

Elevation changes of Greenland's peripheral glaciers from 1985 to 2010/14

Jacqueline Huber (1), Robert McNabb (2), and Michael Zemp (1)

(1) Department of Geography, University of Zurich, Switzerland, (2) Department of Geosciences, University of Oslo, Norway

Greenland's peripheral glaciers play a crucial role in a changing climate and related sea-level rise. However, the recent evolution of the ice volume along Greenland's periphery is still poorly understood. The restricted number of geodetic glacier thickness changes on Greenland is probably related to the absence of digital elevation models (DEM) of sufficient accuracy. The AeroDEM representing the surface in the 1970s-80s and the recently released high resolution TanDEM-X DEM (representing 2010-2014) have potential to provide geodetic volume change estimates of many glaciers in Polar Regions. Using these two DEMs, we were able to calculate glacier-specific elevation changes of approximately 1'400 glaciers in West-central Greenland. To appropriately deal with data voids and artifacts occurring in the AeroDEM, we applied a void-filling method that considers the hypsometry of the individual glaciers.

Based on the preliminary results, we expect the mean elevation change to be approximately -0.5 m per year from 1985-2010/14, resulting in a sea-level contribution of approximately 39 Gt for the full observation period. A previous ICESat study calculated a mean elevation change of -0.28 m per year from 2003-2008 for West-central Greenland. Here, we discuss the reasons for these significant differences. Additionally, our analysis includes a sound uncertainty assessment considering different sources of random and systematic errors. This study contributes to improve current estimates of glacier ice loss and corresponding contributions to global sea level.