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13. Data Report: Bulk Sediment Composition, Grain-Size, Clay, and Silt Mineralogy of Pleistocene Sediments from ODP Leg 177 Sites 1089 and 1090[1]

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T1. Bulk sediment components, core PS2821-1, p. 7.

T2. Bulk sediment components, Site 1089, p. 8.

ABSTRACT

This is a data report of bulk sediment composition, grain size, clay, and silt mineralogy of Pleistocene sediments from ODP Leg 177 Sites 1089 and 1090. Site 1089 was drilled in the southeast Atlantic Ocean, close to the northern flank of the Agulhas Ridge, and Site 1090 on the southern flank of the Agulhas Ridge. At Site 1089 changes in clay mineralogy and grain size are linked to deep- and medium-water circulation. At Site 1090 sediment parameters and their temporal variability document environmental responses of the southeastern South Atlantic to the mid-Pleistocene climate transition.

INTRODUCTION

During Leg 177 of the Ocean Drilling Program, an expanded sequence of Pliocene to Holocene calcareous muds was recovered at Site 1089 on a drift deposit in the southern Cape Basin (Gersonde, Hodell, Blum et al., 1999). The reconstruction of detrital sources and modes of sediment transport in relation to regional current systems and climate variability over the last 590 k.y. were studied from sedimentological and mineralogical parameters of the terrigenous sediment fraction. The results of this study are published in Kuhn and Diekmann (2002), and the analytical data are compiled in Tables T1 and T2.

[1]Kuhn, G., and Diekmann, B., 2003. Data report: Bulk sediment composition, grain-size, clay, and silt mineralogy of Pleistocene sediments from ODP Leg 177 Sites 1089 and 1090. *In* Gersonde, R., Hodell, D.A., and Blum, P. (Eds.), *Proc. ODP, Sci. Results,* 177, 1–10 [Online]. Available from World Wide Web: <http://www-odp.tamu. edu/publications/177_SR/VOLUME/CHAPTERS/SR177_13.PDF>. [Cited YYYY-MM-DD]

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Another important goal of Leg 177 was to explore the nature of the mid-Pleistocene climate transition (MPT) on the Southern Hemisphere. At Site 1090 a 44-m-thick suitable MPT record of Quaternary diatom-bearing foraminiferal muds and oozes was recovered on the Agulhas Ridge. As shown in Diekmann and Kuhn (2002), environmental responses to the MPT comprised changes in terrestrial climate, biological productivity, and regional ocean circulation, as inferred from compositional sediment data and clay mineralogy (Tables T3, T4).

T3. Bulk sediment components, core PS2489-2, p. 9.

T4. Bulk sediment components, Site 1090, p. 10.

MATERIALS AND METHODS

In addition to this data report, sample specifications and data lists can be extracted from the on-line PANGAEA data information system (**www.pangaea.de**).

Site 1089

Site 1089 was drilled in a water depth of 4624 m north of the Agulhas Ridge (40°56.18′S, 09°53.64′E). Four drill holes penetrated a Pliocene to Holocene sequence of calcareous muds (Shipboard Scientific Party, 1999a). The study of Kuhn and Diekmann (2002) was concentrated on the upper part of the spliced composite section between 0 and 90 meters composite depth (mcd), corresponding to the last 580 k.y. (Hodell et al., 2001; Cortese and Abelmann, 2002). For the upper 14 mcd, we refer to sediment core PS2821-1, recovered with a piston corer at the same position during a presite survey with research vessel *Polarstern* (Kuhn et al., 1998). The depth scale of core PS2821-1 was converted to the Site 1089 mcd scale (Table T1) by the correlation of downcore reflectance and magnetic susceptibility data from both records.

Samples for bulk analyses were taken at 10-cm intervals, representing time steps between 0.25 and 1.00 ka. Mineralogical and granulometric analyses were conducted every 10 cm in the upper 28.4 mcd (marine isotope Stage [MIS] 1 to MIS 6) and at lower temporal resolution in the older strata: every 20 cm down to 68.8 mcd (MIS 7 to MIS 11) and every 30 cm below.

Site 1090

Three holes (1090B, 1090D, and 1090E) were drilled at Site 1090 (42°54.8′S, 8°54.0′E; 3702 m water depth) that yielded a spliced Quaternary section down to 44 mcd (Shipboard Scientific Party, 1999b) used for the MPT study (Diekmann and Kuhn, 2002). Because the uppermost part of the Site 1090 section seems to be disturbed, we connected it with nearby sediment core PS2489-2 (42°52.4′S, 8°58.4′E, 3794 m water depth), taken during a presite survey with *Polarstern* (Gersonde, 1995). We spliced the Site 1090 record at 12.40 mcd with the core PS2489-3 record, corresponding to an age of 408 ka. Both records show good overlap in their benthic foraminiferal $\delta^{18}O$ records for the interval between 6.3 and 16.8 mcd (340–560 ka) (Becquey and Gersonde, 2002).

Samples were taken at 10-cm intervals, representing—with a few exceptions—time steps between 5 and 15 k.y. for the interval below 1200 ka (35.5 mcd) and time steps between 1.5 and 6.0 k.y. for the younger interval.

