Data report: particle size distribution for IODP Expedition 329 sites in the South Pacific Gyre[1]

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Chapter contents

[1] Dubois, N., Mitchell, N.C., and Hall, I.R., 2014. Data report: particle size distribution for IODP Expedition 329 sites in the South Pacific Gyre. *In* D'Hondt, S., Inagaki, F., Alvarez Zarikian, C.A., and the Expedition 329 Scientists, *Proc. IODP,* 329: Tokyo (Integrated Ocean Drilling Program Management International, Inc.). doi:10.2204/iodp.proc.329.201.2014
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Abstract

We conducted particle size analyses on 208 samples from Integrated Ocean Drilling Program Expedition 329 in the South Pacific Gyre. Expedition 329 cored deep-sea sediment at seven sites along two transects in the center of the gyre. We analyzed the particle size distribution of sediment in the clay to silt size range (1.5–63 µm) at the seven drill sites using a Sedigraph particle size analyzer. Here we describe our laboratory procedure and present the overall results. The majority of samples are composed of clay-sized material, with some samples having >95 wt% of particles finer than 1.5 µm. However, a number of samples, in particular from sites located further offshore, show an extraordinarily well sorted particle size distribution.

Introduction

Integrated Ocean Drilling Program (IODP) Expedition 329 was conducted to investigate the subseafloor microbiology of the South Pacific Gyre. Its primary aim was to document the extent and character of life in sedimentary habitats with very low biomass and rates of activity (see the **"Expedition 329 summary"** chapter [Expedition 329 Scientists, 2011]). Although Expedition 329 focused on microbiology, the recovered cores also provide a unique opportunity to document a sedimentary system that has never been explored by scientific ocean drilling. The R/V *JOIDES Resolution* cored deep-sea sediment at seven sites (Fig. **F1**) located along two transects in the center of the South Pacific Gyre and spanning nearly the entire width of the Pacific plate in the Southern Hemisphere. The first transect progresses from the western edge of the gyre (Site U1365) to the gyre center (Site U1368) at ~26°S. The second transect at ~42°S goes from the central gyre (Site U1368) through the southern gyre edge (Site U1370) to the northern edge of the upwelling region south of the gyre (Site U1371). The more northern suite of sites has been continuously located off-shore and beneath the low-productivity gyre water for many tens of millions of years (see the **"Expedition 329 summary"** chapter [Expedition 329 Scientists, 2011]). Equally, the southerly sites of the second transect have been located in the southern portion of the present-day gyre (Sites U1369 and U1370) or south of the gyre (Site U1371) during this time. Particularly at Site U1371, chlorophyll-a concentrations and primary productiv-

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ity are much higher than at all of the sites in the northern transect (see the **"Expedition 329 summary"** chapter [Expedition 329 Scientists, 2011]).

We recovered 208 sediment samples from the seven sites drilled (Sites U1365–U1371; Fig. **F1**) to analyze their particle size distribution. The primary objective of these analyses was to create a downcore profile of particle size at each site and to provide textural information that could be correlated with other types of data analyses made on adjacent samples. Samples were usually recovered at regular intervals, except for chert layers, which were avoided. Particle size distribution from this remote location can shed light on depositional conditions and diagenetic alterations and potentially provide information on eolian inputs and/or past deepwater circulation. Few studies have looked at particle size distribution in this area (see Rea, 1994, for a review).

Methods

The particle size data presented in this report were measured on a Micromeritics Sedigraph 5100 at the Paleoceanography laboratory of the School of Earth and Ocean Sciences at Cardiff University (United Kingdom). The Sedigraph technique is described in detail in Coakley and Syvitski (1991); further discussions of the operations of the instrument are provided by Stein (1985), Jones et al. (1988), and Bianchi et al. (1999). The Sedigraph method assumes that particles are dispersed in a fluid and settle according to Stoke's law. The Sedigraph determines the particle size distribution by the measurement of settling velocity and the mass fraction by relative absorption of low-energy X-ray. No specific sediment concentration is required for the analysis, providing the dispersed sample reduces the radiation beam by 40%–60%. This technique provides a rapid and accurate method (instrumental error <1%) for particle size analyses (e.g., Stein, 1985; Bianchi et al., 1999). The data are presented as a cumulative mass percent distribution in terms of equivalent spherical diameter. We used the Sedigraph because it is capable of sensing the total amount of material present and gives the whole size spectrum with satisfactory resolution >1.5 µm.

Samples were collected and freeze-dried on board the *JOIDES Resolution*. Further sample preparation occurred at Cardiff University. Prior to particle size analysis, samples were disaggregated in 0.2% Calgon (sodium hexametaphosphate) dispersant on a rotating carousel for 24 h. Coarse material (>63 µm) was then removed by wet sieving over a 63 µm mesh. The fine fraction was collected in a large 500 mL glass jar and left to settle before siphoning off the excess water. Both the fine and coarse fractions were dried in an oven (40°C) and weighed, allowing the weight percent in fine and coarse fractions to be calculated. Between 2 and 4 g of the fine fraction were weighed out for particle size analysis. The biogenic carbonate component was removed by slow digestion in 2 M acetic acid solution for 24 h (twice for samples with >1% $CaCO_3$). Biogenic silica was removed from Site U1371 samples by digestion using 6% (w/w) sodium hydroxide at 80°C (water bath) for 5 h. Samples were rinsed with deionized water, washed into a 60 mL Nalgene bottle with 0.2% Calgon solution, and placed on a rotating carousel overnight. All samples were sonicated for 1 min immediately before analysis on the Sedigraph.

Samples were run on the Sedigraph at a constant temperature of 35°C with an analysis range of ~1.5–63 µm, thus covering both the silt and clay range. Sedigraph samples were analyzed at the highest resolution possible, which includes an obligatory 11-point smoothing specified by the manufacturer, providing a total of 269 data points (cumulative mass percentage finer). Output data files were analyzed using a custom-designed program (Sedilyze) that allows the full data to be both graphically and numerically displayed.

Results

We analyzed the particle size distribution of 208 sediment samples from the seven Expedition 329 drill sites. Particle size distributions are given in Tables **T1, T2, T3, T4, T5, T6,** and **T7.** We plot the downcore profile of mean grain size (e.g., graphic mean: $\phi = (\phi_{16} + \phi_{50} + \phi_{84})/3$) and sorting (e.g., standard deviation: $\sigma_\phi = [(\phi_{84} - \phi_{16})/4] + [(\phi_{95} - \phi_5)/6.6]$), along with the summary of lithologic units and mineral composition for Sites U1365–U1371 in Figures **F2, F3, F4, F5, F6, F7** and **F8.** In this study, we used the well-established size boundaries of 63 µm separating sand and silt and 4 µm separating silt and clay. The sediment collected during Expedition 329 is dominantly fine-grained clay and silt with negligible sand. Typical fine fraction contents are >99 wt%, with some samples having >95 wt% of particles finer than 1.5 µm, in particular at Sites U1365 and U1370 (Tables **T1, T6;** Figs. **F2, F7**). Samples with >75 wt% of particles finer than 1.5 µm were attributed an arbitrary mean particle size of 1.5 µm (9.4 ϕ) and no sorting. Site U1365 grains are mostly coarse clay with some very fine silt (Table **T1**). Sites U1366 and U1367 are mostly very fine silt (Tables **T2, T3**), as are the deeper parts of Sites U1368 and U1369 (Tables **T4, T5**). The upper part of Sites U1368 and U1369 consist of coarse clay. Site U1370 is mostly medium clay (Table

T6). Site U1371 grains vary between coarse clay and very fine silt (Table T7). In most samples, the particle size distribution is negatively skewed to very negatively skewed and moderately sorted (poorly sorted at Site U1371; Table T7). However, a number of samples at the sites further offshore (Sites U1368 and U1369) are very well sorted (Tables T4, T5).

