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11. Data Report: Bulk and Clay Mineral Assemblages of the Tasmanian Area, Maastrichtian–Pleistocene, ODP Leg 189[1]

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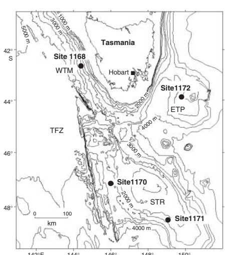
ABSTRACT

Bulk and clay mineral investigations were conducted on ~750 samples from four sites drilled during Ocean Drilling Program Leg 189 on the western Tasmanian margin (Site 1168), the South Tasman Rise (Sites 1170 and 1171), and the East Tasman Plateau (Site 1172). The mineralogy of the bulk sediment is very similar at all sites, and major changes coincide with the boundaries of the three main lithologic units described in the Leg 189 *Initial Reports* volume. The clay mineral assemblages show significant regional differences, but their major variations coincide at all sites and with major changes in regional tectonics and climate.

INTRODUCTION

During Ocean Drilling Program Leg 189 in the Tasmanian area of the Southern Ocean (Exon, Kennett, Malone, et al., 2001), four sites (Fig. F1; Table T1) were cored on the western Tasmanian margin (WTM), South Tasman Rise (STR), and East Tasman Plateau (ETP). The sites are located on both the Indian side (Sites 1168 and 1170) and the Pacific side (Sites 1171 and 1172) of the Tasmanian area. These sites were designed to test the hypothesis that opening of the Tasmanian Seaway near the Eocene/Oligocene boundary and related initiation of circum-polar circulation contributed to the thermal isolation of Antarctica,

F1. Location map, p. 8.



T1. Site characteristics, Leg 189, p. 13.

[1] Robert, C., 2004. Data report: Bulk and clay mineral assemblages of the Tasmanian area, Maastrichtian–Pleistocene, ODP Leg 189. *In* Exon, N.F., Kennett, J.P., and Malone, M.J. (Eds.), *Proc. ODP, Sci. Results,* 189, 1–34 [Online]. Available from World Wide Web: <http://www-odp.tamu.edu/publications/189_SR/VOLUME/CHAPTERS/114.PDF>. [Cited YYYY-MM-DD]
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leading to the development of the initial ice sheet and oceanic thermohaline circulation (Kennett, 1977).

Four sequences of sediments recovered from sites cored during Leg 189 contain the entire Cenozoic history of continental breakup, ocean opening, oceanographic development, and climate changes south of Australia. Major stages of the Cenozoic history of paleoenvironments in the Tasmanian area are delineated by primary sediment variations that separate three identical lithologic units at all sites (Exon, Kennett, Malone, et al., 2001):

1. A siliciclastic unit (Unit III, from the upper Maastrichtian at Site 1172 to the upper Eocene at all sites) consists of silty claystone and clayey siltstone deposited in restricted, poorly ventilated, neritic (water depth = <200 m) environments. Fluctuating contents of organic matter indicate dysoxic to oxic conditions.
2. The lower part of a transitional unit (Unit II) deposited at neritic depths (late Eocene) coincides with the preservation of abundant diatoms at Sites 1170 and 1171. This is followed by occurrences of slowly deposited glauconitic siltstones and minor sands indicative of intensified bottom water activity in increasing water depths near the Eocene/Oligocene boundary.
3. A biogenic pelagic unit (Unit I) deposited at bathyal depths (water depth = 400–2000 m) begins with lowermost Oligocene nannofossil chalk/limestone at all but Site 1168, where a gradational change from shallow terrigenous to pelagic carbonates occurs in the Oligocene and lower Miocene.

Bulk mineralogy provides a general overview of the sediment composition, which includes minerals of terrigenous, biogenic, and diagenetic origin. Variations in bulk sediment mineralogy yield precise information on the sediment composition, its variations in relation to the history of the Southern Ocean, and postdepositional evolution. Bulk mineralogy also helps in interpreting data using nondestructive methods.

Clay mineralogy provides information on continental weathering conditions in the source area of the particles. Terrigenous clay minerals originate from substrates, sediments, and soils. They are very sensitive to climate, continental morphology, and erosion and are easily transported over great distances by winds and oceanic currents. Clay minerals therefore provide information about different aspects of the paleoenvironments.

METHODS

Bulk and clay mineral investigations are based on regular sampling of two samples per core, independent of the nature of the sediment. Each sample was divided into two subsamples. One subsample was crushed in a grinder and pressed into a holder for bulk mineral analyses. The other subsample was washed on a 63-µm mesh. The <63-µm fraction was decalcified using a solution of 10% HCl, rinsed with deionized water, and deflocculated through repeated centrifuging. The clay fraction (<2 µm) was separated by decantation (settling time based on Stoke's law) and deposited onto a glass slide. X-ray diffraction analyses were conducted on natural clay slides after ethylene glycol solvation and heating at 490°C for 2 hr. Clay mineral preparation, treatment, and identification methods were those described in Holtzapffel

(1985). Mineral percentage evaluations of the bulk sediment and clay fraction were based on peak areas measured on X-ray diagrams using MacDiff (version 4) software (servermac.geologie.uni-frankfurt.de/Staff/Homepages/Petschick/RainerE.html). For clay mineral quantification, the diagram obtained from the glycolated sample was preferred.

PRINCIPAL RESULTS

Bulk Mineralogy

The mineralogy of the bulk sediment is almost identical at all sites. Major changes coincide with the boundaries of the three main lithologic units (Exon, Kennett, Malone, et al; 2001).

The lower siliciclastic unit (Unit III) extends from the late Maastrichtian (drilled at Site 1172) to the latest Eocene (at all sites). The bulk mineralogy (Tables T2, T3, T4, T5, T6; Figs. F2, F3, F4, F5) is largely dominated by quartz, in association with significant amounts of clay minerals, minor amounts of feldspars and pyroxenes, and sporadic traces of dolomite. These minerals are essentially terrigenous (Robert, in press). Trace to minor amounts of pyrite and gypsum are present in most intervals, in probable relationship with abundant organic matter (0.5–5 wt% total organic carbon) (Exon, Kennett, Malone, et al., 2001), dysoxic conditions, and/or further diagenesis. Similar mineralogical assemblages are commonly found in rift graben sediments like those of the Lower Cretaceous Otway Group of southeast Australia (Duddy, 1983; Little and Phillips, 1995). Significant abundances of biogenic calcite (and traces of aragonite at Site 1168) are locally present, especially in the upper middle and upper Eocene part of the sequences. Opal-CT is abundant at all sites with the exception of Site 1168 on the WTM. High contents of opal-CT coincide with sharp decreases of siliceous microfossils in smear slides (Exon, Kennett, Malone, et al., 2001) and cease abruptly downhole as quartz increases. Transitions to increased contents of opal-CT and quartz correlate with decreased porosity at all sites (Exon, Kennett, Malone, et al., 2001) and may result from silica diagenesis (Robert, in press).

The transitional unit (Unit II) is latest Eocene to earliest Oligocene in age and is characterized by the preservation of abundant diatoms followed later by occurrences of glauconitic siltstones and sands (Exon, Kennett, Malone, et al., 2001). Bulk mineral assemblages in Unit II (Table T2; Figs. F2, F3, F4, F5) are rather similar to those in the lower siliciclastic Unit III. However, biogenic carbonates start increasing in Unit II, with fluctuations in abundance. The increase in biogenic carbonates (mostly calcite) and decrease in terrigenous minerals continue in the lower part of the upper biogenic Unit I.

The upper biogenic unit (Unit I) extends from the earliest Oligocene to the Pleistocene (Exon, Kennett, Malone, et al., 2001). Bulk mineral assemblages are largely dominated by biogenic carbonates, which essentially consist of calcite with minor and sporadic amounts of aragonite at Sites 1168 and 1170 (Table T2; Figs. F2, F3, F4, F5). Opal-CT is also present intermittently, especially at Sites 1168 and 1170, where it occurs concomitantly with siliceous microfossils (Exon, Kennett, Malone, et al., 2001). Small quantities of clinoptilolite are recorded locally, especially at Site 1168. Trace to minor amounts of pyrite and gypsum are present in a few samples. The contents of quartz, clay minerals, and feldspars are highly variable and intermittently associated with traces of

T2. Bulk mineralogy summary, Leg 189, p. 14.

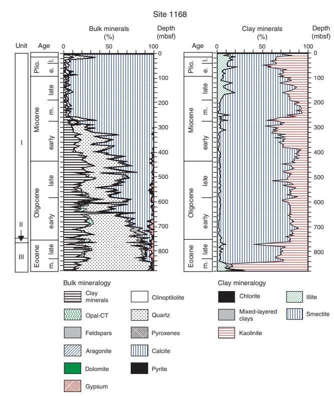
T3. Bulk mineralogy, Site 1168, p. 15.

T4. Bulk mineralogy, Site 1170, p. 18.

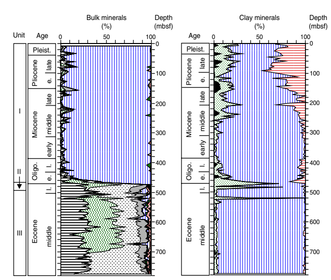
T5. Bulk mineralogy, Site 1171, p. 21.

T6. Bulk mineralogy, Site 1172, p. 24.

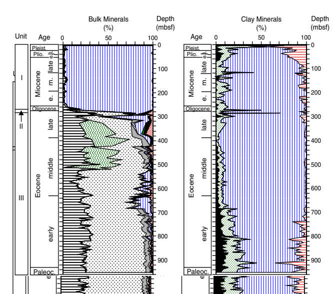
F2. Bulk and clay mineral data, Site 1168, p. 9.



F3. Bulk and clay mineral data, Site 1170, p. 10.

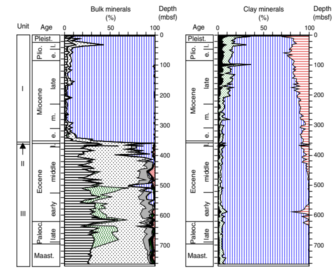


F4. Bulk and clay mineral data, Site 1171, p. 11.



pyroxenes and dolomite. In fact, very low contents of these typically terrigenous minerals are recorded in most of the unit (Figs. F3, F4, F5). The highest terrigenous contents are recognized at the very base of Unit I in the early Oligocene, and terrigenous content decreases rapidly upward. The strong relative decrease in terrigenous minerals and concomitant increase in biogenic carbonates from the transitional Unit II to the Oligocene part of Unit I is probably related to regional subsidence in the Tasmanian area (Exon et al., in press). One exception is Site 1168 on the WTM, close to continental drainage basins and in a less biologically productive area, where terrigenous minerals remain abundant throughout the Oligocene and decrease in the early Miocene to a middle Miocene minimum (Fig. F2). Significant increases in quartz and clay minerals are visible in the late Pliocene and Pleistocene of the northern Sites 1168 (WTM) and 1172 (ETP), probably related to intensified eolian processes (Robert, in press).

F5. Bulk and clay mineral data, Site 1172, p. 12.



Clay Mineralogy

The clay mineral assemblages are essentially terrigenous (Robert, in press) and show significant regional differences (Tables T7, T8, T9, T10, T11; Figs. F2, F3, F4, F5). However, major variations in the clay assemblages coincide at all sites and with major changes in regional tectonics and global climate.

T7. Clay mineralogy summary, Leg 189, p. 26.

T8. Clay mineralogy, Site 1168, p. 27.

T9. Clay mineralogy, Site 1170, p. 29.

T10. Clay mineralogy, Site 1171, p. 31.

T11. Clay mineralogy, Site 1172, p. 33.

The Maastrichtian to upper Paleocene sequence was drilled at Site 1172 (ETP) only, where largely predominant smectite is associated with very minor amounts of chlorite and illite (Fig. F5). The contents of chlorite and illite increase slightly in the late Paleocene, where it is associated with significant occurrences of kaolinite, but smectite remains dominant. However, at Site 1171 on the STR (Fig. F4), late Paleocene abundances of chlorite and illite are significantly higher (and smectite lower). The composite late Paleocene clay mineral assemblage coincides with a transition in the direction of tectonic movements (from northwest–southeast to north–south) and with the formation of basins in the STR area (Exon et al., in press). Chlorite, illite, and kaolinite decrease in the early Eocene, and smectite dominates largely in the middle Eocene of Site 1172 on the ETP, and Sites 1171 and 1170 on the STR.

