward to the equator. During this journey the plateau accumulated a more than 1000-m-thick pelagic sediment column, which has been the subject of several previous expeditions (Winterer, Riedel, et al., 1971; Andrews, Packham, et al., 1975; Moberly, Schlanger, et al., 1986).

Ocean Drilling Program (ODP) Leg 130 drilled Sites 803 through 807 (Kroenke, Berger, Janecek, et al., 1991; Fig. 1 and Table 1) at various depths on a transect over the Ontong Java Plateau. The main objectives were to recover complete and undisturbed sediment records of Neogene, Paleogene, and Late Cretaceous time that would provide the unique possibility to acquire important information about the paleoceanography and paleoclimate of the western Pacific region.

The depositional sequence covering the Ontong Java Plateau is well suited for detailed reconstructions of the carbonate dissolution and mass-wasting history (Berger and Johnson, 1976) and the diagenetic influence on sediments at different water depths. Furthermore, because of the elevated position of the plateau, its sediments are sensitive to global paleoceanographic events, which possibly can be correlated with seismic reflectors (Mayer et al., 1986). Sites 803, 804, 805, and 806 were drilled in a transect across the northeastern flank of the plateau to collect a series of sediment records from water depths ranging between 2500 and 3900 m, whereas Site 807 was located on top of the plateau in a water depth of 2805 m (Fig. 1). At Sites 803 and 807, drilling penetrated through the sediment column into basement.

The purpose of this study is to investigate the amount of preserved organic carbon in the Leg 130 sediments. Based on these measurements, modern surface-water productivity as well as late Cenozoic productivity are estimated from sediment data and compared with data from the literature.

METHODS

The samples used for this study were taken on board *JOIDES Resolution* during Leg 130 using a 10-cm^3 sampling cylinder. Determination of the total organic carbon (TOC) content of the samples required two measurements of a HERAEUS CHN Analyzer. Total carbon was measured from dried and ground bulk sediment samples (see Appendix), and the organic carbon of carbonate free samples was measured on split samples treated with 10% HCl, washed and dried. The organic carbon content (wt%) of the bulk sediment was then calculated using the following equation:

$$TOC = \frac{100 - (8.334 \cdot TC)}{(100/TOC') - 8.334}, \qquad (1)$$

in which TC is the total carbon of the bulk sample and TOC′ is the organic carbon of the carbonate-free residue. Total nitrogen measurements were also performed with the CHN Analyzer. The accuracy of the HERAEUS CHN Analyzer is 0.02%.

Seven samples of Hole 806B were analyzed in a DELSI, Inc., Rock-Eval II instrument (Espitalié et al., 1977). According to standard procedures as described in Emeis and Kvenvolden (1986), approximately 100 mg of the *carbonate-free residue* of selected samples (TOC′ > 1.5%) were measured (Table 2).

Mass accumulation rates (MAR) were calculated according to Van Andel et al. (1975) with physical properties and sedimentation rate data from Kroenke, Berger, Janecek, et al. (1991):

$$MAR_{TOC} = (TOC/100)\ LSR\ [WBD - 1.026\,(PO/100)]\,, \qquad (2)$$

in which MAR = mass accumulation rate ($g/m^2/yr$); TOC = total organic carbon (wt%); LSR = linear sedimentation rates (m/m.y.); WBD = wet-bulk density (g/cm^3); and PO = porosity (%).

The surface-water paleoproductivity was estimated using the following equation:

$$PP = 5.31\ [C\ (WBD - 1.026\ PO/100)]^{0.71}\ LSR^{0.07}\ DEP^{0.45}\,, \qquad (3)$$

in which PP = primary production ($gC/m^2/yr$), C = (marine) organic carbon (wt%), WBD = wet-bulk density (g/cm^3), PO = porosity (%), LSR = linear sedimentation rate (cm/1000 yr), and DEP = paleowater depth of the seafloor (m). This *empirical* formula is based on the relationships among organic carbon accumulation rates in surface sediments, sedimentation rates, water depths, and measured (recent)

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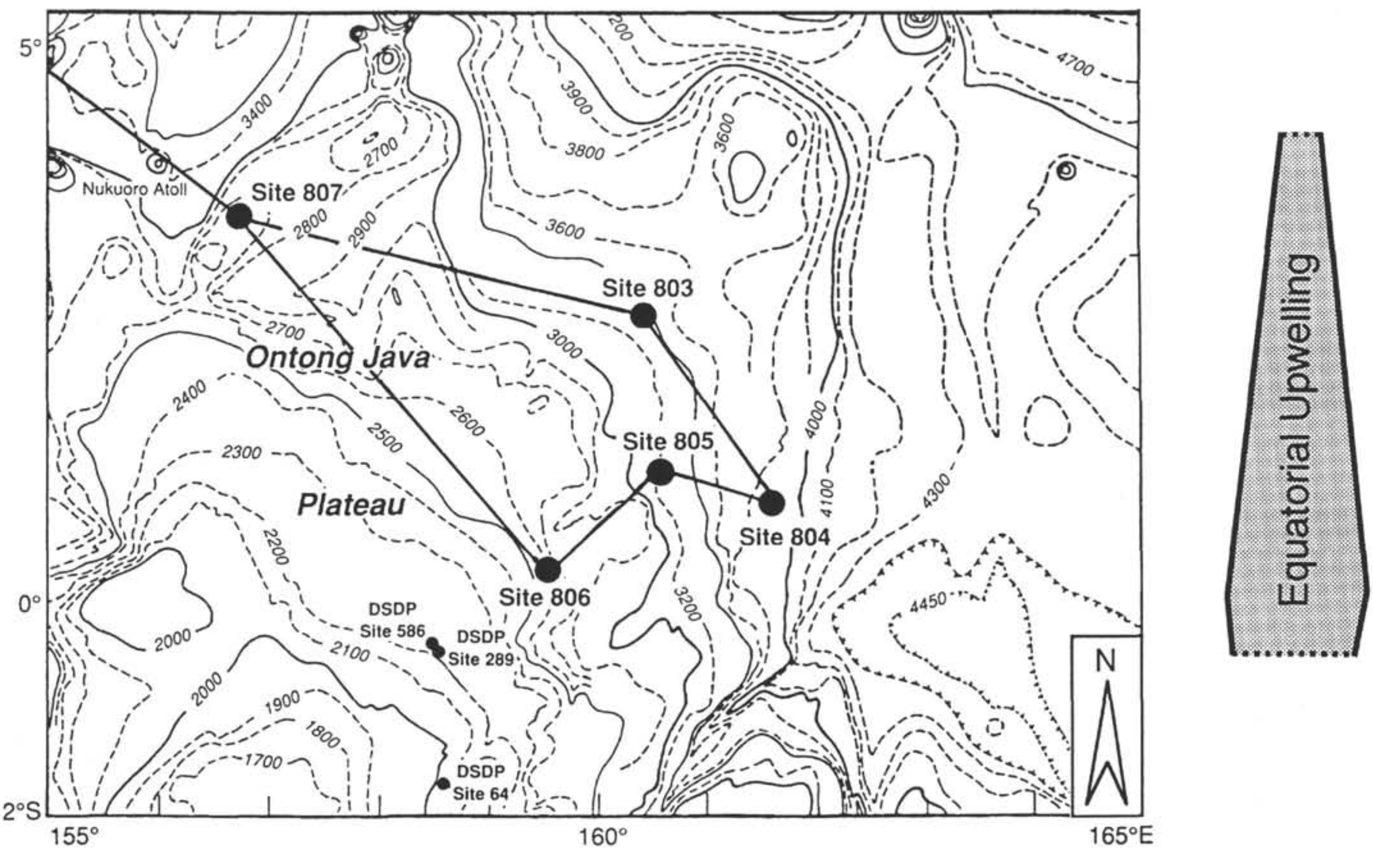

Figure 1. Location map of DSDP Sites 64, 289, and 586 and Leg 130 Sites 803 through 807 on the Ontong Java Plateau. Shaded area indicates the influence of equatorial upwelling.

Table 1. Site locations and water depths, Leg 130.

Site	Latitude (N)	Longitude (E)	Water depth (m)
803	2° 25.98′	160° 32.40′	3410
804	1° 00.28′	161° 35.62′	3861
805	1° 13.68′	160° 31.76′	3188
806	0° 19.11′	159° 21.68′	2520
807	3° 36.42′	156° 37.49′	2805

surface-water productivity. The oxidation of organic matter within the water column and during burial into the sediment is also considered in the equation, which was developed for oxic environments (Stein, 1986b; based on Müller and Suess, 1979; Betzer et al., 1984).

Based on the fact that the Leg 130 sediments consist almost completely of marine biogenic skeletons (Kroenke, Berger, Janecek, et al., 1991) and the low C/N ratios and relatively high hydrogen index values (see below), it is assumed that the organic matter is also mainly of marine origin. Thus, to estimate the paleoproductivity, the total organic carbon fraction was used as *marine* organic carbon in Equation 3.

