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6. Data Report: Biogenic Opal Contents in Sediments of the Southwest Pacific (Sites 1123, 1124, and 1125)[1]

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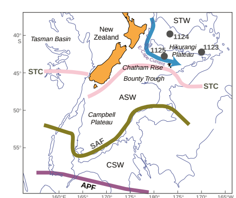
ABSTRACT

Biogenic opal concentrations were measured on bulk sediments recovered at Ocean Drilling Program Sites 1123, 1124, and 1125 off North Island of New Zealand in the southwest Pacific. Site 1124 showed opal contents ranging from approximately 2 to 8 wt%, which is relatively high compared to other sites. The subbottom maximum in biogenic opal content located between 1.0 and 1.5 m composite depth can be recognized at each site. Patterns of biogenic opal content in the uppermost parts of the cores appear to reflect the surface ocean settings relating to the migration of the Subtropical Convergence Zone.

INTRODUCTION

The eastern New Zealand region (Fig. F1), the target area of Ocean Drilling Program (ODP) Leg 181, includes two major oceanic fronts, the Subtropical Convergence (STC) and the Subantarctic Front (SAF). Thus, the region is in a prime position to allow determination of the migration of these boundaries and the environmental response to their movement (Shipboard Scientific Party, 1999a). In the later half of Leg 181, Sites 1123, 1124, and 1125 were drilled in the north of the modern STC. Because sedimentary sequences at these sites are beneath the possible migration area of the STC between glacial and interglacial times, information from these sites provides a record of the position of the STC, together with associated variations in oceanic productivity (Fenner et al., 1992; Weaver et al., 1998).

F1. Bathymetry of eastern New Zealand region with positions of major fronts at ocean surface and site locations, p. 5.



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Sites 1123 and 1124 (3290 m and 4000 m water depth, respectively) are located on the sediments drift, which was built up under a strong influence of the Deep Western Boundary Current, whereas Site 1123 is situated on the north flank of the Chatham Rise at 1340 m water depth. According to the shipboard examination of microfossils, a complete sedimentary record of uniform sedimentation rates from the early Miocene (~20.5 Ma) to Holocene was retrieved at Site 1124. Sites 1123 and 1125 also contain unaltered sequences from the late Miocene to present without major gaps. Average sedimentation rates from Miocene to Holocene vary from about 50 m/m.y. at Site 1124 (the deeper site) to 150 m/m.y. at Site 1125 (the shallower site).

In this data report, we briefly examine the fluctuations of paleoproductivity in the late Quaternary based on the biogenic opal concentrations measured on bulk sediments recovered at ODP Sites 1123, 1124, and 1125.

ANALYTICAL METHODS AND DATA

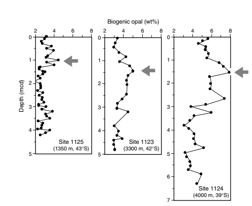
Biogenic opal content was analyzed by the wet alkaline extraction method (Kawahata et al., 1998), which was modified by Mortlock and Froelich (1989) on freeze-dried bulk-sediment samples and squeeze cakes for pore water samples. Approximately 50 mg of the sample was transferred into a 20-mL polypropylene tube. To remove carbonates, 1 mL of 1-N HCl was added, and the suspension was dried overnight at 60°C. After adding 1 mL of 10% H_2O_2 for removing organics, the suspension was again dried overnight at the same temperature. Then, 10 mL of a 7% Na_2CO_3 solution was added to the tubes. The tubes were closed and placed in a temperature-stated drying oven at 85°C. Each hour, the tubes were vigorously shaken to resuspend the solids. After a total time of 5 hr, dissolved silica was measured on diluted samples using the molybdate blue spectrophotometric method (Strickland and Parsons, 1968). Duplicate measurements were conducted on each sample. In order to convert silica concentration to opal content, we employed a factor of 2.4, which is proposed by Mortlock and Froelich (1989). Opal contents were expressed in the unit of weight percent. The relative error of biogenic opal content in sediment samples was better than 5%.

T1. Biogenic opal content, Site 1123, p. 8.

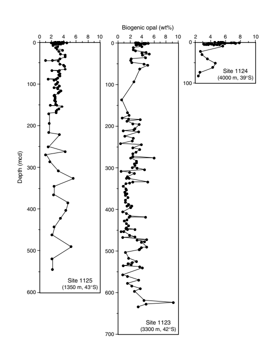
T2. Biogenic opal content, Site 1124, p. 10.

T3. Biogenic opal content, Site 1125, p. 11.

F2. Contents of biogenic opal in sediments, p. 6.



F3. Profiles of biogenic opal in sediments, p. 7.



RESULTS AND DISCUSSION

Results of opal content analyses are reported in Tables T1, T2, and T3. Fluctuations in opal contents in the uppermost cores at Sites 1123, 1124, and 1125 are shown in Figures F2 and F3. The subbottom maximum in biogenic opal content located between 1.0 m and 1.5 m composite depth (mcd) can be recognized at each site. If we take the sedimentation rate of the topmost part of the core into account (Shipboard Scientific Party, 1999b, 1999c, 1999d), these biogenic opal profile maxima appear to correspond to the last glacial maximum (LGM). Fenner et al. (1992) and Nelson et al. (1993) reported an increase in paleoproductivity of the surface water in this region during the LGM compared to the modern level. The former described the increased accumulation rate of diatoms during the LGM in the lower northwestern flank of the Chatham Rise by a factor of 10 compared to the Holocene. Although the increased opal contents may be related to the increase of paleoproductivity, changes in dilution rate by other components or dissolution of the opal are also expected. To quantify and display the true variability of biogenic opal flux at these ODP sites, an estimation of the mass accumulation rate of biogenic opal will be needed. This is an area for future study.

