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5. Data Report: Late Quaternary Calcareous Nannofossils from the Northwestern Pacific Ocean, Holes 1150A and 1151C, Leg 186[1]

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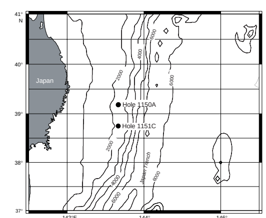
ABSTRACT

To assess the paleoceanographic potential of Leg 186 sediments, we investigated Quaternary calcareous nannofossil flora at Sites 1150 and 1151 in the Japan Trench. Because of the frequent occurrence of barren intervals and the lack of oxygen isotope data, a detailed paleoceanography is not feasible for these cores. We limited our study to the upper 26.07 m of the section from Hole 1150A and the upper 21.01 m of the section from Hole 1151C. The studied samples from Cores 186-1150A-1H through 3H are younger than 0.085 Ma. Core 186-1151C-1H (upper 1.92 meters below seafloor [mbsf]) is younger than 0.085 Ma, and samples between 2H-7, 5–7 cm, and 3H-CC, 5–7 cm, (9.99–21.01 mbsf) are older than 0.245 Ma and younger than 0.408 Ma.

INTRODUCTION

During Ocean Drilling Program (ODP) Leg 186, we drilled six holes at two sites, Sites 1150 (39°11′N, 143°20′E) and 1151 (38°45′N, 143°20′E) on the deep-sea terrace of the landward side of the Japan Trench (Fig. F1) (Sacks, Suyehiro, Acton, et al., 2000). These sites are located under the influence of the Oyashio Extension, the northwest boundary current of the Subpolar Gyre in the Pacific Ocean. Off the coast of northeast Japan, the Subpolar Gyre (Oyashio Current) meets head-on with the Subtropical Gyre (Kuroshio Current) (Tomczak and Godfrey, 1994).

F1. ODP sites, p. 9.



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Distribution of the living calcareous nannoplankton is controlled by the water masses (e.g., Okada and Honjo, 1973a), and the stratigraphic variation in the Quaternary nannoflora reflects the environmental change in surface water (e.g., Chinzei et al., 1987). Therefore, detailed investigation of the nannofossil assemblages at the surface water frontal zones is important in monitoring Quaternary paleoceanography. Here, we present a data set of Quaternary calcareous nannofossil assemblages in the subpolar frontal zone of the western Pacific Ocean that supercedes the preliminary results described by Shipboard Scientific Party (2000a, 2000b).

MATERIALS AND METHODS

A total of 183 sediment samples were collected at 30-cm intervals from Cores 186-1150A-1H through 3H and 186-1151C-1H through 3H of the two Japan Trench sites Holes 1150A and 1151C (Fig. **F1**). Sediment samples were prepared as smear slides using standard techniques (Bown and Young, 1998), and calcareous nannofossils were examined at 1000× magnification under a Nikon E600 polarizing light microscope.

To understand a general trend in the biostratigraphy, samples were examined at intervals of approximately two samples per section in the first stage of investigation. Following this observation, the remaining samples were examined to refine the biostratigraphy.

For the Quaternary, relative abundances of placolith-type species are useful as datum events (e.g., Hine and Weaver, 1998). *Florisphaera profunda* is usually the only lower photic zone dweller that is preserved well in marine sediment, and it often dominates the fossil assemblage. Lower photic zone dwellers respond to environmental changes in a different manner than upper photic zone dwellers (Molfino and McIntyre, 1990a, 1990b; Hagino et al., 2000). For the purpose of biostratigraphy and paleoceanography, more than 300 upper photic zone specimens were identified and counted and the number of *F. profunda* coccoliths present in the same view fields were counted separately.

TAXONOMIC REMARKS

Late Quaternary calcareous nannoflora usually contain abundant placolith-type nannofossils that are produced by *Emiliania huxleyi* and *Gephyrocapsa* species. Placoliths of *Gephyrocapsa* species display a great degree of size variation (Bollmann, 1997; Matsuoka and Okada, 1989, 1990). Downcore size variation of *Gephyrocapsa* species is useful for stratigraphy (Matsuoka and Okada, 1989; Erba 1995; Okada and Wells, 1997); however, classification and taxonomy of the genus *Gephyrocapsa* is in a state of confusion. Because this study does not intend to refine the classification system, *Gephyrocapsa* species are classified into the following four size categories: very small (<2.0 µm), small (2.0–3.0 µm), medium (3.0–5.0 µm), and large (>5.0 µm).

In the small *Gephyrocapsa* specimens, only *Gephyrocapsa caribbeanica* is identified at the species level based on the closed central area. The other small and very small placoliths having a bridge and a wide central area are classified into *Gephyrocapsa* (small) or *Gephyrocapsa* (very small) categories based on size.

Under the light microscope, it is difficult to distinguish the small and very small *Gephyrocapsa* specimens that were lost or did not develop bridge elements from the small and very small *Reticulofenestra* specimens, respectively. Moreover, it is difficult to identify the small and very small placoliths at species level under the light microscope. Therefore, the small and very small *Gephyrocapsa* specimens without bridge and the small and very small *Reticulofenestra* specimens are classified into the placolith (small) or placolith (very small) categories based on size.

RESULTS AND COMMENTS

Biostratigraphy and Paleoceanographic Comments

Hole 1150A

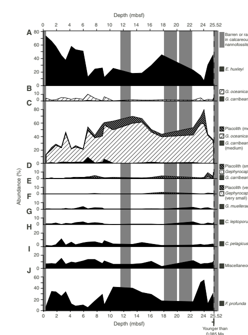
As a preliminary step, a total of 38 selected samples out of 108 samples were examined to check biostratigraphy, and 25 of them contained sufficient numbers of calcareous nannofossils to study the floral composition (Table T1).

