Atmospheric
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Discussions

Interactive comment on "A new method for estimating UV fluxes at ground level in cloud-free conditions" *by* William Wandji Nyamsi et al.

Anonymous Referee #2

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The manuscript presents a new method for estimating UV fluxes at ground level in cloud free conditions. The scientific contribution is valuable, the novelty is evident, the organization and structure of the manuscript is good. The manuscript could be considered for publication if the following comments would be taken into account. Major comments 1. Page 6, lines 9-16: the proposed method (Lefevre et al., 2013) for the definition of clear skies is applied on broadband or total irradiance. Is this valid for UV radiation as well? UV radiation is affected considerably more by scattered cloudiness. In this case, you may have an unobstructed Sun (no clouds to cover) and a non-significant effect on diffuse broadband irradiance, so, you can assume that you have a cloud free instant. In UV (direct and diffuse irradiances) however, the effect of scattered cloudiness will be more evident. This is one of the cases that the cloud

modification factors in UV and broadband irradiance are not related with a linear fit. Can you provide some evidence that the propose method is valid for UV as well? 2. Page 7, lines 15-25: it is not clear in the document the type of albedo used as well as if the spectral dependency of albedo is taken into account. 3. Page 13: figures 7 and 9 should be discussed in much more detail. 4. Figure 1 and relevant text: it seems that the proposed method works significantly better than the Kato et al. approach but it is not adequate for spectral irradiance calculations with e.g. 1nm step and resolution below 340nm. This should be highlighted in the text. 5. Figures 2-6 and relevant text: First, the meaning of counts (color scale) is not clear. The word "count" does not appear in the text. Second, the comparison of estimated vs measured irradiance is vastly dominated by the solar zenith angle, so such types of figures are always looking good. The authors are encouraged to present their results as differences (percentage , ratio, etc) between estimated and measured values vs solar zenith angle (like figure 9). The may skip some figures or replace with new ones. Moreover, due to the assumptions about the surface albedo, the differences as a function of season or some kind of snow measurement will be very helpful, since snow reports are kept at the selected sites.

Minor comments 1. Please explain abbreviations (UV, FWHM etc). In some places, the UV radiation across the whole UV spectrum is mentioned as total or total UV. Please use just UV (280-400nm) and UV-B, UV-A. The same stands for shortwave irradiance: it is referred as total, broadband etc. Please use one definition name. 2. Page 2, lines 10-15: It would be better to talk about risks and benefits from UV exposure instead of talking about "healthy" sun exposure (it is actually safe exposure). Please split and present clearly the impacts from UV over- and under-exposure (related to vitamin D deficiency). 3. Page 5, line 4: please replace "fields of cultures" with "field of agriculture" 4. Page 5, lines 11-12: please rephrase, too many "between". 5. Page 6, lines 22-25: UV irradiance, especially at lower wavelengths and under low solar zenith angles (a usual case for high latitude stations) depends FROM the ozone vertical profile, too. 6. Page 7, line 2: Insert world exponent: Angstrom exponent coefficient 7. Page 7, line 6: upwelling to downwelling flux . . . add phrase "at the surface" 8. Table 1:

Brewer instruments are mentioned as spectrophotometers and SUV-1000 instruments as sperctroradiometers. Is there such a difference? 9. Table 2 and relevant text: please add some more details about the model runs. What is the number of streams used? What about the Delta-Eddington approximation?

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