

**XV. CORED AND DREDGED MATERIAL TAKEN DURING  
THE GH80-3 CRUISE FROM THE  
OFFSHORE KASHIMA, AREA OF THE KASHIMA  
NO. 1 AND KATORI SEAMOUNTS, AND NORTHERN  
AREA OF THE OGASAWARA ARC**

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**Introduction**

Sampling work during the GH80-3 Cruise was carried out at thirty-six stations by dredging (26 stations), piston-coring (7 stations) and rock-coring (3 stations). The sampling stations are divided into three groups by their locations. Six stations are located in the offshore Kashima area, twelve stations are in the area of the Kashima No. 1 and Katori Seamounts and the other eighteen stations are situated in the northern area of the Izu-Ogasawara Arc. The last group is roughly divided into two subgroups, such as the stations distributed around the junction between the Ogasawara Trench and the Sagami Trough and the others in the subarea of the Shichito volcanic chain and Zenisu Ridge.

Information about the samples is described here in each group. Brief descriptions of the samples obtained by dredging and coring are given in Table XV-1 and -2, and the sampling stations in each group are shown in Fig. XV-1, -3, -4 and -6. Detailed locations and depths of the sampling stations are summarized in Table 1-7.

*Offshore Kashima area*

Only three corings (two piston-corings and one rock-coring) and three dredgings were performed near the southern margin of the survey area. The stations are distributed from the continental shelf to the upper part of the continental slope, which continues to the Choshi Spur as shown in Fig. XV-1. Visual descriptions of the cored material taken from this area are shown in Fig. XV-2.

Two piston cores, P184 and P185, were taken from the gentle slope off Choshi from the depths of 1150 and 1160 m, respectively. Core P184 (total length 385 cm) is composed of olive gray fine sand with olive gray silt of the central part of the sequence. Foraminiferal tests are commonly observed in the smear slide of the sand, and calcareous nannoplanktons, diatoms, and sponge spicules are rarely observed. Core P185 (total length 570 cm including the "flow-in" part of ca. 200 cm long) is composed of dark olive gray clayey silt. In the smear slide, abundant diatoms and calcareous nannoplanktons and some foraminifers and sponge spicules are observed.

Rock core RC80, taken from the continental shelf off Choshi, is only 8 cm long. Upper 4 cm of this core is composed of loose black coarse sand and lower 4 cm of pale greenish olive gray very fine-grained calcareous sandstone.

Loose sediments composed of olive gray silt to silty fine sand were obtained at three dredge stations between depths of 650 and 270 m, and thought to be recent surface

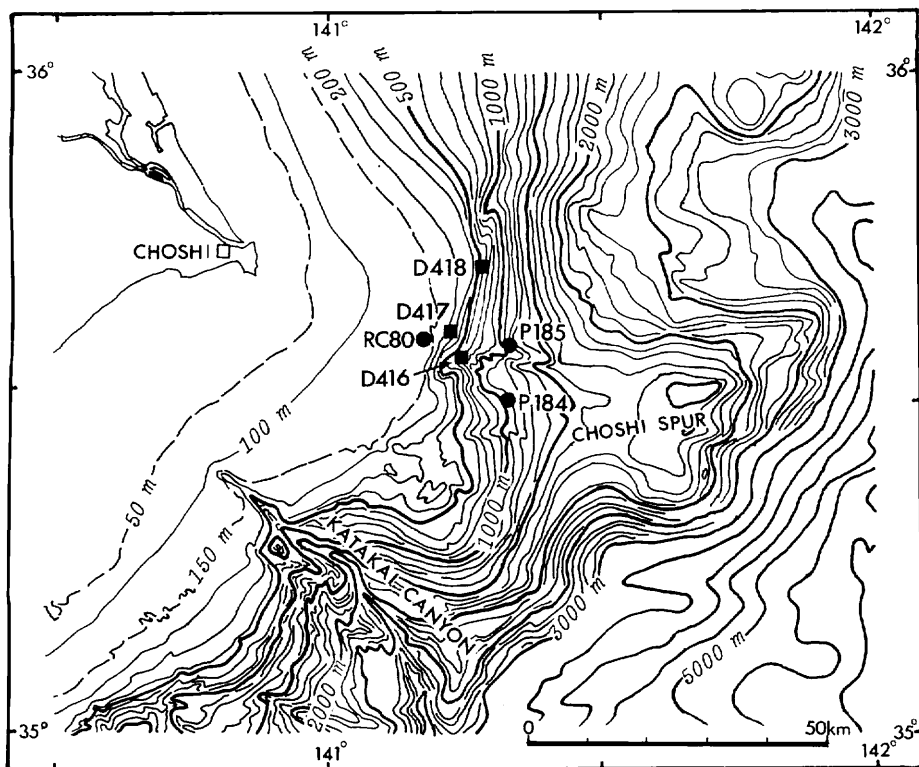


Fig. XV-1 Sampling stations indicated by the sample numbers in the area of offshore Kashima.

sediment. No rock sample was obtained by dredging.