Both Fenner et al. (1992) and Nelson et al. (1993) concluded that the STC remained locked at Chatham Rise (~44°S) throughout the LGM to the Holocene. Site 1124 shows the highest opal content among the three sites, and the opal content decreases in the southern Sites 1123 and 1125. However, this tendency is probably controlled by water depth rather than the proximity to the STC. More careful examination is required in order to reconstruct the past migration of STC using the sedimentary records from these ODP sites.

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REFERENCES

Fenner, J., Carter, L., and Stewart, R., 1992. Late Quaternary paleoclimatic and paleoceanographic change over northern Chatham Rise, New Zealand. *Mar. Geol.,* 108:383–404.

Kawahata, H., Suzuki, A., and Ahagon, N., 1998. Biogenic sediments in the West Caroline Basin, the western equatorial Pacific during the last 330,000 years. *Mar. Geol*., 149:155–176.

Mortlock, R.A., and Froelich, P.N., 1989. A simple method for the rapid determination of biogenic opal in pelagic marine sediments. *Deep-Sea Res. Part A,* 36:1415–1426.

Nelson, C.S., Cooke, P.J., Hendy, C.H., and Cuthbertson, A.M., 1993. Oceanographic and climatic changes over the past 160,000 years at Deep Sea Drilling Project Site 594 off southeastern New Zealand, Southwest Pacific Ocean. *Paleoceanography,* 8:435–458.

Shipboard Scientific Party, 1999a. Leg 181 summary: Southwest Pacific paleoceanography. *In* Carter, R.M., McCave, I.N., Richter, C., and Carter, L., et al., *Proc. ODP, Init. Repts.,* 181: College Station, TX (Ocean Drilling Program), 1–80.

————, 1999b. Site 1123: North Chatham Drift—a 20-Ma record of the Pacific Deep Western Boundary Current. *In* Carter, R.M., McCave, I.N., Richter, C., Carter, L., et al., *Proc. ODP, Init. Repts.,* 181, 1–184 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

————, 1999c. Site 1124: Rekohu Drift—from the K/T boundary to the Deep Western Boundary Current. *In* Carter, R.M., McCave, I.N., Richter, C., Carter, L., et al., *Proc. ODP, Init. Repts.,* 181, 1–137 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

————, 1999d. Site 1125: productivity under the subtropical convergence on North Chatham Slope. *In* Carter, R.M., McCave, I.N., Richter, C., Carter, L., et al., *Proc. ODP, Init. Repts.,* 181, 1–92 [CD-ROM]. Available from: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

Strickland, J.D.H., and Parsons, T.R., 1968. *A Practical Handbook of Seawater Analysis*. Bull. Fish. Res. Board Can., 167.

Weaver, P.P.E., Carter, L., and Neil, H., 1998. Response of surface watermasses and circulation to late Quaternary climate change, east of New Zealand. *Paleoceanography,* 13:70–83.

Figure F1. Bathymetry of the eastern New Zealand region, with the positions of major fronts at the ocean surface (summer temperatures) and site locations of ODP Leg 181. APF = Antarctic Polar Front, SAF = Subantarctic Front, STC = Subtropical Convergence; CSW = Circumpolar Surface Water, ASW = Australasian Subantarctic Water, STW = Subtropical Surface Water.