The latest "standard" nannofossil event is the first occurrence (FO) of *E. huxleyi* at 0.268 Ma (Thierstein et al., 1977). *E. huxleyi* is present in Sample 186-1150A-3H-7, 0–4 cm (25.52 meters below seafloor [mbsf]), which is the lowest sample studied here (Table T1). The Shipboard Scientific Party (2000a) estimated the FO of *E. huxleyi* at 46.33–55.73 mbsf. Therefore, the entire part of the studied sections are younger than 0.268 Ma. The base of the *E. huxleyi* acme Zone is a diachronous event and was reported between 85 ka in low latitudes and 73 ka in transitional waters (Thierstein et al., 1977). This event was identified by the reversal in abundance of *G. caribbeanica/E. huxleyi* (e.g., Thierstein et al., 1977) or by reversal in abundance of *Gephyrocapsa muellerae/E. huxleyi* (Flores et al., 2000). *E. huxleyi* is more abundant at the lowest sample studied here than *G. caribbeanica* and *G. muellerae* from Core 186-1150A-1H up through Core 3H. Therefore, the entire range of studied samples belong to the *E. huxleyi* acme Zone (Fig. F2).

The barren intervals (Fig. F2) likely indicate the weakening of the Kuroshio Current and may correspond to glacial–stadial intervals, but without oxygen isotope data the hypothesis is difficult to test.

T1. Calcareous nannofossils in Cores 186-1150A-1H through 3H, p. 13.

F2. Stratigraphic variation, Hole 1150A, p. 10.

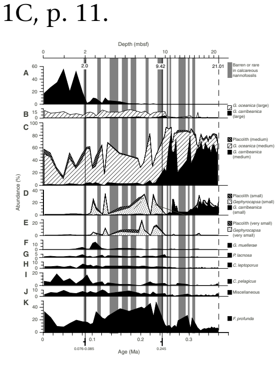


Hole 1151C

Seventy-five samples collected from Cores 186-1151C-1H through 3H were examined, and 52 of them contained sufficient numbers of calcareous nannofossils to study the floral composition (Table T2). Reworked specimens of *Pseudoemiliania lacunosa* are commonly present in the two upper cores (186-1151C-1H and 2H) but are scarce in the lower core (3H) (Table T2; Fig. F3). The preliminary study observed the last occurrence (LO) of *P. lacunosa* (0.408 Ma) in Sample 186-1151C-5H-3, 98 cm (Shipboard Scientific Party, 2000b). Therefore, the entire range of studied sections is younger than 0.408 Ma. Weaver and Thomson (1993) reported an abrupt decrease of *G. caribbeanica* at the boundary between marine oxygen isotope Stages (MISs) 7 and 8 (0.245 Ma). The abrupt decrease of *G. caribbeanica* observed between 9.99 and 8.85 mbsf in Core 186-1151C-3H is likely to correspond to this event. (Table T2; Fig. F3). Based on the LO of *P. lacunosa* (0.408 Ma) (Shipboard Scientific Party, 200b) and the abrupt decrease of *G. caribbeanica* (0.245 Ma), the lowest sample studied here can be estimated as 0.36 Ma in age (horizon-

T2. Calcareous nannofossils in Cores 186-1151C-1H through 3H, p. 14.

F3. Stratigraphic variation, Hole 1151C, p. 11.



tal axis of Fig. F3). In this study, the FO of *E. huxleyi* was observed in Sample 186-1151C-2H-5, 65–67 cm (8.56 mbsf); however, the event has been reported between Samples 2H-CC (12.10 mbsf) and 3H-CC (21.44 mbsf) (Shipboard Scientific Party, 2000b). Because of the vulnerability to dissolution, the FO of *E. huxleyi* is often difficult to identify in a poorly preserved assemblage. Therefore, the true FO of this species may be lower than the identified FO of *E. huxleyi* in this study. *E. huxleyi* is very abundant in the entire Core 186-1151C-1H, except the for Sample 186-1151C-1H-CC. Sections 186-1151C-1H-1 and 1H-2, therefore, are assigned to the *E. huxleyi* acme Zone.

Calcidiscus leptoporus prefers tropical to transitional waters; on the other hand, *Coccolithus pelagicus* prefers Arctic to subarctic waters (e.g., Winter et al., 1994). In the central Pacific Ocean, *Florisphaera profunda* is abundant in the lower photic zone of the tropical to transitional waters and is barren in the subarctic Oyashio Extension water (Okada and Honjo, 1973a). In the studied samples at this site, *C. leptoporus, C. pelagicus,* and *F. profunda* are the major species (Table T2; Fig. F3). Therefore, it is clear that the surface water at Site 1151 has been affected by both warm Kuroshio and cold Oyashio Extensions during the last 0.38 m.y.

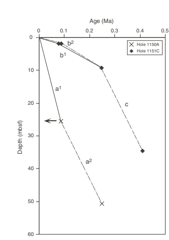
Stratigraphic variation of the lower photic zone species including *F. profunda* is useful as a paleoceanographic indicator, and a lower abundance of lower photic zone species can be interpreted as an indicator of surface water mixing that triggers a shallower nutricline and higher primary productivity (Molfino and McIntyre, 1990a, 1990b; Okada and Matsuoka, 1996; Beaufort et al., 1997). Studies of living calcareous nannoplankton revealed that the relative abundance of lower photic zone species within the water column is controlled by the absolute abundance of the upper photic zone species (Hagino et al., 2000), and small placolith-bearing species flourish in the upper photic zone of the eutrophic equatorial Pacific (Okada and Honjo, 1973b; Hagino, 1999; Hagino and Okada, 2001). Although *Gephyrocapsa* (small) and *Gephyrocapsa* (very small) are only minor components of the flora in the uppermost 2 mbsf, their abundances increased significantly between 2 and 10 mbsf, showing a concordant stratigraphic trend to that of *F. profunda*. (Fig. F3). In the lower core (10–21 mbsf), *Gephyrocapsa* (small) and *Gephyrocapsa* (very small) are minor components and *Gephyrocapsa caribbeanica* (small) becomes a major component, showing an opposite trend to that of *F. profunda* (Fig. F3). According to Molfino and McIntyre (1990b) and Okada (2000), *F. profunda* and small to very small *Gephyrocapsa* are good indicators of stratified and mixed photic layer conditions, respectively. The stratigraphic trend of *G. caribbeanica* (small) is concordant with this theory, but the trends of *Gephyrocapsa* (small) and *Gephyrocapsa* (very small) are contrary to this theory.

