Geophysical Research Abstracts
Vol. 20, EGU2018-15684, 2018
EGU General Assembly 2018

Greenland GPS network: Measurements and Models of 3D Elastic deformation

Per Knudsen (1), S. Abbas Khan (1), Tonie van Dam (2), and Michael Bevis (3)

(1) DTU Space, National Space Institute, Geodesy, Kgs. Lyngby, Denmark (pk@space.dtu.dk), (2) University of Luxembourg, Luxembourg, (3) The Ohio State University, Columbus, Ohio, USA

The Greenland GPS Network (GNET) uses the Global Positioning System (GPS) to measure the displacement of bedrock exposed near the margins of the Greenland ice sheet. The entire network is uplifting in response to past and present-day changes in ice mass. Here, we focus on present-day changes and compare measurements with models.
To retrieve 3D elastic displacements from GPS time series, we correct our observations for glacial-isostatic adjustment and tectonic plate motion. To model 3D elastic displacements, we first estimate mass loss using 1995–2014 NASA's Airborne Topographic Mapper (ATM) flights derived altimetry, supplemented with laser altimetry observations from the Ice, Cloud, and Land Elevation Satellite (ICESat) during 2003–2009; the airborne Land, Vegetation, and Ice Sensor (LVIS) instrument during 2007–2013; radar altimetry from the CryoSat-2 satellite during 2010–2017; and European Remote-Sensing Satellite–1 (ERS-1) and ERS-2 data during 1995–2003. We converted the volume loss rate into a mass loss rate accounting for firncompaction as described by KuipersMunnekeet al. (2015). We predict the elastic displacements by convolving mass loss estimates with Green's functions for vertical and horizontal displacements. We use a variety of elastic Green's functions and mass change grid resolutions, respectively, tostudy the sensitivity of 3D elastic deformation on Earth model parameters different from the Preliminary Reference Earth Reference Model (PREM; Dziewonski & Anderson 1981) and the forcing ice load.