III. 3.5 kHz ECHO SOUNDER PROFILING SURVEY

Kiyokazu Nishimura, Kensaku Tamaki, and Fumitoshi Murakami

A subbottom profiling survey for investigating the structure of surficial sediments was carried out, continuously, throughout the cruise by the 3.5 kHz subbottom profiler.

The subbottom profiling system is composed of nine 3.5 kHz transducers (Type TR75A) installed within the sonar dome beneath the bow bottom, a tranceiver (Model PTR 105A), a correlation echo sounder processor (CESP-II), a precision depth digitizer (model PDD 200A) and a universal graphic recorder (UGR 196C), which were manufactured by Raytheon Co. The signals were recorded on the graphic recorder at a 2-sec sweep rate.

Results

Sediments on the banks show extremely good acoustic penetration; maximum penetration reaches 300 m at the Takuyo Bank (Fig. III-9). This represents the largest penetration, to date, recorded by the 3.5 kHz echo sounder. Several prominent reflectors occur in the sediments on the banks (Fig. III-1, 4, 6 and 9). The opaque-banded layers just below the sea floors at the Kita-Yamato Bank and the Takuyo Bank are considered to correlate with each other (Figs. III-6 and 9). This correlation would imply that at the time of deposition of these layers a uniform depositional environment prevailed at the center of the Japan Sea. On the banks, the upper reflectors are mostly concordant with the sea floor while the lower reflectors are generally discordant (Figs. III-1, 6 and 9). This disconformable feature may have been caused by structural movements during deposition, or alternatively by changes in depositional environment.

In deep sea basins (the Japan Basin, the Yamato Basin) and the Oki trough, well-stratified patterns commonly develope (Figs. III-3, 5 and 12), although opaque patterns also occur intermittently (Figs. III-3 and 12). The lower horizons of the well stratified reflector are, also, not concordant with the sea floor of the basins. Some prominent reflectors can be horizontally traced over approximately 100 km on the profiler records. Typical sliding patterns are observed at the southern margin of the Oki Trough (Figs. III-2 and 3).

The stratified pattern in the Yamato Basin becomes opaque toward the Toyama Channel and this pattern prevails along the course of the Toyama Channel (Fig. III-8). This pattern is consistent with the sedimentation and erosion of the channel interpreted from seismic profiler records (see Chap. V).

Well-stratified patterns are also generally observed on the continental slope to the north of the Noto Peninsula, where numerous NNE to NS trending ridge and troughs develope. The well-stratified patterns generally thin out on the ridge slopes, although some layers maintain a well-stratified pattern and do not change noticeably in thickness (Figs. III-9 and 10). This variation in the reflection character of sediments at the ridge slope may be related to a variation in recent structural movements on the ridges.

At the continental shelf around the Oga Peninsula, distinct reflectors, truncated by the sea floor, are well-developed (Fig. III-11). Seismic profiler data suggest that these distinct, reflectors correlate with the Neogene deposits on the Oga Peninsula.

Fig. III-1 ~ 12 Profiles by 3.5 kHz echo sounder.

