III. 3.5 kHz ECHO SOUNDER PROFILING SURVEY

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The 3.5 kHz Echo Sounder Profiling Survey was carried out almost continuously throughout the present cruise.

The reflected signals were processed through a Raytheon CESP II (Correlation Echo Sounder Processor), and displayed on a four second sweep. The pulse length was fifty or one hundred milliseconds. The thickness of the sediments is represented in meters on the assumption that the speed of sound in the sediment is the same as that in the water.

Results of Observation

Topographically, the surveyed areas are composed of four parts of continental shelf, continental slope, trench and ocean floor, respectively.

Continental Shelf

There are very few reflectors in this area. Sometimes no reflectors can be observed by the presence of basement rocks or coarse sandy sediments (Fig. III-1). The maximum acoustic penetration is about 20 meters below the sea bottom.

Continental Slope

There are several types of acoustic patterns on the continental slope. Namely, ponded basin-like features (Fig. III-2), lenticular basin-like features (Fig. III-3), blanket-like features (Fig. III-4) and opaque patterns (Fig. III-5). Ponded basin-like features are observed in very narrow areas on the slope. The maximum acoustic penetration is about 50 meters below the sea bottom. Lenticular basin-like features are observed on the slopes where there are a few undulations with several subbottom reflectors. The maximum acoustic penetration is about 75 meters below the sea bottom. Blanket-like features are observed on the slopes where there are many undulations and have several reflectors. The maximum acoustic penetration is about 50 meters below the sea bottom.

Trench and Oceanic Floor

No subbottom reflections are observed on the inner trench slopes. In some profiles, there are flat trench bottoms and at least 20 or 30 meters' acoustic penetration is observed (Fig. III-6). The trench bottom which has an irreglar floor shows an opaque pattern (Fig. III-7) or no subbottom reflection is observed. There are several distinct subbottom reflectors on the ocean floor (Fig. III-8). The maximum acoustic penetration is about 70 meters below the sea bottom. In general, the reflectors notably decrease their intervals as approach the trench, and the continuation of individual reflectors are difficult to detect on the outer trench slope where conspicuous tectonic displacements occur (Fig. III-9).

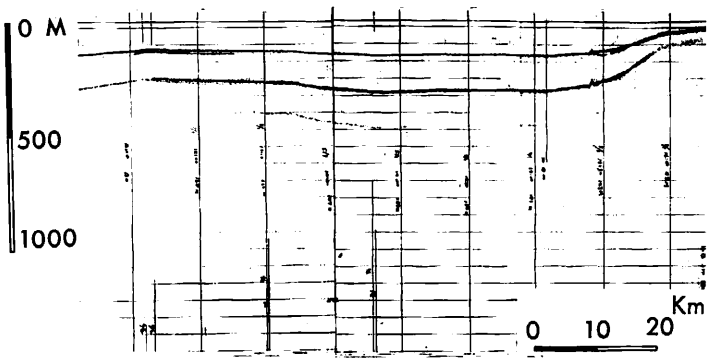

Fig. III-1 3.5 kHz record off Kamaishi continental shelf.

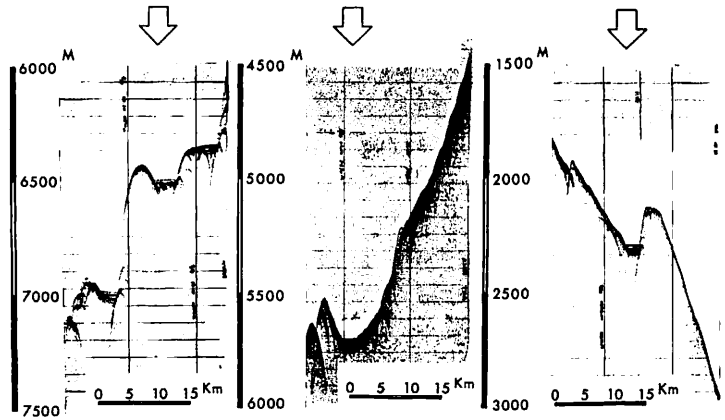

Fig. III-2 3.5 kHz records of ponded basin-like features (L44, L38 and L41).

