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III. 3.5 kHz SUBBOTTOM PROFILING SURVEY ON THE SOUTHEASTERN OFFSHORE OF THE BOSO PENINSULA

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Method

A subbottom profiling survey for investigating the structure of surficial sediments was carried out continuously throughout the cruise by a 3.5 kHz subbottom profiler manufactured by Raytheom Co. This system is composed of nine 3.5 kHz transducers installed within the sonar dome beneath the bow bottom, a power transmitter, a correlation echo sounder processor, a precision depth digitizer and a universal graphic recorder. The reflected signals were recorded on the graphic recorder at a 2 sec sweep rate.

Results

The survey area is characterized topographically by remarkable regional difference on the continental shelf and many submarine canyons on the continental slope. The continental shelf becomes wider toward north, and basement rocks crop out in a southern half of the continental shelf, whose distributing depth ranges from 20 m to 60 m. One of the most extensive canyons in the survey area is Katakai Canyon which extends from the continental shelf to the deep in an NE-SW direction. In the following, we will refer to the characteristics on the typical profiles on the continental shelf and the Katakai Canyon, and will consider a correlation between topography and distribution of surficial sediments on the continental shelf. Locations of their profiles are shown in Fig. III–1.

Continental shelf Various patterns of reflected signals and topography are observed on the continental shelf. We have remarked two typical characters of reflected signals and four typical topographic features. Two typical characters of reflected signals are a transparent and an opaque one, and four typical topographic features are (i) two planation surfaces on the continental shelf, (ii) unduration on the continental shelf, (iii) unduration on the continental shelf edge, and (iv) unduration on the continental slope (Fig. III–2). The transparent layer is acoustically transparent and its thickness is generally 5 m to 10 m. The opaque horizon is entirely opaque and it mainly underlies the planation surface, which is distinguished by remarking inflection points of the shelf bathymetry based on the surface morphology on the continental shelf.

Katakai Canyon Fig. III–3 shows profiles accross the Katakai Canyon. On Line 1, the transparent layer mantles the canyon. This fact indicates that the transparent layer has been deposited after the Katakai Canyon was formed at least on the shelf. On Line 5, small terraces are found nearby the both shoulders of the canyon, whose depth are about 220 m to 240 m.

