

XII. A DETAIL SURVEY AROUND THE OKI ISLANDS IN THE JAPAN SEA

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The surveyed area is located in the foot of the Oki Spur which consists of a high with N-S direction from the Shimane district, separating the Tsushima Basin to the west and the Yamato and Oki Troughs and Ridge to the east. Almost whole of the surveyed area are covered by the continental shelf. Bottom topography on the shelf is rather smooth and flat and tends to deepen toward the north. The slight slope of the bottom in the southern shallower side is well extended downward to the north side of the Oki Islands which form the interruption to the sloped plains of the both sides of the Islands. The bottom topography of the shelf edge is not clearly distinguished in the western side of the spur where the floor on the shelf is gradually deepened to the continental slope. The continental shelf along the coast of the Honshu is narrow in the western and eastern margins of the surveyed area.

Neogene and Pleistocene sedimentary and volcanic rocks are distributed along the coast of the Shimane and Tottori district in the southern margin of the area. Neogene and Pleistocene volcanic rocks, Miocene sedimentary rocks and Paleozoic or older gneiss are distributed on the Oki Islands.

Continuous seismic reflection profiling surveys were carried out along the ship's tracks shown in Fig. I-2. Two energy sources were used during the survey. The one was two BOLT PAR 1900 B air gun with 240-cubic inches (3960 cm³) firing chambers in total operated at a pressure of 1700 psi (approximately 115 kg/cm³). The other supplementary sound source was a sparker (NE 17-B Geo Souar) operated at the energy of 10000 Joules. Receiving system is the same with that mentioned in the former chapter.

Four layers are distinguished in the continuous seismic reflection profiles (Fig. XII-1). One more layer on the upper most horizon is distinguished in 3.5 kHz PDR, which cannot be observed in the seismic reflection profiles. It depends on the resolution of the profiling systems that the profiles of 3.5 kHz PDR has a high resolution than that of seismic profiles.

The upper most layer (A) in the profiles of 3.5 kHz PDR prevails almost in the whole of the surveyed area and show a transparent pattern in the profile. The layer tends to increase with the thickness toward the outer margin of the shelf, and is deformed by the slumped sedimentary structure on the upper steep slope.

The second layer (B) which is the upper most layer in the seismic reflection profiles is a horizontal layer and shows the maximum thickness of 0.4 sec (approximately 300 m) on the shelf in the Oki Strait and of 0.6 sec (approximately 450 m) on the outer shelf of the area. The layer in the eastern side of the upper most part of the slope is eroded out where the layer is suggested to be upbuilt on the outer part of the shelf. The layer in

