



High-frequency signals of oceans and atmosphere in Earth rotation

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Dynamic processes in the atmosphere and oceans with diurnal and sub-diurnal variability leave measurable short-period footprints in polar motion and length of day (LOD)/Universal Time (UT1). The integral effect of all geophysical and extra-terrestrial influences is seen in the Earth rotation variations observed by space geodetic techniques. Allocating the signal components to their generating mechanisms requires appropriate model representations of the individual phenomena.

We give a general overview of the known geophysical effects on Earth rotation from sub-daily to multi-annual time scales with particular attention paid to the high-frequency impact of the oceans and atmosphere. The signals are examined in terms of geophysical modeling as well as with regard to Earth rotation observations. Recent results from the analysis of numerical weather model data and available ocean tide models with respect to sub-daily Earth rotation excitation are shown. As to the observational aspect, we illustrate different methods for the determination of short-period Earth rotation variations by means of VLBI (Very Long Baseline Interferometry) and present respective results, obtained from the analysis of 24-hour sessions covering the years 1984-2010. Furthermore the potential of a combined analysis of VLBI and ring laser measurements, concerning the estimation of Earth rotation parameters with sub-diurnal resolution, is outlined.