Bulk Sediment Parameters

Bulk sediment composition was analyzed on freeze-dried and ground subsamples. Carbonate, organic carbon, and nitrogen were measured on LECO carbon element analyzers (CS-125, CS-400, and CNS-2000). The percentage of carbonate was calculated from the difference between percentage bulk carbon and percentage organic carbon, multiplied by 8.33. Biogenic silica (opal) was measured by an automated leaching method with a relative analytical precision of 4%–10% (Müller and Schneider, 1993). The proportion of nonopaline and noncalacareous constituents is regarded as the lithogenic siliciclastic or terrigenous sediment fraction.

For calculating mass accumulation rates ([MAR] in grams per square centimeter per thousand years) of sediment components, linear sedimentation rates must be multiplied with values of dry bulk density (DBD) and the proportion of the sediment component. DBD was inferred from dry sediment density, measured with a Micromeritics AccuPyc 1330 pycnometer, and shipboard measured wet bulk densities by gamma ray attenuation densitometer with a multisensor track at 2 cm intervals (Shipboard Scientific Party, 1999a). At Site 1090, based on the good correlation between carbonate concentrations and grain densities in shipboard samples, DBD was calculated from wet bulk density (gamma ray attenuation densitometer) and grain density was estimated from carbonate concentration. The inferred high-resolution dry bulk densities for the sample sets used for this study agree well with widely spaced shipboard measurements of dry bulk density in the course of physical properties investigations (Shipboard Scientific Party, 1999b).

Clay and Silt Mineralogy

Mineralogical analyses were carried out by X-ray diffraction measurements on random silt mounts and on glycolated preferentially oriented clay mounts. Sample preparation and semiquantitative evaluation of X-ray diffractograms followed techniques explained in detail elsewhere (Ehrmann et al., 1992; Petschick et al., 1996). Mineral proportions were calculated from weighted peak areas recorded in the X-ray diffractograms. Quartz/feldspar ratios (Qz/Fsp) refer to the quotient of the 4.26-Å peak area times five of quartz divided by the 3.19- to 3.24-Å double peak area of plagioclase and K-feldspar. The relative abundance of the clay mineral groups in the clay fraction is summed to 100% from weighted peak areas recorded in the X-ray diffractograms (Biscaye, 1965); the 17-Å peak area for smectite, the 10-Å peak area times four for illite, and the 7-Å peak area for kaolinite and chlorite subdivided in proportion to the relative areas of their 3.57- and 3.54-Å peaks, respectively. The 5-Å/10-Å peak intensity ratio is an indicator for illite chemistry. Values <0.15 represent Fe-Mg–rich illites (biotitic illite) and those values >0.40 are indicative for the presence of Al-rich illites (muscovite and sericite) (Esquevin, 1969). Relative analytical precision for minor clay components is 8%–14% and 6%–9% for major clay components (Ehrmann et al., 1992).

Grain-Size Analyses

For the granulometric characterization of terrigenous silt and clay, subsamples were washed through a 63-µm mesh for grain-size separation of sand and gravel from the mud fraction, silt, and clay. The fine fraction was treated with 3% hydrogen peroxide solution and 10% acetic acid for the removal of organic carbon and carbonate and for disaggregation. Silt and clay was separated at 2 µm in settling tubes. The silt fraction was dispersed in sodium polyphosphate solution and measured with a Micromeritics SediGraph 5000E to determine the grain-size distribution in 1/10 steps. We used silt samples instead of mud samples to get a better resolution of coarse silt and to avoid flocculation effects caused by the high abundance of smectite in the samples (Stein, 1985).

Since we only analyzed carbonate-free samples, the measured grain-size distributions might be biased by the individual grain-size distributions of opaline particles. However, opal concentrations are generally below 15 wt% in the carbonate-free samples, ruling out a significant impact of opal on terrigenous (Terr) grain-size pattern (Fig. F1). Moreover, terrigenous/opal ratios vary independently from silt grain-size parameters (Kuhn and Diekmann, 2002). The grain-size distributions of unleached carbonate-free samples were discussed in terms of silt/clay ratios and proportions of noncohesive sortable silt (particles >10 µm) in the <63-µm fraction (Kuhn and Diekmann, 2002). The latter parameter has been established as a qualitative proxy of relative changes in bottom-current strengths (McCave et al., 1995).

F1. Biogenic silica vs. grain size, p. 6.

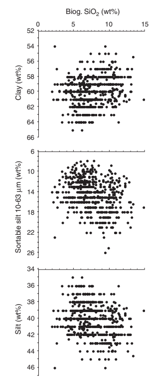

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Figure F1. Scatter plots of biogenic silica vs. grain size parameters (clay, sortable silt, and silt).

