Geophysical Research Abstracts
Vol. 16, EGU2014-3168, 2014
EGU General Assembly 2014

Thermodynamic Modelling of Jakobshavn Isbrae, West Greenland

Johannes H. Bondzio and Angelika Humbert

Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven, Germany
(johannes.bondzio@awi.de)

Jakobshavn Isbræ, West Greenland is one of the major outlet glaciers in Greenland, draining about 6% of its ice sheet (Rignot and Kanagaratnam, 2006). During the last two decades the glacier underwent rapid changes. In a seemingly simultaneous process, its formerly floating ice tongue disintegrated, the glacier thinned and tripled its speed at its retreating calving front (Joughin et al., 2008, 2012). As of 2013, the glacier is still far from a steady state.

The exact chain of feedback processes causing the speedup is yet to be fully understood. Various modelling approaches to the glacier exist (e.g. V.d. Veen et al., 2011, Joughin et al., 2012), but assume a isothermal regime and use simplified flow models, possibly leaving out crucial aspects of the process of acceleration (Pattyn et al., 2013).

The aim of the work presented here is to contribute to the understanding of the acceleration of Jakobshavn Isbræ using the software package ISSM (Larour et al., 2012). Its focus lies on the influence of thermal regime and geometry of the glacier on its flow regime.

A simplified enthalpy formulation in ISSM (Seroussi et al. 2013) has been completed to match the enthalpy formulation as described in Aschwanden et al., 2012. Preliminary results of a fully coupled, transient, thermodynamic Stokes model of the Jakobshavn Isbræ will be presented. A concept for a method to model its calving front evolution will be outlined.