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Regional models of the gravity field from terrestrial gravity data of heterogeneous quality and density

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Gravity field models in a regional scale are needed for a number of applications, for example national geoid computation, processing of precise levelling data and geological modelling. Thus the methods applied for modelling the gravity field from surveyed gravimetric information need to be considered carefully. The influence of using different gridding methods, the inclusion of unit or realistic weights and indirect gridding of free air anomalies (FAA) are investigated in the study.

Known gridding methods such as kriging (KRIG), least squares collocation (LSCO), continuous curvature (CCUR) and optimal Delaunay triangulation (ODET) are used for production of gridded gravity field surfaces. As the quality of data collected varies considerably depending on the methods and instruments available or used in surveying it is important to somehow weigh the input data. This puts additional demands on data maintenance as accuracy information needs to be available for each data point participating in the modelling which is complicated by older gravity datasets where the uncertainties of not only gravity values but also supplementary information such as survey point position are not always known very accurately.

A number of gravity field applications (e.g. geoid computation) demand foran FAA model, the acquisition of which is also investigated. Instead of direct gridding it could be more appropriate to proceed with indirect FAA modelling using a Bouguer anomaly grid to reduce the effect of topography on the resulting FAA model (e.g. near terraced landforms).

The inclusion of different gridding methods, weights and indirect FAA modelling helps to improve gravity field modelling methods. It becomes possible to estimate the impact of varying methodical approaches on the gravity field modelling as statistical output is compared. Such knowledge helps assess the accuracy of gravity field models and their effect on the aforementioned applications.