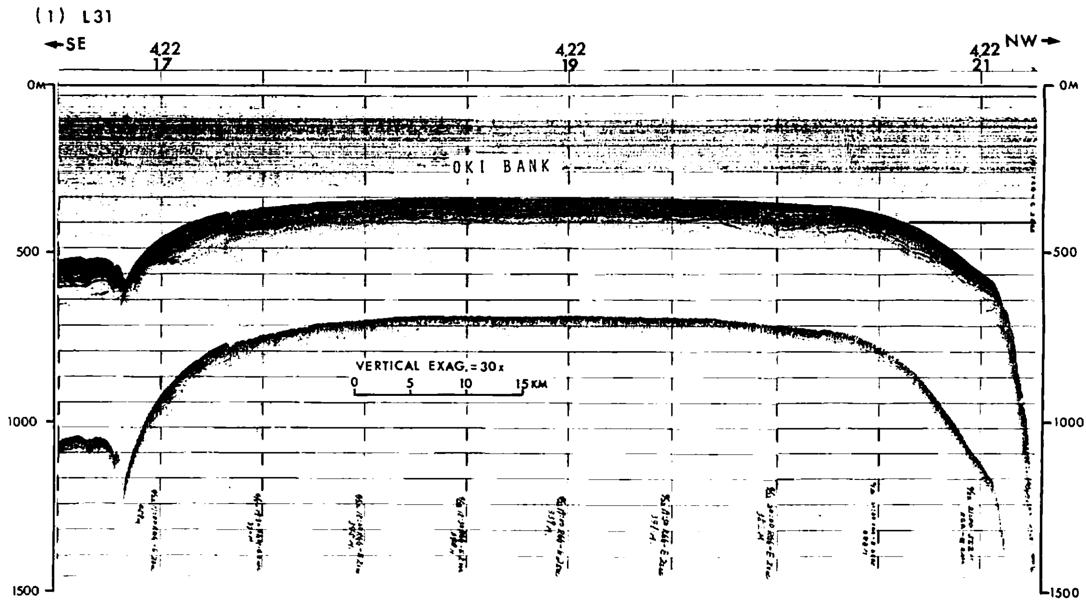

Fig. III-1

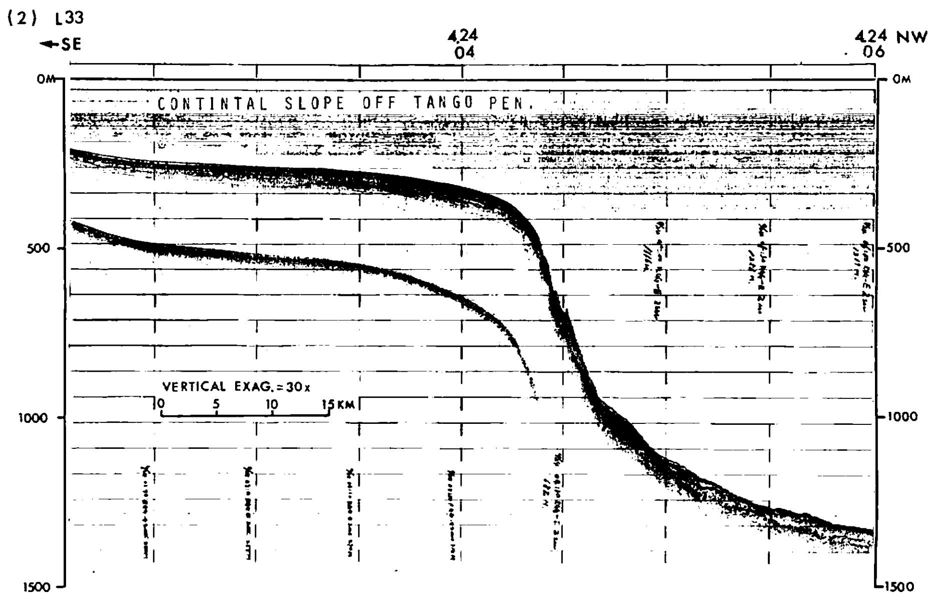

Fig. III-2

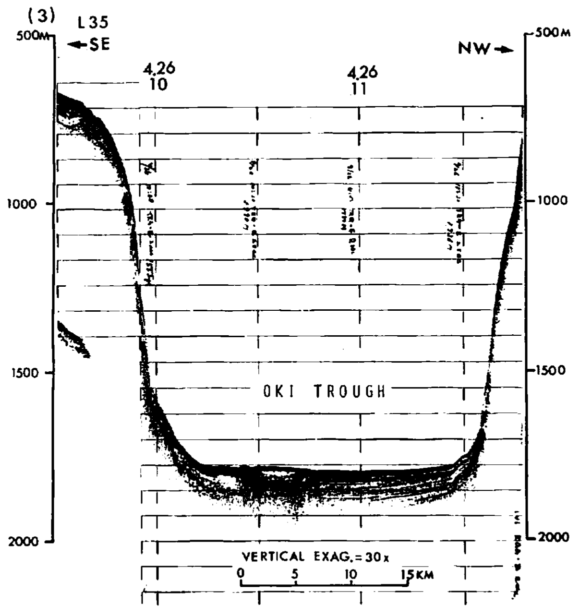