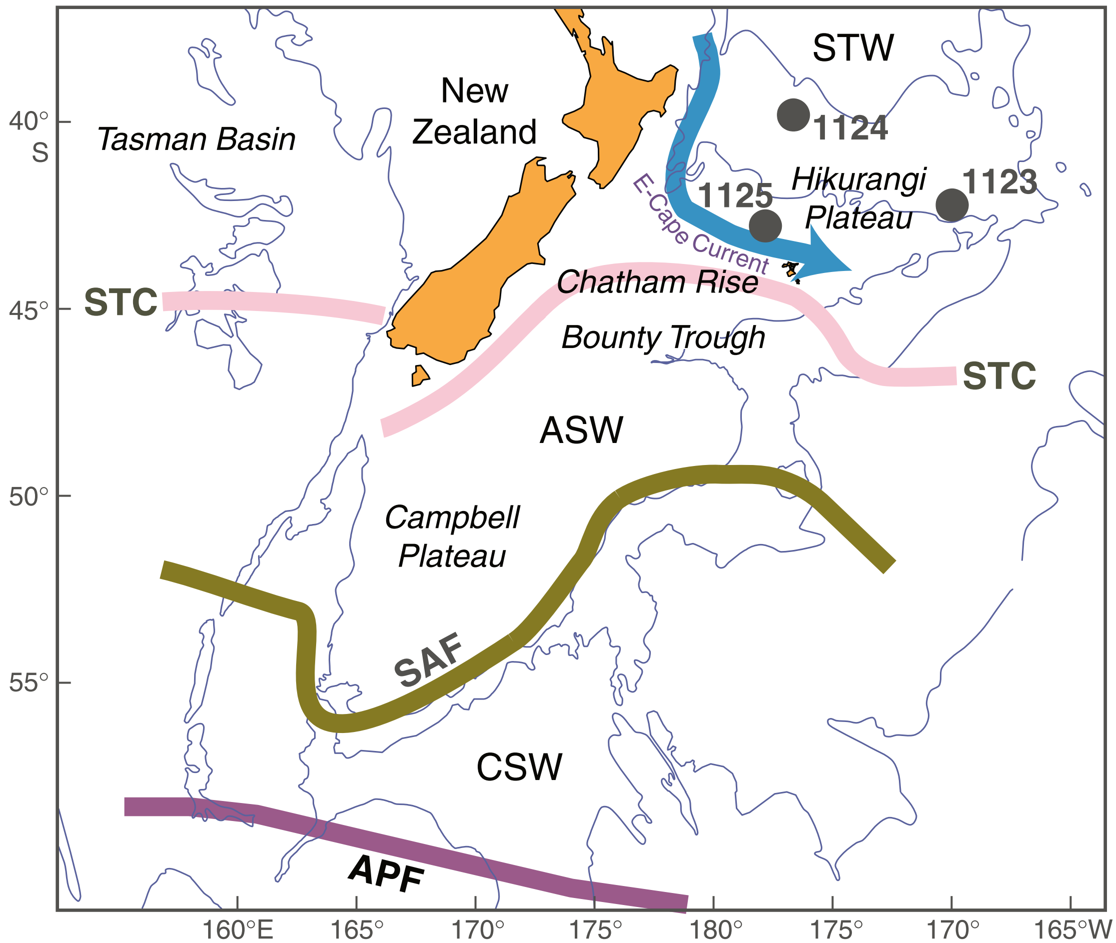

Figure F2. Contents of biogenic opal in sediments from the topmost part of the core at Sites 1123, 1124, and 1125. The probable horizons corresponding to the LGM are shown by dark arrows.

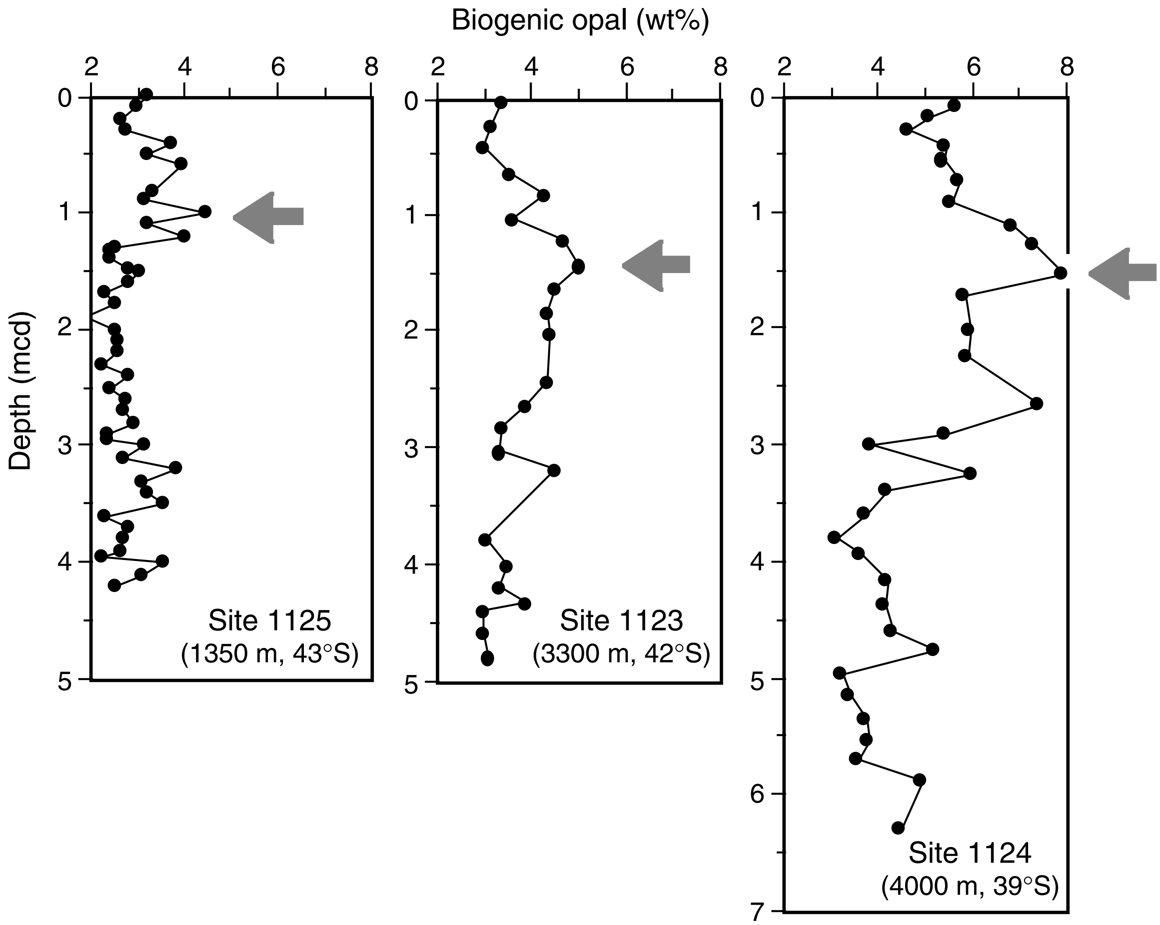

Figure F3. Profiles of biogenic opal in sediments from Sites 1123, 1124, and 1125.

