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Hydrological excitations to polar motion

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The fluctuation in the groundwater storage and the polar ice sheets through seasonal ice and snow loading and melting influence the Earth's inertia tensor. In this work, we compared the effects of three hydrological excitation functions predicted by different models to polar motion. The main goal is the assessment of the hydrological excitation on Earth rotation variations due to mass terms. The first model is based on the assimilated soil moisture and snow accumulation data from NCEP/NCAR (The National Center for Environmental Prediction/The National Center for Atmospheric Research) reanalysis. The excitation functions are public available for the period 1948-2002 at the Special Bureau for Hydrology (SBH) of the Global Geophysical Fluid Center (GGFC) of the International Earth Rotation and reference system Service (IERS). The second is the Land Dynamic model (LaD). LaD is a large scale model of land water and energy balances. The total water storage of a non-frozen cell is given by the sum of snow pack, root zone store and groundwater. The LaD hydrological excitation functions were computed for the period 1980-2002 at monthly intervals. Finally, we also considered the Advanced Land Data Assimilated System (LDAS) model. The effectiveness of the three hydrological models in closing the polar motion budget at annual and semi-annual periods was studied. We also analised the polar motion budget at ter-annual periods only for the LaD model. When comparing LaD with NCEP and LDAS in closing the annual and semi-annual polar motion budget, LaD is close to LDAS in phase for all prograde components. On the other hand, the LaD contribution approximates better to polar motion observations in magnitude, although differences in phase are still important.