Fig. III-3

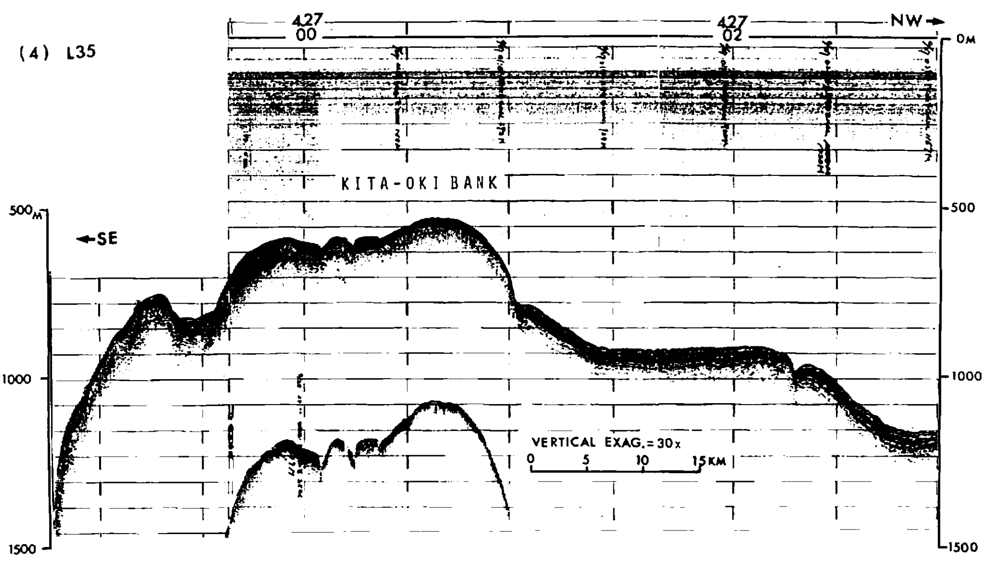

Fig. III-4

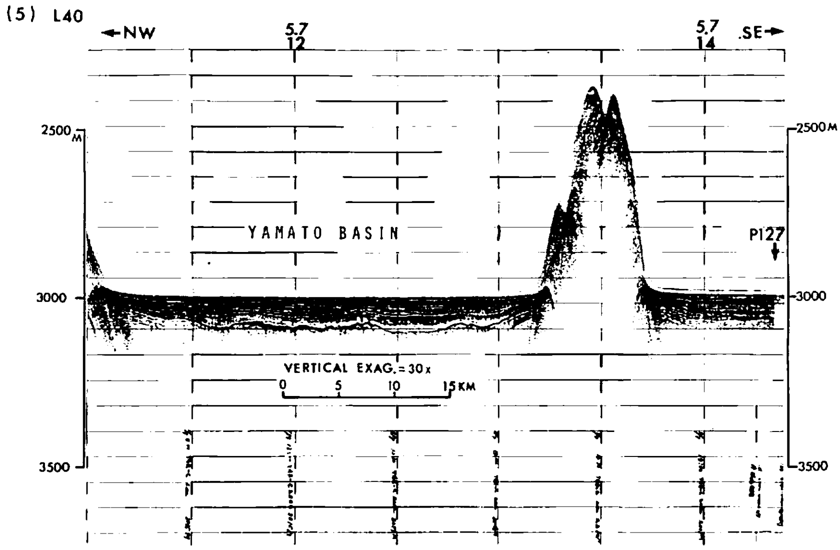

