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Towards a remote monitoring of near real-time glacier mass balances

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In the last decades glaciers worldwide have been losing mass in an unprecedented speed. However, quantitave information of the actual mass changes of glaciers is not available before the processing of the annual measurements during late summer. The aim of this research is to reduce this deficit of information by installing a widely automatic glacier measurement system, which is able to measure glacier mass changes in near real time on a daily or hourly timescale and to present the results to a broader public via a web-based glacier information system.

This remote monitoring network was designed for and installed on four glaciers that are currently monitored by ZAMG. Kleinfleißkees and Goldbergkees on Sonnblick and Pasterze on Großglockner in the National Park Hohe Tauern (Austria) and Freya Glacier in the Northeast-Greenland National Park.

The remote monitoring of glacier mass balance uses mainly two different types of data, which are available online in near real time (delay from 10 minutes on Austrian glaciers to 1 day in Greenland). Glacier mass balance is measured on at least one point on the glacier surface by continuous logging of surface ablation and snow accumulation. To extend that information over the whole glacier surface, the spatial retreat of the seasonal snow line is measured by automatic cameras using the software PRACTISE (HÄRER et al., 2016). By assimilating all those data into a distributed mass balance model, the surface mass balance of a glacier can be monitored the best possible way in near real time. The model used for this purpose is based on the operational Austrian snow cover model SNOWGRID (OLEFS et al., 2013). In this contribution we present selected results from the different measurements of the monitoring network and discuss the model results in regard to different data assimilation procedures.