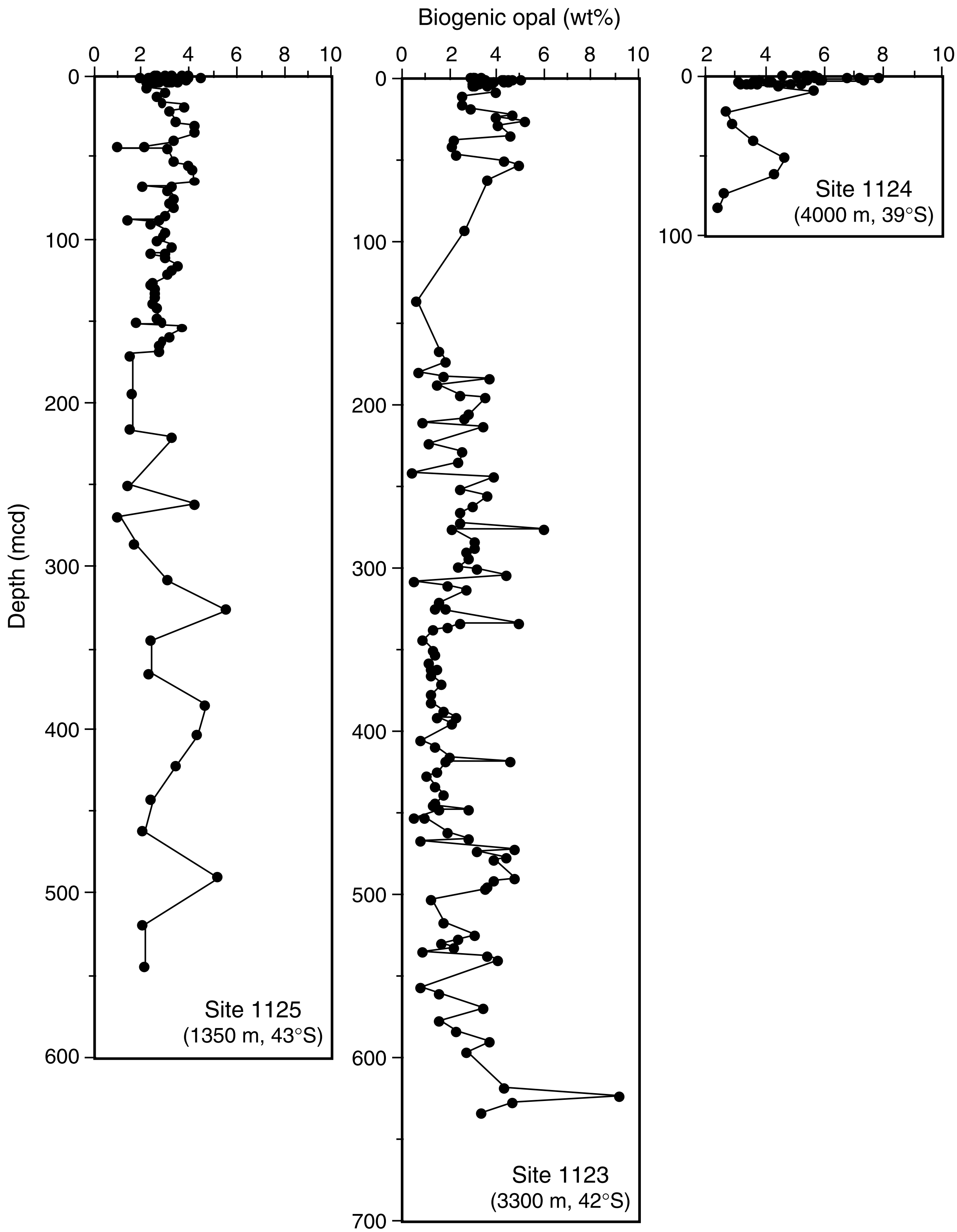

Table T1. Biogenic opal content, Site 1123.(Continued on next page.)

