XII. RESULTS OF A DETAILED SURVEY OF THE JAPAN TRENCH AND SLOPE AREAS OFF MIYAKO

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A detailed survey was carried out over the slopes of the Japan Trench east off Miyako. The tracks were selected to cross perpendicular to the slope trend and trench axis at intervals of every 5 nautical miles in the area of 39°10'N to 40°00'N latitude, 143°10'E to 144°45'E longitude. The surveyed area coveres the lower continental slope, inner trench slope, trench bottom and outer trench slope.

Bottom Topography

The major topographical trend is approximately parallel to the trench axis and is a little oblique from a N–S direction. The trend also shows a little different features in each area, which may be due to changes in the regional tectonic characters, as a distinct block structure is observed in the axis of the trench (Fig. XII-1). The trench axis occurs as a straight line over a limited distance and abruptly changes its direction in neighbouring blocks. The continental and trench slopes in the northern block are characterized by a gradual deepening toward the trench, while those slopes in the southern block are characterized by relatively steep walls and a terrace. Steep walls are observed at depths of 3,600 m to 4,600 m and 5,000 m to 7,000 m and a terrace occurs at a depth of 5,000 m to 5,400 m. A narrow terrace is suggested in the northern block which is a little shallower in comparison with the southern one. The horst and graben structure in the outer trench slope has a oblique trend to the trench axis and extends several to tens of nautical miles. This feature is also noted in the topographical profiles mentioned earlier. The parallel strike of the trench axis to the trend of the horst and graben structure over a distance of a several nautical miles is observed in the northern middle part of the surveyed area.

Subbottom Layers and Structure

Several distinct reflectors and layers are distinguished in the continental slope of the area. The upper most layer (A) has a slightly alternated pattern. The second layer (B) has densly alternated pattern. The third layer (C) has a massive to vaguely alternated pattern. The fourth layer (D) has a densly stratified or massively opaque pattern in the upper-most part and a slightly alternated or transparent pattern in the lower part.

The layers on the inner trench slope have no reflective pattern, except on benches where thin sediments are ponded among small ridges (Fig. XII-2). The layers in the outer trench slope and the Pacific floor consist of the transparent and opaque layers (acoustic basement). Almost all of the profiles of the trench bottom show that it is V-shaped with a small amount of terrigenous sediment. The terrigenous sediment in the trench bottom were observed only in one profile (L. 17) where the densly stratified layers rest on pelagic sediments in the narrow, smooth trench bottom. One more possible occurrence of terrigenous sediments is suggested in a depressed part near on antithetic fault in the lower

