Atmos. Chem. Phys. Discuss., 8, S629–S630, 2008
www.atmos-chem-phys-discuss.net/8/S629/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Tropical Tropopause Layer 1960–2100" *by* A. Gettelman et al.

Anonymous Referee #3

Received and published: 9 March 2008

This paper analyzes the tropical tropopause layer (TTL), its structure and change, in several chemistry climate models. Because of the limitation of current models and re-analysis data in the representation of the TTL, the results are not conclusive. However, this paper is a very good starting point, showing clearly the necessity of the model improvement also for the TTL. I would recommend this paper to appear in ACP after considering the following comments.

Major comments.

NCEP reanalysis and ERA40 often show quite different results. This is very confusing and annoying. Models cannot be validated if we do not know the truth. How about adding the analysis of one more reanalysis data such as NCEP-2?

The tropopause is a tricky parameter as is clearly shown in Figure 15. I would suggest to plot the vertical gradient of potential temperature (dPT/dz) at some fixed pressure

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

levels in the TTL. This is much more straightforward in terms of atmospheric dynamics. If dPT/dz at 100 hPa is increasing (decreasing), the 100 hPa level is becoming more stratospheric (tropospheric).

Minor comments.

Information on the vertical resolution in the TTL of all models and reanalysis data should be described in Table 2 or in a separate table. This should be the critical information for the TTL research.

The ozone concentration in the TTL is quite different in different models (Figure 8) due to the difference in photochemical and perhaps dynamical processes considered in these models. The correlation between the CPT temperature and TTL ozone, described at page 1381 and in section 5, may not be associated solely with direct radiative connection between the two but may be associated with indirect connection through, for example, dynamical processes. The direct (radiative) connection is only one of the candidates at the moment, and may not be appropriate to be stated strongly in the abstract.

In page 1383, lines 5-7, cloud height changes in WACCM are described. Are such tropospheric changes consistent with the IPCC 2007? How about other models?

Regional and seasonal distribution of temperature at CPT should be critical for determining the water vapor mixing ratio in the tropical lower stratosphere, while the discussion in section 5.3 is based on zonal mean value. At least with WACCM outputs, the authors should be able to investigate this point further.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 1367, 2008.

ACPD

8, S629–S630, 2008