#### *Area of the Kashima No. 1 and Katori Seamount*

On the slopes of the Kashima No. 1 and Katori Seamounts, ten dredgings were performed. The stations are shown by arrows and sample numbers in Fig. XV-3 with the other two dredge stations which were performed by our previous cruise. Brief descriptions of the samples and information about these two stations are given as appendix of Table XV-1.

Sedimentary rock samples mainly composed of creamy white limestone were taken from the sampling stations of the Kashima No. 1 Seamount. Most of the limestones are micritic limestone and sometimes have gastropoda shells and moulds. Oolitic textures are observed in the small specimens of the sample D422. One small specimen with abundant *Orbitolina* sp. (Plate XV-1) shows that the limestone is Cretaceous in age, as pointed by RESEARCH GROUP FOR DAIICHI KASHIMA SEAMOUNT (= Kashima No. 1 Seamount) (1976). No limestone sample was obtained from the Katori Seamount.

Igneous rock samples were obtained from three stations on the Katori Seamount and four stations on the Kashima No. 1 Seamount. The rock types are mainly alkali basalt affinities. The forms of the igneous rock samples are mainly non-vesicular lavas, but few

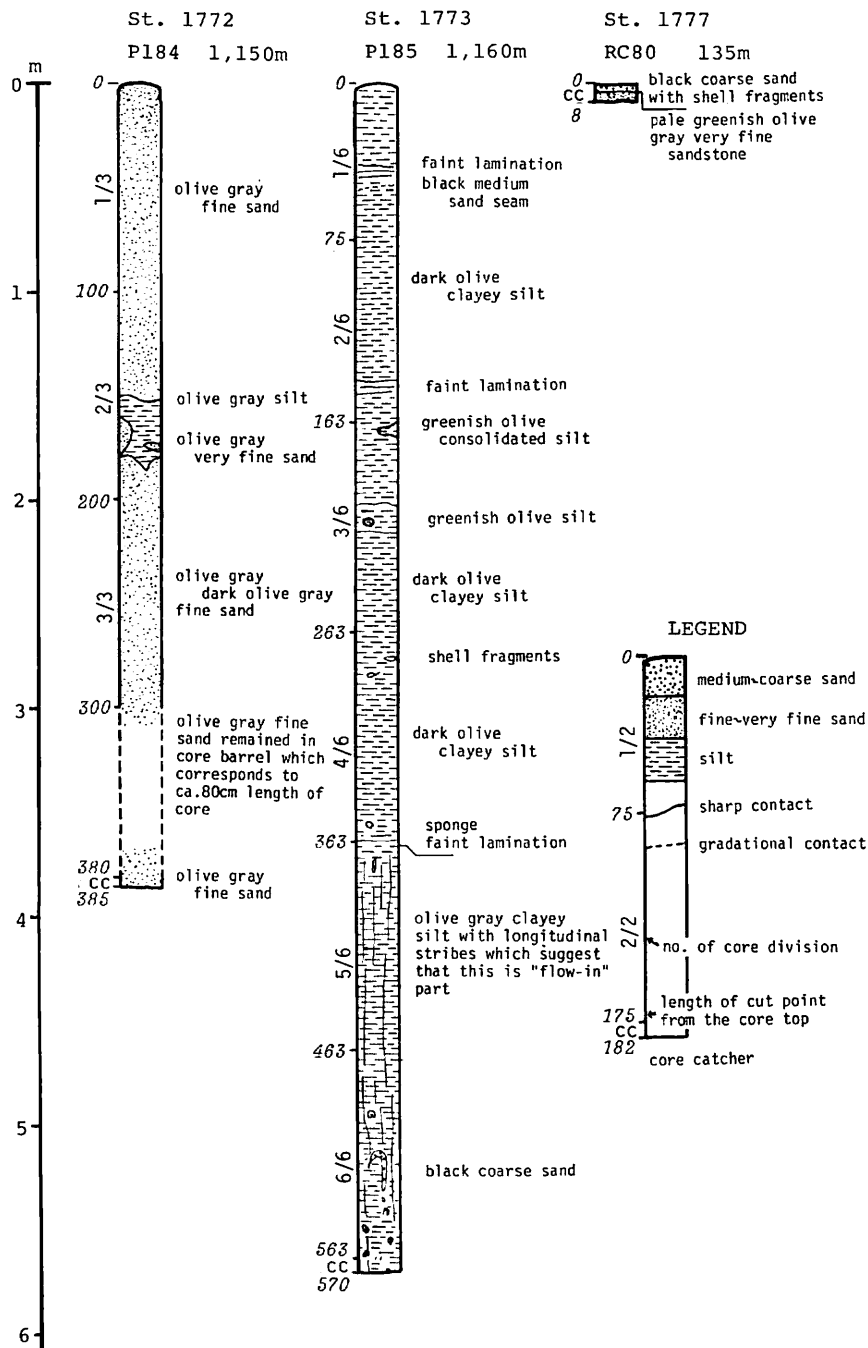


Fig. XV-2 Columnar sections of the cores taken from the offshore Kashima.

