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6. Data Report: Diatom Biostratigraphy of Sites 1251 and 1252[1]

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INTRODUCTION

Sites 1251 (44°34.213′N, 125°4.440′W; 1211 m water depth) and 1252 (44°35.167′N, 125°5.569′W; 1039 m water depth) were drilled on the eastern flank of the southern summit of Hydrate Ridge off Oregon in the northeast Pacific Ocean, where well-stratified sediments were deposited at a rapid rate. Unconformities and debris flow layers of middle Pleistocene age were found at both sites. Their ages are of great importance in constructing the geohistory of Hydrate Ridge. Detailed diatom biostratigraphy of the middle to late Pleistocene of Sites 1251 and 1252 was carried out for this purpose.

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T2. Diatoms, Site 1252, p. 8.

METHODS

A total of 39 samples from Holes 1251C and 1251B and 41 samples from Hole 1252A were analyzed (Tables T1, T2). About 0.1 g of sample was soaked in 10 mL of distilled water for 1 hr and then stirred. Strewn slides were prepared by sampling the solution with a pipette, spreading the sample on an 18 mm × 18 mm coverslip, drying it on a hot plate, and then mounting the sample with mounting medium.

More than 100 diatom valves were counted for each sample at 600× magnification. Resting spores of *Chaetoceros* and its allied forms were counted separately during this routine count of diatom valves. At least half of the slide was scanned after the routine counting to find rare but important diatoms. Identifications of diatoms were checked at 1000× magnification.

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Only one diatom biohorizon was recognized during shipboard analysis of the middle Pleistocene to Holocene sediments from both sites. In order to improve the resolution of the age determination for this interval, it was necessary to correlate the fluctuation of diatom assemblages from both sites to the standard marine oxygen isotope stages (MIS). The abrupt changes of the frequencies of a few taxa, such as *Fragilariopsis doliolus, Thalassionema nitzschioides,* and resting spores of *Chaetoceros* spp., for the past 30 k.y. were dated or correlated to the standard oxygen isotope curve by Sancetta et al. (1992) off Oregon and California. The high-resolution study by Barron et al. (2003) at Ocean Drilling Program Site 1019 off northern California revealed detailed changes in the diatom assemblage for the past 16 k.y. with precise age control by radiometric ages. The fluctuation of diatom assemblages from Sites 1251 and 1252 was correlated with the standard MIS by comparing the results of the present study with the results of Barron et al. (2003) and Sancetta et al. (1992).

RESULTS

Site 1251

Samples were collected from interval 204-1251C-1H-1, 1 cm (0.01 meters below seafloor [mbsf]), to 204-1251B-16H-5, 100 cm (141.60 mbsf). This interval includes lithostratigraphic Unit I and the upper part of Unit II. The boundary between the two units is an unconformity (Tréhu, Bohrmann, Rack, Torres, et al., 2003). This interval was assigned to the *Neodenticula seminae* Zone (NPD12; 0–0.3 Ma) (Yanagisawa and Akiba, 1998) and the sedimentation rate of Unit I was estimated as ≥1.2 m/k.y. (Tréhu, Bohrmann, Rack, Torres, et al., 2003).

Warm-water *F. doliolus* occurs in the interval 204-1251C-1H-1, 1 cm (0.01 mbsf), to 204-1251C-1H-6, 30 cm (7.80 mbsf) (Table **T1**). Since *F. doliolus* occurs from 10 ka to present in the most recent 30 k.y. off Oregon and California (Sancetta et al., 1992), the interval is correlated to MIS 1 or Holocene. The abundance of resting spores of *Chaetoceros* spp. relative to diatom valves is higher in the interval between 0.01 and 11.93 mbsf (Table **T1**). The high abundance of resting spores of *Chaetoceros* spp. resulted from upwelling off Oregon and California under the interglacial climate system (Sancetta et al., 1992). This agrees with the above-mentioned age estimate based on the occurrence of *F. doliolus*.