Late middle and late Eocene-age sediments of southern Sites 1170 and 1171 (STR) are characterized by increased contents of illite, mostly as brief intervals of large dominance of the mineral (Figs. F3, F4). Significant amounts of glauconite in some intervals of Unit II could interfere with illite identification, as they both have relatively similar mineralogical structures and X-ray signals. However,

1. High contents of illite do not correlate with occurrences of glauconite in the sediment (Exon, Kennett, Malone, et al., 2001);
2. Coeval sediments from Site 1168 on the WTM also contain abundant glauconite but their fine fraction shows increased contents of kaolinite (Fig. F2);
3. Glauconite predominantly occurs as sand-sized grains, whereas the increases in illite have been observed in the <2-µm fraction;
4. Electromicrographs show typically terrigenous particles in the <2-µm fraction; and
5. Illite X-ray signals show significant d002 reflections as a result of relatively low Mg and Fe contents (Holtzapffel, 1985).

No such increases in illite are observed at northern Sites 1168 and 1172. Upper middle and upper Eocene sediments at Site 1168 on the WTM are characterized by intervals of abundant to dominant kaolinite (associated with smaller amounts of illite and trace amounts of random mixed-layered clays), separated by an interval of abundant smectite (Table T7; Fig. F2). At Site 1172 on the ETP, which was attached to the passive western margin of the Tasman Sea, only a slight increase in kaolinite is visible over this interval (Table T7; Fig. F5). The upper middle and upper Eocene interval was a time of intense activity along the Tasman Fracture Zone (Exon et al., in press).

The lower Oligocene to lower Miocene interval is characterized at all sites by the large dominance of smectite, associated with relatively small and variable amounts of chlorite, illite, and kaolinite. The abundance of kaolinite is higher at the northern sites, especially at Site 1168 on the WTM (Table T7; Figs. F2, F3, F4, F5). The Oligocene was a time of regional subsidence of the Tasmanian area (Exon, Kennett, Malone, et al., 2001; Exon et al., in press), favorable to increased formation and erosion of smectite (Robert, in press).

An early Miocene increase in kaolinite is visible at Site 1168 on the WTM, where it lasts until the middle Miocene (Fig. F2). There is no significant early Miocene variation in the clay assemblage at Site 1172 on the ETP (Fig. F5). At southern Sites 1170 and 1171 on the STR, the clay assemblages remain largely dominated by smectite, with minor and variable increases in chlorite and illite (Figs. F3, F4).

The middle Miocene is characterized by an increase in smectite at northern Site 1168 on the WTM (Fig. F2), whereas increased contents of illite followed by kaolinite occur at southern Sites 1170 and 1171 on the STR (Figs. F3, F4). At Site 1172 on the ETP, the middle Miocene marks the beginning of a slightly increasing trend in kaolinite (Fig. F5). These changes in the clay mineral assemblages of the Tasmanian area occurred as the East Antarctic Ice Sheet expanded, early in the middle Miocene (Kennett, 1977). The late Miocene is characterized by increased contents of chlorite, illite, and/or kaolinite that are more visible at northern Sites 1172 (ETP) and, especially, 1168 (WTM). These changes occurred as the West Antarctic Ice Sheet developed in the late Miocene (Kennett, 1977).

Beginning in the latest early Pliocene, increased contents of chlorite, illite, and/or kaolinite are visible at all sites (Table T7; Figs. F2, F3, F4, F5). Late Pliocene and Pleistocene clay mineral assemblages in the Tasmanian region are rather similar in nature and abundance at all sites. They are also similar to the clay assemblages recognized on Lord Howe Rise in the adjacent Tasman Sea (Robert et al., 1986; Stein and Robert, 1986). Homogenization of clay assemblages off Australia coincided with the development of aridity in southern Australia (Martin, 1991), probably as wind processes exerted more control on the distribution of clay particles (Robert, in press).

SUMMARY

Quartz and clay minerals dominate the bulk sediment in the lower siliciclastic Unit III of Cretaceous to late Eocene age, as well as in the transitional Unit II of latest Eocene to earliest Oligocene age. Increased contents of opal-CT in Unit III coincide with a downhole decrease in siliceous microfossils and porosity, whereas decreased contents of opal-CT farther downhole coincide with an increase in quartz and a further decrease in porosity. Dominant quartz and clay minerals in Unit III are superseded by dominant calcite from the uppermost Unit II to the lowermost biogenic Unit I in the early Oligocene. One exception is Site 1168 on the WTM, where quartz and clay minerals decrease more slowly until the middle Miocene. Quartz, clays, and associated minerals increase significantly in the late Pliocene at northern Sites 1168 and 1172.

Clay mineral assemblages are dominated by smectite for most of the Cenozoic. Chlorite, illite, and/or kaolinite are locally important or dominant from the late Paleocene to the early Eocene and from the late middle Eocene to the earliest Oligocene. These changes coincide with intervals of active tectonism (strike-slip activity and basin formation) in the Tasmanian area. Further increases in chlorite, illite, and/or kaolinite occur in the middle and in the late Miocene, during intervals of climate change and glacial development in Antarctica. The clay assemblages change near the early/late Pliocene transition to similar assemblages at all sites, corresponding to increasing aridity in southern Australia, and a concomitant increase in wind-blown clays.

ACKNOWLEDGMENTS

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Figure F1. Location map. ETP = East Tasman Plateau. STR = South Tasman Rise. WTM = West Tasmanian Margin. TFZ = West Tasman Fracture Zone.

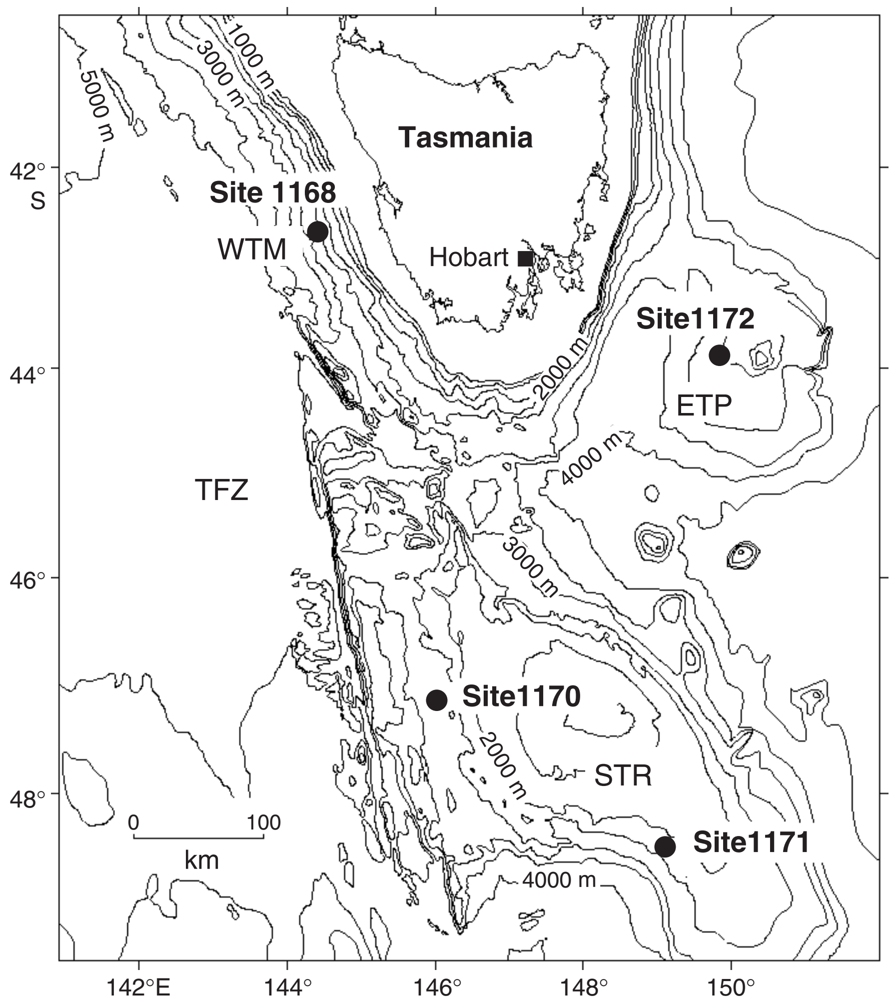

Figure F2. Bulk and clay mineral data, Site 1168, West Tasmanian Margin.

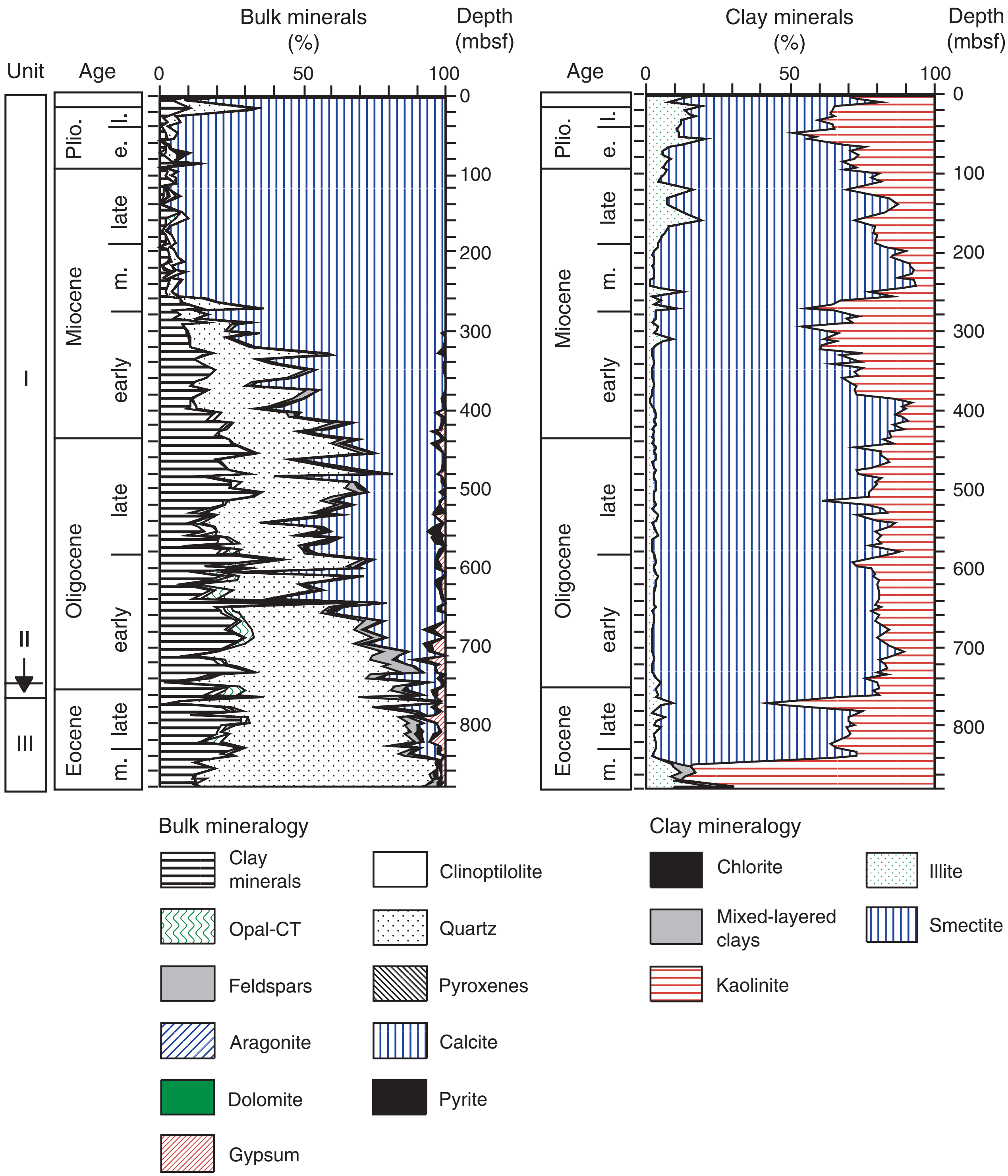

Figure F3. Bulk and clay mineral data, Site 1170, South Tasman Rise. (For key to bulk and clay mineral patterns, see Fig. F2, p. 9.)

