I. SEISMIC REFLECTION SURVEY RESULTS

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Track lines of seismic reflection surveyes which were obtained during GH75–4 cruise are shown in Fig. I-2, and the conditions of the seismic reflection survey are given in Table I-1.

The total survey line covered 2983 sea miles.

Stratigraphic sequences off the Kii Strait situated in the central part of the surveyed area are already known from reflection survey using sparker (OKUDA, *et al.*, 1974, and OKUDA, 1976), and they are summarized in Table I-2.

During the GH75–4 cruise, the stratigraphic sequence was correlated over the whole area off Southwest Japan. However the K-1, K-2 and K-3 formations of the previous work are lumped together as the K formation at present, because of the low density of the track lines and the lower resolution of the seismic reflection records in comparison to those of the reflection records using sparker.

On the continental slope, the sediments on the acoustic basement (M formation or igneous rocks) are divided into the T, K, and P formations in ascending order. In the area of the Nankai Trough, sediments on the acoustic basement are divided into the lowest opaque layer, lower transparent layer, middle opaque layer, upper transparent layer, and upper opaque layer.

Ages are assigned on the basis of the DSDP drilling results at site 297 (DSDP Sci. Staff, 1973) and by correlation with land geology. The stratigraphic relations are listed in Table I-3 and representative seismic reflection records are shown in Fig. I-2A-C which traverse deep sea terraces and the Nankai Trough. An isopach maps of the continental slope are shown in Fig. I-3.

Off Enshu-nada—Kumano Terrace (Fig. I-2A)

Thick sediments of the T, K, and P formations are dammed up by the two outer structural ridges in the Kumano deep sea terrace. The outer slope has many small ridges and troughs, and is termed the ridge and trough zone by IWABUCHI (1970). Below the Kumano Terrace, a basement ridge was observed.

The outer structural ridges can be traced from the Senoumi Bank in Suruga Bay to the oceanward side of the Kumano Terrace through the Kanesunose Bank and the oceanward side of the Enshu-sea area. The ridge is tentatively called the Kanesunose uplifted zone.

The upper part of the ridge and trough zone outside the Kanesunose uplifted zone is composed of probable Neogene sediments because weak reflective signals were detected from approximately the 2 second depth below the sea bottom, although the structure is not so clear where the slope is steep. These sediments are deformed. As the ridge and trough zone are composed of young sediments, deep submarine canyons are developed,