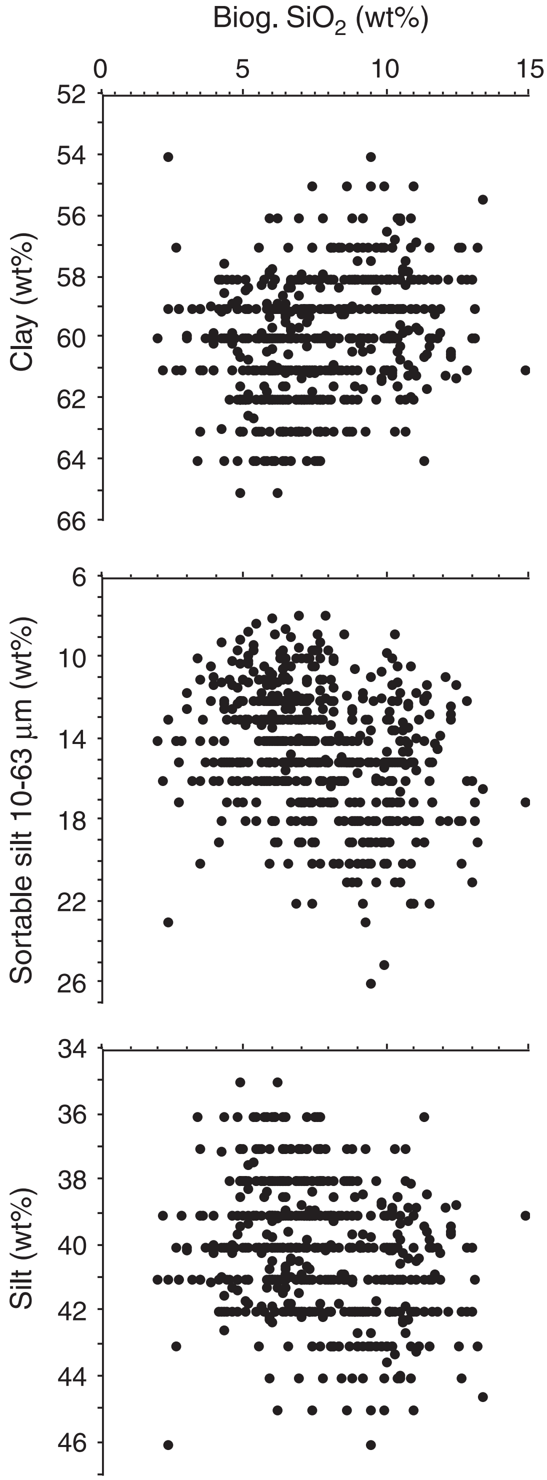

Table T1. Sediment composition, *Polarstern* core PS2821-1.