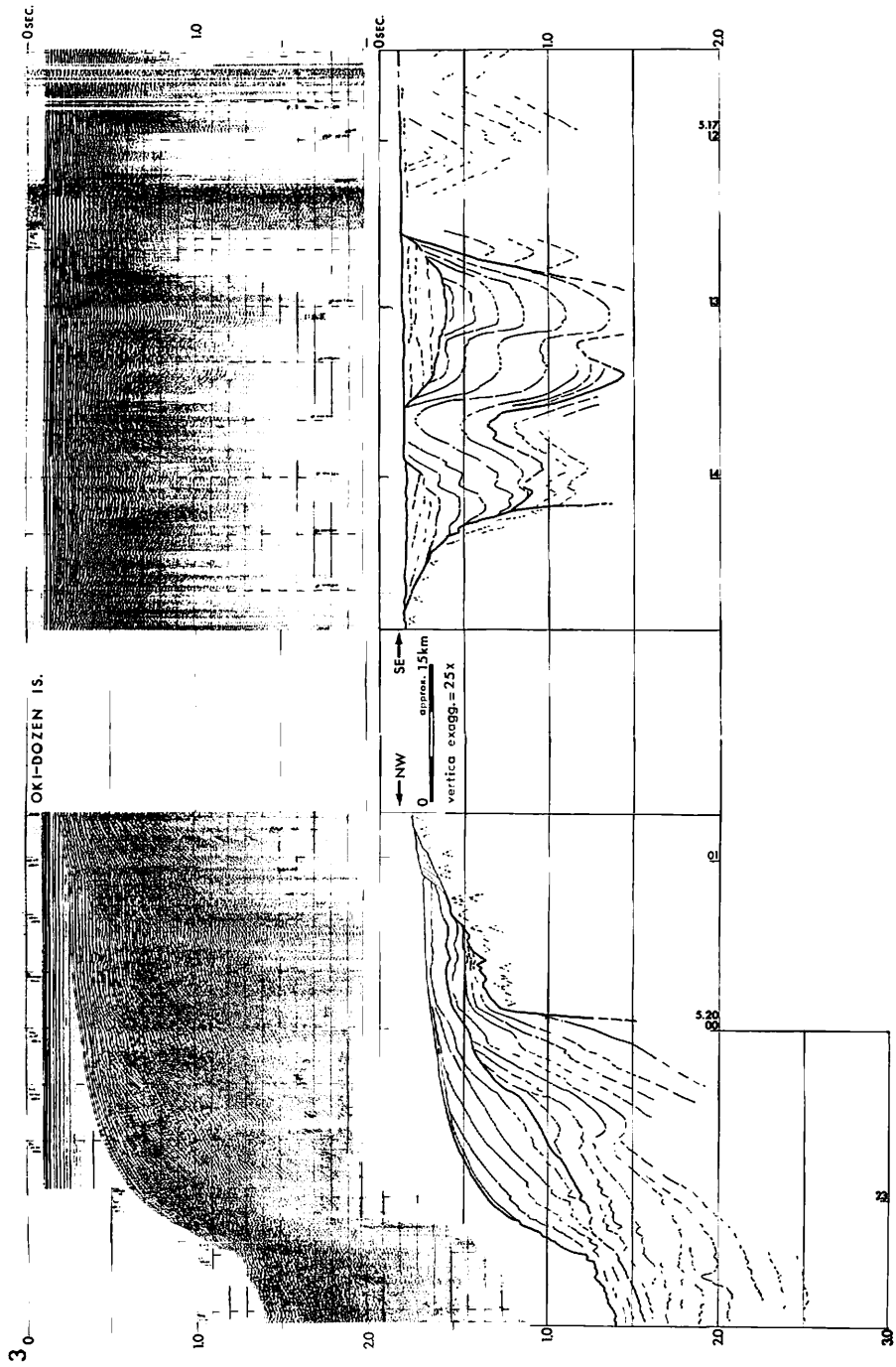


Fig. XII-1 (A) A continuous seismic reflection profile (L-3) in the offshore area of the Shimane and Oki Islands.

