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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The influence of the spatial resolution of topographic input data on the accuracy of 3-D UV actinic flux and irradiance calculations" *by* P. Weihs et al.

Anonymous Referee #1

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Review of The influence of the spatial resolution of topographic input data on the accuracy of 3-D UV actinic flux and irradiance calculations by Weihs et al.

My opinion is that this is a very interesting paper towards the improvement of modeling simulations from the ideal case of flat-no obstacles-homogeneous albedo case, to a much more complex topography representation. The results are unique. The methodology has been clearly described and measurements used for comparison are of highest quality. The choice of the area under study is unique for such an experiment exercise, as it is a very inhomogeneous terrain. My suggestion is that this work can be published taking into account some comments that could clarify some parts of this

work.

27174 line 15 cloud can be written as clouds or cloud coverage.

27174 lines 8-10 and 23-24 refer to the same thing so 8-10 can be probably deleted.

27175 line 8. Day to day variability may or can result in changes of UV. . .

27175 Lines 5-9. This is not very essential. There are several papers referring in their introduction such numbers. It is informative and needed but of course day to day variability including dust events and or smoke events can be seen also in:

e.g. Balis D.S, V. Amiridis, C. Zerefos, A. Kazantzidis, S. Kazadzis, A. F. Bais, C. Meleti, A. Papayannis, V. Matthias, and H. Dier, Study of the effect of different type of aerosols on UV-B radiation from measurements during EARLINET , Atmos. Chem. Phys.,4, 307-321, (2004)

and

Arola, A., Lindfors, A., Natunen, A., and Lehtinen, K. E. J.: A case study on biomass burning aerosols: effects on aerosol optical properties and surface radiation levels, Atmos. Chem. Phys., 7, 4257-4266, doi:10.5194/acp-7-4257-2007, 2007

In addition, certain locations e.g. high aerosol load AERONET AOD stations (e.g. China), could provide AOD data that could lead to much more UV decrease from day to day or daily. So it is more correct to say that you get these numbers from measurement experiments or monitoring such as Krzyscin and Puchalski, 1998, Reuder and Schwander, 1999 and the two references above. Theoretical and modeled UV attenuations using AOD from other stations worldwide could provide higher numbers.

27177 line 8-9. Please define more clearly what radius of importance is. Something like: the minimum radius around a measuring station that outside its limits surface albedo contributes less than the measurement uncertainty ? Here you mention -significant contribution- which is unclear.

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11, C11526–C11528, 2011

27180 line 20 delete sza or put it in a parenthesis.

Model set up.

I still have a difficulty to understand how the albedo of a neighboring shaded area has been taken into account for the simulations of a certain pixel. Maybe this has to be clarified.

Discussion of figures 9 and 10.

Figures 9 and 10 summarize the results shown in figures 5 to 8. It is interesting to discuss on the fact that overall actinic flux is more sensitive when changing from 50m to 800m DEM probably due to the fact that photons from angles close to the horizon are much more sensed in the case of actinic flux that the ones for the irradiance? Also to explain why at higher altitude pixels irradiance ratios are double than the ones of the actinic flux.

I was wondering what would be the correlation of the pixels presented in the ratios (figures 9 and10) with the mean altitude of each pixel. Patterns should match ?

Sections 3.2.2 and 3.2.3. I miss some comments on the absolute differences of model runs and measurements. Relative differences to the DEM are justified.

A case of a shaded pixel and measurement could be very interesting to be evaluated. Also, a sky radiance map could reveal directional features that can be captured or not from model runs. It would be interesting to add some discussion on the above in the case that such data do exist.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 27171, 2011.

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11, C11526–C11528, 2011