Acknowledgments

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Figure F1. Map of annual chlorophyll-a concentrations overlain by Expedition 329 site locations (white circles). White lines indicate basement age in 10 m.y. increments. Black lines indicate site positions over geologic time (by D'Hondt et al., 2013).

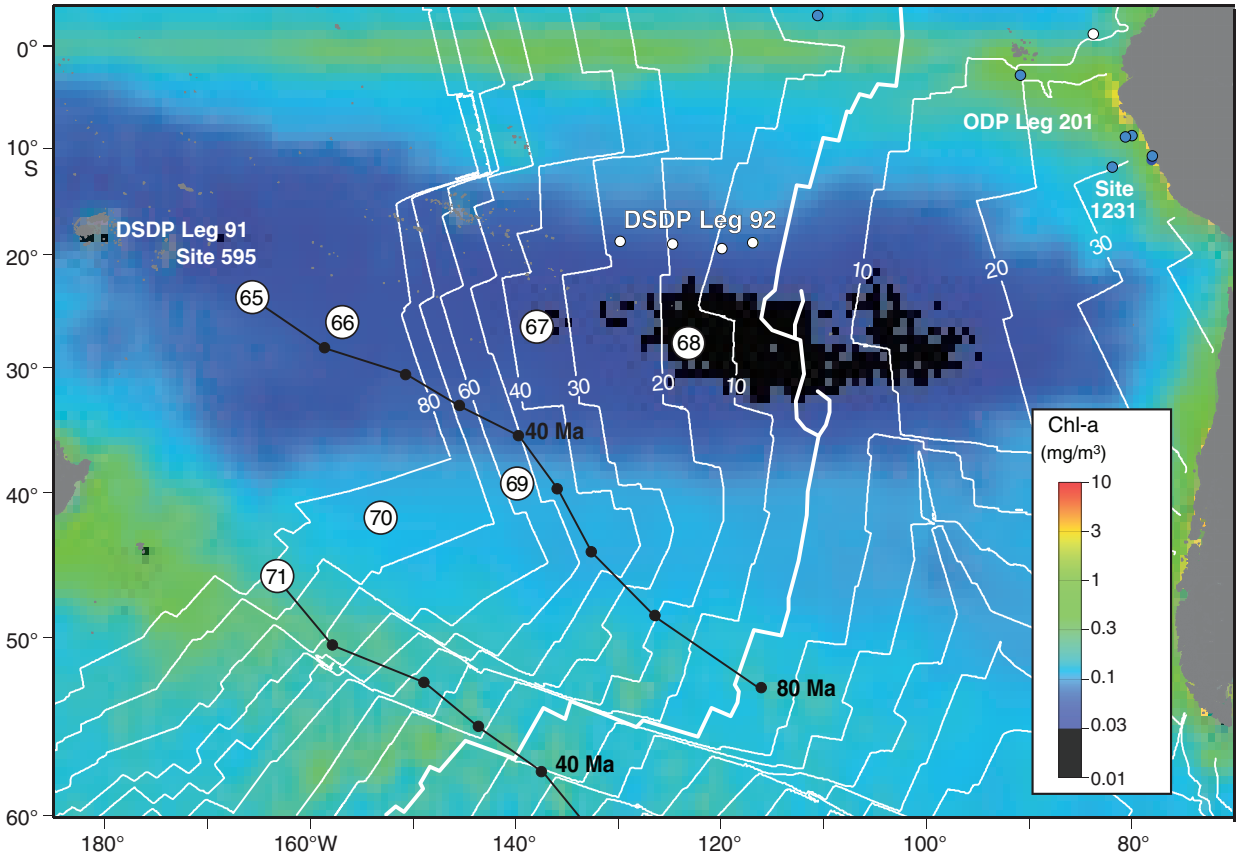

Figure F2. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1365 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

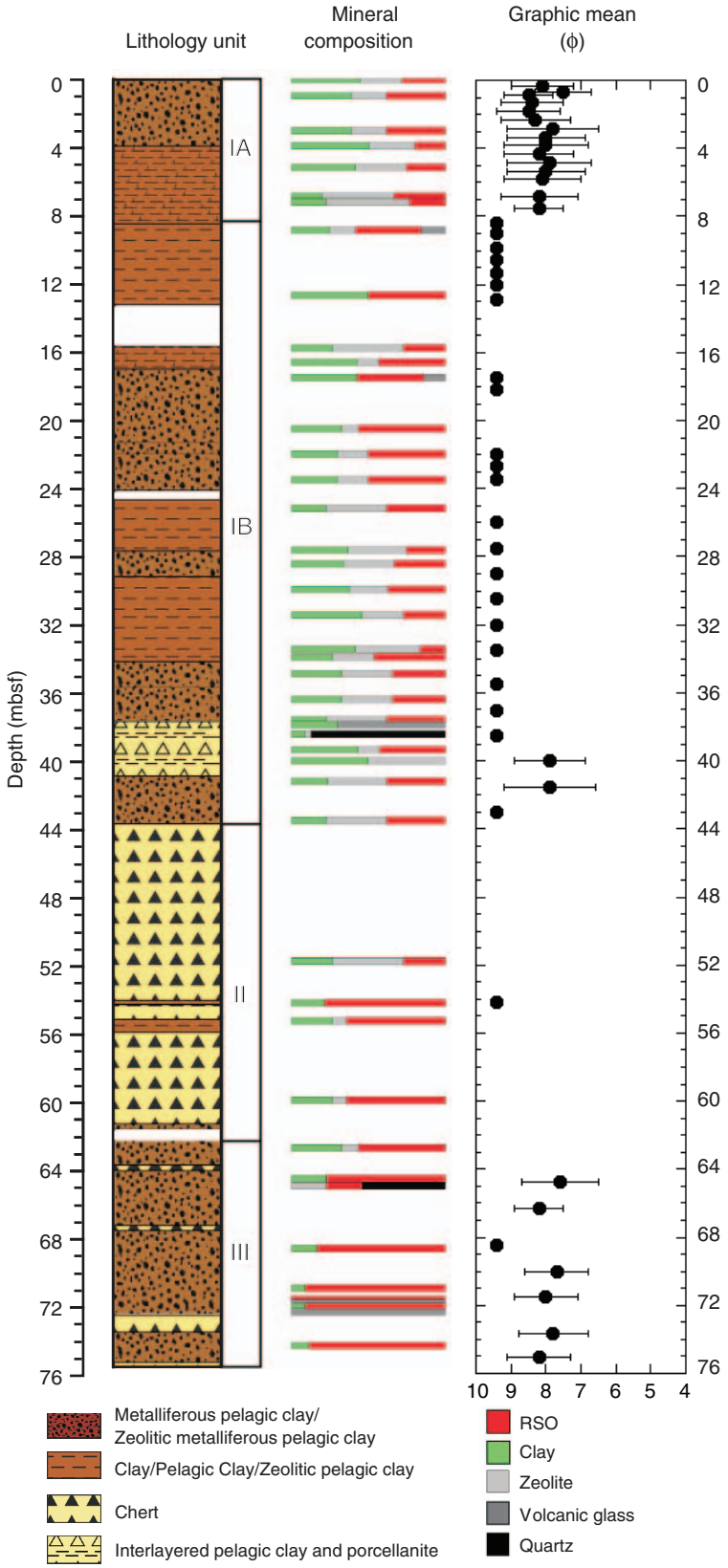

Figure F3. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1366 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

