On the Management of Reference Frames in Sweden

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SUMMARY

The national reference frames in Sweden comprise the three-dimensional SWEREF 99 and the height system RH 2000. SWEREF 99 is the national realization of ETRS89, realized by the CORS network SWEPOS. RH 2000 is realized by the benchmarks established through the extensive third national precise levelling project. There is also a geoid, or height correction, model to relate SWEREF 99 ellipsoidal heights and RH 2000 normal heights.

Both of these reference frames are deformed with time, due to the post-glacial land uplift in Fennoscandia. The main deformation of course occurs in the vertical component, but over time there also is a non-negligible deformation of the horizontal.

The presentation deals with the chosen strategy to manage and maintain the reference frames to obtain sustainability, as well as the development of velocity fields to be used for the maintenance.

SWEREF 99 coordinates and RH 2000 heights are in principle fixed to the values of the original realization (at the epochs 1999.5 and 2000.0, respectively), i.e. coordinates and heights are static. Velocity models are used in order to achieve coordinates in the epoch of the realization, but these velocities are not included in the system definitions. Instead, the velocity models are seen as objects of improvement, allowing introduction of new velocity fields without re-defining the reference frames.

For precise applications, a correct handling of the velocities/epochs is always carefully performed when transforming positions in ITRF, present epoch, to coordinates in SWEREF 99 and/or RH

2000.

The national network RTK service today utilizes the recent velocity model to handle the horizontal and vertical movements, in order to model the error sources in a better way.