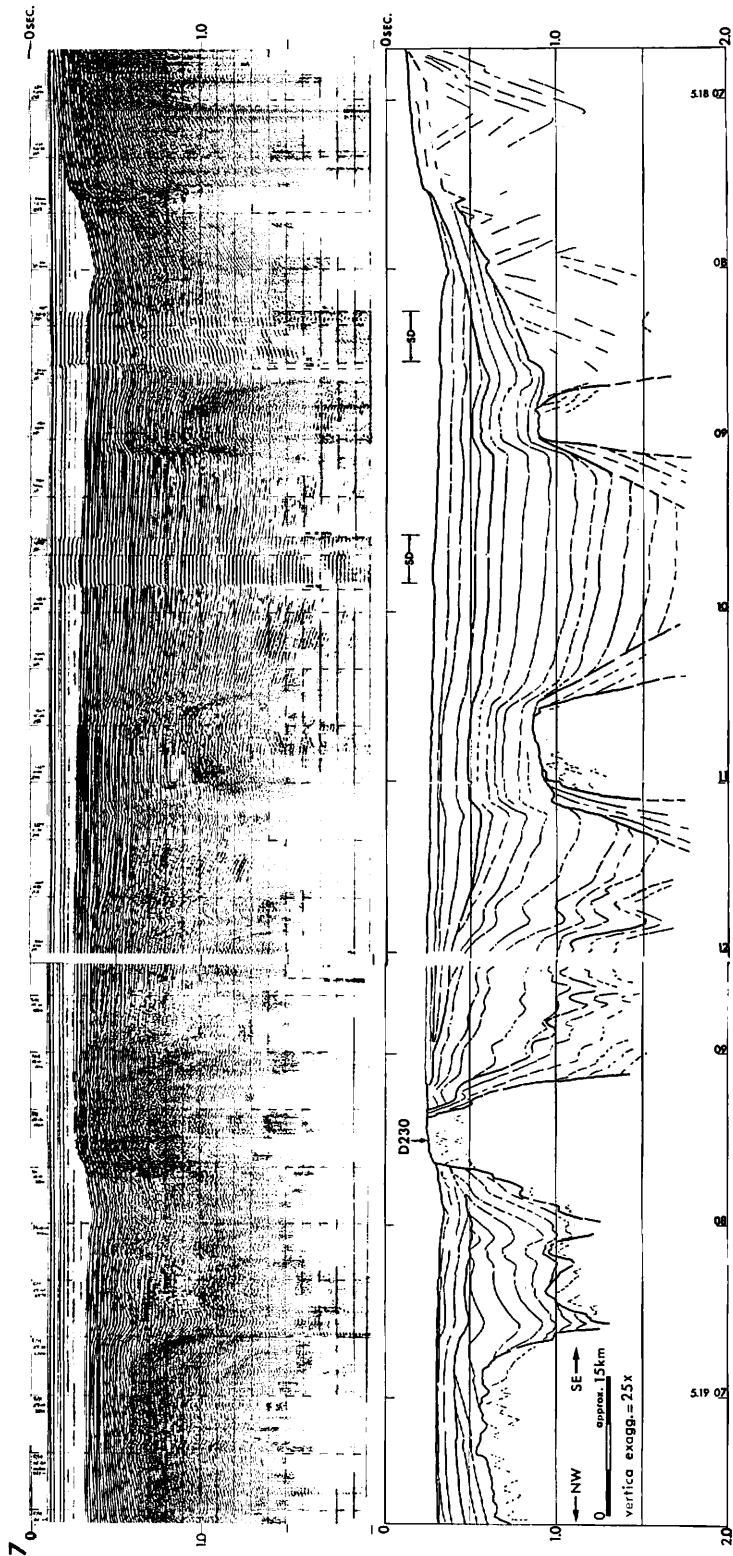


Fig. XII-1 (B) A continuous seismic sparker profiles (L-7) in the offshore area of the Shimane and Oki Islands.