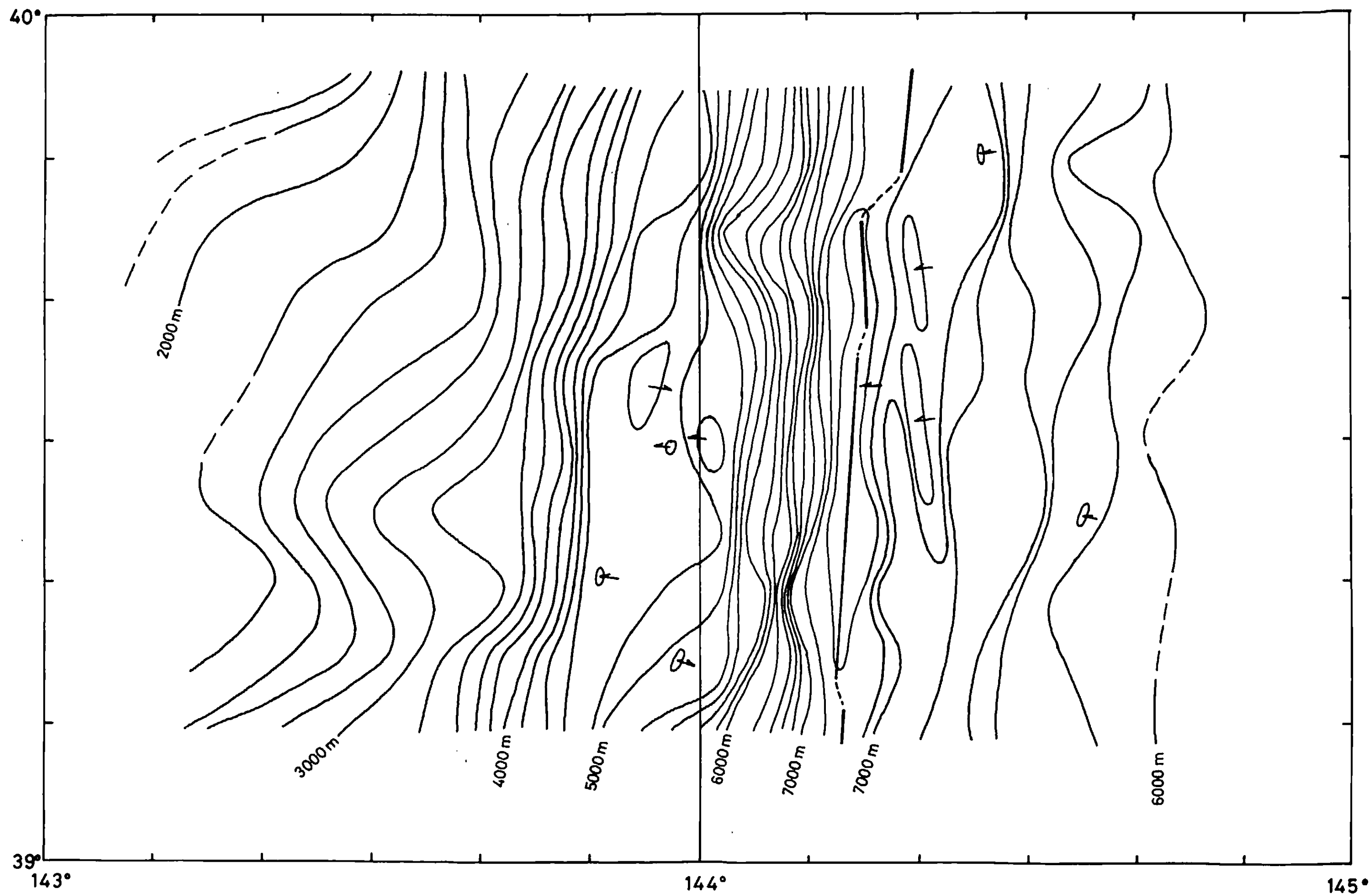

Fig. XII-1 Bathymetry of the detailed surveyed area off Miyako. Contour intervals are every 200 m (corrected). The heavy straight line shows the trench axis in which the converging point of the oceanic basement with the foot of the inner trench slope is represented by the smooth trench bottom.

