



Elastic crustal uplift due to unloading of ice from the main outlet glaciers in southeast Greenland

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The main outlet glaciers in Greenland have more than doubled their ice volume loss in the past decade. Ice volume loss due to thinning of glaciers would result in a rapid mass unloading of the earth's crust. The elastic adjustments of the lithosphere is detectable using geodetic observations. Here, we use continuous Global Positioning System (GPS) measurements to study vertical crustal motions. We analyze data from 20 GPS receivers, all located along the edge of the Greenland ice sheet.

The rapid unloading of ice from the southeastern sector of the Greenland ice sheet causes an elastic uplift of 12 mm/yr at a GPS site in Kulusuk (a settlement located \hat{A} 50 km from the ice sheet margin) and 16 mm/yr at a GPS site in Isortoq (located few km from the ice sheet margin) and 20 mm/yr at HEL2 (a GPS site near the front of the Helheim Glacier). The GPS observations can be explained as due to ice volume loss of $150 \text{ km}^3/\text{yr}$ due to thinning in the southeastern sector of the Greenland ice sheet (including the Helheim glacier and the Kangerdlugssuaq glacier).