B10-O05

MODELING THE FLOW DYNAMICS OF THE BOWDOIN GLACIER, QAANAAQ REGION, NORTHWESTERN GREENLAND

Hakime Seddik *(Institute of Low Temperature Science, Hokkaido University, Japan)*
Ralf Greve *(Institute of Low Temperature Science, Hokkaido University, Japan)*
Shin Sugiyama *(Institute of Low Temperature Science, Hokkaido University, Japan)*
Daiki Sakakibara *(Institute of Low Temperature Science, Hokkaido University, Japan)*

hakime@lowtem.hokudai.ac.jp

The Qaanaaq drainage basin, situated in the northwestern part of the Greenland ice sheet, is a typical Greenlandic drainage basin that consists of an inland accumulation area and a marginal ablation area with a number of fast-flowing outlet glaciers. It is still relatively unexplored and therefore the focus of field and remote sensing activities (ice thickness, mass balance, surface velocity etc.) in Greenland, conducted within the Green Network of Excellence (GRENE) Arctic Climate Change Research Project (www.nipr.ac.jp/grene).

Located 30 km northeast of Qaanaaq, Bowdoin Glacier (77º41' N, 68º35' W) is a fjord-terminating glacier which was intensively surveyed in the GRENE field campaign in summer 2013 and 2014. Here we present the modeling of the Bowdoin Glacier dynamics with the full Stokes model Elmer/Ice (http://elmerice.elmerfem.org). Using the available data set for the basal and surface topographies (Bamber and others, 2013, and own, still unpublished data for the Qaanaaq region), a high resolution footprint of the glacier is created and vertically extruded using 11 terrain-following layers to form the three-dimensional finite element mesh. The model is fully thermo-mechanically coupled by solving the full Stokes and the energy equations. The numerical solution is obtained by using a direct solver coupled with stabilization procedures.

We will first carry out steady-state simulations driven by present-day climatic conditions and, by comparison with observational data, try to understand the dynamic and thermodynamic state of the glacier. More specifically we aim at understanding and explaining the observed present-day flow pattern of the Bowdoin Glacier. The second stage of the study will focus on sensitivity experiments in order to estimate the glacier variations under a changing climate.

Bamber J.L. and 10 others (2013): A new bed elevation dataset for Greenland. The Cryosphere, 7, 499-510.