Geophysical Research Abstracts
Vol. 15, EGU2013-5175, 2013
EGU General Assembly 2013

Modeling of the present surface mass balance over the Ellesmere Island using the regional climate model MAR

Sylvain Watelet, Brice Noel, Xavier Fettweis, and Michel Erpicum
University of Liège, Department of Geography, Liège, Belgium (swatelet@student.ulg.ac.be)

High latitudes are the most affected by recent global warming due to the albedo positive feedback. In particular, there is the Canadian Arctic Archipelago (CAA) which contains one-third of the world's land ice, outside both Greenland and Antarctica ice sheets. According to GRACE measurements between 2003 and 2010, the CAA glaciers and ice caps (Ellesmere and Baffin Island) are those with the highest melt rates (respectively -34$\pm$6 and -33$\pm$5 Gt.yr^{-1}), after Alaska and the two ice sheets.

The Ellesmere Island, part of the CAA, is located between 76 and 83° N and between 61 and 92° W, beyond the Arctic Circle. About 40% of its surface is covered by ice caps and glaciers, which represent 77600 km^2. Also included in our region of interest, there are Axel Heiberg and Devon Islands which surround Ellesmere respectively by west and south sides.

In this study, we reconstruct the near surface climate and surface mass balance (SMB) of these ice caps between 1979 and 2012, using the regional climate model MAR, forced at its boundaries by the ERA-Interim reanalysis.

As validation, we first compare MAR climatic outputs to weather station measurements (temperature and precipitation) from the Environment Canada. An evaluation of MAR versus ERA-Interim and recent ASR reanalysis is also performed. This comparison includes three MAR simulations using different spatial resolutions (25, 20 and 15 km) for testing the sensitivity of results to this parameter.

Finally, we characterise the spatiotemporal variability of the retrieved SMB and other climate parameters. Furthermore, a comparative analysis between this work and recent estimations, remote data and in situ observations of SMB is achieved in order to validate our model outputs.