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The application of 3-D Earth models to Fennoscandian glacial isostatic adjustment

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We shall present results of a sensitivity analysis that considers the influence of realistic, 3-D Earth structure at the global scale on predictions of glacial isostatic adjustment (GIA) in Fennoscandia. The primary aim of the analysis is to quantify the significance of lateral Earth structure on GIA model predictions in order to: (i) gauge the potential bias incurred in previous studies that considered only 1-D Earth models, and (ii) consider the potential of data from this region to resolve 3-D Earth structure within different depth ranges. The presentation will focus on predictions of Holocene relative sea-level changes and present day crustal motion in Fennoscandia.

We constructed models of 3-D Earth structure by adopting constraints from studies that infer effective elastic thickness [e.g. Perez-Gussinye and Watts, *Nature*, **436**, 381-384, 2005] and seismic models of global scale velocity structure [Ritsema, J. et al., *J. Geophys. Res.*, **109**, doi:10.1029/2003JB002610, 2004]. In order to make meaningful comparisons between predictions from the 3-D and 1-D Earth models, we scale the models such that the depth average of the structure is the same, either at the global scale or at the regional (Fennoscandian) scale. The results of our study indicate that lateral structure has a significant effect on predictions of GIA observables, particularly when adopting the 3-D model that has been scaled to be consistent with a 1-D model at the global scale. In addition, we find that the predicted signature of lateral structure within the lithosphere is very similar to that resulting from structure within the upper mantle, suggesting that it will be very difficult to derive unique constraints on the 3-D structure within these sub-surface regions.