The inavailability of oxygen isotope data and the presence of many barren intervals limits what can be learned about (Fig. F3) the paleoceanography from the nannoflora in this area.

Sedimentation Rate

Sedimentation rate was calculated based on the depth of the nannofossil datums (Fig. F4). The base of the *E. huxleyi* acme Zone has been reported from 0.073 to 0.085 Ma (e.g., Thierstein et al., 1977). The only datum information in Cores 186-1150A-1H through 3H is that the deepest studied sample (Sample 186-1150A-3H-7, 0–4 cm; 25.52 mbsf), is younger than 0.085 Ma. This result indicates that the sedimentation

F4. Age-depth plot of biostratigraphic events, Holes 1150A and 1151C, p. 12.



rate between Cores 186-1150A-1H and 3H (upper 25.52 mbsf) is >300 m/m.y. The Shipboard Scientific Party (2000a) estimated that the sedimentation rate for the upper 50.72 mbsf is 204 m/m.y., based on the FO of *E. huxleyi*. Therefore, the sedimentation rate between 25.52 and 50.72 mbsf would be <94 m/m.y. (Fig. **F4**).

In Hole 1151C, the base of the *E. huxleyi* acme Zone (0.076–0.085 Ma) lies within Samples 186-1151C-1H-2, 35–37 cm (1.92 mbsf), through 1H-CC (2.08 mbsf); therefore, the sedimentation rate is >23.5 m/m.y. and <26.3 m/m.y in the upper 2.0 mbsf. An abrupt decrease of *G. carribeanica* (0.245 Ma) observed between Samples 186-1151C-2H-5, 95–97 cm (8.85 mbsf), and 2H-6, 65–67 cm (9.99 mbsf), indicates that the sedimentation rate is >43.9 m/m.y. and <46.4 m/m.y. (between 2.00 and 9.42 mbsf). The preliminary study reported the LO of *P. lacunosa* (0.408 Ma) in Samples 186-1151C-5H-3, 98 cm (23.69 mbsf), and 4H-2, 98 cm (34.68 mbsf) (Shipboard Scientific Party, 2000b). On the basis of an abrupt decrease of *G. carribeanica* and the LO of *P. lacunosa* (0.408 Ma), the sedimentation rate between 9.42 and 29.18 mbsf can be estimated as 121.1 m/m.y.

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TAXONOMIC LIST

Calcidiscus leptoporus (Murray and Blackman, 1989) Loeblich and Tappan, 1978.
Calcidiscus macintyrei (Bukry and Bramlette, 1969) Loeblich and Tappan, 1978.
Ceratolithus cristatus Kamptner, 1950.
Coccolithus pelagicus (Wallich, 1877) Schiller, 1930.
Emiliania huxleyi (Lohmann, 1902) Hay and Mohler in Hay et al., 1967.
Florisphaera profunda Okada and McIntyre, 1977.
Gephyrocapsa caribbeanica Boudreaux and Hay, 1967.
Gephyrocapsa oceanica Kamptner 1943.
Gephyrocapsa muellerae Bréhéret et al., 1987.
Helicosphaera carteri (Wallich, 1877) Kamptner, 1954.
Helicosphaera inversa Gartner, 1980.
Neosphaera coccolithomorpha Lecal-Schlauder, 1950.
Oolithotus fragilis (Lohmann, 1912) Martini and Müller, 1972.
Pseudoemiliania lacunosa (Kamptner, 1963) Gartner, 1969.
Reticulofenestra asanoi Sato and Takayama, 1992.
Rhabdosphaera clavigera Murray and Blackman, 1898.
Syracosphaera historica Kamptner, 1941.
Syracosphaera pulchra Lohmann, 1902.
Umbellosphaera irregularis Paasche in Markali and Paasche, 1955.
Umbellosphaera tenuis (Kamptner, 1937) Paasche in Markali and Paasche, 1955.
Umbilicosphaera hulburtiana Gaarder, 1970.
Umbilicosphaera sibogae var. *foliosa* (Kamptner, 1963) Okada and McIntyre, 1977.
Umbilicosphaera sibogae var. *sibogae* (Weber-van Bosses, 1901) Gaarder, 1970.

Figure F1. Location of the ODP sites studied in this report. Contours = meters below sea level.