Laboratory reference	Core, section, interval (cm)	Depth (mcd)	Opal (wt%)
	181-1123B-		
E-1	1H-1, 5–6	0.05	3.34
E-2	1H-1, 25–26	0.25	3.14
E-3	1H-1, 45–46	0.45	2.96
E-4	1H-1, 65–66	0.65	3.53
E-5	1H-1, 84–85	0.84	4.24
E-6	1H-1, 105–106	1.05	3.57
E-7	1H-1, 125–126	1.25	4.65
	181-1123A-		
E-8	1H-1, 140–150	1.40	
	181-1123B-		
E-9	1H-1, 145–146	1.45	5.01
E-10	1H-2, 15–16	1.65	4.49
E-11	1H-2, 35–36	1.85	4.34
E-12	1H-2, 55–56	2.05	4.38
E-12+	1H-2, 75–76	2.25	
E-13	1H-2, 95–96	2.45	4.30
E-14	1H-2, 115–116	2.65	3.88
E-15	1H-2, 135–136	2.85	3.36
E-16	1H-3, 5–6	3.05	3.29
E-17	1H-3, 19–20	3.19	4.51
E-18	2H-1, 115–116	3.81	3.02
E-19	2H-1, 135–136	4.01	3.50
E-20	2H-2, 5–6	4.21	3.28
	181-1123A-		
E-21	1H-3, 135–145	4.35	3.84
	181-1123B-		
E-22	2H-2, 25–26	4.41	2.97
E-23	2H-2, 43–44	4.59	2.99
E-24	2H-2, 65–66	4.81	3.09
	181-1123A-		
E-25	2H-1, 140–150	5.70	3.64
E-26	2H-3, 140–150	8.70	3.97
E-27	2H-5, 140–150	11.70	2.61
E-28	3H-1, 140–150	16.76	2.56
E-29	3H-3, 140–150	19.76	2.91
E-30	3H-5, 120–130	22.56	4.69
E-31	4H-1, 140–150	24.06	3.95
E-32	4H-3, 140–150	27.06	5.20
E-33	4H-5, 140–150	30.06	4.04
E-34	5H-1, 140–150	35.86	4.60
E-35	5H-3, 140–150	38.86	2.25
E-36	5H-5, 140–150	41.86	2.13
E-37	6H-1, 140–150	48.06	2.29
E-38	6H-3, 140–150	51.06	4.35
E-39	6H-5, 140–150	54.06	4.93
E-40	7H-4, 140–150	62.20	3.63
E-41	8H-4, 140–150	72.80	
E-42	9H-4, 140–150	82.88	
E-43	10H-4, 145–150	93.93	2.69
E-44	11H-4, 140–150	103.58	
E-45	12H-4, 140–150	113.66	
E-46	13H-4, 140–150	124.26	
E-47	14H-4, 140–150	134.70	
	181-1123B-		
E-48	15H-1, 52–53	137.30	0.59
	181-1123A-		
E-49	15H-4, 140–150	145.66	
E-50	17H-4, 140–150	154.50	
E-51	16H-3, 140–150	155.14	
	181-1123B-		
E-52	17H-3, 63–64	161.47	
E-53	17H-4, 140–150	163.74	
E-54	17H-5, 89–90	164.73	
E-55	17H-7, 11–12	166.95	
E-56	18X-1, 39–40	167.73	1.56
E-57	18X-4, 130–131	173.14	
E-58	18X-5, 92–93	174.26	1.84
E-59	19X-1, 19–20	174.83	
E-60	19X-4, 100–101	180.20	0.69
E-61	19X-7, 8–9	183.84	1.77
E-62	20X-1, 60–61	184.84	3.72
E-63	20X-3, 60–61	187.88	1.50
E-64	20X-4, 140–150	190.20	
E-65	20X-6, 60–61	192.42	
E-66	21X-1, 66–67	194.50	2.47
E-67	21X-2, 66–67	196.00	3.54
E-68	21X-3, 66–67	197.50	
E-69	22X-2, 66–67	205.77	2.86
E-70	22X-4, 116–117	209.27	2.65
E-71	22X-6, 93–94	212.04	0.88
E-72	23X-1, 73–74	213.87	3.42
E-73	23X-3, 73–74	216.87	
E-74	23X-3, 140–150	217.54	
E-75	23X-5, 84–85	219.98	
E-76	24X-2, 48–49	224.72	1.13
E-77	24X-5, 39–40	229.13	2.55
E-78	25X-3, 90–91	236.24	2.37
E-79	25X-4, 35–36	237.19	
E-80	26X-1, 28–29	242.22	0.44
E-81	26X-2, 87–88	244.31	
E-82	26X-2, 140–150	244.84	3.92
E-83	27X-1, 146–147	253.00	2.52
E-84	27X-4, 47–48	256.51	3.66
E-85	28X-2, 77–78	263.41	3.02
E-86	28X-4, 77–78	266.41	2.46
E-87	29X-2, 49–50	272.73	2.49
E-88	29X-4, 140–150	276.64	5.98
E-89	29X-5, 42–43	277.16	2.11
E-90	30X-1, 33–34	280.67	
E-91	30X-4, 36–37	285.20	3.12
E-92	30X-6, 36–37	288.20	3.10
E-93	31X-1, 117–118	291.21	2.75
E-94	31X-3, 124–125	294.28	2.84
E-95	32X-1, 85–87	300.49	2.42
E-96	32X-1, 115–117	300.79	3.17
E-97	32X-4, 140–150	305.54	4.46
E-98	33X-1, 24–25	309.48	0.49
E-99	33X-2, 118–119	311.92	1.98
E-100	33X-3, 132–133	313.56	2.77
E-101	34X-3, 4–5	321.88	1.60
E-102	34X-5, 47–48	325.31	1.88
E-103	34X-5, 55–56	325.39	1.45
E-104	35X-1, 117–118	329.61	
E-105	35X-4, 140–150	334.34	4.92
E-106	35X-5, 27–28	334.71	2.49
E-107	35X-6, 88–89	336.82	1.94
E-108	36X-1, 42–43	338.26	1.36
E-109	36X-5, 41–42	344.25	0.91
E-110	37X-3, 135–136	351.79	1.32
E-111	37X-5, 42–43	353.86	1.46
E-112	38X-2, 81–82	359.35	1.11
E-113	38X-4, 81–82	362.35	1.27
E-114	38X-4, 140–150	362.94	1.50
E-115	39X-1, 55–56	367.19	1.28
E-116	39X-4, 84–85	371.98	1.70
E-117	40X-2, 61–62	378.45	1.26
E-118	40X-5, 61–62	382.95	1.26
E-119	41X-2, 42–43	387.96	1.73
E-120	41X-4, 140–150	391.94	2.34
E-121	41X-5, 44–45	392.48	1.50
E-122	42X-1, 92–93	396.56	2.10
E-123	43X-1, 67–68	406.01	0.82
E-124	43X-4, 15–16	409.99	1.44
E-125	44X-1, 112–113	416.06	2.04

Table T1 (continued).

