I. GH 75-1 CRUISE

January 20-February 18, 1975

I-1. GENERAL REMARKS

By Eiichi Honza

Introduction

The Ryukyu Islands extend northeast to southwest, from Kyushu to Taiwan and are convex to the southeast. The Ryukyu Trench extends parallel to the islands on their southwestern side. The Okinawa Trough also extends parallel to the islands on the northwestern. The Tunghai continental shelf is extensively developed northwest of the Okinawa Trough.

Thick Neogene sedimentary layers are probably present on the Tunghai shelf and in the Okinawa Trough (WAGEMAN *et al.*, 1970). The Neogene sediments on the Tunghai shelf are trapped by the structural high at the shelf margin. Thick sediments in the Okinawa Trough have been deformed by tectonic movement and igneous activity. Volcanic activity during Quaternary times represented by a chain of volcanic islands north of the trough. The southern extension of this volcanic chain is not clearly identified because of the lack of topographic highs. The Ryukyu Islands are subdivided into several structural belts on the basis of their geological distribution (KONISHI, 1965). The islands range from Paleozoic, to Cenozoic in age and are correlated with the Outer Seinan Japan Arc.

These structural belts have a somewhat oblique distribution in comparison to the distribution of the Ryukyu Islands and constitute a geanticline in the Ryukyu Arc system.

A thin veneer of layered sediments is present on the eastern continental slope of the Ryukyu Ridge. Layered sediments are scarce on the inner trench slope.

The oceanic floor of the Northern Philippine Basin has a rough topography which may suggest a thin cover of sediments.

The cruises were intended to investigate the geological history of the Ryukyu Island arc system and to compile a geological map of the area.

Outline of the cruise

The investigation was carried out from the 20th of January to the 18th of February, 1975. A test survey of the deep-sea proton magnetometer was made for a few days at the beginning of the cruise. Also, a survey of the volcanic morphology and stratigraphy was made south of Kagoshima Bay. Nine scientists and four technical assistants joined in the investigation around the Ryukyu Islands, and three scientists joined in the investigation for the test of deep-sea proton magnetometer and for the volcanic morphology and stratigraphy. Three scientists left the vessel at Kagoshima. The members of the scientific staff are listed in Table I-1-1. The four technical assistants were graduate

Table I–1–1 Scientific staff on the cruise

Name	Organization	Speciality
Eiichi HONZA	G.S.J.	Chief scientist, geology
Kouji ONODERA	G.S.J.	Vice-chief scientist, geomorphology
Takemi ISHIHARA	G.S.J.	Scientist, geophysics
Masashi ARITA	G.S.J.	Scientist, sedimentology
Yoshihisa OKUDA	G.S.J.	Scientist, geology
Makoto YUASA	G.S.J.	Scientist, mineralogy
Kensaku TAMAKI	G.S.J.	Scientist, geology
Yoshiro INOUCHI	G.S.J.	Scientist, sedimentology
Fumitoshi MURAKAMI	G.S.J.	Scientist, geophysics
* Junsuke CHUJO	G.S.J.	Scientist, geophysics
* Yasumasa KINOSHITA	G.S.J.	Scientist, geology
* Tatsunori SOYA	G.S.J.	Scientist, geology
Ken-ichi HARADA	G.S.J.	Technical assistant
Hidekazu TOKUYAMA	G.S.J.	Technical assistant
Kantaro FUJIOKA	G.S.J.	Technical assistant
Makoto OKAMURA	G.S.J.	Technical assistant

*Funabashi-Kagoshima

Table I–1–2 Schedule of the cruise

Jan. 20	Lv. Funabashi (13: 00)
	Geological and geophysical survey in the Shikoku Basin
	Test of deep-sea proton magnetometer
	Survey of volcanic morphology and stratigraphy to the south of Kagoshima Bay
Jan. 24	Ar. at Kagoshima (10: 00)
Jan. 25	Lv. Kagoshima (12: 00)
	Geological and geophysical survey in the southern region of Ryukyu Islands
Feb. 2	Ar. at Miyako (22: 00)
Feb. 5	Lv. Miyako (09: 00)
	Geological and geophysical survey in the southern and central region of Ryukyu Islands
Feb. 12	Ar. at Nakagusuku Bay (08: 00)
Feb. 13	Shift to Naha (11: 00–17: 00)
Feb. 15	Lv. Naha (06: 40)
	Geological and geophysical survey from Okinawa to Tokyo Bay
Feb. 18	Ar. at Funabashi (18: 00)

students from various Universities. The cruise is also promoted by Dr. E. INOUE who is a leader of the project.

