II-3. 3.5 kHz ECHO SOUNDER PROFILING SURVEY

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The reflected signals were processed through a Raytheon CESP II (Correlation Echor Sounder Processor), and displayed on a Raytheon Universal Graphic Recorder operated at a two second or five second sweep. The pulse length was fifty or one hundred milli-seconds.

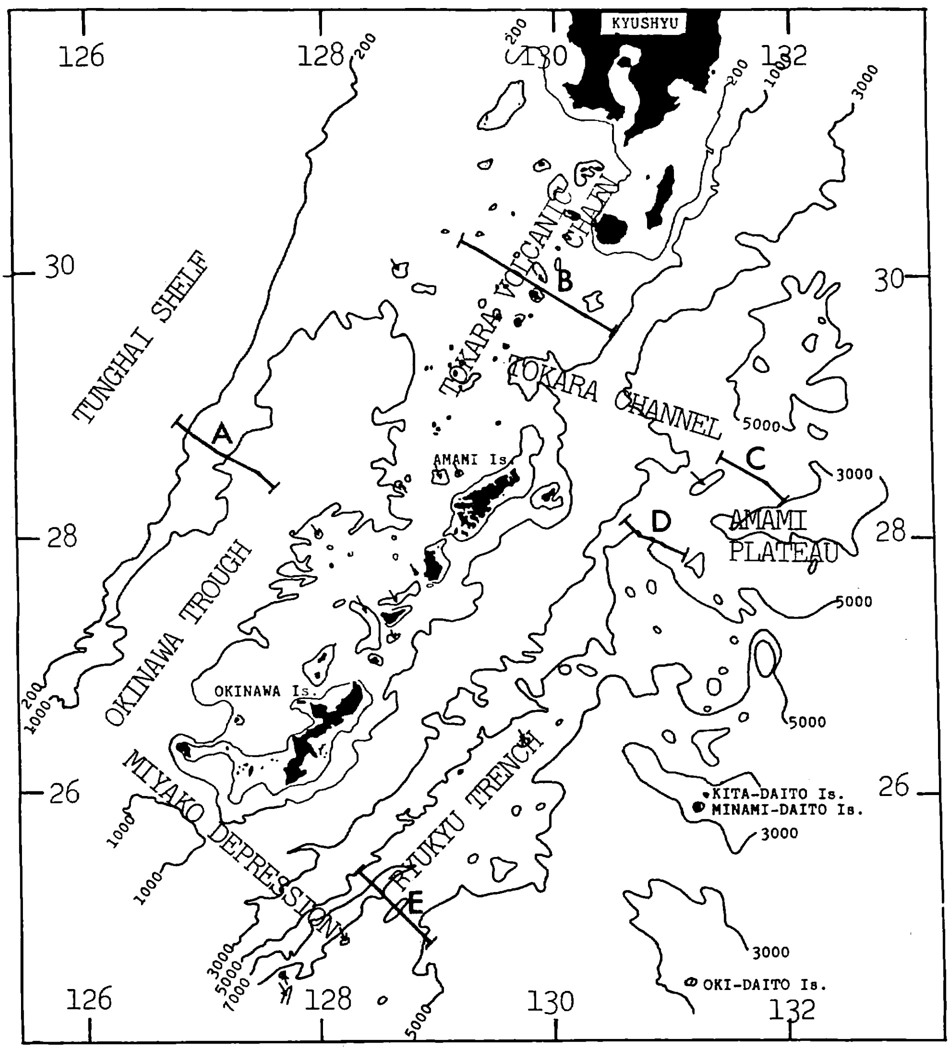

Fig. II-3-1 Location map of profiles A, B, C, D, E. Bathymetry in meters from Japanese bathymetric chart no. 6302.

Results and Preliminary Interpretations

The best acoustic penetration in the surveyed area is approximately 100 meters below the sea-bottom and was observed at the western half of the Okinawa Trough. The most clear profile of the Okinawa Trough is illustrated in Figure II–3–2. There are numerous vertical reverse faults, with dislocations of an estimated 30 meters from the profile. According to the continuous seismic reflection profiles, these faults develop at a depth of 1,000 meters below the sea-bottom. The presence of shallow earthquake epicenters in the Okinawa Trough for the period 1963 to 1972 (TARR, 1974) supports the structural evidence of very recent activity in this area. According to analysis by the cross check with the 3.5 kHz echo sounder profiles of the GH 75–1 cruise, along the longitudinal track in the Okinawa Trough, it is postulated that the trend of these faults is in a NE to NEE direction, striking slightly oblique to the trough axis.

