

The overview of precise quasigeoid modelling in Poland

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Abstract: The paper gives an overview of research activity on modelling a precise quasigeoid in Poland, conducted in 2002-2005. It starts with the specification of all available data: terrestrial, marine and airborne gravity data, height data from country-wide GPS/levelling networks, levelling data, deflections of the vertical, tide gauge data, digital terrain models, and lithosphere density data, with their quality assessment. The analysis of performance of different global geopotential models resulted in indicating the most suitable one for a precise quasigeoid modelling in Poland. Quality of terrain corrections calculated for 1 078 046 gravity stations in Poland with the use of the optimum maximum radius of prisms was discussed. The algorithm for calculating mean Faye anomalies was presented and the height data used for computing those anomalies were specified. The GPS/levelling traverse established for quality control of quasigeoid models in Poland was described and the height anomalies of the sites of GPS/levelling control traverse were compared with the corresponding ones computed from the GUGiK 2001 quasigeoid model. Finally the quasigeoid models developed: an astro-gravimetric model, a number of gravimetric and GPS/levelling models, an integrated model and a best-fitted model were described with specifying data used for calculating them and with their quality assessment based on the data from GPS/levelling networks. Brief description of algorithms applied for calculating GPS/levelling quasigeoid models, an integrated quasigeoid model and the best-fitted one was given. An independent assessment of the accuracy of computed quasigeoid models was done with the use of height anomalies at the sites of a GPS/levelling control traverse. The accuracy of quasigeoid models for Poland developed with the use of gravity data is at the level of 2 cm.

Key words: quasigeoid modelling, geopotential models, gravity data, GPS/levelling data, tide gauge data, digital terrain models, density of the upper lithosphere, terrain corrections, mean gravity anomalies

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