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Constraints on lateral variations of lithospheric thickness and mantle viscosity from GNSS horizontal velocities of the BIFROST project

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The BIFROST (Baseline Inferences for Fennoscandian Rebound Observations Sea Level and Tectonics) project was started in 1993. The primary goal was to establish a new and useful three-dimensional measurement of crustal movement based on Global Navigation Satellite System (GNSS) observations, that is able to constrain models of the glacial isostatic adjustment (GIA) in Fennoscandia. Station velocities derived from analysis of observations at permanent GNSS stations in the Nordic countries and beyond have been published over the last 15 years. The latest GNSS-based 3D velocity field of Fennoscandia is a result of a re-processing of data from 1993 to 2014 from more than two hundred stations in northern Europe. It is computed using a state-of-the-art strategy.

In this poster, we analyse the computed station velocities towards identification of lateral variations in lithospheric thickness and mantle viscosity in Fennoscandia. We therefore focus on the horizontal components. We compare observed velocities against velocities from a large set of GIA models. Preliminary results show that inclusion of lateral mantle viscosity variations in the model is necessary to explain distinct horizontal velocity patterns of the observed motion. However, some patterns can also be explained by strong lithospheric thickness variations, which requires an extended analysis in future.