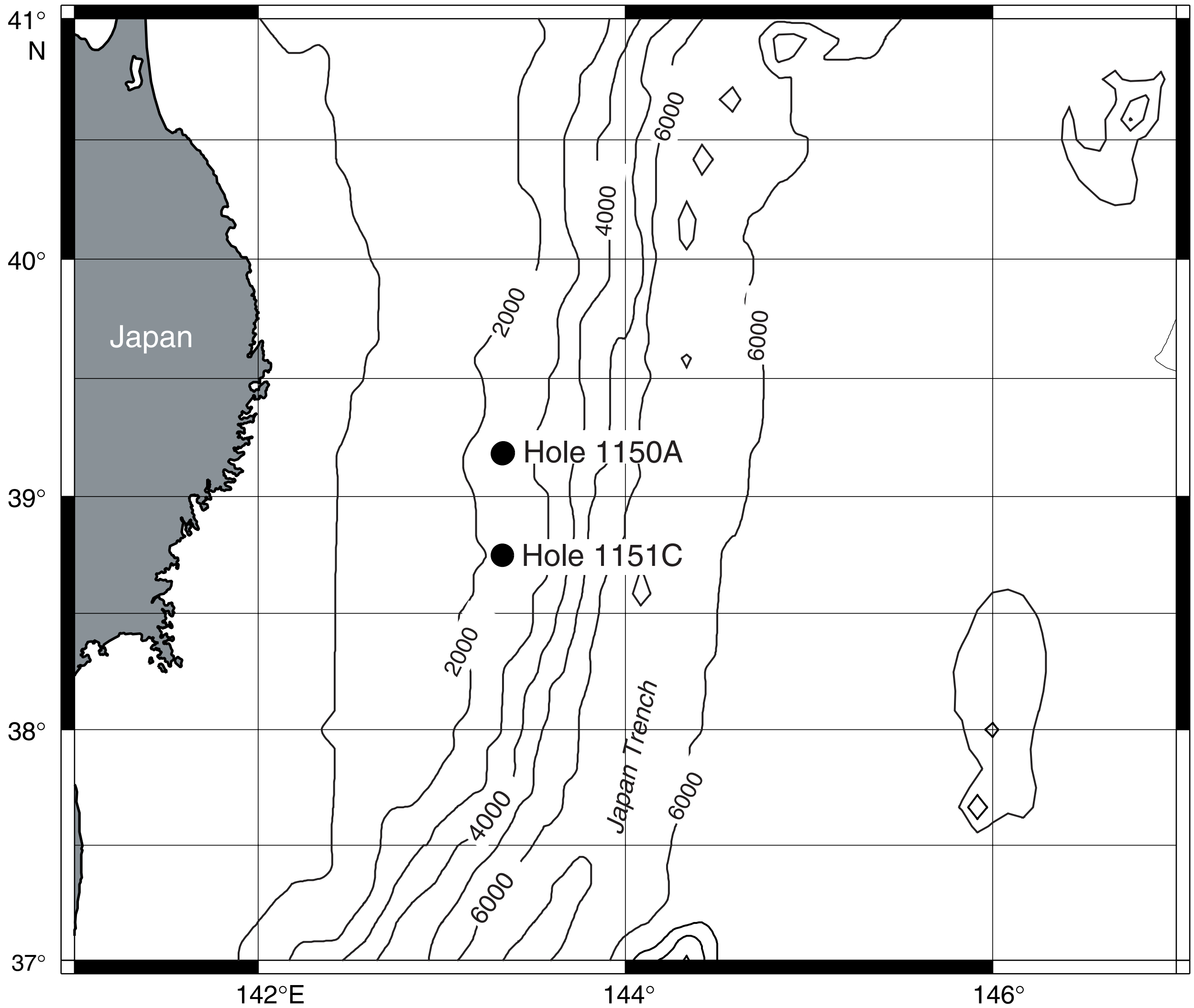

Figure F2. Stratigraphic variation in percentage abundance of the major components of the flora observed in Hole 1150A. Abundance of figs: **A–I.** Percentage abundance of each species within the upper photic zone flora. **J.** Percentage abundance of *F. profunda* (lower photic zone dweller) within the entire calcareous nannofossil assemblage.

