



A continuous velocity field for Norway

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In Norway, as in the rest of Fennoscandia, the process of Glacial Isostatic Adjustment causes ongoing crustal deformation. The vertical and horizontal movements of the Earth can be measured to a high degree of precision using GNSS. The Norwegian GNSS network has gradually been established since the early 1990s and today contains approximately 140 stations. The stations are established both for navigation purposes and for studies of geophysical processes. Only a few of these stations have been analyzed previously.

We present new velocity estimates for the Norwegian GNSS network using the processing package GAMIT. We examine the relation between time-series length and precision. With approximately 3.5 years of data, we are able to reproduce the secular vertical rate with a precision of 0.5 mm/yr.

To establish a continuous crustal velocity field in areas where we have no GNSS receivers or the observation period is too short to obtain reliable results, either interpolation or modeling is required. We experiment with both approaches in this analysis by using (i) a statistical interpolation method called Kriging and (ii) a GIA forward model. In addition, we examine how our vertical velocity field solution is affected by the inclusion of data from repeated leveling.

Results from our geophysical model give better estimates on the edge of the network, but inside the network the statistical interpolation method performs better. In general, we find that if we have less than 3.5 years of data for a GNSS station, the interpolated value is better than the velocity estimate based on a single time-series.