RESULTS

The Neogene sediments recovered during Leg 130 are characterized by very low organic carbon contents throughout the entire sequence (below 0.3%; Fig. 2). Such values, however, are similar to those recorded in other highly open-marine oxic environments (Romankevich, 1984; Stein et al., 1989). All five sites display a characteristic pattern in TOC content. Values of about 0.04% for sediments between 25 and 6 Ma increase abruptly to >0.1% in the interval from 6 Ma to the Holocene.

Site 806 has the highest TOC contents of all the Leg 130 sites, with maximum values up to 0.3% and a variation of 0.2% in upper Pliocene–Pleistocene sediments, whereas at Sites 803 and 807 most of the values do not exceed 0.1% TOC within sediments of this time interval (Fig. 2). Also, the amplitude of the fluctuation in TOC at Sites 803 and 807 is within 0.06% to 0.1% distinctly lower than at Site 806. The TOC values of the interval from the last 6 m.y. vary at Site 804 between 0.05% and 0.15%, and between 0.05% and 0.2% at Site 805. A spike up to 0.3% occurs at about 1.8 Ma in the Site 805 sediments (Fig. 2).

Accumulation Rates

The accumulation rates of organic carbon were calculated for the Leg 130 sites to interpret the data in terms of change in flux. In Figure 2, the flux rates are shown as the average rates between stratigraphic datum levels used as absolute time constraints (from Kroenke, Berger, Janecek, et al., 1991). The records of Sites 803, 805, 806 and 807 show a characteristic pattern with very low rates (0.005–0.015 $g/m^2/yr$) for the lower and middle Miocene (25–8.7 Ma) and increasing values (maximum rates between 0.01 $g/m^2/yr$ at Site 803 and 0.05 $g/m^2/yr$ at Site 806) for the upper Miocene to Pliocene (8.7–2 Ma). The uppermost Pliocene–Pleistocene sediments (i.e., the last 2 m.y.) display distinctly decreased accumulation rates (between 0.005 $g/m^2/yr$ at Site 803 and 0.03 $g/m^2/yr$ at Site 806). As a result of large-scale hiatuses and a possible drilling disturbance at Hole 804C, the average flux rate record is unreliable and does not show the typical pattern of the other four sites (Fig. 2). The accumulation rates of organic carbon at Hole 804C vary between 0.003 and 0.01 $g/m^2/yr$.

Table 2. Results of Rock-Eval pyrolysis of sediments from Site 806.

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	HI	OI
130-806B-				
6H-5, 121	51.71	2.24	186	142
9H-5, 120	80.20	3.11	184	128
12H-5, 121	108.71	3.85	158	134
19H-5, 119	175.19	5.28	159	122
24H-5, 121	222.71	6.30	159	112
25H-5, 121	232.21	6.50	156	117
42X-5, 125	395.15	10.77	259	133

Note: HI = hydrogen index and OI = oxygen index.

Organic Carbon/Nitrogen Ratios and Rock-Eval Pyrolysis

Estimating the surface-water paleoproductivity from organic carbon content requires information about the composition of the organic matter (i.e., how much is of marine origin). Organic carbon/nitrogen (C/N) ratios might yield the first information about this composition. Marine planktonic organisms produce organic matter with characteristic mean C/N ratios of about 6 (Bordowskiy, 1965a, 1965b; Scheffer and Schachtschabel, 1984). Higher C/N ratios of more than 15 point to a significant amount of organic material derived from land plants in the sediments.

In general, the influence of diagenesis on the preservation of the atomic C/N ratio of organic matter in sediments is the subject of discussion in the literature (e.g., Macko and Pereira, 1990; Müller, 1977; Waples and Sloan, 1980). Assuming a related degradation of carbon and nitrogen at least back to 25 Ma (Macko and Pereira, 1990), the C/N ratios of the sediments probably reflect the primary C/N ratio, although only a small amount of the organic fraction produced on the surface is preserved in the sediments.

In this study, the *carbonate-free residue* was used to determine the C/N ratios (Fig. 3 and Appendix) because the nitrogen content of the bulk sample was not detectable in most cases. The organic carbon and nitrogen values of the carbonate-free samples vary between 0.1 and 2.71% and 0.01 and 0.3%, respectively (Appendix). The C/N ratios at Sites 803 through 807 vary between 3 and 10 (Fig. 3). At Site 806, some higher ratios between 10 and 14 occur in the interval before 8 Ma, possibly indicating more terrigenous organic components in the sediments. In these organic-carbon-poor sediments, however, C/N ratios have to be interpreted with caution as an indicator for the quality of organic material (e.g., Müller, 1977).

The results of the Rock-Eval analysis are presented as a diagram of hydrogen index (mgHC/gTOC) vs. oxygen index (mgCO_2/gTOC) (Fig. 4). In general, the HI and OI values vary between 156 and 260 mgHC/gTOC and 112 and 142 mgCO_2/gTOC, respectively (Table 2), indicating the presence of significant amounts of marine organic matter. The HI values, for example, are in the same range as those determined in late Cenozoic sediments from the upwelling area off northwest Africa, where most of the organic matter is of marine origin (e.g., Stein, 1991).

DISCUSSION AND CONCLUSIONS

The depositional regime on the Ontong Java Plateau can be characterized as an highly oxidizing environment influenced by equatorial upwelling (Fig. 1). The pelagic carbonate sediments of this region contain extremely fewer amounts of organic carbon compared with other marine deposits such as those of shallower water depth or coastal upwelling environments (Romankevich, 1984; Suess, 1980; Ten Haven et al., 1990).

The burial of organic carbon in the sediment column is the result of complex and only partly understood processes. In the euphotic zone of the ocean's surface, planktonic organisms produce organic material that sinks slowly. On the way through the euphotic zone, the organic matter is oxidized and/or recycled by other organisms. Only a small amount, the "new production" (Berger. et al., 1989; Eppley, 1989; Stein, 1991; Table 3), leaves this zone and sinks to the seafloor. During its fall through a highly oxic water column, such as present on the Ontong Java Plateau, the organic carbon is subject to strong degradation that results in a significant reduction in the amount of organic material that reaches the seafloor (Suess, 1980; Betzer et al., 1984; Walsh, 1989; Table 3). Additional factors, such as sedimentation rate and bottom-water oxygen content, support the further decay of the organic material during the burial process. These various factors make it difficult to estimate the primary productivity from the organic carbon content of the sediment (Emerson, 1985; Emerson et al., 1985; Sarnthein et al., 1987; Stein, 1991).

Table 3. Calculated values of surface-water productivity, "export production," carbon flux at the seafloor, and accumulation rates of marine organic carbon.

Site	803	804	805	806	807
[a]Surface-water productivity (gC/m^2/yr)	25	43	45	59	46
[b]Export production (gC/m^2/yr)	1.6	4.4	4.7	8.0	5.0
Depth (m)	3410	3861	3188	2520	2805
[b]Carbon flux at seafloor (gC/m^2/yr)	0.2	0.5	0.5	0.9	0.6
TOC MAR (gC/m^2/yr)	0.005	0.01	0.02	0.03–0.04	0.02

[a] Calculated using Equation 3 (see text).
[b] For calculation procedure, see Berger et al. (1989), Betzer et al. (1984), and Stein (1991).

The modern primary production for the five site positions of Leg 130 was estimated using the organic carbon content of the near-surface sample after Equation 3. The productivity values at Sites 803 through 807 (Table 3) corroborate quite well those given in the global productivity distribution maps of Berger (in press) and Koblents-Mishke et al. (1970) for this region. At Site 806, the highest productivity of 59 gC/m^2/yr reflects that the position closest to the equator has the greatest influence from equatorial upwelling of all the Leg 130 sites. The lowest production rate of 25 gC/m^2/yr, which was calculated for the deep Site 803 on the northern flank of the Ontong Java Plateau, probably reflects the diminished influence of the upwelling cell as compared with the other sites (Fig. 1).

The TOC accumulation rates of the Leg 130 sediments are generally low (Fig. 2), but they show a distinct increase between 8 and 2 Ma, which might reflect a long-term change in oceanic circulation and paleoproductivity. This variation is in the same range as the productivity pulses described by Pedersen et al. (1991) for the Quaternary glacial/interglacial cycles in the Panama Basin. The calculated productivity values (Eq. 3) do not show this long-term change. It has to be considered, however, that the quantification of paleoproductivity in the extremely organic-carbon-poor Miocene sediments from the Ontong Java Plateau using Equation 3 has to be seen with caution because these data points are close to the lower limit of use of the equation (cf. Fig. 5; Müller and Suess, 1979; Stein, 1986a). Figure 5 illustrates the correlation between sedimentation rate and organic carbon content in oxic environments, which is the basis for the deduction of Equation 3. The very low values of the Leg 130 sediments scatter in the low SR/low TOC field, indicating a generally low productivity (which seems to be meaningful).