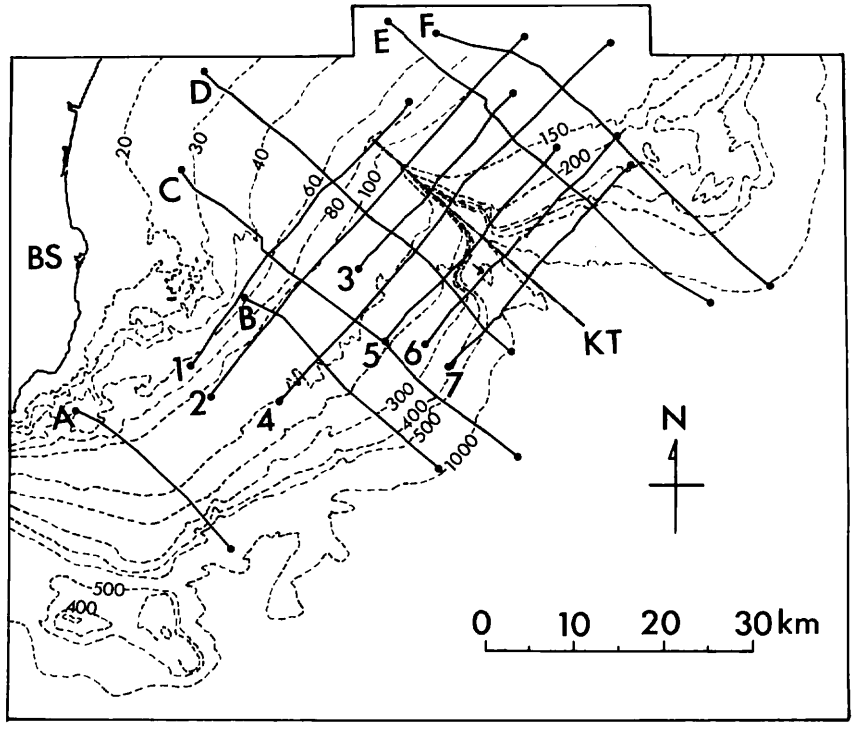
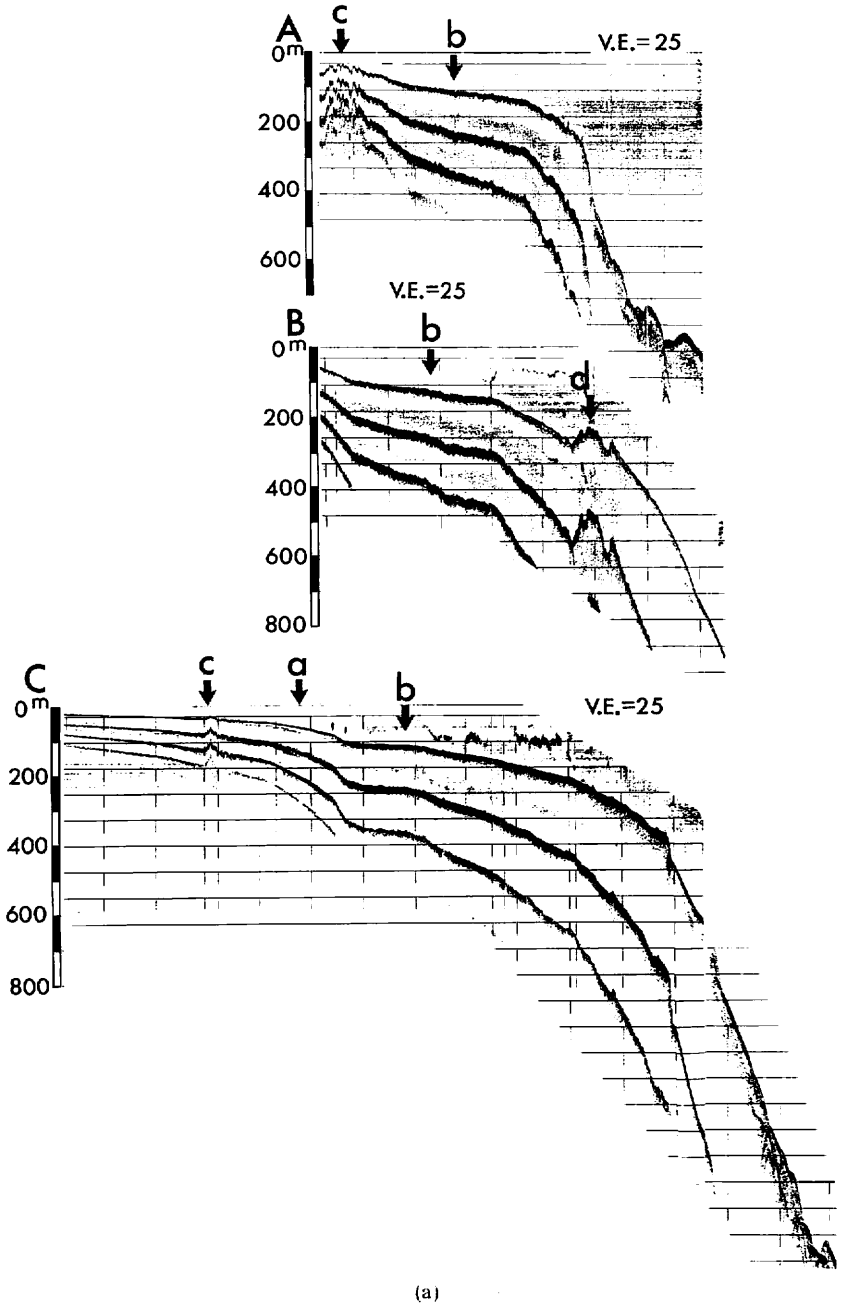