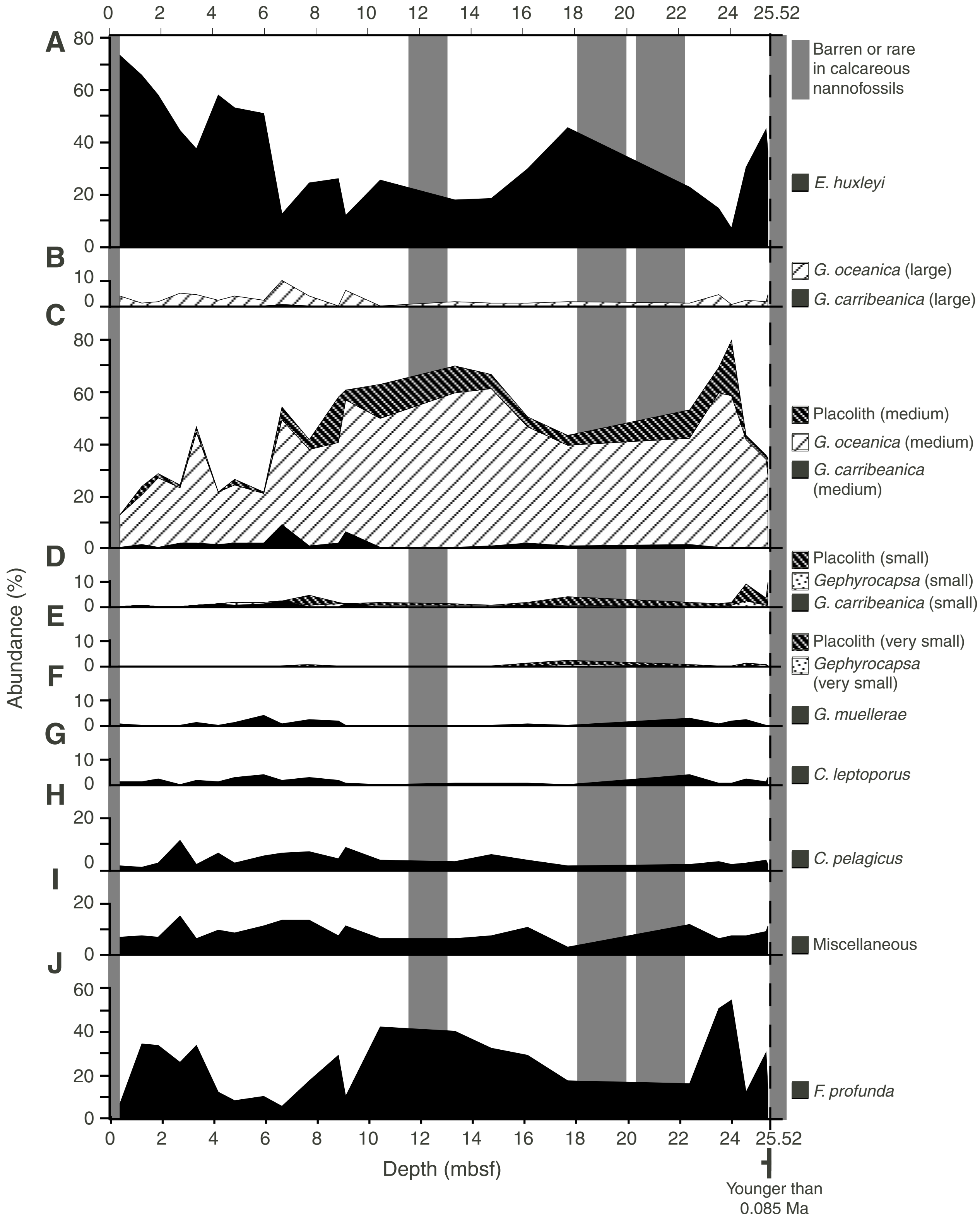

Figure F3. Stratigraphic variation in percentage abundance of the major components of the flora observed in Hole 1151C. **A–J.** Percentage abundance of each species within the upper photic zone flora. **K.** Percentage abundance of *F. profunda* (lower photic zone dweller) within the entire calcareous nannofossil assemblage.

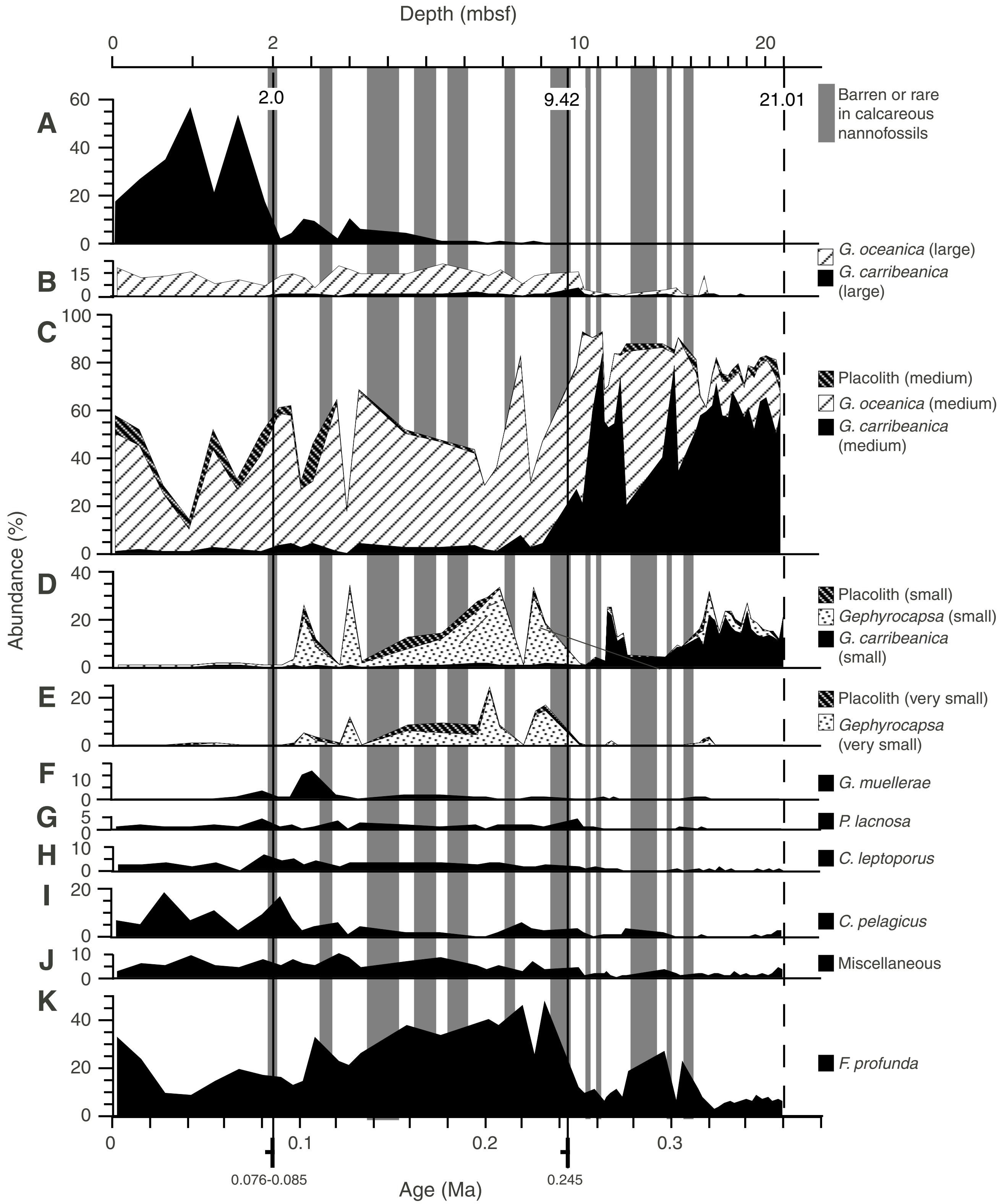

Figure F4. Age-depth plot of biostratigraphic events in Holes 1150A and 1151C. Solid line a^1 = age-depth relationship in Cores 186-1150A-1H through 3H in Hole 1150A, where the age of Sample 186-1150A-3H, 0–4 cm (25.52 mbsf), is assumed to be 0.085 Ma. The age control point at 25.52 mbsf in Hole 1150A can be moved leftward along the horizontal axis because the true acme of *E. huxleyi* is expected to be found in a lower sample. Dotted line a^2 = age-depth relationship between 25.52 and 50.72 mbsf based on the lowest studied sample (25.52 mbsf) and the FO of *E. huxleyi* observed by Shipboard Scientific Party (2000a). Kinked solid line b^1 and kinked dotted line b^2 = age-depth relationship between 9.42 and 0 mbsf in Hole 1151C, when the age of the 2.00-mbsf sample is posited as 0.073 and 0.085 Ma, respectively. The dotted line c = age-depth relationship between 34.68 and 9.42 mbsf in Hole 1151C based on the abrupt decrease of *G. carribeanica* (9.42 mbsf) and the LO of *P. lacunosa* (Shipboard Scientific Party, 2000b).

