

THE DIRECTIONS OF THE MAGNETIC ANOMALY LINEATIONS
AND THE FRACTURE ZONES BETWEEN AFRICA
AND ANTARCTICA (ABSTRACT)

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Vector anomalies of the geomagnetic field were obtained along the two observation lines between Africa and Antarctica across the Enderby Basin and the Southwestern Indian Ridge during the 30th Japanese Antarctic Research Expedition. The directions of two-dimensional magnetic structures produced by fracture zones and magnetic polarity reversals along the two observation lines were determined by using vector anomalies of the geomagnetic field. The direction of the two-dimensional magnetic structure that originated from the fracture zones was distinguished from the one created by polarity reversals by using satellite gravity data and bathymetric features as well as sea surface gravity and sea bottom topography data obtained during this cruise.

The obtained directions in the north of the Southwestern Indian Ridge (north to 55°S, 19–26°E) coincide well with hitherto reported directions of the lineations and the fracture zones.

In the south of the southwestern Indian Ridge (south to 55°S, 22–32°E), however, the features of the obtained magnetic anomaly lineations and fracture zones are more complicated:

(1) NE-SW directions of the fracture zones, between 55°S and 59°S along about 28°E;
(2) NE-SW directions of the fracture zones and N-S and NNE-SSW directions of the magnetic anomaly lineations, between 59–63°S and 22–30°E; (3) WNW-ESE directions of the magnetic anomaly lineations, between 63°S and 65°S along about 31°E.

Some of fracture zones in region (1) have been suggested. The directions of the lineations in region (3) are in good agreement with those of M series lineations off the Dronning Maud Land. The directions of lineations in region (2) are quite different from the previously reported direction of spreading. To explain the features of the obtained geomagnetic anomaly lineations, the existence of N-S trending ridge should be considered. Complex features of gravity anomaly to the south of 60°S, despite flat bathymetric features, may indicate a buried ridge under thick sediments.

The deduced directions of the magnetic anomaly lineations and the fracture zones in this study imply new constraints on the evolution of the Indian Ocean.

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