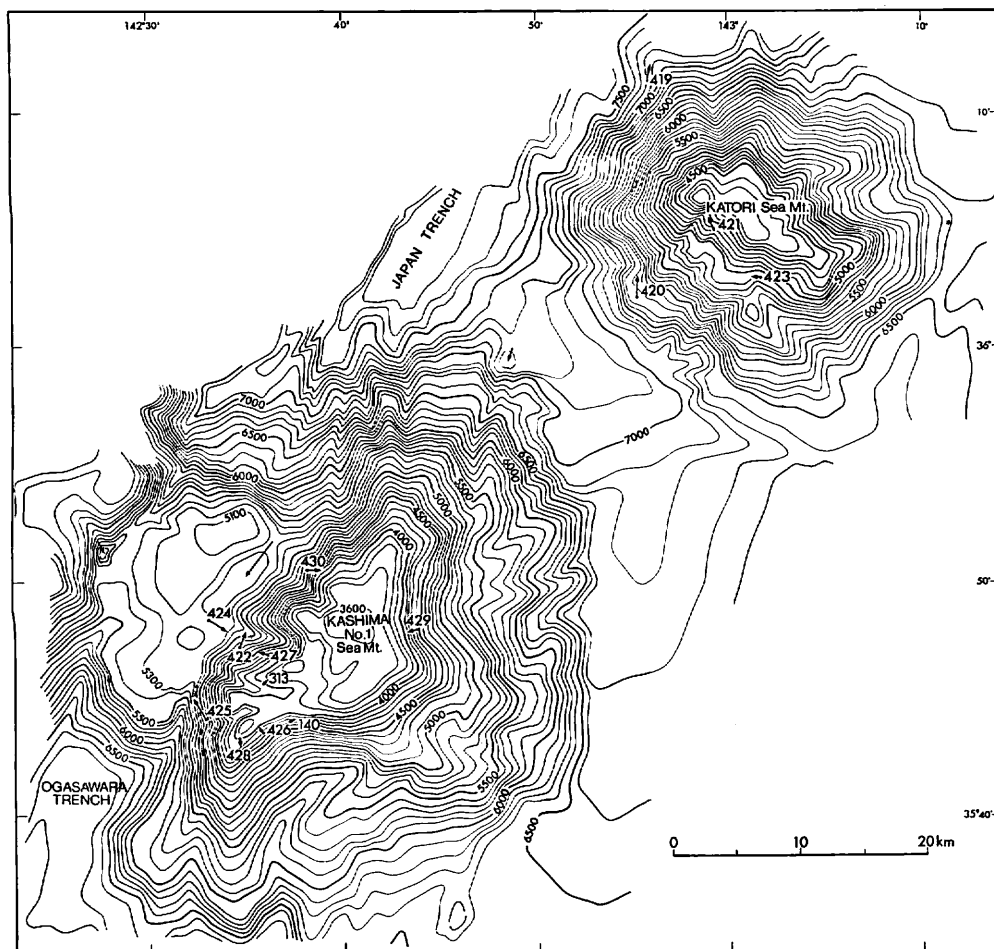


Fig. XV-3 Dredging stations in the area of the Kashima No. 1 and Katori Seamounts. The arrows are drawn from the 'hit' position to the 'lift off' position of the ship as shown in Table I-7. The numbers are 'D'-omitted sample numbers of dredging. Two stations below were performed by our previous cruise.

D140; GH76-2 Cruise (Yuasa *et al.*, 1977)

D313; GH78-4-II Cruise (Inoue and Honza, 1978).

samples contain many vesicles. Hyaloclastic? rocks were also obtained.

Manganese nodule samples were taken from the two stations of the Katori Seamount. The cores of the manganese nodules are composed of claystone and basalt fragments. The chemical compositions of the nodules are shown in Table XV-3.

Geological evidences indicated by the samples from the Kashima No. 1 Seamount are as follows;

1) The flat top of the Kashima No. 1 Seamount is mainly composed of fossiliferous limestones yielding Cretaceous age.

Table XV-1 List of dredged samples taken during the GH80-3 Cruise.  
 Appendix; List of dredged samples taken during by our previous cruise and their positions at the Kashima No. 1 Seamount.