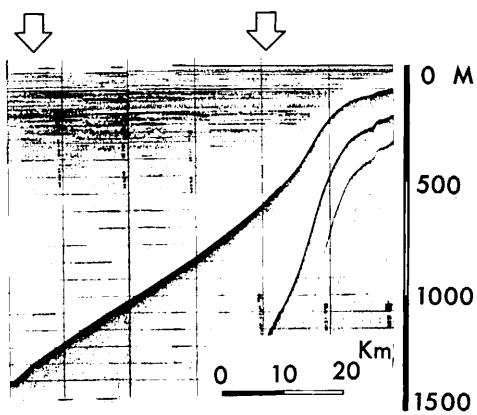

Fig. III-3 3.5 kHz record of lenticular basin-like feature (L23).

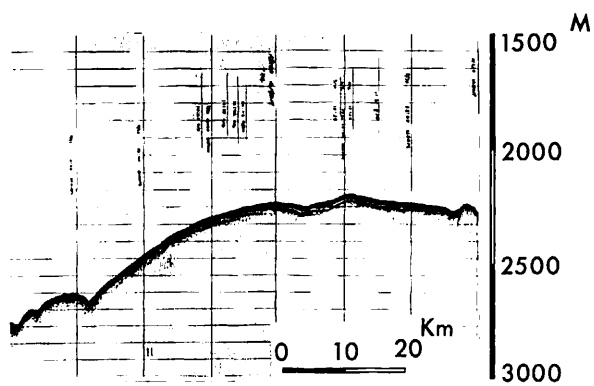

Fig. III-4 3.5 kHz record of blanket-like feature (L18–2 and L19–1).

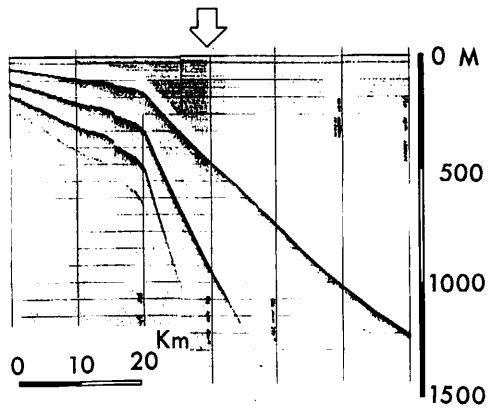

Fig. III-5 3.5 kHz record of opaque pattern (L23).

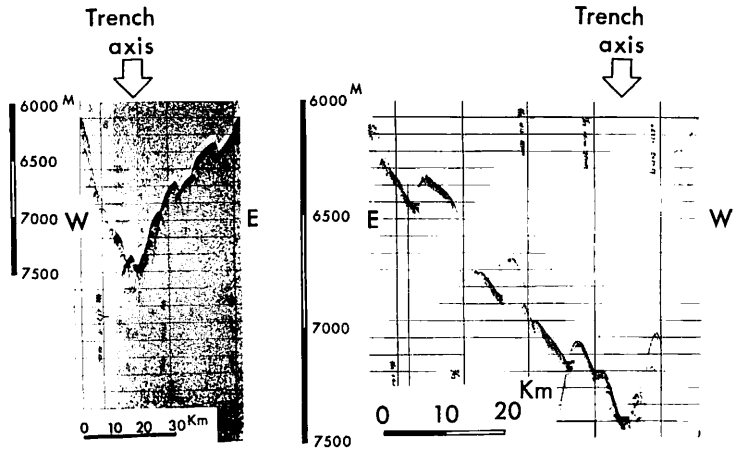

Fig. III-6 3.5 kHz records of flat trench axis [L11 (left) and L19 (right)].

