

Interactive comment on “Comparison of OMI ozone and UV irradiance data with ground-based measurements at two French sites” by V. Buchard et al.

Anonymous Referee #2

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General comments

This well-written paper presents a comparison between OMI (TOMS-like and DOAS-like) estimated total ozone content (TOC) and the value retrieved from two Jobin Yvor spectroradiometers at two French sites. Spectral irradiance and erythemal doses/dose rates estimated from the satellite spectrometer and those measured by the spectroradiometers are also compared. Moreover, the authors analyse the effect of aerosols, clouds, snow and solar zenith angle. Validating satellite estimates is an extremely important task, because satellite products get more and more used and their accuracy is reaching that of well-calibrated precision instruments (Brewer and Dobson photome-

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ters, for ozone products).

I think that the main restriction of the study is the uncertainty of the ozone values retrieved from the spectroradiometers. The authors say that the algorithm has an uncertainty about 3% on clear sky and 7% on cloudy days (daily averages). These uncertainties are rather higher than the expected mean relative differences between OMI and ground-based instruments and than well-calibrated spectrophotometers accuracy, about 1-2% (e.g. Balis et al. 2007, Validation of Ozone Monitoring Instrument total ozone column measurements using Brewer and Dobson spectrophotometer ground-based observations, J. Geophys. Res., 112). Regarding ozone data, I'm wondering if this represents a "validation" study (p. 4310 l. 6) or just a comparison between satellite and ground estimates.

Specific comments

- Introduction (p. 4311): maybe it could be interesting to cite similar papers already published in the scientific literature (e.g. Balis et al. 2007) along with the results;

The description of the algorithm used to retrieve the TOC from the ground-based instrument is very important for the discussion and the study. Thus, an in-depth examination is required, beyond citing the previous paper:

- p. 4312 l. 11: is the total ozone content retrieved from the global irradiance spectrum, as said here, or from global-diffuse (=direct) spectrum, as written in a recent paper by the same authors (C. Brogniez, V. Buchard, and F. Auriol, Validation of UV-visible aerosol optical thickness retrieved from spectroradiometer measurements, Atmos. Chem. Phys. Discuss., 8, 3895-3919, 2008)? This is extremely important, because "all ground-based remote sensing applications which take advantage of measuring scattered radiation in order to infer atmospheric trace gas abundances [...] are subject to large errors, when neglecting the influence of cloud scattering on the derived data" (B. Mayer, A. Kylling, S. Madronich, G. Seckmeyer, Enhanced absorption of UV radiation due to multiple scattering in clouds: Experimental evidence and theoretical

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explanation, JGR-Atmospheres 98JD02676 Vol. 103 , No. D23 , p. 31,241). This subject, if it is the case, should be pointed out.

Moreover, how is the LUT structured (p. 4312 l. 15)? Which variables are taken into account (sza, TOC, ..., cloudiness?)? How was the algorithm validated?

- p. 4312 l. 7-9: how often is the broadband radiometer calibrated? which is the relative difference of the measurements between the Yankee radiometer and the spectroradiometers? is a calibration matrix (TOC, solar zenith angle) used in the data processing?

- p. 4316 l. 2-4: how are the data flagged as cloudy, clear sky and snow covered? Have you considered the COD from OMI, as in the EDR and EDD analysis?

- sect. 3.1: do the authors can explain why the ozone comparison shows a mean relative difference in Briançon higher (absolute value) than that in VdA?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 4309, 2008.

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