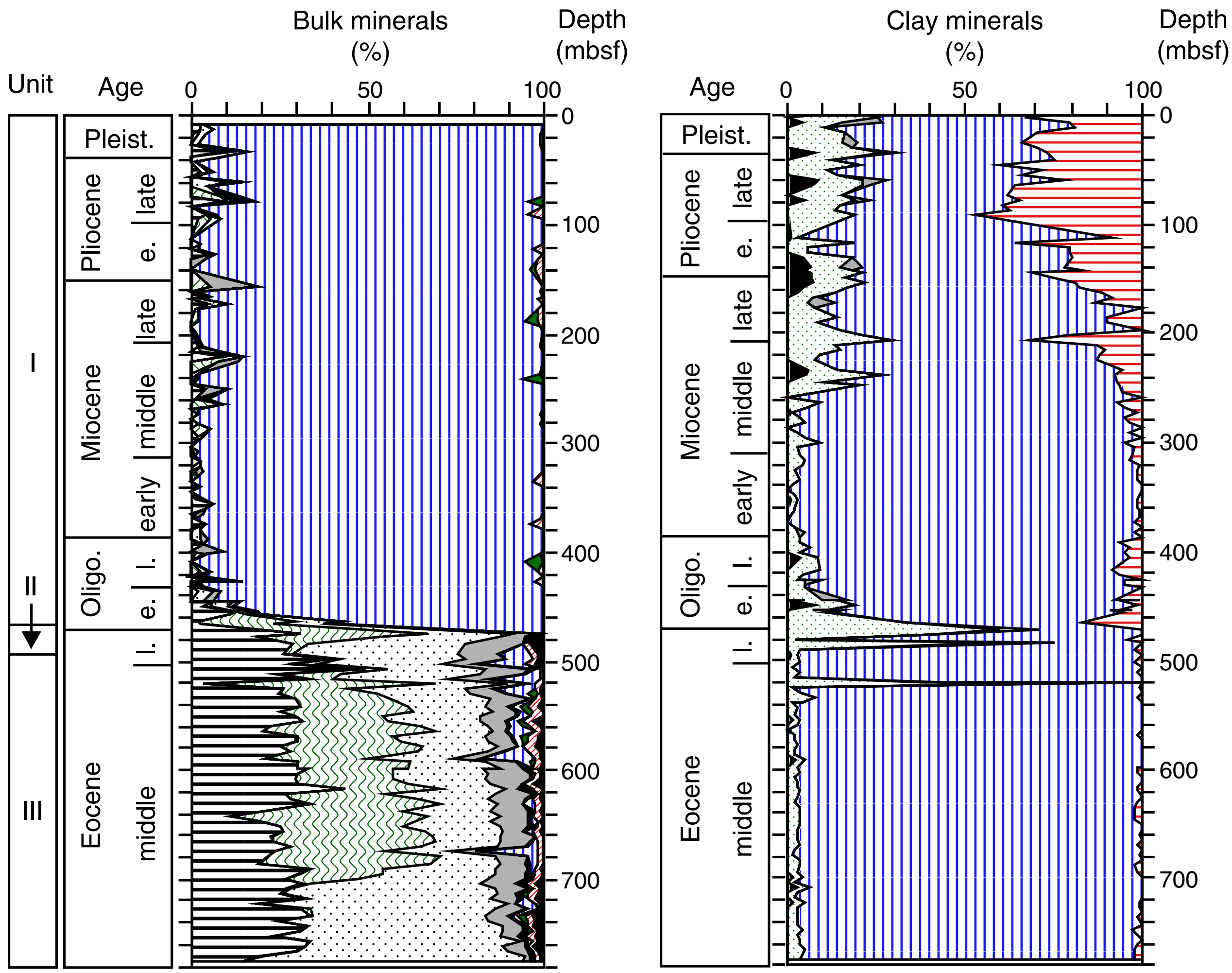

Figure F4. Bulk and clay mineral data, Site 1171, South Tasman Rise. (For key to bulk and clay mineral patterns, see Fig. **F2**, p. 9.)

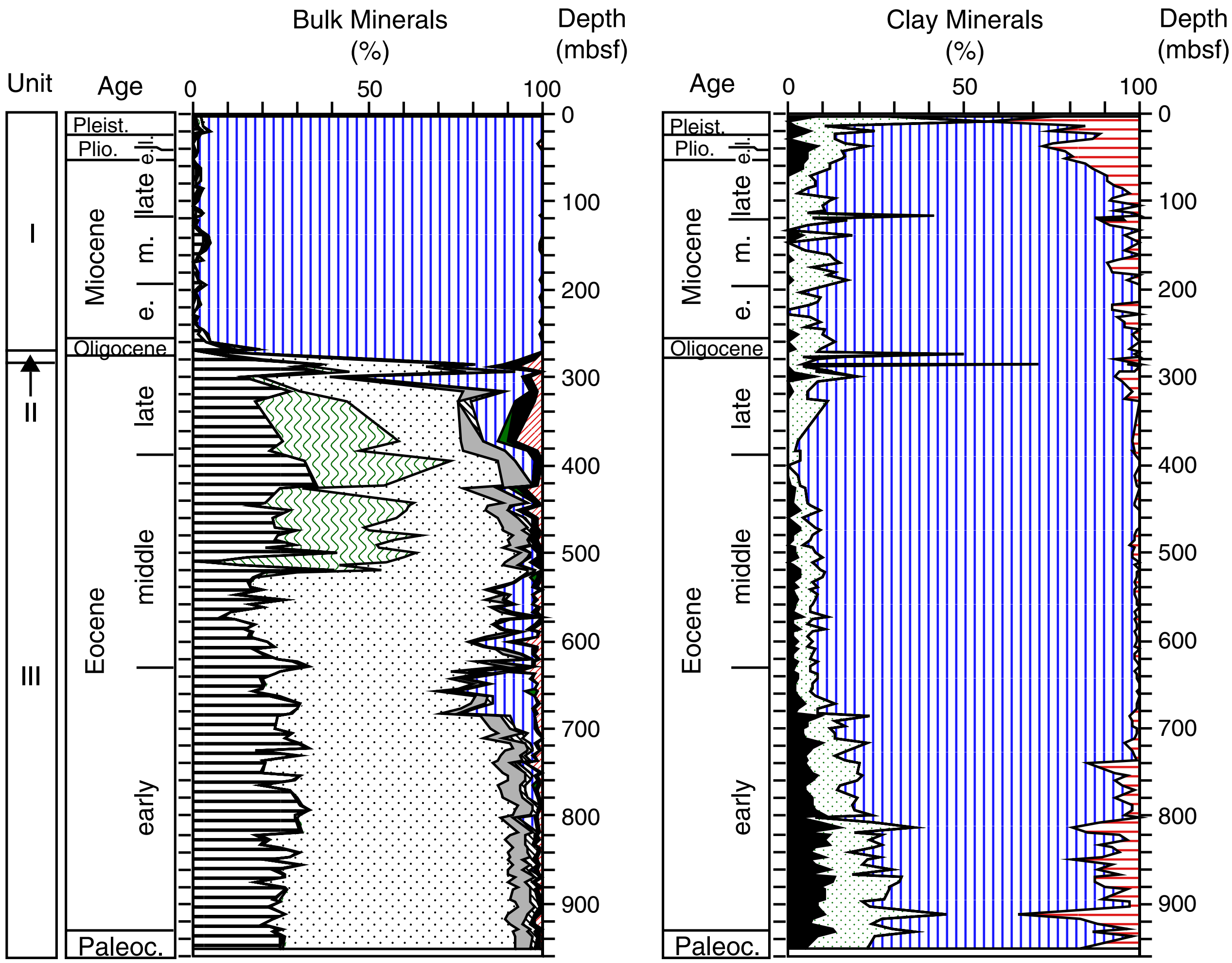

Figure F5. Bulk and clay mineral data, Site 1172, East Tasman Plateau. (For key to bulk and clay mineral patterns, see Fig. F2, p. 9.)

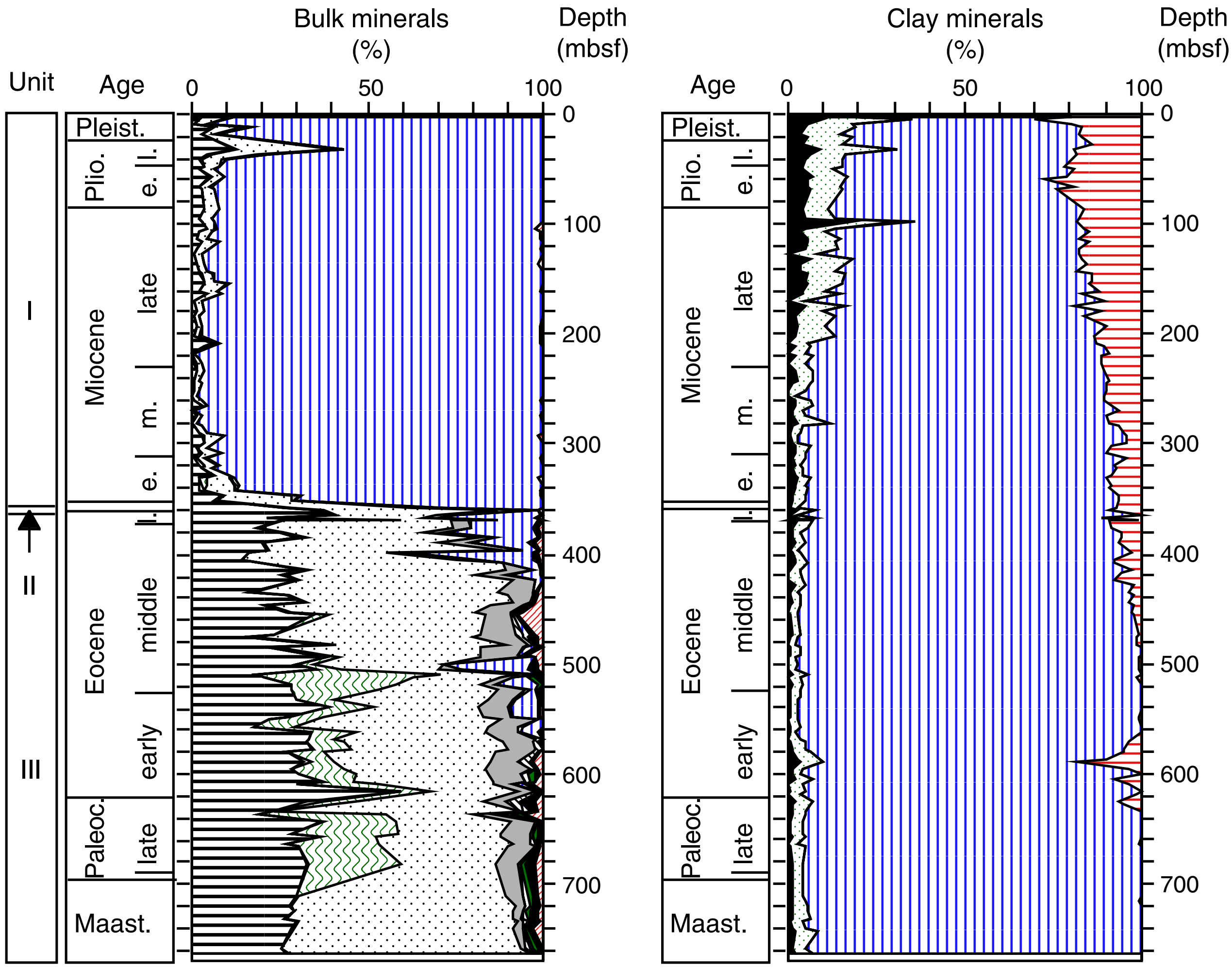

Table T1. Site characteristics, Leg 189.

Site	Latitude	Longitude	Water depth (m)
1168	42°36.58′S	144°24.76′E	2463
1170	47°09.04′S	146°02.99′E	2705
1171	48°29.99′S	149°06.69′E	2148
1172	43°57.58′S	149°55.69′E	2622

Table T2. Bulk mineralogy summary, Leg 189.

