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Comparison between polar motion excitation functions estimated from recent geophysical models and observations

Małgorzata Wińska[1], Justyna Śliwińska[2], and Jolanta Nastula[2]
[1]Warsaw University of Technology, Faculty of Civil Engineering, Poland (mwin@il.pw.edu.pl)
[2]Space Research Centre Polish Academy of Sciences, Warsaw, POLAND

Continental hydrological loading by land water, snow, and ice is a process that influences the Earth's inertia tensor and is very important for full understanding of the excitation of polar motion. In this study, the hydrological contribution to decadal, inter-annual and multi-annual suppress polar motion derived from different GRACE (Gravity Recovery and Climate Experiment) solutions as well as from SLR (Satellite Laser Ranging) and some climate models from CMIP6 project data is discussed here.

The main aim of this study is to show the influence of different representations of hydrological angular momentum (HAM) coming from different GRACE (mas concentration solutions - mascons, Terrestrial Water Storage changes, and Stokes Coefficients), SLR, and climate models solutions on agreement between Geodetic Angular Momentum (GAM) and geophysical excitations of polar motion been a sum of Atmospheric, Oceanic and Hydrological Angular Momentum (AAM+OAM+HAM) in different spectral bands.

To do that, the geodetic and geophysical excitation functions are transformed into time-scale domain using the discrete wavelet transform based on the Complex Morlet wavelet functions. Next, the time series (GAM vs. geophysical ones) are compared in terms of semblance filtering, on the basis of their phase, as a function of frequency, and amplitude information of their cross-wavelet power.

Here, we would like to present the consistency between full polar motion excitations and geophysical fluids, that are the sum of AAM (pressure + wind), OAM (bottom pressure + currents), and HAM contributions. This analysis could let us indicate, which hydrological representation of different HAM solutions cause the biggest errors in the geodetic budget.