Laboratory reference	Core, section, interval (cm)	Depth (mcd)	Opal (wt%)
E-126	44X-3, 135–150	419.29	4.62
E-127	44X-4, 37–38	419.81	1.88
E-128	45X-1, 110–111	425.64	1.53
E-129	45X-3, 43–44	427.97	1.09
E-130	46X-1, 94–95	435.08	1.38
E-131	46X-4, 82–83	439.46	1.80
E-132	47X-1, 111–112	444.85	1.42
E-133	47X-2, 88–89	446.12	1.35
E-134	47X-3, 140–150	448.14	2.86
E-135	47X-4, 13–14	448.37	1.60
E-136	48X-1, 14–15	453.58	0.57
E-137	48X-1, 59–60	454.03	0.97
E-138	49X-1, 39–40	463.13	1.96
E-139	49X-3, 118–119	466.92	2.81
E-140	49X-4, 95–96	468.19	0.84
E-141	50X-1, 31–32	472.65	4.82
E-142	50X-2, 112–113	474.96	3.20
E-143	50X-4, 135–150	478.19	4.46
E-144	50X-6, 20–21	480.04	3.91
E-145	51X-4, 46–47	486.90	
E-146	51X-6, 100–101	490.45	4.76
E-147	52X-1, 43–44	491.67	3.86
E-148	52X-3, 135–150	495.59	3.64
E-149	52X-5, 48–49	497.72	3.51
	181-1123C-		
E-150	19X-2, 95–97	500.51	
E-151	19X-3, 44–45	501.50	
E-152	19X-4, 135–150	503.91	1.27
E-153	20X-1, 110–111	508.76	
E-154	20X-2, 53–54	509.69	
E-155	20X-6, 16–17	515.32	
E-156	21X-1, 30–31	517.56	1.75
E-157	21X-6, 68–69	525.44	3.06
E-158	22X-1, 67–68	527.63	2.39
E-159	22X-3, 75–77	530.71	1.71
E-160	22X-4, 135–150	532.81	2.23
E-161	22X-7, 18–19	536.14	0.87
E-162	23X-2, 56–57	538.62	3.61
E-163	23X-4, 60–61	541.66	4.11
E-164	23X-6, 60–61	544.66	
E-165	24X-1, 57–58	546.73	
E-166	24X-4, 57–58	551.23	
E-167	25X-2, 38–39	557.64	0.84
E-168	25X-4, 135–150	561.61	1.61
E-169	25X-5, 46–47	562.22	
E-170	26X-2, 56–57	567.32	
E-171	26X-4, 78–79	570.54	3.45
E-172	27X-2, 48–49	576.94	
E-173	27X-3, 46–48	578.42	1.58
E-174	27X-5, 46–48	581.42	
E-175	28X-1, 57–58	585.23	2.28
E-176	28X-2, 87–88	587.03	
E-177	28X-4, 135–150	590.51	3.76
E-178	28X-5, 53–54	591.19	
E-179	29X-1, 78–79	595.04	
E-180	29X-3, 73–74	597.99	2.71
E-181	31X-4, 135–150	619.31	4.32
E-182	32X-1, 104–105	624.20	9.17
E-183	32X-4, 49–50	628.15	4.68
E-184	33X-1, 123–135	633.99	3.38

Table T2. Biogenic opal content, Site 1124.

Laboratory reference	Core, section, interval (cm)	Depth (mbsf)	Depth (mcd)	Opal (wt%)
	181-1124B-			
F-1	1H-1, 0–12	0.10	0.10	5.64
F-2	1H-1, 19–21	0.19	0.19	5.06
F-3	1H-1, 29–31	0.29	0.29	4.60
F-4	1H-1, 43–45	0.43	0.43	5.39
F-5	1H-1, 55–57	0.55	0.55	5.34
F-6	1H-1, 73–75	0.73	0.73	5.68
F-7	1H-1, 91–93	0.91	0.91	5.49
F-8	1H-1, 112–114	1.12	1.12	6.79
F-9	1H-1, 127–129	1.27	1.27	7.24
F-10	1H-2, 4–6	1.54	1.54	7.86
F-11	1H-2, 21–23	1.71	1.71	5.80
F-12	1H-2, 52–54	2.02	2.02	5.93
F-13	1H-2, 75–77	2.25	2.25	5.84
F-13+	1H-2, 96–97	2.46	2.46	
F-14	1H-2, 115–116	2.65	2.65	7.39
	181-1124A-			
F-15–	1H-1, 56–57	0.56	2.88	
	181-1124B-			
F-15	1H-2, 140–150	2.90	2.90	5.39
	181-1124A-			
F-16	1H-1, 68–69	0.68	3.00	3.82
F-17	1H-1, 93–94	0.93	3.25	5.97
F-18	1H-1, 107–108	1.07	3.39	4.17
F-19	1H-1, 128–129	1.28	3.60	3.72
F-20	1H-1, 147–148	1.47	3.79	3.09
F-21	1H-2, 12–13	1.62	3.94	3.60
F-22	1H-2, 36–37	1.86	4.18	4.15
F-23	1H-2, 57–58	2.07	4.39	4.07
F-24	1H-2, 77–78	2.27	4.59	4.24
F-25	1H-2, 94–96	2.44	4.76	5.19
F-26	1H-2, 115–116	2.65	4.97	3.19
F-27	1H-2, 132–133	2.82	5.14	3.36
F-28	1H-3, 4–5	3.04	5.36	3.71
F-29	1H-3, 23–24	3.23	5.55	3.73
F-30	1H-3, 39–40	3.39	5.71	3.55
F-31	1H-3, 57–58	3.57	5.89	4.87
F-31+	1H-3, 79–80	3.79	6.11	
F-32	1H-3, 99–100	3.99	6.31	4.42
F-32+	1H-3, 120–121	4.20	6.52	
F-32+	1H-3, 137–138	4.37	6.69	
	181-1124B-			
F-33	2H-2, 140–150	8.30	9.20	5.60
	181-1124C-			
F-34	2X-4, 84–94	21.94	21.94	2.70
F-35	3H-4, 140–150	33.10	30.70	2.89
F-36	4H-4, 140–150	42.60	41.12	3.59
F-37	5H-4, 140–150	52.10	51.60	4.66
F-38	6H-4, 140–150	61.60	61.92	4.27
F-39	7H-4, 140–150	71.10	73.64	2.65
F-40	8H-4, 140–150	80.60	82.92	2.45
F-40+	9H-4, 140–150	90.10	92.90	
F-41	10H-4, 140–150	99.60	103.87	
F-42	11H-4, 140–150	109.10	115.29	
F-43	14H-4, 140–150	137.60	147.79	0.59
F-44	17X-4, 140–150	165.10	176.93	
F-45	20X-4, 140–150	193.90	205.73	
F-46	23X-4, 140–150	222.80	234.63	
F-47	26X-4, 140–150	251.70	263.53	
F-48	31X-4, 140–150	299.90	311.73	
F-49	34X-4, 135–150	328.75	340.58	
F-50	37X-4, 135–150	357.75	369.58	
F-51	40X-4, 135–150	386.65	398.48	1.56
F-52	43X-3, 135–150	414.05	425.88	
F-53	46X-3, 135–150	443.05	454.88	1.84
F-54	49X-3, 135–150	471.75	483.58	