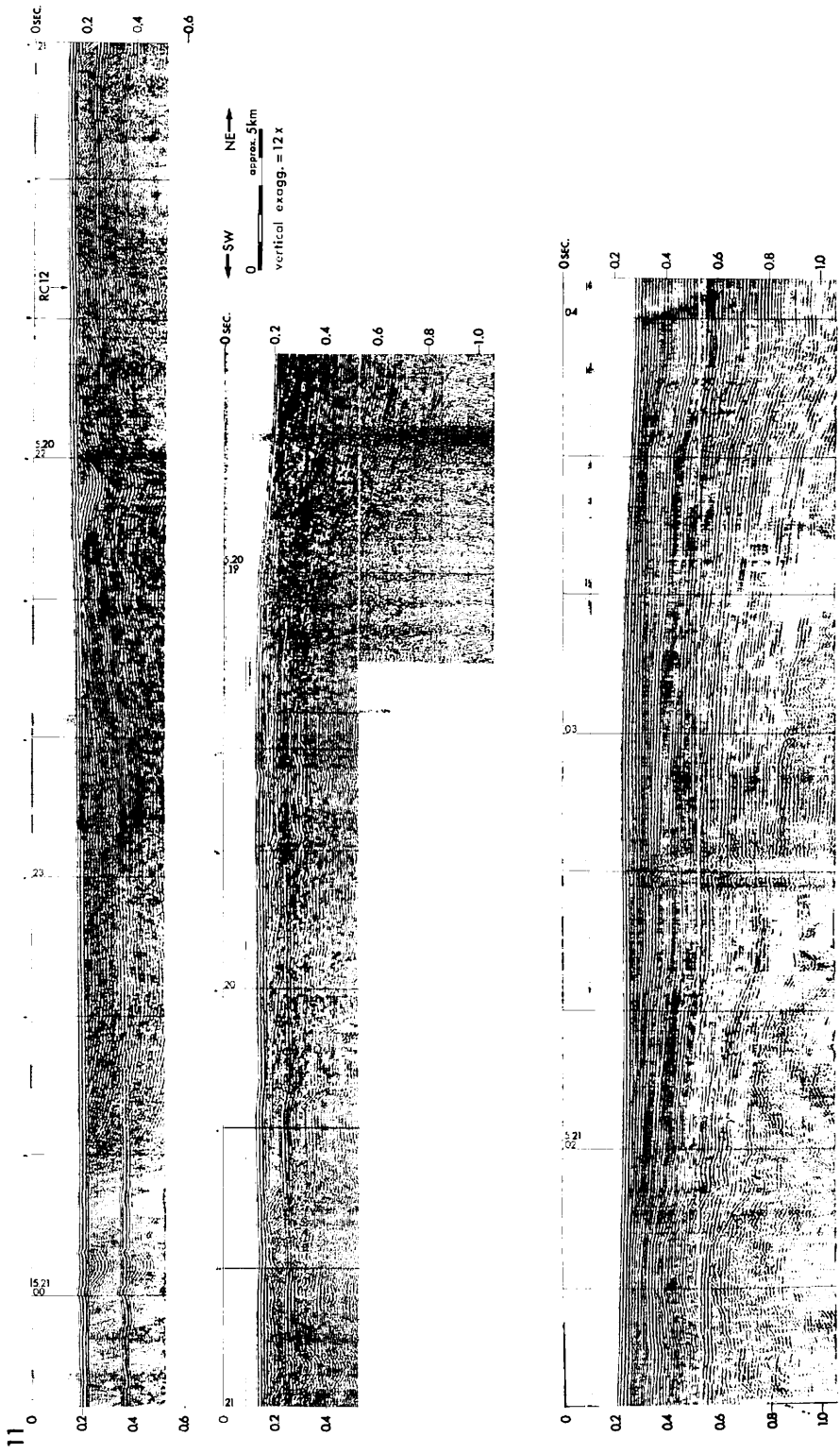


Fig. XII-1 (C) A continuous seismic sparker profiles (L-1) in the offshore area of the Shimane and Oki Islands.

the western side of the shelf shows a progradated deposition from the outer shelf to the upper most part of the slope and thins in the foot of the transition part toward gentle slope.

The third layer (C) is a stratified and folded layer which is widely distributed in the surveyed area. The layer has a maximum thickness with approximate 1.5 sec in the Oki Strait and thins out on the coasts along the Honshu and Oki Islands.

The fourth layer (D) is a remarkably stratified and folded layer and exposed along the coasts of the Honshu and Oki Islands.

The fifth layer (E) shows a massive or vaguely stratified pattern and is distributed dominantly around the Oki Islands. Stratigraphic relation with the layer D is not clear. Partly the layer shows the intrusive feature or overlain by the layer D, which suggests that the layer is partly consisted of the igneous origin.

