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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of stratospheric water vapour measurements from the airborne microwave radiometer AMSOS" *by* S. C. Müller et al.

Anonymous Referee #1

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Review of paper: Validation of stratospheric water vapour measurements from the airborne microwave radiometer AMSOS, by Muller et al.

General Comments:

I think this is a useful paper, as it discusses validation of a dataset that will add to the information we have on stratospheric water vapour. However, I think the paper needs some changes before it is suitable for publication in ACP. In particular, I think the authors should tone down some of their comments, and explain better a number of aspects of the paper. Details are provided in the specific comments below.

Specific Comments:

P. 1636

I suggest a reference is provided for the statements on the importance of water vapour. Suggestions are the SPARC 2000 report on water vapour, and the WMO 2007 report on ozone.

P. 1637

Satellite observations of stratospheric water vapour have also been made by UARS/MLS (albeit for a shorter period of time than UARS/HALOE). Possible references include:

Pumphrey, H C., Validation of a New Prototype Water Vapour Retrieval for UARS MLS, J. Geophys. Res., 104, 9399-9412, 1999.

Lahoz, W.A., et al., Validation of UARS MLS 183 GHz H2O Measurements. J. Geophys. Res., 101, 10,129-10,149, 1996.

P. 1639

L. 3: - forward model is split up -

L. 7: - parameters b include the -

L. 23: define the averaging kernel (e.g. as a derivative); see Rodgers (2000)

P. 1641

Section 2.5: Fig. 5 seems to be referred after Fig. 6.

P. 1642

L. 6: I do not understand the reference - that is elevated -. Is the wet layer elevated? Please clarify.

P. 1643

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L. 4: What profiles are involved?

L. 9: Which independent profiles? Suggest remove - interesting - (in my view, a paper should be neutral and leave these judgments to the reader).

P. 1644

L. 26: - forty -

P. 1645:

L. 3-4: Explain the statement - or until no more information of the satellite is available -.

P. 1647

Paragraph starting line 10: I do not understand what the authors are trying to say here. Please explain why the hygropause would be elevated, and what you mean by the profiles being hidden in the apriori profile of AMSOS and its covariance matrix.

L.26: I think the authors should tone down their statements about wavelength dependence of the bias. The evidence is not strong that the mean bias to AMSOS increases with sensor wavelength. The instrument sample is small (2-3) and the statement made in the caption for Fig. 10 is not true for all cases.

P. 1648

L. 6: Which hypothesis will be tested by Milz et al.?

L. 14: I think the authors should tone down their statement about the lidar profiles matching the 2-sigma error of the AMSOS profile. To my mind, a look at Fig. 11 shows that this is not always the case and that this depends on the altitude range.

L. 14: I think you mean vertical gradients, so please specify.

P. 1649

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Interactive Comment

L. 16-19: Can the authors say what are the likely causes for the lower water vapour values measured in the Arctic upper stratosphere in 2001, 2006 compared to 1998, 2002.

P. 1650

L. 2-3: Tone down statement on wavelength dependence.

L. 9-10: Explain better the statement about the global apriori of the AMSOS dataset and its covariance matrix.

L. 13 and 15: Remove the word - excellent -.

P. 1656

If references to the satellite missions were included in this Table, it would make it more informative to the reader.

P. 1661

Caption: To avoid confusion, suggest you start with - Fig. 4. The AMSOS dataset -

Also: - (g) and (h) are both -.

P. 1662

To follow from P. 1661, write: - Fig. 4. Continued -.

P. 1664

The number in the legend is difficult to see.

P. 1665

As for Fig. 4, use: - Fig. 7. Comparison - and in P. 1666: - Fig. 7. Continued -. It would be helpful to indicate in the caption that positive differences mean AMSOS is wetter than the independent data.

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P. 1667

Why is ECMWF mentioned in the legend for the left-hand panel?

It would be helpful to indicate that positive values in the right-hand panel mean that AMSOS is wetter than MIAWARA.

P. 1668

It would be helpful to indicate that positive values in the right-hand panel mean that AMSOS is wetter than Aura MLS.

P. 1669 and 1670

Tone done statements in figure captions (see various comments above).

P 1671

Do not use colloquial expressions in the caption, e.g., - Have a look for this effect in plot (c) -. What is this effect?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 1635, 2008.