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XIII. CLAY MINERALOGY OF SEDIMENT CORES FROM THE CENTRAL PACIFIC WAKE TO TAHITI TRANSECT—A RPELIMINARY REPORT

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Samples and method

Clay mineral composition was preliminary studied for the sediment samples collected during GH80–1 cruise. The samples used are: twenty-two surface layer sediments of piston and box cores (Table XIII-1), and the sediments from upper through lower sections of selected three piston cores (P179, P160 and P165 from the northern, central, and southern areas of the survey lines, respectively).

The samples were picked up from the plastic cases sealed with vinyl tape, in which sediment samples for a paleomagnetic analysis were contained. Identification and quantification of clay minerals were conducted by X-ray diffraction analysis (SUDO *et al.*, 1961; OINUMA, 1968).

Table XIII-1 Samples used for clay mineral analysis.

Core and station numbers	Interval (from the top)
P159 (St. 1603)	37–39 cm
160 (St. 1605)	47–49
161 (St. 1607)	33–35
162 (St. 1609)	48–50
164 (St. 1615)	20–22
165 (St. 1618A)	59–61
167 (St. 1622)	25–27
168 (St. 1624)	10–12
169 (St. 1626)	16–18
170 (St. 1628)	17–9
172 (St. 1632)	11–13
173 (St. 1634)	7–9
174 (St. 1635A)	12–14
175 (St. 1636)	7–9
176 (St. 1638)	11–13
177 (St. 1640)	6–8
178 (St. 1642)	10–12
179 (St. 1644)	4–6
B 6 (St. 1601)	6–8
17 (St. 1619)	9–11
24 (St. 1631)	1–3
30 (St. 1645)	2–3

P: piston core B: box core

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Results

X-ray diffraction analysis has revealed the presence of montmorillonite, illite, chlorite, and kaolinite as clay minerals in the sediment samples. Other clay minerals were not detected by the X-ray diffraction method.

Clay mineral distribution in the surface layers of sediment cores

Of the twenty-two surface sediment samples observed, three samples of P162 (48–50 cm), P164 (20–22 cm) and P168 (10–12 cm) do not contain any clay mineral, but contain abundant calcite and trace amount of quartz. Their sediment types are calcareous ooze. The most dominant clay mineral occuring through the samples studied is montmorillonite which ranges from 68% to 20% and is 49% on the average except for the three samples of calcareous ooze (Fig. XIII-1). The mineral is most abundant in seventeen samples of the total nineteen ones.

The next abundant is illite which ranges from 49% to 13% with the average of 26%.

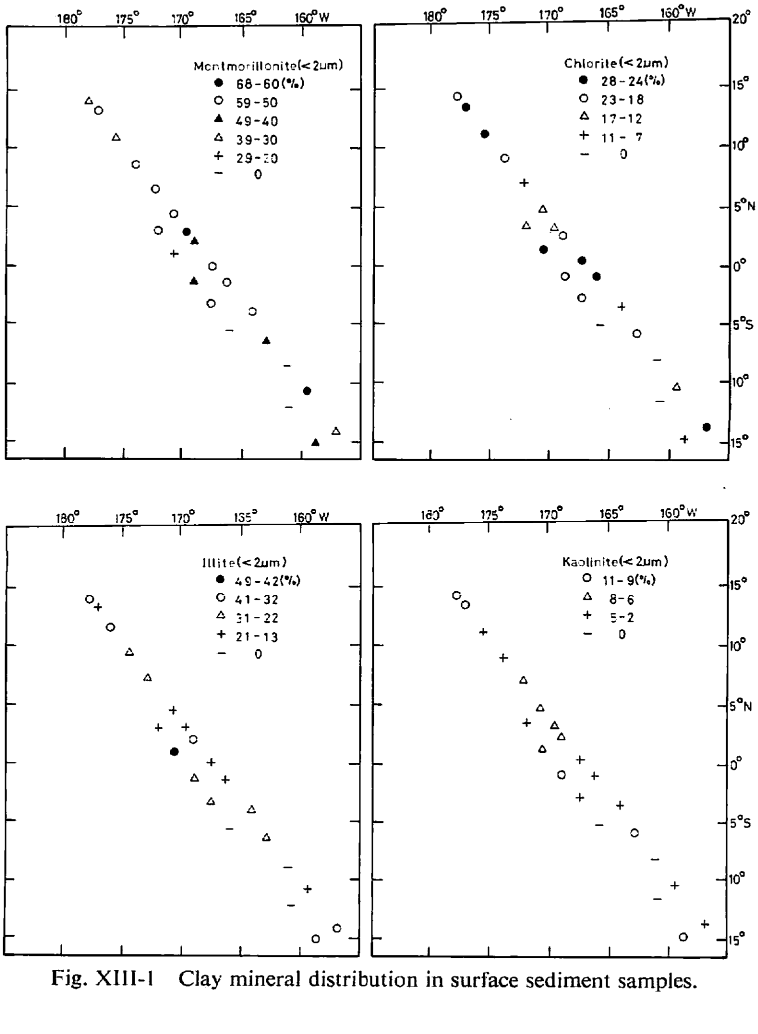

Fig. XIII-1 Clay mineral distribution in surface sediment samples.

It is most dominant in two samples, P159 (37–39 cm) and B30 (2–3 cm). Chlorite ranges from 28% to 7% and is 19% on the average. Kaolinite is the least amount in the clay mineral assemblage and ranges from 11% to 2% with the average of 6%.