The abundance of *F. doliolus* is maximum in Sample 204-1251C-1H-6, 30 cm (7.80 mbsf), and decreases upward. This decrease can be correlated to the decrease at Site 1019 off northern California, where Barron et al. (2003) found that the abundance of *F. doliolus* is low during the interval of low-alkenone sea-surface temperatures in the middle Holocene (~8.2–3.2 ka). The abundance of *F. doliolus* remains low to the top of the core at this site, although it increases in the late Holocene (~3.2–present) at Site 1019. This difference may result from the difference in oceanographic conditions in the late Holocene between the two sites or simply the lack of late Holocene interval in this core.

The abundance of *T. nitzschioides* is highest in Sample 204-1251B-3H-1, 100 cm (19.60 mbsf). This peak in the abundance in *T. nitzschioides* is correlated to the peak in *T. nitzschioides* at 18–23 ka off Oregon and California (Sancetta et al., 1992). Thus, the debris flow layer at 23–34 mbsf (DF1) in Hole 1251B is dated at ~25 ka.

Neither a continuous occurrence of *F. doliolus* nor a high abundance of resting spores of *Chaetoceros* spp., which corresponds to MIS 5 and the last interglacial, was found in lithostratigraphic Unit I (0–130 mbsf) below the Holocene interval. Considering the high sedimentation rate of Unit I, the sampling interval is enough to identify MIS 5. Therefore, the bottom of Unit I, which unconformably overlies Unit II, should be younger than MIS 5.

Site 1252

Samples were collected from the top to bottom of Hole 1252A (4.89–258.96 mbsf). Reinvestigation revealed that the stratigraphic position of the last occurrence (LO) of *Proboscia curvirostris* should be revised as follows. The LO was placed in Sample 204-1252A-10H-CC (90.80 mbsf) by shipboard study (Tréhu, Bohrmann, Rack, Torres, et al., 2003). Considering that this sample was taken from the debris flow deposit (DF2) and *P. curvirostris* does not occur in the five samples just below it (Table T2), the occurrence of *P. curvirostris* at 90.80 mbsf is judged to be a reworked fossil. Thus, the LO is moved to Sample 204-1252A-14H-2, 99 cm (121.39 mbsf), based on this reexamination (Table T2). The sedimentation rate is ≥0.4 m/k.y. above the LO of *P. curvirostris*.

Stephanopyxis spp. continuously and abundantly occurs above the LO of *P. curvirostris,* including Sample 204-1252A-1H-CC (4.89 mbsf), which is the youngest sample examined at this site; however, it occurs only sporadically from the Holocene interval at Site 1251. This indicates that Sample 204-1252A-1H-CC (4.89 mbsf) can be older than the Holocene and that the thickness of the Holocene may be thinner than in Hole 1251C. Rare and sporadic occurrences of *F. doliolus* in the upper part of Site 1252 are concordant with this interpretation.

The boundary between lithostratigraphic Units I and II at Site 1252 is an unconformity correlated to the unconformity between lithostratigraphic Units I and II at Site 1251 (Tréhu, Bohrmann, Rack, Torres, et al., 2003). The unconformity is judged to be younger than MIS 5, as at Site 1251, because clear evidence for MIS 5 (e.g., abundant *F. doliolus* or resting spores of *Chaetoceros* spp.) was not found above the unconformity, although a narrower sampling interval is needed to ensure the lack of MIS 5.

SUMMARY

1. The base of the Holocene in Hole 1251C is between 7.80 and 8.51 mbsf.
2. The debris flow deposit at 23–34 mbsf in Hole 1251B is dated at ~25 ka.
3. The unconformity between lithostratigraphic Units I and II at Sites 1251 and 1252 is younger than MIS 5.

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Table T1. Diatoms, Site 1251. (Continued on next page.)

