Changes in the ice sheet, glaciers, ocean, climate and environment in Greenland

Shin Sugiyama[1, 2], Kumiko Gogo-Azuma[3, 4] and ArCS Greenland Project members
[1] *Instutute of Low Temperature Science, Hokkaido University, Japan*
[2] *Arctic Research Center, Hokkaido University, Japan*
[3] *National Institute of Polar Research, Japan*
[4] *SOKENDAI (The Graduate University for Advanced Studies)*

Ice sheet, glaciers and the ocean in and around Greenland are rapidly changing under the influence of climate changes in the Arctic. For instance, Greenland ice sheet is losing mass for the last decades which results not only in sea level rise, but also in changes in the global climate and ocean circulations. These environmental changes are also relevant to the human societies and economies in Greenland. Despite the importance, the mechanisms of abrupt environmental changes in Greenland are not well understood. To better understand the past and ongoing changes in Greenland, and to predict the future, we initiated researches on (1) variability of the Greenland ice sheet and climate, which focuses on Greenland's interior areas; and (2) ice sheet/glacier-ocean interaction in Greenland, which focuses on the coastal regions of Greenland.

In the first subject on the "variability of the Greenland ice sheet and climate", we participate in an international ice coring project (East Greenland Ice Core Project, EGRIP) led by Denmark. The project aims to drill a deep ice core to the bed at the onset of the North-East Greenland Ice Stream (NEGIS), the largest ice stream in Greenland. The ice core and borehole observations are utilized to reconstruct the climate, environment and ice sheet elevation/extent during the Holocene and the last glacial period. In the summer 2016, two project members joined the field activity at the EGRIP site.. The first part of the ice core was successfully retrieved, and observations relevant to ice core studies, such as snow pit observations and sampling, were carried out.

The project on "ice sheet/glacier-ocean interaction in Greenland" aims to quantify glacier and ice sheet changes in Greenland, with special attention to ice sheet/glacier-ocean interaction. We also investigate the impact of these changes on human activities in the region. To this end, we perform field and satellite observations, sampling and analyses of snow/ice and sea water, and numerical modeling of the ice sheet/glaciers and the ocean in Greenland. From June to August 2016, field observations were carried out in the vicinity of Qaanaaq in northwestern Greenland. Measurements were performed at Bowdoin Glacier, Qaanaaq Ice Cap and nearby fjords to understand the influence of glacier discharge on physical, chemical and biological environments in the ocean. After the field activities, we organized a workshop with indigenous people in Qaanaaq to introduce our research activities and exchange ideas about recent changes in natural and social environments.

In this contribution, we introduce the background and aim of the ArCS Greenland project, and present the overview of our research activities in 2016.

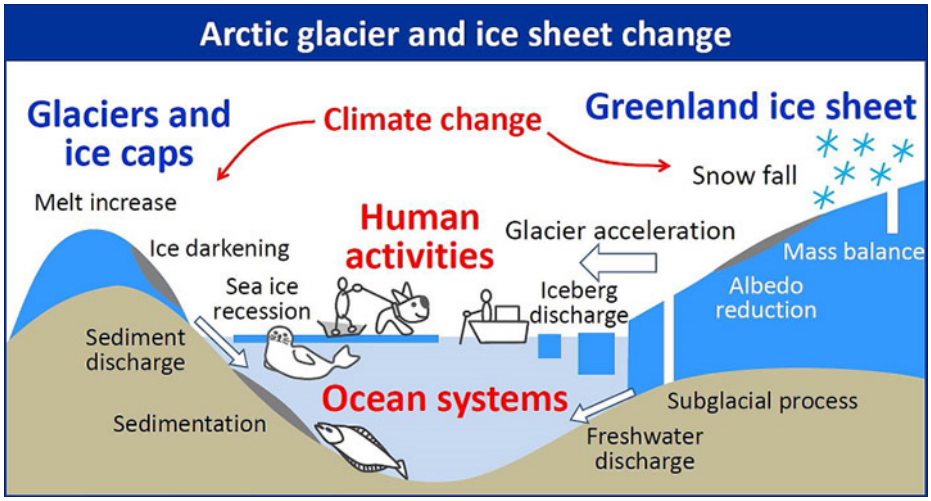

Figure 1. Schematic diagram showing the research targets of the ArCS Greenland project.