The vessel covered a total distance of 5413.8 nautical miles during thirty days (Table I–1–2). NNSS and Loran C navigation systems were simultaneously used in the navigation and for position fixing for all of the geological and geophysical tracks and sampling sites. Geophysical survey traverses were set to cross the extension of the arc, and one track was run parallel to the trough (Figs. I–1–1 and I–1–2). Sampling sites included the sedimentary layers and acoustic basement. Piston coring was done in the Okinawa Trough and the Philippine Basin. These survey methods are summarized in table I–1–3. Sampled sites and their results are listed in table I–1–4.

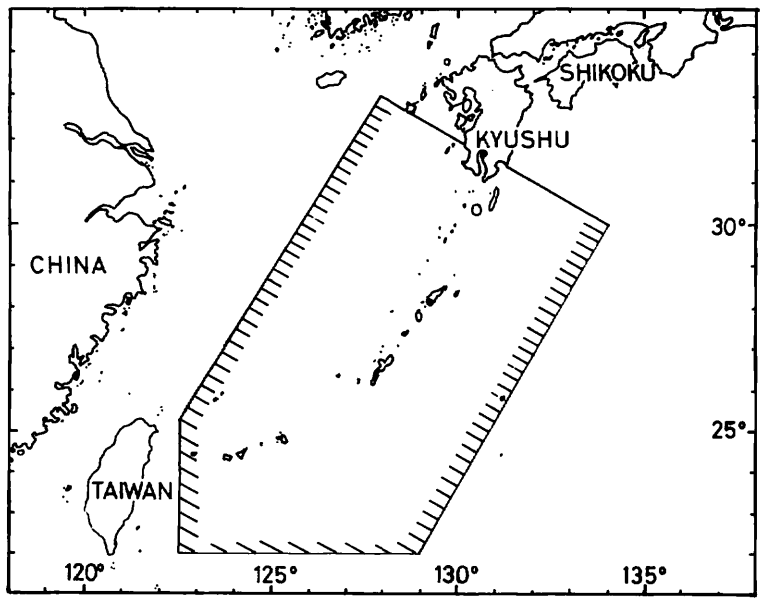

Fig. I-1-1 The surveyed area.

Table I-1-3 Observation methods

Cruising and positioning by NNSS and Loran C
Geophysical methods
Bathymetric survey by 12 kHz PDR
—Prospecting of bottom topography
Subbottom profiling by 3.5 kHz PDR
—Prospection of sedimentary surficial layers and surficial structure
Continuous seismic profiling survey by air-gun
—Prospecting of sedimentary layers and geological structure
Magnetic survey by proton magnetometer
Gravity measurement by on-board gravimeter
—Auxiliary consideration of general geological structure
Geological methods
Bottom sampling by chain-bag and cylinder dredges
—Sampling of sediments and rocks
Bottom sampling by Smith-McIntyre grab
—Sampling of undisturbed surficial sediments
Bottom sampling by piston corer with 6 m core-barrel
—Observation of vertical sequence of surficial sedimentary columns

References Cited

KONISHI, K. (1965) Geotectonic framework of the Ryukyu Islands (Nansei-shoto). *Jour. Geol. Soc. Japan*, vol. 71, p. 437–457.

WAGEMAN, J. M., HILDE, T. W. C. and EMERY, K. O. (1970) Structural framework of East China Sea and Yellow Sea. *Amer. Asso. Pet. Geol. Bull.*, vol. 54, p. 1611–1643.