Station No.	Sample No.	Sampling Station	Sample Description	Remarks
1774	D416	A slope off Choshi	olive gray silt	neroids and their nests, gastropoda
1775	D417	A slope of outer edge of continental shelf off Choshi	olive gray silty fine sand semiconsolidated greenish olive fine sand	neroids and their nests, echiuroids, gastropoda, wood fragments
1776	D418	A slope off Choshi	olive gray sandy silt	neroids and their nests, echiuroids, wood fragments
1778	D419	A foot of the Katori Seamount	greenish yellow pumiceous coarse-grained sandstone? altered yellowish brown tuff breccia aphyric basalt very dark grayish brown silty clay	
1779	D420	A lower slope of the Katori Seamount	manganese nodules and fragments of manganese crust olivine basalt (partly vesiculate, fairly weathered) yellowish brown consolidated silt? very dark grayish brown clay	
1780	D421	An upper slope of the Katori Seamount	plagioclase basalt (well vesiculate) greenish yellow coarse to very fine-grained tuff fragments of manganese crust and manganese nodules	
1781	D422	A step slope of the Kashima No. 1 Seamount	creamy white limestone* brownish gray siltstone dark reddish brown tuff plagioclase basalt aphyric basalt (phenocryst-clinopyroxene, rare) gray very fine ash (consolidated)**	*yielding molluscan fossils and <i>Orbitolina</i> sp. of Cretaceous age  **radiolarians and benthonic forams bearing
1782	D423	A step slope near the top of the Katori Seamount	pumice (lapilli size, small amount) very dark brown sandy silt	
1783	D424	Western slope of the Kashima No. 1 Seamount	granules of basalt (small amount) pumice, lapilli size (small amount) olive gray silt	

Table XV-1 (continued)

Station No.	Sample No.	Sampling Station	Sample Description	Remarks
1784	D425	Southwestern slope of the Kashima No. 1 Seamout	small fragments of basalt (pebble size, fairly weathered) plagioclase basalt (microcrystalline, lava and lava breccia) rounded granules of limestone olive brown semiconsolidated silt	
1785	D426	Southern slope near the crest of the Kashima No. 1 Seamout	a fragment of manganese crust limestone fragments (small amount) pumice (lapilli size, small amount) a rounded pebble, chert? olive gray sandy silt	
1786	D427	Western slope of the Kashima No. 1 Seamout	shell limestone hyaloclastic? breccia to siltstone augite basalt (vesiculate) aphyric basalt (vesiculate) aphyric basalt (flow texture) dark grayish brown sandy silt	
1787	D428	Southwestern slope near the top of the Kashima No. 1 Seamout	white limestone	
1788	D429	Eastern slope of the Kashima No. 1 Seamout	pumice and scoria (lapilli size, small amount) olive gray sandy silt	
1789	D430	Northwestern slope of the Kashima No. 1 Seamout	olive gray plagioclase (saussuritized) basalt (one sample) rounded granules of limestone (small amount) subangular granules of siltstone (small amount) pumice (lapilli size, small amount) dark olive gray sandy silt	
1790	D431	Off Hachijojima Island, inner trench slope	pumice (lapilli size, small amount) dark grayish brown clay	

Table XV-1 (continued)

Station No.	Sample No.	Sampling Station	Sample Description	Remarks
1792	D432	Southern slope of the southwestern part of the Zenisu Ridge	weathered subrounded fragments of light olive gray burrowed siltstone to sandy siltstone (cobble size)* a block of alternative beds of light gray and dark gray semiconsolidated silt dark yellowish brown pumice (lapilli size) medium-grained tuff (small amount) grayish brown sandy silt	*forams bearing
1793	D433	Crest of the southwestern part of the Zenisu Ridge	lava (large amount) two pyroxene andesite olivine two pyroxene andesite brown hornblende two pyroxene andesite olivine brown hornblende two pyroxene andesite lava breccia or volcanic sandstone two pyroxene andesite brown hornblende andesite and two pyroxene (±) green hornblende andesite	
1794	D434	East of Miyakejima Island, a small knoll	scoria or clinker (lapilli to fine block size, augite basalt, olivine bearing or no)* pumice (lapilli size, small amount)	*30 kg neroids
1795	D435	Onohara No. 2 Knoll, west of Miyakejima Island	dark yellowish olive rhyolite (partly vesiculate, weathered) conglomerate cemented by carbonates	fragments of coral
1798	D436	Southeastern part of the Sagami Trough	a pebble and granules of olive gray sandy siltstone	echinoid (15 cm in diameter) gastropoda, small molluscs
1799	D437	Northeastern slope of the Omuro Dashi Bank, southeast of Oshima Island	olive gray medium sand containing granules	
1803	D438	Pacific Ocean floor, east of the junction between	moderate brown yellowish burrowed siltstone* light olive gray siltstone (small amount)	*forams and radiolarians bearing

Table XV-1 (continued)

