Geophysical Research Abstracts
Vol. 14, EGU2012-13501, 2012
EGU General Assembly 2012

Relationships among Brewer-Dobson circulation, double tropopauses, ozone and lower-stratospheric water vapor

J. M. Castanheira (1), T. R. Peevey (2), C. A. F. Marques (1), and M. A. Olsen (3)

(1) CESAM, Departmento de Física, Universidade de Aveiro, Aveiro, Portugal (jcast@ua.pt), (2) Department of Atmospheric and Oceanic Sciences, University of Colorado, Boulder, Colorado, USA, (3) Goddard Earth Sciences Technology and Research, NASA Goddard Space Flight Center, Greenbelt, USA

This communication will discuss the statistical relationships between the variability of the area covered by double tropopause events and the variabilities of total column ozone and of lower-stratospheric water vapor. The QBO signal in double tropopause events statistics and the relationship between tropical upwelling and the near global ($50^{o}\mathrm{S} - 50^{o}\mathrm{N}$) lower stratospheric water vapour will be also presented. The analysis is based on both reanalysis data (ERA-Interim) and satellite data.

Significant correlations were found between the area covered by double tropopause events in the latitudinal band $20 - 65^{o}\mathrm{N}$ and the gradient of total column ozone in the subtropical Northern Hemisphere. Significant correlations were also found between de global area of double tropopause events and the near global ($50^{o}\mathrm{S} - 50^{o}\mathrm{N}$) water vapour in the lower stratosphere.

The relationship between double tropopause events and lower stratospheric ozone is detailed by a correlation analysis between the frequencies of ozone laminae and double tropopause events as found in the HIRDLS data.

The correlations of DT variables with total column ozone and ozone laminae are both consistent with intrusion events of tropospheric tropical air into the lower extratropical stratosphere, with the tropical tropopause overlaying the extratropical one. The poleward excursions of the tropical tropopause are also consistent with the found negative correlation between the area extension of DTs and the near global lower stratospheric water vapour.

Finally, we will show the existence of a significant negative correlation between the tropical upwelling, determined using the ”downward control principle”, and the near global lower stratospheric water vapor.