Present-day crustal motion and gravity change around the Lützow-Holm Bay region based on GIA modeling

Jun'ichi Okuno[1, 2], Koichiro Doi[1, 2], Yuichi Aoyama[1, 2], Takeshige Ishiwa[1], Akihisa Hattori[2] and Yoichi Fukuda[3]
[1]*Natinal Institute of Polar Research*
[2]*SOKENDAI (The Graduate University for Advanced Studies)*
[3]*Kyoto University*

Geodetic and geomorphological surveys in the Lützow-Holm Bay region, East Antarctica have been conducted by Japanese Antarctic Research Expedition (JARE) to evaluate the crustal deformation induced by Glacial Isostatic Adjustment (GIA) in various time scales. In particular, several geodetic observations (e.g., Global Navigation Satellite Systems: GNSS and absolute gravity observations) have been carried out on outcrop rocks in this area since the 1990s to monitor crustal movements related to the Antarctic Ice Sheet (AIS) change (e.g., Ohzono, 2006, Kazama et al., 2013). These observations include the components of the GIA induced by the melting of AIS from Last Glacial Maximum (~21,000 years before present) and elastic deformation due to present surface mass balance. Therefore, to estimate the change of AIS based on the geodetic signals, it is crucial for the separation of the components of viscous and elastic signals in comparison of these observations with numerical predictions based on the GIA modeling. In this presentation, we will show the crustal deformation rates and gravity changes calculated by the GIA modeling using the previously published deglaciation histories and the comparisons with these observations obtained by JARE for about 20 years. Preliminary results show that the numerical predictions of the crustal deformation rates due to only last deglaciation cannot explain the recent observations of GNSS sufficiently. We intend to discuss the separation of the components between recent ice mass change and the last deglaciation, and estimate influences of recent AIS mass changes on the geodetic measurements in the Lützow-Holm Bay region.

References

Ohzono M., T. Tabei, K. Doi, K. Shibuya and T. Sagiya, Crustal movement of Antarctica and Syowa Station based on GPS measurements. Earth, Planets and Space, 58(7), 795-804, 2006.
Kazama T., H. Hayakawa, T. Higashi, S. Ohsono, S. Iwanami, T. Hanyu, H. Ohta, K. Doi, Y. Aoyama, Y. Fukuda, J. Nishijima and K. Shibuya, Gravity measurements with a portable absolute gravimeter A10 in Syowa Station and Langhovde, East Antarctica. Polar Science, 7(3-4), 260-277, 2013.