Atmospheric Chemistry and Physics Discussions

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Comment

Interactive comment on "Retrieval of global water vapour columns from GOME-2 and first applications in polar regions" *by* S. Noël et al.

Anonymous Referee #2

Received and published: 11 January 2008

The paper by Noel et al. provides an interesting overview about first GOME-2 water vapour results with special emphasis on retrievals over polar regions. I have some general comments to the paper provided hereafter. The paper could be published after revision.

1) I think it is worth to discuss a little more the impact of cloudiness on retrieved to-tal water vapour columns especially over arctic regions. The authors don't say much about and even the cloud clearing algorithm applied is not mentioned. Since GOME-2 does not have channels in the infra-red, the cloud detection relies presumably on a combination of thresholds (contrasts) and O2 band absorption depths data. GOME-2 as well as similar UV/VIS sensors will miss clouds (especially cirrus clouds) and will be affected by bright surfaces in arctic regions which limits cloud detection. This will have

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an impact on retrieved total water vapour columns, even more over arctic regions when absolute columns are low.

2) It would be nice to see a comparison of GOME-2 results with ATOVS data (columns and error budget). This would allow estimating the quality of GOME-2 retrievals with respect to other satellite retrievals that are widely known and used. A comparison against model data is an asset but the satellite-satellite intercomparison tells more about the overall performance of GOME-2.

3) Daily courses of total water vapour columns based on a few data samples per day need to be discussed and justified. The authors speak about "short-term variations" in the abstract (should be called diurnal variation instead, as done view lines below) since it depends on the readers view-point what frequency is interpreted as "short-term". Climatologists have certainly another time scale in mind than e.g., people being interested in air chemistry and process studies. On p 17543, l9 the authors themselves speak about "the strong spatial and temporal variability of water vapour" but use the comparably low GOME-2 temporal sampling to discuss the diurnal cycle.

4) The comparison of GOME-2 and SCIAMACHY water vapour data are obviously strongly influenced by viewing geometry and temporal differences between data acquisition over the same area. To some extent the different scattering regime (forward scatter/east, back-scatter/west) seems to affects the retrieval which could be due to surface BRDF effects (bright surfaces, strongly anisotropic scattering of snow and ice, large sun zenith angle) and atmospheric scattering. The authors could add some more explanations/details about the AMF computations here (e.g. treatment of surface reflection, which albedo model is used, which aerosol model is used ?). Even at the early stage of GOME-2 (cal/val phase products) it is however disappointing to have such artefact in the data which seriously limits the application of such combined data set for climatological studies. The question is then if the paper appears too early in the game. I appreciate the ambition to be the first on the market but there is a trade-off between being the first and the presentation of consolidated results. Maybe the title

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could be changed to something like

"Preliminary results of GOME-2 water vapour retrievals and first applications in polar regions"

5) p17543 "Related to the average global water vapour column of about 2 g/cm2 this variation is very small (˜6%)" Yes, that's true but the authors emphasize the retrieval of water vapour columns over polar regions where the total column is in the order of 0.5 gcm-2. The variation of 0.1-0.15 gcm-2 causes then an uncertainty of 20-30%. This should be added.

6) Conclusion: On the one hand the enhanced GOME-2 swath is several times mentioned as improvement, making the instrument advantageous over GOME and SCIA-MACHY. On the other hand it became obvious that it is especially the large swath that causes the problems when comparing the results to GOME and SCIAMACHY. I see that the authors are in a tricky situation here but I would prefer it to have a clear statement if the large swath is really an improvement over GOME/ERS-2.

7) p 17549: DLR-Bonn $\rightarrow$ DLR (Germany)

8) Replace "concentration" by "total column", "atmospheric column" etc. in the text. It's not concentration what is retrieved from GOME-2.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17537, 2007.