Relative sea-level reconstruction using glacial isostatic adjustment model with changes in Antarctic Ice Sheet volume during glacial period

Takeshige Ishiwa[1] and Jun'ichi Okuno[1,2]
[1] *National Institute of Polar Research*
[2] *Department of Polar Science, SOKENDAI*

Glacial isostatic adjustment (GIA) model through sea-level equation (Farrell and Clark et al., 1976) is useful to reconstruct past sea-level change. A comparison of predicted RSL with observations using marine sediment cores and corals leads to improvement of continental ice-sheet history (e.g., Deschamps et al., 2012). The Last Glacial Maximum (LGM: ~20,000 years ago) is characterized by the maximum volume of continental ice sheet. This period is important to understand glacial-period earth system due to the comprehensive comparison of a plenty of paleoclimatic proxies. However, the global ice volume during the LGM ranges from ~160 to 100 m ice volume equivalent sea level because of large uncertainty in observations and each continental ice-sheet history (Clark and Tarasov, 2014). Moreover, the global ice volume established by far-field records does not match with a sum of individual ice sheets volume reconstructed by near-field records. This discrepancy, "missing LGM ice", leads to uncertainties in the LGM boundary condition (Clark and Tarasov, 2014). In case of Antarctic ice sheets, the wide range of ice volume during the LGM is occurred, corresponding to 5–30 m ice volume equivalent sea level.

Here, we demonstrate relative sea-level change using glacial isostatic adjustment (GIA) model to determine the potential Antarctic ice sheet volume during the LGM. We adopt the various Antarctic ice sheet history as ice model and detect the regional difference of predicted relative sea-level change. The comparison of the predictions with near- and far-field relative sea-level records would provide information of the Antarctic ice sheet volume during the LGM and solution key of "missing LGM ice".

References

Farrell, W. E., Clark, J. A. On Postglacial Sea Level. *Geophysical Journal of the Royal Astronomical Society* **46**, 647–667 (1976)

Deschamps, P. et al. Ice-sheet collapse and sea-level rise at the Bølling warming 14,600 years ago. *Nature* **483**, 559–564 (2012)

Clark, P. U. & Tarasov, L. Closing the sea level budget at the Last Glacial Maximum. *Proceedings of the National Academy of Sciences **111***, 15861–15862 (2014)