Table T3. Biogenic opal content, Site 1125. (Continued on next page.)

Laboratory reference	Core, section, interval (cm)	Depth (mbsf)	Depth (mcd)	Opal (wt %)
	181-1125A-			
G-1	1H-1, 0–2	0.00	0.00	3.22
G-2	1H-1, 10–12	0.10	0.10	2.99
G-3	1H-1, 20–22	0.20	0.20	2.63
G-4	1H-1, 30–32	0.30	0.30	2.74
G-5	1H-1, 40–42	0.40	0.40	3.72
G-6	1H-1, 50–52	0.50	0.50	3.21
G-7	1H-1, 60–62	0.60	0.60	3.97
G-8	1H-1, 82–84	0.82	0.82	3.33
G-9	1H-1, 88–90	0.88	0.88	3.17
G-10	1H-1, 100–102	1.00	1.00	4.47
G-11	1H-1, 110–112	1.10	1.10	3.20
G-12	1H-1, 120–122	1.20	1.20	3.99
G-13	1H-1, 129–130	1.29	1.29	2.52
G-14	1H-1, 132–134	1.32	1.32	2.42
G-15	1H-1, 140–142	1.40	1.40	2.39
G-16	1H-1, 148–150	1.48	1.48	2.80
G-17	1H-2, 0–2	1.50	1.50	3.03
G-18	1H-2, 10–12	1.60	1.60	2.81
G-19	1H-2, 20–22	1.70	1.70	2.30
G-20	1H-2, 29–31	1.79	1.79	2.50
G-21	1H-2, 40–42	1.90	1.90	1.96
G-22	1H-2, 50–52	2.00	2.00	2.52
G-23	1H-2, 60–62	2.10	2.10	2.55
G-24	1H-2, 70–72	2.20	2.20	2.58
G-25	1H-2, 80–82	2.30	2.30	2.21
G-26	1H-2, 90–92	2.40	2.40	2.80
G-27	1H-2, 100–102	2.50	2.50	2.39
G-28	1H-2, 110–112	2.60	2.60	2.73
G-29	1H-2, 120–122	2.70	2.70	2.67
G-30	1H-2, 130–132	2.80	2.80	2.91
G-31	1H-2, 140–142	2.90	2.90	2.35
G-32	1H-2, 145–150	2.95	2.95	2.35
G-33	1H-3, 0–2	3.00	3.00	3.15
G-34	1H-3, 10–12	3.10	3.10	2.67
G-35	1H-3, 20–22	3.20	3.20	3.83
G-36	1H-3, 30–32	3.30	3.30	3.11
G-37	1H-3, 40–42	3.40	3.40	3.21
G-38	1H-3, 50–52	3.50	3.50	3.55
G-39	1H-3, 60–62	3.60	3.60	2.26
G-40	1H-3, 70–72	3.70	3.70	2.82
G-41	1H-3, 80–82	3.80	3.80	2.68
G-42	1H-3, 90–92	3.90	3.90	2.64
G-43	1H-3, 96–97	3.96	3.96	2.21
G-44	1H-3, 100–102	4.00	4.00	3.55
G-45	1H-, 4–6	4.10	4.10	3.07
G-46	1H-, 13–15	4.19	4.19	2.49
G-47	2H-1, 134–135	5.64	7.21	2.28
G-48	2H-3, 132–133	8.62	10.19	2.95
G-49	2H-5, 142–143	11.72	13.29	2.67
G-50	3H-2, 117–118	16.47	16.36	2.86
G-51	3H-4, 123–124	19.53	19.42	
G-52	3H-4, 145–150	19.75	19.64	3.75
G-53	3H-6, 130–131	22.60	22.49	3.18
G-54	4H-2, 87–88	25.67	28.76	3.45
G-55	4H-4, 81–82	28.61	31.70	4.24
G-56	4H-6, 81–82	31.61	34.70	4.22
G-57	5H-2, 91–92	35.21	40.26	3.30
G-58	5H-4, 130–131	38.60	43.65	2.14
G-59	5H-4, 145–150	38.75	43.80	0.98
G-60	5H-5, 123–124	40.03	45.08	3.07
G-61	6H-2, 109–110	44.89	53.32	3.36
G-62	6H-4, 99–100	47.79	56.22	3.98
G-63	6H-6, 72–73	50.52	58.95	4.18
G-64	7H-2, 98–100	54.28	64.46	4.23
G-65	7H-4, 87–89	57.17	67.35	3.28
G-66	7H-4, 140–150	57.70	67.88	2.05
G-67	7H-6, 101–103	60.31	70.49	3.07
G-68	8H-2, 90–91	63.70	75.15	3.37
G-69	8H-4, 68–69	66.48	77.93	3.14
G-70	8H-6, 72–73	69.52	80.97	3.31
G-71	9H-2, 100–101	73.30	85.22	3.00
G-72	9H-4, 60–61	75.90	87.82	2.81
G-73	9H-4, 140–150	76.70	88.62	1.43