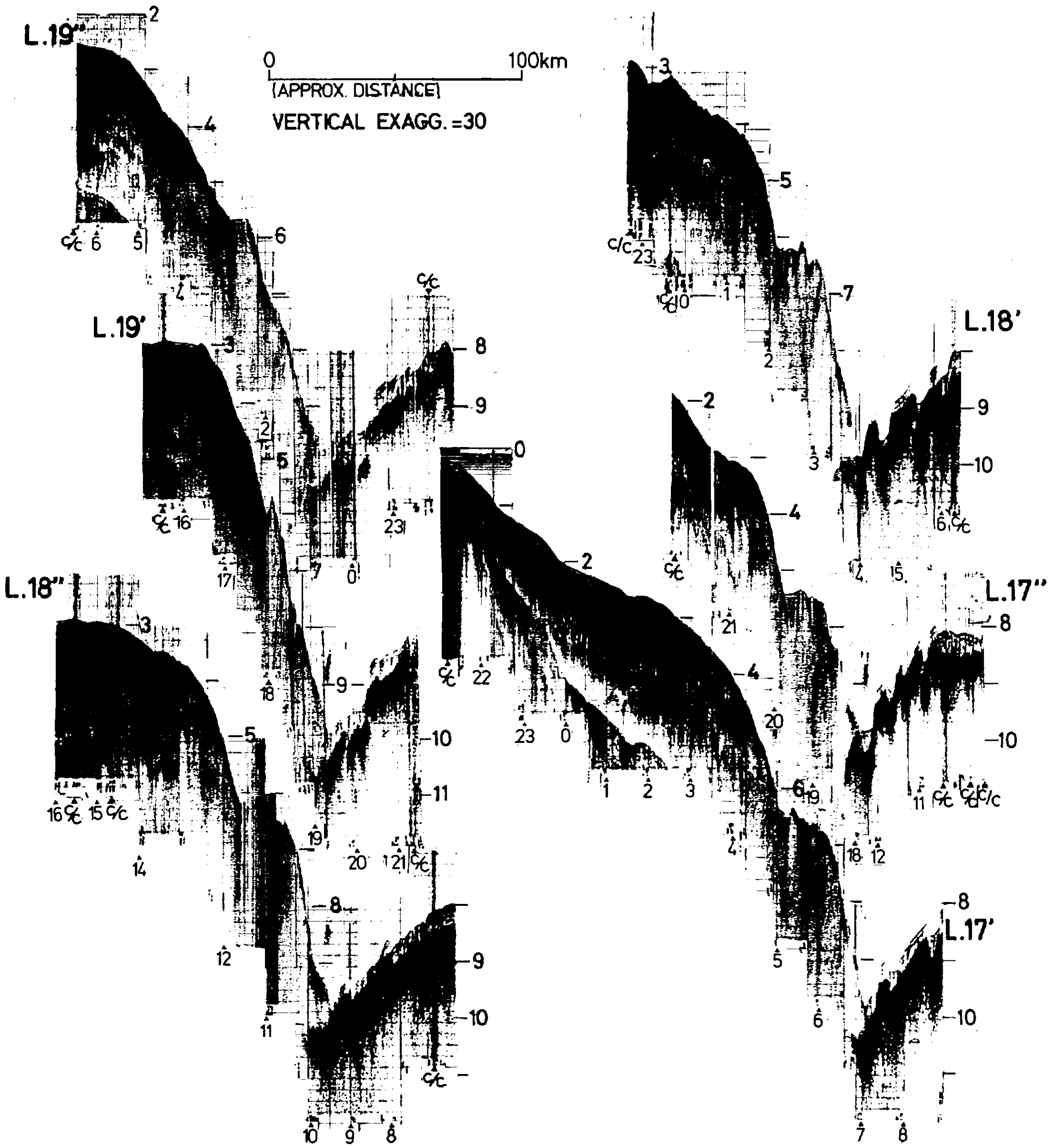

Fig. XII-2 Continuous seismic reflection profiles. The profiles L17–L20 are illustrated in Fig. VI-1.

