Geophysical Research Abstracts
Vol. 16, EGU2014-10916, 2014
EGU General Assembly 2014

Constraints on the glacial history of Iceland from currently observed land uplift rates

Alexander H. Jarosch (1) and Tómas Jóhannesson (2)

(1) University of Iceland, Institute of Earth Sciences, Reykjavík, Iceland (alex@hi.is), (2) Icelandic Meteorological Office, Reykjavík, Iceland (tj@vedur.is)

We simulate Iceland's crustal motion with a spectral Earth model which solves a single PDE describing viscous mantle flow underneath an elastic crust. The model is forced with potential glacier evolution histories from 1890 to 2012, which are based on mass balance modelling as well as available measurements of ice volume changes. By utilizing a network of observed vertical GPS velocities as a performance measure for the model, we estimate crustal and mantle properties for Iceland with gradient methods based on the adjoint of our earth model. Additionally, we can quantify the suitability of different possible glacier histories as forcing for a realistic model thereby deriving a mutually consistent ice-volume history and uplift rate field. To assess the potential of glacial isostatic adjustment models for reconstructing past glacier changes, we present adjoint sensitivities of our modelling framework.