

Interactive comment on “The quasi 16-day wave in mesospheric water vapor during boreal winter 2011/2012” by D. Scheiben et al.

Anonymous Referee #2

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This is a generally clearly written paper which does a nice analysis of variations in mesospheric water vapor on ~ 16 -day scales. My primary concern is with the presentation of the Seoul data, where the 20-day wave which is ~ 180 degrees out-of-phase compared to the MLS measurements is referred to as “insignificant”, despite the fact that it has only a slightly smaller amplitude than the 16-day wave from this Seoul. There is also an apparently inconsistency in the manuscript between sensitivity claims made in Section 2 and variations of H₂O with pressure mentioned in Section 4. Below are detailed comments.

By implication it seems that there were no gaps in the Seoul data over the 4-month period shown. Is this true?

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In Section 2 it is stated that “Data used for the analyses performed in this study are only considered if the measurement contribution to the retrievals is higher than 0.8 . . .”. This statement that $>80\%$ of the contribution comes from the measurements is inconsistent with the authors statement in 4.1 that “the increase in the relative wave amplitude cannot be observed in our data due to the decrease of measurement sensitivity above 0.02 hPa”.

“Since the data from Aura MLS on 0.05 hPa has a vertical resolution comparable to the one from the ground-based microwave radiometers” – what is the vertical resolution of Aura MLS at 0.05 hPa?

In Figure 5 the phase of the wave at Seoul appears to be almost exactly 180 degrees out of phase with respect to the MLS wave at that point. The authors claim that “The phase difference in Seoul can be explained by the fact that the 20 day wave above Seoul is practically inexistent and therefore the phase difference is insignificant.”, but the amplitude of the 20 day wave shown on Figure 5 ($\sim 2\%$) is only slightly smaller than that of the 16-day wave at Seoul shown on Figure 6 (which is 2-3%). Given this discrepancy, it is not obvious to that the Seoul measurements contain any useful information on these waves. The authors need to either: 1) state clearly that the amplitude of the 20-day wave in the Seoul data is comparable to that of the 16-day wave and which has a phase nearly 180 degrees out of phase with MLS data. 2) show somehow, by comparison with MLS, that there is useful information about these waves in the Seoul data. 3) drop the Seoul data.

Are the MLS measurement longitudes shown in Figure 5 the longitudes of the actual measurements, or have they been put on a standard grid?

Are the MLS measurements at different times of day combined? Is there a diurnal difference in the MLS measurements at 0.05 hPa at the $\sim 2\%$ level of the smallest observed waves?

The authors point out that no water vapor variations will be seen unless there are ver-

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tical and/or horizontal gradients. Can they distinguish between these? Given the observed vertical/horizontal gradients, what are the changes in pressure/latitude required to produce the observed variations?

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