Geophysical Research Abstracts
Vol. 13, EGU2011-4971, 2011
EGU General Assembly 2011

A possible tectonic component in the Fennoscandian post-glacial uplift

Willy Fjeldskaar (1) and Aleksey Amantov (2)
(1) Tectonor, Stavanger , Norway, (2) VSEGEI, St. Petersburg, Russia

Fennoscandia has experienced major uplift in post-glacial time. The rate of uplift along the coasts is so high that its effects have been observed within one generation. In the northern Gulf of Bothnia uplift is occurring at 9 mm/yr. The uplift has been intensely studied and discussed since the 18th century and it is now widely accepted to be an isostatic response to the recent deglaciation. In fact, our knowledge of the fluid properties of the Earth comes largely from its uplift response to load redistributions that occurred over the last ice age. The elevation of past shorelines and the present rate of land uplift constrain the fluid properties of the Earth and the elastic rigidity of the lithosphere.
Models of post-glacial rebound have generally assumed the uplift to be exclusively of glacial isostatic origin, but this is an assumption not fully justified by evidence. In a previous study we found that there are areas where the measured present rate of uplift significantly deviates from than that predicted by regional glacial isostatic models. The difference is assumed to be a tectonic component in the post-glacial uplift. Interestingly enough, the areas found partly correspond to areas with pronounced seismic activity, and the assumption that the postglacial rebound is responsible for much of the observed onshore seismicity is substantiated. In the earlier study we suggested that part of the differences potentially could be a consequence of the Plio-Pleistocene erosional pattern, which is of glacial origin.
We have now revisited the present rate of uplift, and done high resolution modeling which include glacial isostasy, hydro isostasy and sediment isostasy. We conclude that there seems to be present-day deformation along the shoreline of mid-Norway, southern Norway (shoreline and mountain areas), and along the Swedish east coast with the centre northeast of the Gulf of Bothnia that cannot be explained by glacial isostasy. The largest differences, which are up to 1.5 mm/yr, are located in the mountainous areas onshore north Norway (North Scandes Dome), the very areas most affected by the Cenozoic tectonic uplift. The misfit between observations and the isostatic uplift modelling is interpreted here to reflect a tectonic component of the uplift.