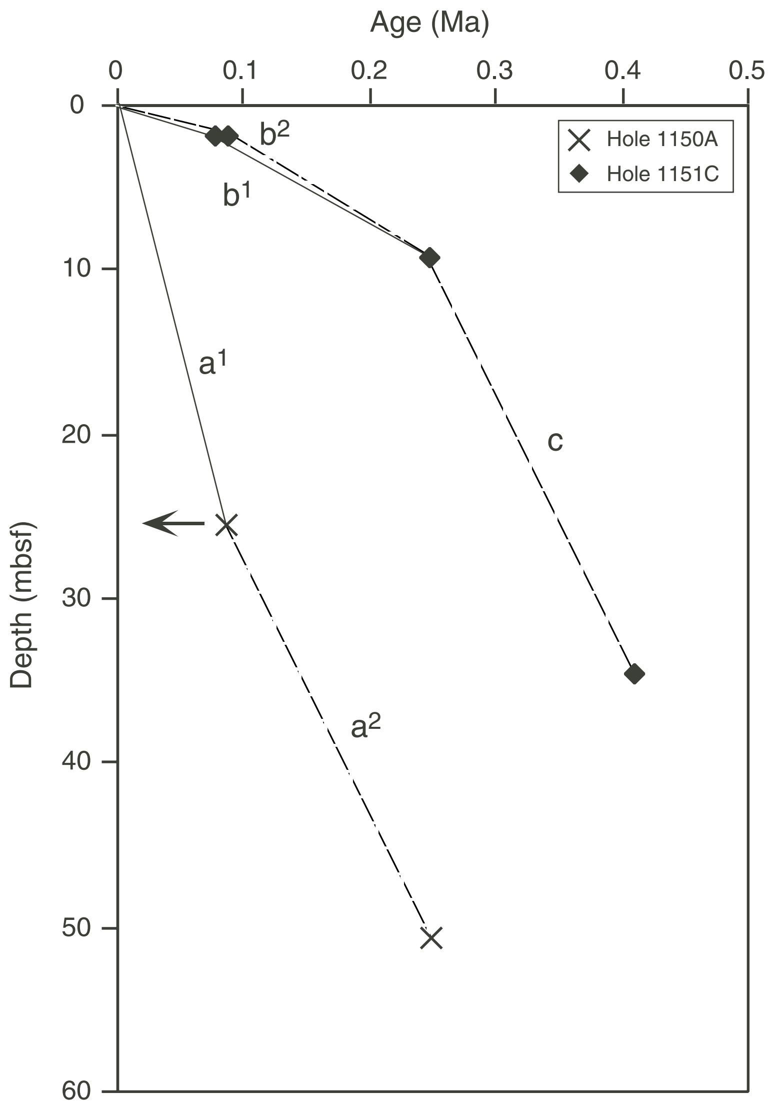

Table T1. Quantitative distribution of calcareous nannofossils, Cores 186-1150A-1H through 3H.

Core, section, interval (cm)	Average depth (mbsf)	*Calcidiscus leptoporus*	*Calcidiscus macintyrei*	*Ceratolithus cristatus*	*Coccolithus pelagicus*	*Emiliania huxleyi*	*Gephyrocapsa carribeanica* (large)	*Gephyrocapsa carribeanica* (medium)	*Gephyrocapsa carribeanica* (small)	*Gephyrocapsa muellerae*	*Gephyrocapsa oceanica* (large)	*Gephyrocapsa oceanica* (medium)	*Gephyrocapsa* (small)	*Gephyrocapsa* (very small)	*Helicosphaera carteri*	*Neosphaera coccolithomorpha*	*Oolithotus fragilis*	*Pseudoemiliania lacunosa*	Placolith (medium)	Placolith (small)	Placolith (very small)	*Reticulofenestra asanoi*	*Reticulofenestra clavigera*	*Sphenolithus* spp.	*Syracosphaera histrica*	*Syracosphaera pulchra*	*Syracosphaera* spp.	*Tetralithoides* spp.	*Umbellosphaera irregularis*	*Umbellosphaera tenuis*	*Umbilicosphaera hulburtiana*	*Umbilicosphaera* var. *sibogae*	*Umbilicosphaera sibogae* var. *foliosa*	Miscellaneous	Subtotal	*Florisphaera profunda*	Total	Remarks
186-1150A-																																						
1H-1, 3–7	0.05																																					Barren
1H-1, 35–39	0.37	5			6	248				2	12	43			4	1											2		1			1	3		339	24	363	
1H-1, 120–124	1.22	5			3	223		4	2		4	65			4				11								9		1				1		341	175	516	
1H-2, 35–39	1.86	7			9	198					6	92			1				5		1						4					2	1		342	170	512	
1H-2, 120–124	2.71				41	159		7	1		17	75			2				5								9		1						358	123	481	
1H-3, 35–39	3.36	7			8	128		6	1	4	15	146			1				7	1						1	3						1		344	174	518	
1H-3, 120–124	4.20	4			23	200		5	4		8	69				1	1									2	1								346	48	394	
1H-4, 35–39	4.85	10			9	181		7	2	5	13	75	3		3				8							2	4								341	29	370	
1H-4, 145–149	5.95	14			19	184		6	4	14	8	69	1		2				3								5						1		363	40	403	
1H-5, 65–68	6.64	6	3		23	43	1	31	8	3	34	145			2			2	17			2		1		1	1							6	358	21	379	
2H-1, 0–4	7.72	10	1		25	90		2		8	13	138	2		1		1	1	14	15	3					2	7			1					369	75	444	
2H-1, 120–124	8.85	5			13	84		6		5		125	4					1	56	2							1						3		324	133	457	
2H-2, 0–4	9.14	2	1	1	31	43		22	4	1	21	182							13							2		1	1					1	359	41	400	
2H-2, 146–149	10.51				11	80						157	2						41	4							9								315	225	540	
2H-3, 90–94	11.41				2	6						4																							14	11	25	
2H-3, 120–124	11.69											1																							1		1	Rare
2H-3, 143–148	11.91					1						2																							3		3	Rare
2H-4, 0–4	11.98											2																							2		2	Rare
2H-4, 90–94	12.83																																		0		0	Barren
2H-5, 0–4	13.40	3			10	56		1			5	187	2		1				32	1							3					2			316	208	524	
2H-6, 0–4	14.81	2			21	62		3			3	208	1						19								3								345	161	506	
2H-7, 0–4	16.23	3	1		13	99		7	1	3	4	149		1	6				13	5	2						6				2	1	4		336	136	472	
3H-1, 60–64	17.77				5	139		2		1	5	119	2	1	1				11	9	5						2			1					308	65	373	
3H-2, 30–34	18.88																																		0		0	Barren
3H-2, 60–64	19.16																																		0		0	Barren
3H-2, 90–94	19.43											1																							1		1	Rare
3H-2, 120–124	19.71	1									1																								3		3	Rare
3H-2, 146–149	19.94											3																							3		3	Rare
3H-3, 0–4	19.99	18		1	14	10	5	136	7	2	10	97			4				8								3					2	1		351	30	381	
3H-3, 139–143	21.27																																		0		0	Barren
3H-4, 120–124	22.48	13			7	72		5		10	4	131			2				35	6	2						15								322	61	383	
3H-5, 90–94	23.58	2			11	48				2	15	195			1			1	32	3							5					1			329	335	664	
3H-6, 0–4	24.14	2			6	21				6	1	182	1						65	4			1				11					1			311	365	676	
3H-6, 60–64	24.69	7			8	100				7	7	136	7	1	3				7	22	3						4				1		2		330	45	375	
3H-6, 146–149	25.48	4	1		12	152		1			6	113	2	2	2	1			6	9			2		1	1		2				1	4		338	145	483	
3H-7, 0–4	25.52	10	2		7	128		1			15	97			6				23	32		1				1	2	2	2				7		353	54	407	
3H-7, 30–34	25.80											2																							2		2	Rare
3H-7, 60–64	26.07																																		0		0	Barren

