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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mesosphere-to-stratosphere descent of odd nitrogen in February–March 2009 after sudden stratospheric warming" *by* S.-M. Salmi et al.

Anonymous Referee #2

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General comments:

In this manuscript Salmi et al. investigated the effect of odd nitrogen (NOx) produced by energetic particle precipitation in the Northern Hemisphere winter with different dynamic conditions (2007 and 2009). They compared the descending NOx in a chemistry transport model (CTM) to observations from ACE-FTS. The descending NOx was controlled by dynamics and chemistry only played a minor role in NOx-loss. They also showed changes in the ozone mixing ratio in the stratosphere which is not due to NOx descent.

In the last years several discussions about winter NOx enhancements occured. This

paper is a good contribution to these discussions and therefore should be published after a few modifications.

Major comments:

1) I completely agree with point 2 of referee 1. I think the paper by Funke et al. (2007) also should be added in the references.

2) The parts treating the ECMWF-data up to 80 km have to be revised. You are writing that the ECMWF data is not consistent with observations above 50 km (p. 1433, l. 26) and "all the issues mentioned above might influence the model results“(p. 1434, l. 8). One of your goals was to test the quality of the ECMWF data. Having the statements from before in mind I think you really should do a test, e.g. do the same model run without using ECMWF above 50 km.

3) You only have a few observations by ACE-FTS. How are the NOx mixing ratios distributed at the model upper boundary? Uniformly or longitude/latitude dependent? Within the polar vortex or northward of 60N? How big is the uncertainty in the results due to the assumptions made for the UBC?

4) Satellite data always have a limited vertical resolution. Observed mixing ratios therefore can be lower than the real ones. Is this considered in your measurement error? If not: How big is the influence of vertical resolution for NOx observations by ACE-FTS?

Minor comments:

1. Figure 6 and figure 7 have different color scales. Please use same color scale for better comparability

2. Figure 6: NOx; Figure 7: NO; I guess both show NOx?

3. Figure 9: loacations → locations

4. page 1431, line 29: spelling: "enchancement“ → enhancement

ACPD

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References:

Funke, B., M. López-Puertas, H. Fischer, G. P. Stiller, T. von Clarmann, G. Wetzel, B. Carli, and C. Belotti (2007), Comment on “Origin of the January–April 2004 increase in stratospheric NO2 observed in northern polar latitudes” by Jean-Baptiste Renard et al., Geophys. Res. Lett., 34, L07813, doi:10.1029/2006GL027518.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 1429, 2011.