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Modelling of the surface mass balance in Svalbard with the regional climate MAR model over 1958-2010.

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It is well known that high latitude zones are very sensitive to climate change. As a result of global warming, ice sheet melting has increased which in turn has an influence on climate through modifications of the thermohaline circulation, feedback of ice albedo, sea level rise, ...

Svalbard is an archipelago between 74 and 81°lat N and 60 percent of its area (62 248 km2) is covered with glaciers and ice sheets. The impact of global warming on the Svalbard cryosphere can be estimated with climate models. However, we need to use regional climate models as they offer the possibility of a higher resolution than general circulation models.

We have carried out a simulation of the Svalbard climate over the last 50 years (from 1958 to 2010) with the regional climate MAR model (tuned for the Greenland ice sheet) at a 10 km resolution forced with the ECMWF reanalysis. As validation, the modelled climate has been compared to near surface measurements at several weather stations through the archipelago.

The results show a large interannual variability of the surface mass balance over Svalbard along with an increasing melting since the 1990's. The variability is due to the variations of the Artic Oscillation and the significant increase in temperature is responsible for the melting rate.