

## ***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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The referee suggests that we attempt to link the possible launch plumes seen in the MLS data near French Guiana and the Caspian Sea to known launches from Kourou or Baikonur. We make an attempt to do this in the re-written paper. The French Guiana cluster do indeed appear to be associated with three Ariane-5 launches. These are a small fraction of the 31 launches which took place during the study period. The one detection near the Caspian sea was on 25 December 2006 at 22:10 UTC. This coincides with a Proton launch at 20:18 UTC on the same day, so that could indeed

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have been it. This is just one of at least 44 Proton launches that took place during the study period.

The referee also suggests that we should be able to examine the anomalous high values seen at high latitudes and to infer from the profile whether they are related to a launch elsewhere in the world. This might be true if MLS scanned to a higher altitude. With the top of the scan where it is, at 92-94 km, and with the rather coarse resolution of the scan it is not clear that there is any useful information to be obtained in the way the referee suggests. If there were, it would probably require a new and improved retrieval to extract it.

The referee requests a full list of shuttle launches during the period studied: we provide this, noting that it is also requested by another referee in RC C1691.

The referee requests that we re-order the text by placing figure 1 after figures 2 and 3 and (presumably) putting section 3 after section 4. We disagree as we feel that this would make the paper harder to understand for a reader who was unfamiliar with the instrument.

We attribute the poor detection rate both to the instrument's sensitivity and to the fact that it does not scan high enough in the atmosphere. The referee suggests that we distinguish between these two effects. This would be interesting to do and would be important if one were designing a new instrument for the specific purpose of detecting launches. But it would require some detailed modelling. If we were to do this we would have to defer it to another paper. We have, however re-written the sentence in question to clarify that we are talking about sensitivities to rocket exhaust in particular and not to water vapour in general and that the fact that MLS does not scan as high as SABER is one important factor, but probably not the only one.

We expand the acronyms SABER and GUVI as the reviewer suggests and we also reference Siskind (2003) in the discussion on plume dispersion and add a sentence on that topic to the conclusions. We follow the referee's suggestion and add labels

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(a), (b), etc to panels of multi-panel figures and also have changed the vertical axis on Figure 1 panel (i) to be a logarithmic pressure axis rather than a linear axis in  $\log_{10}(\text{Pressure/hPa})$ .

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Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3971, 2010.

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