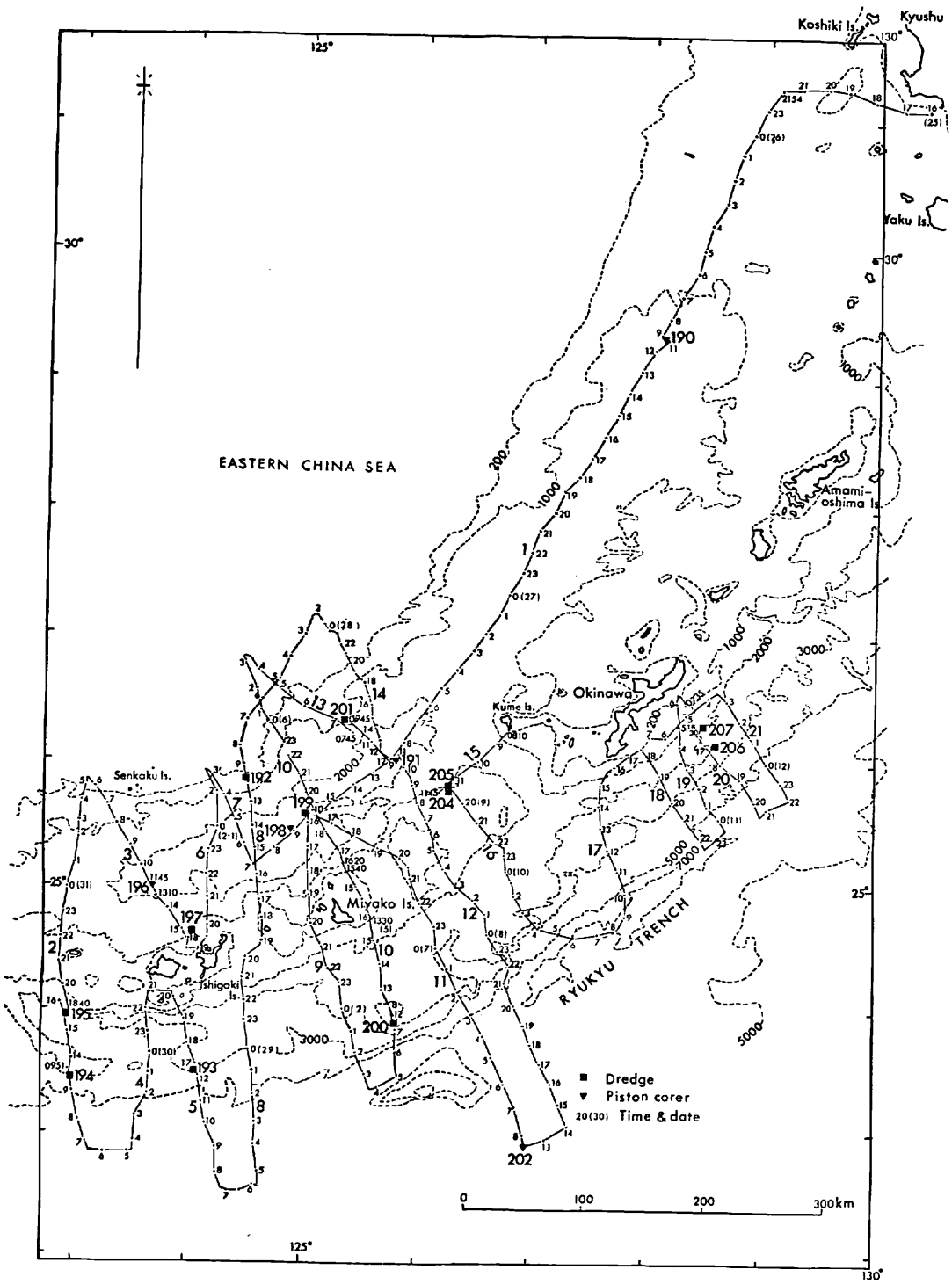

Fig. I–1–2 Sampling sites and tracks by geophysical surveys.

