IV. GRAVITY ANOMALIES NORTHEAST OF HACHIJOJIMA ISLAND

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Gravity data were obtained with the LaCoste-Romberg air-sea gravimeter model S-63 mounted on a gyrostabilised platform, with cross-coupling correction. Navigation was by satellite. Although more accurate navigational data is available from the Decca system, it has not been utilized in the gravity processing of this brief report. Owing to highly variable ocean currents in the survey area, dead reckoning positions, which were used in data processing, and positions obtained from the Decca system, sometimes differ by 1 n.m. or more.

Characteristics of free air and Bouguer anomalies

Figures IV-1 and -2 show free air and Bouguer anomalies in the survey area. Figure IV-3 shows gravity profiles along three E-W lines.

The survey area is characterized by positive free air anomalies. Free air anomalies are greater than +100 mgal in almost the entire area. Free air anomalies around Hachijojima Island are relatively low (in the range of +150 to +170 mgal), although a maximum of +240 mgal occurs on the side of Mount Miharayama (FUJII *et al.*, 1964). A low maximum of +140 mgal occurs on the southeastern rim of the Kurose Hole. A belt of anomalies greater than +180 mgal runs from the Kitakurose Bank southward through the Shinkurose Bank. Free air anomalies exceed +210 mgal in the centers of these banks.

The most prominent feature on the Bouguer anomaly map is a sharp transition zone which strikes N-S in the western part of the survey area. This boundary zone appears to shift about 15 km westward north of the Nakanokurose Bank. Recent volcanic islands, including Hachijojima, Mikurajima and Miyakejima Islands and also the Kurose Hole, lie west of this boundary, while the Shinkurose and Kitakurose Banks are situated east of it, where Bouguer anomalies are 50 to 60 mgal greater. This suggests that these banks and the volcanic chain have entirely different crustal structures. The crustal structure of the northeastern part of Honshu gives support to this theory. In the Tohoku district, Bouguer anomalies are 50 mgal or more lower in the green tuff region than in the Kitakami Mountains east of it (Geographical Survey Institute, 1957). The velocity structure from explosion seismic data shows rapid deepening of the boundary between the granitic layer (v_p=5.9 km/sec) and the gabbroic layer (v_p=6.6 km/sec) around Mizusawa to the west, where a rapid decrease in Bouguer anomalies is also observed (YOSHII and ASANO, 1972). Although the Tohoku district and the survey area have different geological histories, it seems probable that the boundary between the granitic and gabbroic layers also becomes rapidly shallower eastwards under the transition zone, and that the gabbroic layer thickens under the

