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The atmospheric corrections for absolute and relative gravity measurements in Józefosław, Poland

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In this paper we discuss the importance of atmospheric gravity corrections in gravimetric works conducted in Józefosław, suburb area of Warsaw, Poland. We present here three methods which are usually used when influence of atmosphere on gravity measurements has to be mitigated. The first one is simple approach which use regression coefficient. This admittance factor were estimated using relative gravity measurements from spring gravimeter along with atmospheric pressure recordings. We also used the nominal factor, when the empirical one cannot be determined. The second method utilize the surface pressure fields from the weather model, while the third one uses also vertical profiles of meteorological data (hence called 3D method here). These last two methods has the main advantage that they do not rely on any statistical assumption and reflects physics of the phenomena. This methods model both the attraction („newtonian") part and indirect deformation term.
In this work we study how the different approach change the corrected gravity results and consequent inferences. For this purpose we used the gravity measurement from absolute (FG5 no. 230) and relative (LCR ET no. 26) gravimeters which are a part of gravimetric equipment in Józefosław. We give discussion when the complex atmospheric gravity correction are necessary and when the simple approach is sufficient enough. The differences between different methods are at the microgal level but this can be crucial in geophysical and geodynamics studies.