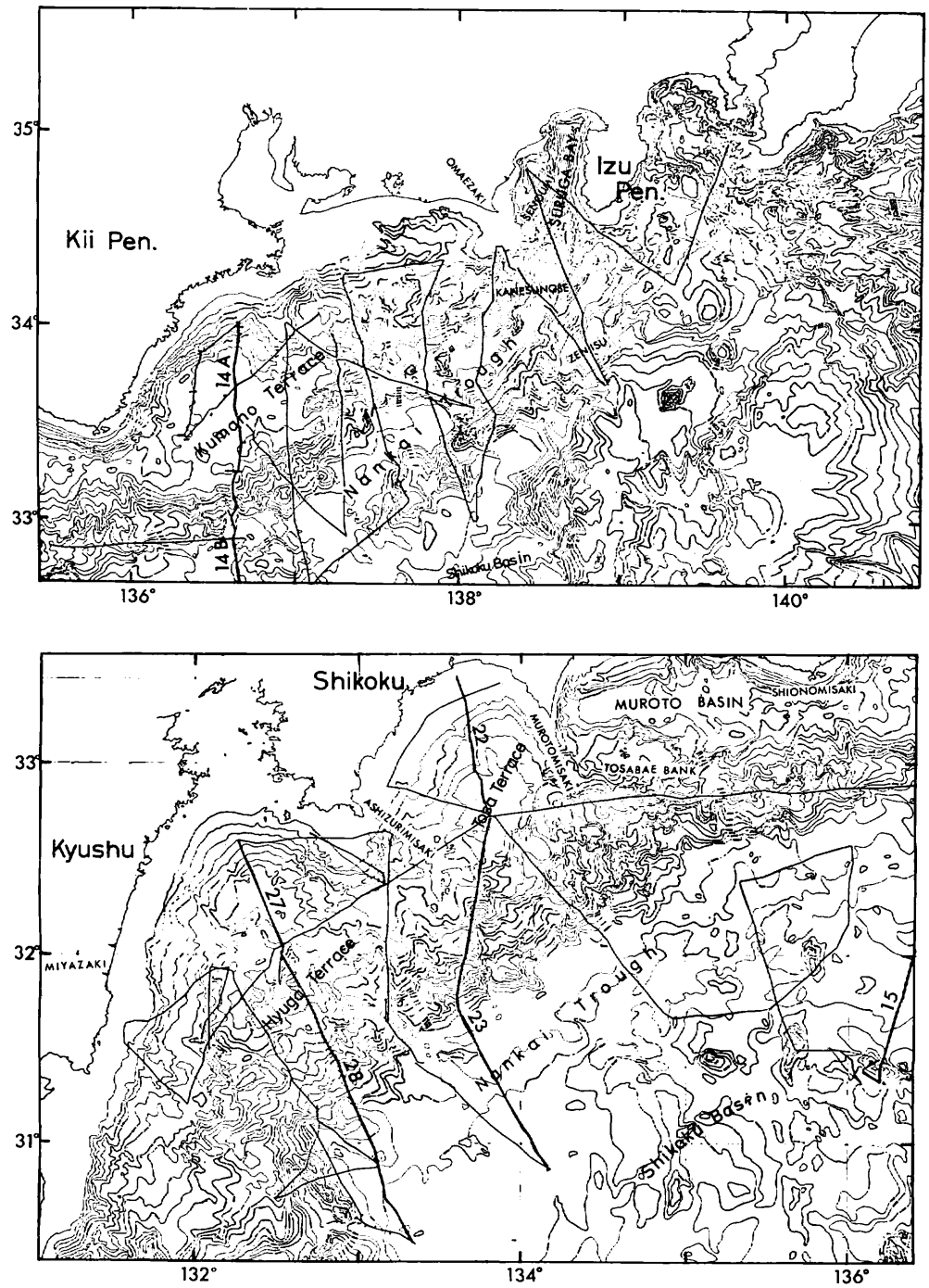

Fig. I-1 Traverse lines of seismic reflection survey during GH75-4 cruise. Thick lines numbered are profile lines of Figure I-2.

and sections crossing the slope shows that the canyons are trough-like. The trends of the small ridges and troughs obliquely cross the trends developed in the uplifted zone and slope and these show the complex characteristics of the development of canyons and small grooves.

An uplifted zone inside the Kanesunose uplifted zone extends from a spur off Omaezaki to the oceanward side of the Muroto (Toki) Basin through the inside of the outer margins of the Kumano Terrace and the upper slope flank off Shionomisaki. This uplifted zone is named the Omaezaki uplifted zone. The top of the zone is composed of sediments of the T formation of Miocene age, which have been deformed– the deformation is more pronounced toward Omaezaki. The T formation is correlated with the consolidated mudstone dredged from St. 362 and is overlain by the K formation with a clinoun-conformity in the region of the uplifted zone, where the K formation transverses the basin formed by earlier deposits. Therefore, the uplifted zone may have been formed before the deposition of the K formation.

Piston coring at St. 377 and St. 363, including the presence of coarse sediments with many plant and shell fragments, is indication of shallow facies, which are tentatively correlated to the K formation.

A small uplifted zone below the central part of the basin extends from the Shima Spur to near the Shionomisaki–Kumano outcrop of acidic rocks. Therefore, the ridge may be closely related to this intrusive activity and is termed the Shionomisaki uplifted zone.

The sediments filling the interridge basin are developed from Enshu-sea to the Kumano Terrace and increase in thickness toward the Kumano Terrace.

