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Glacial isostatic Adjustment in Fennoscandia and GRACE

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We present a series of analyses of the postglacial rebound process in Fennoscandia based upon a new model of glacial history for this region that improves upon the history embodied in the ICE-5G (VM2) model of Peltier (2004) This Fennoscandian component of the ICE-6G (VM5a) model includes corrections to the time dependent deglaciation isochrones described in Peltier et al (2011,GJI,submitted)including the timing of the connectivity of the Fennoscnadian ice-sheet complex to that which simultaneously existed over the British Isles. The new model is shown to as accurately fit the BIFROST constraints derived from GPS observations as did the previous model. The primary focus of this paper, however, will be upon the ability of the model to reconcile the time dependent gravity field observations being made by the GRACE satellite system Because of the relatively small area of the Fennoscandia ice-sheet compared to that of the Laurentide ice-sheet complex of North America, the predicted GRACE mass-rate field has been changing significantly as the time series of observations increases in length. At present, however, the prediction seems to have stabilized and, as will be shown, this signal is now well explained by the new model of the regional glacial isostatic adjustment response to the deglaciation process As is the case in North America, however, the quality of the fit is found to depend quite strongly upon the correction for time dependent surface hydrology. We have employed the GLDAS model of Rodell et al (2003) to perform the hydrology correction which is now of significant vintage and the accuracy of this model is not well understood for the Eurasian land mass.