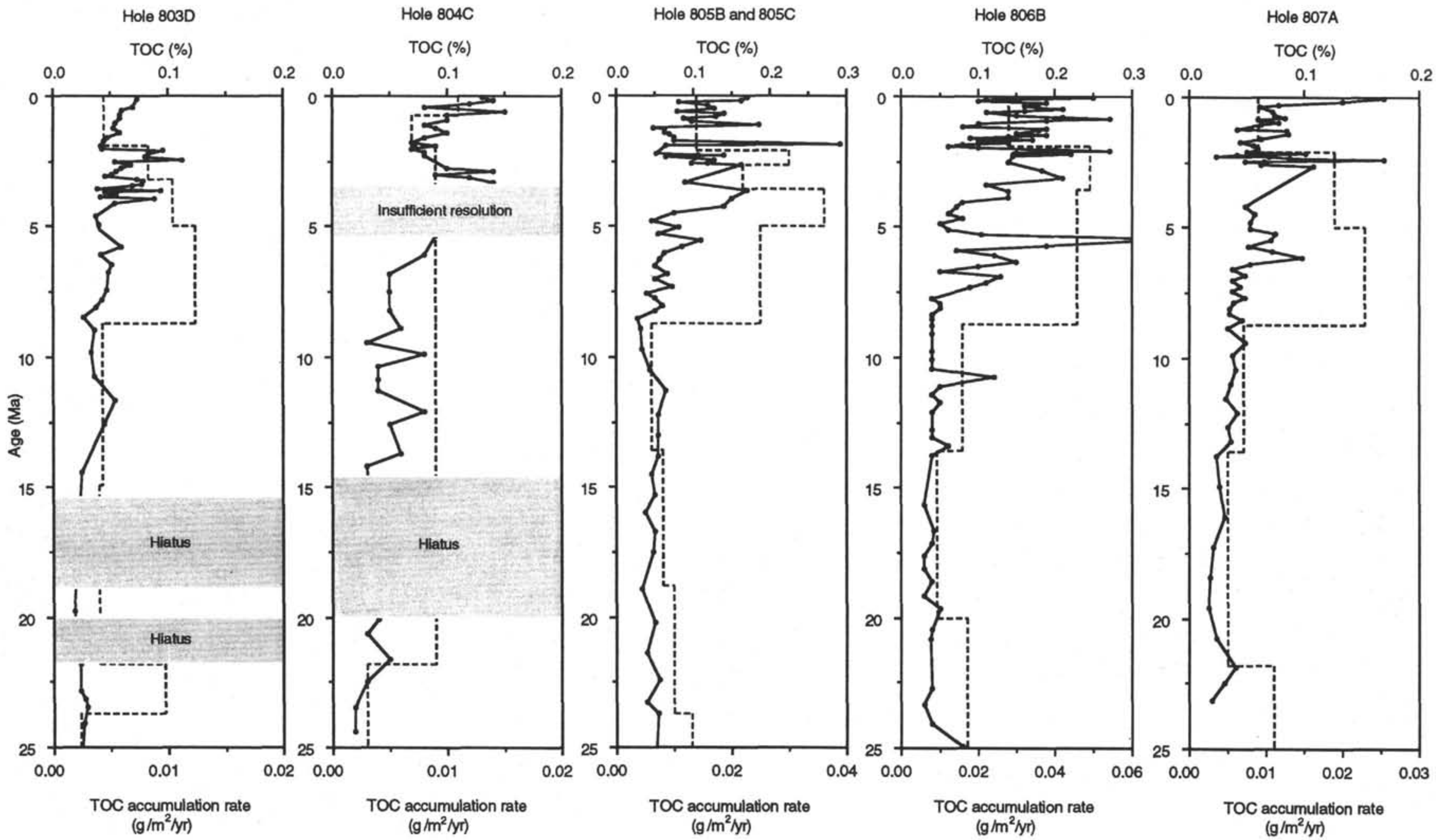

Figure 2. Total organic carbon (TOC) values and accumulation rates vs. age. The accumulation rates are shown as the average rates between stratigraphic datum levels used as absolute time constraints.

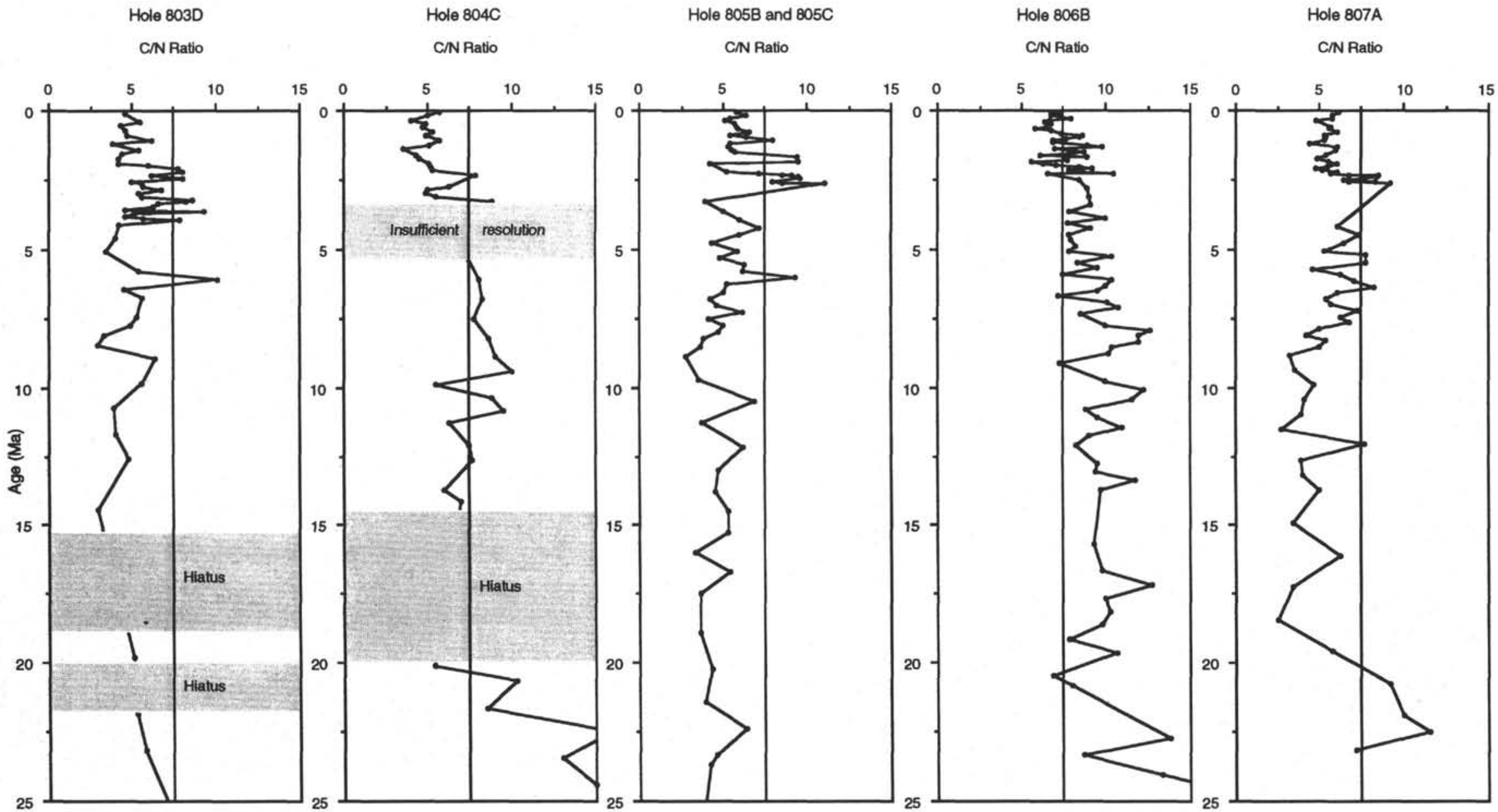

Figure 3. C/N ratios calculated using carbon and nitrogen values of the carbonate-free residue of the samples.

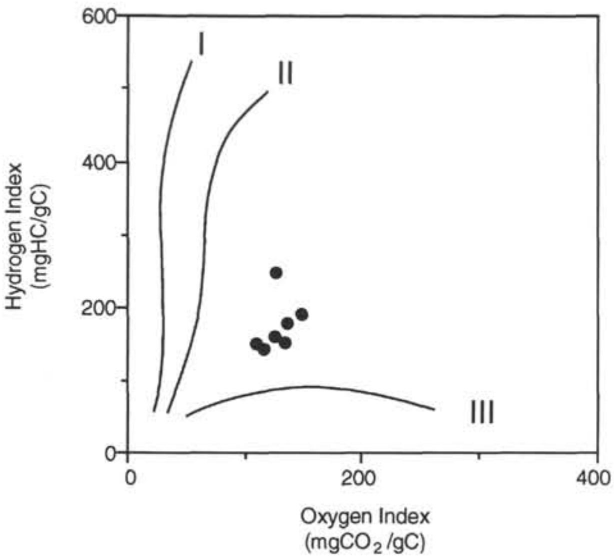

Figure 4. Hydrogen vs. oxygen indexes ("van Krevelen diagram") of organic matter from carbonate-free samples, Site 806.

