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Geophysical excitations of the Earth rotation

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The change of the Earth rotation is caused by mass redistribution and movement within the Earth system, including the atmosphere, ocean, land, cryosphere, and solid Earth. At time scales of a few years or shorter, variations of atmospheric wind circulations play a dominated role in driving the length-of-day (LOD) change, accounting for about 90% of the observed variability, while the atmosphere, ocean, and land hydrology all play comparably important roles in driving polar motion (X,Y). Advancements in numerical modeling of the atmosphere, ocean, and land hydrology, and measurements from space geodetic techniques, such as satellite altimetry and gravimetry provide the chance for more closely examinations of the Earth rotational excitations from different components of the Earth system. In this study, we will use advanced climate models and satellite gravity observations from GRACE to quantify atmospheric, oceanic, hydrological, and cryospheric excitations of the Earth rotational change, and try to provide a clearer picture on how well we can close the Earth rotational excitation budget and what may be the major error sources in estimating Earth rotational excitations.