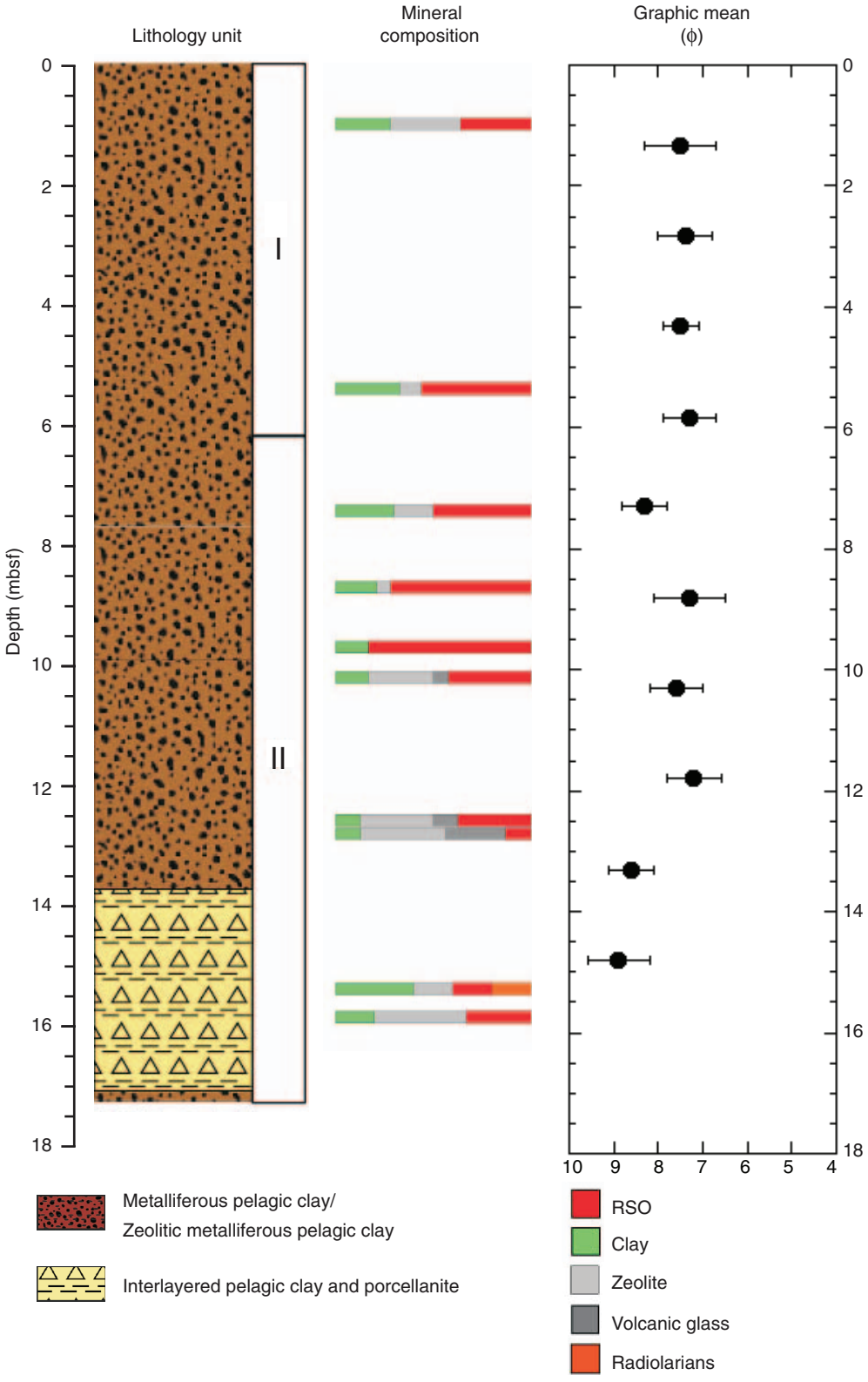

Figure F4. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1367 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

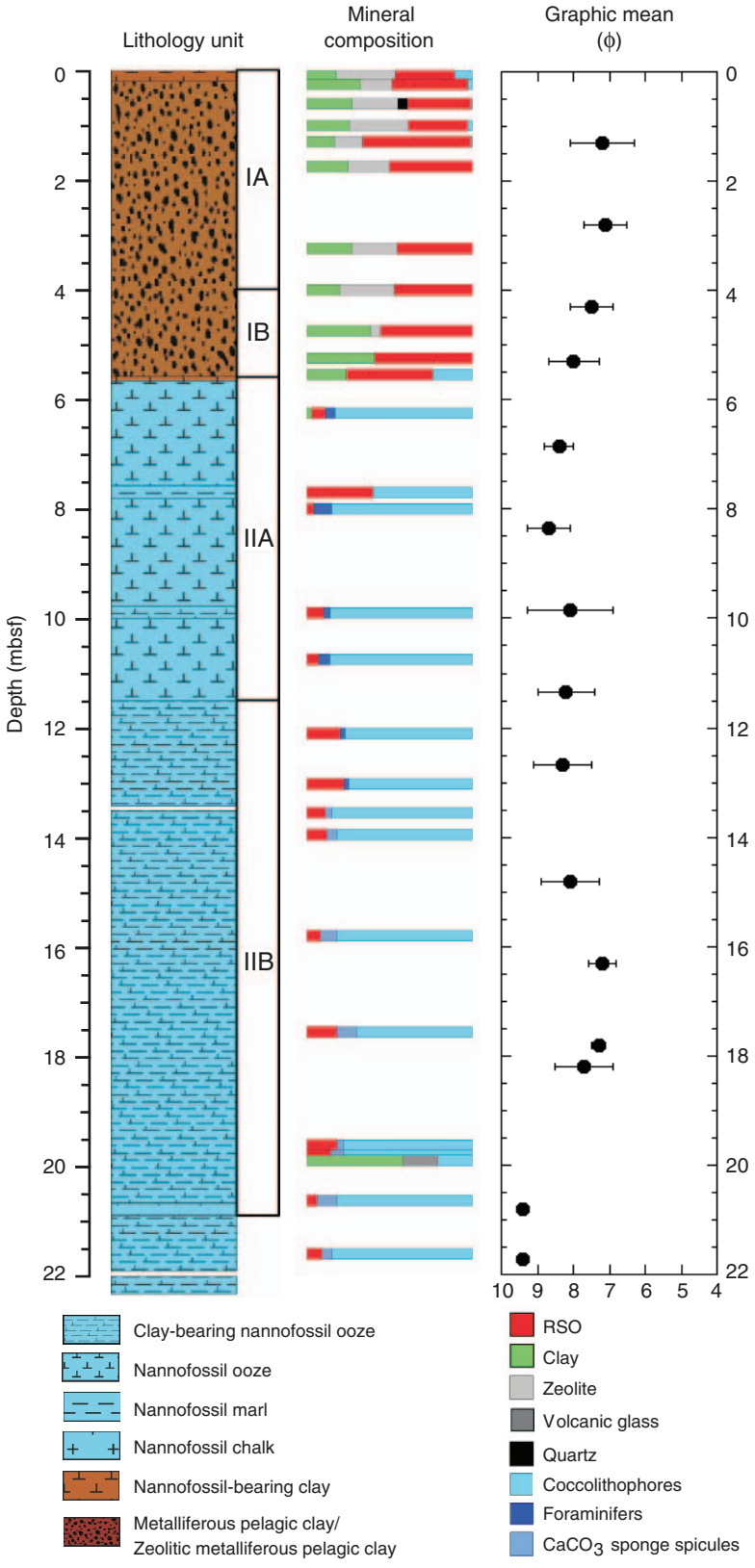

Figure F5. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1368 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

