



Relational model for gravimetric data storage and processing

Otakar Nesvadba (1,2), Martin Lederer (1), and Vojtech Pálinkáš (2)

(1) Land Survey Office, Zeměměřický úřad, Praha 8, Czech Republic (nesvadba@sky.cz), (2) Research Institute of Geodesy, Topography and Cartography, VÚGTK, v.v.i., Zdíby, Prague-east, Czech Republic

Gravimetric data related to the Czech national gravity network were transferred to the relational database about ten years ago. In this respect, all the data, including the respective metadata, have been described by the relational data model. Our implementation of the model rests on PostgreSQL database server. Therefore, the data storage, data maintenance and data processing are performed by means of PostgreSQL queries.

Data processing and observation modelling are based on the realisation of a functional tie, the so-called observation equation, between observations and model parameters. The ability to express the systematic effects in observations within the relational data model allows us to customise the observation equation (and thus the adjustment) dynamically in almost any aspect and detail. Moreover, the relational database proves to be useful in the data validation, in the maintenance of the gravity network as well as in the production of complex data selections or data presentations.

The repeated absolute gravity observations from several stations in the Czech Republic are used to illustrate the abilities of the relational data model to estimate a long term drift (i.e. secular gravity change) and periodical changes (seasonal gravity variations) and further to reflect these results to a realisation/maintenance of the whole gravity network. In this way, the relational model of gravimetric data is appropriate for the realisation of a dynamic gravity reference frame that takes into account e.g. the time-variable gravity field and variable systematic (instrumental) effects.