Computation of precise regional geoid in Great Lakes region using GOCE data and two different approaches

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The goal of our contribution is to compare the two regional models of the geoid in a relatively flat area around the Great Lakes – Canada and the USA. The first model is computed with the standard Stokes-Helmert (SH) approach while the second model is compiled as numerical Finite Element Solution (FE) to the geodetic boundary-value problem. The terrestrial data used as an input for both models are the same. The GOCE (Gravity Field and Steady-State Ocean Circulation Explorer) input data are, however, different. The SH model uses the recent GOCE global geopotential model while the FE approach employs the grid of downward continued gravity anomalies derived from the GOCE gravitational gradients. The SH approach is well documented and described in many publications. The FE approach is recent and novelty approach which can be almost independent from the global geopotential model, except from the dependency inherited from the GOCE EGG_TRF_2 data product. Moreover the FE approach is able to combine the terrestrial and satellite input data in a natural way. Both models are compared with GNSS-Levelling data to assess the accuracy of both models and efficiency of particular approaches.