

Interactive comment on “Longitudinal hot-spots in the mesospheric OH variations due to energetic electron precipitation” by M. E. Andersson et al.

Anonymous Referee #1

Received and published: 7 October 2013

General comments: This is an interesting and generally well written study on the effect of energetic electron precipitation on upper mesospheric hydroxyl. OH measurements by MLS/Aura and electron flux measurements with MEPED were used. The scientific analysis present appears to be robust and does not contain any obvious errors – as far as I can tell. In my opinion this manuscript should be published after the specific comments raised by the other 2 reviewers and the ones listed below have been addressed. In contrast to anonymous reviewer #3 I think that the manuscript contains enough original material to warrant publication in ACP.

Specific comments:

1) Page 19898, line 19: 'of about 13 orbits per day.'

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Aura actually completes about 14.6 orbits per day, not 13.

2) Page 19899, line 11: 'The systematic error of the H₂O/temperature data is typically less than 25 %/5 %.'

Can you provide the temperature error in K rather than %?

3) Page 19899, line 21: 'consists of two electron telescopes and two proton telescopes pointed approximately perpendicular to each other.'

This is just a minor point, but from the way the sentence is phrased it is not clear which telescopes are pointed perpendicular to each other.

4) Page 19900, line 8: 'in 2005, 2006, 2008 and 2009.'

I think a brief explanation why 2007 is not shown would be appropriate.

5) Page 19900, line 11: 'For each day of the year selected, a 1deg spatial resolution map of the median > 30 keV fluxes was produced for each POES spacecraft in subsatellite coordinates.'

Was there a specific reason why median maps and not maps of the arithmetic mean electron fluxes were made? How would maps of the mean electron fluxes look like?

6) Page 19900, line 18: 'In Fig. 1 the electron precipitation is confined to the geomagnetic latitudinal bands 55–72 N and 55–72 S and can occur at all geographic longitudes.'

I suggest adding lines showing 55 and 72 N/S magnetic latitude to the panels of Fig. 1.

7) Page 19900, line 26: 'with lower electron fluxes observed between 150–30W, i.e., North America (NA_m) hot-spot.'

Perhaps I'm not getting the point, but it seems to me that the fluxes between 150 and 30 W in the northern hemisphere are larger, not lower than in the remaining part of the

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latitude belt.

8) Page 19902, line 17: 'Figure 3 gives an example of the OH mixing ratios from SIC model run averaged between 70–78 km.'

Can you provide a brief qualitative statement as to the main reason for this local time variation?

9) Page 19902, line 29: 'of nighttime OH medians between 70–78km and 2005–2009' You write '2005-2009'.

Does this imply that 2007 is now included?

10) Page 19906, line 11: 'The amplitude of the PC 1 is highly correlated with ECR'

Looking at the bottom panel of Fig. 7 also shows periods with enhanced PC 1 values, but quite low electron count rates, e.g., immediately after March 2006. Possible reasons for this should be discussed.

11) Caption Fig. 2: 'Approximate geomagnetic latitudes'

In what sense are these geomagnetic altitudes approximate?

12) Fig. 5: I assume that only nighttime measurements have been used to produce these Figures? Perhaps this should be mentioned explicitly in the Fig. caption.

Typos etc.:

Page 19896, line 22: 'which suggest' -> 'which suggests'

Page 19897, line 4: 'and loss process occur' -> 'and loss processes occur'

Page 19897, line 11: 'of the particle' -> 'of the particles'

Page 19897, line 12: 'see e.g.' -> 'see, e.g.'

Page 19899, line 13: 'Pickett et al. (2008); Lambert et al.' -> 'Pickett et al. (2008), Lambert et al.'

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Page 19899, line 14: 'Note, that' -> 'Note that'

Page 19903, line 21: 'nighttime' -> 'nighttime'

Page 19904, line 7: 'in average' -> 'on average'

Caption Fig. 3: 'from SIC model' -> 'from SIC model simulations' ?

Caption Fig. 7: 'for 6 selected month' -> 'for 6 selected months'

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 19895, 2013.

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