Geophysical Research Abstracts, Vol. 7, 10453, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10453

Decadal and interdecadal variability in atmospheric angular momentum

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Atmospheric angular momentum (AAM) provides a convenient framework to study the role of various transport mechanisms in variability ranging from intra-seasonal to interdecadal and beyond. AAM is useful as an index of the large scale zonal flow since it is highly correlated with independent length-of-day measurements and with phenomena such as the ENSO, the stratospheric QBO, the MJO and global warming.

Over the past decade observations have been published demonstrating the appearance in the tropics and subsequent poleward propagation of interannual anomalies in zonally averaged atmospheric angular momentum. The emergence of these anomalies in the tropics appears to be associated with El Niño-Southern Oscillation (ENSO) events. Instead upward and downward variations in the stratosphere have been associated with the stratospheric quasi biennial oscillation. The variability of atmospheric angular momentum has been shown to present decadal as well as interdecadal time scales. Here we will extend the work to investigate regional origin and transport of decadal oscillations present in reanalyzes as well as different model runs from NCAR and CERFACS.

Both the AAM from reanalyzes and the atmospheric runs by Arpege model (CERFACS) over 1949 to 2000 present decadal (10-12 yr) and interdecadal periods, as well the same geographical variability. Its variability originates primarily from the Pacific

Ocean region, but we find also an important variability originating from the Atlantic. We also analyze decadal signals in AAM from different model runs of NCAR models runs, It shows too a well-represented decadal and interdecadal variability well above the statistical significance level.

Their propagation into, or at least appearance in, the subtropics and middle latitudes suggests that this decadal generated signal, a signal with some potential for predictability, may make a significant contribution to decadal variability in middle latitudes.