Station No.	Sample No.	Sampling Station	Sample Description	Remarks			
		the Ogasawara Trench and the Sagami Trough, outer ridge	altered olivine? basalt (part of pillow lava) manganese nodules (two sample) olive gray silt				
1804	D439	Southeast of the Boso Peninsula, western slope of a knoll	olive gray sandy silt				
1805	D440	East of Nijijima Island, near the mouth of Katsuura Canyon, trench slope break	a subrounded fragment of alternative beds of graded medium to fine-grained brown sandstone and pale yellow siltstone (cobble size) partly weathered subangular fragments of pale yellow burrowed tuffaceous siltstone (cobble size) olive gray sandy silt				
1806	D441	A mound near the junction between the Ogasawara Trench and the Sagami Trough	light olive gray siltstone pumice (lapilli size, small amount) dark brown silt				
Appendix 436	D140	Southern slope near the crest of the Kashima No. 1 Scamout	basaltic rocks (large amount) augite olivine basalt fine-grained mugearite medium-grained mugearite alkali olivine dolerite oolitic limestone silt	GH76-2 Cruise (Yuasa <i>et al.</i> , 1977)			
1447	D313	Western slope of the Kashima No. 1 Scamout	creamy white limestone* siliceous ooze (semiconsolidated)**	*yielding <i>Nerinea</i> of Cretaceous age **yielding radiolarians of early Miocene age GH78-4-II Cruise (Inoue and Honza, 1978)			
St. 436	D140	Lat. (N) 35°43.3'	Hit	Depth	Date		
		Long. (E) 142°37.1'	Lat. (N) 35°44.1'	Hit 4550 m	Lift off 4400 m	Apr. 8, 1976	
St. 1447	D313	142°35.8'	35°45.8'	142°36.1'	3820 m	3800 m	Aug. 11, 1978



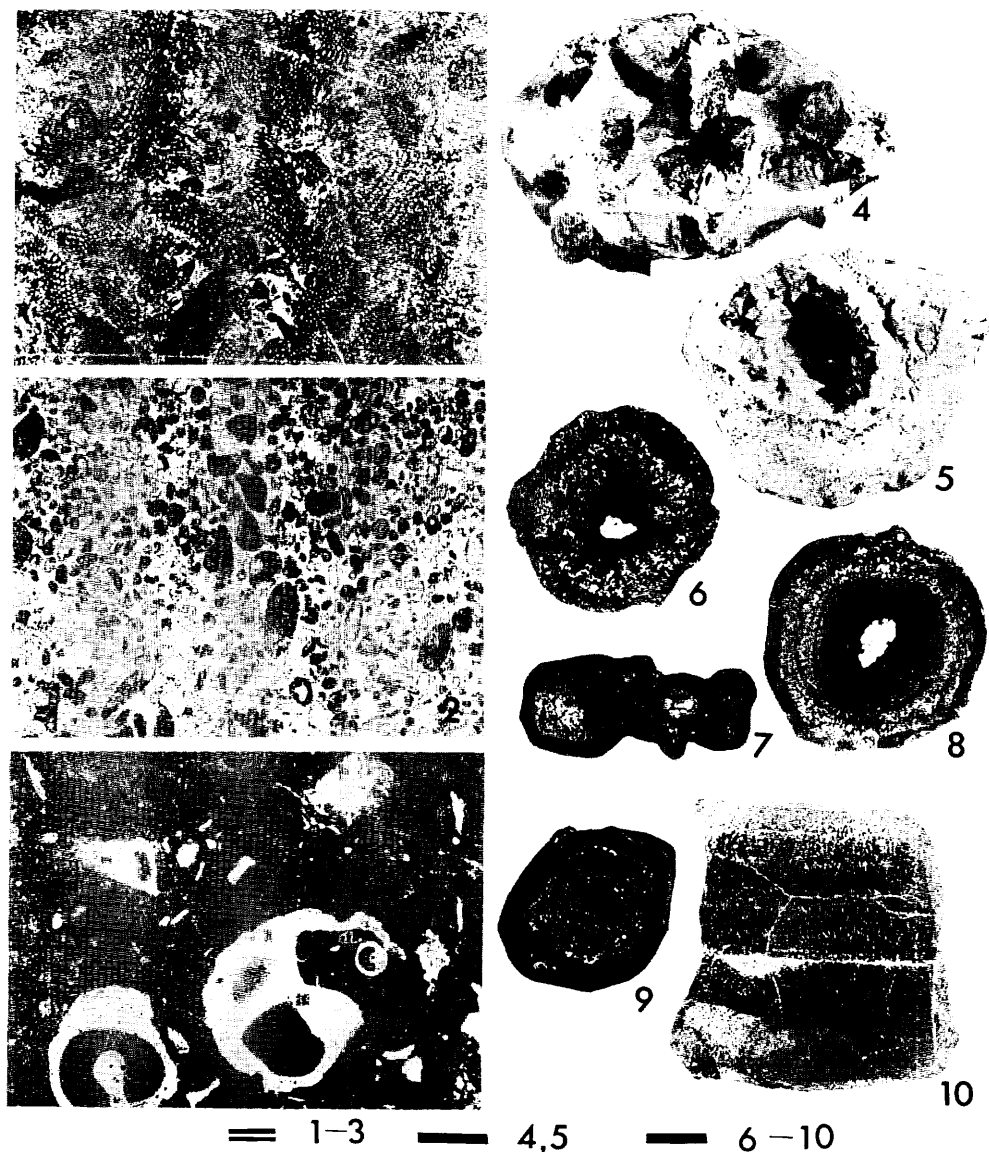


Plate XV-1 Photographs of some selected samples obtained in the area of the Kashima No. 1 and Katori Seamount.