A thick sedimentary sequence is present in the Nankai Trough. In the shallower part of the Nankai Trough which extends from Suruga Bay to the outside of the Enshu-sea area, the upper turbidite abuts against small grabens formed in the lower sedimentary layers, and small channels are developed between the grabens. The upper turbidite layer extends into the deeper, western part of the trough at a depth of 4000 m. The lower, thick sedimentary layer is noticeably folded. The Zenisu ridge south of the Nankai

Table I-1 Conditions of seismic reflection survey.

1) Equipment		
Air Gun	Bolt Par Air Gun 1900 B	
Compressor	Norwalk APS-120	
Firing Circuit	Bolt FC-4	
Controller	Oyogiken AE-391 Firing Controller	
Receiver	Teledyne Hydrostreamer Cable Model 24257	
Amplifier	Teledyne Amplifier System Model 24220	
Recorder	Raytheon UGR 196B	
2) Condition		
Volume of air gun		120 cubic inches
Pressure		1600 p.s.i.g.
Shot interval		12 sec
Filter range		30–100 c/s
Record range		4 sec
Record system		Pulse delay start-stop system
Ship speed		10–13 kt
Towing length of air gun		30 m
Towing length of hydrophone		160 m

Table I-2 Stratigraphic correlations in the area studied.

Age		Formation	Shikoku	Kii Peninsula	Continental Shelf	Continental Slope	Toki Basin	North Slope of Tosabae	Tosabae Bank
Quaternary	Recent	Re			Surface	Surface	Basin Sediments (Turbidites)	Surface	Surface
	late Pleistocene	P	Terrace Deposits	Terrace Deposits		Canyon Fills		Canyon Fills	
	early Pleistocene	K_3			Shelf edge Sediments	Slope Sediments	Basin Sediments	Slope Sediments (Sliding)	Topped Sediments Terrace Deposits
Neogene Tertiary	middle ∫ upper Pliocene	K_2	Tonohama Group		Shelf Sediments	Slope Sediments	Basin Sediments	Slope Sediments	Topped Sediments Terrace Deposits
	upper Miocene ∫ middle Pliocene	K_1				Low level Slope Sediments	Basin Bottom Sediments	Low level Slope Sediments	
	lower ∫ middle Miocene	Tanabe	Shijujiyama Group	Tanabe Formation	Acoustic Basements	Acoustic Basements	Acoustic Sediments	Acoustic Basements	igneous intrusive body

Table I-3 Tentative correlation of stratigraphy between off-shore and on-land.

		Stratigraphy on land			Acoustic stratigraphy		DSDP data
		Kyushu	Shikoku and Kii	Kakegawa	Continental slope	Nankai Trough and Shikoku Basin	Site 297, Shikoku Basin
Quaternary	Holocene				P Formation	Upper opaque layer	Diatom Ash-rich Clay
Quaternary	Pleistocene			Soga Group			Clay-rich Nannofossil ooze
Neogene	Pliocene	Miyazaki Group	Anauchi F. Nobori Form.	Kakegawa Group	K Formation	Upper Transparent layer	Claystone
Neogene	Miocene			Sagara Group		Middle Opaque layer	Terrigineous Turbidites
Neogene	Miocene				T Formation	transparent Lower Opaque layer	Volcanic-rich Clay
Neogene	Miocene	Sakatani G.	Tanabe Formation	Saigo Form.			
Neogene	Miocene	Nichinan Group	Muro Group	Kurama Form.	M Form. (acoustic basement)	Acoustic basement	Basement (Olivine basalt)
Paleogene	Oligocene			Horai Group			