Core, section, interval (cm)	Depth (mbsf)	*Actinocyclus curvatulus* Janisch	*Actinocyclus ochotensis* Jousé	*Actinoptychus senarius* (Ehrenberg) Ehrenberg	*Asteromphalus* sp.	*Aulacoseira granulata* (Ehrenberg) Simonsen	*Aulacoseira* spp.	*Azpeitia tabularis* (Grunow) Fryxell and Sims	*Bacterosira fragilis* (Gran) Gran	*Cavitatus jouseanus* (Sheshukova-Poretzkaya) Williams	*Cocconeis* spp.	*Coscinodiscus marginatus* (Ehrenberg)	*Coscinodiscus radiatus* (Ehrenberg)	*Cyclotella striata* (Kützing) Grunow	*Delphineis angustata* (Pantocsek) Andrews	*Delphineis* spp.	*Delphineis surirella* (Ehrenberg) Andrews	*Denticulopsis hyalina* (Schrader) Simonsen	*Denticulopsis lauta* (Bailey) Simonsen and Kanaya	*Denticulopsis praedimorpha* Akiba ex. Barron	*Denticulopsis simonsenii* Yanagisawa and Akiba	*Diploneis* spp.	*Epithemia* spp.	*Fragilariopsis doliolus* (Wallich) Medlin and Sims	*Grammatophora* spp.	*Hemidiscus cuneiformis* Wallich	*Navicula* spp.	*Neodenticula kamtschatica* (Zabelina) Akiba and Yanagisawa	*Neodenticula koizumii* Akiba and Yanagisawa	*Neodenticula seminae* (Simonsen and Kanaya) Akiba and Yanagisawa	*Nitzschia interruptestriata* (Heiden) Simonsen
204-1251C-																															
1H-1, 1	0.01			2								2	4	2	2	*	3							2			15			12	
1H-2, 40	1.90	2		3							1	6	4	1	1		2							2			10				
1H-3, 100	2.50		1	2				*				1	2	2	2	1	5							1			14			1	2
1H-3, 85	3.85										1	1	5				4			1				9			7			4	
1H-4, 30	4.80			2								2	2	4	6		5							8						10	1
1H-4, 130	5.80			2		1		1				3		2	7		3							7						10	1
1H-5, 85	6.80			1								4	4	4	*		1							14	5					9	
1H-6, 30	7.80							2				2	1	6	4		4							23				1		5	
2H-1, 41	8.51	1		3			1	2			1	5	2		1		4					1					1	1		2	1
2H-1, 123	9.35	1		1			3	1			1	5			1		8	2				1						*		3	
2H-2, 42	10.02	1		2			1				5	2			1		3										5	*		2	4
2H-3, 41	11.18	1		3			5	3			1	1			4		2							*	1		1		1	8	
2H-3, 126	11.93			5			4	2			3	2	1		1		2	2					1			1	2			1	
204-1251B-																															
3H-1, 100	19.60			2				1			2	2	1					1							3		*			3	
3H-3, 100	22.50			2			1				*				8		8		1									*		7	
3H-4, 100	24.00	2					3	3			*						11	1									3			2	
4H-1, 100	29.10						2	2		*	1	4			*		1	1					1					*		1	
4H-3, 100	32.10	1		1					*		1	3												*							
4H-5, 100	35.10			3			3	4			1	2	1				2												*	1	
4H-6, 74	36.30						2	1			1						2													*	
5H-1, 100	40.10			1				1		*	3				3	3	1										1			2	
5H-5, 100	44.50			1			2	1			2	1					2	2				1				1	1	1		2	
6H-2, 100	48.90			3	1			1									7								2					9	
6H-4, 100	51.80			2							1	1			4		8													2	
7H-2, 100	59.10	1		2							1	1	1				1				1									1	
7H-4, 100	62.10												1		1		1													2	
8H-2, 100	68.60	2					1				3	2				3	3										4	*		1	
8H-5, 100	73.00	3					4				2	2			1							3					3			2	
10H-2, 100	87.60	3		1			3					1			1	1	6										5			7	
10H-5, 100	92.10							1							*								1							5	1
11H-2, 71	96.80						1				1					3									1		1			2	
11H-5, 67	100.70			3			1	1			2	3	3		6	3	9													9	
13H-2, 104	108.30			1			5	3				1			1	4	3						1				1			8	*
13H-5, 100	112.60			2							1					2	1													1	
14H-5, 100	122.10										1						2													*	
15H-2, 100	127.60			2			5				1	2			6	12	19							*			*	1		5	
15H-5, 100	132.10	1					3				1	1					2										2			17	
16H-2, 93	137.03	1		1			2					1	2	1	1		1										1			15	
16H-5, 100	141.60	3					4				1	2			*	1	2					1		*						3	

Note: * = species found as a fragment or after a routine count.

