

Accurate estimation of current East Antarctic ice sheet and sea level changes based on geodetic and Quaternary geological study

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Mass balance of Antarctic ice sheet is one of key major factors that cause sea level change and urgent question. However, current mass balance of East Antarctic ice sheet still remains poorly resolved. Solid Earth response to change in ice sheet mass such as glacial isostatic adjustment (GIA) plays an important role for estimating mass balance, and determining past extent and retreat of the ice sheet is required for precise modeling of the solid Earth response. Consequently, observation of the present and past changes in ice mass and solid Earth response are required to elucidate current mass balance of East Antarctic ice sheet.

We propose a research plan for precise estimation of current mass balance of Antarctic ice sheet from mainly geodetic and Quaternary geological approach. The specific observations and analyses to be carried out are as follows;

[Geodetic and geophysical investigations]

- Analysis of satellite data (Altimetry, Gravity mission, Synthetic Aperture Radar)
- Observations by gravimeter and Global Navigation Satellite System (GNSS) on the ground and ice sheet,
- Current relative sea level change monitoring by bottom pressure gauge in Syowa Station,
- Current sea water mass change observation by ocean bottom pressure gauge,
- Thickness estimation of lithosphere by seismic exploration,
- Comprehension of base map and ice thickness by airborne radiometric survey,

[Quaternary geological investigations]

- Reconstruction of post glacial sea level change on the coastal region of East Antarctica,
- Reconstruction of temporal ice surface height change after the Last Glacial Maximum (LGM) in inner mountainous regions of East Antarctica,
- Determinations of maximum extent position of East Antarctic ice sheet in the LGM and its recession history in continental shelf,
- Production of East Antarctic ice sheet extent in the LGM from GIA modeling by using data from above three research and assumed earth's visco-elastic structure,
- Estimation of heat flow deduced from geological structure under Antarctic ice sheet by geological and airborne survey.

We aim at precise estimation of recent ice mass loss of East Antarctica and its contribution to sea level change according to the history of East Antarctic ice sheet mass loss since the LGM reconstructed through the GIA model with taking in the results of recent crustal displacements and gravity changes derived by geodetic observations.