

Comparison of the Geophysical Excitations of Polar Motion from the Period: 1980.0-2009.0

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Abstract

In this study we compared contributions to polar motion excitation determined separately from each of three kinds of geophysical data: atmospheric pressure, equivalent water height estimated from hydrological models, and harmonic coefficients of the Earth gravity field obtained from Gravity Recovery and Climate Experiment (GRACE). Hydrological excitation function (Hydrological Angular Momentum – HAM) has been estimated from models of global hydrology, based on the observed distribution of surface water, snow, ice, and soil moisture. In our consideration we used several global models of land hydrosphere and models of Atmospheric Angular Momentum (AAM) and Oceanic Angular Momentum (OAM). All of them were compared with observed Geodetic Angular Momentum (GAM). The spectra of the following excitation functions of polar motion: GAM, AAM+OAM, AAM+OAM+HAM, GAM-AAM-OAM residual geodetic excitation function, and HAM were computed too. The time variable spectra of geodetic, gravimetric, and the sum of atmospheric, oceanic, and hydrological excitation functions are also presented. Phasor diagrams of the seasonal components of polar motion excitation functions of all HAM excitation functions as well as of two GRACE solutions: Center for Space Research (CSR), Centre National d'Etudes Spatiales/Groupe de Recherche en Geodesie Spatiale (CNES/GRGS) were determined and discussed.

Key words: hydrological angular momentum, geophysical excitation, polar motion.