



## **Very High Resolution 2.5km Surface Mass balance Modelling Forced with Non-Hydrostatic HARMONIE-AROME**

Ruth Mottram (1), Peter Langen (1), Kristian Pagh Nielsen (1), Xiaohua Yang (1), and Emily Gleeson (2)

(1) Danish Meteorological Institute, Arctic and Climate Research, København, Denmark, (2) Met Eireann, Glasnevin Hill, Dublin 9, Ireland

The numerical weather prediction (NWP) model system HARMONIE, developed in collaboration between 26 European and Mediterranean countries by the ALADIN-HIRLAM consortium, offers an opportunity for extraordinarily high resolution surface mass balance (SMB) modelling. We present some initial experimental simulations where HARMONIE-AROME output from the DMI's operational NWP system, is used to force an offline SMB model for the whole of Greenland. The output from HARMONIE-AROME is compared with automatic weather station data from the PROMICE network on the ice sheet to evaluate its performance. We find the HARMONIE-AROME to represent the surface weather over the ice sheet very well, in particular 2m temperature, surface temperature and wind speeds are well reproduced. Ongoing work to assess precipitation is complicated by the difficulties of measuring solid precipitation in Greenland. The SURFEX model provides the surface scheme for HARMONIE-AROME and output from this part of the model is compared with that from the offline SMB model to assess the comparability of HARMONIE-AROME with the HIRHAM5 regional climate model.

Improved SMB modelling is crucial in Greenland and Iceland not just to assess the rate of glacier change and sea level rise but also to facilitate infrastructural considerations such as communal water supplies, hydropower development and mineral extraction. The model evaluation here suggests that HARMONIE may be helpful in existing NWP domains that cover for example the Svalbard archipelago, the Alps and the Scandinavian mountain glaciers, in order to assess glacier runoff and change.