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Modelling Glaciers in the ALADIN-HIRLAM Numerical Weather Prediction System

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The ALADIN-HIRLAM numerical weather prediction (NWP) system is used for high resolution operational weather forecasting by 26 national meteorological services in Europe and North Africa which form the HIRLAM (High Resolution Limited Area Model) and ALADIN (Aire Limitée Adaptation dynamique Développement International) consortia. This system is now also being adopted for climate research purposes as a limited area model known as HCLIM.
The HARMONIE-AROME canonical configuration of the ALADIN-HIRLAM system is used for operational forecasting over Greenland but does not include glacier parametrizations. We have shown that improving the characterization of glacier surfaces improves the NWP forecasts over this domain. In addition, we have taken some steps towards implementing a glacier scheme in the model, which includes accurate ice melt and run-off computations, which are important for ice surface mass balance estimations and hydropower forecasting. These improvements should also improve NWP forecasts over the Icelandic, Svalbard archipelago, Alps and Scandinavian mountain glaciers and will be very important for HCLIM climate and glaciological applications.
Here, we report the first results from experiments using improved characterization of glaciers compared to observations from the PROMICE network of automatic weather stations in Greenland.