The clear subbottom reflectors detected in the profile of Figure II–3–2 are inferred to be pumice beds or volcanic sand beds, according to the results of piston corer sampling. These reflector horizons abut against or overlap on the continental slope but do not continue up the slope surface (Fig. II–3–2).

A thin cover of the transparent layer is observed on the slope, and a semi-opaque layer, which is correlated with the lower sequence of the above stated trough sediments, is detected beneath the transparent layer. The transparent layer is truncated at the shelf edge and the lower semi-opaque layer is expose on the sea floor. This feature suggests erosion during the Pleistocene.

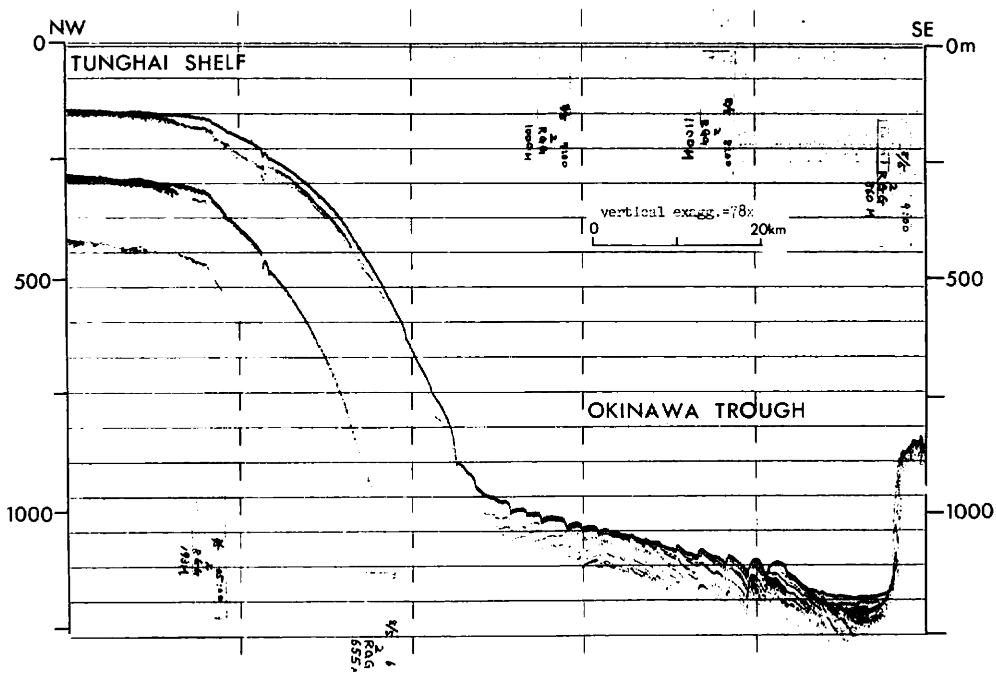

Fig. II–3–2 Profile by 3.5 kHz echo sounder (A).

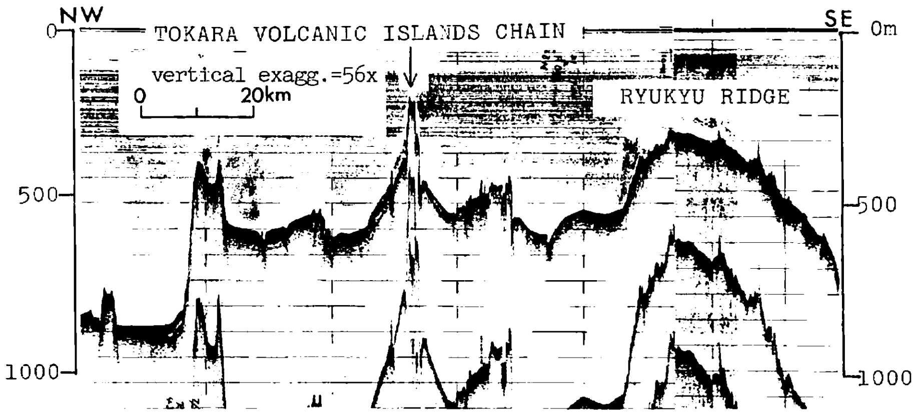

Fig. II–3–3 Profile by 3.5 kHz echo sounder (B).