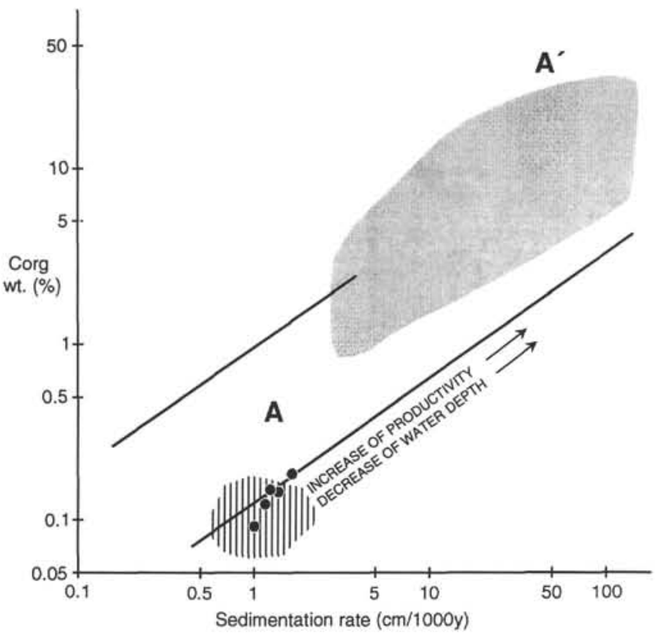

Figure 5. Correlation between sedimentation rate and organic carbon in oxic marine environments. The distinction between Fields A (oxic deep-water conditions) and A′ (high oceanic productivity) is derived from Holocene to Miocene sediments (Müller and Suess, 1979; Stein, 1986a, 1990). The small hachured area indicates the data points of Leg 130 sediments; solid dots are data from the surface sediment of Sites 803 through 807.

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REFERENCES

Andrews, J.E., Packham, G.H., et al., 1975. *Init. Repts. DSDP,* 30: Washington (U.S. Govt. Printing Office).

Berger, W.H., in press. Produktivität des Ozeans aus geologischer Sicht: Denkmodelle und Beispiele. *Z. Dt. Geol. Ges.*

Berger, W.H., Smetacek, V., and Wefer, G., 1989. *Productivity of the Ocean: Past and Present.* Life Sci. Res. Rep., 44: New York (Wiley).

Berger, W.H., and Johnson, T.C., 1976. Deep-sea carbonates: dissolution and mass wasting on the Ontong Java Plateau. *Science,* 192:785–787.

Betzer, P.R., Showers, W.J., Laws, E.A., Winn, C.D., Ditullo, G.R., and Kroopnick, P.M., 1984. Primary productivity and particle fluxes on a transect of the equator at 153°W in the Pacific Ocean. *Deep-sea Res., Pt. A,* 31:1–11.

Bordowskiy, O.K., 1965a. Accumulation of organic matter in bottom sediments. *Mar. Geol.,* 3:33–82.

Emeis, K.-C., and Kvenvolden, K.A., 1986. Shipboard organic geochemistry on *JOIDES Resolution.* ODP Tech. Note, No. 7.

————, 1965b. Sources of organic matter in marine basins. *Mar. Geol.,* 3:5–31.

Emerson, S., 1985. Organic carbon preservation in marine sediments. *In* Sundquist, E.T., and Broecker, W.S. (Eds.), *The Carbon Cycle and Atmospheric CO_2: Natural Variations Archean to Present.* Geophys. Monogr., 32:78–89.

Emerson, S., Fischer, K., Reimers, C., and Heggie, D., 1985. Organic carbon dynamics and preservation in deep-sea sediments. *Deep-sea Res., Pt. A,* 32:1–22.

Eppley, R.W., 1989. New Production: History, Methods, Problems. *In* Berger, W. H., Smetacek, V., and Wefer, G. (Eds.), *Productivity of the Ocean: Past and Present.* Life Sci. Res. Rep., 44: New York (Wiley), 85–98.

Espitalié, J., Laporte, J.L., Madec, M., Marquis, F., Leplat, P., Paulet, J., and Boutefeu, A., 1977. Méthode rapide de characterisation des roches-mere, de leur potential petrolier et de leur degree d'evolution. *Rev. Inst. Franc. Petrol.,* 32:23–42.

Koblents-Mishke, O.I., Volkovinsky, V.V., and Kabanova, Y.G., 1970. Plankton primary production of the World Ocean. *In* Wooster, W. (Ed.), *Scientific Exploration of the South Pacific:* Washington (Nat. Acad. Sci.), 183–193.

Kroenke, L.W., Berger, W.H., Janecek, T.R., et al., 1991. *Proc. ODP, Init. Repts.,* 130: College Station, TX (Ocean Drilling Program).

Macko, S.A., and Pereira, C.P.G., 1990. Neogene paleoclimate development of the Antarctic Weddell Sea region: organic geochemistry. *In* Barker, P.F., Kennett, J.P., et al., *Proc. ODP, Sci. Results,* 113: College Station, TX (Ocean Drilling Program), 881–893.

Mayer, L.A., Shipley, T.H., and Winterer, E.L., 1986. Equatorial Pacific seismic reflectors as indicators of global oceanographic events. *Science,* 233:761–764.

Moberly, R., Schlanger, S.O., et al., 1986. *Init. Repts. DSDP,* 89: Washington (U.S. Govt. Printing Office).

Müller, P.J., 1977. C/N ratios in Pacific deep-sea sediments: effect of inorganic ammonium and organic nitrogen compounds sorbed by clays. *Geochim. Cosmochim. Acta,* 41:765–776.

Müller, P.J., and Suess, E., 1979. Productivity, sedimentation rate, and sedimentary organic matter in the oceans. I. Organic matter preservation. *Deep-sea Res., Pt. A,* 26:1347–1362.

Pedersen, T.F., Nielsen, B., and Pickering, M., 1991. Timing of late Quaternary productivity pulses in the Panama Basin and implications for atmospheric CO_2. *Paleoceanography,* 6:657–677.

Romankevich, E.A., 1984. *Geochemistry of Organic Matter in the Ocean:* Berlin (Springer-Verlag).

Sarnthein, M., Winn, K., and Zahn, R., 1987. Paleoproductivity of oceanic upwelling and the effect on atmospheric CO_2 and climatic change during deglaciation times. *In* Berger, W.H., and Labeyrie, L. (Eds.), *Abrupt Climatic Change:* Dordrecht (Riedel), 311–337.

Scheffer, F., and Schachtschabel, P., 1984. *Lehrbuch der Bodenkunde:* Stuttgart (F. Enke).

Stein, R., 1986a. Organic carbon and sedimentation rate—further evidence for anoxic deep-water conditions in the Cenomanian/Turonian Atlantic Ocean. *Mar. Geol.,* 72:199–209.

————, 1986b. Surface-water paleo-productivity as inferred from sediments deposited in oxic and anoxic deep-water environments of the Mesozoic Atlantic Ocean. *In* Degens, E.T., Meyers, P.A., and Brassel, S.C. (Eds.), *Biochemistry of Black Shales.* Mitt. Geol. Paläont. Inst. Univ. Hamburg, 60:55–70.

————, 1990. Organic carbon content/sedimentation rate relationship and its paleoenvironmental significance for marine sediments. *Geo. Mar. Lett.,* 10:37–44.

————, 1991. Accumulation of organic carbon in marine sediments. *Lect. Earth Sci.,* 34: Berlin (Springer-Verlag).

Stein, R., Littke, R., Stax, R., and Welte, D.H., 1989. Quantity, provenance, and maturity of organic matter at ODP Sites 645, 646, and 647: implications for reconstruction of paleoenvironments in Baffin Bay and Labrador Sea during Tertiary and Quaternary time. *In* Srivastava, S.P., Arthur, M.A., et al., *Proc. ODP, Sci. Results,* 105: College Station, TX (Ocean Drilling Program), 185–208.

Suess, E., 1980. Particulate organic carbon flux in the oceans—surface productivity and oxygen utilisation. *Nature,* 288:260–263.

Ten Haven, H.L., Littke, R., Rullkötter, J., Stein, R., and Welte, D.H., 1990. Accumulation rates and composition of organic matter in late Cenozoic sediments underlying the active upwelling area off Peru. *In* Suess, E., von Huene, R., et al., *Proc. ODP, Sci. Results,* 112: College Station, TX (Ocean Drilling Program), 591–606.