Double-bar shows 1 mm and single-bars show 10 mm.

1. Thin section of *Orbitolina* limestone, D422-2.
2. Thin section of oolitic limestone, D422-3.
3. Thin section of micritic limestone with some gastropoda shells, D422-13.
4. Limestone with gastropoda shells, D422.
5. Limestone with cavity having sword-shape calcite crystals, D422.
6. Cut-surface of spheroidal manganese nodule, D420.
7. Cut-surface of irregular manganese nodule, D420.
8. Cut-surface of spheroidal manganese nodule, D420.
9. Cut-surface of spheroidal manganese nodule with basalt core, D421.
10. Cut-surface of manganese crust, D421

Table XV-2 List of cored samples taken during the GH80-3 Cruise.

Station No.	Sample No.	Sampling Station	Total Length (cm)	Sample Description	Remarks
1772	P184	A gentle slope off Choshi	300+	olive gray fine sand with a small amount of olive gray silt in middle part	A large amount of fine sand remained in core-barrel because of its bending.
1773	P185	ditto	570	olive gray clayey silt with black sand seam and greenish olive siltstone	Lower part (about 200 cm) has longitudinally band which suggests flow-in sediment.
1777	RC80	A rough plain of continental shelf off Choshi		black coarse sand with shell fragments pale greenish olive very fine sandstone	gastropoda
1791	P186	Northeastern margin of Shikoku Basin, near the mouth of Zenisu Canyon	700	olive gray (upper part) to very dark gray (lower part) silt with gray fine sand and tuff seams	Almost all of the sand layers are three to four times stretched out. True total length may be less than 600 cm.
1796	P187	Southeastern end of the Sagami Trough	680	dark olive gray clay with graded dark gray fine sand and tuff seams	Upper half of the core is strongly stretched out and has longitudinally band. True total length may be less than 460 cm.
1797	P188	Southeastern part of the Sagami Trough	190	medium to coarse pumice bearing very dark gray fine to medium sand	Upper part (about 100 cm) has longitudinally band.
1800	RC81	East of Nijijima Island		no sample	misfitting of core-catcher
1801	RC82	Southeast of Oshima Island		no sample	misfitting of core-catcher
1802	P189	Pacific Ocean floor, east of the junction between the Ogasawara Trench and the Sagami Trough, outer ridge	290	olive gray to dark grayish brown silt with black fine sand and scoriaceous tuff seams	
1807	P190	Southeast of the Boso Peninsula, bottom of a small canyon	680	dark olive gray foraminiferal clay (upper part) to olive gray sandy silt (lower part) with pumiceous tuff seams	dark brown clay with very dark gray bands in the pilot core (68 cm)

Table XV-3 Chemical compositions of manganese nodules from the Katori Seamount.

	Mn(%)	Fe(%)	Ca(%)	Mg(%)	K(%)	Na(%)	Cu(ppm)	Ni(ppm)	Co(ppm)	Pb(ppm)	Zn(ppm)
D420	20.2	12.1	0.34	0.92	0.42	1.43	1440	2415	2270	1600	370
D421	17.6	19.5	0.23	0.72	0.33	1.44	605	2000	1390	2620	590

Analyzed by atomic absorption spectrometer (S. Yokota and M. Yuasa of our institute)

2) The western slope of the Kashima No. 1 Seamount is mainly composed of clastics of limestones and fragments of hyaloclastites and lavas.

These evidences may agree with the relative subsidence of the western half of the Kashima No. 1 Seamount (MOGI and NISHIZAWA, 1980; Chapter XIII in this report). But carbonate sediment drift and sedimentation on the slope of seamount and the volcanoclastic structure of the seamount remains obscure. It is not enough to indicate the relative subsidence by sampling results.

If limestone cap does not exist on the Katori Seamount and the age of the formation of the seamount is the same with the Kashima No. 1 Seamount, the relative sea-level in the middle Cretaceous age can be determined.

#### *Northern area of the Ogasawara Arc*

##### *Subarea around the junction between the Ogasawara Trench and the Sagami Trough*

Six dredgings and four piston-corings were performed in this subarea. The stations in this subarea and visual descriptions of the cored material taken from the northern area of the Ogasawara Arc are shown in Fig. XV-4 and -5.

On the Pacific Ocean floor, east of the Ogasawara Trench, altered olivine? basalt was dredged with burrowed siltstone and two manganese nodules (D438). The basalt sample is columnar shape and seems to be a part of pillow lava cut along radial jointing. Many tuff seams are observed in the upper portion of the core P189. Scoriaceous tuff seams are prominent among them.

