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## ***Interactive comment on “Retrieval of aerosol optical depth and vertical distribution using $O_2$ A- and B-band SCIAMACHY observations over Kanpur: a case study” by S. Sanghavi et al.***

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This paper describes an interesting study on the possibility to retrieve aerosol optical thickness and layer height from SCIAMACHY oxygen A- and B-band measurements. I would like to share three brief comments:

1) In noticed the paper van Diedenhoven et al. (2007) was referenced on page 6790, line 9, in relation to the correction factor applied to SCIAMACHY oxygen A-band mea-

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surements. However, that paper describes a method to retrieve cloud parameters applied to GOME measurements. The correction factor to SCIAMACHY oxygen A-band measurements was determined by van Diedenhoven et al. (2005) (see below).

2) In van Diedenhoven et al. (2005), we also discussed the possible decrease or enhancement of photon path lengths in the oxygen A-band owing to aerosol and the sensitivity thereof to aerosol optical thickness, aerosol vertical distribution and observation geometry. To provide the reader with some more insight on these competing effects on the light path due to aerosol, I suggest referring to this paper in the end of section 2 (from line 5, page 6786), where these effects are mentioned.

3) Finally, I would like to point out that the residuals obtained in the oxygen A-band, shown in Fig. 8, seem to resemble the residuals presented by van Diedenhoven et al. (2005). Moreover, they also seem to resemble the residuals obtained by van Diedenhoven et al. (2007) after retrieving cloud parameters from GOME measurements in the oxygen A-band. As discussed by van Diedenhoven et al. (2007), the fact that similar residuals are obtained using two different instruments and with different retrieval procedures may indicate that many of the residuals result from errors in (HITRAN) spectroscopy or the assumed line shapes, or neglecting collision induced absorption in the forward model (Tran et al., 2006), rather than from errors in the aerosol model. The authors might want to elaborate somewhat more on the possible causes of the residuals on page 6791, where Fig. 8 is discussed.

#### References:

Van Diedenhoven, B., O.P. Hasekamp, and I. Aben, 2005: Surface pressure retrieval from SCIAMACHY measurements in the O<sub>2</sub> A Band: validation of the measurements and sensitivity on aerosols, *Atmos. Chem. Phys.*, 5, 2109-2120, doi:10.5194/acp-5-2109-2005.

Tran, H., C. Boulet, and J.-M. Hartmann (2006): Line mixing and collision-induced absorption by oxygen in the A band: Laboratory measurements, model, and

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tools for atmospheric spectra computations, J. Geophys. Res., 111, D15210, doi:10.1029/2005JD006869.

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 6779, 2011.

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