



Glacier volume changes 1970-2006 on Edgeøya, Eastern Svalbard, using ASTER satellite stereo and ICESat GLAS data

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Whereas the mass balance of ice caps in north-eastern Svalbard is extensively studied, little is known about volume changes in the South-East of the archipelago. In deed, one of the major current methodological gaps in the observation of glaciers from space is the measurement of volume changes of mountain glaciers and ice caps. Both motivations lead us to conduct a case study of intercomparing a photogrammetric digital elevation model derived from ASTER satellite optical stereo, elevation data from the ICESat GLAS instrument, and contour lines from a topographic map from the 1970s for several ice caps on Edgeøya. We obtain an overall thickness change between -0.5 m/yr and -0.6 m/yr between 1970 and 2002 (ASTER), or ICESat (2006) respectively. Ice thickness changes at the snouts of outlet glaciers amount up to -80 m, but remained nearly stable in the highest elevations. From comparison of different methods and quality checks we estimate the error of this numbers to be in the order of 5%. The study demonstrates that and how long-term glacier volume changes can be observed from space over a large number for ice caps and glaciers.