Table T1 (continued).

Core, section, interval (cm)	Depth (mbsf)	*Odontella aurita* (Lyngbye) Agardh	*Paralia sulcata* (Ehrenberg) Cleve	*Proboscia barboi* (Brun) Jordan and Priddle	*Pyxidicula zabelinae* (Jousé) Makarova and Moiseyeva	*Rhaphoneis* spp.	*Rhizosolenia hebetata* Gran	*Rhizosolenia styliformis* Bright	*Rouxia californica* Peragallo	*Stephanodiscus* spp.	*Stephanodiscus horridus* Koizumi	*Stephanopyxis dimorpha* Schrader	*Stephanopyxis* spp.	*Thalassionema nitzschioides* H. and M. Peragallo	*Thalassiosira antiqua* (Grunow) Cleve-Euler	*Thalassiosira eccentrica* (Ehrenberg) Cleve	*Thalassiosira hyalina* (Grunow) Gran	*Thalassiosira leptopus* (Grunow) Hasle and Fryxell	*Thalassiosira lineata* Jousé	*Thalassiosira nordenskioeldii* Cleve	*Thalassiosira oestrupii* (Ostenfeld) Lavrenko	*Thalassiosira simonsenii* var. minor	*Thalassiosira trifulta* Fryxell	*Thalassiosira* spp.	*Thalassiothrix longissima* Cleve and Grunow	Total valves	Resting spores of *Chaetoceros* spp.
204-1251C-																											
1H-1, 1	0.01		6				2							43				3			1			1		100	150
1H-2, 40	1.90		4										1	58		1		1	1			1		1	2	102	418
1H-3, 100	2.50		2											54		3			4		2			1		100	296
1H-3, 85	3.85		8											54						1		1		2	2	100	351
1H-4, 30	4.80											2	1	42					1					14		100	180
1H-4, 130	5.80		1										2	44		1			1					14		100	322
1H-5, 85	6.80	1												41				1				4		11		100	265
1H-6, 30	7.80	1	1										1	65		1			2		1	2		8	*	130	371
2H-1, 41	8.51											1		45	1		1				1		1	26		102	308
2H-1, 123	9.35		1			2								28	1				2			1	2	36	1	101	522
2H-2, 42	10.02					1	1			1			4	51								1		16	*	101	372
2H-3, 41	11.18	1	1			3				1		23	8	17	1		2		1			2	1	8	*	100	419
2H-3, 126	11.93					5				2		13	2	35	1							5		10		100	527
204-1251B-																											
3H-1, 100	19.60				1	*						2	8	114										12		152	118
3H-3, 100	22.50		1			1						22	16	27					3					22		119	188
3H-4, 100	24.00	1				13						18	10	63	2		1						8	10		151	180
4H-1, 100	29.10					2			1	1		26	11	23	1								5	17		100	284
4H-3, 100	32.10					1						40	31	16	1									6		101	72
4H-5, 100	35.10			1		3			*			13	8	28			2					3	2	23		100	129
4H-6, 74	36.30										9	18	18	21			1						3	34		110	184
5H-1, 100	40.10					2						22	12	38	2		3		2				5	47		148	185
5H-5, 100	44.50					2						24	16	52	2							2	2	9		126	234
6H-2, 100	48.90		1			3						16	8	66										32		149	285
6H-4, 100	51.80					*						11	28	77					1					12		147	127
7H-2, 100	59.10					2		1				23	24	26		5	3		2					32		127	203
7H-4, 100	62.10								*			88	70	20	1									15		199	130
8H-2, 100	68.60		2			4						30	27	12	1				2					25		122	217
8H-5, 100	73.00		1			5				3		26	27	19	2				1				1	20		125	220
10H-2, 100	87.60		1			*				1		24	15	43			8		2		3			58		183	88
10H-5, 100	92.10					1						6	17	23	1		8							35	1	100	250
11H-2, 71	96.80					2						49	41	5										14		120	190
11H-5, 67	100.70		2			3						21	22	15					1					13		117	244
13H-2, 104	108.30		1						*			31	24	60				1					1	31		177	148
13H-5, 100	112.60	2	3			1				2		28	24	47					1		2			30	*	147	167
14H-5, 100	122.10											78	41	22										6	*	150	219
15H-2, 100	127.60	1	1			4				1		3	9	23	2		1				2			7		107	243
15H-5, 100	132.10					1				2		40	16	40				1						6		133	192
16H-2, 93	137.03		2									8	4	47							7			13	*	107	358
16H-5, 100	141.60		1			1				1		44	21	18	1									6		110	196