Table T2. Quantitative distribution of calcareous nannofossils, Cores 186-1151C-1H through 3H. (Continued on next page.)

Core, section, interval (cm)	Average depth (mbsf)	*Calcidiscus leptoporus*	*Ceratolithus cristatus*	*Coccolithus pelagicus*	*Emiliania huxleyi*	*Gephyrocapsa carribeanica* (large)	*Gephyrocapsa carribeanica* (medium)	*Gephyrocapsa carribeanica* (small)	*Gephyrocapsa muellerae*	*Gephyrocapsa oceanica* (large)	*Gephyrocapsa oceanica* (medium)	*Gephyrocapsa* (small)	*Gephyrocapsa* (very small)	*Helicosphaera carteri*	*Helicosphaera inversa*	*Neosphaera coccolithomorpha*	*Pseudoemiliania lacunosa*	Placolith (medium)	Placolith (small)	Placolith (very small)	*Sphenolithus* spp.	*Syracosphaera histrica*	*Syracosphaera pulchra*	*Syracosphaera* spp.	*Umbellosphaera irregularis*	*Umbilicosphaera hulburtiana*	*Umbilicosphaera* var. *sibogae*	*Umbilicosphaera sibogae* var. *foliosa*	Subtotal	*Florisphaera profunda*	Total	Remarks
186-1151C-																																
1H-1, 5–7	0.06	10		22	60		5			38	165	3		3			2	24						1					333	162	495	
1H-1, 35–37	0.37	8		16	87		6			22	139	1		2		1	3	21					1	10		1			318	98	416	
1H-1, 65–67	0.68	13		64	124		5			28	85	1		3			1	12					1	9		1	1		348	35	383	
1H-1, 95–97	0.99	6		23	207		6			37	32	2		7			1	15	1	3				24			1		365	32	397	
1H-1, 125–127	1.30	14		41	77		10	1		19	154	4	4	2			4	29						7		1	1	1	369	58	427	
1H-2, 5–7	1.61	2		8	176		6	1	2	22	84	3		1		1	2	14						4	1		1	2	330	79	409	
1H-2, 35–37	1.92	24	3	33	63		5		11	13	143	3		1			12	32					8				1	1	353	69	422	
1H-CC, 5–7	2.08																												0		0	Barren
2H-1, 5–7	2.26	17	1	67	9	1	14		3	31	220	1	1	1	2		2	11		1				12		1			395	73	468	
2H-1, 35–37	2.54	20		31	20	1	17	2	2	36	219	9	2	12	1		6	15		1				7			2		403	56	459	
2H-1, 65–67	2.83	8		9	34	2	9		33	21	81	68	16	2				11	15	1			2	11	1		2		326	53	379	
2H-1, 95–97	3.12	13		14	32	1	16	3	37	10	85	25	5	2	1		2	52	11	7			1	9				1	327	158	485	
2H-1, 125–127	3.40																												0		0	Barren
2H-2, 5–7	3.69	7	1	20	8		4		4	42	207	2	1	2			10	4		1				18					331	94	425	
2H-2, 35–37	3.98	11		3	36	1	1	1	1	36	58	108	37	3	1			3	6	4		1	2	18	2	1			334	88	422	
2H-2, 65–67	4.26	12		15	21	2	15			28	209	6		3			6	3	1					5					326	114	440	
2H-2, 95–97	4.55																												0		0	Barren
2H-2, 125–127	4.84																												0		0	Rare
2H-3, 5–7	5.12																												0		0	Barren
2H-3, 32–34	5.38	13		5	16	2	9	2	5	28	162	23	21	1			3	3	15	8				17			1		334	202	536	
2H-3, 65–67	5.69																												0		0	Barren
2H-3, 95–97	5.98																												0		0	Barren
2H-3, 125–127	6.27	10		5	4	1	10	3	4	40	136	32	15	5			1	2	8	14			1	11		1	2	3	308	156	464	
2H-4, 5–7	6.55																												0		0	Barren
2H-4, 36–38	6.84																												0		0	Barren
2H-4, 65–67	7.13	9		1	5	4	12	6	2	27	126	69	15	4			4	5	13	13			6		1			1	323	202	525	
2H-4, 95–97	7.41	13		1	1	2	8	4	3	26	89	87	75					1	7	7		1	6				1	2	334	220	554	
2H-4, 125–127	7.70	12		6	4	3	4	3		33	115	104	25	2			4		2	3	1		1	4		1		2	329	197	526	
2H-5, 5–7	7.99			1		1				1	6													1					10	3	13	Rare
2H-5, 35–37	8.27	7		17	2		25	1		15	231	2					4	1			1			3					309	266	575	
2H-5, 65–67	8.56	6		10	3	2	10	1	3	26	93	97	42	7			3		15	8			1	8	2		1	1	339	112	451	
2H-5, 95–97	8.85	10		9		2	15	4	1	28	143	54	49				1		2	8			7					2	335	308	643	
2H-5, 125–127	9.13																												0		0	Barren
2H-6, 5–7	9.42																												0		0	Barren
2H-6, 35–37	9.70																												0		0	Rare
2H-6, 65–67	9.99	7		10		10	87	2		20	163	2	1				11	2		1				1					317	40	357	
2H-6, 95–97	10.28	4		5		1	71	3		6	237						1	4						1					333	32	365	

