

On the Use of Crustal Deformation Models in the Management of ETRS89 Realizations in Fennoscandia

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SUMMARY

ETRS89 has been introduced as a common reference system for Europe. It is managed by EUREF (the International Association of Geodesy Regional Reference Frame sub-commission for Europe) and is coincident to ITRS (International Terrestrial Reference System) at epoch 1989.0. It is thus co-moving with the Eurasian tectonic plate and is practically drifting away from ITRS with roughly 2.5 cm/yr. ETRS89 is mandatory for data exchange as governed by the INSPIRE (Infrastructure for spatial information in Europe) directive within the European Union. Most countries in Europe, and all Fennoscandian countries, have adopted national realizations of ETRS89 that has been endorsed by EUREF.

In Fennoscandia, the post-glacial land uplift is up to about 1 cm/year in the vertical, but causes also significant crustal deformations in the horizontal components. This need to be considered in the management and use of reference frames.

This presentation will focus on new models of crustal deformation and their use in reference frame management. The new land uplift model NKG2016LU, which has been developed within the NKG (Nordic Geodetic Commission), and new refined models for Glacial Isostatic Adjustment (GIA) have facilitated considerable improvements in both the horizontal and vertical components. The use of land uplift models in appropriate transformation procedures makes it possible to transform between national realizations of ETRS89 and recent ITRFs (International Terrestrial Reference Frames) at the few mm level, which is a necessity for a possible use of a “dynamic reference frame” in parallel to the national realization of ETRS89.