



First Indications of Intraplate Deformations in Central Germany from Reprocessed GNSS Time Series and Geological Data

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Six years of GPS data have been reprocessed in ITRF2008 for a regional SAPOS CORS network in the federal state of Hesse with 25 stations and some anchor sites of IGS and EPN to derive accurate and consistent coordinate time series. Based on daily network solutions coordinate time series parameters like velocities, offsets in case of antenna changes and annual periodic variation have been estimated. The estimation process includes the fitting of a sophisticated stochastic model for the time series which accounts for inherent time correlation. The results are blended with geological data to verify information from geology on potential recent deformations by the geodetic analyses.

Besides of some information on the reprocessing of the GNSS the results the stochastics of the derived velocity field will be discussed in detail. Special emphasis will be on the intra-plate deformation: for the horizontal component the residual velocity field after removal of a plate rotation model is presented, while for the vertical velocities the datum-induced systematic effect is removed in order to analyze the remaining vertical motion.

The residual velocity field is then matched with the geology for Hesse. Correlation of both vertical and horizontal movements with major geological structures reveals good accordance. SAPOS stations with documented significant subsidence are mainly located in tertiary Graben structures such as the Lower Hessian Basin (station Kassel), the Wetterau (station Kloppenheim) or the Upper Rhine Graben (Station Darmstadt). From the geological point of view these structures are supposed to be subsiding ones. Other major geological features, i.e. the Rhenish Shield as well as the East Hessian Bunter massif are supposed to be affected by recent uplift. SAPOS stations located in these regions match the assumed movement (e.g. Weilburg, Wiesbaden, Bingen, Fulda). Furthermore SAPOS-derived horizontal movements seem to trace tectonic movements in the region, i.e. extension along the tertiary Graben structures, including a sinistral strike slip component. However, a more detailed analysis is needed to confirm the link between detected movement and geodynamic processes.