

キングジョージ島マリアン湾周辺の磁気異常 — 岩石磁気や海底を含む地形を考慮に入れて —

坂中伸也¹、船木寛²、中村教博³、申炯澈⁴、崔韓眞⁴、La Hyoung Sul⁴

¹ 秋田大学大学院工学資源研究科

² 国立極地研究所

³ 東北大学大学院理学研究科

⁴ 韓国極地研究所

Magnetic anomaly around Marian Cove in King George Island with bathymetric and topographic data into consideration

Shin'ya Sakanaka¹, Minoru Funaki², Norihiro Nakamura³, Hyoung Chul Shin⁴, Han-jin Choe⁴, Hyoung Sul La⁴

¹ Graduate School of Engineering and Resource Science, Akita University

² Graduate School of Science, Tohoku University

³ National Institute of Polar Research

⁴ Korea Polar Research Institute

We carried out magnetic survey during February in 2011 around Marian cove in King Georg Island, Antarctica. An Overhauser proton magnetometer (GSM-19 made by GEM Systems) was mainly used for gathering the magnetic total intensity data and a small fluxgate magnetometer with three components (FLFG27 made by Tierra Tecnica) was partly used. On land area we walked around sustaining the sensor of the magnetometers at the height of around 2.5 m with the aid of GPS loggers for the location. The sampling rate of the Overhauser magnetomer was 3 sec with 1 sec sampling of GPS posotioning. The fluxgate magnetometer can aquire the magnetic and GPS data with 10 Hz sampling. A zodiac (a rubber rafting boat with motor engine with the length of around 5 m and the width of around 2 m) belonging to Korean Antarctic basement of King Sejong station was used on Marian cove. The sensor of Overhauser proton magnetometer was made effort of fixing on the swinging boat at the height of around 2 m on the sea surface. The fluxgate magnetometer was on the hand-made small boat towed by the zodiac with a 20 m rope. On the route of the zodiac we also recorded the depth of the sea water by acoustic exploration. Such precise bathymetric data will be able to be used for further analysis of the magnetic structure.

The resuted magnetic anomalies of the total intensity at the height of the Overhauser magnetometer sensor are shown in Figure 1. The magnetic anomalies in Figure 1 are combined the land data and those acquired on Marian cove. In order to remove the diurnal geomagnetic chnages, we use the fixed reference data monitoring (1 Hz) at King Sejong Station. In Figure 2 geological map on land around Marian cove is shown. The original map was published by Lee et al. (2002) and partly picked up adjusting to the area of Figure 1. Figure 2 is slightly rotated clockwise adjusting true north up.

As shown in Figure 1, we found that the range of the magnetic anomalies in this area is up to 3000 nT. We can see intense positive magnetic anomalies on the southern shore of Marian cove (at the side of Barton peninsula). The source of these intense positive anomalies are inferred due to the intrusive granodiorite in the era of Paleocene to Eocene. At the outcrop of the granodiorite we comfirmed the color of the rocks was whitish. The grain size of magnetic-bearing minerals might be small. On the northern side of Marian cove called Weaver peninsula, east-west oriented mafic dykes are there but we cannot see the intense magnetic anomalies just around the mafic dykes. On the other hand a set of positive and negative magnetic anomalies are recognized around the gabrro outcrop just north of Marian cove on Weaver peninsula.

In the view of the topography of King Georg island we can see several east-west elongated coves in lines. Probably these coves were formed by glacier or ice erosion along a kind of pull-aprt or normal faults. In this study we conducted magnetic survey at Marian cove which is one of these coves. If we do similar surveys at other coves in arranging the same line, we might be able to discover the features of structure such as characteristic of intrusion or fault filling at this kind of coves in King Gerge island.

References

Lee, J.K., S.D. Hur, C.M. Yoo, J.P. Yeo, H. Kim, J. Hwang, M.Y. Choe, S.H. Nam, Y. Kim, B.K. Park, X. Zheng and J. Lopez-Martinez, Explanatory text of the geological map of Barton and Weaver peninsulas, King Georg island, Antarctica, Korea Antarctic Reserch Program, 2002.