Along and near the Sagami Trough, no rock sample was obtained with the exception of a cobble of altered aphyric plagioclase-free basalt taken in the core of the core-catcher of core P187. Dredged samples are mainly composed of fragile siltstone in addition to loose sediments. A fragment of fragile alternative beds of graded medium to fine-grained brown sandstone and pale yellow siltstone was dredged near the mouth of Katsuura Canyon where the Boso Escarpment appears to cut the canyon (D440). Medium to fine thick sand bed (P188) and many graded fine sand beds (P187) are observed in the core obtained near the bottom of the Sagami Trough. Foraminiferal clay lies on the pumiceous sandy silt on the upper slope of the Boso Escarpment (P190).

##### *Subarea of the Shichito volcanic chain and Zenisu Ridge*

Five dredgings, one piston-coring and two rock-corings were performed in this subarea (Fig. XV-6). Rock-cores were failed to obtain samples due to misfitting of their core-catchers.

At the eastern submarine flank of Miyakejima Island, a large amount of scoria or clinker was dredged. They are fresh, black, well vesiculate, angular in shape and non-defaced and vary in size from lapilli size to fine volcanic block size. The rock types are

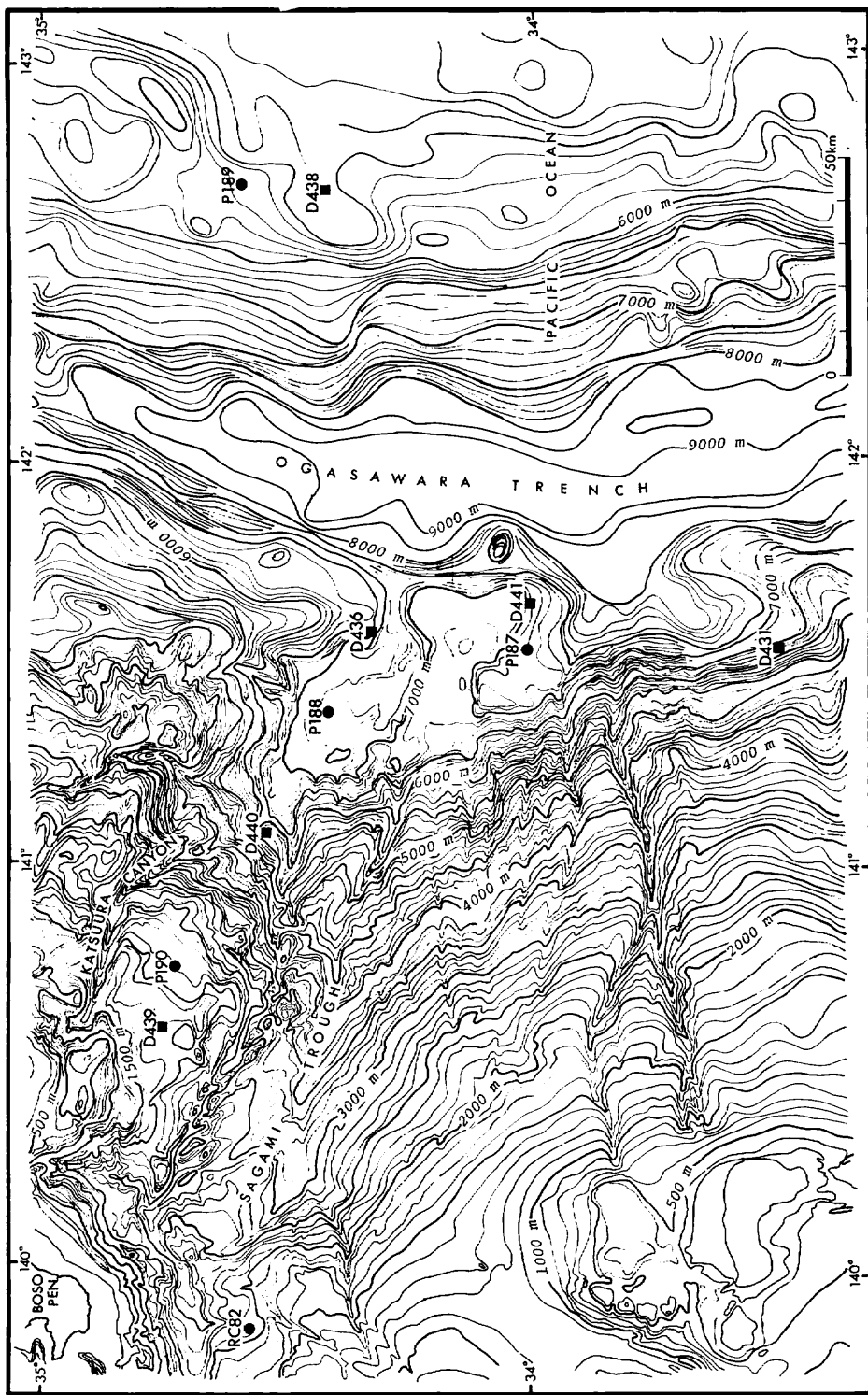


Fig. XV-4 Sampling stations indicated by the sample numbers around the junction between the Ogasawara Trench and the Sagami Trench.