Unit	Site	Bulk mineralogy (%)										
		Clay	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Dolomite	Pyrite	Gypsum
I	1168	0–54	0–6	0–11	0–85	0–11	0–3	0–4	5–99	0	0–5	0–8
	1170	0–13	0–3	0–27	0–14	0–13	0–3	0–5	57–100	0–5	0–5	0
	1171	0–10	0–2	0–3	0–5	0–2	0	0	81–100	0	0–1	0–2
	1172	0–12	0–1	0–2	1–28	0–3	0–1	0	56–99	0	0–1	0–3
II	1168	16–24	1–4	4–8	51–61	3–5	1	0	3–12	0	1–2	1–3
	1170	19–40	0	3–36	24–46	7–16	0–3	0	0–8	0	0–2	0–4
	1171	2	0	1	3	1	0	0	93	0	0	0
	1172	27–36	0	1–2	34–49	8–11	0–1	0	0–29	0	0	0–2
III	1168	3–26	0–6	0–8	33–93	0–14	0–2	0–1	0–13	0	0–2	0–9
	1170	4–48	0–2	0–65	15–78	1–13	0–3	0	0–13	0–2	0–4	0–3
	1171	4–40	0–2	0–51	13–86	0–12	0–6	0	0–50	0–3	0–7	0–7
	1172	14–59	0–5	0–52	21–70	0–12	0–4	0	0–36	0–3	0–4	0–7

Table T3. Bulk mineralogy, Site 1168. (Continued on next two pages.)

Depth (mbsf)	Bulk mineralogy (%) Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Pyrite	Gypsum
2.10	8	0	0	10	1	0	0	81	0	0
5.10	5	0	0	4	0	0	0	91	0	0
15.40	10	0	0	21	2	0	0	66	0	0
18.87	9	0	0	20	2	0	0	69	0	0
24.90	3	0	0	3	0	0	0	94	0	0
28.40	2	0	0	5	0	0	0	93	0	0
34.25	3	0	0	4	0	0	0	93	0	0
37.90	1	0	0	2	0	0	0	97	0	0
47.40	3	0	0	4	0	0	1	93	0	0
53.35	2	0	0	2	0	0	0	95	0	0
56.90	0	0	0	1	0	0	0	99	0	0
62.90	2	0	0	1	0	0	0	97	0	0
66.40	2	0	0	2	0	0	0	96	0	0
72.40	0	0	2	4	0	1	4	89	0	0
75.90	1	0	0	5	0	0	3	91	0	0
81.90	4	0	0	2	0	0	0	94	0	0
85.42	10	0	0	4	1	0	0	85	0	0
91.42	0	0	0	2	0	0	0	98	0	0
94.92	3	0	0	3	1	0	0	93	0	0
100.92	2	0	0	2	0	0	0	96	0	0
104.42	2	1	0	2	0	0	0	94	0	0
110.42	6	0	0	0	0	0	0	94	0	0
113.92	1	0	0	1	0	0	0	97	0	0
120.62	1	1	0	1	0	0	0	97	0	0
130.22	2	1	1	2	1	1	0	92	0	0
139.82	0	0	0	1	0	0	0	99	0	0
149.42	7	0	0	1	0	0	0	92	0	0
159.02	3	0	3	4	0	0	0	90	0	0
168.62	2	0	0	2	0	0	0	96	0	0
174.62	1	0	0	1	0	0	0	97	0	0
178.22	2	0	0	2	0	0	0	96	0	0
187.82	2	0	2	2	0	0	0	94	0	0
193.82	0	0	0	3	0	0	0	97	0	0
197.52	3	0	0	2	0	0	0	95	0	0
207.12	4	0	0	3	0	0	0	93	0	0
213.12	3	1	1	3	1	0	0	92	0	0
216.72	1	0	0	3	0	0	0	96	0	0
222.72	2	1	0	2	0	0	0	95	0	0
226.32	4	1	0	4	0	0	0	91	0	0
232.32	1	0	0	2	0	0	0	97	0	0
235.92	4	0	0	4	1	0	0	92	0	0
251.52	2	0	0	2	0	0	0	95	0	0
255.12	3	0	0	4	0	0	0	93	0	0
259.54	7	0	0	8	1	0	0	84	0	0
264.72	7	0	0	12	1	0	0	79	0	0
270.72	15	0	0	18	2	0	1	64	0	0
274.32	5	0	0	7	0	0	0	88	0	0
280.33	7	0	0	9	1	0	0	83	0	0
283.92	5	0	0	8	0	0	0	87	0	0
289.92	16	0	0	12	1	3	0	68	0	0
293.52	8	0	0	17	2	0	0	73	0	0
299.52	10	0	0	13	1	0	0	76	0	0
302.82	10	0	0	21	4	0	0	64	1	1
308.82	10	0	1	12	1	0	0	75	0	0
321.72	11	0	0	20	2	0	0	66	0	1
327.72	18	0	0	35	4	0	1	38	2	1
331.32	15	0	1	38	3	2	1	38	1	1
337.32	12	0	0	21	2	0	0	64	0	0
340.92	15	0	0	23	2	0	1	57	0	1
350.52	19	0	0	31	3	0	0	45	0	1
360.12	17	0	0	27	2	0	0	53	0	1
366.12	12	0	0	19	2	0	0	66	0	0
369.72	11	0	1	18	2	0	0	68	0	0
375.72	17	0	0	34	4	0	0	45	0	0
385.42	11	0	0	35	4	0	0	48	1	1
395.02	11	2	0	25	1	3	1	57	1	0
398.62	9	3	0	20	2	0	1	65	0	0
404.62	20	2	0	23	3	2	0	47	1	3

Table T3 (continued).

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Pyrite	Gypsum
408.26	18	2	0	25	2	0	0	51	1	1
414.22	16	2	0	35	3	2	1	38	1	1
417.82	24	1	1	35	5	2	1	30	1	1
423.82	21	1	2	29	3	2	1	38	1	1
427.42	21	0	0	27	1	0	2	44	2	3
433.40	19	1	0	32	2	2	1	39	1	2
437.02	24	1	0	39	4	1	1	29	1	1
443.02	25	1	0	34	3	1	1	30	2	3
456.22	33	1	0	37	4	1	0	23	0	1
462.22	19	1	0	24	3	0	0	51	1	0
475.42	24	0	0	42	4	2	1	26	1	1
481.42	31	0	0	44	5	1	1	16	0	3
485.02	14	0	2	24	2	0	0	57	0	2
491.02	25	0	4	38	1	1	0	29	2	0
500.62	24	1	1	39	4	1	1	28	1	0
504.22	35	1	0	33	3	1	0	24	1	1
510.22	31	1	0	28	4	0	1	35	0	0
513.82	22	1	0	32	4	2	1	35	1	2
519.82	22	1	0	39	4	1	0	30	0	2
529.22	11	4	1	37	2	0	3	37	5	0
533.22	18	1	1	38	2	3	2	31	0	4
542.82	10	2	3	20	0	2	1	61	1	1
548.82	14	5	1	35	0	0	2	38	3	1
552.52	15	5	0	34	2	2	2	34	4	2
558.52	9	5	5	28	0	2	4	42	3	1
562.12	20	2	1	37	2	0	1	31	3	2
568.12	20	5	3	23	2	3	2	37	3	1
571.72	10	0	6	32	2	1	0	48	0	1
577.72	22	3	4	21	0	0	2	46	1	1
581.32	20	3	4	25	2	2	1	42	1	2
590.92	38	1	4	27	3	0	2	21	1	3
596.92	16	1	9	40	3	0	1	27	2	2
600.52	28	1	3	36	2	0	0	25	1	2
606.52	12	0	10	2	2	0	0	74	0	0
610.12	21	4	3	39	2	1	1	27	1	0
616.12	17	3	7	32	2	1	0	34	2	2
619.72	7	3	3	35	1	0	1	46	2	2
629.32	18	1	7	28	3	1	0	41	1	2
638.92	12	3	6	18	1	0	0	60	1	1
644.92	54	0	11	3	10	0	0	21	0	0
648.52	19	2	3	34	2	2	1	33	1	2
654.52	21	2	3	31	2	2	1	35	2	2
658.22	21	3	4	29	3	0	0	41	0	0
667.92	27	1	1	42	5	1	1	21	0	0
677.61	23	1	8	36	3	1	0	20	3	5
687.15	29	1	3	41	4	1	0	20	0	1
696.85	26	1	4	38	3	1	1	19	3	5
706.42	19	0	1	57	8	1	0	7	1	5
712.42	9	0	3	62	9	0	0	16	0	0
716.02	19	2	1	51	8	1	1	6	3	8
722.02	21	2	1	57	6	0	0	9	2	3
725.72	24	1	2	51	11	1	0	7	0	4
731.72	32	0	2	51	7	0	0	4	1	3
734.27	18	3	1	52	6	0	0	19	1	1
740.27	13	3	1	54	4	1	1	19	1	2
744.92	2	3	1	85	2	1	0	4	1	1
750.92	24	1	4	54	4	1	0	12	1	1
754.52	19	4	7	51	5	1	0	8	2	3
760.52	16	3	8	61	3	1	0	3	2	3
763.72	26	6	4	33	14	0	0	12	0	4
769.60	7	0	0	87	3	0	0	0	1	2
773.72	3	0	0	93	0	0	0	0	0	2
779.72	21	2	2	49	3	1	1	15	2	4
783.32	24	2	3	56	4	1	0	7	1	2
789.32	11	2	0	79	1	0	0	3	0	4
792.92	28	2	0	53	3	0	0	2	2	9
798.92	29	2	1	56	5	0	0	4	1	3
802.53	21	2	3	60	4	0	0	8	0	3

Table T3 (continued).

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Pyrite	Gypsum
808.55	20	2	0	66	3	1	1	5	1	2
812.02	20	4	0	61	4	2	0	4	3	2
821.62	14	0	8	67	2	1	0	2	0	6
827.62	24	3	0	52	5	0	0	13	0	2
831.35	27	2	1	59	0	2	1	6	1	2
837.24	21	3	0	59	4	1	0	9	1	2
840.82	25	0	1	59	5	1	1	7	0	0
846.82	15	0	0	82	0	0	0	1	0	2
849.92	12	0	1	83	0	1	0	1	1	2
857.52	19	0	0	77	0	0	0	1	1	2
863.52	12	0	0	82	2	1	0	1	0	1
869.37	12	0	0	83	2	1	0	1	0	2
869.62	12	0	5	79	2	0	0	1	0	2
875.52	13	0	0	81	3	1	0	1	0	2
875.62	11	0	0	84	2	1	0	1	0	1
879.62	14	0	0	78	4	0	0	1	0	3

Table T4. Bulk mineralogy, Site 1170. (Continued on next two pages.)

