Review of F. Azam, et al., "SCIAMACHY lunar occultation water vapor measurements: retrieval and validation results"

Comments:

Page 1032, line 6&7: "high accuracy" is not a given outcome of due to the "self calibrating" nature of occultation. The "self calibration" needs to be of high accuracy.

Page 1032, line 14: What is the size of the SCIAMACHY FOV relative to the moon?

Page 1032, 17 & 18: The sentence about the angular rate of the moonrise is not clear.

Page 1032: Sentences on line 18-20 should be moved to the end of the paragraph. It disrupts the flow of the discussion.

Page 1032: How does the switch between the scanner following predicted movement and using the MFD impact the occultation quality? Does this affect the calibration?

Page 1033, line 26: Reword to "…fact that the latitude of the sub-satellite point changes…"

Page 1034, line 9: What causes the light to be "scattered"? Presumably it is the Earth's atmosphere, but this should be clarified.

Section 4, Page 1034 & 1035: Why is an a priori used in the retrieval? One of the hallmarks of solar/lunar occultation is the minimal dependence upon assumptions. What is ill-posed about this particular problem that causes you to use an a priori?

Section 5.1: Why are two different version (6.3 & 7.0) of data used?

Section 5.1: What is level 1b data? Is it radiance or transmission?

Section 5.2: Define 'differential optical depth'.

Section 5.4.1: In general this section is confusing, especially the portion on page 1039. Be more careful with the use of the superscripts and subscripts or you'll easily lose the reader.

Page 1038, line 15: Change prior to priori.

Page 1038, line 15: Does the S_a also come from the US Standard Atmosphere climatology (1976)?

Page 1038, line 23: Need to state that the 'increased' linearity is due to the fact that the fundamental physics is the transmission of the light.

Page 1039, line 6: What is the 'retrieval parameter index?'

Page 1039, line 10: What is superscript "l" in the numerator? Shouldn't the 'ref' be a subscript since that is the script used for altitude?

Page 1039 and elsewhere try nonlinear instead of non linear.

Page 1039, Eq. 10: Need a subscript on I in the numerator.

Page 1040, line 10: What W are you referring to? Eq. 12, "the above equation" has W hat (or is it W tilde).

Page 1040: Is Doppler shift computed explicitly? Why isn't a wavelength shift computed for the event using the Reference spectra and then applied to all the other spectra within the event? How do the shift and squeeze parameters vary with altitude?

Page 1041: So, really how much of a time difference is there between the ESFT and LBL? Since you ran multiple cases you should have reliable estimates of how much time is saved.

Page 1043, Section 5.4.4: What resolution is addressed here? SCIAMACHY has finite resolution in both the spectral direction (most likely the resolution discussed here) and the spatial dimension, which I don't think is accounted for in the retrievals.

Page 1044: Was the ESFT vs LBL fit done for all events during 2008?

Page 1045, line 12: Again, what is the FOV of SCIAMACHY, 3.3km is spacing of the samples.

Page 1045, section 7: Does it make any difference if the SCIAMACHY concentrations are converted to vmr using the temperature and pressure profile that is assumed in the forward model?

Section 8: Do the comparisons change depending on the: lunar phase, latitude of event or solar zenith angle?

Page 1050, Conclusions, line 15: Delete 'very' since it can mean different quantitative values to different people.

Page 1050, line 16: The figure 10 does not show zero difference between ESFT and LBL, so you can't claim that there is no bias. There still exist a 3% difference that may be condition dependent.

Page 1050, line 20: Again, drop the use of "very good". What you've done is attempt to make the case that SCIAMACHY Lunar Occultation Water Vapor profiles are comparable to other measurements of stratospheric water vapor and thus you believe they are scientifically useful.

Fig. 8: What is the other line plotted in each figure?

Fig. 9: What is the definition of Theoretical error? Is this precision or accuracy? I think you mean precision, since the OE method only produces that quantity. Why do you plot results below 17 km, when you only use data between 17 and 50 km?

Fig. 12: I don't understand how the retrieval is so different from the a priori at 50 km, when Fig. 11 says only half the answer is from the measurement and half from the a priori.