Table T2. Diatoms, Site 1252. (Continued on next two pages.)

Core, section, interval (cm)	Sample depth (mbsf)	Diatom zone	*Actinocyclus curvatulus* Janisch	*Actinocyclus ochotensis* Jousé	*Actinocyclus octonarius* Ehrenberg	*Actinocyclus oculatus* Jousé	*Actinoptychus senarius* (Ehrenberg) Ehrenberg	*Aulacoseira granulata* (Ehrenberg) Simonsen	*Aulacoseira* spp.	*Azpeitia tabularis* (Grunow) Fryxell and Sims	*Bacterosira fragilis* (Gran) Gran	*Cocconeis* spp.	*Coscinodiscus marginatus* Ehrenberg	*Coscinodiscus radiatus* Ehrenberg	*Cyclotella striata* (Kützing) Grunow	*Delphineis angustata* (Pantocsek) Andrews	*Delphineis* spp.	*Delphineis surirella* (Ehrenberg) Andrews	*Denticulopsis hyalina* (Schrader) Simonsen	*Denticulopsis simonsenii* Yanagisawa and Akiba	*Diploneis* spp.	*Epithemia* spp.	*Fragilariopsis doliolus* (Wallich) Medlin and Sims	*Fragilariopsis reinholdii* Kanaya	*Grammatophora* spp.	*Hemidiscus cuneiformis* Wallich	*Melosira albicans* Sheshukova-Poretzkaya
204-1252A-																											
1H-CC	4.89		3	2			5		2				1	1	1								2			1	
2H-2, 100	7.40						2		1		1		1								1						
2H-CC	14.88			1									3														
3H-2, 100	15.65		1		1		4					1	1					3									
3H-CC	23.84			2			1						1			*	2										
4H-2, 100	26.40				1		1	6				1	2		1			*		*	3						
4H-CC	33.77						1					1													1		
5H-2, 86	34.85											1		2		1		4									1
5H-CC	43.45												1			1											
6H-2, 100	45.40						2			1		1				1		3							1		1
6H-CC	53.00		2														7										
7H-2, 100	54.90	NPD12					2	3										2									
7H-CC	61.73						1	4				1				2	2								1		
8H-2, 100	64.40		1		1	1	4	1			*		6	3	1	1		3				1					
8H-CC	71.42		3									1			12	1							2		1		
9H-3, 100	75.40						2	2			1		3														
9H-CC	81.28		1																								
10H-3, 100	84.00		3				1					1													1		
10H-CC	90.80			1			4	3				1	5		1	3	14	12	*						1		
11H-2, 100	92.90		3				1	*				1	2		4			1									
11H-CC	100.59		2					1				1		2		1							*				
12H-5, 100	106.80		1				2	4		3		*	4					2									
12H-CC	110.06		*	3			1			5		1	1			1	4	6	1						*		
13H-2, 100	111.90				1					3		5						5	2								
14H-2, 99	121.39	NPD11	2		1		*						5	1		1											
14H-5, 98	125.80		4				4					1		2				2					2	3	3		
14X-CC	128.72		4	2		2							2	1		2		2									
15X-CC	134.64		*			*	1							*		*											
16X-CC	141.57		6				1					1	1	1		1		*					*	*			
17X-CC	153.31		3	2			1		1					4		4							1	2			
18X-CC	161.28		3			2			1																		
19X-CC	173.39	NPD10		2							1						1										
20X-CC	179.54												1														
21X-CC	192.97		6	*									1				2									1	
22X-CC	202.54		8			*							1														
23X-CC	209.12		11									1	2										*				
24X-CC	218.27		6	*									1	1													
25X-CC	230.00		3			1		1					2			4	1							*			
26X-CC	239.65	NPD9														3											
27X-CC	249.34		6				1							4													
28X-CC	258.96	NPD8	1	*		1		1										1									

