Increasing meltwater discharge from the Greenland ice sheet into Nuuk Fjord and implications for glacier mass balance

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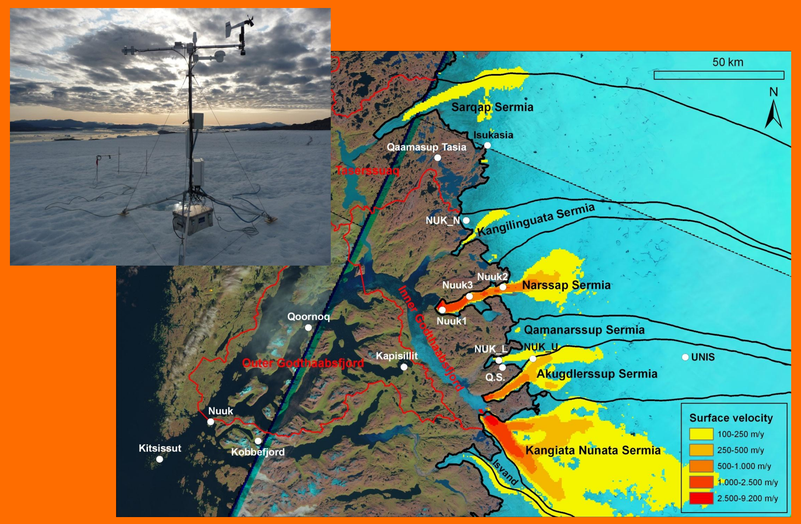
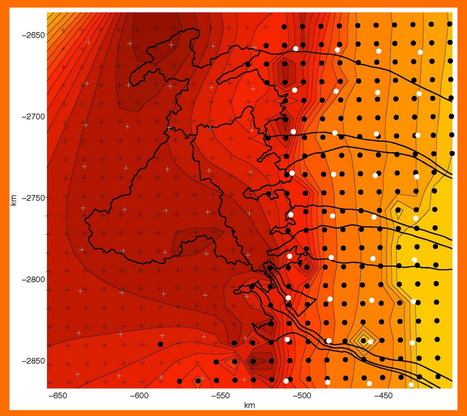
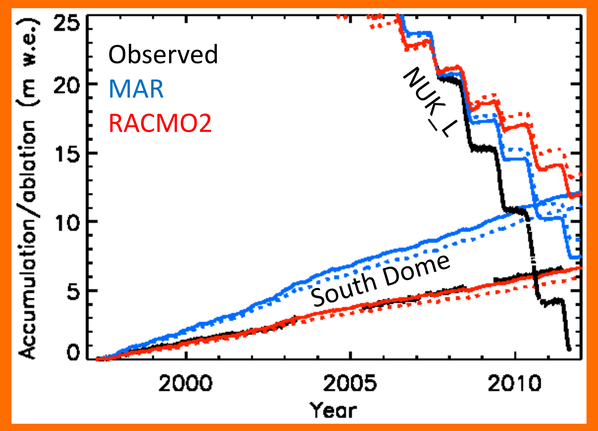


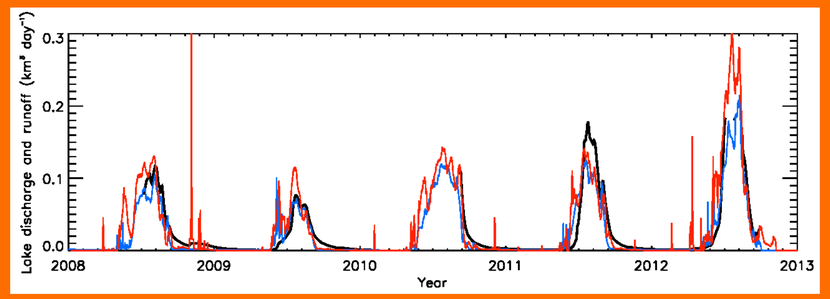
Observations from 13 automatic weather stations are used for regional climate model validation in the Nuuk region. Here, 3 GEUS weather stations are located in the ablation zone of the ice sheet (Greenland Climate Research Centre and Programme for Monitoring of the Greenland Ice Sheet (PROMICE)).

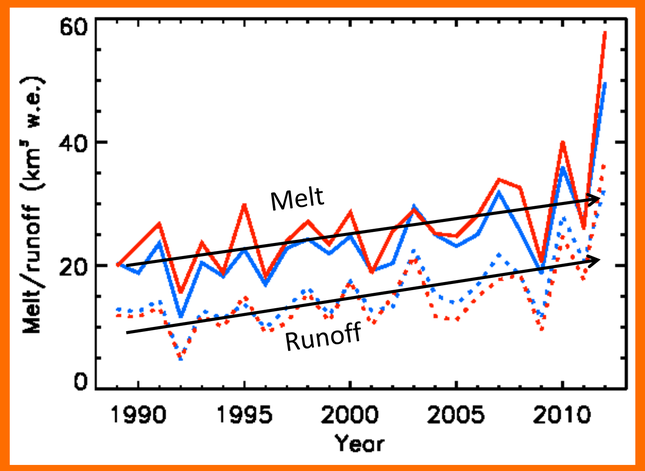


Two climate models are used; MAR and RACMO2. Because their spatial resolutions do not resolve the actual ice-sheet outline we interpolate their output to a smaller grid spacing.

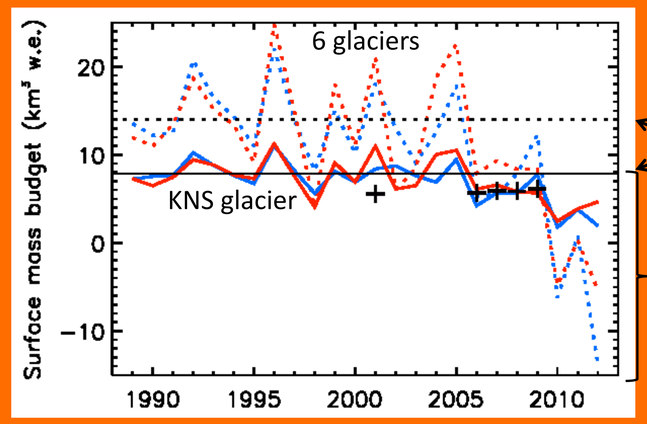


The most important steps in the validation of the regional climate models are those comparing modelled and measured values of:
- accumulation and ablation at the on-ice weather station sites and
- runoff from the Sarqap Sermia catchment into Taserssuaq lake





Meltwater runoff from the Nuuk region has roughly doubled in 2 decades.



The mass budget for the region is turning negative, not even taking into account the solid ice discharge from the calving glaciers. Compensating for the calving flux from Kangiata Nunata Sermia, we find that the glacier has been losing mass in recent years.

If 2010 melting conditions were to prevail or intensify during the remainder of this century, which is plausible given various future climate scenarios, a low-end estimate of SMB contribution to sea level rise of 5 mm is expected by 2100, from this relatively small section (2.7%) of the ice sheet alone.