

Influence of Soil Moisture Variation on Gravity Measurements

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Abstract: One of the main hydrological factors, in terms of gravity variation, is the soil moisture. The amplitude of the gravity variation caused by soil moisture can reach more than 10 μGal . In the present-time the absolute gravity measurements have very high accuracy ($<1 \mu\text{Gal}$). Therefore, the influence of hydrological effects should be modelled so that the observed gravity can be appropriately corrected. Often, due to the lack of observations, an accurate local hydrological model is not available and the gravity observations are affected by an unknown error. The effect of soil moisture is analyzed with help of freely available data, namely global hydrological model The Global Land Data Assimilation System. This model provides information at the space resolution of 0.25 degrees and time resolution of three hours. The hydrological corrections obtained in this study were tested with FG5 absolute gravity measurements in Slovakia. This work presents theoretical and numerical results of the test.

Key words: gravity measurements, soil moisture, hydrology, correction

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