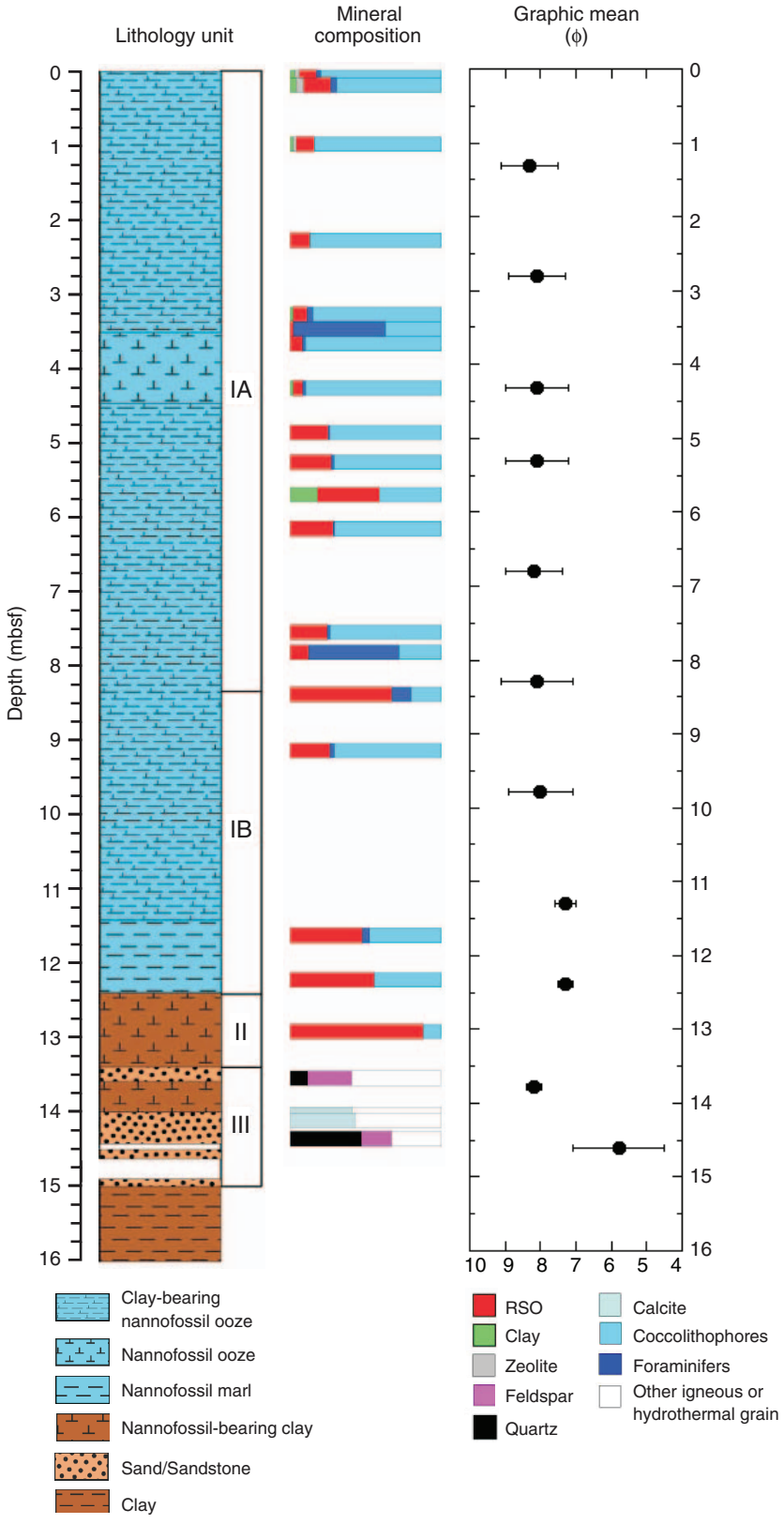

Figure F6. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1369 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

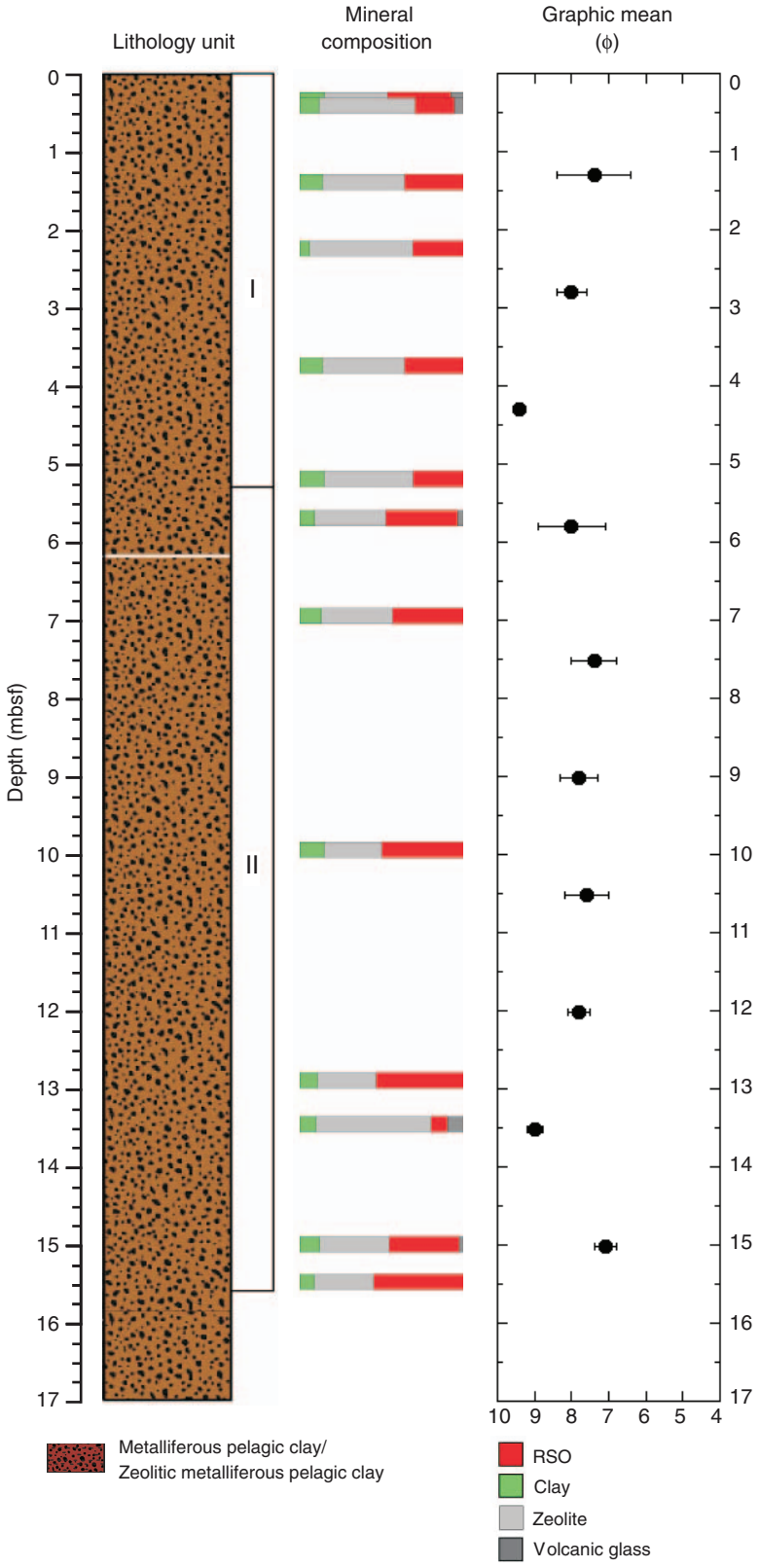

Figure F7. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1370 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

