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Earth rotation variations from ocean tide models

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Tidal forces, primarily of lunar and solar origin, cause periodic changes in the surface height and current flows of the world oceans. The corresponding mass displacements alter the tensor of inertia of the Earth, while the tidal currents introduce relative angular momenta. Both effects cause remarkable variations in the pole coordinates and in the Earth angular velocity, expressed e.g. in terms of Universal Time (UT1). The varying tidal heights and current velocities can be predicted with purely hydrodynamic models or with models which assimilate tide gauge measurements and/or observations from satellite altimetry. We use a publicly available assimilation ocean tide model to derive the tidal Earth rotation variations for the eight major diurnal and semi-diurnal constituents (K1, O1, P1, Q1, M2, S2, N2, K2) as well as for two long period terms (Mf, Mm). The study focuses on the transfer from variations of sea surface elevations and currents to effective variations of the Earth rotation parameters (ERP). These modelled ocean tidal variations are compared to the ERP variations observed by space geodetic techniques such as GNSS and VLBI.