

***Interactive comment on* “Trends in cloud top height from passive observations in the oxygen A-band” by L. Lelli et al.**

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I would like to provide a specific comment to the paper "Trends in cloud top height from passive observations in the oxygen A-band" by L. Lelli, A. A. Kokhanovsky, V. V. Rozanov, M. Vountas, and J. P. Burrows (acpd-13-31409-2013). It is not my intent to provide a full review of the paper.

In Figure 1 of their paper, Lelli et al. show time series of cloud top heights retrieved using oxygen A-band measurements of GOME, SCIAMACHY and GOME-2. Offsets between the time series are apparent. The authors hypothesize that this may be due to differences in sensor footprint sizes.

However, I think the presence of calibration errors is a far more likely explanation for

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these offsets. In our paper van Diedenhoven et al. (2005), we tested the calibration of GOME and SCIAMACHY measurements in the oxygen A-band by retrieving surface pressures in cloud-free conditions and validating them using meteorological data. Over a wide range of surface albedos, a consistent positive bias of 20 hPa in the SCIAMACHY results, compared to those of GOME, was apparent in the data. Furthermore, the GOME results agreed much better with the validation set after accounting for the effects of aerosol on the retrievals. For an average cloud height of 6 km and a atmospheric scale height of 7.4 km, a 20 hPa offset would translate in a ~ 0.3 km negative bias in the SCIAMACHY cloud top height, which seems very consistent with the offsets in the global results shown in Figure 1.

In van Diedenhoven et al. (2005), we interpreted this offset as resulting from an offset (rather than scaling) bias in the oxygen A-band measurements and recommended adding 0.86% of the continuum reflectance at 756 nm to the SCIAMACHY reflectance measurements in the oxygen A-band. This correction is apparently consistent with a correction advised by Noël (2004) at the University of Bremen. If these conclusions are accepted it appears that GOME-2 has a greater calibration offset than SCIAMACHY.

I would recommend taking such calibration errors into account when interpreting the data.

References:

van Diedenhoven, B., Hasekamp, O. P., and Aben, I.: Surface pressure retrieval from SCIAMACHY measurements in the O₂ A Band: validation of the measurements and sensitivity on aerosols, *Atmos. Chem. Phys.*, 5, 2109–2120, doi:10.5194/acp-5-2109-2005, 2005

Noël, S.: Determination of correction factors for SCIAMACHY radiances and irradiances, Tech. Note IFE-SCIA-SN-20040514, University of Bremen, Bremen, Germany, 2004.

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