Atmos. Chem. Phys. Discuss., 8, S8457–S8460, 2008
www.atmos-chem-phys-discuss.net/8/S8457/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mainz Isoprene Mechanism 2 (MIM2): an isoprene oxidation mechanism for regional and global atmospheric modelling" *by* D. Taraborrelli et al.

D. Taraborrelli et al.

Received and published: 22 October 2008

We thank Referee #1 for acknowledging the detailed evaluation of MIM2 as valuable.

A main recommendation of Referee #1 is that we include an extensive comparison of 3D results with observations. In principle we agree that this is of value, and we have already presented such comparisons of 3D results in two other papers, Lelieveld et al. (Nature, 2008, 452, 737-740) and Butler et al. (Atmos. Chem. Phys., 2008, 8, 6273-6312). However, we are not inclined to repeat and extend those comparisons in this manuscript for a few reasons. First, the manuscript is already extensive, and this would mean a substantial increase in length (especially given that some of the other referee and public comments ask for increases in the detail on the central points of

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

the manuscript). Second, in those papers it has already been shown that MIM2, as well as MIM and the MCM, all substantially underestimate the HOx levels in pristine environments where isoprene is abundant. For this reason, a thorough evaluation of 3D results is planned for MIM2 and for a modified version that will be closer to the results of Lelieveld et al., which is currently in an advanced stage of development, but not yet completed. In fact, the development of MIM2 provides a reduced mechanism capable of including new experimental and theoretical results directly in a meaningful way. Therefore, MIM2 is an important step towards the overall development of a state-of-art isoprene oxidation mechanism in 3D atmospheric models. We would like to stress that this objective is very difficult to achieve with the other reduced mechanisms that have been used in the past. Finally, on this point, following the suggestion of Referee #1 we propose to change the text at page 14055 lines 12-13 from

"A more in-depth discussion of the model-measurement comparison during this campaign for OH and isoprene is presented in Butler et al. (2008)."

to

"A more in-depth discussion of the model-measurement comparison during this campaign for OH, isoprene and many other intermediates is presented in Butler et al. (2008).".

Referee #1 also suggests comparisons of the new species to observations. We also agree that this is will be very sensible to include in a future broader evaluation, such as that noted above. We do not feel, however, that it is appropriate to include in this paper for the reasons noted above and for the following further reasons:

1) comparison of acetaldehyde to observations has already been done by Butler et al. (see corresponding supplement) showing that only a slight improvement is obtained with MIM2 compared to MIM;

2) comparisons for propene are not considered worth doing because the propene mea-

ACPD

8, S8457–S8460, 2008

Interactive Comment

surements from the NOAA Cooperative Air Sampling Network were evaluated as having poor accuracy and reproducibility (Pollmann et al., J. Chrom. A, 2008, 1188, 75-87);

3) comparisons for glyoxal are considered still premature with the 3D model we are using (Joeckel et al., ACP, 2006, 6, 5067-5104) since it does not represents aromatics and the aerosol phase yet. In fact - a previous study inferred a large missing sink of glyoxal in the aerosol phase (Volkamer etal., GRL, 2007, 34) - glyoxal has other important atmospheric sources like aromatics (Volkamer et al., J. Phys. Chem. A, 2001, 105 (33), 7865 -7874)

Reply to specific comments

p. 14044 last line: we will change the text from

"The box is considered to be 1km long and to be representative of the boundary layer."

to

"The box is considered to be 1km long on each side and to be representative of the boundary layer."

p. 14045, line 13: Guenther et al. (2006) present a more sophisticated calculation of the isoprene emission depending on many more parameters compared to the one presented in Guenther et al. (1995). However, the differences in global estimates are 67 Tg/yr, well below the uncertainty range of the estimates themselves. Moreover, for a box model evaluation of mechanisms for isoprene oxidation any emission function can be used. The use of such a function serves the purpose of having a diurnal cycle for the isoprene emission that is not far off from reality.

p. 14046, line 20: 3.33x9 is a typo during the editing process. We will change it together with the other two ones.

p. 14047, 26: "of" will be deleted

p. 14048, 24: we will change "referred as MIMvK" to "referred to as MIMvK"

ACPD

8, S8457–S8460, 2008

p. 14051, 2: NOA is already shown in the text to be the acronym for alpha-nitrooxy acetone. We don't understand what Referee #1 would like.

Supplement. In Table 3 we will mention that the J values are given in Table 6, in which we will add a column specifying for which molecules or molecular patterns each value is used.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 14033, 2008.