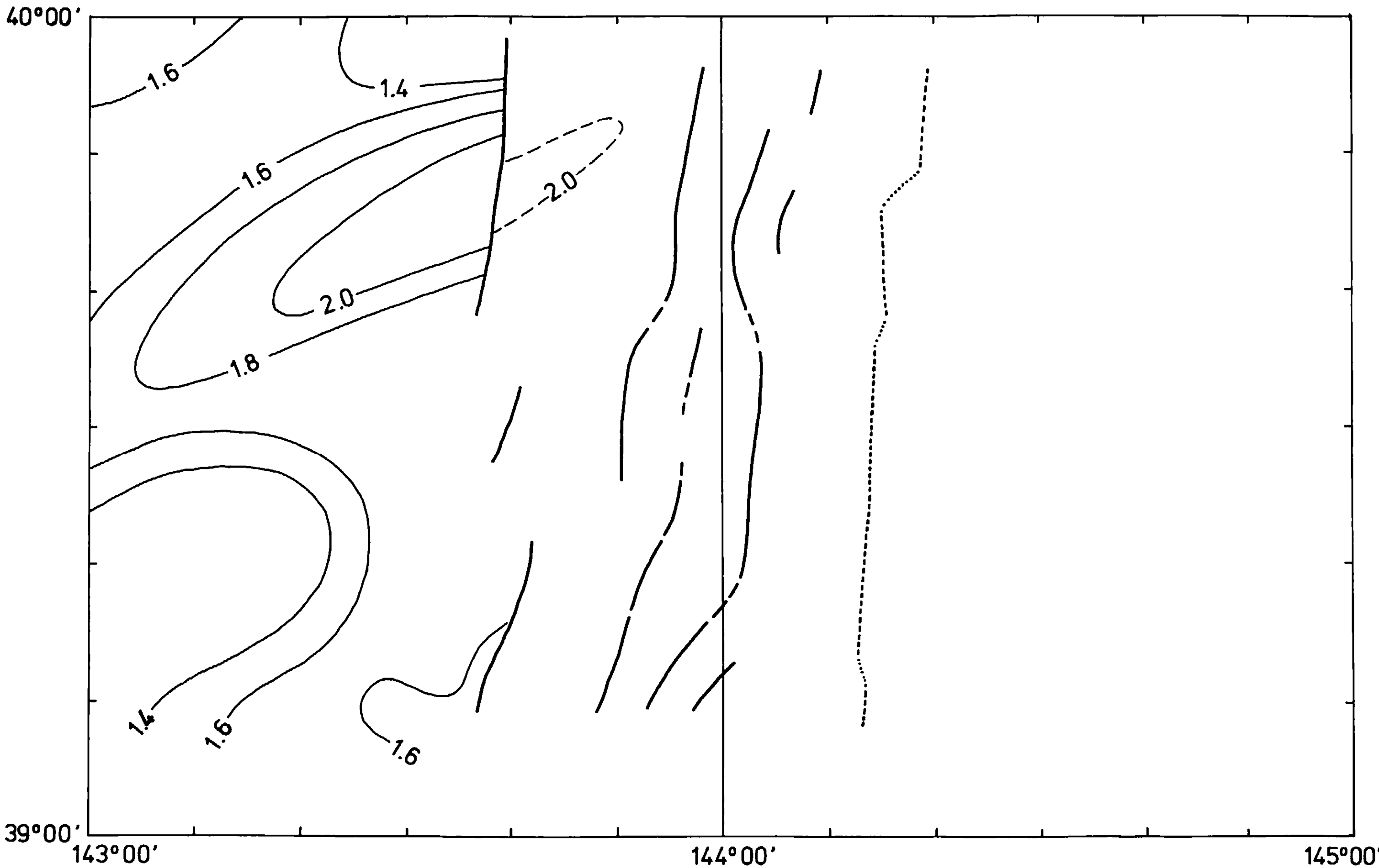

Fig. XII-3 Isochronal contour map of the Neogene and Quaternary sediments and faults which are developed in the inner trench slope. The base of the Neogene sediments is estimated from the stratigraphical data by Honza (1976), Ishiwada (1974) and Sakurai *et al.* (1975). Dashed line shows the axis of the trench bottom.