Notes: NPD 12 = *Neodenticula seminae* Zone, NPD 11 = *Proboscia curvirostris* Zone, NPD 10 = *Actinocyclus oculatus* Zone, NPD 9 = *Neodenticula koizumii* Zone, NPD8 = *Neodenticula koizumii/Neodenticula kamtschatica* Zone. * = species found as a fragment or after a routine count.

Table T2 (continued).

Core, section, interval (cm)	Sample depth (mbsf)	Diatom zone	*Navicula* spp.	*Neodenticula kamtschatica* (Zabelina) Akiba and Yanagisawa	*Neodenticula koizumii* Akiba and Yanagisawa	*Neodenticula* sp. A	*Neodenticula seminae* (Simonsen and Kanaya) Akiba and Yanagisawa	*Odontella aurita* (Lyngbye) Agardh	*Paralia sulcata* (Ehrenberg) Cleve	*Porosira gracilis* (Greville) Heiberg	*Proboscia alata* (Brightwell) Jordan and Priddle	*Proboscia barboi* (Brun) Jordan and Priddle	*Proboscia curvirostris* (Jousé) Jordan and Priddle	*Stephanodiscus horridus* Koizumi	*Rhaphoneis amphiceros* Ehrenberg	*Rhaphoneis* spp.	*Rhizosolenia bergonii* Peragallo	*Rhizosolenia hebetata* Gran	*Rhizosolenia styliformis* Brightwell	*Stephanopyxis dimorpha* Schrader	*Stephanopyxis* spp.	*Thalassionema nitzschioides* H. and M. Peragallo	*Thalassiosira antiqua* (Grunow) Cleve-Euler	*Thalassiosira decipiens* (Grunow) Jørgensen	*Thalassiosira eccentrica* (Ehrenberg) Cleve	*Thalassiosira gravida* Cleve	*Thalassiosira hyalina* (Grunow) Gran
204-1252A-																											
1H-CC	4.89						4								2					39	4	17	1		2		
2H-2, 100	7.40						4		1						1					30	29	28					1
2H-CC	14.88						*													83	1	7					
3H-2, 100	15.65						2													26	1	35	1	7			5
3H-CC	23.84						2								1					83	4	2					1
4H-2, 100	26.40		1				3								4					47	5	13	2				4
4H-CC	33.77						1	2							1					46	6	4					10
5H-2, 86	34.85		1				1								2					62		2		1			9
5H-CC	43.45						2													61	11	2					9
6H-2, 100	45.40						5								3					57		14		1			3
6H-CC	53.00						5		1						3					32	8	16					8
7H-2, 100	54.90						5		3						1					44	3	16		2			9
7H-CC	61.73	NPD12					5		*											26	14	27					5
8H-2, 100	64.40		1				*		28							1			1	22	3	19					*
8H-CC	71.42						2											1		7	5	52			1		
9H-3, 100	75.40						3									1				33		13					
9H-CC	81.28			1			4								1					39	17	24	2				
10H-3, 100	84.00						7				1									37	1	20			*	5	11
10H-CC	90.80						5		1			1	*		9					17	4	15	1				
11H-2, 100	92.90		*				9											2		28	8	28			1		1
11H-CC	100.59						5		2											11	2	67	1				
12H-5, 100	106.80						4		2							2				39	7	21	1				1
12H-CC	110.06						4								1					13		51	1				
13H-2, 100	111.90						3												1	12	2	56					1
14H-2, 99	121.39						8						3					1		65	2	4					3
14H-5, 98	125.80	NPD11					25				1	1	3			4	1		1	13		16	1		1		
14X-CC	128.72						53					1	2		1					7	4	12					
15X-CC	134.64						1						*							85	11	1					
16X-CC	141.57						41						*					1		30	4	4	1		1		4
17X-CC	153.31						24		1	1			*		1			2		16	5	14			3		
18X-CC	161.28						10						1					1	1	51	24	1					
19X-CC	173.39	NPD10					5				1		1							6	17	2					
20X-CC	179.54											1								1	1						
21X-CC	192.97						17					2			1			1	1	29	23	6					
22X-CC	202.54						43				*	1								15	19	6					
23X-CC	209.12						21													12	26	10					
24X-CC	218.27						35													21	30	4					
25X-CC	230.00				3	4	38					*			2			1		2	19	17			*		
26X-CC	239.65	NPD9			2		48							*						3	16	24	1				
27X-CC	249.34						63				1	2			1					3	9	5					
28X-CC	258.96	NPD8		*	4		76													1	4	9	1				