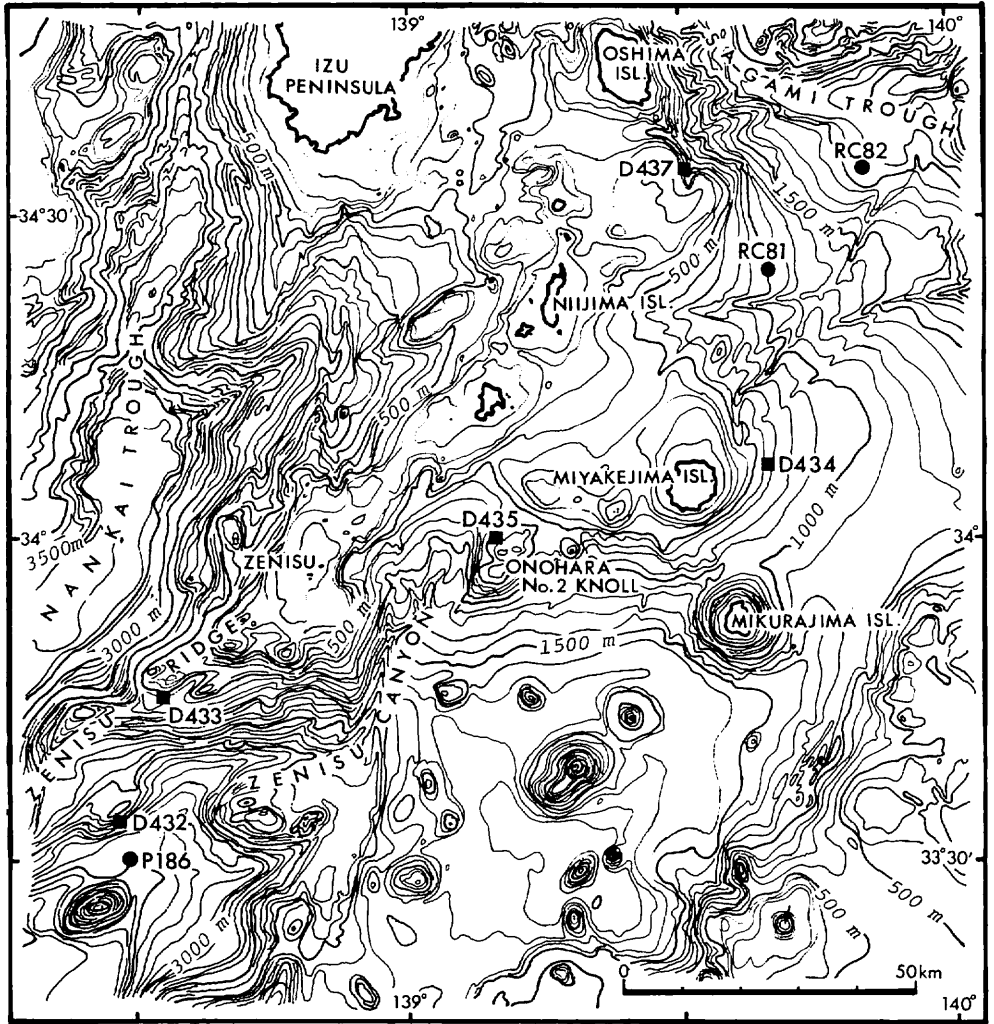


Fig. XV-6 Sampling stations indicated by the sample numbers around the Shichito volcanic chain and Zenisu Ridge.

basalt affinities. They seem to be volcanic ejecta near the scoria cone or clinker on the advancing lava surface. No evidence exists that they are products of submarine volcanism, but it is too deep (about 600 m in depth) to suppose that aerial vent exists near the dredge station. So they are supposed to be some deposits of rock avalanche or debris flow from land source on Miyakejima Island. No rock sample was obtained from the other station along the Shichito volcanic chain (D437).

From the Onohara No. 2 Knoll, west of the Shichito volcanic chain, rhyolite conglomerate cemented by carbonates was dredged with small fragments of coral.

On the Zenisu Ridge, a large amount of andesite was dredged (D433). They are not so weathered as the Yugashima Group which has been considered to form the ridge (NIINO, 1935; ISSHIKI, 1980). The volcanic rocks younger than the Yugashima Group may form part of the ridge. In the other part of the ridge siltstone was dredged (D432).

One piston-coring was performed at the northeastern margin of Shikoku Basin, near the mouth of Zenisu Canyon (P186). The core is composed of gray silt with gray fine sand and tuff seams.

#### Acknowledgements

Thanks are expressed to Messrs. Tatsunori Soya, Makoto Yuasa and Dr. Takashi Nakajima of our institute for many suggestions and discussions.

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