



## ***Interactive comment on “Observation of the exhaust plume from the space shuttle main engine using the Microwave Limb Sounder” by H. C. Pumphrey et al.***

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This referee provides a number of suggestions for improved wording which we have included except where noted.

The referee suggests that we should not use Remsberg (2010) as a source for the assertion that water vapour in the vicinity of the mesopause responds strongly to the solar cycle. Now, I was working rather on the assumption that it was a well-established fact that there was less water near the solar maximum due to the enhanced Lyman- $\alpha$  radiation. But looking through some more papers (Hartogh, 2010; Lübken, 2009) on

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the subject it appears that the situation is more complicated and less well understood than this. I have added these references to the paper.

The referee suggests more caution or more discussion in respect of Thomas's proposal that NLC changes are driven by changes in CO<sub>2</sub> or CH<sub>4</sub>. We have added the referee's clarification as to why CO<sub>2</sub> and/or CH<sub>4</sub> are supposed to be important. We do not, however, want to expand the discussion much as it is not the main thrust of the paper. We mentioned the matter merely to provide motivation for the the work presented. We had supposed that by calling Thomas's assertion a "suggestion" that we had been cautious enough. In the hope of being even more cautious we have added a reference to Lübken (2009).

The referee suggests that we remove reference to the MLS-specific abbreviations MAF and MIF. We have done this in most places, but have left the definition in as the reader may come across the terms elsewhere in the MLS literature.

The referee notes that the spacing between individual MIFs appears in Fig. 1 to be less than 3 km. It is actually more like 2.4 km and the text has been altered to reflect this.

The referee asks what the field of view is in the vertical. The gory details on the MLS antenna pattern are to be found in Cofield and Stek (2006); the executive summary is that the half-power beam-width at the limb is 8 km horizontally and 4 km vertically. An additional sentence in the text now provides this information.

The referee is concerned about the many detections in the summer polar regions. It is difficult to infer the exact processes that are going on in this region from the MLS data. In particular the data do not appear to reveal a clear connection between the polar detections and rocket launches elsewhere in the world. (If such a connection exists then the study of it would be a separate project.) It seems more likely that the polar detections are the way that our detection procedure reacts to the natural enhancements of water vapour near the summer mesopause.

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The referee suggests that we add Ariane and Proton launches to Fig. 5. We have tried this, but find that it makes the figure far too cluttered — there are many such launches during the study period.

## References

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