Table I–1–4 Results of stationary observations

St. No.	Sample No.	Date	Time	Position		Depth (m)	Bottom topography	Samples	Remarks
				Lat. N	Long. E				
186	DM 1	Jan. 21	10.05	32°41′	136°19′	4650			
187	DM 2	23	08.37	30°33.5′	130°13.7′	520			
188	D 84	23	14.17	30°47.0′	130°25.1′	507	Flat surface in small basin	Gravel consisted of pumices and shell fragments. They range in cobble to coarse sand	
189	D 85	23	15.16	30°45.6′	130°24.7′	165	Top at small sea hill in small basin	Coarse sand containning pumices (cobble-pebble), shells and semiconsolidated fine tuff blocks (yellowish gray)	
190	P 23	26	09.45	29°21.0′	128°06.5′	1090	Flat surface in Okinawa trough	core length 240 cm greenish gray clay with burrow. The lowest part of this core is medium tuffaceous sand	(Recent)
191	P 24	27	10.05	26°01.0′	125°46.6′	2100	Flat surface in Okinawa trough	core length 462 cm. 0–33 cm, repetition of graded beddes ("turbidites") 330–462 cm, homogeneous clay (dark gray)	Volcanic ash fall sediments? (pleistocene–Recent)
192	D 86	28	10.25	25°50.9′	124°29.8′	250	Small hill on continental slope	Shell fragments and corals	
			10.45	25°51.2′	124°30.1′	237			
193	D 87	29	14.05	23°28.0′	124°05.2′	2930	Slope of sea hill on continental slope	yellowish browns calcareous ooze containing shell fragments and pumices less than 20 mm	(lower Pleistocene)
			14.36	23°28.5′	124°05.2′				
			15.24	23°28.6′	124°05.2′	2700			
			15.27	23°28.6′	124°05.2′	2700			
194	D 88	30	11.30	23°25.0′	122°59.7′	3970	Small hill on slop of sea mount	a little sample of gray clay	(pliocene)
			12.06	23°25.4′	122°59.9′	3500			
195	D 89	30	17.28	23°56.8′	122°56.4′	2385	Slope of sea mount	gray clay containing a little pumices and foraminifera	(not Recent)
			17.48	23°56.8′	122°57.0′	2345			
196	P 25	31	11.45	25°00.2′	123°40.0′	2070	Flats surface in Okinawa trough	core length 513 cm repetition of graded bedes	(not Recent)
197	D 90	31	17.01	24°37.2′	123°57.8′	915	Slope of sea hill on continental slope	Brown clay containing small shell fragments, foraminifera and minerals	(upper Miocene)
			17.10	24°37.3′	123°57.8′	915			
198	P 26	Feb. 01	12.40	25°27.0′	124°53.4′	2100	Flat surface in Okinawa trough	core length 515 cm. 3–135 cm, repetition of graded bedds. 135–515 cm, homogeneous gray clay	(Pleistocene–Recent)

Table I-1-4 (continued)

St. No.	Sample No.	Date	Time	Position Lat. N	Position Long. E	Depth (m)	Bottom topography	Samples	Remarks
199	D 91	01	14.29	25°33.0′	125°01.0	1150	Slope of sea mount	Angular rock blocks surfaces of rocks show block in color. Size range is boulder to pebble. Rock species is classfied as follow o Quartz porphyry o Andesite o Slate o Hornfels o Limestone	Sediment age (up Miocene–Pliocene) Max. size (25 cm × 15 cm × 12 cm) (serpentine)
				25°34.0′	125°01.1′	1125			
200	D 92	02	09.37	23°52.2′	125°47.0′	1180	Shoulder of sea mount	o Siltstones with large burrow o Fine sandstone o Weathered andesite o Pumice o Foraminifera sand	(unknown age)
			10.40	23°54.9′	125°48.5′	885			
			10.51	23°55.0′	125°48.6′	900			
201	D 93	06	08.54	26°19.5′	125°19.9′	650	Shoulder of sea mount	Gray silt containing large shells and consalidated burrows	(unknown age)
			09.15	26°19.5′	125°19.9′	625			
202	P 27	07	10.28	22°54.7′	127°57.0′	5715	Flat surface in oceanic basin	Core length 564 cm. hard brown clay with burrow.	(unknown age)
203	GEK 1	09							
204	D 94	09	15.55	25°46.9′	126°16.7′	820	Slope of sea hill on continental slope	Shell fragments, sponge, and pumice	
			16.07	25°46.7′	126°16.5′	770			
205	D 95	09	18.09	25°48.7′	126°15.3′	1000	Slope of sea hill	Brownish gray coarse sand containing spicule of sponge	(Recent)
				25°48.3′	126°15.0′				
206	D 96	11	10.54	26°07.7′	128°32.5′	2490	Small sea hill on continental slope	o Yellowish brown clay (calcareous clay) o A greenish rock fragment tuff or shiest (1 cm × 1 cm × 0.3 cm)	
			11.50	26°08.6′	128°34.5′	2450			
			12.23	26°08.9′	128°34.2′	2415			
207	D 97	11	14.49	26°18.4′	128°27.0′	1830	Small sea hill on continental slope	Yellowish brown clay (calcareous clay) containing pumice, spicule of sponge, shell fragments and an angular andesite fragment (0.5 cm × 0.5 cm)	(Pleistocene–Recent)
			15.12	26°18.0′	128°26.1′	1795			