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Geodetic - hydrological residual time series: characterization of their noise level

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Changes in Terrestrial Water Storage (TWS) due to seasonal changes in soil moisture, ice and snow loading and melting influence the Earth's inertia tensor. Quantitative assessment of hydrological effects of polar motion remain unclear because of the lack of the observations and differences between various atmospheric and ocean models. Here, we compare the effects of several hydrological excitation functions computed as the difference between the excitation function of polar motion GAM (Geodetic Angular Momentum) and join atmospheric plus oceanic excitation functions, called geodetic residuals. The estimation of hydrological effects on Earth rotation differs when using one atmospheric (Atmospheric Angular Momentum - AAM) and one oceanic model (Oceanic Angular Momentum - OAM) or the other combination of AAM+OAM.
The purpose of this work is to build an objective criterion that justifies the use of one combination of AAM+OAM to estimate geodetic residuals. To do that, we determine the quality of each series by making an estimation of their noise level, using a generalized fomulation of the "three-cornered hat method". We show the correlation between the noise of the join AAM+OAM time series and geodetic data – GAM time series. After that, we construct a combined AAM+OAM series, which the noise level of combined geophysical time series will be minimal. These geodetic residuals time series will be analysed and compared with hydrological excitation functions determined from hydrological models and from Gravity Recovery and Climate Experiment GRACE satellite mission.
The results presentation is completed by the diagrams in the Unified Modeling Language (UML).