

Ocean-Atmosphere Effects on Intraseasonal & Interannual Length-of-Day (LOD) Variations

E. Lehmann, G.C. Leckebusch, U. Ulbrich and P. Névir

Contact: elfrun.lehmann@met.fu-berlin.de, Institut für Meteorologie, Carl-Heinrich-Becker-Weg 6-10, 12165 Berlin, www.met.fu-berlin.de, Phone: +45 30-838-71154

Introduction

Intraseasonal and interannual variations in the Length of Day (LOD) are caused by various phenomena of the coupled ocean-atmosphere system that yet need to be clearly identified and quantified. This study assesses variations in the wind-driven axial atmospheric angular momentum (AAM) that are proportional to LOD variability on intraseasonal and interannual time scales. For this purpose we examine the frequency behavior of the LOD (IERS' EOP C04) excited by large scale atmospheric circulation patterns using ERA40 reanalysis data (1962-2001). ENSO is a prominent coupled ocean-atmosphere phenomenon to cause global climate variability on interannual time scales. Several studies relate changes in the interannual LOD variability to the El Nino/Southern Oscillation phenomenon due to strong wind anomalies associated with ENSO events. For that reason, this study performs a detailed investigation of LOD cycles by using filters to determine the relation of dominant modes for intraseasonal and interannual periods of LOD variations and corresponding ENSO events. Changes in the LOD signal are explored by relating ENSO sensitive parameters, such as NINO3.4 sea surface temperatures (SST) to semi-annual, annual and interannual variations in the relative AAM and the LOD for selected ENSO events.

Correlations between annual and interannual amplitudes of the LOD and selected parameters of the ocean-atmosphere system (SST, AAM) demonstrate their significant but highly varying effect on the LOD variability. A cross wavelet analysis confirms these results. However, the highly variable influence of ocean and atmosphere on the variability of LOD in relation to atmospheric background processes needs to be further investigated.

Webpage Earth Rotation Portal: http://www.erdrotation.de (Project P10)

