

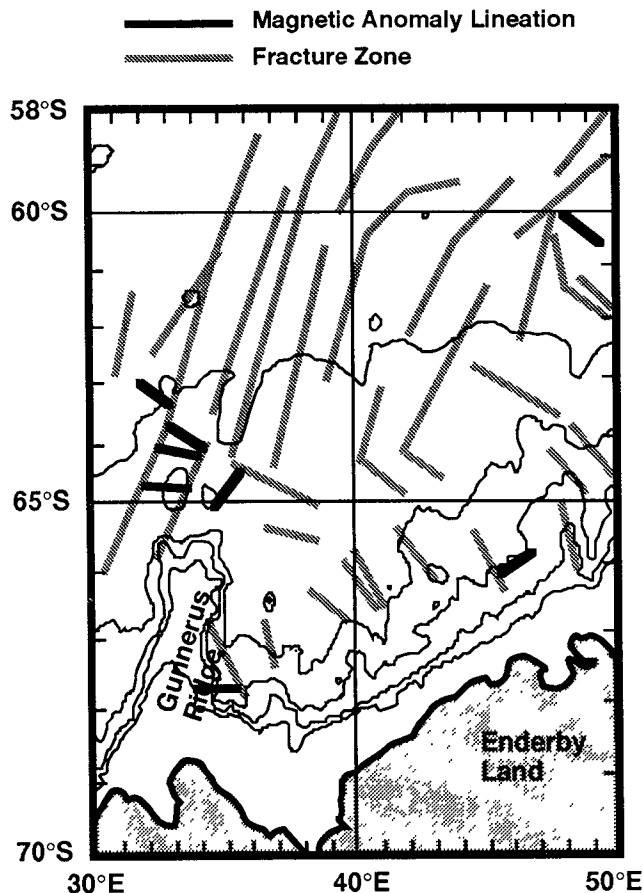
## Vector Geomagnetic Anomaly Field in Antarctic Ocean

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Vector measurements of the geomagnetic field provide more detailed information than measurements of the total intensity for understanding the magnetic structures of oceanic crust. A shipboard three-component magnetometer (STCM) was developed recently and used in many oceanic regions to measure successfully geomagnetic field vectors.

STCM is a useful alternative instrument for identifying magnetic anomaly lineations and fracture zone trends



**Fig. 1.** Fracture zone and magnetic anomaly lineation formations in the West Enderby Basin. Solid and shaded lines show magnetic anomaly lineation and fracture zone trends, respectively. Bathymetric data is based on ETOPO5 and the contour interval is 100 m.

in areas where data are sparse, such as the Southern Ocean. Conventional (proton) shipboard magnetic observations in the Southern Ocean are too sparse to allow identification of the magnetic anomalies. In contrast, the STCM measures the vector geomagnetic anomaly field and the strike of two-dimensional magnetic structures, such as magnetic anomaly lineations and fracture zones, is obtained using only one observation line. Moreover, STCM is easy to install on any ship and operates even under severe weather, such as the Southern Ocean, because the sensors of this system are fixed on the deck.

An experiment with the STCM was carried out during the 30th, 31st, 32nd, and 33rd Japanese Antarctic Research Expeditions (JARE-30, -31, -32, -33) on the icebreaker Shirase during the summer seasons in 1988-1992. Vector anomalies of the geomagnetic field were obtained in the Enderby Basin, Southern Indian Ocean. The strikes of the two-dimensional magnetic structures were determined from the vector anomaly data. Magnetic anomaly lineation and fracture zone trends in the Enderby Basin are deduced from vector geomagnetic anomaly field data as well as seasurface and satellite gravity anomaly. Recently, the STCM was installed on board the British Antarctic Survey ship, RRS James Clark Ross, during JR09 in January-February 1995, and geomagnetic anomaly field data were successfully obtained for first time in the east Scotia Sea and Bouvet Triple Junction. We present the results of vector geomagnetic field in these areas and describe those applications in the Antarctic Ocean.