The verification of GIA in Estonia using GNSS data

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Estonia is situated at the South-East corner of the Fennoscandian post-glacial rebound (PGR) area, thus the impact of ongoing Glacial Isostatic Adjustment could be noticed on accurate geodetic measurements; e.g. in Estonia the uplift rates up to 4 mm/yr have been observed so far.
In this contribution we use horizontal and vertical uplift rates derived from (1) the time series of several Estonian GNSS permanent reference stations (CORS), and (2) nation-wide GPS campaigns held in 1997 and 2008.
Different methods and software were used to process and analyse GNSS data and time series. Slight discrepancies between the results helped to evaluate the effects of different approaches in data processing.
To model the surface displacements and other geodetic quantities in response to the melting of ice sheets the open source software SELEN (Spada and Stocchi, 2007) with several ice models was used.
The observed displacements of geodetic points as well as velocity estimates of CORS were compared with the predictions of latest PGR empirical models (e.g. NKG2005LU) and with the results from GIA modelling. In most cases good fit between the observations and models was found within study area. The higher discrepancies appeared in the East and South-East Estonia. Besides noise in aforementioned measurements the reason could be that almost no observed data from study area have been used in compilation of widespread (common, well-known) ice and GIA models.

Keywords: GNSS measurements, postglacial rebound, glacial isostatic adjustment, Estonia.

References
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