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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modelling UV irradiances on arbitrarily oriented surfaces: effects of sky obstructions" *by* M. Hess and P. Koepke

Anonymous Referee #2

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This paper gives a relevant contribution to the knowledge of the assessment of personal exposure to UV irradiation in various environments. The paper presents a new computation procedure, based on a chain of radiation models that allows simulating UV irradiances (in terms of UV Index) on anyhow inclined and oriented surfaces. Additionally the proposed procedure takes also into consideration the sky obstruction due to objects like mountains as well as buildings. Particularly important is the fact that the procedure allows to compute a modification factor ("Sky Obstruction and Tilt Modification Factor", SOTMF) that allows to compute in a more realistic way UV Index values of tilted and eventually shadowed surfaces on the basis of horizontal values. Only minor revisions (listed hereafter) will be necessary for the publication of this paper.

For the benefit of the reader and of possible users it would be useful to give indications

about the computer characteristics required as well as the computation time for each single run.

The spectral resolution of the radiative models (5 nm) appears quite close to the limit considered acceptable in terms of accuracy of the outputs:

Comments on Fig. 2. It should be defined in the text the relative position of the receiving surface respect to the wall in terms of the distance of the receiver from the wall and its height respect to the top of the wall. The indications given in the figure caption (the receiver is positioned …half of the sky”) may not be clear enough.

Comments on Fig. 3. How is explained the difference between simulated and measured values when the sensor was at 0.07 m from the wall and the fact that with the sensor at 0.07 m from the wall it measured two different values of SOTFM (0.84 at 9.25 and 0.8 at 9.5) while the models indicate the same value of 0.8?

Page 3365 line 12: it would be helpful to add the solar zenith angle at which measurements were performed.

Page 3365 line 13: it should be worth to clearly state that the sensor was in front of the south looking face of the wall.

It should also be specified that the receiving surface of the sensor was positioned horizontally.

Is there any reason to use two different terms in the text (wall reflectivity) and in the legend (wall albedo) of Fig. 3?

Comments on Fig. 4. There is a discrepancy between the figure caption (13:00 GTM) and the text (12:00 GTM) (page 3366 line 18) concerning the time of the simulation.

In the figure the area with the higher value of radiance is centred at a value of about 40° ZA that is quite different from the ZA of 25.4° indicated in the text (page 3366 line 18).

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Comments on Fig. 5. It would be worth to stress the asymmetry of the diurnal curve of SOTMF shown in this figure that is likely due to the different contribution of the east and west side of the mountains. Moreover it is remarkable the additional effect of the mountain albedo: the asymmetry increases, in fact, with increasing of the mountain albedo. This behaviour is likely due to the orographic configuration of the area.

In the conclusions it is recommended not to refer to trees as object whose interference with UV radiation is assessed by the proposed models combination. In this case in fact it should be necessary to consider also the partial transparency of the tree canopy that is not considered by the models.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3357, 2008.

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