Fig. III-5

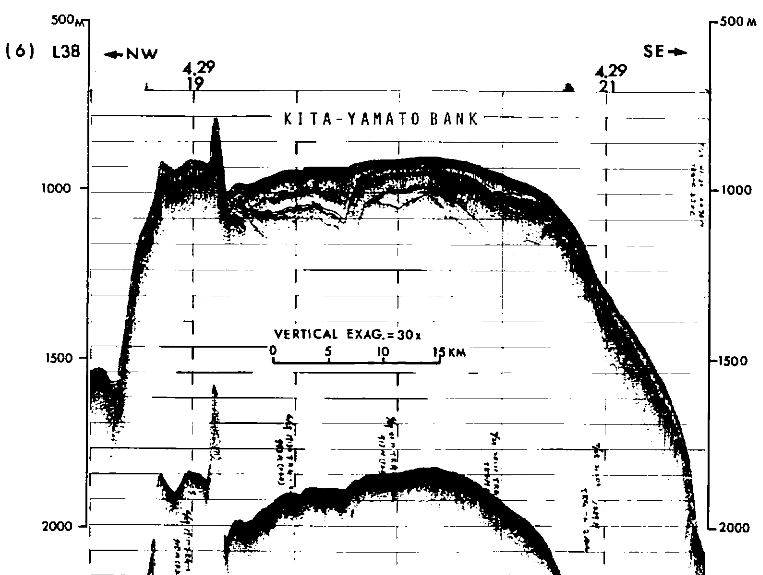

Fig. III-6

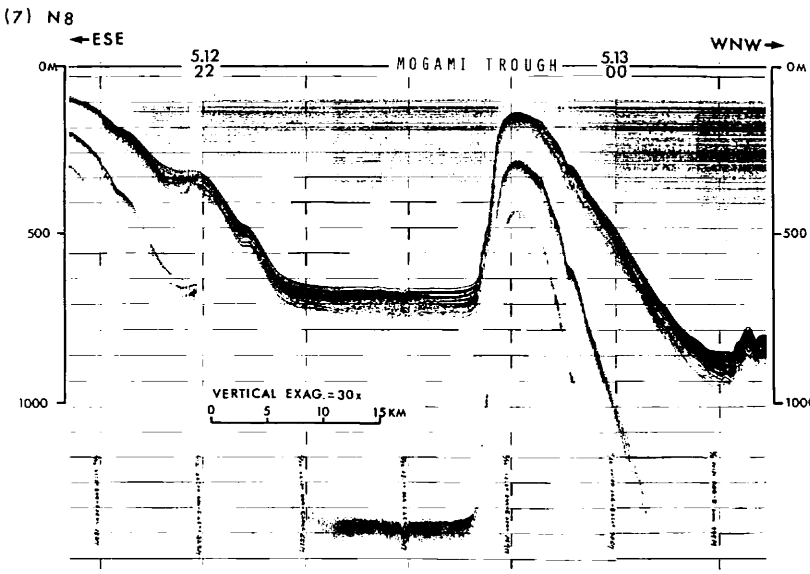

Fig. III-7

