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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Energetic particle induced inter-annual variability of ozone inside the Antarctic polar vortex observed in satellite data" *by* T. Fytterer et al.

Anonymous Referee #1

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General comments: The authors use three satellite instruments (ENVISAT MIPAS, TIMED SABER, and Odin SMR) to investigate the possible influence of energetic particles on ozone inside the Antarctic polar vortex. This is a very fascinating subject and I commend the authors on their work. They find a strong indication that ozone depletion is associated with geomagnetic activity through the charged particles' production of NOx. The authors use three different solar and geomagnetic indices (F10.7 cm solar radio flux, Ap index, and > 2MeV electron flux) in their analysis of ozone and NO2 data. They also use a comprehensive three-dimensional chemistry and transport model (3dCTM) in their analysis. The paper is very well-written and the conclusions

are presented in a clear and reasonable way. I recommend that the paper be published subject to the authors considering one specific comment and three suggested technical corrections.

Specific comments:

1) p. 31266, lines 8-10: "The cause of the NO2 behaviour is possibly related to the formation of the reservoir species ClONO2 and HNO3, slowing down the catalytic destruction of O3 by Cl." The authors might be interested to know that this mechanism was discussed in some detail in Jackman et al. (J. Geophys. Res., 114, D11304, doi:10.1029/2008JD011415, 2009), who used the Whole Atmosphere Community Climate Model (WACCM) to study the impact of the very large July 2000 solar proton event on the atmosphere (see Figures 6 & 7).

Suggested technical corrections:

1) p. 31251, line 28: Change "show, that," to "show that"

2) p. 31260, line 2: Change "for the all" to "for all"

3) p. 31260, line 28: Change "pattern" to "patterns"

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 31249, 2014.