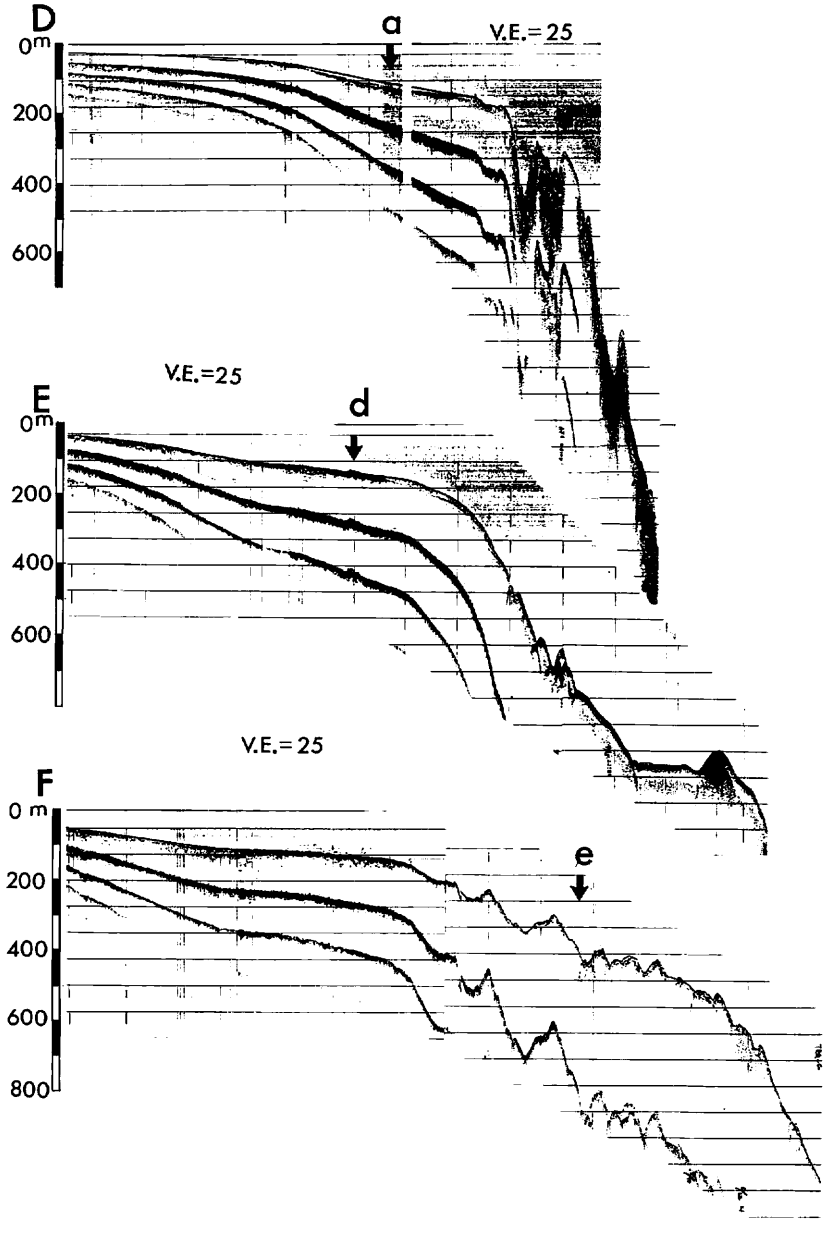
Fig. III–1 Locations of 3.5 kHz subbottom profiles illustrated in Figures III–2 and 3. Line labeled KT shows the axis of the Katakai Canyon, and BS shows the Boso Peninsula. Bathymetry is shown by dotted line.