	Interval (cm)		Depth		Component (wt%)				Carbonate-free mud (wt%)					Clay mineral component (%)†				
Piston core	Top	Bottom	(m)	(mcd)	$CaCO_3$	Biogenic SiO_2	TOC	N	Silt	10–63 µm	Clay	Qz/Fsp*	Qz/Fsp†	Smectite	Illite	Kaolinite	Chlorite	DBD (g/cm^3)
PS2821-1	2	3	0.02	–0.24	23.2	10.5	0.674	0.094	43.9	16.5	56.1	5.79	4.89	45.1	32.9	12.2	9.8	0.361
PS2821-1	7	8	0.07	–0.18	22.6	13.4	0.595	0.099	44.6	16.4	55.4	4.98	5.1	55.8	24.6	10.5	9.1	0.389
PS2821-1	12	13	0.12	–0.13	23.8	10	0.558	0.082	43.5	14.5	56.5	4.49	4.38	46	32.2	12.5	9.3	0.402
PS2821-1	17	18	0.17	–0.07	26.7	10.3	0.515	0.086	43.3	13.5	56.7	4.32	4.4	49.7	27	13.1	10.2	0.419
PS2821-1	22	23	0.22	–0.02	30.3	9.5	0.509	0.07	42.6	13.5	57.4	6.21	4.09	45.6	30.3	14	10.1	0.461
PS2821-1	27	28	0.27	0.04	30.6	11.1	0.468	0.081	43.2	15.4	56.8	3.87	4.05	52.6	25.1	12	10.3	0.439
PS2821-1	32	33	0.32	0.09	33.2	8.1	0.476	0.066	43	16.2	57	5.74	4.78	53.8	25	11.3	9.9	0.393
PS2821-1	37	38	0.37	0.15	36.3	10.7	0.45	0.077	42.6	16	57.4	4.49	4.8	51.3	28.1	11.2	9.4	0.475
PS2821-1	42	43	0.42	0.20	39	10.8	0.444	0.06	42.2	14.6	57.8	5.44	5.13	52.4	26.7	11.1	9.7	0.469
PS2821-1	47	48	0.47	0.26	42.2	11.8	0.416	0.07	42	14.4	58	4.86	4.33	50.8	27.8	11.7	9.7	0.500
PS2821-1	52	53	0.52	0.31	45.4	8.3	0.396	0.056	41.7	13.7	58.3	5.61	4.48	55.2	25.3	10.6	8.8	0.502
PS2821-1	58	59	0.58	0.38	50	5.1	0.361	0.061	41.6	13.2	58.4	5.64	4.22	43.1	33.4	13.5	10	0.539
PS2821-1	62	63	0.62	0.42	49.9	8.8	0.403	0.061	41.1	12.4	58.9	3.62	4.71	51.9	26.9	11.6	9.5	0.557
PS2821-1	72	73	0.72	0.53	53.4	4.6	0.338	0.045	41.2	12.5	58.8	5.85	4.92	53.6	25.4	11.6	9.4	0.623
PS2821-1	82	83	0.82	0.64	57.2	6.5	0.347	0.053	41.2	12.5	58.8	4.71	5.13	49.3	26.8	11.2	12.7	0.616
PS2821-1	92	93	0.92	0.75	60.2	4.3	0.313	0.043	41.5	12.2	58.5	5.6	5.12	45.4	29.7	11.6	13.3	0.632
PS2821-1	102	103	1.02	0.86	60.3	6.2	0.381	0.048	41.2	11.1	58.8	4.76	4.63	53.1	23.1	11.4	12.4	0.651
PS2821-1	112	113	1.12	0.97	62.9	3.9	0.338	0.047	40.2	10.8	59.8	4.87	4.35	46.9	30.8	12.5	9.9	0.676
PS2821-1	122	123	1.22	1.08	63	4.6	0.33	0.045	40.2	11.2	59.8	5.43	4.58	60.2	23.4	7.8	8.6	0.678
PS2821-1	132	133	1.32	1.19	63.1	4.8	0.362	0.051	39.6	12.2	60.4	5.11	3.98	50.9	29.4	9.9	9.9	0.753
PS2821-1	142	143	1.42	1.30	58.6	3	0.299	0.042	40.1	12.5	59.9	5.68	4.02	57.4	22.9	9.1	10.5	0.795
PS2821-1	152	153	1.52	1.41	61.6	3	0.283	0.041	40	11.7	60	5.37	4.33	43	30.6	12	14.5	0.796
PS2821-1	162	163	1.62	1.52	62.5	4.2	0.353	0.054	40.9	11.1	59.1	4.97	3.57	37.2	39.8	12.2	10.8	0.675
PS2821-1	172	173	1.72	1.64	57.4	3.9	0.454	0.061	39.9	11.2	60.1	4.83	3.42	47	29.8	9.8	13.3	0.641
PS2821-1	182	183	1.82	1.77	52.4	5.8	0.432	0.057	39.6	12	60.4	5.55	3.16	49.5	32.1	8.1	10.3	0.610
PS2821-1	192	193	1.92	1.89	52.5	8.2	0.418	0.064	39.2	12.6	60.8	5.28	3.08	53.6	27	8.7	10.6	0.578
PS2821-1	202	203	2.02	2.01	52.8	5.6	0.473	0.068	40.2	13.2	59.8	5.46	3.25	46	32.7	9.6	11.7	0.568
PS2821-1	212	213	2.12	2.13	45.5	6.2	0.46	0.078	39.1	11.8	60.9	4.26	3	52.2	26.7	8.3	12.8	0.617
PS2821-1	222	223	2.22	2.26	48.8	5.8	0.511	0.082	38.3	11.1	61.7	4.83	3.28	47.3	31	9.1	12.7	0.567
PS2821-1	232	233	2.32	2.38	49.2	5.2	0.483	0.075	38.2	10.2	61.8	4.56	2.94	56.1	28.5	6.8	8.6	0.566
PS2821-1	242	243	2.42	2.50	54.3	7.4	0.487	0.072	38.3	10.4	61.7	4.5	2.64	49.8	31.3	8.6	10.4	0.531
PS2821-1	252	253	2.52	2.63	53.5	5.7	0.504	0.072	38.5	10.4	61.5	4.07	2.95	55.2	25.4	8.7	10.7	0.545
PS2821-1	262	263	2.62	2.75	50.6	6.5	0.51	0.077	38.5	10	61.5	4.12	2.4	37.9	34.3	12.6	15.2	0.515
PS2821-1	272	273	2.72	2.87	50	9.8	0.554	0.081	38.6	10.6	61.4	4.1	3.08	40	32.3	10.4	17.3	0.515
PS2821-1	282	283	2.82	2.99	53.3	8.6	0.543	0.086				4.4	2.82	46.3	32.3	9.8	11.7	0.531
PS2821-1	292	293	2.92	3.12	53.9	10.4	0.546	0.085	38.5	11.1	61.5	4.17	2.98	48.2	31.2	8.6	12	0.542
PS2821-1	302	303	3.02	3.24	52.6	7	0.526	0.084	38.7	11.9	61.3	4.23	2.64	39.7	36.9	10.8	12.6	0.537
PS2821-1	312	313	3.12	3.36	49.5	6.6	0.571	0.091	39.5	12.1	60.5	4.08	3.05	43.6	32.8	10.3	13.4	0.529
PS2821-1	322	323	3.22	3.48	45	6.7	0.631	0.1	40.3	12.2	59.7	5.6	2.63	44.8	34.4	10.1	10.6	0.510
PS2821-1	332	333	3.32	3.61	45.6	7	0.609	0.098	40.8	12	59.2	4.5	2.69	49.6	32.8	7.7	10	0.522
PS2821-1	342	343	3.42	3.73	42.1	7.3	0.688	0.104	40.7	11.9	59.3	4.27	2.95	44.8	34.5	10.1	10.6	0.520
PS2821-1	352	353	3.52	3.85	37.2	9.2	0.719	0.111	40	11.9	60	4.1	2.8	49.2	30.6	9.8	10.5	0.508
PS2821-1	360	361	3.6	3.95	33.3	12.3	0.679	0.109	39.6	12.3	60.4	4.67	3.15	46.5	32.8	9.1	11.6	0.472

Notes: TOC = total organic carbon. Qz = quartz, Fsp = feldspar. DBD = dry bulk density. * = in carbonate-free silt. † = in clay fraction. Only a portion of this table appears here. The complete table is available in **ASCII format.**

Table T2. Sediment composition, Site 1089.