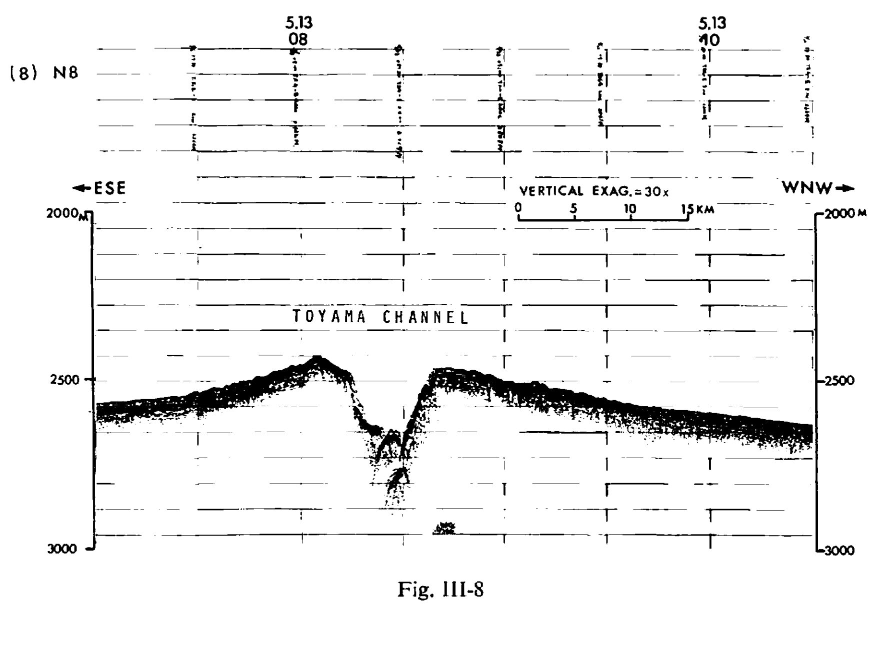

Fig. III-8

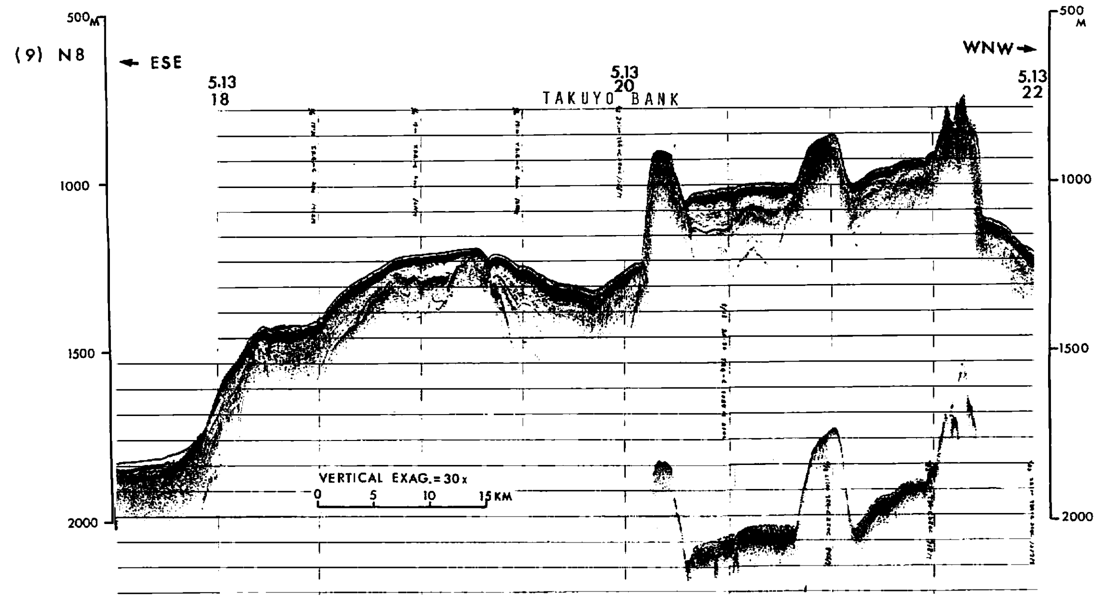

Fig. III-9

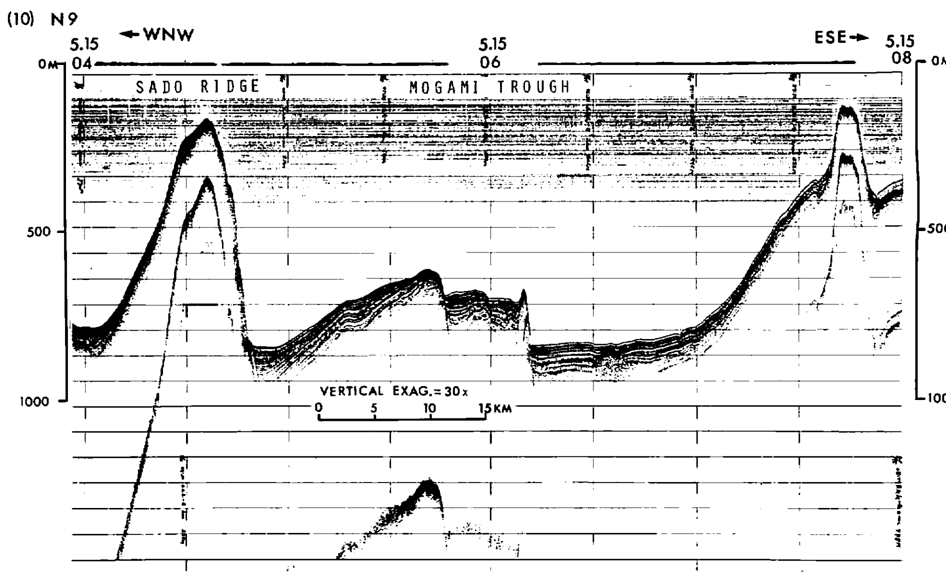