Van Andel, T.H., Heath, G.R., and Moore, T.C., 1975. Cenozoic history and paleoceanography of the central equatorial Pacific Ocean. *Mem. Geol. Soc. Am.,* No. 143.

Walsh, J.J., 1989. How much shelf production reaches the deep sea? *In* Berger, W.H., Smetacek, V., and Wefer, G. (Eds.), *Productivity of the Ocean: Past and Present.* Life Sci. Res. Rep., 44: New York (Wiley), 175–192.

Waples, D.W., and Sloan, J.R., 1980. Carbon and nitrogen diagenesis in deep sea sediments. *Geochim. Cosmochim. Acta,* 44:1463–1470.

Winterer, E.L., Riedel, W.R., et al., 1971. *Init. Repts. DSDP,* 7, Pts. 1 and 2: Washington (U.S. Govt. Printing Office).

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APPENDIX

Accumulation Rates of Bulk Sediment and Total Organic Carbon, Leg 130

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	Bulk accumulation rate ($g/m^2/yr$)	TOC accumulation rate ($g/m^2/yr$)	TOC (%)	Carbonate-free residue TOC′ (%)	N′ (%)	TOC′/N′
130-803D-								
1H-1, 129	1.29	0.14	6.53	0.005	0.07	0.47	0.10	4.6
2H-1, 129	3.79	0.40	7.56	0.005	0.07	0.57	0.10	5.4
2H-2, 129	5.29	0.57	8.02	0.005	0.06	0.47	0.11	4.3
2H-3, 129	6.79	0.73	7.54	0.004	0.06	0.41	0.09	4.7
2H-4, 117	8.17	0.87	7.66	0.005	0.06	0.48	0.10	4.7
2H-5, 129	9.79	1.05	7.86	0.004	0.05	0.48	0.08	6.2
2H-6, 129	11.29	1.21	7.96	0.004	0.05	0.35	0.09	3.9
3H-1, 129	13.29	1.42	7.62	0.005	0.06	0.35	0.07	5.4
3H-2, 129	14.79	1.58	7.88	0.004	0.05	0.43	0.10	4.4
3H-3, 129	16.29	1.74	8.48	0.004	0.05	0.34	0.08	4.2
3H-4, 131	17.81	1.89	12.56	0.005	0.04	0.33	0.08	4.3
3H-5, 130	19.30	2.00	12.15	0.005	0.04	0.37	0.06	5.9
3H-6, 128	20.78	2.10	12.74	0.012	0.10	0.95	0.12	7.8
4H-1, 129	22.79	2.24	13.09	0.011	0.08	0.69	0.09	8.1
4H-2, 129	24.29	2.34	12.60	0.010	0.08	0.70	0.11	6.1
4H-3, 130	25.80	2.44	11.46	0.013	0.11	1.03	0.13	8.1
4H-4, 128	27.28	2.55	12.50	0.007	0.05	0.45	0.09	5.0
4H-5, 129	28.79	2.65	13.76	0.009	0.07	0.56	0.10	5.6
4H-6, 129	30.29	2.75	12.96	0.008	0.06	0.60	0.11	5.7
5H-1, 132	32.32	2.89	12.91	0.007	0.06	0.53	0.08	6.7
5H-2, 137	33.87	3.00	13.05	0.007	0.05	0.47	0.09	5.4
5H-3, 129	35.29	3.10	13.43	0.006	0.05	0.36	0.06	5.6
5H-4, 129	36.79	3.20	16.89	0.012	0.07	0.63	0.07	8.6
5H-5, 129	38.29	3.28	15.93	0.013	0.08	0.68	0.08	8.3
5H-6, 129	39.79	3.36	16.81	0.013	0.08	0.67	0.10	6.6
6H-1, 129	41.79	3.47	15.89	0.011	0.07	0.51	0.08	6.3
6H-2, 129	43.29	3.55	15.93	0.006	0.04	0.44	0.10	4.6
6H-3, 129	44.79	3.63	16.35	0.016	0.10	0.98	0.11	9.3
6H-4, 98	45.98	3.70	16.32	0.008	0.05	0.38	0.07	5.2
6H-5, 129	47.79	3.80	16.11	0.009	0.06	0.36	0.08	4.6
6H-6, 129	49.29	3.88	16.86	0.007	0.04	0.35	0.06	5.7
6H-7, 42	49.92	3.91	16.26	0.015	0.09	0.59	0.08	7.8
7H-5, 129	53.39	4.10	17.59	0.010	0.05	0.55	0.13	4.2
8H-5, 129	62.89	4.62	17.13	0.007	0.04	0.49	0.12	4.0
9H-5, 129	72.39	5.09	25.43	0.010	0.04	0.44	0.13	3.4
11H-5, 129	91.39	5.76	28.45	0.017	0.06	0.82	0.15	5.4
12H-5, 129	100.89	6.10	29.02	0.012	0.04	0.72	0.07	10.1
13H-5, 129	110.39	6.44	27.54	0.014	0.05	0.63	0.14	4.5
14H-5, 129	119.89	6.77	29.44	0.014	0.05	0.64	0.12	5.6
16H-5, 129	138.89	7.44	27.28	0.013	0.05	0.61	0.12	5.3
17H-5, 129	148.39	7.78	29.56	0.013	0.04	0.52	0.11	4.9
18H-5, 129	157.89	8.12	27.22	0.010	0.04	0.34	0.10	3.3
19H-5, 129	167.39	8.45	29.62	0.008	0.03	0.34	0.11	3.0
20H-5, 129	176.89	8.94	11.29	0.004	0.04	0.25	0.04	6.4
21H-5, 129	186.39	9.85	11.63	0.004	0.03	0.39	0.07	5.5
22H-5, 129	195.89	10.76	11.55	0.004	0.04	0.42	0.11	4.0
23H-5, 129	205.39	11.67	10.05	0.005	0.05	0.32	0.08	4.0
24H-5, 129	214.89	12.58	11.36	0.005	0.05	0.24	0.05	4.8
26X-5, 129	234.09	14.42	12.06	0.003	0.03	0.32	0.11	2.9
28X-4, 129	251.69	19.79	21.91	0.004	0.02	0.18	0.04	5.1
29X-4, 129	261.29	21.83	39.28	0.009	0.02	0.43	0.08	5.3
32X-5, 124	291.54	22.83	38.42	0.009	0.02	0.38		
33X-5, 126	301.36	23.16	37.14	0.010	0.03	0.40	0.07	5.8
34X-5, 123	310.53	23.46	35.99	0.011	0.03	0.39		
35X-5, 134	320.34	24.09	8.29	0.002	0.03	0.43		
130-804C-								
1H-1, 72	0.72	0.06	8.31	0.010	0.13	0.62	0.11	5.7
1H-2, 72	2.22	0.20	8.64	0.013	0.14	0.46	0.09	5.0
1H-3, 72	3.72	0.33	9.21	0.011	0.12	0.39	0.10	4.1
1H-4, 72	5.22	0.46	9.32	0.007	0.08	0.44	0.09	4.9
2H-1, 72	7.02	0.62	7.93	0.012	0.15	0.44	0.09	4.7
2H-2, 72	8.52	0.76	7.91	0.008	0.10	0.38	0.07	5.3
2H-3, 72	10.02	0.92	8.43	0.008	0.10	0.52	0.11	4.9
2H-4, 72	11.52	1.08	8.16	0.006	0.08	0.40	0.07	5.7
2H-5, 72	13.02	1.23	7.89	0.007	0.09	0.36	0.07	5.1
2H-6, 72	14.52	1.39	7.74	0.008	0.10	0.44	0.13	3.5
3H-1, 72	16.52	1.60	7.88	0.006	0.08	0.45	0.10	4.3
3H-2, 72	18.02	1.76	8.66	0.006	0.07	0.32	0.07	4.5
3H-3, 72	19.52	1.91	9.06	0.008	0.09	0.37	0.07	5.1

