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The official Austrian geoid solution 2008: Data, Method and Results

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New Austrian geoid and quasi-geoid solutions have been computed as a combination solution of terrestrial gravity field data and global satellite gravity field models. Compared to the former Austrian geoid models, the accuracy could be significantly improved mainly due to the substantially enhanced quality of the input data and methodological developments.
In addition to a thoroughly validated data base of gravity anomalies and deflections of the vertical, new measurements of deflections of the vertical in the South-East of Austria as well as GPS/levelling information have been incorporated. The long to medium wavelengths representation of the solution could be significantly improved by the incorporation of the global GRACE gravity field model EIGEN-GL04S. Special emphasis has been given to the optimum relative weighting of the individual data types in the frame of a least squares collocation procedure.
The new Austrian geoid solution has an estimated accuracy in the order of 2-3 cm. It has been thoroughly validated by comparison with independent GPS/levelling control observations, and applying other validation methods. Additionally, also a quasi-geoid solution has been computed based on identical input data, for the purpose of validation against the European quasi-geoid model. Due to the positive conclusions resulting from these evaluation steps, the new geoid solution has been declared the new official Austrian geoid model.
In the paper the input data used for the Austrian geoid solution, the key aspects of the methodology and algorithms applied for the geoid computation itself, and the validation of the final Austrian geoid solution are described, the main error sources are discussed, and an outlook for potential future improvements concerning both the data bases and the methodology is given.