ANALYSIS OF THE EARTH'S CENTER OF MASS PERIODICAL MOVEMENTS

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Abstract

Taking into account recommendations of the International Earth Rotation and Reference Systems Service (IERS) and International DORIS service (IDS), a reprocessing of the DORIS data for the period of 1993.0-2010.0 has been performed aiming to obtain a unified coordinated solution of the IDS analysis centers for the developing of the new version of the Terrestrial Reference Frame - ITRF2008. The weekly solutions of coordinates of all 71 DORIS ground sites and Earth Observations parameters (EOP) have been estimated with the use of new improved satellite surface models, submitted by CNES, and with measurement data of the satellites SPOT2, SPOT3, SPOT4, SPOT5, TOPEX, and ENVISAT. After the transformation of the free-network solution into a well-defined reference frame ITRF2005 (exactly, long-term cumulative IGN solution: ign07d02) weekly coordinates of the sites were estimated with the internal precision at the level of 5-40 mm for majority of the stations. With a view to study variations of the geocenter movements, the sets of translation parameters have been analyzed. In order to estimate linear trend, amplitudes, periods and phases of geocenter variations a linear regression analysis has been applied with the use of least square method. Amplitudes and phases of the evaluated annual and semiannual variations of the geocenter components X, Y, Z are presented. The same time series of geocenter coordinates (X, Y, Z), have been examined with the use of so-called method of adaptive Dynamic Regression Modeling (DRM). Unlike the linear regression analyses, the DRM method envisages the further iterative, step by step, regression analyses of the non-random content of the de-trended series, obtained after first harmonics removing, aiming to avoid errors, caused by noise residuals and inter correlation between estimated harmonics and to find out the additional regularities. As a result of DRM–method the original time series is approximated by the complex mathematical model, which contains trend, periodical components and parameters of the dynamic regression model. With this model a forecasting of weekly geocenter positions has been performed**.** The results are discussed.