

Interactive comment on “SCIAMACHY lunar occultation water vapor measurements: retrieval and validation results” by F. Azam et al.

Anonymous Referee #1

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SCIAMACHY Lunar Occultation Water Vapor Measurements: Retrieval and Validations Results by F. Azam et al.

This manuscript describes the near infrared measurements of H₂O made from Space by lunar occultation using SCIAMACHY.

The radiative transfer fast forward model, which uses the exponential sum fitting of transmission coefficients method (ESFT), is described and compared to accurate line-by-line (LBL) calculations. The retrieval algorithm is described along with sensitivity studies to investigate Tikhonov smoothing parameters and an optimization of the fit-residuals was carried out to obtain the FWHM of a Gaussian representation of the instrument slit function. ESFT is shown to agree with LBL to within acceptable limits over a relevant height range from the upper troposphere to the stratopause. The a

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priori is shown to have little influence on retrieved H₂O except at heights near to the stratopause.

The averaging kernels appear a little strange. The retrieval height grid is on a higher resolution grid than the measurements. Why are the simulated radiances not convolved with the instrument vertical field-of-view? This is not described adequately in the manuscript.

The sections on the validation of the derived H₂O product with other measurements are acceptable.

I recommend acceptance of the manuscript provided that the above concerns on averaging kernels and convolution are addressed.

The manuscript contains far too many typos. There is barely a page that doesn't need corrections. The co-authors clearly did not read the manuscript carefully.

/xxx/ means delete xxx

[xxx] means insert xxx

p.1030

l.9 measurement/s/

l.18 to [the] polar

l.24 improv/e/[ing]

l.26 instrument /is/ [has] provid/ing/[ed]

p.1031

l.8-9 suggest that these lines are deleted as they contain almost the same information as p.1032 l.11-12 (add 2002-2010)

p.1033

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l.3 instrument[ation]
l.4 comprises /one/ [a single] instrument[,]
l.8 are [a] few
l.11 of [the] vortex
l.12 and[,] as a ... latitudes[,] /is lost/ [it breaks down]
l.20 occulta[t]ion
l.26 point/s/
p.1034
l.25 parameters [such] as
p.1035
l.1 kind[s]
l.18 measurement [height] and
p. 1036
l.5 by [a] Tikhonov
l.10 termed [the]
l.11 of [the] Tikhonov
p.1037
l.8 ESFT should be defined here first (see p.1038 l.8)
l.16 offsets [such] as
l.20 add some more explanation of "bad pixels" ... e.g. persistant/occasional/spurious high/low readings?

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p.1038
l.12 parameters [such] as
p.1039
l.5 ind/ex/[ic]es
l.5 j an[d] i
l.7 depth[s]
p.1040
l.5 /im/[ap]plying
Eq (12) l.8 b_sh/i/
l.13 [, e]specially
p.1041
l.2 [un]till
l.5 absorber/s/
l.9 [the] LBL
l.11 with [a]
l.14 the decision on whether ESFT is preferred to LBL must depend on the accuracy of ESFT (not just that it is faster) which has not been discussed up to this point
p.1043
l.7 IUP is not defined
p.1045
l.4

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/(FWHM)/

p.1046

l.6 PSC/s/

p.1047

l.3 /regarding its/ [with respect to their] standard error[s]

l.1048

l.18 /e/[E]arth's limb

p.1051

l.4

Specifically, what is "unique" about the SCIAMCHY lunar occultation water vapor dataset since several instruments were used for colocated validation?

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