Appendix (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	Bulk accumulation rate ($g/m^2/yr$)	TOC accumulation rate ($g/m^2/yr$)	TOC (%)	Carbonate-free residue		
						TOC′ (%)	N′ (%)	TOC′/N′
3H-5, 72	22.52	2.17	9.43	0.008	0.08	0.53	0.10	5.3
3H-6, 72	24.02	2.30	8.92	0.007	0.08	0.43	0.06	7.9
4H-3, 96	29.26	2.75	9.48	0.010	0.10	0.54	0.09	6.3
4H-4, 72	30.52	2.86	8.51	0.012	0.14	0.67	0.13	5.0
4H-5, 72	32.02	2.99	9.42	0.008	0.09	0.44	0.09	4.9
4H-6, 68	33.48	3.12	9.64	0.011	0.12	0.59	0.11	5.5
4H-7, 68	34.98	3.29			0.14	0.91	0.10	8.8
5H-4, 72	40.02	3.97			0.10	0.39	0.08	5.2
5H-5, 72	41.52	4.18			0.09	0.33	0.06	5.5
5H-6, 72	43.02	4.38			0.09	0.28	0.09	3.2
6H-1, 72	45.02	4.65			0.07	0.53	0.08	6.4
6H-2, 72	46.52	4.86			0.08	0.56	0.11	5.3
6H-3, 72	48.02	5.06			0.09	0.74	0.12	6.1
6H-4, 72	49.52	5.24	12.49	0.016	0.13	0.75	0.12	6.3
6H-5, 72	51.02	5.35	13.21	0.012	0.09	0.67	0.09	7.4
7H-5, 72	60.52	6.07	14.29	0.011	0.08	0.72	0.09	8.0
8H-5, 72	70.02	6.80	12.58	0.006	0.05	0.33	0.04	8.3
9H-5, 72	79.52	7.52	12.89	0.006	0.05	0.31	0.04	7.8
10H-5, 72	89.02	8.25	11.87	0.006	0.05	0.26	0.03	8.7
11H-5, 72	98.52	8.90	18.98	0.011	0.06	0.36	0.04	9.0
12H-5, 72	108.02	9.43	18.44	0.006	0.03	0.30	0.03	10.0
13H-5, 72	116.02	9.88	17.68	0.014	0.08	0.33	0.06	5.5
14X-5, 72	125.52	10.41	17.66	0.007	0.04	0.44	0.05	8.8
15X-3, 72	133.52	10.86	16.20	0.006	0.04	0.19	0.02	9.5
16X-2, 72	141.52	11.30	15.78	0.006	0.04	0.25	0.04	6.3
17X-5, 72	155.52	12.09	18.96	0.015	0.08	0.30	0.04	7.5
18X-5, 71	165.01	12.62	16.97	0.008	0.05	0.23	0.03	7.7
20X-5, 72	184.42	13.71			0.06	0.30	0.05	6.0
21X-4, 72	192.62	14.17			0.03	0.21	0.03	7.0
22X-5, 72	203.82	20.10	15.54	0.006	0.04	0.38	0.07	5.4
23X-5, 72	213.52	20.62	20.16	0.006	0.03	0.31	0.03	10.3
25X-5, 86	233.06	21.65	20.75	0.010	0.05	0.17	0.02	8.5
26X-5, 72	242.52	22.48	10.43	0.003	0.03	0.16	0.01	16.0
27X-5, 70	252.10	23.44	11.30	0.002	0.02	0.13	0.01	13.0
28X-5, 43	261.53	24.39	12.86	0.003	0.02	0.15	0.01	15.0
29X-5, 72	271.42				0.02	0.10	0.01	7.3
30X-5, 72	281.12				0.04	0.44	0.05	8.8
31X-5, 72	290.72				0.04	0.37	0.03	12.3
32X-5, 72	300.42				0.06	0.80	0.07	11.4
33X-5, 72	309.81				0.04	0.25	0.02	12.5
130-805C-								
1H-1, 112	1.12	0.07	10.94	0.019	0.17	1.09	0.19	5.8
1H-2, 112	2.62	0.17	10.96	0.018	0.16	1.26	0.20	6.4
1H-3, 112	4.12	0.27	11.94	0.010	0.08	0.73	0.13	5.4
1H-4, 112	5.62	0.37	12.17	0.014	0.12	0.62	0.12	5.1
1H-5, 112	7.12	0.47	11.99	0.015	0.13	0.81	0.14	5.7
2H-1, 112	8.92	0.59	12.54	0.010	0.08	0.69	0.12	5.8
2H-2, 112	10.42	0.68	12.59	0.018	0.14	0.83	0.14	5.9
2H-3, 112	11.92	0.78	12.59	0.016	0.13	0.96	0.15	6.6
2H-4, 112	13.42	0.88	12.83	0.011	0.09	0.60	0.11	5.4
2H-5, 112	14.92	0.98	12.53	0.012	0.10	0.75	0.12	6.4
2H-6, 112	16.42	1.08	12.69	0.024	0.19	1.25	0.16	7.9
3H-1, 112	18.42	1.21	12.69	0.006	0.05	0.56	0.10	5.4
3H-2, 112	19.92	1.31	12.71	0.008	0.06	0.65	0.12	5.3
3H-3, 112	21.42	1.41	12.91	0.008	0.06	0.51	0.09	5.5
3H-4, 112	22.92	1.50	12.88	0.009	0.07	0.53	0.09	5.7
3H-5, 112	24.42	1.60	12.91	0.010	0.07	0.51		
3H-6, 112	25.92	1.70	12.91	0.009	0.07	0.53	0.06	9.4
4H-1, 112	27.92	1.83	13.95	0.041	0.29	1.60	0.17	9.5
4H-2, 112	29.42	1.93	12.07	0.008	0.07	0.48	0.11	4.2
4H-6, 112	35.42	2.19	26.77	0.014	0.05	0.60	0.12	5.2
5H-1, 112	37.42	2.25	27.61	0.029	0.11	0.88	0.12	7.2
5H-2, 112	38.92	2.30	27.61	0.038	0.14	1.08	0.12	9.1
5H-3, 112	40.42	2.35	29.36	0.019	0.06	0.80	0.09	8.5
5H-4, 112	41.92	2.40	27.55	0.028	0.10	1.05	0.11	9.5
5H-5, 112	43.42	2.44	25.61	0.033	0.13	1.18	0.12	9.6
6H-1, 112	46.92	2.55	29.90	0.035	0.12	0.84	0.11	7.9
6H-2, 116	48.46	2.60	26.32	0.026	0.10	1.02	0.12	8.5
6H-3, 115	49.95	2.65	30.15	0.049	0.16	1.22	0.11	11.1
130-805B-								
8H-5, 112	70.82	3.30	25.05	0.022	0.09	0.65	0.17	3.9

