

***Interactive comment on* “Signature of the 27-day solar rotation cycle in mesospheric OH and H₂O observed by the Aura Microwave Limb Sounder” by A. V. Shapiro et al.**

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"1 - Introduction: focus on the main objectives of the paper: the first and the second paragraph are ok and convey the idea for mechanistic studies. Following there is a forest of arguments that not necessarily leads to the objectives of the paper. The third paragraph mix model problems with observations problems and neither one of another is the focus of the paper or would be solved by the results of this paper. I would suggest from the second paragraph on to focus on the objectives of the paper: an analyses of measurements looking for short term (27 days) signatures at the mesosphere, an altitude where signals are amplified and therefore easier to be detected."

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We thank the referee for this comment. The introduction was rewritten and we think it helped us to improve the paper.

"2 - One important point: there are ground based lidar measurements of mesospheric OH in a couple of sites. Those data actually cover from late 1990's and therefore may contain valuable information. Should at least be mentioned in the text. Please look at: Brinksma, E. J., et al. (1998), First lidar observations of mesospheric hydroxyl, Geophys. Res. Lett., 25, 51–54, (Erratum, Geophys. Res. Lett., 25, 521, 1998.)."

The reference was added.

"3 – Data description: Explain the altitude range covered. Maybe here the authors could put a climatological altitude profile with the 1 sigma variability. This would illustrate the variability in the measurements and the altitude range. There is no discussion on measurement uncertainties, precision, accuracy. Would the measurements error bars support the analysis performed here?"

The full description of the MLS data are given in Livesey et al., 2011 and Pickett et al., 2008 papers. We gave references on these works.

" Include also that by looking at the tropics you avoid effects of energetic particle precipitation. "

Done

"When introducing Figure 2: clearly describe what we learn from this figure and drive us on how it builds the idea the authors want to convey at the paper. The discussion on the Lyman alpha is really confusing. Suggestions: include a section on OH/H₂O chemistry at mesosphere. This will provide a clear picture without many words."

We thank the referee for this comment. We changed the structure of the paper a bit and hope that the paper becomes more clear. The section "Data description" was divided in two parts. In the new section 3 some description of the mesospheric chemistry was added. The text was slightly reorganized.

"4 – The OH and H₂O responses. . . . Section: This is really confusing and it mix too many aspects. Here I would suggest to introduce the methodology and explain why it was chosen, what are the limits and how it is applied. "

Some explanation was added.

"The paragraph with the discussion 'To analyze the OH and H₂O variability during the periods od high and low solar activity. . . .' could go to Data Description section as it selects what dataset will be used in the paper. Here the focus should be on the statistical analysis proposed."

Done.

"5 – Sensitivity Analysis section: I do not really see how it is a sensitivity analysis. I would call this section Analyses (remove sensitivity)."

Done.

"6 – Conclusions: there is a problem with the analysis as coefficients as found here are not convincing (order of 0.74 or 0.76). Further analyses could be added here. In anyhow the word 'strong' does not apply here given the correlation coefficients found."

The comment was implement.

"Another point in the conclusion is they mention the results could be used for the CCM model validations: elaborate on how."

Done.

Figures: "1 - show uncertainty in the data. Here it may be really interesting to show a climatology profile with 1 sigma variability."

We added the references to Livesey et al., 2011 and Pickett et al., 2008 papers where the full description of the MLS data is given.

"2 - This figure is confusing and it is not clear what we see from it. Maybe a better

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description in the text may help here."

We have rewritten the figure description. Besides we have added a new figure (the figure is attached to the answer to the referee 3) which is an analog of figure 2 first panel, but for the solar minimum. We think it would help to make this part of the paper more clear.

3 - 7 - OK.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 28477, 2011.

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