
[EJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS06]Global climate change driven by the Southern Ocean and the Antarctic Ice Sheet

convener: Osamu Seki(Institute of Low Temperature Science, Hokkaido University), Akira Oka(Atmosphere and Ocean Research Institute, The University of Tokyo), Ryosuke Makabe(国立極地研究所, 共同), Ryu Uemura(University of the Ryukyus)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

The Southern Ocean and Antarctic ice sheet, which are the giant reservoirs of heat, water, and materials, have a potential to play central roles in long-term global climate change. This system is composed of the following sub-systems; ice shelf which is a place of the interaction of ice sheet and ocean, flowing iceberg, seasonal sea ice zone, Antarctic bottom water which drives the thermohaline circulation, active biological production and Antarctic Circumpolar Current. These sub-systems are interacted with each other and have significant impact on changes in the global environmental system. This session aim to summarize recent observational and simulation studies from various fields relating to the past and present changes in the Antarctic Ice sheet and Southern Ocean, which are essential elements for unraveling the changes in the global climate system. Further, future science plans for understanding of the environmental changes of the Antarctic Cryosphere is also discussed.

[MIS06-P15]A new research project on the interaction of the solid Earth and the Antarctic Ice Sheet: Summary of the first year activities

*Yoichi Fukuda¹, Jun Nishijima², Takahito Kazama¹, Kazuki Nakamura³, Koichiro Doi⁴, Yusuke Suganuma⁴, Jun'ichi Okuno⁴, Akito Araya⁵, Heitaro Kaneda⁶, Yuichi Aoyama⁴, Hideki Miura⁴ (1.Department of Geophysics, Graduate School of Science, Kyoto University, 2.Graduate School of Engineering, Kyushu University, 3.Faculty of Engineering, Nihon University, 4.National Institute of Polar Research, 5.ERI, University of Tokyo, 6.Graduate School of Science, Chiba University)

Keywords:Glacial Isostatic Adjustment, Ice sheet melting, Sea level rise, East Antarctica

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.

This study was partially supported by JSPS KAKENHI Grant No. 17H06321.