Appendix (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	Bulk accumulation rate (g/m²/yr)	TOC accumulation rate (g/m²/yr)	TOC (%)	Carbonate-free residue TOC′ (%)	N′ (%)	TOC′/N′
9H-5, 112	80.32	3.63	30.83	0.052	0.17	1.12	0.22	5.0
10H-5, 113	89.83	3.92	30.69	0.046	0.15	1.41	0.23	6.0
11H-5, 112	99.32	4.21	32.48	0.045	0.14	1.41	0.20	7.2
12H-5, 116	108.86	4.50	31.22	0.023	0.07	0.86	0.14	6.0
13H-5, 112	118.32	4.78	33.39	0.015	0.05	0.55	0.13	4.3
14H-5, 112	127.82	5.06	36.31	0.029	0.08	0.68	0.12	5.9
15H-5, 112	137.32	5.31	40.62	0.022	0.06	0.72	0.15	4.8
16H-5, 112	146.82	5.55	39.38	0.044	0.11	1.45	0.23	6.3
17H-5, 112	156.32	5.80	42.30	0.036	0.09	1.22	0.20	6.2
18H-5, 112	165.82	6.05	40.24	0.025	0.06	1.19	0.13	9.3
19H-5, 112	175.32	6.29	40.32	0.022	0.06	0.91	0.18	5.2
20H-5, 111	184.81	6.54	41.25	0.021	0.05	0.69	0.14	5.0
21H-5, 113	194.33	6.79	43.77	0.029	0.07	1.05	0.25	4.2
22H-5, 113	203.83	7.03	42.08	0.021	0.05	0.72	0.16	4.6
23H-5, 112	213.32	7.28	38.69	0.028	0.07	0.79	0.13	6.2
24H-5, 112	222.82	7.53	41.02	0.017	0.04	0.40	0.10	4.1
25H-5, 112	232.32	7.77	40.90	0.020	0.05	0.66	0.13	5.0
26H-5, 112	241.82	8.02	41.18	0.025	0.06	0.49	0.10	4.7
27H-5, 112	249.91	8.23	38.03	0.019	0.05	0.40	0.10	3.8
28H-5, 112	260.82	8.51	41.32	0.012	0.03	0.30	0.08	3.6
29X-5, 112	270.32	8.89	12.53	0.004	0.03	0.33	0.12	2.7
30X-5, 112	280.02	9.73	12.84	0.004	0.03	0.37	0.10	3.5
31X-5, 112	289.62	10.50	13.74	0.006	0.04	0.51	0.07	6.9
32X-4, 112	297.82	11.30	14.06	0.009	0.07	0.50	0.14	3.7
33X-5, 112	308.52	12.20	13.74	0.007	0.05	0.80	0.13	6.2
34X-5, 112	318.12	13.00	12.63	0.007	0.06	0.45	0.10	4.7
35X-5, 112	327.62	13.80	16.10	0.009	0.06	0.55	0.12	4.5
36X-5, 112	337.12	14.50	17.64	0.008	0.05	0.49	0.09	5.3
37X-5, 112	346.82	15.30	15.41	0.008	0.05	0.51	0.10	5.3
38X-5, 112	356.52	16.00	15.86	0.006	0.04	0.41	0.12	3.3
39X-5, 112	366.12	16.70	15.79	0.008	0.05	0.65	0.12	5.4
40X-5, 112	375.82	17.50	15.95	0.008	0.05	0.36	0.10	3.6
42X-5, 110	395.10	18.90	22.15	0.008	0.03	0.34	0.09	3.6
44X-5, 112	414.42	20.20	20.81	0.010	0.05	0.51	0.12	4.3
46X-5, 112	433.62	21.40	20.53	0.008	0.04	0.43	0.11	3.9
48X-4, 112	451.12	22.40	21.12	0.012	0.06	0.49	0.08	6.4
50X-4, 112	470.42	23.70	22.28	0.012	0.05	0.50	0.12	4.2
130-806B-								
1H-1, 121	1.21	0.06	16.26	0.040	0.25	1.78	0.26	6.8
1H-2, 121	2.71	0.13	15.69	0.018	0.11	0.68	0.09	7.3
1H-3, 118	4.18	0.20	17.64	0.018	0.10	0.67	0.10	6.8
1H-4, 121	5.71	0.27	17.01	0.033	0.19	1.26	0.16	7.9
2H-1, 120	7.70	0.36	17.51	0.028	0.16	1.21	0.18	6.7
2H-2, 120	9.20	0.43	17.34	0.031	0.18	1.12	0.17	6.4
2H-3, 120	10.70	0.50	17.57	0.038	0.21	1.41	0.21	6.8
2H-4, 120	12.20	0.57	18.30	0.029	0.16	1.34	0.21	6.5
2H-5, 121	13.70	0.64	16.78	0.018	0.11	0.75	0.13	5.8
2H-6, 120	15.20	0.71	18.09	0.026	0.15	1.21	0.18	6.8
3H-1, 121	17.21	0.81	19.08	0.039	0.21	1.55	0.21	7.4
3H-2, 121	18.71	0.88	18.52	0.049	0.27	2.02	0.24	8.6
3H-3, 121	20.21	0.95	19.16	0.037	0.19	1.87	0.22	8.4
3H-4, 118	21.68	1.02	17.77	0.018	0.10	0.87	0.11	7.6
3H-5, 121	23.21	1.09	19.01	0.019	0.10	0.90	0.13	6.9
3H-6, 121	24.71	1.16	18.76	0.016	0.08	0.67	0.10	6.9
4H-1, 121	26.71	1.25	18.37	0.035	0.19	1.58	0.18	8.9
4H-2, 121	28.21	1.32	19.33	0.035	0.18	1.80	0.18	9.8
4H-3, 121	29.71	1.40	18.82	0.027	0.15	1.12	0.16	7.0
4H-4, 122	31.22	1.47	18.45	0.036	0.19	2.05	0.24	8.7
4H-5, 122	32.72	1.54	17.64	0.025	0.14	1.25	0.16	7.8
4H-6, 120	34.20	1.61	19.31	0.018	0.09	0.86	0.14	6.1
4H-7, 68	35.18	1.65	18.56	0.032	0.17	1.60	0.18	8.9
5H-1, 121	36.21	1.70	19.70	0.020	0.10	1.06	0.14	7.6
5H-2, 121	37.71	1.77	18.07	0.025	0.14	1.18	0.15	7.7
5H-3, 121	39.21	1.84	17.29	0.014	0.08	0.69	0.12	5.6
5H-4, 121	40.71	1.90	28.71	0.017	0.06	0.75	0.12	6.3
5H-5, 121	42.21	1.95	28.39	0.028	0.10	1.00	0.14	7.1
5H-6, 121	43.71	2.00	27.09	0.054	0.20	1.86	0.22	8.4
6H-1, 121	45.71	2.06	32.52	0.088	0.27	2.68	0.29	9.2
6H-3, 121	48.71	2.15	28.28	0.043	0.15	1.26	0.16	7.8
6H-4, 121	50.16	2.19	29.24	0.043	0.15	1.42	0.18	7.9
6H-5, 121	51.71	2.24	30.34	0.067	0.22	2.52	0.24	10.5
6H-6, 121	53.21	2.29	31.19	0.045	0.15	1.72	0.26	6.6
7H-5, 121	61.21	2.53	31.60	0.044	0.14	1.67	0.20	8.4

Appendix (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	Bulk accumulation rate (g/m²/yr)	TOC accumulation rate (g/m²/yr)	TOC (%)	Carbonate-free residue TOC′ (%)	Carbonate-free residue N′ (%)	Carbonate-free residue TOC′/N′
8H-5, 121	70.71	2.82	28.88	0.053	0.18	2.14	0.24	8.9
9H-5, 120	80.20	3.11	30.64	0.064	0.21	2.71	0.30	9.0
10H-5, 121	89.71	3.40	28.35	0.031	0.11	1.46	0.16	9.1
11H-5, 121	99.21	3.65	44.46	0.062	0.14	1.33	0.17	7.8
12H-5, 121	108.71	3.85	45.31	0.063	0.14	1.70	0.17	10.0
13H-5, 120	118.20	4.06	43.34	0.035	0.08	1.08	0.14	7.7
14H-5, 121	127.71	4.26	45.78	0.032	0.07	1.37	0.15	9.1
15H-5, 121	137.21	4.47	48.32	0.029	0.06	1.17	0.15	7.8
16H-5, 121	146.71	4.67	42.83	0.034	0.08	1.27	0.16	7.9
17H-5, 121	156.21	4.87	43.48	0.022	0.05	0.98	0.12	8.2
18H-5, 120	165.70	5.08	48.08	0.029	0.06	1.09	0.14	7.8
19H-5, 119	175.19	5.28	46.06	0.048	0.11	1.67	0.16	10.4
20H-5, 120	184.70	5.48	47.66	0.167	0.35	1.25	0.15	8.3
21H-5, 120	194.20	5.69	46.49	0.088	0.19	2.08	0.22	9.5
22H-5, 120	203.70	5.89	47.34	0.034	0.07	0.98	0.13	7.5
23H-5, 121	213.21	6.10	48.42	0.058	0.12	1.66	0.16	10.4
24H-5, 121	222.71	6.30	48.88	0.073	0.15	2.29	0.23	10.0
25H-5, 121	232.21	6.50	49.22	0.049	0.10	1.33	0.14	9.5
26H-5, 121	241.71	6.71	48.00	0.024	0.05	0.72	0.10	7.2
27H-5, 121	251.21	6.91	48.24	0.063	0.13	1.61	0.16	10.1
28H-5, 121	260.71	7.12	48.80	0.054	0.11	1.51	0.14	10.8
29H-5, 121	270.21	7.32	45.88	0.041	0.09	1.02	0.12	8.5
31H-5, 121	289.21	7.73	50.82	0.020	0.04	0.50	0.05	10.0
32H-5, 121	298.71	7.93	49.51	0.025	0.05	0.63	0.05	12.6
33H-5, 121	308.21	8.13	48.85	0.024	0.05	0.48	0.04	12.0
34H-5, 121	317.71	8.34	47.81	0.019	0.04	0.48	0.04	12.0
35X-5, 121	327.21	8.54	47.39	0.019	0.04	0.52	0.05	10.4
36X-5, 122	336.92	8.78	32.87	0.013	0.04	0.51	0.05	10.2
37X-5, 122	346.62	9.11	28.11	0.011	0.04	0.44	0.06	7.3
39X-5, 121	366.01	9.77	32.99	0.013	0.04	0.50	0.05	10.0
40X-5, 111	375.61	10.10	32.07	0.013	0.04	0.49	0.04	12.3
41X-5, 90	385.10	10.43	33.25	0.013	0.04	0.58	0.05	11.6
42X-5, 125	395.15	10.77	32.16	0.039	0.12	1.50	0.17	8.8
43X-5, 123	404.73	11.10	30.89	0.015	0.05	0.57	0.06	9.5
44X-5, 123	414.43	11.43	32.67	0.013	0.04	0.44	0.04	11.0
45X-5, 122	424.12	11.76	32.67	0.016	0.05	0.54	0.06	9.0
46X-5, 123	433.73	12.09	32.43	0.013	0.04	0.41	0.05	8.2
48X-5, 122	453.02	12.75	31.60	0.013	0.04	0.38	0.04	9.5
49X-5, 121	462.71	13.08	32.37	0.013	0.04	0.47	0.05	9.4
50X-5, 121	470.81	13.36	32.93	0.020	0.06	0.59	0.05	11.8
51X-5, 121	480.51	13.73	23.44	0.009	0.04	0.58	0.06	9.7
55X-5, 121	518.81	15.68	23.34	0.007	0.03	0.37	0.04	9.3
57X-5, 121	538.11	16.67	23.64	0.010	0.04	0.39	0.04	9.8
58X-5, 122	547.72	17.16	24.82	0.010	0.04	0.38	0.03	12.7
59X-5, 121	557.41	17.65	24.43	0.007	0.03	0.30	0.03	10.0
60X-5, 57	566.47	18.11	24.35	0.007	0.03	0.31	0.03	10.3
61X-5, 121	576.81	18.64	24.94	0.010	0.04	0.39	0.04	9.8
62X-5, 121	586.51	19.14	24.82	0.007	0.03	0.39	0.05	7.8
63X-5, 121	596.21	19.63	25.31	0.013	0.05	0.64	0.06	10.7
65X-5, 121	615.51	20.45	35.83	0.014	0.04	0.48	0.07	6.9
66X-5, 121	625.11	20.81	34.76	0.013	0.04	0.48	0.06	8.0
72X-1, 121	676.71	22.75	37.28	0.015	0.04	0.55	0.04	13.8
73X-5, 121	692.41	23.34	37.30	0.011	0.03	0.61	0.07	8.7
75X-5, 122	711.72	24.07	37.10	0.015	0.04	0.53	0.04	13.3
78X-1, 81	734.21	24.92	39.05	0.031	0.08	0.78	0.04	19.5
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1H-1, 124	1.24	0.08	12.21	0.021	0.17	1.05	0.17	6.2
1H-2, 124	2.74	0.18	10.99	0.015	0.13	1.02	0.18	5.8
1H-3, 124	4.24	0.28	11.23	0.009	0.08	0.74	0.13	5.8
1H-4, 124	5.74	0.38	13.04	0.008	0.06	0.61	0.13	4.8
2H-1, 123	8.63	0.57	12.71	0.009	0.07	0.75	0.13	5.7
2H-2, 123	10.13	0.67	12.13	0.009	0.07	0.71	0.13	5.6
2H-3, 123	11.63	0.77	12.36	0.010	0.08	0.74	0.12	6.0
2H-4, 123	13.13	0.87	12.94	0.008	0.06	0.52	0.10	5.3
2H-5, 123	14.63	0.97	12.48	0.010	0.08	0.70	0.13	5.4
3H-1, 123	18.13	1.21	12.81	0.005	0.04	0.40	0.09	4.4
3H-2, 123	19.63	1.30	11.69	0.010	0.09	0.65	0.11	6.1
3H-3, 123	21.13	1.40	13.13	0.011	0.09	0.71	0.12	6.0
3H-5, 123	24.13	1.60	13.54	0.008	0.06	0.50	0.09	5.4
3H-6, 123	25.63	1.70	12.62	0.006	0.05	0.44	0.09	4.9
4H-1, 123	27.63	1.84	12.34	0.007	0.06	0.46	0.08	5.6
4H-2, 123	29.13	1.94	13.09	0.008	0.06	0.51	0.08	6.1
4H-3, 123	30.63	2.04	11.61	0.007	0.06	0.53	0.10	5.5

