Evaluation of selected gravity field parameters from local high resolution gravity and elevation data

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A b s t r a c t : Theory and numerical evaluation of selected parameters of the gravity field over a region in Central Europe, namely of the geoidal heights, deflections of the vertical and anomalous vertical gradients of gravity, are discussed in this manuscript. Input values for their numerical evaluation represent a detailed and accurate gravity and elevation database GOP30x30, that contains discrete values of mean gravity and elevation data on a homogeneous geographical grid with spacing of 30×30 arcsec, and the global geopotential model EGM96. Local gravity and elevation data are used for evaluation of high-frequency components of the sought parameters using discretized integral equations of Greens's kind. Discrete numerical integration is applied within a spherical cap centered at each computation point. The effect of gravity data outside the spherical cap is computed by the Molodensky approach using the spectral description of the global gravity field. The Stokes function is modified according to *Vaníček and Kleusberg (1987)* to minimize the effect of gravity data outside the spherical cap. The Vening-Meinesz function and the integration function in the gravity gradient integral are not modified due to their relatively fast attenuation with the increasing spherical distance. The low-frequency components of the same parameters are synthesized using the EGM96 spherical harmonic coefficients. Obtained results can be used in geodesy and geophysics.

Key words: geoid, deflections of the vertical, anomalous gravity gradient, Central Europe

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