

Initial breakup process of Gondwana deduced from magnetic anomalies in the south of Conrad Rise, the Southern Indian Ocean

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Magnetic anomalies in the Southern Indian Ocean are key to understanding seafloor spreading history related to the fragmentation process of the Gondwana. However, tectonic history in the Southern Indian Ocean still remains almost unknown because of the sparse observations in this area. The R/V Hakuho-maru cruise KH-07-4 Leg3 were carried out to reveal the tectonic history related to the Gondwana breakup in the Southern Indian Ocean between Cape Town, South Africa, and off Lutzow-Holm Bay, Antarctica. Total intensity and vector geomagnetic field measurements as well as swath bathymetry mapping were conducted during the cruise. Magnetic anomaly data have been collected along WNW-ESE trending inferred from satellite gravity anomalies just to the south of Conrad Rise. We have also obtained magnetic anomaly data along NNE-SSW trending lineaments, widely used as initial breakup trends of Gondwana in the Southern Indian Ocean, from satellite gravity anomaly data, between the south of the Conrad Rise and off Lutzow-Holm Bay.

Magnetic anomalies with amplitude of about 500 nT, originating from normal and reversed magnetization of oceanic crust are shown along the WNW-ESE trending structures just to the south of Conrad Rise, and most likely indicate Mesozoic magnetic anomaly sequence. Along the NNE-SSW trending lineaments between the south of the Conrad Rise and off Lutzow-Holm Bay, Mesozoic sequence magnetic anomalies with amplitude of about 300 nT are also observed. Oceanic crusts possibly formed during Cretaceous normal polarity superchron are found in the both profiles, although magnetic anomaly C34 has been identified just to the north of the Conrad Rise. These suggest the extinct spreading axes in the south of Conrad Rise and seafloor spreading system with WNW-ESE direction coexisted with that with NNE-SSW direction around Cretaceous normal polarity superchron between the south of the Conrad Rise and off Lutzow-Holm Bay. These imply the existence of triple junction around this region and provide new constraints for the initial breakup process of the Gondwana.