Surface Distribution Map Fig. III–4 shows the surface distribution of these patterns or topographic features. Two planation surfaces are distinguished on the profiles. One extends on the shallower area than 60 m (Face I) and the other extends in depth from 80 m to 140 m (Face II). Face I is observed in the northern half area, but does not continue to the south where the undulated layer is scattered. Face II is found throughout the survey area. The distribution of the opaque horizon almost overlaps that of the planation surface, i.e. harmoniously with the bathymetry and in belt shaped. On the other hand, the transparent layer is distributed across bathymetric contours from 35 m to 160 m deep. Concluding from the distribution of the transparent layer and the opaque horizon on the profiles and in the distribution map, it seems that the transparent layer is deposited over the opaque layer. Unduration is very irregular surface that has several peaks and troughs. The unduration on the shelf and the slope can be traced in adjacent profiles, but that on the shelf edge seems to be isolated.



(a)

Fig. III–2 Typical subbottom profiles on the continental shelf and slope: a) transparent layer; b) opaque horizon; c) unduration on the shelf; d) unduration on the shelf edge; e) unduration on the slope. Location of profiles in Figure III–1.


D
a
V.E.=25
0m
200
400
600
V.E.=25
E
d
0m
200
400
600
V.E.=25
F
0 m
e
200
400
600
800

(b)