Fig. III-10

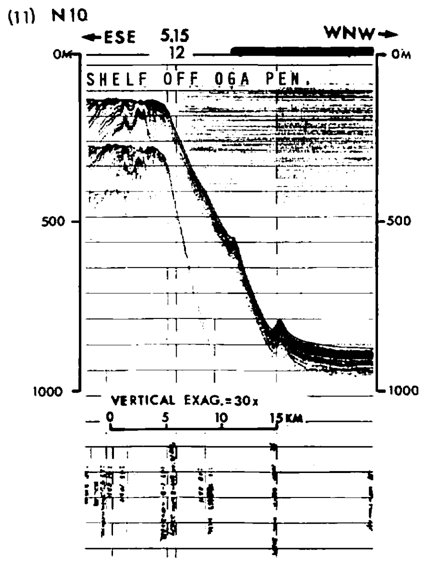

Fig. III-11

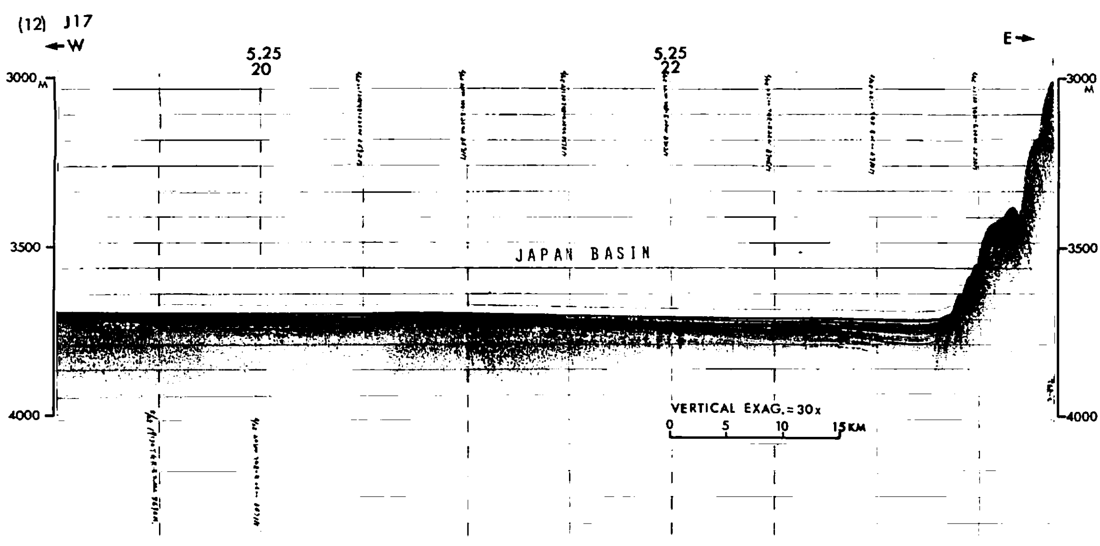

Fig. III-12