Geophysical Research Abstracts
Vol. 18, EGU2016-9352, 2016
EGU General Assembly 2016

Very high resolution surface mass balance over Greenland modeled by the regional climate model MAR with a downscaling technique

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This study presents surface mass balance (SMB) results at 5 km resolution with the regional climate MAR model over the Greenland ice sheet. Here, we use the last MAR version (v3.6) where the land-ice module (SISVAT) using a high resolution grid (5km) for surface variables is fully coupled while the MAR atmospheric module running at a lower resolution of 10km. This online downscaling technique enables to correct near-surface temperature and humidity from MAR by a gradient based on elevation before forcing SISVAT. The 10 km precipitation is not corrected. Corrections are stronger over the ablation zone where topography presents more variations. The model has been force by ERA-Interim between 1979 and 2014. We will show the advantages of using an online SMB downscaling technique in respect to an offline downscaling extrapolation based on local SMB vertical gradients. Results at 5 km show a better agreement with the PROMICE surface mass balance data base than the extrapolated 10 km MAR SMB results.