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Interactive comment on “Variability of the nighttime OH layer and mesospheric ozone at high latitudes during northern winter: influence of meteorology” by A. Damiani et al.

Anonymous Referee #2

Received and published: 9 August 2010

The paper presents the results of the MLS observations of OH and ozone in the mesosphere and the lower thermosphere in polar regions during five winters 2005-2009. Medium-term and short-term variability is discussed. The analysis is well-thought. The paper is interesting. It certainly deserves publication in ACP. My (mainly minor) comments are below.

COMMENTS

- 1) p.14585 lines 10-11: Please explain in more detail the HO_x dilemma (one sentence would be sufficient).
- 2) p.14587 line 14: please explain the notation [O].

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3) p.14587, lines 18-20: I think it is worth not only mention the modeling work by Sonnenman et al., 2006a but also explain shortly their findings.

4) p.14588, line 23: The paper by Wang and Alexander (2009) discusses gravity wave activity during the 2008 SSW, not mesospheric ozone...

5) p.14599, line 13: 2.5 km is the grid for the data product. Please indicate the actual MLS vertical resolution (this should be done using the information about the averaging kernel).

6) Discussion of Figure 2 in pages 14590-14591: Significant difference between SH and NH polar regions is observed and it is worth to mention.

7) Explanation of the mechanism of cooling in the mesosphere in pages 14593-14594: I think that together with the explanation of (Matsuno, 1971) based on the mass balance, another explanation based on gravity wave propagation (Holton, 1983) should be also mentioned. See (Wang and Alexander, 2009, introduction, and references therein).

8) The sentence: "The stratospheric wind reversal induced by planetary waves during SSWs also changes the filtering of gravity waves and allows more eastward gravity waves to enter the MLT..." might be ambiguous. You probably mean "only a small portion of GW is able to enter the MLT", don't you?

9) Discussion on increased ozone rate production due to decreased temperature in page 14597: you are discussing polar night conditions when the ozone production is low. Therefore, the main reason for the expected ozone-temperature anticorrelation is the temperature dependence of the ozone loss reaction.

10) P.14597: "Other events of sudden mesospheric ozone rise associated with temperature decrease are evident also in late February 2005, late January 2008 and February 2008." I think it is worth also to mention the SSWs when such behavior is not observed.

11) Please discuss the ozone-temperature and OH-temperature correlations at 0.004 hPa.

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12) I do not see gray regions in Fig.3.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 14583, 2010.

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