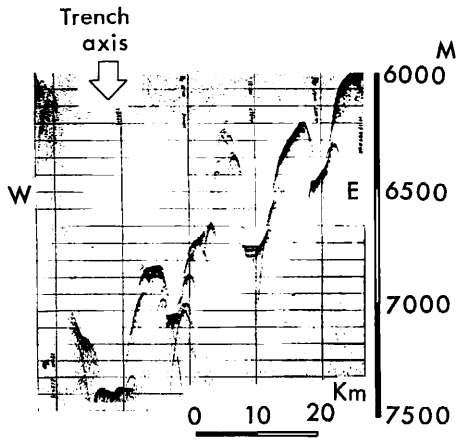

Fig. III-7 3.5 kHz record of trench axis which shows irregular floor and opaque pattern.

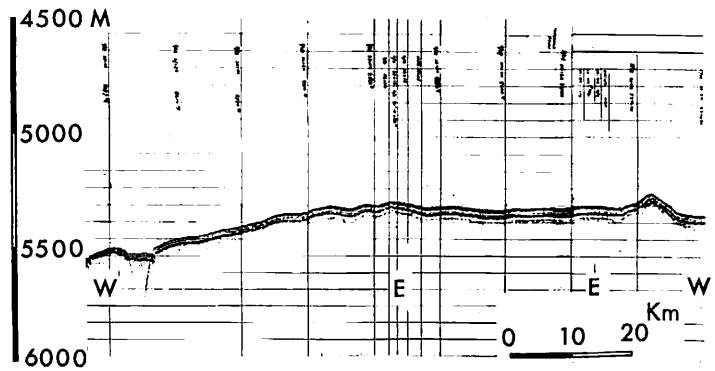

Fig. III-8 3.5 kHz records of Ocean floor [L18 (left) and L17 (right)].

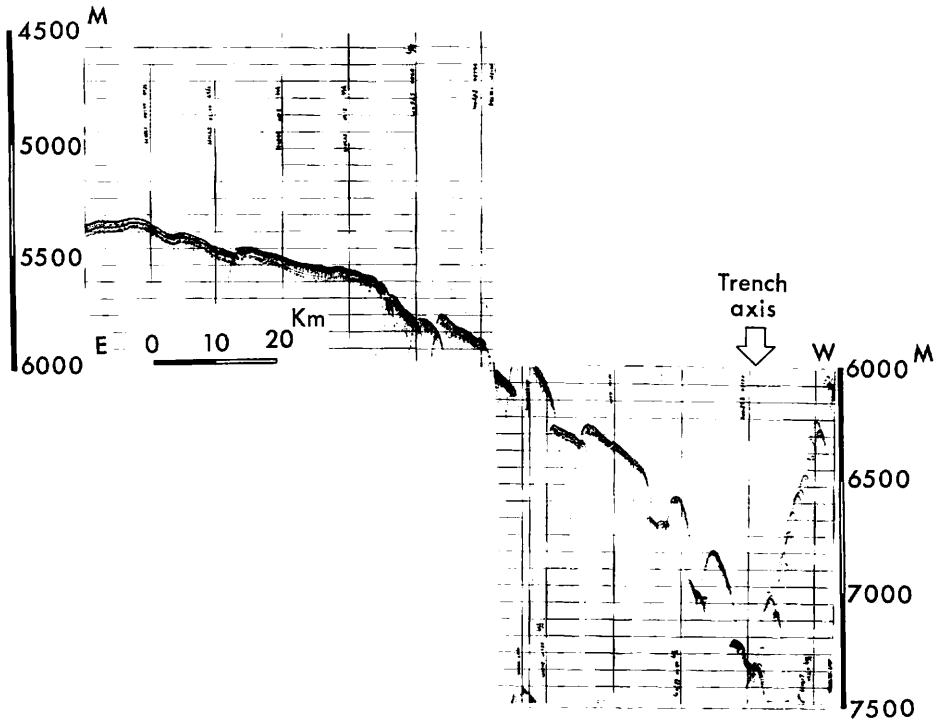

Fig. III-9 3.5 kHz record of Ocean floor and trench axis (L17).