



Near six-year oscillations of the length-of-day and mean sea level

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This research extends previous one which was presented in 2005 EGU G9 Symposium (Chapanov et al., 2005).

The interannual variability (of 2-10 year bands) of length-of-day (LOD) are explored on the base of data both modern (VLBI, SLR and GPS) and classical services of the Earth rotation. The most long and homogeneous series of the LOD from (<http://hpiers.obspm.fr/eop-pc/>), including a series before TAI epoch (from 1832 up to 1956) were used. The singular spectrum analysis and its version for multivariate series (implementation of the software from <http://www.gistatgroup.com/gus/>) were applied for research as the most adequate method to extract various components of a non-stationary series without the loss of the phase and amplitude variations.

The 5-7 year oscillations of the LOD with amplitude near 0.2 ms are revealed in the classical observations of UT which are referred usually to the vertical. These observations were continued after 1992 up to 2005 by 12 classical telescopes for UT determinations. Prolonged LOD series was combined using these observations and previously obtained best astronomical data (Vondrak et al., 1997). The same LOD variations (5-8 years) are found in that prolonged series as well as in series before 1956, based on the old observations of the star occultations by the Moon. However, only the 2-4 year variations with amplitude about 0.15 ms are found in this frequency band by the modern LOD observations (from 1985 up to 2005), which referred to the centre of mass of the Earth. These variations are well explained by ENSO and QBO oscillations.

It is supposed that these variations are caused by low-frequency nontidal variations of vertical and so they are absent in modern LOD observations. Pseudo-periodic signals (5-8 year) with amplitude 2-4 cm are revealed also in the longest series (> 80 years records for each gauge-station mainly in Europe) of mean sea level (MSL) obtained

by Permanent Service of MSL (<http://www.nbi.ac.uk/psmsl/>). These MSL variations can be one of the reasons of nontidal variations of vertical for stations in wide zone of coastal regions (gauge-station in internal Lake Ladoga has the same MSL variations as the Baltic Sea level). Vice versa situation can take place: variations in the Earth rotation excite by means of centrifugal forces the relevant tides in the ocean. However there are not near 6 year LOD oscillation after 1985 but such MSL oscillations are present up to now.

References:

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