

II-5. GEOMAGNETIC SURVEY

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Geomagnetic total field measurement was carried out with a Geo-Metrics proton free precession magnetometer. The sensor was towed about 200 m astern in order to be free of the ship's magnetic effect. Observed total field was recorded on a chart with a pen recorder and also on magnetic tapes with a NNSS data logger system manufactured

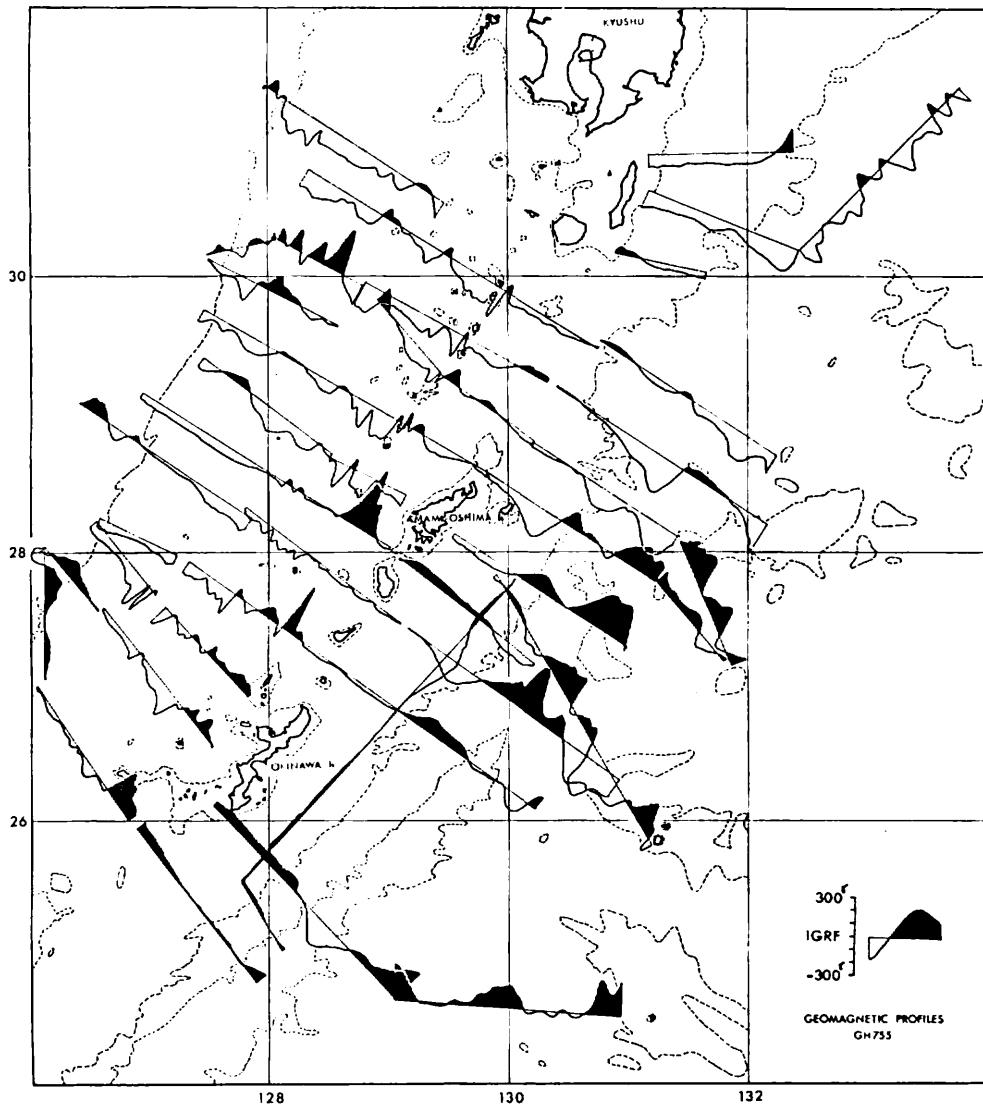


Fig. II-5-1 Magnetic anomaly profiles along ship's tracks of the cruise.