Table T2 (continued).

Core, section, interval (cm)	Sample depth (mbsf)	Diatom zone	*Thalassiosira jouseae* Akiba	*Thalassiosira leptopus* (Grunow) Hasle and Fryxell	*Thalassiosira lineata* Jousé	*Thalassiosira nidulus* (Temphre and Brun) Jousé	*Thalassiosira oestrupii* (Ostenfeld) Proshukina	*Thalassiosira temperei* (Brun) Akiba and Yanagisawa	*Thalassiosira* spp.	*Thalassiothrix longissima* Cleve and Grunow	Total valves	Resting spores of Chaetoceros
204-1252A-												
1H-CC	4.89						1		12		100	90
2H-2, 100	7.40								20		120	224
2H-CC	14.88								2	3	100	32
3H-2, 100	15.65				2				10		100	418
3H-CC	23.84								1		100	47
4H-2, 100	26.40		1		1			1	3		100	95
4H-CC	33.77						1		26		100	75
5H-2, 86	34.85				2				11		100	110
5H-CC	43.45				2				11		100	130
6H-2, 100	45.40								7		100	142
6H-CC	53.00				2				16		100	146
7H-2, 100	54.90	NPD12					1		9		100	74
7H-CC	61.73				*				12		100	284
8H-2, 100	64.40								2		100	156
8H-CC	71.42						5		7		100	177
9H-3, 100	75.40								2		60	149
9H-CC	81.28				2		1		8		100	155
10H-3, 100	84.00				3				9		100	725
10H-CC	90.80								2		100	76
11H-2, 100	92.90						3		7	1	100	285
11H-CC	100.59						4		1		100	86
12H-5, 100	106.80								7		100	107
12H-CC	110.06								7		100	53
13H-2, 100	111.90				*				9		100	62
14H-2, 99	121.39								4		100	98
14H-5, 98	125.80	NPD11					8		4		100	287
14X-CC	128.72			1			2		2		100	184
15X-CC	134.64								1		100	18
16X-CC	141.57						1		2		100	147
17X-CC	153.31			1			7		7		100	542
18X-CC	161.28					1	1		3		100	24
19X-CC	173.39	NPD10				2			1		39	25
20X-CC	179.54										4	0
21X-CC	192.97			2	1	1	1		5		100	700
22X-CC	202.54						1		6		100	634
23X-CC	209.12						2		1		86	364
24X-CC	218.27				1				1		100	74
25X-CC	230.00						1		1		100	134
26X-CC	239.65	NPD9					1		2		100	83
27X-CC	249.34								5		100	836
28X-CC	258.96	NPD8					*		1		100	932