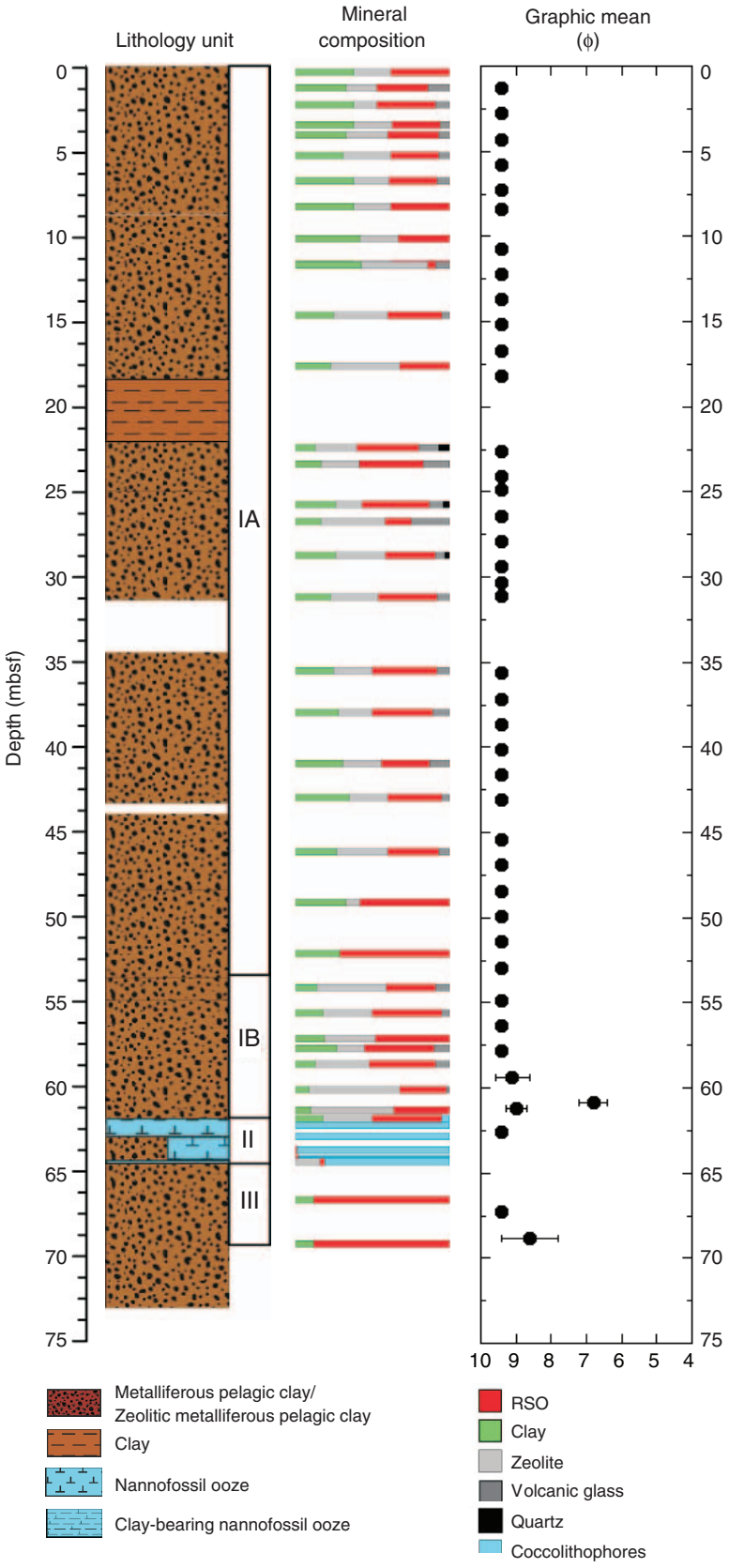

Figure F8. Downcore distribution of mean grain size (ϕ) and sorting (σ_ϕ), along with the lithostratigraphic units and mineral composition of Site U1371 (modified from Expedition 329 Scientists, 2011). RSO = red-brown to yellow-brown semiopaque oxide.

