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Analysis of changes compliance in gravity observed by satellite method with absolute measurements

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The work present an comprehensive analysis of gravitation changes determined by the GRACE periodical model from the 3 processing centers compared with the changes observed on the absolute gravimetric measurements at the Astronomical-Geodetic Observatory in Józefosław (JOZE). An analysis of time series was carried out for selected monthly solutions of GRACE missions produced by: GFZ (GeoforschungsZentrum Potsdam), CSR (Center for Space Research at University of Texas, Austin) and JPL (Jet Propulsion Laboratory). The data from GFZ, within observation period from 4.2002 to 3.2016 were used with the degree and the order of development equal to n = k = 96, which gives a spatial resolution equal to about 200 km. For data from CSR and JPL, observational ages were used from for the same period of the degree and the order of development equal to n = k = 90 and a smaller spatial resolution of about 220 km. For absolute measurements we used data from the period of 5.2005-11.2016 in about a month spatial resolution performed in the our Observatory using the FG-5 gravity No. 230 for epochs which were determined by the gravitational disturbances based on the description of the terrestrial field of gravity model in the form of series of spherical harmonics (.gfc file from the IAG website - International Center for Global Earth Models) . This is the longest homogeneous accuracy observation series in Poland. In the analyzed time series of GRACE mission solutions, we included all eight types of non-isotropic filtration from the DDK series, from DDK1 to DDK8 and data without the use of filtration.

The aim of the study is to show the accuracy of temporal solutions in relation to high accuracy observations of gravity made using ground gravity methods and an attempt to indicate the significance of differences between solutions from different centers and solutions using different levels of DDK filters.

The data used in this research was obtained by means en elaboration of gravimetric absolute measurements and periodic geopotential models of the GRACE mission. The analysis was carried out at the gravity station JOZE (Józefosław-POLSKA).

In order to validate the models, the values of gravity disturbance from monthly solutions of geopotential models were extrapolated to the each epoch of absolute measurements. As a result, it was possible to perform an accuracy analysis of selected solutions for given geopotential models.