Depth (mbsf)	Bulk mineralogy (%)										
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Dolomite	Pyrite	Gypsum
6.43	3	0	0	1	0	0	0	96	0	0	0
11.43	3	0	0	4	0	0	0	93	0	0	0
15.93	1	1	1	2	0	0	0	95	0	1	0
24.72	0	0	0	2	0	0	0	97	0	1	0
30.47	9	3	0	5	0	0	0	84	0	0	0
34.93	0	0	0	9	0	0	0	91	0	0	0
39.93	0	0	0	2	0	0	0	98	0	0	0
49.43	3	0	0	2	1	0	0	94	0	0	0
53.93	0	0	0	0	0	0	0	100	0	0	0
58.93	0	0	0	10	5	0	0	85	0	0	0
63.43	0	0	0	5	0	0	0	95	0	0	0
72.93	0	0	9	0	0	0	5	86	0	0	0
77.93	9	1	1	3	0	1	4	77	5	0	0
82.43	0	0	0	0	0	0	0	100	0	0	0
87.43	4	0	0	0	0	3	0	88	0	5	0
91.93	2	0	4	2	0	0	0	92	0	0	0
110.93	0	0	0	0	0	0	0	100	0	0	0
116.19	0	0	0	3	0	0	0	97	0	0	0
120.43	0	0	0	0	2	0	0	95	0	3	0
125.47	5	0	0	0	0	0	2	93	0	0	0
129.95	0	0	0	0	5	0	0	94	0	2	0
139.43	0	0	0	0	0	0	0	96	2	2	0
153.93	0	0	6	0	13	0	0	81	0	0	0
158.43	0	0	0	0	3	0	0	96	0	1	0
163.43	4	0	0	0	0	2	0	94	0	0	0
166.93	0	0	4	0	0	0	0	95	0	1	0
171.43	6	0	5	0	0	0	0	89	0	0	0
176.53	1	0	1	0	0	0	0	96	0	2	0
186.13	0	0	2	0	0	0	0	92	3	2	0
190.63	0	0	0	0	0	0	0	99	0	1	0
195.73	0	0	0	0	1	0	1	98	0	0	0
209.83	3	0	0	0	0	0	1	96	0	1	0
214.93	0	0	0	3	5	0	0	91	0	0	0
219.43	9	0	6	0	0	0	0	85	0	0	0
224.53	0	0	8	0	6	0	0	87	0	0	0
234.13	0	0	0	2	0	0	0	96	0	1	0
238.63	0	0	0	0	0	3	0	92	6	0	0
243.73	0	0	0	0	1	0	0	99	0	0	0
248.23	5	0	0	0	6	0	0	89	0	0	0
257.83	2	0	0	0	0	0	3	95	0	0	0
262.93	0	0	9	0	0	0	0	91	0	0	0
267.43	0	0	0	0	2	0	0	98	0	0	0
272.53	2	0	0	0	0	0	0	97	0	1	0
277.03	0	0	0	0	0	0	0	100	0	0	0
282.13	0	2	0	0	0	0	0	97	0	1	0
286.63	0	0	6	0	0	0	0	94	0	0	0
291.73	2	0	0	2	0	0	0	96	0	0	0
301.03	0	0	0	0	0	0	0	100	0	0	0
305.53	0	0	0	1	1	0	0	98	0	0	0
310.33	0	0	2	0	0	0	0	98	0	0	0
314.83	3	0	0	0	0	0	0	97	0	0	0
319.93	1	2	0	0	0	0	0	97	0	0	0
324.43	0	0	0	2	2	0	0	96	0	0	0
329.53	0	0	2	0	0	0	0	96	0	2	0
334.03	0	0	0	0	0	0	0	97	0	3	0
339.13	3	0	0	0	0	0	0	97	0	0	0
343.63	0	0	0	0	0	0	0	100	0	0	0
348.83	1	0	0	1	1	0	0	96	0	0	0
353.33	7	0	0	0	0	0	0	93	0	0	0
358.43	4	0	0	0	0	0	0	96	0	0	0
362.93	0	0	0	2	2	0	0	96	0	0	0
368.03	2	0	0	0	0	0	0	97	0	1	0
372.53	4	0	0	0	0	0	0	92	0	4	0
377.63	0	1	0	2	0	0	0	97	0	0	0
382.13	0	0	0	3	1	0	0	96	0	0	0
387.20	0	0	0	3	2	0	0	95	0	0	0
391.73	3	0	0	0	0	0	0	97	0	0	0
396.83	0	0	0	0	9	0	0	91	0	0	0

Table T4 (continued).

Depth (mbsf)	Bulk mineralogy (%)										
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Dolomite	Pyrite	Gypsum
401.33	2	0	0	2	1	0	1	94	0	1	0
406.43	0	0	0	0	0	0	0	95	5	0	0
416.03	0	0	3	2	1	0	0	92	0	2	0
420.53	0	0	0	0	0	0	5	95	0	0	0
425.20	4	0	3	6	0	1	0	83	0	2	0
425.65	0	0	0	3	0	0	0	95	0	2	0
430.15	0	0	0	0	0	0	4	96	0	0	0
433.73	0	0	2	4	2	0	0	91	0	1	0
443.33	0	0	0	4	2	0	0	94	0	0	0
444.83	7	0	0	5	2	0	0	86	0	0	0
449.30	4	0	1	5	1	0	0	88	0	0	0
452.93	13	0	0	3	4	0	0	80	0	0	0
454.45	11	0	4	4	0	0	0	80	0	0	0
462.53	2	0	27	13	1	0	0	57	0	0	0
464.16	3	0	20	14	2	1	0	59	0	0	0
472.55	31	0	36	24	9	0	0	0	0	0	0
476.81	19	0	36	33	7	3	0	2	0	0	0
481.73	29	0	4	44	16	0	0	0	0	2	4
491.33	26	0	3	46	12	1	0	8	0	2	2
495.83	40	0	3	35	11	0	0	8	0	2	1
500.92	28	1	7	35	9	1	0	13	0	3	3
505.43	48	2	7	27	12	2	0	1	0	1	0
510.55	24	1	17	40	11	1	0	4	0	1	0
515.03	33	1	6	33	11	1	0	13	0	1	0
520.03	4	0	65	21	5	0	0	2	0	2	0
524.23	26	0	18	33	8	1	0	11	0	2	1
529.41	25	1	28	26	10	1	0	6	2	1	1
534.13	30	0	27	29	11	0	0	1	0	3	0
539.33	31	0	30	22	6	1	0	3	2	3	2
543.83	25	0	37	23	6	1	0	1	2	3	1
548.93	30	0	25	27	10	1	0	3	0	3	1
553.43	32	0	24	26	7	1	0	2	1	3	3
558.53	23	0	43	19	6	1	0	3	2	3	1
563.02	21	0	49	16	4	1	0	8	0	3	0
568.13	30	1	26	27	7	1	0	3	2	3	2
572.63	30	1	29	25	7	1	0	2	2	3	2
577.75	26	0	40	21	6	0	0	1	0	3	3
582.23	29	0	35	20	5	1	0	6	0	4	1
587.29	22	0	29	24	7	0	0	15	0	2	1
590.75	30	0	32	22	8	1	0	4	2	2	0
596.87	30	0	32	26	7	2	0	0	0	2	1
596.93	33	0	25	25	12	1	0	0	0	2	2
601.46	31	0	27	27	12	1	0	0	0	2	1
606.53	30	0	27	26	13	1	0	0	0	2	1
611.03	31	0	31	23	10	0	0	0	0	3	3
616.13	44	0	27	18	3	3	0	2	0	3	0
619.48	27	0	28	31	11	1	0	0	0	1	1
625.83	28	0	36	19	11	1	0	1	0	3	1
630.33	34	0	37	16	7	0	0	3	0	3	0
635.53	21	0	39	25	11	2	0	0	0	2	1
640.03	11	0	56	21	8	2	0	0	0	3	0
645.13	20	1	43	21	11	1	0	2	0	1	1
649.63	26	0	34	28	8	2	0	0	1	2	0
654.83	27	0	40	22	5	1	0	2	0	2	1
659.33	23	1	46	19	9	1	0	0	0	2	0
664.43	24	0	45	19	8	1	0	2	0	2	0
668.93	29	0	37	22	8	0	0	3	0	1	0
674.03	24	0	31	19	7	1	0	17	0	1	0
678.02	22	0	49	15	9	0	0	3	0	2	0
683.73	20	0	48	19	7	1	0	2	0	2	0
688.09	34	0	21	31	9	1	0	1	0	2	1
693.43	31	0	24	31	9	1	0	1	0	2	0
697.78	27	0	21	37	11	2	0	0	0	2	1
703.03	31	0	2	47	10	1	0	2	0	3	3
707.53	27	1	1	58	9	2	0	0	0	2	1
712.63	26	0	1	60	5	1	0	0	2	3	2
717.13	31	0	2	52	8	1	0	1	0	2	3
722.23	19	0	1	70	1	1	0	6	0	1	1

Table T4 (continued).

Depth (mbsf)	Bulk mineralogy (%)										
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Aragonite	Calcite	Dolomite	Pyrite	Gypsum
726.73	31	0	3	52	8	1	0	2	2	0	0
731.83	34	0	0	49	7	1	0	2	2	2	3
736.33	25	0	0	60	7	1	0	1	1	2	3
741.43	33	0	0	55	6	1	0	0	0	1	3
745.93	31	0	0	57	6	2	0	0	1	2	2
751.03	24	0	0	63	5	1	0	0	1	2	2
755.53	34	0	1	59	1	1	0	2	0	2	1
760.73	33	0	0	56	6	1	0	0	0	1	3
765.23	30	0	0	59	6	1	0	0	0	1	2
770.33	19	0	1	74	2	1	0	0	0	1	1
774.81	15	0	0	78	2	1	0	1	0	1	1

Table T5. Bulk mineralogy, Site 1171. (Continued on next two pages.)

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Calcite	Dolomite	Pyrite	Gypsum
2.55	1	0	0	1	0	0	98	0	0	0
14.15	1	0	0	1	0	0	97	0	0	0
19.15	2	1	0	2	1	0	95	0	0	0
23.65	0	1	1	1	0	0	97	0	0	0
28.65	1	0	0	1	0	0	98	0	0	0
33.15	0	0	0	1	0	0	97	0	0	2
42.65	1	0	0	1	0	0	98	0	0	0
47.65	0	0	1	1	0	0	99	0	0	0
52.15	0	0	0	0	0	0	100	0	0	0
57.15	0	0	0	1	0	0	99	0	0	0
61.65	1	0	1	1	0	0	97	0	0	0
69.79	1	1	0	0	1	0	98	0	0	0
76.15	0	0	0	1	1	0	98	0	0	0
80.65	0	0	0	1	0	0	99	0	0	0
85.65	1	1	0	1	0	0	97	0	0	0
90.15	1	0	1	0	1	0	98	0	0	0
99.65	0	0	0	1	0	0	98	0	0	1
104.65	0	0	0	0	0	0	99	0	0	0
109.15	1	0	0	1	0	0	98	0	0	0
112.75	1	2	0	0	0	0	96	0	0	1
115.85	1	2	0	0	0	0	96	0	0	1
117.35	0	0	0	0	0	0	100	0	0	0
120.35	1	1	0	0	0	0	98	0	0	0
127.35	0	0	1	0	0	0	99	0	0	0
131.85	1	0	0	1	0	0	98	0	0	0
137.05	3	0	1	0	0	0	96	0	0	0
146.65	3	0	0	1	1	0	94	0	0	1
156.25	2	1	0	1	0	0	95	0	0	1
160.75	1	0	0	0	0	0	98	0	0	0
165.85	1	0	0	1	1	0	97	0	0	0
170.35	0	0	0	0	0	0	100	0	0	0
179.95	1	0	0	0	0	0	98	0	0	0
184.75	1	0	0	0	0	0	98	0	0	0
189.25	1	0	0	0	0	0	97	0	0	1
194.35	2	0	0	1	0	0	97	0	0	0
204.05	0	0	0	0	0	0	99	0	0	0
208.55	1	0	0	1	0	0	97	0	0	1
218.15	0	0	0	1	1	0	97	0	0	0
223.25	0	0	0	0	0	0	99	0	0	0
227.75	0	0	0	0	0	0	100	0	0	0
232.85	1	0	0	1	0	0	98	0	0	0
237.35	0	0	0	1	0	0	98	0	0	1
242.15	1	0	0	0	0	0	98	0	0	0
246.65	2	0	0	1	0	0	97	0	0	0
251.45	2	0	0	2	0	0	95	0	0	1
261.05	3	0	0	1	0	0	95	0	0	0
269.15	10	0	3	5	2	1	81	0	0	0
270.65	2	0	1	3	1	0	94	0	0	0
278.75	15	0	5	26	7	2	39	0	4	3
286.10	37	0	0	40	4	0	8	2	4	6
287.10	29	0	5	33	5	0	13	2	7	7
294.10	34	2	8	33	12	2	7	0	1	0
300.60	14	0	5	20	4	1	50	0	2	4
317.25	28	0	3	46	10	2	7	0	2	2
326.85	18	0	26	32	0	3	13	0	5	3
372.69	26	0	33	18	6	0	4	3	2	8
384.54	22	0	25	30	12	0	7	0	2	2
394.15	32	0	42	13	5	0	6	0	2	0
422.95	35	1	19	34	8	0	0	0	2	2
427.45	25	0	6	46	10	0	3	2	2	5
442.15	21	0	42	25	8	0	2	0	1	1
446.65	17	0	44	23	6	1	6	0	1	1
451.75	27	0	33	23	6	0	3	0	2	5
459.40	22	1	45	20	5	0	2	0	2	2
461.35	23	0	35	29	6	2	2	0	2	2
471.05	23	0	25	40	7	1	0	0	2	2
475.55	29	1	21	38	6	2	0	0	3	1
480.65	24	0	41	26	5	1	0	0	2	1

Table T5 (continued).