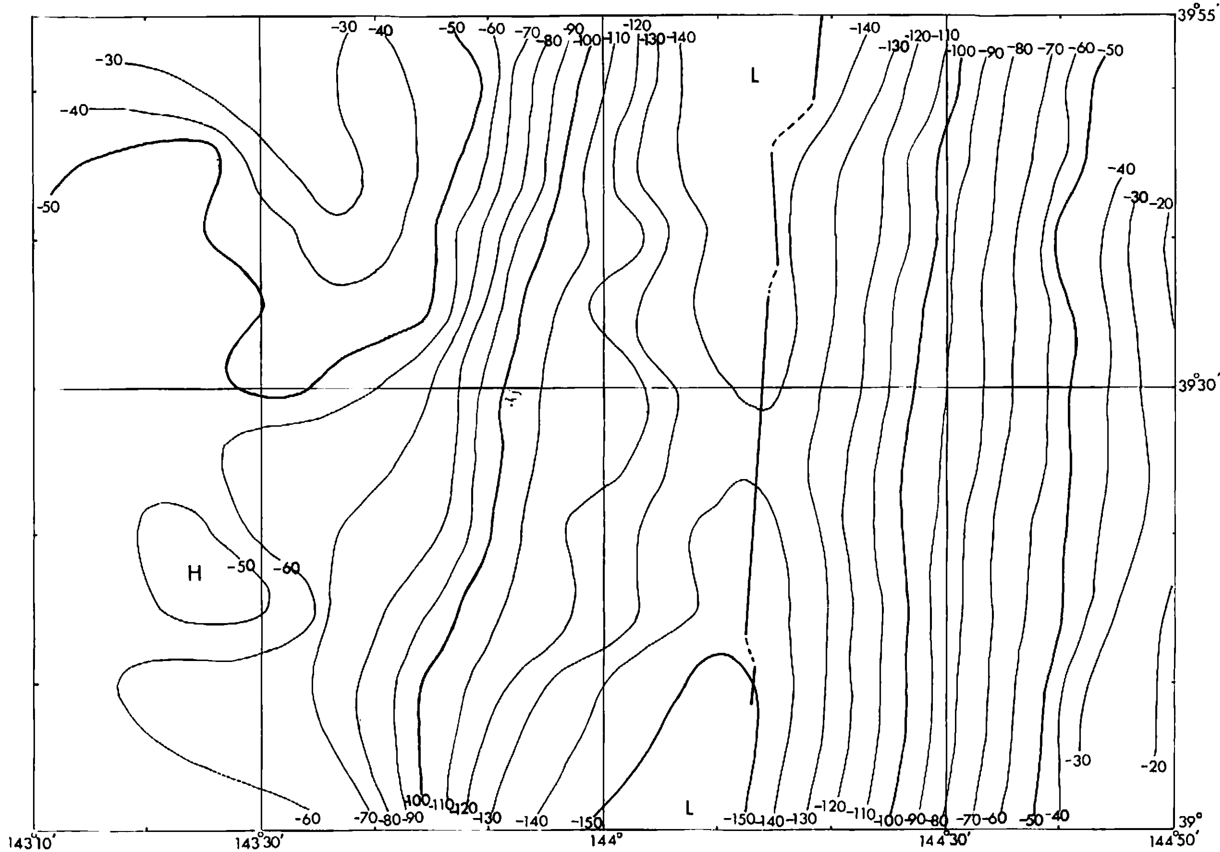

Fig. XII-4 Free air gravity anomalies. Contour intervals are every 10 mgal. Straight lines show the trench axis.

