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Thinning of the major outlet glaciers in southeast Greenland

S. A. Khan(1), J. Wahr(2), L. Stearns(3), T. van Dam(4), K. M. Larson(5), G. Hamilton(3), O. Francis(4)

(1) Danish National Space Center, Department of Geodesy, Copenhagen, Denmark (2) University of Colorado, Boulder, USA (3) Climate Change Institute, University of Maine, Orono, USA. (4) University of Luxembourg, Luxembourg L-1511, Luxembourg (5) Department of Aerospace Engineering Sciences, University of Colorado, Boulder, USA.

The Greenland ice sheet is mainly drained through its major outlet glaciers. The largest outlet glaciers in east Greenland are the Helheim Glacier (HGL) and the Kangerlussuaq glacier (KGL). To study volume changes of the glaciers, we use differencing ASTER-derive DEMs over Kangerdlugssuaq and Helheim Glacier, and GPS observations at Kulusuk. The GPS site at Kulusuk is located about 90 km from the front of the Helheim glacier. Thus, a portion of the observed uplift at Kulusuk may be due to the Earth's elastic response to ongoing thinning of the nearby glaciers. Volume changes determined by differencing ASTER-derived DEMs suggest crustal uplift at Kulusuk of 7.0 mm between 2002-2005 due to volume loss of HGL and 1.8 mm between 2001-2006due to volume loss of KGL. However, our GPS measurements at Kulusuk suggest an uplift of 23.6 +/- 6.3 mm between 2001-2006. Thus, melting of the main two outlet glaciers cannot explain all of the observed uplift. To explain the remaining 10-15 mm of uplift, we use different models of volume loss of the ice sheet along the ice sheet margin in southeast Greenland.