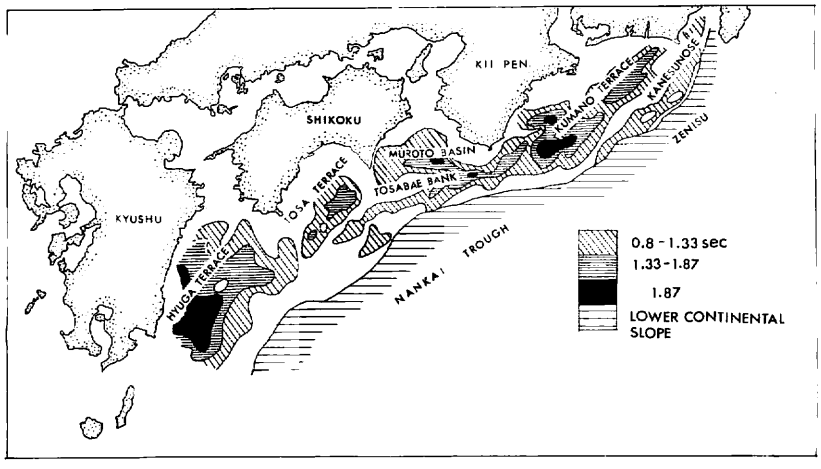

Fig. I-3 Isopach of upper Neogene and Quaternary sediments on upper continental slope.

Trough is composed mainly of acoustic basement, which is correlated with the igneous rocks dredged from St. 361. The top of the ridge is partly covered with a relatively thin veneer of sediments.

The lower turbidite layer in the Shikoku Basin dips northward parallel to the surface of the acoustic basement. The southern limit of its distribution is around St. 364 where basement olivine basalt was dredged. In this area the top of the turbidite layer is approximately 2000 m shallower than in the northern part of the Nankai Trough. This suggests that the northern part of the trough may have undergone some subsidence since the deposition of the turbidites.

Muroto (Toki) Basin and Tosa Terrace (Fig. I-2B)

The Kanesunose uplifted zone described above extends to the eastern slope of the Muroto Knoll through the southern part of the Tosa Terrace. The Omaezaki uplifted zone extends towards Murotomisaki Point and then trends southwest to form the main ridge of the outer structural dam of the Tosa Terrace. The Shionomisaki uplifted zone trends through the northern part of the Tosabae Bank, towards Murotomisaki Point and forms the inner part of the outer margin of the Tosa Terrace.

Although the Shionomisaki uplifted zone and the other uplifted zones diverge in the Kumano-sea areas, the three uplift zones converge at the Tosabae Bank and then extend to the outer ridges of the Tosa Terrace through Murotomisaki Point. At the top of the Tosabae Bank, a small graben is developed in an E-W direction between the ridges, so that in this area the Muroto Basin and Tosa Terrace have a simple form of basin.

In this area, the clinounconformity between the T formation and K formation is present.

The lower turbidite layer and acoustic basement in the Shikoku Basin dip northward and continue beneath the flank of the continental slope.

Hyuga Terrace (Fig. I-2C)

The Outer ridge of the Tosa Terrace is terminated off Ashizurimisaki Point. In this area a normal fault downthrown to the east and striking NNW-SSE from the Shimanto River east of Ashizurimisaki Point is present. This fault can be traced south to a depth of approximately 1000 m. West of the fault, three basement uplifted ridges strike in a NNE-SSW direction parallel to the Volcanic line between Mt. Aso and Mt. Sakurajima, namely, the trend of the Ryukyu Arc, and extend to the northern part of the Hyuga Terrace. Inside the ridge, there is a thick sedimentary basin.

If the Kumano acidic intrusives and the Ashizuri granitic rocks are the same, the Shionomisaki uplift zone is clearly discontinuous. The boundary of this discontinuity has a NNW-SSE trend and its extension can be correlated with a west dipping basement fault in the Shikoku Basin.

The unconformity between the K formation and T formation is also observed on the outer ridge of the Hyuga Terrace, where shallow sediments correlated with the K formation were obtained from St. 371. Consolidated tuffaceous mudstone correlated with the T formation were dredged from St. 372.

Recent turbidites are poorly developed in the Nankai Trough off the Hyuga Terrace.

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