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***Interactive comment on* “Composition changes
after the “Halloween” solar proton event: the
High-Energy Particle Precipitation in the
Atmosphere (HEPPA) model versus MIPAS data
intercomparison study” by B. Funke et al.**

Anonymous Referee #1

Received and published: 12 May 2011

General comments:

This manuscript describes the response of nine chemistry-transport models to the Solar Proton Event (SPE) of October 2003. MIPAS observations are used for validation. SPE's provide excellent opportunities for examining the response of both observations and models to a specific source. The manuscript is well thought out and well written with sections describing the observations, the models, the methodology used,

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and the results. Most of the discussion of the results is included as the results are presented. A summary of the main results concludes the manuscript. The abstract gives a concise overview of the observations, models, and results. One highlight of this work is the comprehensive overview of the SPE atmospheric signal as seen in temperature and 13 tracers provided by MIPAS. Another highlight is the inclusion of chemistry-transport models forced both by assimilated and modeled winds. This is an excellent publication for ACPD and ACP and should serve as a useful overview of state-of-the art stratopause chemistry knowledge and modeling.

I have a few specific comments and technical corrections below, however, these are very minor and I would recommend publication of this manuscript in its present form.

Specific Comments:

Page 9425, B3dCTM: What happens at the vertical boundaries?

Page 9426, CAO: What Radiative scheme is used with the dynamical core?

Page 9433: How does underestimating the background HOCl lead to apparent better agreement? It seems confusing because lowering (underestimating the background) would seem to give lower modeled HOCl values while the figure show high HOCl values than observed.

Page 9435, discussion of Fig. 9: Would a Potential Vorticity Area diagnostic show stronger gradients in the lower mesosphere, more consistent with gradient above and below, if planetary waves are responsible for the reduced gradient?

Page 9435, discussion of Fig. 10: Other than changes in values from the initial conditions (in most models) and varying rates of descent (in most models), there is not much agreement in the Ch4 fields. Is there an explanation for such poor agreement of the models with MIPAS?

Page 9441, discussion of Fig. 14: Has there been speculation as to why the MIPAS NO_y seems to have much larger zonal asymmetry during the main SPE than the mod-

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els?

Page 9459, discussion of Fig. 34: Any speculation on why the FinROSE shows such a large response, and why two models: B2dM and CAO show very little response?

Page 9459, discussion of Fig. 35: Why is there almost no response in the CAO model?

Technical Corrections:

Figs. 1, 3, 25, and 26 are very small on my printer.

Page 9433, Fig. 6 discussion: The case with the averaging kernel is broader and slightly shifted to lower altitudes. Is this the former not the latter case?

Page 9436, Line 24: Comma not needed after "both".

Page 9440, Line 8: Period not needed after "acts".

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 9407, 2011.

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