Core, section, interval (cm)	Depth (mbsf)	Depth (mcd)	Component (wt%) CaCO$_3$	Biogenic SiO$_2$	TOC	N	Carbonate-free mud (wt%) Silt	10–63 µm	Clay	Qz/Fsp*	Qz/Fsp†	Clay mineral component (%)† Smectite	Illite	Kaolinite	Chlorite	DBD (g/cm^3)
177-1089A-																
2H-3, 131.5–134	11.61	11.19	22.4		0.631	0.11										
2H-4, 1.5–4	11.82	11.4	20.6		0.628	0.11										
2H-4, 11.5–14	11.91	11.49	18.3		0.664	0.11										
2H-4, 21.5–24	12.02	11.6	17.5		0.717	0.12										
2H-4, 31.5–34	12.11	11.69	12.4		0.614	0.11										
2H-4, 37–40	12.17	11.75	12.8		0.58	0.1										
2H-4, 51.5–54	12.32	11.9	15.9		0.576	0.1										
2H-4, 62–64.5	12.42	12	16.8		0.594	0.1										
2H-4, 72.5–75	12.52	12.1	20.4		0.621	0.11										
2H-4, 81.5–84	12.61	12.19	15.4		0.676	0.12										
2H-4, 91.5–94	12.72	12.3	16.2		0.707	0.12										
2H-4, 101–104	12.81	12.39	13.1		0.611	0.11										
2H-4, 111.5–114	12.91	12.49	15.8		0.618	0.11										
2H-4, 121.5–124	13.02	12.6	15.2		0.518	0.09										
2H-4, 131.5–134	13.11	12.69	21.4		0.608	0.1										
2H-4, 141.5–144	13.22	12.8	27.3		0.457	0.09										
2H-5, 1.5–4	13.32	12.9	26		0.466	0.09										
2H-5, 11.5–14	13.41	12.99	16.2		0.567	0.1										
2H-5, 21–24	13.51	13.09	12.9		0.55	0.1										
2H-5, 31.5–34	13.61	13.19	31.2		0.483	0.08										
2H-5, 41.5–44	13.72	13.3	32.5		0.418	0.08										
2H-5, 51.5–54	13.82	13.4	23.4		0.438	0.08										
2H-5, 61.5–64.5	13.91	13.49	20.7		0.448	0.08										
2H-5, 71.5–74	14.02	13.6	32.1		0.444	0.08										
2H-5, 81.5–84	14.11	13.69	38.5		0.384	0.07										
2H-5, 91.5–94	14.22	13.8	39.8		0.312	0.06										
2H-5, 101–104	14.31	13.89	51.2		0.318	0.06										
2H-5, 111.5–114	14.41	13.99	50.2		0.301	0.05										
177-1089B-																
2H-3, 56.5–59	8.36	14.06	50.4	6.6	0.353	0.06	39	13	61	4.1	5.13	43.6	32.1	13.1	11.2	0.686
2H-3, 66.5–69	8.46	14.16	42	10.2	0.363	0.06	39	12	61	4.54	3.37	28.8	38.6	18.5	14.1	0.64
2H-3, 76.5–80	8.57	14.27	26.1	7.9	0.385	0.07	39	14	61	4.45	3.98	40.1	37.2	13.1	9.5	0.579
2H-3, 86.5–89	8.66	14.36	17.9	10.2	0.407	0.07	41	16	59	3.92	3.51	38.3	35.2	15.1	11.4	0.59
2H-3, 96.5–99	8.77	14.47	14.9	10.9	0.533	0.08	41	15	59	4.32	4.53	54.8	26.2	10.1	8.9	0.571
2H-3, 106.5–109	8.87	14.57	12	6.5	0.581	0.08	41	15	59	4.63	4.17	46.6	29.8	12.3	11.3	0.56
2H-3, 116.5–119	8.96	14.66	13	12.7	0.718	0.1	42	18	58	4.22	3.96	39.8	34.4	13.7	12.1	0.563
2H-3, 126.5–129	9.07	14.77	15.8	8.8	0.661	0.09	42	19	58	4.09	4.15	47.5	27.7	12.7	12.1	0.621
2H-3, 136.5–139	9.16	14.86	21.8	7.9	0.636	0.08				5.45	4.72	47.5	30.3	11.3	10.9	0.618
177-1089D-																
2H-3, 6.5–9	9.36	15.06	28.2	10.6	0.604	0.08	41	15	59	3.15	5.12	37.4	32.9	17.1	12.6	0.629
2H-3, 16.5–19	9.46	15.16	27.9	8.7	0.581	0.08	40	15	60	4.61	4.88	45.8	30	13	11.2	0.648

Notes: TOC = total organic carbon. Qz = quartz, Fsp = feldspar. DBD = dry bulk density. * = in carbonate-free silt. † = in clay fraction. Only a portion of this table appears here. The complete table is available in **ASCII format.**

Table T3. Sediment composition, *Polarstern* core PS2489-2.