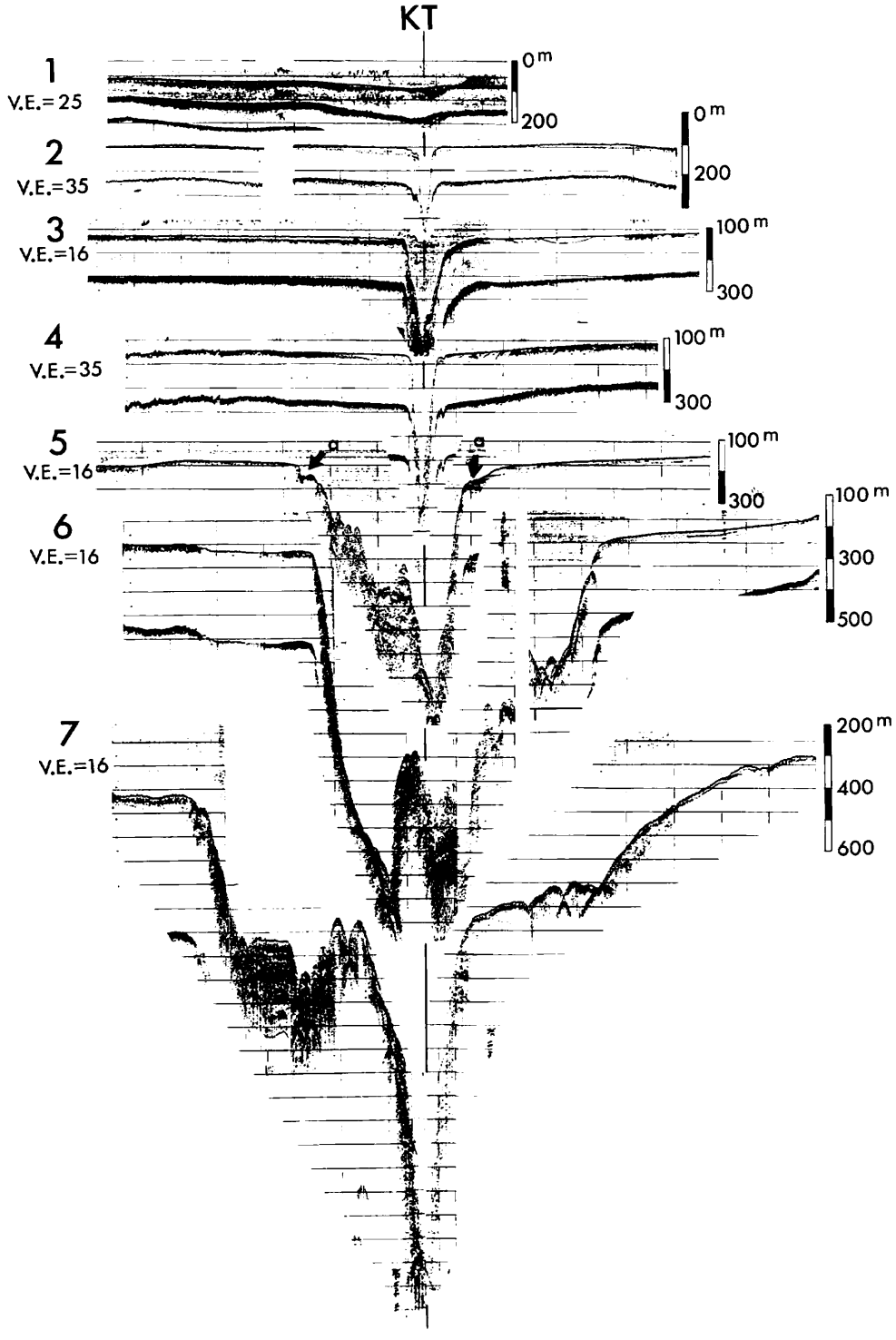


Fig. III-3 Subbottom profiles across the Katakai Canyon. KT indicates the axis of the Katakai Canyon. Small letter 'a' on Line 5 shows small terraces nearby the shoulder of the canyon. Location of profiles in Figure III-1.

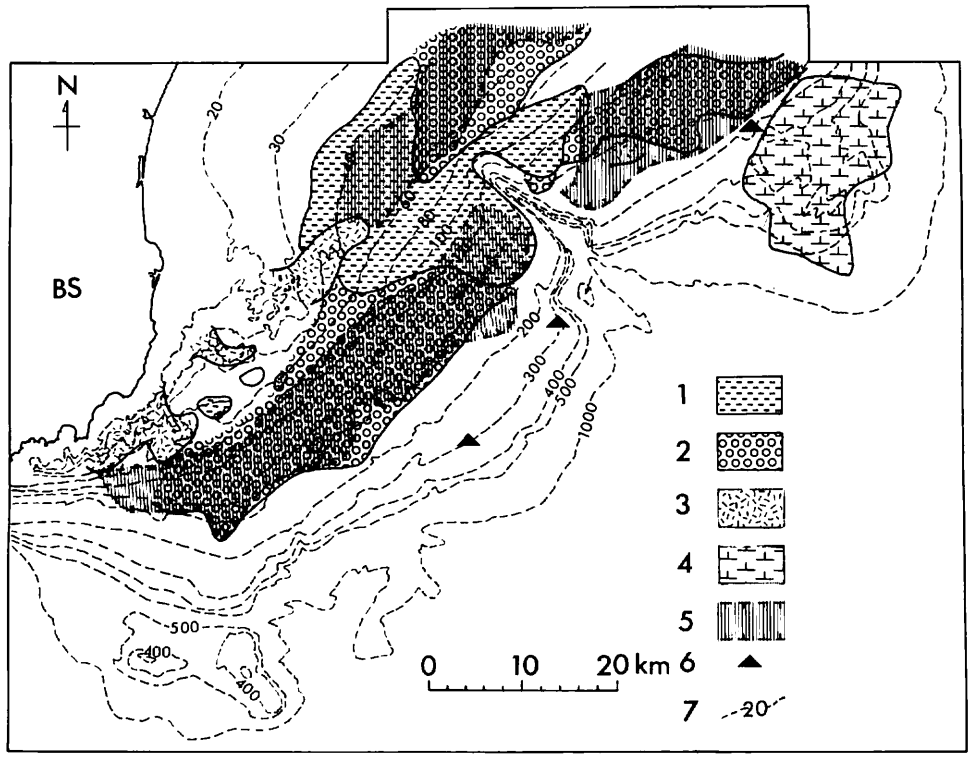


Fig. III-4 Distribution map of transparent layer, opaque horizon, planation surface, and unduration: 1) transparent layer; 2) opaque horizon; 3) unduration on the shelf; 4) unduration on the slope; 5) planation surface on the shelf; 6) unduration on the shelf edge; 7) bathymetric contour.