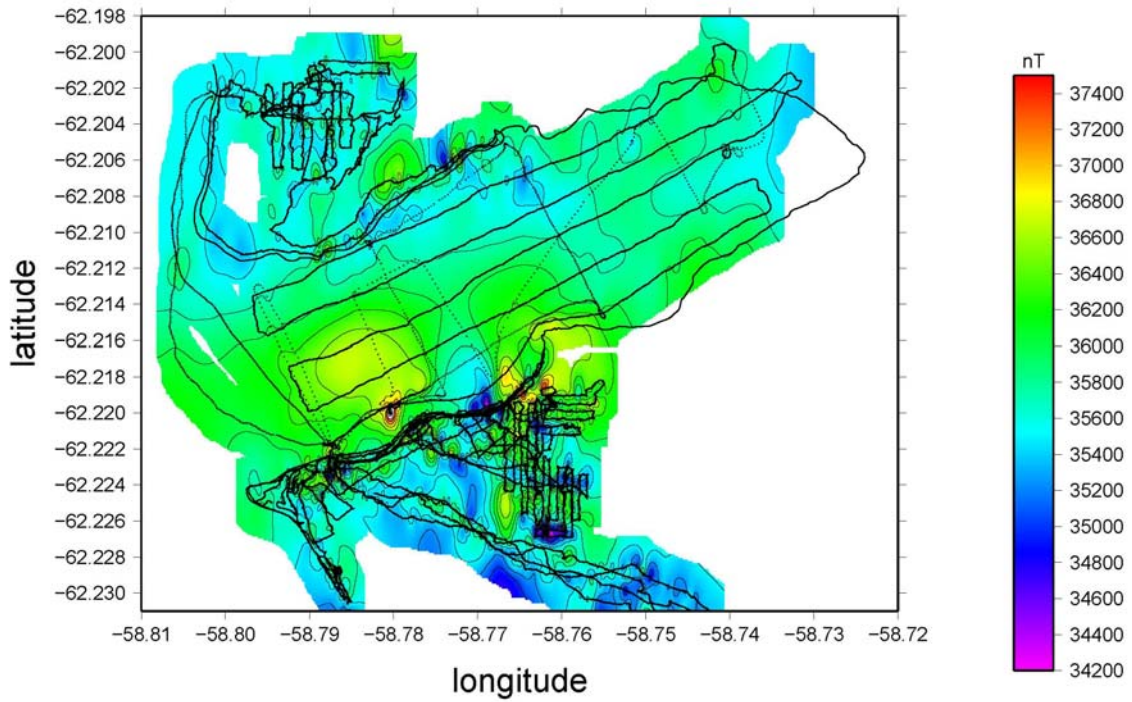


Fig.1 Magnetic anomaly around Marian Cove including the data on the sea and on the land.

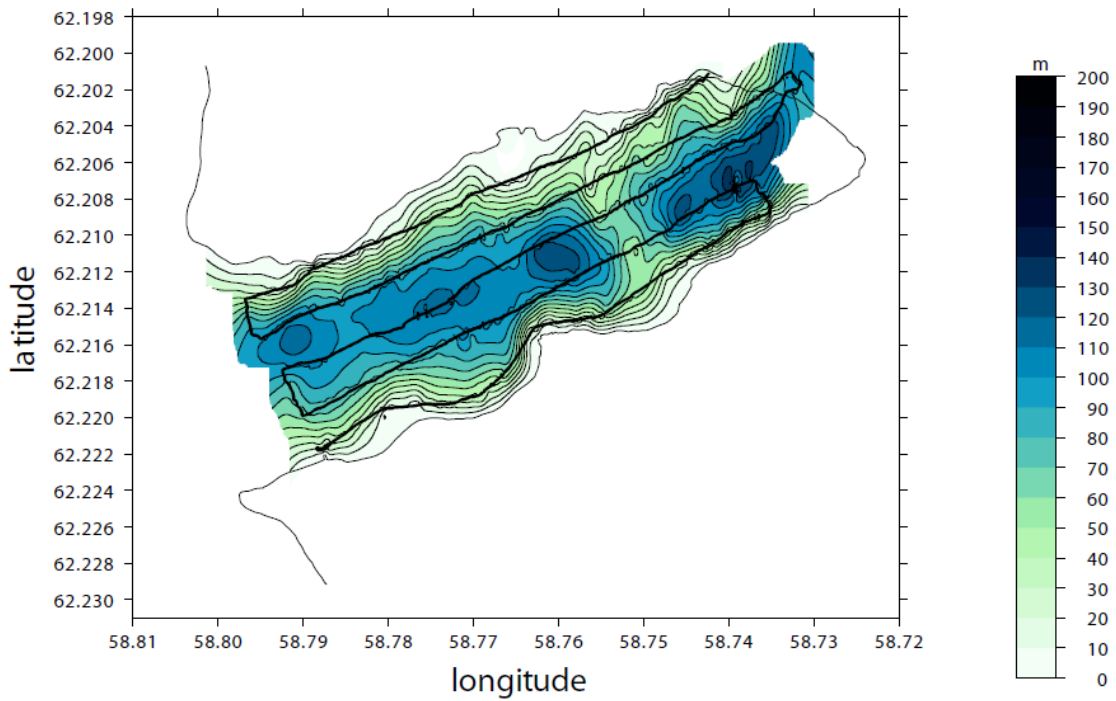


Fig.2 Bathymetric data at Marian cove measured by the sonic wave instrument by Korean King Sejong Station staff.