Atmos. Chem. Phys. Discuss., 13, C6973–C6975, 2013
www.atmos-chem-phys-discuss.net/13/C6973/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ozone seasonality above the tropical tropopause: reconciling the Eulerian and Lagrangian perspectives of transport processes" *by* M. Abalos et al.

Anonymous Referee #2

Received and published: 16 September 2013

Review of M. Abalos et al., "Ozone seasonality above the tropical tropopause: reconciling the Eulerian and Lagrangian perspectives of transport processes"

Recommendation: Minor revision required

General comment:

This paper tries to reconcile the apparent contradicting results regarding the seasonality of ozone in the tropical lower stratosphere and its links to tropical up-welling and horizontal in-mixing by analyzing data from a chemistry-climate model and from a one-dimensional Lagrangian transport model. The results clearly explain the standpoint

concerning the seasonality of ozone in the tropical lower stratosphere from the Eulerian and Lagrangian perspectives in different coordinate systems with respect to pressure versus potential temperature.

One overall comment is about the authors' focus of ozone. To highlight in-mixing, transport process would be important and ozone is not necessarily appropriate since the chemistry process should be considered even in the lower stratosphere. Some other tracer species or potential vorticity would be better to analyze. The authors should say some words about their focus on ozone seasonality.

I am not sure about the policy of ACP, but I feel that this paper is a kind of a discussion part of a full paper which is assumed rather longer than this. Except the shortness of this paper, I found that it is clearly written and that it gives insight for understanding some signatures of the tropical tropopause layer. Therefore I recommend that this paper is acceptable to ACP after some minor revisions based on the following comments which the authors might consider to take into account.

Specific comments:

2. Model data and method: There is no description about the vertical grid points for the chemistry climate model WACCM and the Lagrangian 1-D model. Some related information can be seen in the figures, but it would be better to give the grid point information for the vertical resolution.

Page 19295, line 25: αN and αS are used but not defined in the following. Actually there are some explanations around Page 19297 and line 1, but it is too far from Eq. 1. Also we could not find clear definition of the two parameters including actual values they used. In other way to ask, are these two parameters constant and same for the two hemispheres? They are somewhat magic numbers to explain in-mixing in the model. Similarly there is no detailed description about χN and χS, but these should be also very important to represent seasonal variation in the TTL due to in-mixing.

ACPD
13, C6973–C6975, 2013

Page 19300, line 4- : The authors stress overall similarity. I agree a part of their discussion, but do not fully. During boreal winter there is Australia monsoon, and there seems a sign in the WACCM data but not in the 1-D model data. Also the duration of the boreal summer maxima is not well reproduced in the 1-D model. I understand that it is not a discussion in this paper, but this may be related to the previous comment about the specification of αN and αS, and χN and χS.

Figure 4: It is somewhat difficult for me to understand the detailed messages from this Figure. Some explanations are written in the figure caption, but for easy reading and clarity more detailed descriptions would be preferable in the main text.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 19291, 2013.