

## X. BOTTOM FEATURES ON KUROSE BANK BY SIDE-SCAN SONAR

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The Kurose Bank is north-northwest of Hachijojima Island. The top of it is flat to a depth of 120–130 m. A hole over 600 m in depth, like a caldera, which was named the Kurose Hole, is located in the central part of the Kurose Bank. We assumed that the surface of the Kurose Bank was formed by a pumice flow, because three cores of pumice were obtained on the Kurose Bank by a rock corer and submerged boring machine during cruise GH79–4. We investigated the bottom features on the Kurose Bank by side-scan sonar, the product of EG&G, in order to collect evidence relating to the direction of the pumice flow.

The characteristics of our side-scan sonar system aboard ship and the operating parameters were as follow: ship speed approximately 6 kt, slant range scale 500 m, side-scan sonar fish height off bottom 75–300 m, paper feed speed 150 lines/inch, scan half-width 125 mm, water depth 120–400 m, pulse frequency 1.5 pps, horizontal beam spread  $1.2^\circ$ . For these parameters, at extreme slant range, the horizontal spread of a single sonar pulses is 10.4 m. BURMA (1980), assumed that a minimum of three consecutive sonar pulse returns from a single target are necessary for the target to be discerned on the record paper. Therefore, the transverse resolution, which is defined as the minimum distance between two objects parallel to the line of travel, that will be recorded on paper as separate objects is 5–35 m for these parameters. Because it is nearly impossible to detect clearly any variation in tonal quality of less than 1 mm width on the record paper, our minimum range resolution, which is defined as the distance between two objects perpendicular to the ship's course, is calculated as the 500 m range scale per 125 mm record paper width. With a minimum range resolution of 4 m, the minimum detectable height in a slant range of 100–500 m could not be less than 1–3 m. Therefore, we feel that our operating system was sufficiently sensitive to detect objects with widths of 4 m, height in excess of 3 m, and lengths of 20 m.

### Results

A rough sketch of the side-scan record patterns is shown in Figure X-1. The patterns on the side-scan record were divided into a rough sea bed with a pattern like pockmarks and a linear structures pattern. In the region surrounding the Kurose Hole, the linear structures are arranged in concentric circles entering on the Kurose Hole. On the southwestern part of the Kurose Bank, the direction of these lineations is deflected to northwest-southeast. A submarine canyon, which is considered to have been eroded on land, dissects the north slope of the Kurose

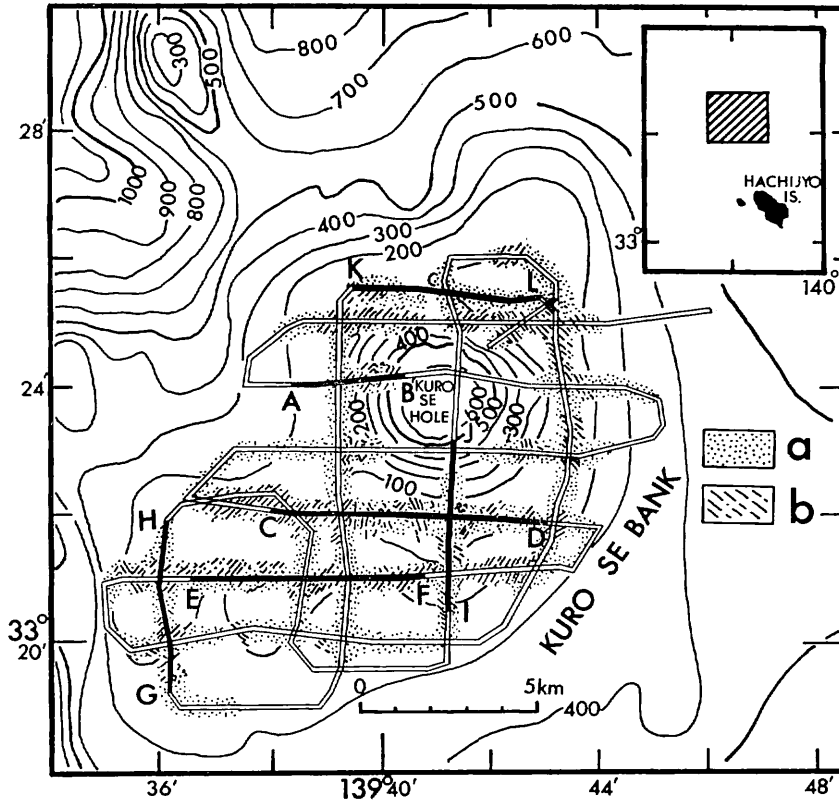


Fig. X-1 Survey tracks and a rough sketch of patterns on side-scan records, patterns being divided into rough sea bed (a) and lineation structures (b). A-B through K-L represent the portions of side-scan records shown in Fig. X-2.

