



Importance of terrestrial surface density information and satellite-aided global gravity field models for high precision regional geoid computation

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High precision regional geoid determination is a challenging task. Besides the quality of the input data, the quality of the global gravity field data and the density information is essential for a consistent treatment of the gravity field quantities within the remove-compute-restore procedure.

In this investigation a surface density model based on geological observations is introduced, replacing the constant standard crustal density. The long-wavelength component of the gravity field is represented by the GOCO05s global gravity field model. The geoid computation is based on a Gauss-Markov model with radial basis function parametrization. The achieved improvements are remarkable and lead to an unprecedented accuracy of the pure gravimetric geoid in Austria. As final outcomes a new geoid solution and a map for the xi and eta components of deflections of the vertical are computed.

The achieved results are primarily validated with independent GPS/leveling observations. Secondly validation has been carried out through deflections of the vertical, obtained from precise zenith camera and astronomical measurements. Furthermore, differences between the current official Austrian geoid solution based on data from 2008 and the new estimated geoid are shown. An overview about the achieved improvements and the validation is given in the presentation.