Geophysical Research Abstracts
Vol. 14, EGU2012-12101, 2012
EGU General Assembly 2012

Surface movement and elevation change at the NEEM deep drilling site, North Greenland, 2007-2011

C. S. Hvidberg, L. B. Larsen, D. Dahl-Jensen, and S. L. Buchardt
University of Copenhagen, Niels Bohr Institute, Copenhagen, Denmark (ch@gfy.ku.dk)

In this work we present results from a surface GPS survey near the NEEM drill site in North Greenland, and discuss the resulting surface movement and elevation change in relation to satellite observed data. The NEEM deep drilling site (77.45°N 51.06°W) is located at the main ice divide in North Greenland. A strain net has been established around the NEEM site in 2007 and re-surveyed with GPS in 2008, 2009, 2010 and 2011. The strain net at NEEM consists of a reference pole and 12 poles placed in three diamonds at distances of 2.5, 7.5 and 25 km, respectively, from the reference pole. Additional poles are located at the ridge, approximately 50 km upstream from NEEM. The reference pole has been measured each year to provide the horizontal and vertical movement from 2007 to 2011. Preliminary analysis showed that the ice flow along the ice divide is W-NW with an average horizontal surface velocity at NEEM of 5.8±0.3 m/a along the ridge, and we estimate surface strain rates at NEEM to be (0.9±1.2)•10-5 a-1 (longitudinal) and (11.8±0.6)•10-5 a-1 (transverse), i.e. flow is divergent and slightly extending along the ridge. Measurements of surface height of all the poles provide consistent observations of the mean rate of surface elevation changes over the strain net. The mean rate of surface elevation change has varied significantly from year to year, between negative and positive values reflection variations in accumulation rate, but with an overall lowering trend of the surface from 2007-2011. Only in 2009-2010 sufficient data are available to investigate the spatial pattern of surface elevation changes. We compare our results with observations of the Greenland ice sheet from the satellite missions, and discuss the mass balance and possible implications for the dynamic stability of the ice sheet in this region.