	Interval (cm)		Depth		Component (wt%)				Clay mineral component (%)*					
Piston core	Top	Bottom	(m)	(mcd)	$CaCO_3$	Biogenic SiO_2	TOC	Qz/Fsp*	Smectite (%)	Illite (%)	Kaolinite (%)	Chlorite (%)	Illite 5Å/10Å	DBD (g/cm^3)
PS2489-2	5	6	0.05	0.05	87.5	2	0.091	3.46	49.9	39.4	5.7	5	0.47	0.816
PS2489-2	15	16	0.15	0.15	86.4	1.9	0.073	2.83	55.7	34.9	5.1	4.3	0.44	0.81
PS2489-2	25	26	0.25	0.25	60.4	4	0.373	2.11	53.7	37.7	3.2	5.4	0.46	0.673
PS2489-2	35	36	0.35	0.35	49.9	4.8	0.511	1.9	43.2	45.8	4	7	0.45	0.618
PS2489-2	45	46	0.45	0.45	74.1	2.4	0.134	2.49	40.3	47.7	5	6.9	0.51	0.745
PS2489-2	55	56	0.55	0.55	65.4	1.8	0.233	3.12	50.6	40	4	5.4	0.48	0.699
PS2489-2	65	66	0.65	0.65	70.9	2.8	0.167	3.15	33.2	51.5	6.5	8.9	0.58	0.728
PS2489-2	75	76	0.75	0.75	69	3.5	0.122	2.25	46.6	41.6	4.9	6.8	0.52	0.719
PS2489-2	82	83	0.82	0.82	67.5	3.4	0.255	2.13	27.9	56.2	6	9.9	0.57	0.711
PS2489-2	87	88	0.87	0.87	79.8	2.3	0.141	2.19	31	53	6.5	9.5	0.59	0.775
PS2489-2	95	96	0.95	0.95	83.9	2.2	0.056	4.31	51.3	38	6.1	4.6	0.53	0.796
PS2489-2	105	106	1.05	1.05	85.2	2.5	0.064	3.81	42.8	42.1	8.3	6.9	0.6	0.804
PS2489-2	115	116	1.15	1.15	86.5	1.9	0.062	3.42	48.6	39.7	6.5	5.2	0.53	0.81
PS2489-2	125	126	1.25	1.25	85.2	2.7	0.063	3.02	36	47.7	8.8	7.4	0.55	0.804
PS2489-2	135	136	1.35	1.35	80.8	1.7	0.074	2.64	27	50.1	11.8	11.1	0.75	0.78
PS2489-2	145	146	1.45	1.45	83.3	2.1	0.072	3.06	45.1	43.4	6.1	5.4	0.48	0.794
PS2489-2	155	156	1.55	1.55	83.2	1.5	0.08	4.07	28.8	50.8	10.2	10.2	0.67	0.793
PS2489-2	165	166	1.65	1.65	81.9	1.9	0.099	2.95	45.4	42.6	6.2	5.8	0.52	0.786
PS2489-2	175	176	1.75	1.75	85.9	1.6	0.078	2.84	35.5	50.7	7.1	6.7	0.53	0.807
PS2489-2	184	185	1.84	1.84	79.5	1.7	0.148	2.52	39.7	46.8	6.4	7.1	0.52	0.773
PS2489-2	195	196	1.95	1.95	63.6	2.6	0.194	2.07	36.6	48.9	5.8	8.7	0.61	0.69
PS2489-2	205	206	2.05	2.05	63	3.9	0.293	1.79	35.1	49.1	5.7	10.1	0.6	0.687
PS2489-2	215	216	2.15	2.15	68.9	2.3	0.244	1.59	27.7	55.1	6.3	10.8	0.57	0.718
PS2489-2	225	226	2.25	2.25	73.7	3	0.16	1.83	43.5	44.6	4.7	7.2	0.55	0.743
PS2489-2	235	236	2.35	2.35	65.5	2.2	0.275	1.96	49	37.9	5.3	7.9	0.64	0.7
PS2489-2	242	243	2.42	2.42	67.4	2.9	0.289	2.31	34.6	50.8	5.3	9.3	0.57	0.71
PS2489-2	248	249	2.48	2.48	69.9	2.8	0.238	2.08	45.3	43	4.5	7.1	0.51	0.723
PS2489-2	255	256	2.55	2.55	72.6	1.8	0.206	2.21	48	41.4	4.3	6.4	0.49	0.737
PS2489-2	265	266	2.65	2.65	78.9	2	0.077	2.48	53.2	38.5	3.7	4.6	0.43	0.77
PS2489-2	275	276	2.75	2.75	81.4	1.7	0.062	2.35	49.4	39.5	5.3	5.9	0.51	0.783
