

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

S. C. Müller et al.

Received and published: 20 March 2008

Thank you for the detailed comments. We will try to address to all your points of criticism except for the minor comments, which we will apply in the final revision.

P. 1642 L. 6: I do not understand the reference - that is elevated -. Is the wet layer elevated?

What we wanted to say is that the upper troposphere extends to higher altitudes in tropical regions than in arctic regions. This effect can be seen also in the water vapour distribution. As an example Figure 4.e) the high values at the bottom of the plot in red color extend to 17 km in the tropics and 13 km in the arctic.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

P. 1643 L. 4: What profiles are involved?

The involved profiles for the direct difference are the AMSOS profile and the satellite profile to compare with.

P. 1643 L. 9: Which independent profiles?

Both the AMSOS and the DIAL profile were plotted as they have been processed by their standard data processing routines.

P. 1645: L. 3-4: Explain the statement - or until no more information of the satellite is available

This means that we have done the comparison only in the overlap of the AMSOS profile, with measurement response larger 50%, and the provided satellite profile.

P. 1647 Paragraph starting line 10: ...Please explain why the hygropause would be elevated...

The inverse problem is ill-posed. By defining apriori information and its covariance we constrain the retrieval process to a certain range of possible solutions. In the case of water vapour this is not so easy to handle because there is a strong gradient in the troposphere, large variance in the troposphere in contrast to the stratosphere and a latitudinal dependence of the hygropause. E.g. there is large variability below the hygropause at 16 km in the tropics and at the same altitude in the arctic there is low variability above the hygropause. Our apriori profile is representing more a subtropical mid-latitudinal water vapor distribution than an arctic.

One could argue to use different apriori information. Since the retrieval is largely dependent on the apriori information, the use of different apriori profiles would make our whole dataset inconsistent and would lead to a split in different subdatasets each for one of the apriori profiles.

P. 1647 L.26: ...statements about wavelength dependence of the bias...[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

P. 1648 L. 6:

We agree with the argument that our statistical information for Figure 10 is rather small and think it is better to leave this section away.

P. 1647 L. 14: ...statement about the lidar profiles matching the 2-sigma error of the AMSOS profile...

We agree with the criticism. In the last three cases there were cirrus clouds with an enhanced uncertainty in and around clouds. In case of the Microwave instrument ice clouds are not critical.

P. 1649 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.

1998 and 2002 were flight campaigns in late summer (August, September) and 2001 and 2006 as well as 1999 and 2000 in autumn, winter or early spring (further called winter missions). The winter missions were with the presence of the polar vortex that cause the descent of dry mesospheric air into the stratospheric wintertime polar vortex.

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

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