The layers A and B are correlated to Quaternary from the micropaleontological works (Appendix I). Especially, the layer A is correlated to Holocene. The layer D is correlated to Miocene which also is suggested in the extension of the shore areas where thick Miocene sediments are distributed. No diatom or foraminifera were observed in the sampled layer C of the area, however, megafossils in the layer which is suggested to be correlated to the layer C to the west of the area are correlated to Pliocene. It suggests

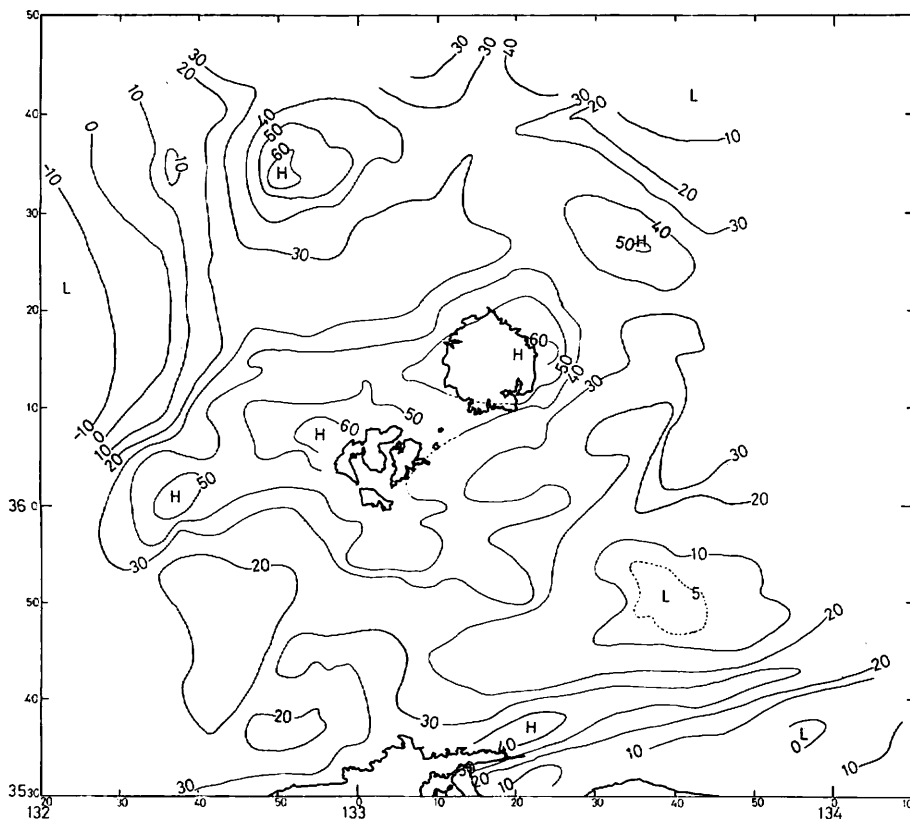


Fig. XII-2 Free air gravity anomaly in the offshore area of the Oki Islands (in mgal).

that almost of the layer C is correlated to Pliocene.

The layers C, D and E are partly exposed on the sea-floor along the uplifted zone. The wave length of the folded axis is approximately 10 to 15 nautical miles and suggested to be caused by block movements with the trend of NEE to SWW. Dominant structural movements in the area are suggested to have occurred during and since the deposition of the layer D. The upper layers of C, B and A are distributed rather horizontally on the strongly deformed layer D.

Dominant structural trend is suggested to be along the high of the Oki Spur, with N-S direction, however, the structural trend of the area is superimposed by the NEE-SWW direction which is the same direction as the extension of the Oki Islands and of the Shimane Peninsula.

The sampled results are listed in the stationary observations in Table I-4. Sediments on the continental shelf are mostly consisted of sandy material which oftenly are contained by pebbles and shell fragments. Volcanic rocks outcrops in the Oki Strait and in the shallower part around the Oki Islands.

Several high anomalies of the free air gravity are observed in the surveyed area which reach approximately 60 mgal in maximum (Fig. XII-2). The high anomalies around the Oki Islands and the eastern offshore extension of the Shimane Peninsula are suggested to be caused by both the topographical and basements highs. Some of other high anomalies are suggested to be caused by the uplifts of the basement layers which are resulted in the reflection profiles, however, some of them are not correlated to the dense material in the reflection profiles. These anomalies may be caused in the deeper material which exceed the penetration depth of the reflection profilings.