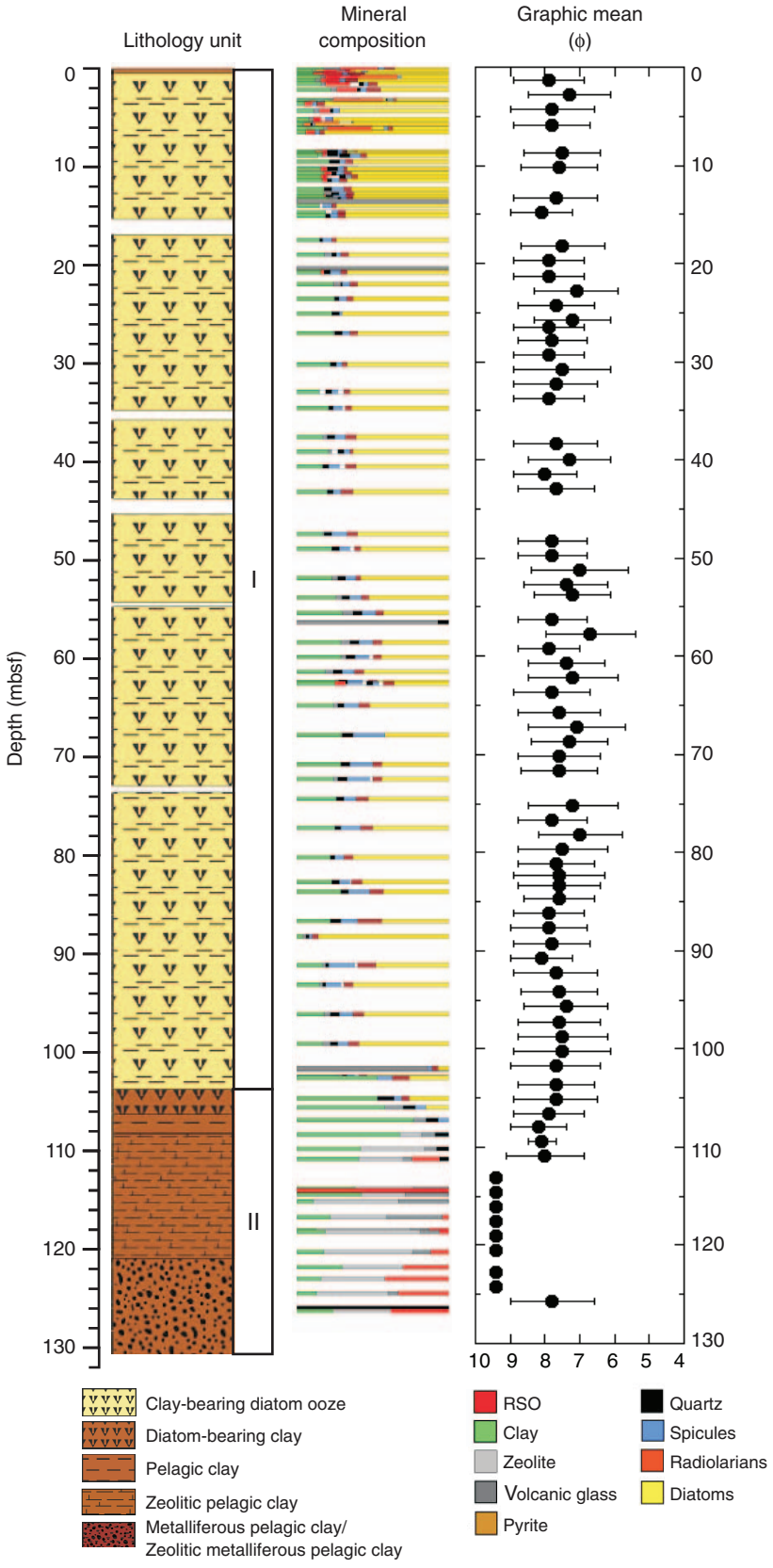

Table T1. Particle size analysis results, Site U1365.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1365A-									
1H-1, 32–36	0.34	0.00	46.51	53.49	3.68	8.09	0.95	Coarse clay	Moderately sorted
1H-1, 65–69	0.67	0.00	77.72	22.28	5.42	7.53	0.75	Very fine silt	Moderately sorted
1H-1, 82–86	0.84	0.15	22.49	77.36	2.78	8.49	0.70	Coarse clay	Moderately sorted
1H-1, 132–136	1.34	0.00	28.19	71.81	3.01	8.38	0.88	Coarse clay	Moderately sorted
1H-2, 32–36	1.84	0.15	20.75	79.10	2.76	8.50	0.86	Coarse clay	Moderately sorted
1H-2, 82–86	2.34	0.00	30.63	69.37	3.14	8.31	0.99	Coarse clay	Moderately sorted
1H-2, 132–136	2.84	0.26	43.33	56.41	4.52	7.79	1.30	Coarse clay	Poorly sorted
1H-3, 32–36	3.34	0.03	38.29	61.68	3.82	8.03	1.14	Coarse clay	Poorly sorted
1H-3, 82–86	3.84	0.09	38.35	61.55	4.03	7.95	1.25	Coarse clay	Poorly sorted
1H-3, 132–136	4.34	0.00	33.94	66.06	3.42	8.19	1.00	Coarse clay	Moderately sorted
1H-4, 32–36	4.84	0.00	41.46	58.54	4.26	7.88	1.24	Coarse clay	Poorly sorted
1H-4, 82–86	5.34	0.10	37.46	62.44	3.90	8.00	1.15	Coarse clay	Poorly sorted
1H-4, 132–136	5.84	0.20	36.98	62.81	3.58	8.13	1.09	Coarse clay	Poorly sorted
2H-1, 65–69	6.87	0.00	33.76	66.24	3.32	8.23	1.10	Coarse clay	Poorly sorted
2H-1, 130–134	7.52	0.01	31.05	68.94	3.35	8.22	0.66	Coarse clay	Moderately well sorted
2H-2, 65–69	8.37	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-2, 130–134	9.02	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-3, 65–69	9.87	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-3, 130–134	10.52	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-4, 65–69	11.37	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-4, 130–134	12.02	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-5, 65–69	12.87	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-2, 62–66	17.46	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-2, 136–140	18.20	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-5, 66–70	22.00	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-5, 133–137	22.67	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-6, 59–63	23.43	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-1, 130–132	26.01	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-2, 133–135	27.54	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-3, 130–132	29.01	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-4, 130–132	30.51	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-5, 130–132	32.01	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-6, 130–132	33.51	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-1, 132–134	35.53	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-2, 132–134	37.03	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-3, 132–134	38.53	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-4, 131–133	40.02	0.27	48.47	51.27	4.14	7.92	1.04	Coarse clay	Poorly sorted
5H-5, 131–133	41.52	0.00	43.69	56.31	4.11	7.93	1.26	Coarse clay	Poorly sorted
5H-6, 132–134	43.03	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
14H-1, 136–138	54.17	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
23H-1, 148–150	64.79	0.05	58.48	41.47	5.13	7.61	1.12	Coarse clay	Poorly sorted
23H-2, 148–150	66.29	0.00	34.61	65.39	3.34	8.23	0.72	Coarse clay	Moderately sorted
24H-1, 130–132	68.51	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
24H-2, 130–132	70.03	0.00	62.19	37.81	4.85	7.69	0.93	Very fine silt	Moderately sorted
24H-3, 130–132	71.53	0.00	45.22	54.78	3.87	8.01	0.90	Coarse clay	Moderately sorted
25H-1, 122–124	73.63	0.00	55.48	44.52	4.55	7.78	1.00	Coarse clay	Moderately sorted
25H-2, 115–119	75.06	0.01	38.79	61.20	3.33	8.23	0.86	Coarse clay	Moderately sorted

ND = not detected.

Table T2. Particle size analysis results, Site U1366.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1366C-									
1H-1, 132–134	1.33	0.02	84.15	15.83	5.81	7.43	0.72	Very fine silt	Moderately sorted
1H-2, 132–134	2.83	0.00	91.27	8.73	5.88	7.41	0.59	Very fine silt	Moderately well sorted
1H-3, 132–134	4.33	0.14	95.20	4.66	5.50	7.51	0.44	Very fine silt	Well sorted
1H-4, 132–134	5.83	0.00	95.35	4.65	6.63	7.24	0.50	Very fine silt	Moderately well sorted
2H-1, 130–132	7.31	0.00	23.02	76.98	3.19	8.29	0.47	Coarse clay	Well sorted
2H-2, 130–132	8.81	0.00	88.64	11.36	6.54	7.26	0.78	Very fine silt	Moderately sorted
2H-3, 130–132	10.31	0.06	82.72	17.22	5.18	7.59	0.57	Very fine silt	Moderately well sorted
2H-4, 130–132	11.81	0.00	98.50	1.50	6.93	7.17	0.64	Very fine silt	Moderately well sorted
2H-5, 130–132	13.31	0.02	8.59	91.39	2.09	8.90	0.45	Medium clay	Well sorted
2H-6, 130–132	14.81	0.00	16.69	83.31	2.38	8.72	0.71	Medium clay	Moderately sorted

Table T3. Particle size analysis results, Site U1367.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1367B-									
1H-1, 130–132	1.31	0.00	85.72	14.28	6.70	7.22	0.88	Very fine silt	Moderately sorted
1H-2, 130–132	2.81	0.01	94.13	5.86	7.10	7.14	0.64	Very fine silt	Moderately well sorted
1H-3, 130–132	4.31	0.02	81.88	18.10	5.39	7.54	0.65	Very fine silt	Moderately well sorted
1H-4, 80–82	5.31	0.01	59.37	40.61	3.99	7.97	0.72	Very fine silt	Moderately sorted
2H-1, 135–137	6.86	0.00	13.55	86.45	2.94	8.41	0.38	Coarse clay	Well sorted
2H-2, 135–137	8.36	0.00	14.22	85.78	2.39	8.71	0.55	Coarse clay	Moderately well sorted
2H-3, 135–137	9.86	0.37	43.97	55.66	3.62	8.11	1.15	Coarse clay	Poorly sorted
2H-4, 135–137	11.36	0.00	37.28	62.72	3.31	8.24	0.78	Coarse clay	Moderately sorted
2H-5, 116–118	12.67	0.00	33.07	66.93	3.15	8.31	0.77	Coarse clay	Moderately sorted
3H-1, 130–132	14.81	0.00	42.55	57.45	3.55	8.14	0.76	Coarse clay	Moderately sorted
3H-2, 130–132	16.31	0.00	94.91	5.09	6.85	7.19	0.39	Very fine silt	Well sorted
3H-3, 130–132	17.81	0.01	99.74	0.25	6.15	7.34	0.20	Very fine silt	Very well sorted
3H-4, 20–22	18.21	0.02	76.38	23.60	4.81	7.70	0.76	Very fine silt	Moderately sorted
3H-5, 130–132	20.81	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-6, 72–74	21.73	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND

ND = not detected.