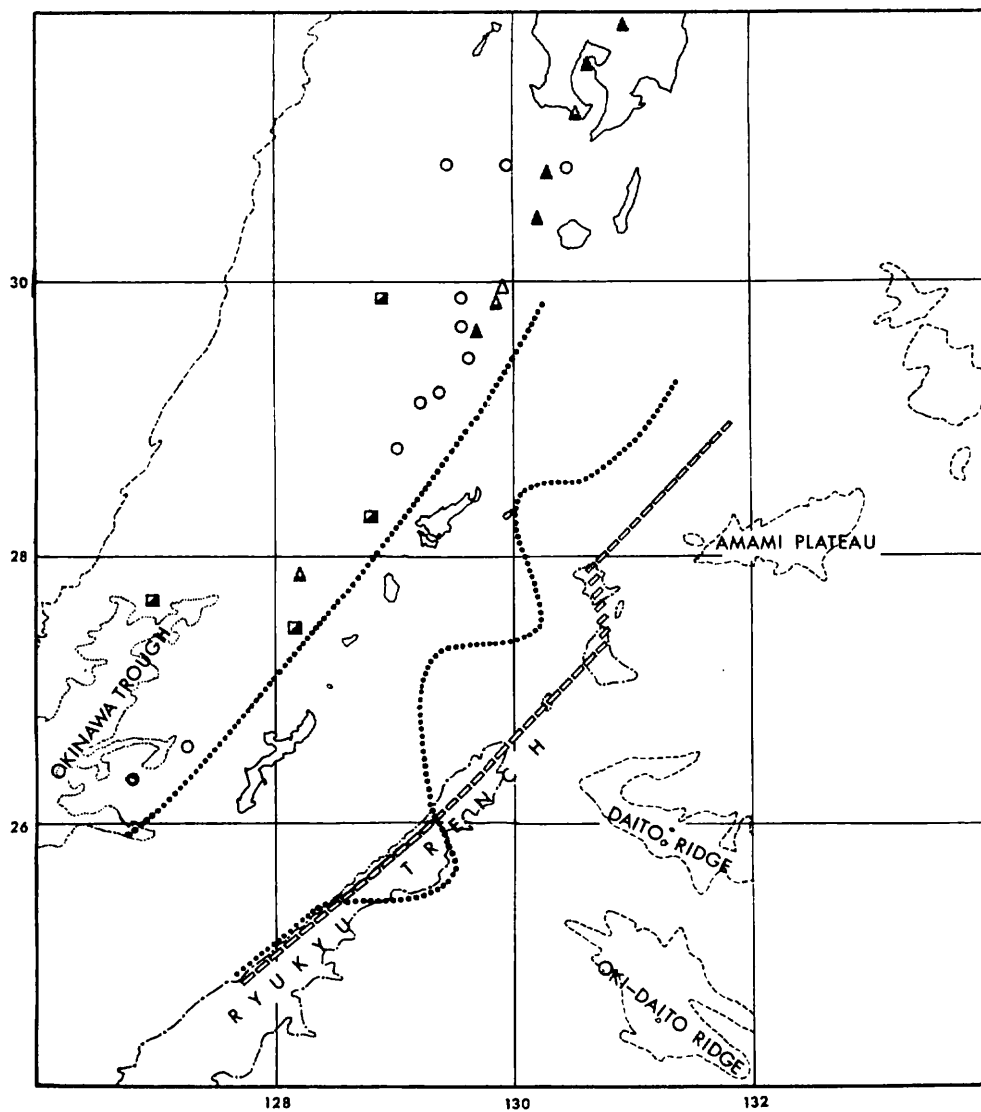


Fig. II-5-2 Magnetically quiet zone and volcanic islands. Dotted line shows marginal line of the quiet zone; dashed line shows trench axis; ▲, ▲, and △, show active, dormant and dead volcanos, respectively, and open circle shows cenozoic lava (after SAWATA, H. and TAKAHASHI, H.); ◻ shows magnetically local anomaly found in the profiles.

by Magnavox Co. Magnetic anomalies were calculated by subtracting IGRF from observed total field. The tracks of the magnetic survey are shown in Fig. II-1-1 and magnetic anomaly profiles are shown in Fig. II-4-3 together with Bouguer and free air anomalies and topographic profiles.

Magnetic anomaly profiles plotted at right angles to ship's tracks are shown in Fig. II-5-1. As can be seen in this figure, the amplitudes of anomalies around the Ryukyu Ridge are small. This area is bounded by the Tokara volcanic chain and its extension which yield magnetic irregularities with a short wavelength. The other side of this area terminates near the Ryukyu Trench, outside of which anomalies have an amplitude of several hundred gammas with a long wavelength (about one hundred kilometers). It seems that the Amami Plateau, the Daito Ridge and the Oki-Daito Ridge are normally magnetized through there are no tracks across these features.

In the Okinawa Trough, magnetic anomalies are weak and negative as a whole, and their wavelength is rather short. Some intensive anomalies are, however, present in the trough. One of those is at $\sim 27^{\circ}30'N$ and $\sim 127^{\circ}E$, where there is a seamount from which rock was dredged (ST 398; Fig. II-4-3, Tracks L 24 and L 26). Anomalies of the marginal area of the Tunghai Shelf have an amplitude of $\sim 200 \gamma$ (Fig. II-4-3, Tracks L 23 and L 24). The linearity of magnetic anomalies is not very clear in the trough and also in the Philippine Basin.

Fig. II-5-2 shows the magnetically quiet zone which is defined as the area where anomalies do not exceed $+ 50$ around the Ryukyu Ridge. To determine the quiet zone, two profiles of GH 74-7 shown in Fig. II-5-1 have been used. Volcanic islands and the axis of the Ryukyu Trench are also shown in this figure where the two dotted lines represent the limits of the quiet zone.

It is seen that the western marginal line lies about 40 km from the main ridge and runs parallel to the Ryukyu Arc and the eastern marginal line is irregular. The quiet zone approximately corresponds to the low Bouguer anomaly area, and has the surface expressions of a narrow trough (Amami Trough), the main ridge and continental slope. This suggests that non-magnetic sediments are deposited there, and that the straight western boundary is caused by the volcanic front (the inner ridge) and the sinuous marginal line is the boundary between the non-magnetic continental region and the magnetized oceanic region.

A Reference Cited

SAWATA, H. and TAKAHASHI, H. (1960) *Volcanoes of Japanese Archipelago*. Geological Survey of Japan.