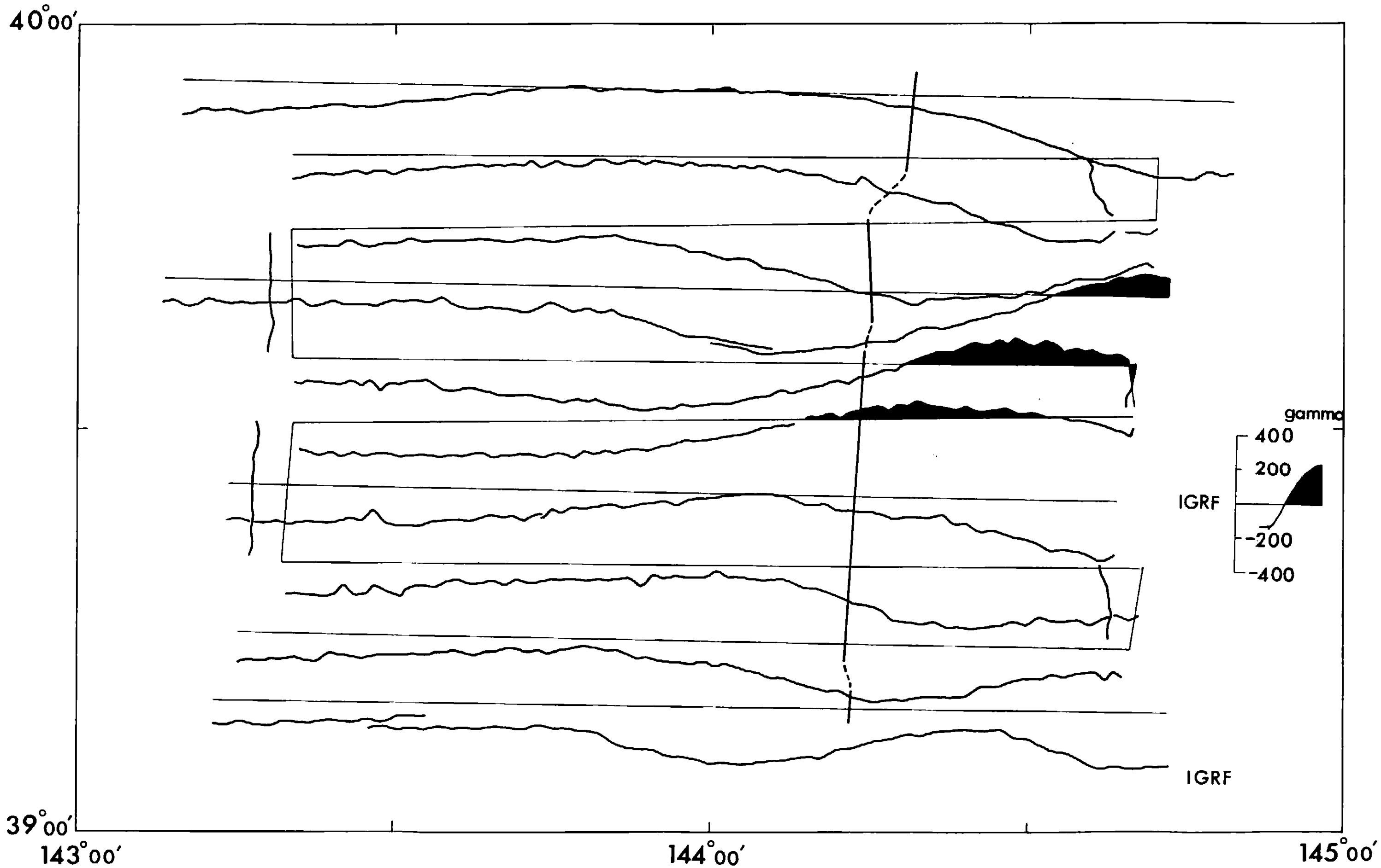

Fig. XII-5 Geomagnetic anomaly profiles. Long ranged anomalies in the oceanic area extend to a little inside of the trench axis.

part of the outer trench slope of profile L. 18′ where stratified layers are observed. The possible distribution of terrigenous sediments in the foot of the outer trench slope is suggested in Peru-Chile Trench (PRINCE and KULM, 1975). However, the fault is traced both to north and south in profiles L. 18″, L. 18 and L. 17″ (Fig. XII-2 and VI-1) where no terrigenous sediments are suggested in the depression. Therefore, the sediments may be the derived from the neighbouring pelagic material by subaerial ersion caused by faulting deformation.

Terrigenous sediments on the continental slope are slightly deformed by gentle folding. The ages of the sediments are correlated from previous work (HONZA, 1976; ISHIWADA, 1975; SAKURAI *et al.*, 1975) and by HASEGAWA and others in this paper. Neogene and Quaternary sediments thin both toward the upper continental slope and inner trench slope. Presumable Paleogene sediments thin out toward the uplifted high which consists of the trench slope break at the boudary of the continental slope and the inner trench slope. The sedimentary layers of Neogene and Quaternary in the outer continental slope are approximately 1.4 to 2.0 second in thickness (Fig. XII-3). The layers are bounded by faults which occur on the mid-slope of the inner trench slope, and are also deformed by faults, which occur along the trench slope break. These faults have an irregular strike along the slope, which contrasts with the trench axis which is straight. The faults, therefore, seem to be low angle overthrusts dipping toward the west.