Table T2 (continued).

Core, section, interval (cm)	Average depth (mbsf)	*Calcidiscus leptoporus*	*Ceratolithus cristatus*	*Coccolithus pelagicus*	*Emiliania huxleyi*	*Gephyrocapsa carribeanica* (large)	*Gephyrocapsa carribeanica* (medium)	*Gephyrocapsa carribeanica* (small)	*Gephyrocapsa muellerae*	*Gephyrocapsa oceanica* (large)	*Gephyrocapsa oceanica* (medium)	*Gephyrocapsa* (small)	*Gephyrocapsa* (very small)	*Helicosphaera carteri*	*Helicosphaera inversa*	*Neosphaera coccolithomorpha*	*Pseudoemiliania lacunosa*	Placolith (medium)	Placolith (small)	Placolith (very small)	*Sphenolithus* spp.	*Syracosphaera histrica*	*Syracosphaera pulchra*	*Syracosphaera* spp.	*Umbellosphaera irregularis*	*Umbilicosphaera hulburtiana*	*Umbilicosphaera* var. *sibogae*	*Umbilicosphaera sibogae* var. *foliosa*	Subtotal	*Florisphaera profunda*	Total	Remarks
2H-6, 125–127	10.56																												0		0	Barren
2H-7, 5–7	10.85	5		1			204	11		4	103						1	2	3					4					338	40	378	
2H-7, 35–37	11.14																												0		0	Barren
2H-7, 64–66	11.41	2		3		1	252	7	1		26	1						3		1				3					300	19	319	
2H-CC, 5–7	11.49	2		2		1	178	74	2	2	42	3						2	3	2				6					319	24	343	
3H-1, 5–7	11.76	2		3			172	71		2	58	4	5						5					3					325	31	356	
3H-1, 35–37	12.05	3		3			177	35	2	1	96	4							1										322	38	360	
3H-1, 65–67	12.34	2		3			245	41			29	4						4						1					329	27	356	
3H-1, 95–97	12.63	2		12			68	13		3	211			1				12	4					1					327	73	400	
3H-1, 125–127	12.92																												0		0	Barren
3H-2, 5–7	13.21																												0		0	Barren
3H-2, 35–37	13.50																												0		0	Barren
3H-2, 65–67	13.80																												0		0	Barren
3H-2, 95–97	14.09																												0		0	Barren
3H-2, 125–127	14.38																												0		0	Rare
3H-3, 5–7	14.67	1		4		3	121	12		5	140			1				4	1					8					300	107	407	
3H-3, 35–37	14.96																												0		0	Rare
3H-3, 65–67	15.25	2					245	25		9	16	3						4						4					308	17	325	
3H-3, 95–97	15.54	1					104	24		1	170						1							1					302	89	391	
3H-3, 125–127	15.83																												0		0	Barren
3H-4, 5–7	16.13																												0		0	Barren
3H-4, 35–37	16.42	3					162	39	1		74	4	2					16	5					3					309	37	346	
3H-4, 65–67	16.71	1		2		3	203	31	3	24	26	22	4				1	2	15	4				5					346	28	374	
3H-4, 95–97	17.00	3				1	194	71	3	2	5	26	9						6	1				1					322	16	338	
3H-4, 125–127	17.29			1		1	204	62			40	4						3	4					5					324	7	331	
3H-5, 5–7	17.58	5					227	43			31	4		1				3						2			1		317	11	328	
3H-5, 35–37	17.87						198	70			48	8						10	2					2					338	18	356	
3H-5, 65–67	18.16	3					201	58			52	18		1				9	4	1				1					348	22	370	
3H-5, 95–97	18.45	1					221	49			21	11						8	3					8					322	16	338	
3H-5, 125–127	18.75	2				1	208	45			44	10	1					12	4					2					329	18	347	
3H-6, 5–7	19.04	1					194	78			44	12						4	1					4					338	23	361	
3H-6, 35–37	19.33	1		1			208	53			53	13						6		1				1					337	19	356	
3H-6, 65–67	19.62	3		3			186	48			76	16		1				17	2	1				1					354	30	384	
3H-6, 95–97	19.91	2		1			211	42			55	6						5	3					4					329	24	353	
3H-6, 125–127	20.20	3		2			208	41			52	5						3	1					1					316	25	341	
3H-7, 5–7	20.49	1		4			198	41			66	4	1					9	3					4					331	20	351	
3H-7, 35–37	20.78	2	1	7			162	34			77	1		1				24	1					11					321	22	343	
3H-CC, 5–7	21.01			8			192	63			29	3						16						11					322	20	342	