There is no particular pattern of clay mineral distribution throughout the survey lines. It is pointed out, however, that montmorillonite tends to be most abundant in siliceous clay, but it is also the most dominant constituent in other sediment types. The sediment types characterized by the predominance of montmorillonite are: siliceous clay (six samples), calcareous mud or clay (four samples), pelagic clay (four samples) and zeolitic clay (three samples).

Vertical variation of the clay mineral composition in sediment cores

Three cores, P160 (St. 1605), P165 (St. 1618A) and P179 (St. 1644) from the Central Pacific Basin, the Penrhyn Basin, and the Mid-Pacific Mountains area, respectively, were analyzed throughout the columns.

The clay mineral composition in two cores, P160 and P179, are shown in Fig. XIII-2. The relative abundance of clay minerals in core P160 is 67% to 22% for montmorillonite, 36% to 13% for illite, 22% to 10% for chlorite, and 11% to 0% for kaolinite. Thus, the clay mineral assemblage in the two cores are characterized by the predominance of montmorillonite throughout as well as those in the surface layers. Particularly the outstanding feature is its downward increasing in core P179. The lowest part of core P179 (core catcher) consists of chert and tuffaceous mudstone (NAKAO and MIZUNO, this cruise report). The downward increasing of montmorillonite through the uncon-

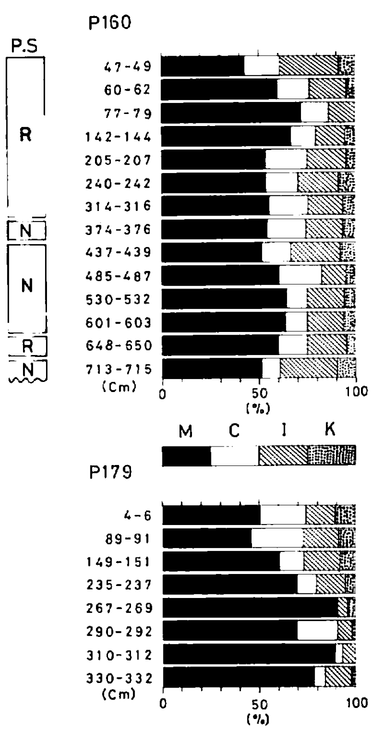

Fig. XIII-2 Vertical variation of the clay mineral composition in cores P160 and P179. P.S: paleomagnetic stratigraphy (JOSHIMA, this cruise report) R: reverse epoch N: normal epoch. M: montmorillonite C: chlorite I: illite K: kaolinite.

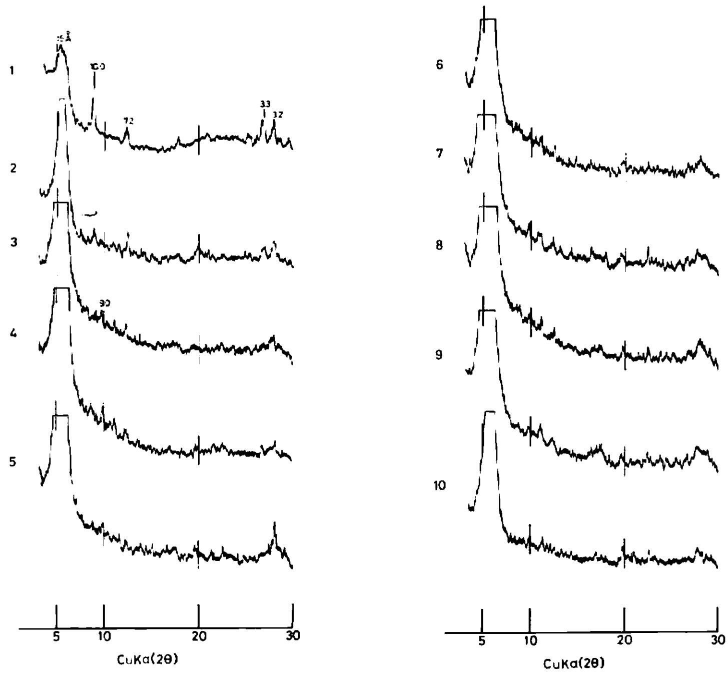

Fig. XIII-3 X-ray diffractogram of P165
1: 59–61 cm 2: 131–133 cm 3: 233–235 cm 4: 325–327 cm 5: 370–372 cm
6: 439–441 cm 7: 493–495 cm 8: 550–552 cm 9: 607–609 cm 10: 683–685 cm.

solidated sediment sequence above the core catcher is consistent with the known fact that sediments overlying chert in the GH76–1 area tend to be dominated by montmorillonite (Aoki and Oinuma, 1978). Core P179 also includes clinoptilolite which is generally present in older sediments and its abundance tends to increase with the burial depth (Kastner, 1979). This supports Nakao and Mizuno's tentative conclusion of the Tertiary age of the lower part of core (this cruise report).

The surface layer (59–61 cm) of core P165 collected from the southern extremity of the survey lines is characterized by the clay mineral assemblage of montmorillonite, illite, chlorite, and kaolinite. The X-ray diffractogram is shown in Fig. XIII-3. The diffractogram shows, however, remarkable change of the clay mineral composition at some 230 cm from the top, and simultaniously 9.0 A mineral, clinoptilolite, appears.

The lower part of the core is composed of almost pure montmorillonite. The montmorillonite belongs to an iron-rich variety which is found in the sediments cores from the northeastern and southeastern Pacific (Aoki *et al.*, 1974; 1979). This suggests the iron-rich montmorillonite to be widely prevalent in the pacific deep-sea sediments.

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