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AREA OF EXPERTISE:	Glaciers, Remote Sensing
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DATE OF DISPUTATION:	21st of October 2016
DISSERTATION TITLE:	*Analysis of glacier surface velocity using repeat Synthetic Aperture Radar (SAR) images*

Isbreer dekker store deler av Svalbard og hver av dem har sin egen karakteristiske dynamikk. Ved hjelp av data fra satellitter er det mulig å studere breenes dynamikk nærmere. I denne studien undersøker PhD student Thomas Schellenberger bevegelsene til breene og deres bidrag til den globale havnivåstigningen. Han belyser også et av de store mysteriene innenfor glasiologien - 'surgende breer'.

Understanding the dynamics of Svalbard's glaciers from space

Glaciers, ice caps and ice sheets are nowadays important contributors to global sea level rise. In his PhD thesis, Thomas Schellenberger investigates the dynamics of Svalbard's glaciers using remote observation data of the archipelago taken by the satellites TerraSAR-X and Radarsat-2. Glacier velocities can vary highly between a few centimeters per year and up to 50 meters per day. He uses the radar satellite data to extract glacier velocities of all fast flowing glaciers on Svalbard and changes in their extend. From these data it is possible to estimate the iceberg production of the glaciers which terminate in the sea.

The research reveals that continuous monitoring of glacier surface velocity is very important to quantify the highly variable iceberg production rate of the archipelago. For example, Basin-3, one glacier belonging to the largest ice cap of Svalbard, Austfonna, speeded up from less than 1m per day up to ~20m per day within a couple of month - a phenomenon called surging. The related sea-level rise contribution from this surge was as large as the annual ice-mass loss of all other glacier from the entire Svalbard archipelago.

In this PhD study Schellenberger was also able to identify the seasonal and interannual variations in surface velocity and iceberg production of two of the fastest flowing glaciers, Kronebreen and Kongsbreen in NW-Svalbard close to Ny-Ålesund. These variations are closely linked to changes in the hydrological system of the glaciers due to surface melt and rain. Both glaciers also retreated significantly during the last years.

The study was carried out in the project RASTAR financed by the Research Council of Norway (http://www.mn.uio.no/geo/english/research/projects/rastar/index.html).

Open access to the scientific journal publications:
Schellenberger et al. 2015 (http://www.the-cryosphere.net/9/2339/2015/)
Dunse et al. 2015 (http://www.the-cryosphere.net/9/197/2015/)
Schellenberger et al. 2016 (http://www.mdpi.com/2072-4292/8/9/785)