Appendix (continued).

Core, section, interval (cm)	Depth (mbsf)	Age (Ma)	Bulk accumulation rate (g/m²/yr)	TOC accumulation rate (g/m²/yr)	TOC (%)	Carbonate-free residue TOC′ (%)	Carbonate-free residue N′ (%)	Carbonate-free residue TOC′/N′
4H-4, 123	32.13	2.10	25.54	0.013	0.05	0.36	0.08	4.8
4H-5, 123	33.63	2.15	27.14	0.028	0.10	0.51	0.10	5.2
4H-6, 123	35.13	2.19	26.75	0.011	0.04	0.55	0.09	6.1
5H-1, 123	37.13	2.25	26.23	0.006	0.02	0.56	0.10	5.7
5H-2, 123	38.63	2.30	27.77	0.020	0.07	0.63	0.09	6.8
5H-3, 123	40.13	2.35	28.65	0.025	0.09	0.85	0.10	8.5
5H-4, 123	41.63	2.39	27.77	0.047	0.17	1.85	0.22	8.4
5H-5, 123	43.13	2.44	26.88	0.017	0.07	0.80	0.11	7.6
5H-6, 123	44.63	2.49	25.70	0.012	0.05	0.42	0.07	6.4
6H-1, 124	46.64	2.55	26.58	0.018	0.07	0.71	0.09	8.4
6H-2, 124	48.14	2.59	26.58	0.017	0.06	0.55	0.08	6.7
6H-3, 124	49.64	2.64	28.42	0.031	0.11	1.30	0.14	9.2
11H-5, 123	100.10	4.20	27.93	0.014	0.05	0.58	0.10	6.1
12H-5, 123	109.60	4.49	29.24	0.017	0.06	0.82	0.11	7.4
13H-5, 123	119.10	4.78	30.15	0.016	0.05	0.61	0.09	6.5
14H-5, 123	128.60	5.06	40.89	0.022	0.05	0.72	0.14	5.3
15H-4, 123	135.40	5.21	38.63	0.029	0.08	0.92	0.12	7.8
16H-5, 123	147.60	5.49	43.14	0.031	0.07	1.14	0.15	7.7
17H-5, 123	157.10	5.71	44.77	0.023	0.05	0.84	0.18	4.6
18H-5, 123	166.60	5.93	42.65	0.031	0.07	1.20	0.19	6.3
19H-5, 123	176.10	6.14	43.22	0.043	0.10	1.25	0.18	7.1
20H-5, 123	185.60	6.36	46.36	0.025	0.05	0.94	0.11	8.3
21H-5, 123	195.10	6.58	43.49	0.016	0.04	0.62	0.10	6.1
22H-5, 123	204.60	6.79	46.18	0.023	0.05	0.66	0.12	5.4
23H-5, 123	214.10	7.01	49.01	0.019	0.04	0.61	0.11	5.7
24H-5, 123	223.60	7.23	43.95	0.019	0.04	0.69	0.10	7.2
25H-5, 123	233.10	7.44	43.50	0.017	0.04	0.43	0.07	6.2
26H-5, 123	242.60	7.66	42.26	0.020	0.05	0.58	0.09	6.8
27H-5, 123	252.10	7.88	43.58	0.017	0.04	0.41	0.08	5.0
28H-5, 123	261.60	8.10	41.52	0.014	0.04	0.39	0.09	4.2
29X-5, 123	271.30	8.32	45.44	0.016	0.04	0.43	0.08	5.4
30X-5, 123	281.00	8.54	41.86	0.019	0.05	0.53	0.11	5.0
31X-5, 123	290.70	8.85	17.22	0.006	0.03	0.36	0.11	3.2
32X-5, 123	299.90	9.37	19.19	0.009	0.05	0.47	0.13	3.6
33X-5, 123	309.50	9.91	19.30	0.007	0.04	0.41	0.09	4.7
34X-5, 123	319.20	10.46	20.87	0.008	0.04	0.40	0.10	4.2
35X-5, 123	328.40	10.98	18.71	0.007	0.04	0.37	0.10	3.9
36X-5, 123	338.10	11.53	19.87	0.006	0.03	0.33	0.12	2.8
37X-5, 123	347.80	12.08	19.57	0.008	0.04	0.46	0.06	7.7
38X-5, 123	357.40	12.63	18.16	0.006	0.03	0.38	0.10	4.0
39X-5, 123	367.10	13.18	18.48	0.007	0.04	0.34	0.09	4.0
40X-5, 126	377.00	13.74	18.41	0.004	0.02	0.35	0.07	5.0
42X-5, 123	396.40	14.92	20.02	0.005	0.03	0.37	0.11	3.4
44X-5, 109	415.70	16.09	21.72	0.006	0.03	0.48	0.08	6.3
46X-5, 131	435.10	17.27	21.96	0.005	0.02	0.36	0.11	3.4
48X-5, 123	454.30	18.43	21.34	0.004	0.02	0.22	0.09	2.6
50X-5, 123	473.60	19.60	20.94	0.003	0.02	0.41	0.07	5.8
52X-5, 123	493.00	20.77	19.91	0.005	0.02	0.92	0.10	9.2
54X-5, 123	512.30	21.88	34.63	0.014	0.04	0.98	0.10	10.0
56X-5, 124	531.20	22.51	39.73	0.012	0.03	1.04	0.09	11.6
58X-5, 123	550.60	23.15	37.30	0.007	0.02	0.66	0.09	7.1

Notes: The appendix table also lists the total organic carbon content of the bulk sediment (TOC), the organic carbon and nitrogen contents of the carbonate-free residue (TOC′ and N′), and the TOC′/N′ ratios of Leg 130 sites. The ages of the samples are based on mean sedimentation rates (Kroenke, Berger, Janecek, et al., 1991).