Acoustic penetration of 3.5 kHz echo sounder is weak with slight subbottom reflectors in the vicinity of the volcanic zone in the Okinawa Trough (Fig. II–3–3). This weakness of subbottom penetration may be caused by the dense deposition of volcanic material such as pumice and volcanic sand.

On the Ryukyu Ridge, as well as on the continental and trench slope, the acoustic penetration is quite weak and this fact indicates the presence of terrigenous sediments or exposure of basement rock (Fig. II–3–3).

Sediments filling the trench with coherent subbottom reflectors are present in the southern and northern parts of the Ryukyu Trench. Deformed sediments with no acoustic penetration by 3.5 kHz, have been detected by continuous seismic reflection profiling and are distributed in the central part of the trench. The coherent reflectors in the trench fill may correspond to turbidite sand layers.

Layers deformed by normal faults are observed in the southern area of the outer trench slope (Fig. II–3–4E). In contrast, reverse faults occur in the northern area of the outer trench slope (Fig. II–3–4C). Basins with subbottom coherent reflectors decend into the trench in the central part of the outer trench slope (Fig. II–3–4D). These small basins occur among topographic highs composed of deformed sediment, which is detectable by continuous seismic reflection profiling. These features suggest evidence of recent activity in the Ryukyu Trench.

A Reference Cited

Tarr, A. C. (1974) *World seismicity map*. U.S. Geological Survey.

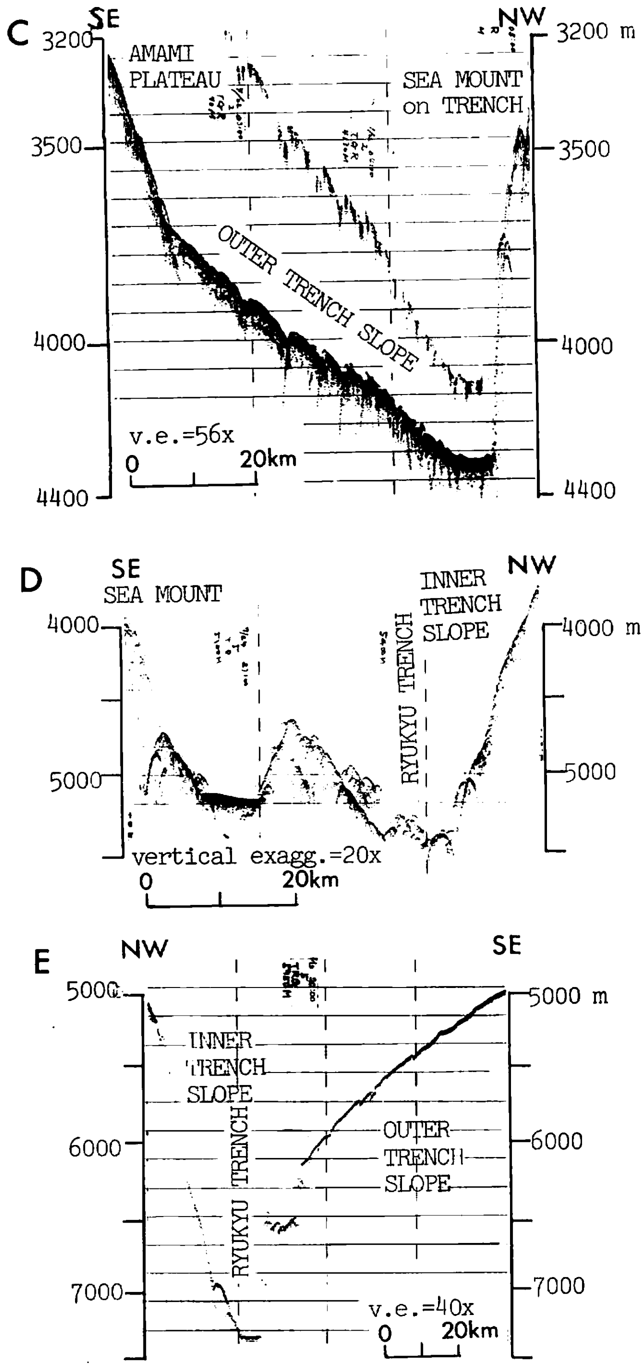

Fig. II-3-4 Profiles by 3.5 kHz echo sounder. Profile C is of the northern trench slope. Profile D is of the central part of the trench slope and profile E is of the southern trench slope.