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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Australian bush fires of February 2009: MIPAS observations and GEM-AQ model results" *by* N. Glatthor et al.

Anonymous Referee #2

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Glatthor et al. presents MIPAS observations of various organic species and biomass burning tracers emitted from the large Australian bush fires of February 2009. The observations are compared to GEM-AQ model simulations and provide evidence of high injection height (upper than 8.5 km) and transport in the lower stratosphere.

General comments

The objectives of the paper are not clearly defined. The paper remains very descriptive of the plume dispersion and pollutant height. It confirms previous studies but one would expect more. What does one learn from the comparison with the model? It would be valuable for the paper that the observations and the model were exploited more to draw stronger geophysical conclusions. Neither the observations nor the model are used to discuss the chemical evolution of the plume for instance. Moreover, as

currently presented, I am not fully convinced by the model/observations comparison. The authors claim that the agreement is generally good (for example in the abstract) but when I look the figures, I am not so enthusiastic.

The presentation of the results could also be improved. The explanation of the evolution of the plume is repeated for each analyzed molecule. I would suggest the authors to reorganize the paper presenting for instance (1) the horizontal evolution of the plume using either the model and/or the observations; (2) the vertical extension of the plume using MIPAS observations (e.g. Fig 11); (3) detailed comparison with the model; (4) geophysical discussion (chemical evolution of the plume or so).

Specific comments

1) The model is taken at 12:00 in the comparison with the observation, whereas the observations time can vary from 0 to 24h. Why are the model and the observations not compared at the same time? Can this assumption mislead the interpretation of these comparisons? The authors mention themselves, p15020, l23-25, that significant differences are observed in the model between 12:00 and 23:00. I would suggest the authors make a composite of the model at the observation time to do proper comparison with the observations.

2) The authors mention that they smoothed the model with the MIPAS averaging kernels. It is not clear in the figures if it is done or not. I guess not, I guess the smoothed results are only presented in Table 2. This should be clarified. Moreover, in addition to the comparison at the same time previously suggested, the comparison should be done with the smoothed model simulations and a discussion of the differences between smoothed and not model added if existing.

3) In the figures 3-10 and Fig. 12, it is not always easy to clearly see the MIPAS observations and to find the “red diamonds with black pluses inside”. Maybe white line for the diamond contour would be more visible and larger symbols in addition to black pluses.

ACPD

12, C5437–C5439, 2012

4) P15017 l26-27 : please provide references

5) P15028 l18-23 : this last conclusion should be more strongly discussed in the paper. It is coming without any real reason according to the current discussion in the paper. If one of the objectives of the paper is also to demonstrate the needs for more resolved instrument to sample correctly this kind of events, it should be clearly mentioned and discussed in the paper.

Technical corrections:

Supplement material: the latitude and the longitude should be inverted.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 15009, 2012.