Magnetic anomaly mapping around Antarctica

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Magnetic anomaly data plays an important role in understanding crustal architecture and tectonics in the Antarctic region. Magnetic anomalies obtained in the East Antarctic are used for identification of the tectonic elements and geological structures. Geodynamics and tectonic evolution of the supercontinents such as Rodinia and Gondwana are deduced from those. On the other hand, offshore magnetic anomaly data around the East Antarctic provide information on seafloor spreading history, and the breakup process and mechanism of supercontinent Gondwana are derived from those in consequence. However, magnetic anomaly observation around Antarctica, especially around the East Antarctic, are sill sparse, and the detailed tectonic evolution and fragmentation process of the supercontinents remain unknown. Magnetic anomalies in Antarctica obtained near-surface and satellite magnetic observations have been complied by the Antarctic Digital Magnetic Anomaly Project (ADMAP) working group under the Scientific Committee on Antarctic Research (SCAR). The ADMAP anomaly grid was completed in 2000 and helps to understand the geological and tectonic history around Antarctica. To produce he next generation magnetic anomaly map for the Antarctic, an ADMAP-2 has been started to integrate the new survey data into the database.
As an example of magnetic anomaly observations around the Antarctica, magnetic anomaly observations have been carried out around Syowa Station, the Japanese Antarctic wintering Station in Lützow- Holm Bay, by the shipborne, airborne and ground surveys to elucidate the tectonic evolution and breakup process of Gondwana. The area around Syowa Station is considered to be a junction of Africa, India, Madagascar, and Antarctic continents from the reconstruction model of Gondwana. Therefore, this area is a key to investigate the formation and fragmentation of Gondwana. The shipborne, airborne and ground survey data around Syowa Station made advances in understanding the tectonic evolution in this area. In particular, several characteristic features that may be related to the tectonic evolution of Gondwana were inferred primarily from magnetic anomalies by joint Japanese-German airborne geophysical surveys. A part of those magnetic data have already been used in ADMAP and new data will be incorporated into an ADMAP-2.
The present status of magnetic anomaly map around Antarctica is presented, and the examples of geological structures and the tectonic history deduced from magnetic anomaly map are introduced. Future perspective of magnetic anomaly map in Antarctica is also addressed.

Keywords: magnetic anomaly, Antarctica, geological structure, tectonics

