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An improved and extended GPS derived velocity field of the postglacial adjustment in Fennoscandia

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A new three-dimensional velocity field for 53 permanent GPS stations in northwest Europe will be presented. This solution is based on 3000 days of continuous GPS observations between January 1996 and June 2004. The period encompasses a prolongated phase of stable observation conditions after Fall 1996. Our new solutions exhibit narrower uncertainties and lower systematic errors compared to our previous results for a number of reasons. Elevation cutoff angle was lowered from 15 to 10 degrees, we fixed ambiguities to integers, and in total only a few hardware changes occurred over the entire network. In this study the GAMIT/GLOBK software package has been used for the GPS analysis and reference frame realization. Our approach for reference frame realization has demonstrated global consistency with the ITRF2000 velocity field at the sub-mm/yr level. From internal and external accuracy assessments, the 1-sigma rate uncertainty for stations with the longest records is estimated to be at the level of 0.2 mm/yr in horizontal components and 0.5 mm/yr in the vertical component.

The results show a maximum vertical rate of 10.6 mm/yr at Umeå, which is somewhat south of current estimated location of the land uplift maximum. We then compare our new GPS-determined rates with other observations (including tide-gauge, repeated leveling and repeated gravity data) as well as predictions based on a model of glacial isostatic adjustment (GIA).In general, the new results confirm earlier results that showed maximum discrepancies between GIA models and observations in northern Finland. We propose that this discrepancy may be due to either an overestimate

of ice thickness or inaccurate timing of deglaciation in the adopted ice model. With the exception of northern Finland, the new GPS-determined rates compare well to the GIA model predictions.