

B10-P02

SURFACE ELEVATION CHANGE ON ICE CAPS IN NORTHWESTERN GREENLAND

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A large number of glaciers and ice caps (GIC) is distributed along the Greenland coast, being physically separated from the ice sheet (e.g. Raster and others, 2012). The total area of the GIC accounts for 5 % of the ice cover in Greenland, and melt water input from the GIC to the ocean substantially contributed to sea-level rise over the last century. Recently, mass loss of GIC in Greenland was measured with ICESat laser altimeter and the results showed rapid mass loss of the GIC (Bolch and others, 2013). Satellite altimetry is a powerful tool to measure elevation change over a large area, but the tracks are separated by 10–30 km in the horizontal direction, and thus difficult to estimate accurate volume change. Here, we report surface elevation change of six ice caps near Qaanaaq (77°28'N, 69°13'W) in northwestern Greenland based on photogrammetric analysis of Advanced Land Observing Satellite (ALOS), Panchromatic remote-sensing Instrument for Stereo Mapping (PRISM) stereo pair images. We processed the images with a digital map plotting instrument (ERDAS Inc., LPS: Leica Photogrammetry Suite; Planar Systems Inc., SD2020) to generate digital elevation models (DEMs) with a grid resolution of 500 m. Generated DEMs were compared to measure surface elevation changes during periods of 2006–2010, 2007–2009, and 2007–2010. The mean rate of the elevation change over the six ice caps (1215 km²) was -1.3 m a^{-1} . This rate is significantly greater than that reported for GIC in northwestern Greenland for the period 2003–2008 (-0.6 m a^{-1}) (Bolch and others, 2013). Our result suggests that mass loss of GIC in northwestern Greenland is increasing in recent years.

¹ Rastner, P and others, The first complete inventory of the local glaciers and ice caps on Greenland. *The Cryosphere*, 6, 1483–1495, 2012.

² Bolch, T and others, Mass loss of Greenland's glaciers and ice caps 2003–2008 revealed from ICESat laser altimetry data. *Geophys. Res. Lett.*, 40, 875–881, 2013.