最終氷期最盛期における南極氷床拡大範囲と氷床量

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Spatial distribution and volume of Antarctic Ice Sheet at Last Glacial Maximum

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Spatial and temporal variations of the Quaternary sea-levels have the important informations on melting history of the major ice sheets. In particular, the prediction of relative sea-level (RSL) along the coast of Antarctica calculated by glacial isostatic adjustment (GIA) modelling is dependent on the variation of configuration and thickness of the Antarctic ice sheet since Last Glacial Maximum (LGM) around 20 kaBP because the crustal rebound by deglacial unloading of local ice sheet is dominant component of RSL in this region. In previous study, Nakada et al. (2000) used GIA models to generate a snapshot of the ice sheet at a series of time slices between LGM and the present day, and this reconstruction was tuned using glacial geological data of RSL around the Antarctica. Furthermore, Ivins and James (2005) developed the last deglaciation history and recent change of Antarctic ice sheet to explain geodetic signals of vertical and horizontal crustal motion, gravity-field change in addition to RSL data set. However, viscous response to last deglacial unloading of Antarctic ice sheet is poorly constrained because there are few Holocene RSL histories available. Hence estimates of the contribution of Antarctic ice loss to global sea level rise in the last deglaciation vary greatly: 10 m (Ivins and James, 2005), 14 m (Denton and Hughes, 2002), 18 m (ICE-5G: Peltier, 2007), and 7-17 m (Nakada et al. 2000). Therefore we highlight the two ambiguous components of Antarctic ice melting history that are the onset of the melting in last deglaciation and the position of the edge of Antarctic ice sheet at LGM. In particular, the continental shelf around Antarctica is very deep about 800 - 1000 m below present sea-level, then the ice sheet at LGM can not extent to the continental shelf. In this study, we present a comparison between RSL predictions derived by GIA modelling and the sparse Antarctic RSL data set, and discuss potential reasons for any misfit. We therefore highlight key locations that we can obtain the important informations in order to reduce uncertainty within Antarctic ice sheet models.

References

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