PS2489-2	288	289	2.88	2.88	71.1	3.2	0.173	2.2	29.4	55.5	6.4	8.6	0.53	0.729
PS2489-2	297	298	2.97	2.97	67.2	2.8	0.136	2.29	42.9	45.9	4.9	6.4	0.46	0.709
PS2489-2	305	306	3.05	3.05	66.3	3.6	0.157	2.58	38.1	49.3	4.6	8	0.49	0.704
PS2489-2	308	309	3.08	3.08	66.7		0.198							0.706
PS2489-2	315	316	3.15	3.15	67.1	3.1	0.17	2.44	38.2	48.3	5.6	7.9	0.55	0.709
PS2489-2	325	326	3.25	3.25	75.8	2.9	0.1	2.77	47.2	41.4	4.9	6.4	0.48	0.754
PS2489-2	335	336	3.35	3.35	85.7	1.9	0.055	3.13	49.2	40.3	5.8	4.7	0.4	0.806
PS2489-2	345	346	3.45	3.45	81.6	3.1	0.064	3.42	51.8	37	6.1	5	0.58	0.785
PS2489-2	355	356	3.55	3.55	84.5	2.1	0.054	3.78	52.2	36.4	6.1	5.3	0.52	0.8
PS2489-2	365	366	3.65	3.65	83.3	2.7	0.05	2.45	28	54.3	8.7	9	0.62	0.793
PS2489-2	375	376	3.75	3.75	82.9	1.5	0.052	3.04	52.9	37	4.9	5.2	0.48	0.791
PS2489-2	385	386	3.85	3.85	78.5	2.8	0.062	2.61	40.3	45.9	6.6	7.2	0.56	0.768
PS2489-2	395	396	3.95	3.95	75.4	2.1	0.066	3.25	36	49	7.1	7.9	0.59	0.752
PS2489-2	405	406	4.05	4.05	83.2	2.3	0.052	2.78	28.7	52.9	9.3	9.1	0.58	0.793
PS2489-2	415	416	4.15	4.15	83.7	2.4	0.05	2.69	38.1	45.6	8	8.2	0.61	0.795
PS2489-2	425	426	4.25	4.25	84.1	2.7	0.052	3.63	47.3	41.1	6	5.5	0.51	0.798
PS2489-2	435	436	4.35	4.35	76.7	2.6	0.076	2.91	51.9	37.2	5.2	5.6	0.51	0.759
PS2489-2	445	446	4.45	4.45	73.9	2.8	0.087	2.38	45.6	42.3	5.2	6.9	0.55	0.744
PS2489-2	455	456	4.55	4.55	72.2	2.2	0.107	2.51	46	42.1	5	7	0.58	0.735
PS2489-2	461	462	4.61	4.61	74.3	3.2	0.154	2.4	31.6	51.7	6.8	9.9	0.57	0.746
PS2489-2	466	467	4.66	4.66	70.2	2.9	0.114	2.5	46.4	41.4	5.7	6.5	0.52	0.725
PS2489-2	471	472	4.71	4.71	66.2	4.7	0.151	1.95	39.5	47.2	5.4	7.9	0.56	0.703
PS2489-2	477	478	4.77	4.77	63.2	4.2	0.251	1.93	55.5	34.5	4	6	0.56	0.688
PS2489-2	485	486	4.85	4.85	51.7	5.4	0.284	2.04	32.9	51.7	5.7	9.7	0.51	0.627
PS2489-2	495	496	4.95	4.95	63.3	3.7	0.214							0.689
PS2489-2	503	504	5.03	5.03	88.4	0.3	0.054	2.75	41.7	43.2	6	9.1	0.67	0.82
PS2489-2	512	513	5.12	5.12	63.6	3	0.201	2.26	22.6	57.1	8.6	11.7	0.67	0.69
PS2489-2	520	521	5.2	5.2	78.6	2	0.102	2.6	32.5	49.7	8	9.7	0.58	0.769
PS2489-2	530	531	5.3	5.3	83.8	1.8	0.064	2.79	31.2	49.5	9.5	9.9	0.68	0.796
PS2489-2	539	540	5.39	5.39	83.2	2.4	0.058	3.44	36	48.6	7.6	7.7	0.54	0.793
PS2489-2	545	546	5.45	5.45	74	2.2	0.075	2.13	49.8	37.8	4.8	7.7	0.57	0.745
PS2489-2	555	556	5.55	5.55	78.7	2.5	0.077	2.72	31.5	45.7	12.2	10.6	0.8	0.769
PS2489-2	565	566	5.65	5.65	82.6	2	0.055	2.71	31.6	51	9.2	8.1	0.54	0.79