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Calcite	Dolomite	Pyrite	Gypsum
485.15	23	0	34	33	5	1	0	0	2	1
490.25	29	0	23	38	6	1	0	0	1	1
494.75	21	1	31	35	5	1	3	0	3	1
499.85	41	0	22	30	3	0	2	0	2	0
504.35	16	0	45	31	4	1	2	0	1	0
509.55	5	0	51	34	5	0	2	0	2	1
514.05	14	0	28	47	5	1	4	0	1	1
518.96	40	0	14	42	2	0	3	0	0	0
523.46	21	0	9	65	2	1	0	0	1	1
528.77	17	0	0	76	0	1	2	2	1	1
533.23	16	0	0	75	0	1	6	0	1	1
538.37	16	0	0	70	1	1	9	0	1	2
542.85	20	0	0	64	1	0	15	0	1	0
548.05	12	0	1	75	1	1	6	0	0	3
552.55	26	0	0	57	5	1	9	0	0	2
557.65	16	0	0	75	0	1	5	0	0	3
562.15	20	0	0	65	1	1	12	0	1	1
567.25	11	0	0	77	2	1	6	0	1	2
571.75	8	0	1	86	4	1	0	0	0	0
576.85	12	0	0	76	2	1	8	0	1	1
581.35	17	0	0	68	0	1	12	0	1	1
586.45	15	0	0	73	1	0	7	0	1	3
590.95	17	0	0	74	2	1	4	0	1	1
596.15	15	0	1	67	4	1	10	0	0	2
600.68	21	0	0	57	1	1	10	1	1	8
605.75	23	0	1	59	1	1	14	0	1	2
610.25	17	0	0	70	1	1	8	0	1	2
615.35	20	0	1	68	5	1	3	0	0	2
619.85	24	0	0	70	1	1	1	0	1	1
624.95	28	1	0	51	4	1	11	0	0	3
629.45	32	0	1	55	7	1	0	0	1	3
634.55	25	0	1	48	5	1	9	3	1	8
639.05	24	0	0	58	4	1	10	0	1	2
644.13	19	0	1	53	3	1	18	0	1	3
648.67	20	0	1	59	4	1	14	0	0	1
653.85	19	0	1	55	2	1	19	0	0	3
658.39	17	0	0	53	4	1	20	3	0	2
663.45	22	0	3	55	4	1	12	0	0	2
673.05	31	0	0	48	5	1	13	0	0	1
677.55	30	0	1	46	3	1	16	0	1	3
681.89	27	0	1	42	5	1	21	0	0	2
685.96	24	0	0	58	6	2	7	0	0	2
701.08	23	0	0	61	5	2	6	1	0	2
705.57	28	0	1	58	7	2	3	0	0	1
711.65	27	0	0	56	6	6	6	0	0	0
716.15	30	0	0	60	4	2	2	0	0	2
721.25	33	0	1	58	4	1	2	0	0	1
726.75	18	0	1	71	6	2	2	0	0	1
730.85	30	0	0	58	5	1	2	0	1	2
735.35	20	0	0	67	7	2	2	0	0	2
740.45	21	0	0	65	5	2	2	0	0	5
750.05	19	0	1	69	6	2	2	0	1	0
754.55	30	0	0	59	5	2	1	0	0	2
759.65	28	0	1	60	5	1	2	0	0	1
764.15	19	0	0	68	6	2	2	1	1	1
769.25	27	0	0	60	5	1	3	0	1	2
778.94	29	0	1	59	5	2	2	0	1	1
788.45	30	0	1	61	5	1	0	0	0	1
792.95	33	0	0	59	5	2	0	0	0	1
798.05	29	0	1	61	5	2	0	0	0	2
802.55	29	0	1	57	3	2	5	0	0	2
817.25	30	0	1	61	4	2	0	0	0	1
821.75	18	0	1	71	5	3	0	0	0	2
826.85	21	0	1	67	6	3	0	0	1	1
831.35	19	0	1	71	4	2	0	0	1	2
836.44	24	0	0	66	5	2	0	0	1	1
840.95	30	0	0	60	6	3	0	0	1	1
846.05	28	0	0	62	5	2	0	0	1	1

Table T5 (continued).

Depth (mbsf)	Bulk mineralogy (%) Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Calcite	Dolomite	Pyrite	Gypsum
850.55	20	0	1	68	4	2	0	0	1	2
855.65	31	0	0	60	5	2	0	0	1	1
860.15	23	0	1	66	4	2	1	0	1	2
865.25	26	0	0	64	6	2	0	0	1	1
869.75	25	0	1	66	5	1	0	0	1	1
874.85	18	0	0	72	5	2	0	0	1	3
879.35	25	0	1	66	4	2	0	0	1	0
884.25	26	0	1	64	5	2	0	0	1	1
893.85	23	1	1	66	5	3	0	0	0	0
898.35	25	0	0	67	5	2	0	0	1	1
903.45	21	0	1	71	5	1	0	0	1	1
913.05	26	0	0	63	6	2	0	0	1	1
917.55	22	0	0	66	5	2	0	0	1	2
922.75	20	0	0	70	4	2	0	0	1	3
927.25	24	0	2	67	4	2	0	0	1	1
932.45	23	0	1	68	4	2	0	0	1	1
936.95	25	0	1	65	5	1	0	0	1	1
951.75	25	0	1	66	4	2	0	0	1	1

Table T6. Bulk mineralogy, Site 1172. (Continued on next page.)

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Calcite	Dolomite	Pyrite	Gypsum
2.55	3	0	0	7	1	0	88	0	0	0
8.85	1	0	0	3	0	0	96	0	0	0
11.85	6	0	0	8	2	0	83	0	0	0
18.35	3	0	0	4	1	0	93	0	0	0
30.85	12	0	1	28	3	0	56	0	0	0
37.35	5	1	0	13	3	0	78	0	0	0
40.35	3	1	0	6	1	0	90	0	0	0
46.85	3	0	0	5	0	0	92	0	0	0
49.85	2	0	0	5	0	0	93	0	0	1
56.35	5	0	0	4	0	0	90	0	0	0
65.85	2	0	0	3	0	0	94	0	0	1
68.85	3	0	0	4	0	0	93	0	0	0
86.35	3	0	0	4	0	0	91	0	0	1
94.35	2	0	0	4	0	0	94	0	0	0
97.35	3	0	0	3	0	0	94	0	0	0
103.85	5	0	0	2	1	0	90	0	0	3
106.85	2	0	0	3	0	0	93	0	0	1
113.35	2	0	0	3	0	0	95	0	0	1
116.35	3	0	0	5	0	0	92	0	0	0
122.85	2	0	0	3	0	0	94	0	0	1
125.85	1	0	0	3	0	0	97	0	0	0
135.35	2	0	0	2	0	0	95	0	0	2
141.85	2	0	0	2	0	0	95	0	0	0
144.85	2	1	0	3	0	0	94	0	0	0
151.35	4	0	0	3	0	0	94	0	0	0
154.35	4	0	0	6	1	0	89	0	0	0
160.85	2	0	0	5	0	0	92	0	0	1
163.85	4	0	0	4	0	0	91	0	0	0
170.35	1	0	0	2	0	0	97	0	0	0
179.85	2	0	0	2	0	0	96	0	0	0
182.85	1	0	0	1	0	0	97	0	0	0
192.35	2	0	0	1	0	0	96	0	0	1
201.85	1	0	0	1	1	0	96	0	0	1
208.35	6	0	0	2	0	0	91	0	1	0
211.35	4	0	1	1	0	0	94	0	0	0
217.85	0	0	0	1	0	0	99	0	0	0
220.85	1	0	0	1	0	0	97	0	0	1
225.85	1	0	1	1	0	0	97	0	0	0
232.65	1	0	0	2	0	0	96	0	0	0
242.25	1	0	0	1	0	0	98	0	0	0
245.25	1	0	0	2	0	0	97	0	0	0
251.85	1	0	1	1	0	0	97	0	0	0
254.85	0	0	0	1	0	0	98	0	0	0
261.45	1	0	0	2	0	0	96	0	0	1
264.45	3	0	0	1	0	0	96	0	0	0
270.55	0	0	0	1	0	0	99	0	0	0
273.55	1	0	0	1	0	0	96	0	0	1
280.15	0	0	0	2	0	0	98	0	0	0
283.15	1	0	0	2	0	0	96	0	0	1
289.75	2	0	0	2	0	0	96	0	0	0
292.75	3	0	0	6	0	0	89	0	0	2
299.35	4	0	0	3	0	0	94	0	0	0
302.35	2	0	0	3	0	0	95	0	0	1
309.05	2	1	0	6	0	0	91	0	0	0
312.05	1	1	0	2	1	0	95	0	0	1
318.65	3	1	0	4	1	0	92	0	0	0
321.65	3	0	0	3	0	0	94	0	0	0
328.25	6	1	0	4	0	0	89	0	0	0
331.25	3	0	2	7	1	0	86	0	0	2
337.85	2	1	1	8	0	1	86	0	0	0
340.85	2	1	0	8	1	0	87	0	0	1
347.50	9	0	1	19	2	1	68	0	0	1
350.43	7	0	0	21	1	0	70	0	0	0
357.15	27	0	1	34	8	1	29	0	0	0
360.15	36	0	2	49	11	0	0	0	0	2
365.35	40	0	2	28	4	1	24	0	1	0
366.75	22	0	2	42	4	1	27	0	1	1
368.35	37	0	23	23	4	0	12	1	0	0

Table T6 (continued).

Depth (mbsf)	Bulk mineralogy (%)									
	Clay minerals	Clinoptilolite	Opal-CT	Quartz	Feldspars	Pyroxenes	Calcite	Dolomite	Pyrite	Gypsum
369.75	25	0	1	47	5	1	19	0	1	1
376.34	19	0	1	55	4	0	18	1	1	2
379.35	25	0	1	40	6	0	25	0	1	1
385.95	30	0	3	48	4	1	12	0	1	1
388.95	20	0	1	49	9	0	16	1	1	3
395.55	21	0	1	66	6	0	4	0	1	1
398.55	16	0	0	39	5	0	36	0	2	2
405.15	14	0	0	61	5	1	15	0	2	1
408.15	19	0	0	70	0	0	9	0	1	1
414.75	32	0	2	56	8	0	2	0	0	0
417.75	26	0	1	54	8	1	8	1	0	1
424.35	31	0	0	60	6	0	2	0	0	0
433.95	16	0	2	69	10	0	1	0	1	2
436.95	27	0	1	62	7	0	0	0	1	2
443.55	31	0	1	58	6	0	0	0	1	3
446.55	20	0	2	62	9	2	0	0	1	3
453.15	27	0	1	52	10	1	0	0	3	6
456.15	34	0	5	44	7	1	0	0	1	7
472.35	24	0	0	59	9	2	2	0	1	2
475.34	15	0	2	63	12	1	1	0	3	2
481.95	37	0	4	48	6	1	0	0	1	2
484.95	21	0	3	58	12	1	3	1	1	0
491.55	34	0	4	45	10	0	2	0	2	4
494.55	39	0	3	40	11	1	3	0	0	3
501.15	30	0	5	37	0	0	24	0	2	2
504.15	35	0	7	28	6	0	19	0	3	2
509.57	18	0	52	21	6	1	0	0	1	0
512.57	21	0	42	25	4	0	4	2	1	1
519.17	28	0	30	24	4	0	12	2	0	0
522.17	29	0	24	34	8	1	2	1	1	1
531.75	30	0	10	44	7	1	7	0	1	0
538.35	39	0	13	30	8	1	8	0	1	1
547.95	27	0	10	45	7	1	7	0	1	1
550.95	22	0	13	52	10	0	2	0	0	0
557.65	18	0	11	55	9	1	5	0	1	0
560.65	34	0	13	37	9	1	5	0	1	1
567.25	33	0	8	46	11	2	0	0	1	0
570.25	33	0	11	45	9	1	0	1	1	0
576.85	34	1	10	45	7	2	0	0	1	0
579.85	27	0	10	49	10	1	0	0	1	1
589.45	32	3	6	44	8	3	0	0	1	3
596.05	28	1	15	40	13	1	0	0	1	2
599.05	30	0	17	38	9	0	2	2	2	1
605.65	38	0	8	40	9	0	1	2	0	3
608.65	30	0	23	33	5	0	4	0	2	3
615.25	59	0	8	25	5	1	0	0	0	0
624.85	32	5	10	36	6	4	0	0	4	3
634.45	23	0	1	70	0	1	2	1	1	2
637.29	19	0	36	24	6	1	4	3	1	5
644.05	37	1	21	32	7	1	0	0	1	0
653.65	28	0	30	30	8	1	0	1	2	0
656.65	36	0	16	35	8	1	0	1	1	0
663.25	27	0	27	38	4	1	0	0	2	1
666.25	31	0	23	36	8	1	0	0	1	1
681.05	33	1	26	27	6	1	0	1	2	3
711.43	30	0	1	59	5	0	1	1	2	2
720.81	27	1	0	63	3	0	1	1	2	1
723.71	29	0	0	62	3	0	1	1	2	2
730.62	26	0	1	65	2	1	1	1	2	1
733.62	30	0	0	62	2	1	1	1	2	1
740.25	28	0	1	62	3	0	1	1	2	3
759.45	25	0	1	67	2	1	1	1	1	1
762.45	27	0	1	68	2	1	0	0	1	0

Table T7. Clay mineralogy, Leg 189.