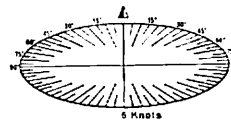
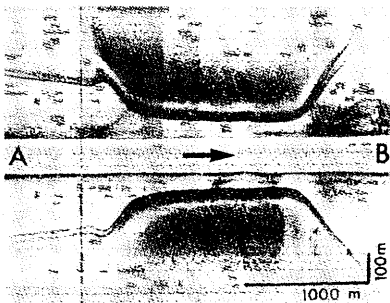
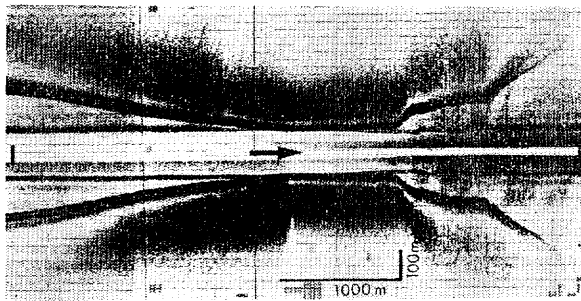
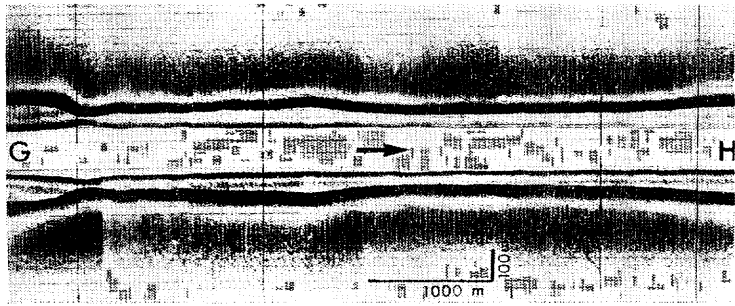
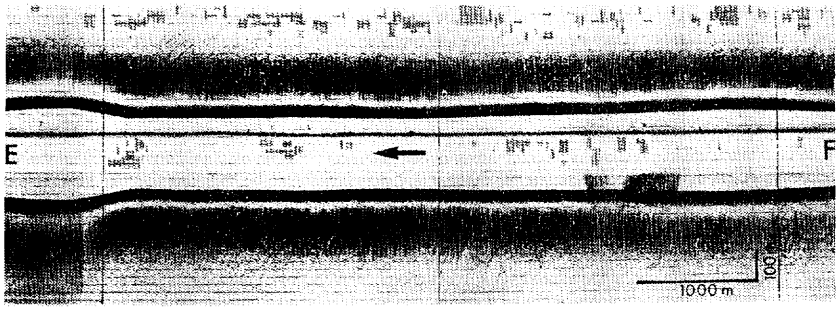
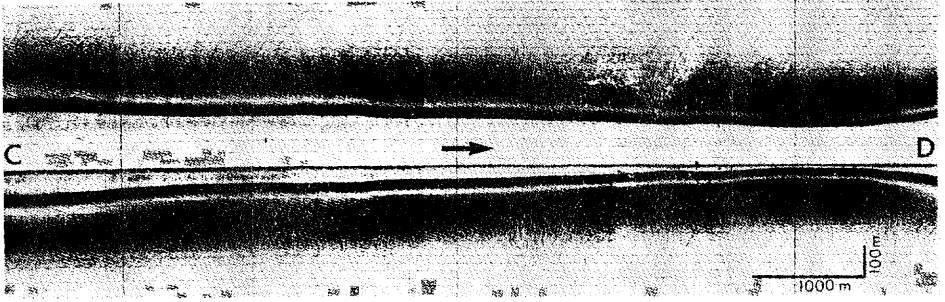
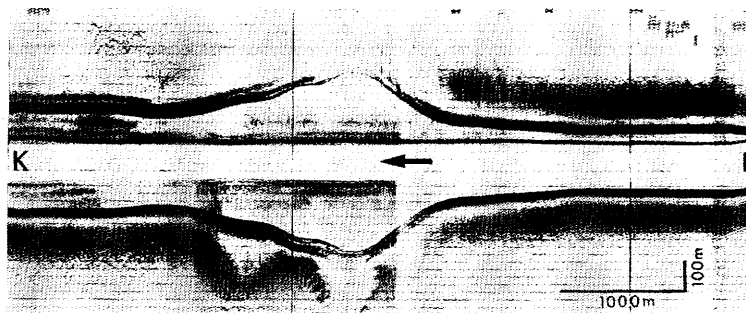


Fig. X-2 Side-scan records. Ellipsoid in the figure shows orientation of the side-scan records corresponding to the direction of ship travel with compression ellipsoid based on 6 knots. A-B to K-L correspond to the sections of track lines shown in Fig. X-1. Ship's travel direction indicated by the arrow.





Bank. This can be seen in the central part of line K-L in Figure X-2. Owing to the presence of the canyon and the flat top of the bank, we suggest that the Kurose Bank formed before the Recent Epoch.

#### Reference

BURMA, A. H., RAPPEPORT, M. L., ORLANDO, R. C., and HAMPTON, M. A. (1980) Identification of bedforms in lower Cook Inlet, Alaska. *Sedimentary Geol.*, vol. 26, p. 157-177.