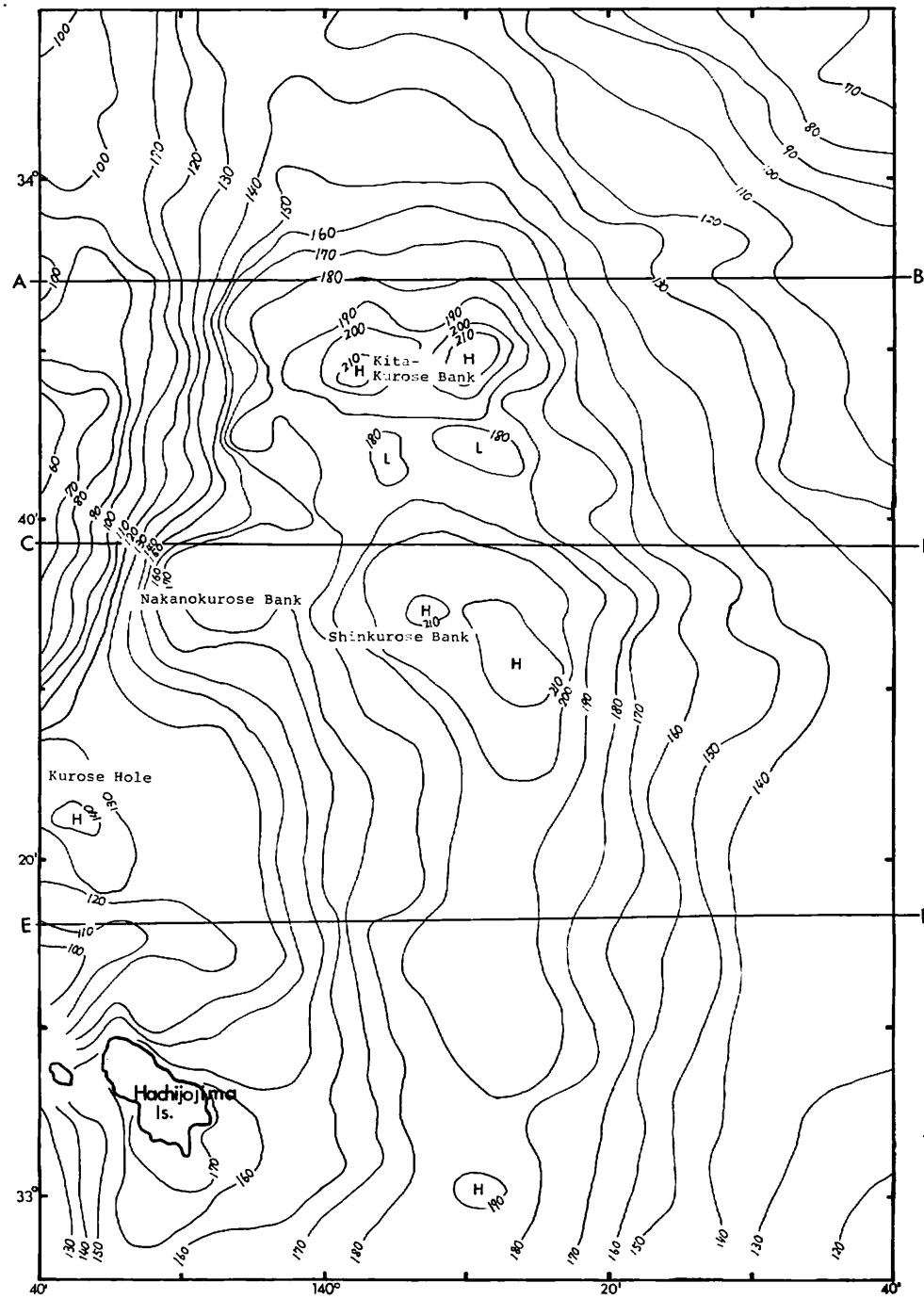

Fig. IV-1 Free air anomaly map contoured at intervals of 10 mgal.

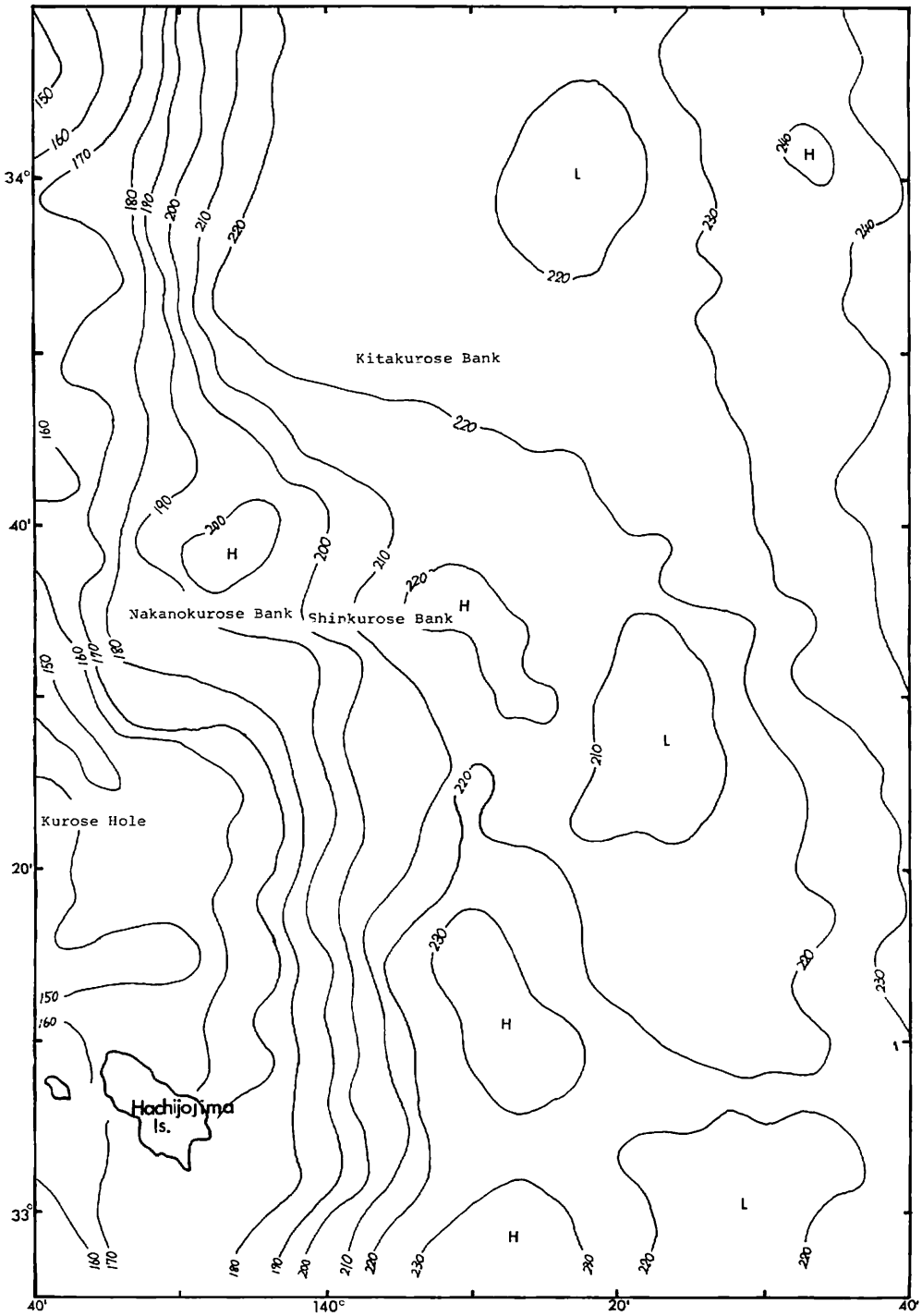

Fig. IV-2 Bouguer anomaly map contoured at intervals of 10 mgal.

