



How does the ocean surrounding the Greenland ice sheet impact its surface mass balance ?

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During summer 2012, melt record was observed over the Greenland Ice Sheet (GrIS). It most certainly results from more frequent negative phases of the North-Atlantic Oscillation (NAO) favoring warmer conditions over the GrIS.

Anomalies in sea ice cover (SIC) and sea surface temperature (SST) don't seem to be involved in these recent GrIS melt records.

To demonstrate this hypothesis, a set of sensitivity experiments using different SIC and SST has been achieved to estimate the impact of these variables on the GrIS surface mass balance (SMB) and katabatic winds strength over 2007-2012. These sensitivity tests consist of single or coupled fluctuations of SST and SIC, using the regional climate model MAR forced by the ERA-INTERIM reanalysis.

Comparisons of these sensitivity experiments to the reference one show that changes in SST and SIC surrounding Greenland have not a direct impact on the GrIS SMB due to the katabatic winds. Indeed, continental katabatic winds are strong enough to prevent the synoptic oceanic wind, influenced by SIC and SST variability, from penetrating into the GrIS. However, anomalies in SST and SIC could have affected the general circulation over Greenland.