G-74	9H-6, 94–95	79.24	91.16	2.45
G-75	10H-2, 95–96	82.75	95.62	3.00
G-76	10H-4, 115–116	85.95	98.82	2.91
G-77	10H-6, 125–126	89.05	101.92	2.74
G-78	11H-2, 89–90	92.19	105.77	3.23
G-79	11H-4, 85–86	95.15	108.73	2.96
G-80	11H-4, 140–150	95.70	109.28	2.43
G-81	11H-6, 68–69	97.98	111.56	2.97
G-82	12H-2, 91–92	101.71	116.52	3.53
G-83	12H-4, 93–94	104.73	119.54	3.24
G-84	12H-6, 100–101	107.80	122.61	3.08
G-85	13H-2, 116–118	111.46	127.69	2.56
G-86	13H-2, 145–155	111.75	127.98	2.42
G-87	13H-4, 118–120	114.53	130.76	2.63
G-88	13H-6, 60–61	116.95	133.18	2.64
G-89	14H-1, 124–126	119.54	136.61	2.57
G-90	14H-3, 135–137	122.65	139.72	2.56
G-91	14H-5, 103–105	125.33	142.40	2.68
G-92	15H-2, 143–145	130.73	148.71	2.74
G-93	15H-4, 135–137	133.65	151.63	2.84
G-94	15H-4, 145–155	133.75	151.73	1.84
G-95	15H-6, 121–123	136.56	154.54	3.72
G-96	16H-2, 131–133	140.08	159.25	3.18
G-97	16H-4, 133–135	143.10	162.27	2.86
G-98	16H-6, 132–135	146.09	165.26	2.78
G-99	17H-2, 134–136	149.64	168.39	2.83
G-100	17H-4, 127–128	152.57	171.32	
G-101	17H-4, 145–155	152.75	171.50	1.57
G-102	17H-6, 133–134	155.68	174.43	
G-103	18H-2, 126–128	159.06	181.50	
G-104	18H-4, 126–128	162.06	184.50	
G-105	18H-5, 123–125	163.53	185.97	
G-106	19H-2, 125–127	168.55	191.35	
G-107	19H-4, 118–120	171.48	194.28	
G-108	19H-4, 143–153	171.73	194.53	1.60
G-109	19H-6, 131–134	174.64	197.44	
G-110	20H-2, 133–136	177.93	203.03	
G-111	20H-4, 131–133	180.91	206.01	
G-112	20H-6, 124–126	183.84	208.94	
G-113	21H-2, 135–137	187.65	213.51	
G-114	21H-4, 119–122	190.49	216.35	
G-115	21H-4, 140–150	190.70	216.56	1.51
G-116	21H-6, 24–26	192.54	218.40	
	181-1125B-			
G-117	21X-4, 140–150	194.70	221.76	3.27
	181-1125A-			
G-118	22H-2, 135–137	197.15	224.85	
G-119	22H-4, 77–79	199.57	227.27	
G-120	22H-6, 74–76	202.54	230.24	
	181-1125B-			
G-121	27X-4, 140–150	212.70	243.77	
G-122	25X-4, 140–150	251.10	251.10	1.41
G-123	29X-4, 140–150	231.90	262.97	4.23
G-124	31X-2, 140–150	270.30	270.30	1.01
G-125	33X-4, 140–150	286.60	286.60	1.75
G-126	35X-4, 140–150	308.90	308.90	3.04
G-127	37X-3, 140–150	327.80	327.80	5.56
G-128	39X-4, 140–150	345.50	345.50	2.46
G-129	41X-4, 140–150	366.30	366.30	2.33
G-130	43X-3, 140–150	385.60	385.60	4.67
G-131	45X-3, 140–150	403.40	403.40	4.28
G-132	47X-4, 135–150	422.65	422.65	3.46

Table T3 (continued).

Laboratory reference	Core, section, interval (cm)	Depth (mbsf)	Depth (mcd)	Opal (wt %)
G-133	49X-4, 135–150	443.35	443.35	2.46
G-134	52X-4, 135–150	462.25	462.25	2.05
G-135	55X-4, 135–150	490.75	490.75	5.24
G-136	58X-2, 135–150	519.65	519.65	2.05
G-137	58X-2, 135–150	545.45	545.45	2.17