Minimum free air gravity anomalies occur over the inner side of the trench bottom (Fig. XII-4), which suggests less dense material in the foot of the inner trench slope and

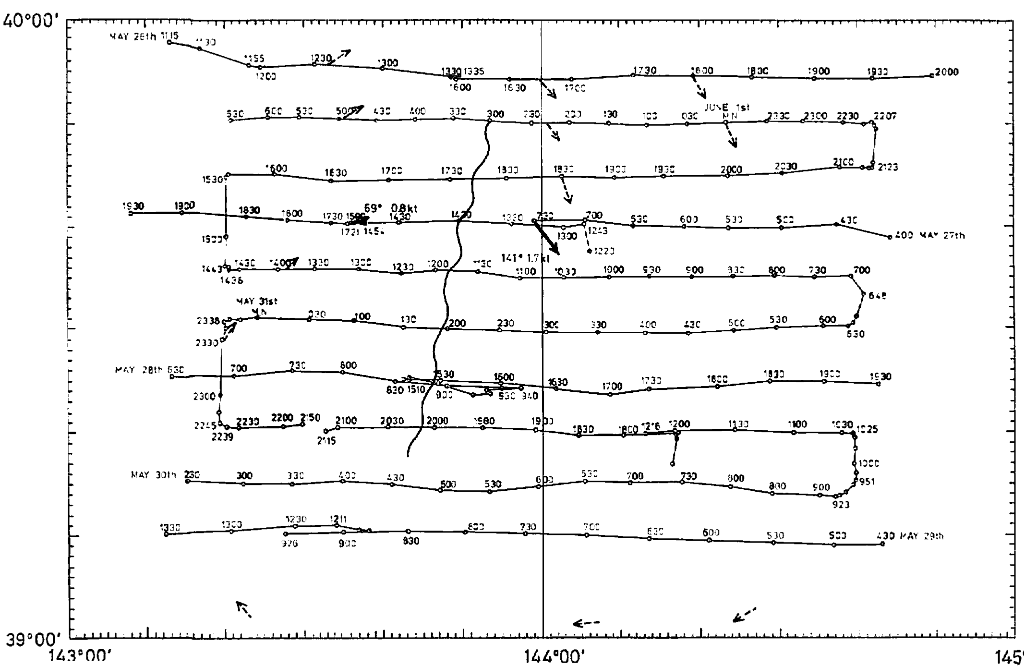

Fig. XII-6 Surface currents estimated from measurements by a geo-electric kinetometer (straight arrow) and by deductions from the drift and deviation of heading of the ship (arrow with broken line).

agrees with the accretional mechanism of pelagic soft sediments thrust up onto the inner trench slope. The results are also supported by a low seismic velocity wedge (1.9 km/s) suggested by the refraction data (LUDWIG *et al.*, 1966).

The magnetic anomalies of the continental slope are rather smooth and less anomalies appear to be present. The anomalies in the oceanic floor and over the inner trench slope have a NEE-SWW trend which is similar in that of the magnetic anomalies of the nothern Pacific basin (UYEDA and VACQUIER, 1968; LARSON and CHASE, 1972). The anomalies can be traced in the foot of the inner trench slope through the trench axis.

The surface currents in the region were measured at two sites by a geo-electric kinetometer. Some deductions of the surface current were also done from the drift of the ship during times of stationary observations and from the deviation of the heading of the ship (Fig. XII-5). The surface current is suggested to be affected by the Kuroshiro branch which changes in direction from northeast near the coast to southwest further out toward the ocean with the maximum current velocity of two knots.

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