Notes: TOC = total organic carbon. Qz = quartz, Fsp = feldspar. DBD = dry bulk density. * = in clay fraction. Only a portion of this table appears here. The complete table is available in **ASCII format.**

Table T4. Sediment composition, Site 1090.

Core, section, interval (cm)	Depth (mbsf)	Depth (mcd)	Component (wt%) $CaCO_3$	Component (wt%) Biogenic SiO_2	Component (wt%) TOC	Qz/Fsp*	Clay mineral component (%)* Smectite	Illite	Kaolinite	Chlorite	Illite 5Å/10Å	DBD (g/cm³)
177-1090D-												
2H-1, 128–130.5	8.68	10.83		2.8	0.190	2.17	42.9	42.7	6.6	7.8	0.57	
2H-1, 134-140.5	8.78	10.93		1.0	0.110	2.8	40.1	45.4	6.8	7.6	0.6	
2H-1, 148–150.5	8.89	11.04		2.2	0.105	2.47	55.6	33.2	5.5	5.6	0.63	
2H-2, 8–10.5	8.98	11.13		1.5	0.101	2.58	37.5	43.2	9	10.3	0.74	
2H-2, 18–20.5	9.08	11.23		1.9	0.106	2.18	42.6	41.8	8.1	7.5	0.55	
2H-2, 28–30.5	9.18	11.33		1.9	0.073	2.5	39.3	44.9	8.1	7.7	0.63	
2H-2, 38–40.5	9.28	11.43		1.3	0.082	2.83	40.2	42	9.3	8.6	0.65	
2H-2, 48–50.5	9.38	11.53		0.8	0.055	3.1	38.7	46.6	7.3	7.4	0.53	
2H-2, 58–60.5	9.48	11.63		2.0	0.086	2.85	34.9	45.7	10	9.4	0.67	
2H-2, 68–70.5	9.58	11.73		3.1	0.082	3.3	41.8	45	7.1	6.1	0.53	
2H-2, 78–80.5	9.68	11.83	94.6	1.4	0.056	3.78	47.7	40.2	6.6	5.5	0.57	
2H-2, 88–90.5	9.78	11.93	95.0	1.1	0.071	2.97	41.9	41.5	8.7	7.8	0.68	
2H-2, 98–100.5	9.88	12.03	96.0	1.2	0.047	3.91	45.8	35.6	10.6	8.1	0.71	
2H-2, 108–110.5	9.98	12.13	90.9	1.8	0.051	3.02	44.9	37.4	10.1	7.6	0.61	
2H-2, 118–120.5	10.08	12.23	94.4	1.2	0.044	3.16	42.3	44.1	7.5	6.1	0.52	
2H-2, 128–130.5	10.18	12.33	94.0	2.5	0.054	4.26	51.8	38.7	5.2	4.3	0.44	
2H-2, 138–140.5	10.28	12.43	95.1	1.5	0.046	3.75	44.6	41.3	7.9	6.2	0.51	0.916
2H-2, 148–150	10.39	12.54	95.6	1.8	0.043	3.41	48.8	37.7	7.3	6.2	0.49	0.951
2H-3, 8–10.5	10.48	12.63	84.3	1.5	0.046	3.61	54	35.5	5.7	4.8	0.53	0.946
2H-3, 18–20.5	10.58	12.73	95.9	1.2	0.039	2.91	57.7	32.1	5.7	4.5	0.56	0.924
2H-3, 28–30.5	10.68	12.83	95.0	1.0	0.036	3.07	68.8	25.2	2.9	3.1	0.5	0.92
2H-3, 38–40.5	10.78	12.93	93.5	1.7	0.042	2.28	57.2	32.9	4.9	4.9	0.52	0.915
2H-3, 48–50.5	10.88	13.03	91.5	1.6	0.056	1.99	61.7	29.3	4.1	4.9	0.59	0.902
2H-3, 58–60.5	10.98	13.13	83.3	2.9	0.247	1.76	60.5	28	4.7	6.8	0.64	0.819
2H-3, 68–70.5	11.08	13.23	71.9	2.7	0.271	1.8	44.9	40.5	6.2	8.5	0.63	0.784
2H-3, 78–80.5	11.18	13.33	68.4	3.9	0.358	1.67	46	39	5.5	9.5	0.68	0.738
2H-3, 88–90.5	11.28	13.43	61.5	5.6	0.403	1.69	44.9	42.8	4.4	7.8	0.58	0.691
2H-3, 98–100.5	11.38	13.53	55.4	4.7	0.430	1.56	40.4	43.9	5.7	10	0.63	0.686
2H-3, 108–110.5	11.48	13.63	59.0	4.9	0.380	1.4	45.4	42.8	4	7.8	0.51	0.675
2H-3, 118–120.5	11.58	13.73	67.0	5.4	0.385	1.53	43.6	42.5	5	8.8	0.58	0.733
2H-3, 128–130.5	11.68	13.83	78.1	3.5	0.237	1.48	39	45.8	5.9	9.3	0.58	0.78
2H-3, 138–140.5	11.78	13.93	80.4	2.9	0.195	1.91	44	43.7	4.4	7.9	0.57	0.818
2H-3, 147.8–150	11.89	14.04	76.7	3.6	0.232	1.59	36	45	7.7	11.2	0.76	0.812
2H-4, 8–10.5	11.98	14.13	73.3	3.4	0.272	1.75	37.4	46.5	6.1	10	0.65	0.81
2H-4, 18–20.5	12.08	14.23	71.6	3.9	0.290	1.83	41.7	44.5	5.3	8.6	0.57	0.76
2H-4, 28–30.5	12.18	14.33	61.9	5.5	0.299	1.79	42	42.4	6.3	9.3	0.62	0.766
2H-4, 38–40.5	12.28	14.43	70.4	3.5	0.222	2.15	40.8	45	6.1	8.1	0.59	0.802
2H-4, 48–50.5	12.38	14.53	68.7	4.3	0.272	2.04	44.7	41.4	5.4	8.5	0.63	0.772
2H-4, 58–60.5	12.48	14.63	80.8	3.0	0.152	2.54	46.6	40.4	6.4	6.6	0.52	0.88
2H-4, 68–70.5	12.58	14.73	86.4	2.4	0.114	2.27	39.8	44.4	7.1	8.7	0.62	0.894
2H-4, 78–80.5	12.68	14.83	85.3	1.4	0.075	2.39	40.5	44.1	7.8	7.6	0.54	0.913
2H-4, 88–90.5	12.78	14.93	89.9	2.1	0.071	2.43	44.8	41.3	7.1	6.8	0.54	0.925
2H-4, 98–100.5	12.88	15.03	94.3	1.5	0.056	2.87	56.3	33.8	5.4	4.5	0.47	0.948

Notes: TOC = total organic carbon. Qz = quartz, Fsp = feldspar. DBD = dry bulk density. * = in clay fraction. Only a portion of this table appears here. The complete table is available in **ASCII format.**