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Atmospheric Chemistry and Physics Discussions

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Interactive comment on "An urban agglomeration effect on surface UV doses: Comparison of the Brewer measurements in Warsaw and at Belsk, Poland, for the period 2013–2015" *by* Agnieszka E. Czerwińska et al.

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Here are my comments concerning the publication to ACP

line 9: you have to explain what exactly you mean smoothness. What is the algorithm ?

Figures 1 and 2. How much stray light issues mentioned before in the text affect the ratio especially on low elevation (winter) and cloudy (low signal) conditions ?

Why a 6h cloudless period with the model when you measure 3h with the BS ?

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Discussion paper

analysis: 1. The real day to day AOD has to be used in order to quantify the real AOD effect 2. A sensitivity study has to be included in order to specify the effect of ozone variability within the 6 hour period to the model results 3. Using the same TOC for the two locations the solar zenith angle effect of the 60 km distance on erythemal dose can be exactly quantified with the model help. 4. Figure 3 TOC differ within 5 % which can be ∼15 DU. This can not be considered negligible. 5. There is a clear solar zenith angle dependence on the ratios in the order of 5% (for all albedos) probably related with the solar zenith angle differences 6. A 6 to 12 % albedo in the UV without snow. Is there any publication or theoretical document to support this?

AOD from cimel you have to specify the wavelength and the level (1.5 or 2) of data used and also to mention that Cimel SSA is measured at the visible region and you have assumed that it can be extrapolated to the UVB. In addition there is no documentation for the uncertainties of CIMEL SSA for AOD <0.4 so since you are using it you should comment on this.

Figure 5. Erythemal : there is a clear solar zenith angle dependence of the ratio. You can show this if you plot this raio against minimum solar zenith angle for each of the days used.

Discussion

Line 11: It is not straight forward to extrapolated AOD amplification factors and percentages from 550nm to the UV.

The paper needs clear restructuring in order to quantify different effects: Here we have spatial and temporal related differences mixed that are also linked with AOD, ozone, and albedo variability.

First issue is the 60Km distance. Using the model you can quantify this. It is related with the 6h window and also ozone (and partly aerosol effects). To make things easier I would suggest to use a constant solar zenith angle (e.g. X +/- 1 degree) for both places in the comparisons to get rid of this problem or to try to homogenize the series based on the model results. In addition, using a conctant solar angle you get rid of problems like ozone variability over the 6 hour period, AOD changes, averaging (measurement frequency) issues. What remains is a. the ozone difference, b. the AOD difference, c. the albedo possible differences d. instrumental issues such as stray light and absolute calibration. Its important to try to separate them for example starting from UVA where ozone plays no role so to quantify the AOD effects.

Also working in a constant solar zenith angle provides the possibility to calculate indirectly the AOD that has to be used in order to match the Belsk and Warsaw measurements for a constant SSA. Then to compare your results with the MODIS related study. In the end if all do not add up you can quantify the SSA needed to be used in order to match the measurements of the two sites.

SHICRIVM: Since you are not actually measuring the UVA1 but you are using SHICRIVM to simulate the spectrum, this adds an additional uncertainty especially for the single monochromator measurements.

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