Table T4. Particle size analysis results, Site U1368.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1368B-									
1H-1, 130–132	1.31	0.00	35.50	64.50	3.16	8.30	0.79	Coarse clay	Moderately sorted
1H-2, 130–132	2.81	0.03	42.95	57.02	3.56	8.13	0.82	Coarse clay	Moderately sorted
1H-3, 130–132	4.31	0.00	43.38	56.62	3.65	8.10	0.87	Coarse clay	Moderately sorted
1H-4, 80–82	5.31	0.00	42.54	57.46	3.61	8.11	0.86	Coarse clay	Moderately sorted
2H-1, 128–130	6.79	0.01	42.18	57.81	3.49	8.16	0.79	Coarse clay	Moderately sorted
2H-2, 128–130	8.29	0.20	43.86	55.94	3.71	8.07	1.01	Coarse clay	Poorly sorted
2H-3, 128–130	9.79	0.06	49.81	50.13	3.91	8.00	0.87	Coarse clay	Moderately sorted
2H-4, 128–130	11.29	0.00	98.15	1.85	6.24	7.32	0.27	Very fine silt	Very well sorted
2H-5, 88–90	12.39	0.01	99.85	0.14	6.24	7.32	0.20	Very fine silt	Very well sorted
2H-6, 128–130	13.79	0.00	11.24	88.76	3.28	8.25	0.21	Coarse clay	Very well sorted
2H-CC, 10–12	14.61	0.44	89.64	9.92	17.71	5.82	1.35	Medium silt	Poorly sorted

Table T5. Particle size analysis results, Site U1369.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1369B-									
1H-1, 130–132	1.31	0.00	69.21	30.79	6.02	7.38	0.97	Very fine silt	Moderately sorted
1H-2, 130–132	2.81	0.00	39.12	60.88	3.85	8.02	0.35	Coarse clay	Well sorted
1H-3, 130–132	4.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-4, 130–132	5.81	0.00	43.81	56.19	3.84	8.03	0.93	Coarse clay	Moderately sorted
2H-1, 130–132	7.51	0.02	90.41	9.57	5.77	7.44	0.64	Very fine silt	Moderately well sorted
2H-2, 130–132	9.01	0.06	57.24	42.70	4.39	7.83	0.54	Very fine silt	Moderately well sorted
2H-3, 130–132	10.51	0.02	81.70	18.28	5.13	7.61	0.58	Very fine silt	Moderately well sorted
2H-4, 130–132	12.01	0.00	82.92	17.08	4.64	7.75	0.33	Very fine silt	Very well sorted
2H-5, 130–132	13.51	0.00	3.03	96.97	2.01	8.96	0.20	Coarse clay	Very well sorted
2H-6, 130–132	15.01	0.00	98.17	1.83	7.06	7.15	0.31	Very fine silt	Very well sorted

ND = not detected.

Table T6. Particle size analysis results, Site U1370.

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1370D-									
1H-1, 130–132	1.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-2, 130–132	2.81	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-3, 130–132	4.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-4, 130–132	5.81	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-5, 130–132	7.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
1H-6, 90–92	8.41	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-2, 130–132	10.71	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-3, 130–132	12.21	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-4, 130–132	13.71	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-5, 130–132	15.21	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-6, 130–132	16.71	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
2H-7, 126–128	18.17	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-3, 147–149	22.59	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-4, 147–149	24.09	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
3H-5, 75–77	24.87	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-1, 140–142	26.41	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-2, 140–142	27.91	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-3, 140–142	29.41	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-4, 80–82	30.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
4H-5, 60–62	31.11	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-1, 115–117	35.66	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-2, 115–117	37.16	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-3, 115–117	38.66	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-4, 115–117	40.16	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-5, 115–117	41.66	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
5H-6, 115–117	43.13	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-1, 144–146	45.45	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-2, 144–146	46.95	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-3, 144–146	48.45	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-4, 144–146	49.95	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-5, 144–146	51.45	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
6H-6, 144–146	52.95	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
7H-1, 135–137	54.86	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
7H-2, 135–137	56.36	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
7H-3, 135–137	57.87	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
7H-4, 135–137	59.37	0.00	6.20	93.80	1.88	9.06	0.51	Medium clay	Moderately well sorted
7H-5, 135–137	60.88	0.03	96.75	3.22	8.98	6.80	0.42	Fine silt	Well sorted
7H-6, 18–20	61.21	0.01	2.15	97.84	1.98	8.98	0.25	Medium clay	Very well sorted
7H-7, 10–12	62.63	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
8H-3, 130–132	67.31	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
8H-4, 130–132	68.81	0.02	22.94	77.04	2.54	8.62	0.82	Medium clay	Moderately sorted

ND = not detected.

Table T7. Particle size analysis results, Site U1371. (Continued on next page.)

