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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modeling of biomass smoke injection into the lower stratosphere by a large forest fire (Part I): reference simulation" *by* J. Trentmann et al.

Anonymous Referee #2

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Biomass burning is an increasing important subject in atmospheric research as it has the potential of greatly disturbing the thermodynamic, dynamic and chemical equilibriums of the atmosphere. This is especially so if its influence extends up to the stratosphere and this is precisely what is addressed in this paper.

This paper also deals with the injection of the forest fire smoke into the stratosphere by pyro-Cbs in high latitudes. High latitude regions are traditionally considered as convectively inactive and yet recent observational studies show that strong convections can occur, especially with the additional energy released by combustion. Water vapor and other chemicals can then be carried into the stratosphere and their impacts on the

global atmospheric processes must be carefully assessed.

The paper is clearly written and the results are also discussed nicely. I would like to suggest the following minor revisions that I believe would clarify a few points.

(1) The model ATHAM is used for this study. The authors have presented some information of this model in Sec. 4 and provided a few references. Nevertheless, it may be a good idea to discuss a few more details about the model properties. Specifically, what is the model spin up time? This is important since some models take long time to spin up and hence the results of the earlier time steps are often discounted somewhat. Since the results presented here are for the first 40 min, it is necessary to indicate that this is much longer than the spin up time and hence the results are representative. (2) In sec. 5, many numbers of the model results are provided. Of course the authors are familiar with the numbers but readers may get confused after reading back and forth about various quantities. Maybe it is a good idea to come up with a table so that readers will have easier time to figure out how some numbers are arrived? (For example, on liner 349, how is the number 5% to the total energy released calculated? It will be easier to see that in a table). (3) If I understand it correctly, you use constant fire induced fluxes to initialize the pyro-Cb on the observed sounding background. Can you provide some comments about the advantages and/or disadvantages of this initialization technique as compared to other possible techniques?

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6, S2524–S2525, 2006