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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Towards closure between measured and modelled UV under clear skies at four diverse sites" *by* J. Badosa et al.

Anonymous Referee #1

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The manuscript presents a comparison of UV-Index values determined from clear sky spectral UV measurements and from model calculations at 4 diverse sites. The extensive set of measurements is compared with different approaches for the input parameters of a radiative transfer model. The results and the discussions do not show principally new aspects, but they show very detailed and in depth the problems and uncertainties of both approaches, measurements and modelling.

The manuscript is well organised. In the abstract the significant results are mentioned, tables and figures are generally informative and clear, and the list of references is adequate.

Some small points should be addressed by the authors prior to publication:

p1512/16-25: I think such a detailed list of content is not necessary.

p1514/9, Tab3: When the uncertainties of the measurements are discussed, it should be stated if all uncertainties refer to a coverage factor of k=1 or k=2 (1 sigma or two sigma level).

p1518/21-22: wrong sequence of words: 'is used'

p1519/9-14: what are the highest SZA, where TOZs can be used reliably without a systematic error?

p1526/10-20: I think, this discussion of diurnal variations of ozone and AOD should be more systematic, to show better the effects: After discussing the standard case (D2), which is wrong by both assumptions (high SSA and constant ozone), the discussion of D6 (no aerosol, constant ozone) does not provide a significant contribution, because it is also wrong by both parameters (AOD and ozone), thus it can be deleted to increase clarity. When comparing D8 (low SSA, constant ozone) with D2, then not the effect of ozone variations is seen, but the effect of lower SSA. The effect of changing ozone becomes clearly visible in comparing D8 (low SSA, constant ozone) with D9 (low SSA, variable ozone) or D2 (high SSA, constant ozone) with D3 (high SSA, variable ozone). Both of these comparisons show the same, therefore, again for increasing clarity, D3 is not necessary and can be deleted. However, when discussing diurnal variations of UV as a consequence of diurnal variations of ozone, it should be kept in mind that the ozone value was determined from the UV measurements and not independently. For example, if a wrong ozone profile is assumed, this would result in a diurnal effect on UV (see Fig. 4). But the method of ozone retrieval from the UV measurements would give a variation in ozone, which perfectly describes the UV measurements, but which nevertheless would be wrong. Furthermore it should be mentioned that for detailed analyses of the reasons for a difference between modelling and measurements it would be advisable to use the complete spectral data (instead of a weighted integral), then ozone-related effects could be clearly separated from aerosol-related effects.

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p1529/26: 'the broadest possible range of ancillary data' might be exaggerated, because from the paper it becomes clear that the SSA would be an additional important information, which is also possible to measure, but is not available in the present data set.

p1530/6: I do not understand the argument that 'polluted sites are good to test the model': if at a polluted site the necessary ancillary input information are available, then the model would give satisfying results. If not, then the measurements might be used to derive aerosol parameters to get agreement between model calculations and measurements, but this I would not call 'test the model'. p1530/10-15: When the fact is discussed that for Melbourne the agreement between model calculations and measurements is outside the given uncertainties of both approaches, it is never clearly said that there might be a more serious problem with the UV measurements. May be this is indicated a bit when the authors state that Melbourne is the 'only non-DACC site' - do they mean that there the quality is less and therefore the estimation of uncertainty is not valid?

p1531/4-5: this estimation of a 5% effect is only true for the data used in this study, in general ozone variations and the corresponding UV variations can be significantly higher.

References: the 6 references of McKenzie et al. should be sorted according to the date of publication.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 1507, 2007.

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Interactive Comment