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
329-U1371D-									
1H-1, 135–137	1.36	0.17	50.67	49.16	4.14	7.92	0.98	Coarse clay	Moderately sorted
1H-2, 135–137	2.86	0.17	70.47	29.35	6.49	7.27	1.22	Very fine silt	Poorly sorted
1H-3, 135–137	4.36	0.29	55.36	44.35	4.57	7.77	1.16	Coarse clay	Poorly sorted
1H-4, 135–137	5.86	0.07	53.46	46.47	4.49	7.80	1.14	Coarse clay	Poorly sorted
2H-1, 137–139	8.78	0.01	66.08	33.91	5.70	7.45	1.15	Very fine silt	Poorly sorted
2H-2, 137–139	10.28	0.13	61.43	38.44	5.11	7.61	1.13	Very fine silt	Poorly sorted
2H-4, 137–139	13.28	0.14	58.12	41.74	4.86	7.68	1.18	Very fine silt	Poorly sorted
2H-5, 137–139	14.78	0.00	42.31	57.69	3.61	8.11	0.87	Coarse clay	Moderately sorted
3H-1, 134–136	18.25	0.00	63.97	36.03	5.48	7.51	1.18	Very fine silt	Poorly sorted
3H-2, 134–136	19.75	0.00	51.94	48.06	4.18	7.90	0.99	Coarse clay	Moderately sorted
3H-3, 134–136	21.25	0.00	50.65	49.35	4.10	7.93	0.96	Coarse clay	Moderately sorted
3H-4, 134–136	22.75	0.07	76.74	23.19	7.33	7.09	1.21	Very fine silt	Poorly sorted
3H-5, 134–136	24.25	0.00	54.63	45.37	4.76	7.71	1.14	Coarse clay	Poorly sorted
3H-6, 134–136	25.75	0.00	77.40	22.60	7.00	7.16	1.11	Very fine silt	Poorly sorted
3H-7, 60–62	26.51	0.00	49.94	50.06	4.16	7.91	0.99	Coarse clay	Moderately sorted
4H-1, 140–142	27.81	0.05	53.27	46.68	4.36	7.84	0.99	Coarse clay	Moderately sorted
4H-2, 140–142	29.31	0.00	48.93	51.07	4.07	7.94	0.97	Coarse clay	Moderately sorted
4H-3, 140–142	30.81	0.14	60.22	39.64	5.56	7.49	1.36	Coarse clay	Poorly sorted
4H-4, 140–142	32.31	0.15	54.97	44.87	4.65	7.75	1.18	Coarse clay	Poorly sorted
4H-5, 140–142	33.81	0.06	50.15	49.79	4.16	7.91	0.97	Coarse clay	Moderately sorted
5H-2, 140–142	38.41	0.19	55.15	44.66	4.77	7.71	1.21	Coarse clay	Poorly sorted
5H-3, 140–142	39.91	0.02	68.43	31.54	6.29	7.31	1.22	Very fine silt	Poorly sorted
5H-4, 140–142	41.41	0.00	49.19	50.81	4.02	7.96	0.91	Coarse clay	Moderately sorted
5H-5, 140–142	42.91	0.00	58.55	41.45	4.67	7.74	1.09	Very fine silt	Poorly sorted
6H-2, 130–132	48.21	0.00	54.59	45.41	4.51	7.79	1.00	Coarse clay	Moderately sorted
6H-3, 130–132	49.71	0.00	53.10	46.90	4.43	7.82	1.02	Coarse clay	Poorly sorted
6H-4, 130–132	51.21	0.23	74.42	25.35	7.71	7.02	1.38	Very fine silt	Poorly sorted
6H-5, 130–132	52.71	0.05	68.76	31.19	6.08	7.36	1.22	Very fine silt	Poorly sorted
6H-6, 86–88	53.77	0.06	73.64	26.31	6.60	7.24	1.14	Very fine silt	Poorly sorted
7H-1, 130–132	56.21	0.00	52.65	47.35	4.35	7.84	1.05	Coarse clay	Poorly sorted
7H-2, 130–132	57.71	0.04	83.72	16.24	9.84	6.67	1.29	Fine silt	Poorly sorted
7H-3, 130–132	59.21	0.00	52.53	47.47	4.24	7.88	0.89	Coarse clay	Moderately sorted
7H-4, 130–132	60.71	0.04	70.08	29.89	6.07	7.36	1.11	Very fine silt	Poorly sorted
7H-5, 130–132	62.21	0.16	72.74	27.10	6.86	7.19	1.28	Very fine silt	Poorly sorted
7H-6, 130–132	63.71	0.12	50.40	49.48	4.44	7.81	1.12	Coarse clay	Poorly sorted
8H-1, 131–133	65.72	0.06	61.34	38.60	5.25	7.57	1.19	Very fine silt	Poorly sorted
8H-2, 131–133	67.22	0.39	71.28	28.33	7.25	7.11	1.42	Very fine silt	Poorly sorted
8H-3, 131–133	68.72	0.05	69.03	30.92	6.15	7.35	1.10	Very fine silt	Poorly sorted
8H-4, 131–133	70.22	0.00	55.21	44.79	5.17	7.60	1.24	Coarse clay	Poorly sorted
8H-5, 131–133	71.72	0.00	61.89	38.11	5.26	7.57	1.11	Very fine silt	Poorly sorted
9H-1, 130–132	75.21	0.08	66.36	33.56	6.63	7.24	1.28	Coarse clay	Poorly sorted
9H-2, 130–132	76.71	0.10	44.65	55.25	4.44	7.81	1.04	Coarse clay	Poorly sorted
9H-3, 130–132	78.21	0.00	76.10	23.90	7.75	7.01	1.22	Very fine silt	Poorly sorted
9H-4, 130–132	79.71	0.01	58.52	41.47	5.58	7.49	1.26	Coarse clay	Poorly sorted
9H-5, 130–132	81.21	0.02	53.17	46.81	4.67	7.74	1.14	Coarse clay	Poorly sorted
9H-6, 98–100	82.39	0.16	55.89	43.95	5.30	7.56	1.32	Coarse clay	Poorly sorted
9H-7, 98–100	83.39	0.00	58.42	41.58	5.29	7.56	1.19	Coarse clay	Poorly sorted
10H-1, 130–132	84.71	0.06	59.39	40.55	5.06	7.63	1.04	Coarse clay	Poorly sorted
10H-2, 130–132	86.21	0.00	51.37	48.63	4.27	7.87	0.98	Coarse clay	Moderately sorted
10H-3, 130–132	87.71	0.00	47.09	52.91	4.24	7.88	1.12	Coarse clay	Poorly sorted
10H-4, 130–132	89.21	0.05	51.15	48.80	4.51	7.79	1.08	Coarse clay	Poorly sorted
10H-5, 130–132	90.71	0.11	43.53	56.35	3.67	8.09	0.89	Coarse clay	Moderately sorted
10H-6, 130–132	92.21	0.27	54.38	45.35	4.88	7.68	1.20	Coarse clay	Poorly sorted
11H-1, 130–132	94.21	0.00	63.00	37.00	5.29	7.56	1.08	Very fine silt	Poorly sorted
11H-2, 130–132	95.71	0.08	68.68	31.24	6.13	7.35	1.23	Very fine silt	Poorly sorted
11H-3, 130–132	97.21	0.00	55.72	44.28	5.27	7.57	1.21	Coarse clay	Poorly sorted
11H-4, 130–132	98.71	0.17	56.06	43.77	5.46	7.52	1.33	Coarse clay	Poorly sorted
11H-5, 130–132	100.22	0.07	58.22	41.71	5.62	7.48	1.36	Coarse clay	Poorly sorted
11H-6, 130–132	101.72	0.05	48.61	51.34	4.74	7.72	1.31	Coarse clay	Poorly sorted
12H-1, 126–128	103.67	0.00	61.17	38.83	4.94	7.66	1.10	Very fine silt	Poorly sorted
12H-2, 126–128	105.17	0.00	54.47	45.53	4.79	7.70	1.16	Coarse clay	Poorly sorted
12H-3, 126–128	106.67	0.00	47.94	52.06	4.07	7.94	0.98	Coarse clay	Moderately sorted
12H-4, 126–128	107.95	0.00	37.50	62.50	3.45	8.18	0.84	Coarse clay	Moderately sorted
12H-5, 126–128	109.45	0.00	30.80	69.20	3.67	8.09	0.35	Coarse clay	Well sorted
12H-6, 126–128	110.95	0.03	45.63	54.34	3.98	7.97	1.07	Coarse clay	Poorly sorted
13H-1, 120–122	113.11	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
13H-2, 120–122	114.61	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND

Table T7 (continued).

Core, section, interval (cm)	Depth (mbsf)	Particle size (wt%)			Mean (μm)	Mean (ϕ)	Sorting (ϕ)	Grain size (Wentworth)	Sorting
		Sand	Silt	Clay					
13H-3, 120–122	116.11	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
13H-4, 120–122	117.61	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
13H-5, 120–122	119.11	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
13H-6, 118–120	120.59	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
14H-1, 135–137	122.76	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
14H-2, 135–137	124.26	ND	ND	ND	1.50	9.40	ND	Medium-fine clay	ND
14H-3, 135–137	125.76	0.00	53.06	46.94	4.60	7.77	1.18	Coarse clay	Poorly sorted

ND = not detected.