Age	Site	Clay mineralogy (%)		
		C, I, ml	Smectite	Kaolinite
late Pliocene–Pleistocene	1168	7–20	35–68	19–50
	1170	10–31	34–71	19–47
	1171	13–56	0–76	11–44
	1172	13–36	34–71	14–30
late Miocene–early Pliocene	1168	4–18	53–80	14–33
	1170	3–21	45–89	3–21
	1171	6–16	63–85	7–21
	1172	5–36	46–85	10–27
middle Miocene–late Miocene	1168	1–4	74–92	7–22
	1170	8–30	39–92	0–32
	1171	0–41	59–100	0–12
	1172	2–12	82–90	6–13
early Miocene–middle Miocene	1168	1–12	45–91	8–46
	1170	0–9	84–100	0–7
	1171	0–12	85–100	0–8
	1172	3–6	84–92	4–10
early Oligocene–early Miocene	1168	1–4	58–88	10–40
	1170	3–19	75–97	3–19
	1171	5–14	88–92	0–5
	1172	3–7	83–90	6–9
middle Eocene–early Oligocene	1168	2–31	0–81	16–88
	1170	1–100	0–98	0–17
	1171	3–71	25–96	0–7
	1172	2–8	84–97	0–11
early Eocene–middle Eocene	1168	—	—	—
	1170	0–8	90–100	0–3
	1171	0–11	88–100	0–2
	1172	2–5	93–98	0–3
late Paleocene–early Eocene	1168	—	—	—
	1170	—	—	—
	1171	8–45	20–92	0–19
	1172	2–10	72–98	0–18
Cretaceous–late Paleocene	1168	—	—	—
	1170	—	—	—
	1171	—	—	—
	1172	3–8	92–96	0–1

Notes: C = chlorite, I = illite, ml = random mixed-layered clays. — = not available.

Table T8. Clay mineralogy, Site 1168. (Continued on next page.)

Depth (mbsf)	Clay mineralogy (%)			
	Illite	Mixed-layer clays	Smectite	Kaolinite
2.10	15	0	55	30
5.10	12	0	58	29
9.40	7	0	74	19
15.40	18	0	46	35
18.87	13	0	51	36
24.90	14	0	48	37
28.40	16	0	48	36
34.25	12	0	47	41
37.90	11	0	52	36
43.80	10	0	54	36
47.40	11	0	39	50
53.35	11	0	47	42
56.90	20	0	35	45
62.90	11	0	57	32
66.40	7	0	68	25
72.40	5	0	65	30
75.90	5	0	68	27
81.90	8	0	64	28
85.42	7	0	61	33
91.42	5	0	67	28
94.92	6	0	62	32
100.92	6	0	74	20
104.42	4	0	73	23
110.42	4	0	76	20
120.62	16	0	53	31
130.22	7	0	77	16
139.82	7	0	80	14
149.42	12	0	70	18
159.02	18	0	53	28
168.62	7	0	72	22
174.62	6	0	72	22
178.22	5	0	74	21
187.82	4	0	74	22
193.82	4	0	78	18
197.52	3	0	87	10
203.52	2	0	84	14
207.12	2	0	83	15
213.12	2	0	89	9
216.72	1	0	90	8
222.72	2	0	90	7
226.32	2	0	90	8
232.32	2	0	85	13
235.92	1	0	91	7
241.92	1	0	92	7
245.52	4	0	85	11
251.52	12	0	65	23
255.12	1	0	84	15
259.54	5	0	63	33
264.72	2	0	62	36
270.72	10	0	45	45
274.32	3	0	62	35
280.33	3	0	71	27
283.92	3	0	66	31
289.92	1	0	70	29
293.52	4	0	50	46
299.52	3	0	60	37
302.82	2	0	64	33
308.82	8	0	53	39
312.12	5	0	61	34
318.12	3	0	57	39
321.72	2	0	58	40
327.72	1	0	74	25
331.32	2	0	66	33
337.32	2	0	72	26
340.92	2	0	62	35
346.92	1	0	73	25
350.52	2	0	70	28
356.52	1	0	72	26
360.12	2	0	66	32
366.12	2	0	70	28
369.72	2	0	71	27
375.72	2	0	71	28
379.42	2	0	71	27
385.42	1	0	84	15
389.02	1	0	91	8
395.02	2	0	86	12
398.62	2	0	87	11
404.62	3	0	84	14
408.26	3	0	85	12
414.22	2	0	88	10
417.82	3	0	82	14
423.82	2	0	87	11
427.42	2	0	82	16
433.40	2	0	83	15
437.02	2	0	80	18
443.02	2	0	84	15
446.62	3	0	69	28
452.62	2	0	80	19
456.22	3	0	79	19
462.22	3	0	80	17
465.82	2	0	82	16
471.82	2	0	76	22
475.42	3	0	70	27
481.42	2	0	72	26
485.02	2	0	79	19
491.02	3	0	76	21
494.62	3	0	77	20
500.62	3	0	75	22
504.22	2	0	74	23
510.22	3	0	74	23
513.82	2	0	58	39
519.82	3	0	73	23
523.52	2	0	80	18
529.22	3	0	80	17
533.22	4	0	69	27
539.20	3	0	77	20
542.82	2	0	85	14
548.82	2	0	82	16
552.52	3	0	77	21
558.52	4	0	78	19
562.12	1	0	78	20
568.12	2	0	79	19
571.72	2	0	76	23
577.72	2	0	86	12
581.32	3	0	83	14
590.92	3	0	69	28
596.92	2	0	71	27
600.52	2	0	76	22
606.52	3	0	76	21
610.12	4	0	75	22
616.12	3	0	77	20
619.72	3	0	77	20
629.32	2	0	78	20
638.92	3	0	78	19
644.92	2	0	77	21
648.52	3	0	79	18
654.52	2	0	76	22
658.22	2	0	78	19
667.92	2	0	77	21
677.61	2	0	82	16
687.15	2	0	78	20
696.85	1	0	83	16
706.42	1	0	88	11
712.42	2	0	81	16
716.02	2	0	78	19
722.02	2	0	81	17

Table T8 (continued).

Depth (mbsf)	Clay mineralogy (%) Illite	Mixed-layer clays	Smectite	Kaolinite
725.72	2	0	81	17
731.72	1	0	78	20
734.27	3	0	81	16
740.27	3	0	73	24
744.92	5	0	75	20
750.92	3	0	78	19
754.52	3	0	75	21
760.52	4	0	77	19
763.72	3	0	63	34
769.60	10	0	32	58
773.72	5	0	42	53
779.72	3	0	72	25
783.32	2	0	71	27
789.32	7	0	63	30
792.92	3	0	67	30
798.92	3	0	69	28
802.53	5	0	64	31
808.55	3	0	68	29
812.02	3	0	67	30
821.62	4	0	60	36
827.62	4	0	62	34
831.35	3	0	70	27
837.24	2	0	70	27
840.82	4	0	60	36
846.82	10	2	5	83
849.92	9	6	0	85
857.52	12	5	0	83
863.52	9	5	0	86
869.37	12	0	0	88
869.62	10	4	0	86
875.52	23	8	0	69
875.62	10	6	0	84
879.62	10	5	0	85

Table T9. Clay mineralogy, Site 1170. (Continued on next page.)

Depth (mbsf)	Clay mineralogy (%) Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
0.23	7	16	3	49	25
1.93	0	25	0	41	33
6.43	4	12	11	53	21
11.43	0	10	0	71	19
15.93	0	16	0	55	30
24.72	0	16	4	46	34
30.47	0	18	0	53	29
34.93	7	19	4	43	27
39.93	0	12	0	63	25
44.43	0	20	0	39	40
49.43	0	11	0	61	28
53.93	0	14	0	52	34
58.93	8	13	7	50	22
63.43	7	14	2	41	36
72.93	0	16	0	47	38
77.93	5	13	5	42	34
82.43	0	15	0	46	40
87.43	0	13	0	50	37
91.93	0	19	0	34	47
110.93	1	2	0	89	8
116.19	0	19	0	45	36
120.43	0	6	0	74	20
125.47	0	5	0	75	20
129.95	4	14	0	62	20
139.43	6	9	6	57	22
142.43	5	13	0	65	17
144.43	6	14	0	48	31
148.74	6	10	0	59	25
153.93	7	14	0	59	19
158.43	4	13	0	66	17
163.43	3	11	0	75	12
166.93	0	7	2	82	9
171.43	0	6	8	73	14
176.53	0	8	0	92	0
186.13	0	14	0	76	10
190.63	0	8	0	81	10
195.73	0	15	0	85	0
200.23	0	21	0	58	21
205.33	0	30	0	39	32
209.83	0	13	0	74	12
214.93	0	14	0	75	11
219.43	0	9	0	79	12
224.53	0	8	0	79	13
234.13	5	8	0	80	6
238.63	4	22	0	66	8
243.73	0	11	0	82	7
248.23	0	20	0	73	6
253.33	0	8	0	86	6
257.83	0	0	0	100	0
262.93	0	9	0	84	7
282.13	0	4	0	92	3
286.63	0	0	0	100	0
291.73	0	3	0	94	4
296.23	0	5	0	95	0
301.03	0	9	0	86	5
305.53	0	3	0	95	2
310.33	0	3	0	94	3
314.83	0	5	0	92	3
319.93	0	4	0	95	1
324.43	0	2	0	97	1
329.53	0	3	0	96	1
334.03	0	3	0	95	2
339.13	0	1	0	99	0
343.63	0	0	0	100	0
348.83	0	2	0	97	1
353.33	0	2	0	96	1
358.43	0	2	0	97	2
362.93	0	2	0	97	1
368.03	0	1	0	98	1
372.53	0	0	0	98	2
377.63	0	2	0	98	0
382.13	0	3	2	93	2
387.20	0	4	0	96	0
391.73	0	4	0	90	6
396.83	0	6	0	90	4
401.33	0	4	0	92	5
406.43	3	5	0	88	3
416.03	0	9	0	82	9
420.53	0	4	0	89	6
425.20	0	3	0	97	0
425.65	0	4	5	86	5
430.15	0	5	0	90	5
433.73	0	5	0	95	0
443.33	0	9	7	76	8
444.83	5	8	0	86	1
445.32	0	14	0	79	6
449.30	8	11	0	80	1
452.93	0	11	0	82	7
453.44	0	7	0	90	3
454.45	0	15	0	75	9
454.92	0	11	2	82	6
462.53					
464.16	0	33	0	50	17
472.55	0	60	11	29	0
476.81	0	40	0	60	0
481.73	0	2	0	94	4
482.22	0	59	16	25	0
491.33	0	3	0	94	2
495.83	1	2	0	97	0
500.92	0	4	0	94	2
502.76	0	4	0	95	2
505.43	0	1	0	99	0
510.55	0	4	0	95	2
515.03	0	2	0	98	0
520.03	0	38	6	56	0
520.52	0	100	0	0	0
524.23	0	1	0	98	1
529.41	0	3	0	97	0
539.09	0	4	0	96	0
534.13	0	8	0	91	2
539.33	0	1	0	99	0
543.83	0	3	0	97	0
548.93	0	2	0	98	0
549.42	0	2	0	98	0
553.43	1	2	0	97	0
558.53	0	2	0	98	0
563.02	0	0	0	100	0
568.13	0	2	0	97	1
572.63	0	2	0	98	0
577.75	0	2	0	98	0
582.23	0	2	0	98	0
587.29	0	2	0	98	0
590.75	2	3	0	95	0
596.87	0	3	0	97	0
596.93	0	3	0	96	2
601.46	0	4	0	95	2
606.53	0	2	0	98	0
611.03	0	2	0	98	0
616.13	0	2	0	96	1
619.48	0	4	0	95	1
625.83	0	2	0	98	0
630.33	0	2	0	97	1
635.53	0	3	0	95	2
640.03	0	3	0	95	2
645.13	0	3	0	95	2
649.63	0	3	0	97	0

Table T9 (continued).