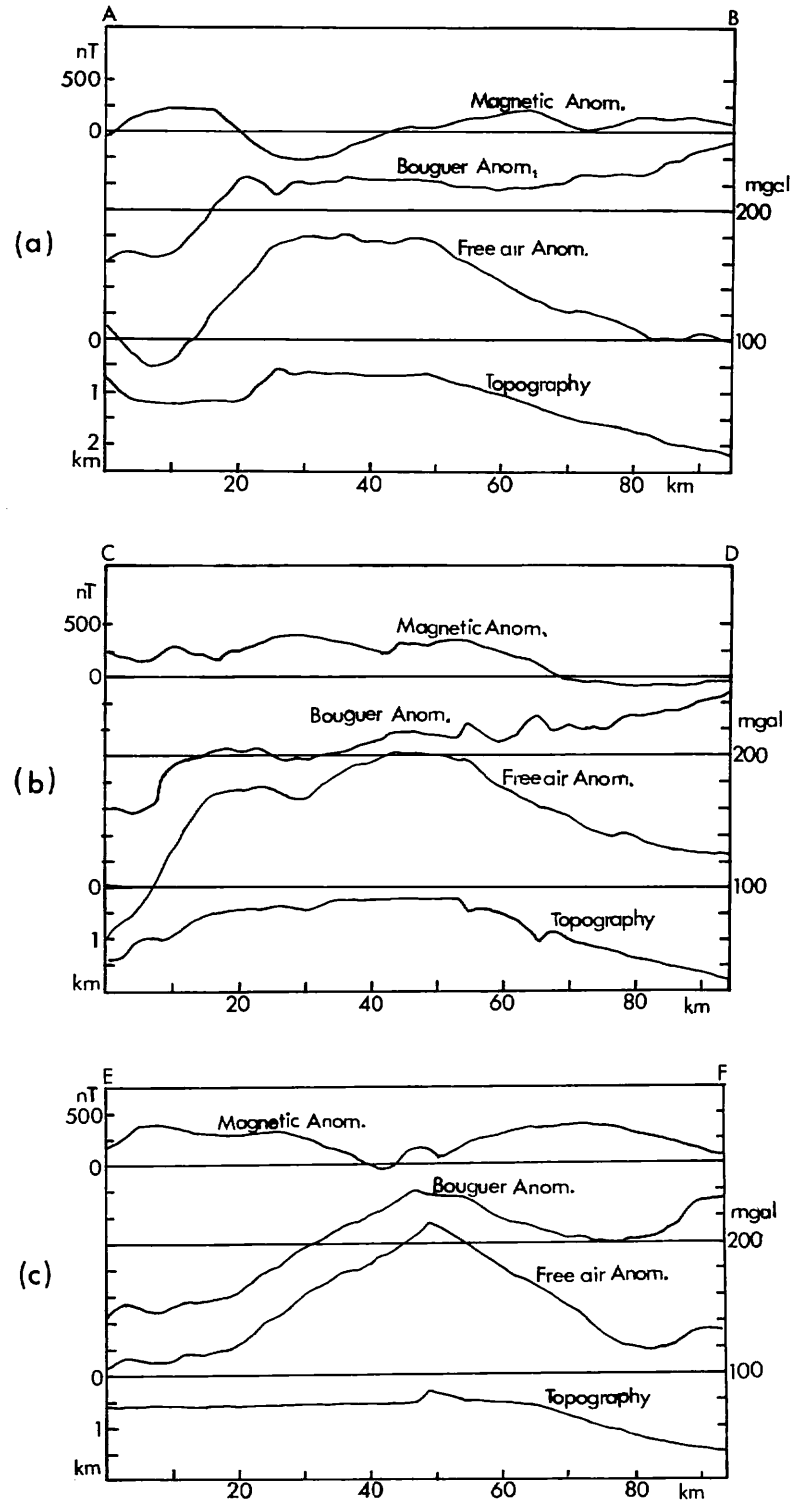

Fig. IV-3 Magnetic, Free air, Bouguer anomaly and topographic profiles. (a) along line A-B, (b) along line C-D, (c) along line E-F in Fig. IV-1.

Kitakurose and the Shinkurose Banks. Assuming a density difference of 0.2 gr/cm^3 between the two layers, and a Bouguer anomaly difference of 60 mgal, the boundary is about 7 km shallower under these banks than under the volcanic chain.

References

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