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Atmospheric Measurement Techniques Discussions

Interactive comment on "Aerosol profile information from high resolution oxygen A-Band measurements from space" *by* A. Geddes and H. Bösch

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We would like to thank he reviewer for the helpful and detailed comments. We have revised the manuscript according to the suggestions and we address the reviewers comment with a point-by-point response below. Changes in the manuscript as per your comments are highlighted in blue in the supplement.

It's a good manuscript that easy to read and follow. Actually, I enjoyed reading it (which doesn't happened very often) and learned quite a bit from it. The paper definitely deserves to be published in the AMT. I'm sure it will be well cited by everyone who

uses O2 A-band aerosol retrievals. I don't have any specific comments but have a suggestion that might help a reader to get a broader picture. As it was mentioned in Introduction, "there are a number of satellite instruments that provide measurements of the O2 A-band" but the paper discusses only 4 of them. What's about GOME satellite? I'm not aware of any aerosol-profile related studies using GOME data. Are there any?

- No, we are not aware of any either

The authors also mentioned that SCIAMACHY observations could resolve only 3 aerosol layers. Is this because of a low spectral resolution?

- Yes, the resolution of SCIAMACHY is in the region of 0.5nm in the O2 A-band

Both GOME and SCIAMACHY have a very low spatial resolution comparing to the four instruments chosen for comparison. In addition to the detailed comparison of the four instruments, I would like to see a more general physically-based statement about other satellite instruments with the O2 A-band measurements.

- Indeed, we did not use other O2 A-band instruments such as GOME/2 and SCIAMACHY in this study. Their resolution is comparable to that of S-5P and Figure 3 can be used to relate these instruments to S-5P. We have included a statement in the text of the manuscript.

Here is a technical question. There is a lack of monotonicity in the total AOD error around 3 km for S-5P in Fig. 8 and all satellites in Fig. 9. Why is that? (this is the case for all instruments in figure 8, just more pronounced for S5P)

- Increasing AOD leads to an increase in the values of the weighting function (ie a larger change in radiance), and thus in information content as shown here in Figure 1. However as the AOD increases, the SNR reduces (for the albedo scenario shown in Figure 8 and 9) which leads to an increase in error (Figure 2). When taken together these two competing effects result in an 'optimum' AOD value, in this case between 0.3 and 0.6. This has been made clearer in the text.

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Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/7/C2810/2014/amtd-7-C2810-2014-supplement.pdf

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 6021, 2014.

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Interactive Comment

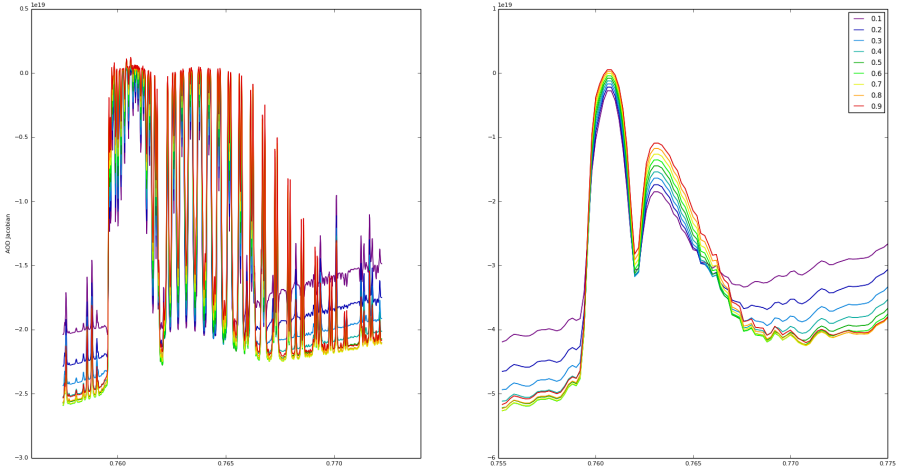

Fig. 1. AOD weighting function for a parameter retrieval of 3 km high and 1km fwhm aerosol, SZA of 30 degrees for OCO-2 and S-5P and 0.5 albedo as a function of AOD

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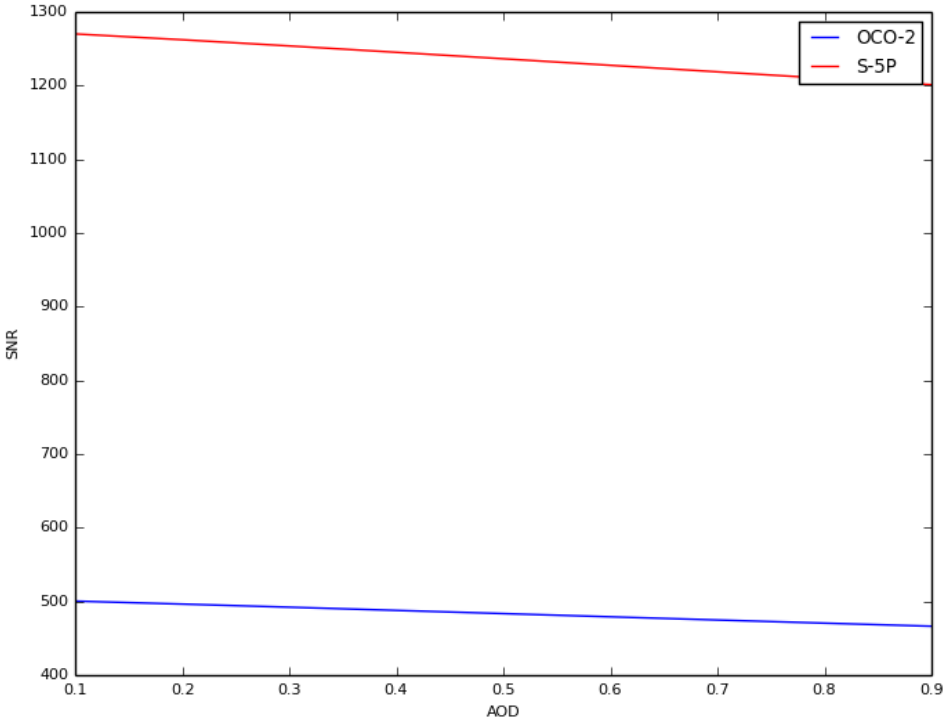

Fig. 2. Mean SNR for a parameter retrieval of 3 km high and 1km fwhm aerosol, SZA of 30 degrees for OCO-2 and S-5P and 0.5 albedo as a function of AOD.

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