Depth (mbsf)	Clay mineralogy (%)				
	Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
654.83	0	2	0	98	0
659.33	0	3	0	96	1
664.43	0	3	0	97	0
668.93	0	3	0	95	2
674.03	0	2	0	98	0
678.02	0	2	0	98	1
683.73	0	3	0	97	0
688.09	0	3	0	95	2
693.43	0	3	0	96	1
697.78	1	3	0	96	0
703.03	0	2	0	98	0
707.53	2	4	0	93	0
712.63	0	2	0	98	0
717.13	0	2	0	98	0
722.23	1	3	0	95	0
726.73	0	2	0	97	1
731.83	0	3	0	97	0
736.33	0	2	0	96	1
741.43	0	3	0	97	0
745.93	0	4	0	93	3
751.03	0	3	0	96	1
755.53	0	3	0	97	0
760.73	0	4	0	95	2
765.23	0	4	0	94	2
770.33	0	4	0	94	2
774.81	0	3	0	95	2

Table T10. Clay mineralogy, Site 1171. (Continued on next page.)

Depth (mbsf)	Clay mineralogy (%) Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
2.55	8	21	0	46	25
9.65	0	56	0	0	44
14.15	2	8	0	74	16
19.15	6	18	0	50	26
23.65	4	9	0	76	11
28.65	0	13	0	74	13
33.15	5	11	0	59	25
38.15	8	14	0	50	27
42.65	5	10	0	63	21
47.65	6	11	0	65	19
52.15	5	10	0	64	21
57.15	4	8	0	73	15
61.65	4	8	0	75	14
69.79	0	6	0	85	9
76.15	0	7	0	83	9
80.65	0	8	0	85	7
85.65	0	5	0	90	5
90.15	0	3	0	94	3
95.15	0	14	0	79	8
99.65	0	12	0	79	9
104.65	0	10	0	90	0
109.15	0	11	0	82	7
112.75	0	5	0	93	2
115.85	0	24	18	59	0
117.35	0	18	0	70	12
117.75	0	7	0	88	5
120.35	0	14	0	82	4
122.25	0	17	0	72	12
127.35	0	5	0	86	9
131.85	0	0	0	100	0
137.05	4	14	0	78	4
146.65	0	0	0	100	0
156.25	0	4	0	92	4
160.75	0	12	0	88	0
165.85	1	12	0	81	6
170.35	0	15	0	76	9
175.45	0	7	0	84	9
179.95	0	13	0	79	7
184.75	0	11	0	89	0
189.25	1	15	0	80	3
194.35	0	12	0	88	0
204.05	0	3	0	97	0
208.55	0	9	0	91	0
213.60	0	5	0	92	3
213.65	0	8	0	92	0
218.15	0	7	0	85	8
223.25	0	0	0	92	8
227.75	0	0	0	100	0
232.85	0	7	0	87	7
237.35	0	9	0	87	4
242.15	0	5	0	91	5
246.65	0	11	0	89	0
251.45	2	7	0	88	2
261.05	0	14	0	86	0
269.15	2	6	0	89	3
270.65	0	8	0	92	0
274.27	0	44	5	48	2
276.92	0	4	12	84	0
278.75	0	8	0	85	7
286.10	0	4	0	96	0
286.52	0	46	25	25	4
287.10	0	4	0	96	0
294.10	2	11	0	86	1
294.35	0	8	5	82	6
300.60	7	12	0	73	7
306.10	0	8	0	87	5
317.25	1	4	0	92	2
325.02	0	5	0	90	4
326.85	0	11	0	89	0
372.69	0	3	0	95	2
382.72	0	2	0	97	1
384.54	0	3	0	95	2
394.15	0	3	0	97	0
401.22	0	0	0	100	0
411.52	0	3	0	96	2
413.33					
422.95	1	2	0	96	1
427.45	2	3	0	95	0
442.15	2	4	0	93	2
446.65	2	5	0	92	2
451.75	4	5	0	91	0
461.35	0	4	0	96	0
471.05	3	5	0	92	0
475.55	3	6	0	90	1
480.65	2	5	0	92	2
485.15	1	5	0	92	2
490.25	0	4	0	94	3
494.75	2	5	0	92	2
499.85	2	6	0	90	2
504.35	2	7	0	88	2
509.55	0	7	0	93	0
514.05	2	6	0	91	1
518.96	4	5	0	91	0
523.46	3	7	0	89	1
528.77	3	7	0	90	1
533.23	1	6	0	91	1
538.37	2	6	0	92	0
542.85	1	5	0	93	1
548.05	2	6	0	90	2
552.55	2	5	0	92	0
557.65	2	4	0	93	0
562.15	2	4	0	94	0
567.25	1	5	0	93	1
571.75	4	8	0	88	1
576.85	1	6	0	92	1
581.35	1	4	0	94	1
586.45	4	7	0	89	1
590.95	1	6	0	92	1
596.15	1	5	0	93	1
600.68	2	5	0	93	0
605.75	1	4	0	93	1
610.25	3	5	0	92	0
615.35	2	5	0	92	1
619.85	1	5	0	92	1
624.95	3	5	0	92	0
629.45	2	4	0	94	0
634.55	2	5	0	92	1
639.05	2	6	0	91	1
644.13	2	6	0	91	1
648.67	2	5	0	93	0
653.85	2	5	0	93	0
658.39	2	4	0	93	0
663.45	3	5	0	92	0
673.05	5	9	0	85	1
677.55	3	5	0	91	1
681.89	2	6	0	89	2
685.96	9	14	0	74	3
692.45	5	8	0	85	2
696.95	6	10	0	82	2
701.08	4	8	0	87	1
705.57	4	9	0	86	1
711.65	4	9	0	86	1
716.15	10	12	0	73	4
721.25	7	12	0	79	2
726.75	6	11	0	81	2
730.85	5	8	0	85	2

Table T10 (continued).

Depth (mbsf)	Clay mineralogy (%) Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
735.35	6	10	0	83	1
740.45	4	16	0	65	15
750.05	7	13	0	73	7
754.55	9	13	0	75	4
759.65	7	12	0	74	7
764.15	5	10	0	80	5
769.25	5	9	0	85	1
778.94	7	13	0	74	7
788.45	7	11	0	80	2
792.95	7	11	0	79	2
798.05	10	13	0	72	4
802.55	3	5	0	92	0
807.65	9	15	0	64	11
812.15	14	21	0	45	19
817.25	5	14	0	66	15
821.75	12	15	0	68	6
826.85	10	13	0	73	3
831.35	12	15	0	62	12
836.44	8	17	0	68	8
840.95	6	11	0	77	6
846.05	10	16	0	64	10
850.55	6	16	0	58	19
855.65	8	14	0	71	8
860.15	12	17	0	59	12
865.25	6	12	0	76	6
869.75	13	19	0	55	13
874.85	12	19	0	56	12
879.35	9	20	0	62	10
884.25	10	18	0	68	4
893.85	11	17	0	62	10
898.35	8	13	0	76	3
903.45	8	15	0	74	3
913.05	10	35	0	20	35
917.55	7	19	0	57	17
918.20	12	17	0	59	12
922.75	6	18	0	64	12
927.25	13	17	0	67	4
932.45	13	22	0	51	13
936.95	8	16	0	73	2
951.75	5	18	0	60	17

Table T11. Clay mineralogy, Site 1172. (Continued on next page.)

Depth (mbsf)	Clay mineralogy (%) Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
2.55	5	12	0	63	19
5.55	10	26	0	34	30
8.85	6	13	0	62	20
11.85	5	14	0	64	17
18.35	3	11	0	68	17
21.35	6	13	0	65	17
27.85	4	12	0	71	14
30.85	9	21	0	50	19
37.35	6	10	0	66	18
40.35	5	10	0	65	19
46.85	4	11	0	62	22
49.85	4	9	0	68	19
56.35	7	10	0	62	21
59.35	6	11	0	56	27
65.85	6	9	0	66	19
68.85	6	10	0	61	24
86.35	4	7	0	73	16
94.35	5	9	0	69	17
97.35	18	12	5	46	18
103.85	5	8	0	71	16
106.85	4	7	0	75	15
106.86	4	6	0	78	12
113.35	5	9	0	68	18
116.35	5	8	0	72	15
122.85	5	9	0	69	17
125.85	0	9	0	74	17
130.85	6	12	0	65	16
135.35	4	13	0	68	16
141.85	4	10	0	68	18
144.85	6	11	0	70	14
151.35	5	11	0	71	14
154.35	5	10	0	70	14
160.85	4	7	0	77	12
163.85	4	11	0	68	17
170.35	0	5	0	85	10
173.35	5	11	0	65	19
179.85	4	7	0	79	11
182.85	2	11	0	71	16
192.35	3	8	0	80	10
201.85	2	12	0	73	13
208.35	0	5	0	82	13
211.35	2	5	0	83	11
217.85	0	5	0	86	9
220.85	2	5	0	82	11
225.85	0	5	0	83	11
232.65	2	5	0	83	11
242.25	3	4	0	84	9
245.25	2	5	0	84	9
251.85	0	5	0	85	10
254.85	0	2	0	87	10
261.45	2	4	0	83	11
264.45	2	4	0	85	8
270.55	2	2	0	90	6
273.55	2	3	0	86	9
280.15	3	9	0	79	9
283.15	1	3	0	90	6
289.75	1	2	0	92	5
292.75	1	2	0	93	4
299.35	1	1	0	93	4
302.35	2	4	0	85	9
309.05	2	3	0	86	9
312.05	1	4	0	91	4
318.65	2	2	0	89	8
321.65	2	2	0	89	7
328.25	2	2	0	88	8
331.25	3	3	0	84	10
337.85	2	3	0	87	8
340.85	2	3	0	85	9
347.50	2	3	0	89	6
350.43	2	3	0	89	6
357.15	1	2	0	90	7
360.15	3	5	0	83	9
365.35	1	2	0	97	0
366.75	3	5	0	81	11
368.35	0	2	0	97	1
369.75	3	4	0	84	9
376.34	1	4	0	86	8
379.35	1	2	0	91	5
385.95	1	3	0	90	5
388.95	2	3	0	89	6
395.55	1	2	0	93	4
398.55	1	2	0	94	3
405.15	2	3	0	88	7
408.15	2	4	0	86	8
414.75	0	3	0	94	3
417.75	0	4	0	91	6
424.35	0	4	0	88	8
427.35	2	3	0	93	2
433.95	1	3	0	94	3
436.95	1	3	0	95	2
443.55	1	3	0	93	3
446.55	1	3	0	95	2
453.15	0	3	0	95	3
456.15	1	3	0	95	2
472.35	1	2	0	96	1
475.34	1	2	0	96	1
481.95	0	2	0	97	1
484.95	1	3	0	97	0
491.55	1	3	0	97	0
494.55	0	2	0	97	1
501.15	0	3	0	97	1
504.15	0	2	0	98	0
509.57	1	4	0	95	0
512.57	0	4	0	95	1
519.17	1	3	0	96	0
522.17	1	3	0	96	0
528.75	1	3	0	96	0
531.75	1	3	0	97	0
538.35	1	2	0	98	0
541.35	1	2	0	97	0
547.95	1	3	0	97	0
550.95	0	3	0	96	1
557.65	1	3	0	96	0
560.65	0	1	0	98	0
567.25	0	3	0	94	3
570.25	1	4	0	92	4
576.85	1	4	0	90	5
579.85	1	5	0	89	5
586.45	3	6	0	81	10
589.45	3	6	0	72	18
596.05	1	3	0	92	3
599.05	1	2	0	96	0
605.65	2	5	0	86	7
608.65	0	4	0	92	3
615.25	1	4	0	95	0
618.25	0	3	0	96	1
624.85	2	5	0	87	6
627.85	2	4	0	89	5
634.45	1	4	0	95	0
637.29	1	4	0	95	0
644.05	1	3	0	96	0
653.65	1	3	0	96	0
656.65	1	4	0	95	0
663.25	0	3	0	96	1
666.25	1	4	0	95	0
681.05	1	3	0	96	0

Table T11 (continued).

Depth (mbsf)	Clay mineralogy (%)				
	Chlorite	Illite	Mixed-layer clays	Smectite	Kaolinite
711.43	1	3	0	96	0
714.43	1	3	0	95	0
720.81	2	4	0	94	0
723.71	2	4	0	94	0
730.62	2	5	0	94	0
733.62	1	4	0	96	0
740.25	1	4	0	95	0
743.25	2	6	0	92	0
759.45	1	4	0	95	0
762.45	2	5	0	93	0