

A new research project on the interaction of the solid Earth and the Antarctic Ice Sheet: Summary of the first year activities

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A new research project of "Grant-in-Aid for Scientific Research on Innovative Areas" funded by JSPS (Japan Society for the Promotion of Science) has recently been launched. The title of the project is "Giant reservoirs of heat/water/material: Global environmental changes driven by Southern Ocean and Antarctic Ice Sheet", and as a five years project, is aiming to establish a new research area for Antarctic environmental system science.

The project consists of 7 research topics, including Antarctic ice sheet and Southern ocean sciences, new observation methodology, modeling and other interdisciplinary topics, and we are involved in the topic A02-2, "Interaction of the solid Earth and the Antarctic Ice Sheet".

The Antarctic ice sheet, which relates to the global climate changes through the sea level rise and ocean circulation, is an essential element of the Earth system for predicting the future environment changes. Thus many studies of the ice sheet changes have been conducted by means of geomorphological, geological, geodetic surveys, as well as satellite gravimetry and satellite altimetry.

For these studies, one of the largest uncertainties is the effects of GIA (Glacial Isostatic Adjustment), which is the viscoelastic response of the solid Earth to the loading mass changes. Although GIA is a key to investigate the interaction between the solid Earth and the ice sheet changes, in-situ data for constraining GIA models are very few in East Antarctica and this is the main reason of the large inconsistency among the GIA models in Antarctica. Therefore we plan to conduct geomorphological, geological and geodetic surveys in the inland mountain areas and the coastal areas including the surrounding areas of a Japanese station Syowa in East Antarctica. Combining these new observations with other in-site data, various satellite data and numerical modeling, we aim to estimating a precise GIA model, constructing a reliable ice melting history after the last glacial maximum and obtaining the viscoelastic structure of the Earth's interior.

A part of the first year activities, we have conducted absolute gravity measurements and GNSS observations at several outcrop areas near Syowa station, and other field surveys. In the presentation, we will report the preliminary results of these surveys and the outline of other activities as well as the five years research plans.

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