

## ***Interactive comment on “The relationship between tropospheric wave forcing and tropical lower stratospheric water vapor” by S. Dhomse et al.***

### **Anonymous Referee #3**

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#### General comments

This paper discusses the relationship between stratospheric water vapor, the strength of the Brewer-Dobson Circulation (BDC), and tropospheric wave forcing. The main idea is that a stronger BDC due to more tropospheric wave activity leads to colder tropopause temperatures, and to a drier stratosphere. This topic is relevant for publication in ACP; the mechanisms controlling the water vapor concentrations in the stratosphere have recently received a lot of attention, and is important for, e.g., ozone depletion. The results are interesting, but not novel. Furthermore, the structure of the paper should be improved. I suggest reconsidering publication after major revisions.

#### Specific comments

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The results presented in this paper confirm the results presented by Randel et al., 2006: more tropospheric wave activity leads to a stronger BDC, colder tropical tropopause temperatures, and, through dehydration, to a drier stratosphere. The authors should clearly state which aspects of their results are novel. On a similar note, the difference between the mechanism described in p. 9565 l. 20-end (increased Brewer-Dobson circulation), and that in p. 9565 l. 15-17 (decreased tropical tropopause temperatures) should be explained.

The paper needs some restructuring. I suggest adding a section entitled “Data”, in which more technical issues are discussed (e.g., p.9567 line 22-end). The discussion on the NCEP reanalysis (p. 9570, l 12- p. 9571 l. 6), could be described in an additional section entitled “Discussion”

p. 9565, line 4: 'Some observations': please specify

p. 9566, line 21: WVMRs?

Fig. 1: Discuss the time lag in the seasonal cycles of eddy heat flux (maximizing November-February) and the stratospheric water vapor (minimizing between February and March).

p. 9567, line 5: Please give more physical arguments for the high anti-correlation for the selected periods

p. 9567, line 1: Numbers of correlation should be given including and excluding data from 1997. The low anti-correlation in that year is not a valid reason for excluding it from the statistics, especially since the low anti-correlation is not understood.

Fig. 3: How are the anomalies calculated?

p. 9570, line 7-12: Superfluous. A cooling of the TTL has been directly associated with a strengthening of the BDC in previous studies.

Fig. 6: Since a large part of the discussion of the first part of Section 3 focuses on 70

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hPa, this level should be included in Fig. 6.

p. 9570, line 26: Since the authors discuss differences between 1995-2000 and 2000-2005, it is essential for the NCEP data to be reliable not only after 2000, but also between 1995 and 2000.

p. 9581, Fig 6 caption: The bias of the ECMWF operational data is not really relevant for the ideas presented in the paper.

Technical corrections:

p. 9566, l.23: controls → control

p. 9567, l. 1: southern hemisphere → Southern Hemisphere

Fig. 1 caption: averaged averaged → averaged; from added from → added from

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9563, 2006.

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