

El Niño Structures in Earth Rotation and Atmospheric Angular Momentum

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Comparisons between length of day (LOD) and the strength of the ENSO cycle, represented by the Southern Oscillation Index (SOI, the difference in sea level pressure between Darwin and Tahiti), have indicated striking agreement, with high interannual values of LOD generally coinciding with ENSO events. During an ENSO event, the SOI reaches a minimum, leading to an increase in atmospheric angular momentum (AAM) associated with the collapse of the tropical easterlies. Further increases in AAM may result from a strengthening of westerly flow in the subtropical jet streams. Conservation of total angular momentum then requires the Earth's rate of rotation to slow down, thus increasing LOD.

The impact of the 1997-98 ENSO event will be presented in context of angular momentum exchange utilizing LOD, SOI and AAM (both global and latitudinally belted) data. We have utilized the NCEP reanalysis from 1970 to 1998 from the surface to 10mb and have examined separate effects of the tropospheric (below 100mb) and the stratospheric (100 to 10mb) zonal winds. Special emphasis will be placed on the globally coherent polarward propagation observed on interannual time scales. The techniques utilized include traditional Fourier and recursive filter as well as single- and multi-channel singular spectrum analysis. Comparisons will be made with previous events, especially the 1982-83 event.