Atmos. Chem. Phys. Discuss., 11, C1553–C1554, 2011
www.atmos-chem-phys-discuss.net/11/C1553/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Tropical cooling in the case of stratospheric sudden warming in January 2009: focus on the tropical tropopause layer" *by* K. Yoshida and K. Yamazaki

Anonymous Referee #2

Received and published: 6 April 2011

This manuscript analyses in detail the causes of the temperature changes in the tropical regions (TTL) during the major SSW event occurred in January 2009. The manuscript presents convincing and interesting conclusions about the drivers of the tropical ascent in the 100-150 hPa region causing the cooling during the January 2009 episode.

I would recommend to publish the paper as it is, taking into account few minor comments:

- Page 2270, line 1 from bottom: it is not clear in which way the inclusion of boundaries may generate errors related to topography (the boundaries are based on the observed

residual mean vertical velocity)

- Page 2271, line 1 from bottom: The anomalies are calculated w.r.t. a climatology of 4 months (DJFM) or 3-months as indicated in the caption of Figure 1? In case it is for the 3-months, which ones?

- page 2273, line 9 from top: could you clarify the role of the boundary effect?

- page 2274, lines 1-4 from bottom: Not clear, from Figure 5 it appears that the main contributor to the ascent on 18 Jan is still the diabatic heating.

- Page 2275, line 11 from top: 'decays with decreasing altitude'. Not clear from the Figure

- Page 2275, lines 8-10 from bottom: the eddy forcing term in the SH troposphere has an insignificant effect on the TTL: but it induces a positive anomaly even a bit below 200 hPa. Do you mean that it is too small to be significant at 95%?

Then, this insignificant effect is occurring on the 18 January only. Things would have been different on January 9 if we refer to Figure 4. Any comment?

- Page 2277 and discussion of Figure 10. Looking at the vertical component of the wave activity flux at 100-125 hPa, on January 18 and January 21 there are large values (red contours) over the North Atlantic. Could this be a source region of wave activity relevant for the SSW occurrence and duration? (For example, at 500 hPa (well below), these regions appear to coincide with the Greenland blocking area - Jan 18 - and European blocking area - Jan 21). See for example: woollings et at 2010 - Associations between stratospheric variability and tropospheric blocking). Could you add a comment?

- Page 2279, lines 6-9: sentence not clear, there is a verb missing?

- A question: Could this interesting analysis be extended (in a next work) to other strong SSW events and make some statistics ?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2263, 2011.

ACPD

11, C1553–C1554, 2011

Interactive Comment