



Iceland hotspot track in southeast Greenland causes huge present-day vertical viscoelastic motion of the bedrock

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The process of Glacial Isostatic Adjustment (GIA) represents the ongoing response of the solid Earth to past ice mass loss that occurred following the Last Glacial Maximum (LGM, ~ 21 ka B.P.). The magnitude of the GIA uplift depends on the temporal history of the ice load and is highly sensitive to variations in upper mantle viscosity. Greenland GIA is thought to be well contained and due to relative high viscosity, influence of more recent changes e.g. since the Little Ice Age have minor present-day effect (< 2 mm/yr). Here we use data from the Greenland Global Positioning System (GPS) network to measure GIA. We identify an unexpected GIA anomaly of ~ 12 mm/yr in southeast Greenland, which we interpret as linked to a zone of warmer upper mantle caused by the Iceland hotspot track that would reduce the viscosity and produce greater viscoelastic uplift due to recent ice mass changes. We reconsider the evolution of the Greenland ice sheet since LGM and estimate a total ice mass loss equivalent to sea level rise of 4.9 m since LGM. Our observations suggest southeast and northwest Greenland, subject to present-day major ice loss, also contributed by significantly more mass loss on millennia scale than previously estimated.