

Interactive comment on “Modeling erythemal ultraviolet diffuse fraction” by Guadalupe Sanchez Hernandez et al.

Anonymous Referee #2

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Review of "Modeling erythemal ultraviolet diffuse fraction" by Sanchez et al.

General comments:

This paper presents estimates of UVER diffuse fraction (ratio between UVER diffuse radiation and global UVER radiation) using several empirical models based on models for total radiation found in the literature. The authors use measurements of UV radiometers to determine the fitting coefficients of the models. Further, they check the derived expressions with other radiometer measurements. The aim of their work is to provide an efficient model of UVER diffuse fraction enabling deriving the UVER diffuse radiation from UVER global radiation measurements.

This kind of study is useful since UVER diffuse radiation measurements are not so

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frequent as global UVER radiation measurements.

Specific comments:

- p. 1, line 5: The authors say "Although being extremely interesting...", they must explain why the diffuse component of UVER is so interesting.
- p. 1, lines 19-28: The sentence in lines 25-26 concerns beneficial effect of UV, it is written between negative effects in lines 20-23 and 26-29. I suggest all beneficial effects be gathered, the same for adverse effects.
- p. 4, line 112: The authors don't give any detail about the processing of Kipp & Zonen measurements. For ex. which TOC is used? Is it the same as that included in the models which comes from OMI?
- p. 4, line 139: Give the definition of the total transmissivity, k_t . Currently, the definition can only be guessed after reading the UVER transmissivity definition in lines 140-141.
- p. 4, line 141: I believe that $G_{UVER}(0)$ is the same as G_{UVER} in Equation (1) and line 126. Please, use the same writing.
- p. 5, Equation (3): r_0 and r should be defined separately, not only via their ratio in line 148.
- p. 5, lines 152-155: Figure 1 shows the relationship between UVER diffuse fraction (f_{UVER}) and UVER transmissivity (k_{UVER}). If I understand correctly the first one is derived from measurements of the K&Z radiometers ($G_{UVER}(0)$ and $D_{UVER}(0)$) and the second one is derived from measurements of $G_{UVER}(0)$ and from a computation (Eq. 3). If it is true, the authors should mention all that (see also another comment below).
- p. 5, line 156: What does "meteorological magnitudes" mean? Is it not rather "meteorological quantities" or "meteorological parameters"?
- p. 5, line 156-157: I don't understand why the authors state that other parameters

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“could have been included in the models for estimating UVER diffuse fraction”. As I told just above concerning Fig. 1, it sounds to me that fUVER was derived from measurements, not from modeling. I am rather confused, so the authors should clarify all that.

- p. 5, line 160: Replace “radiometric magnitudes” with “radiometric quantities” or “radiometric parameters”.

- p. 7, Eq. (6) and (7): Define N.

- p. 7, line 224: The authors say “where sigma is the standard deviation”, they should precise of what it is the standard deviation (of kUVER).

- p. 10, Eq. (19) and (20): xi and xi* must be defined just after the equations, not much later in lines 325-326.

- p. 10, line 320: What does “total variance “ mean ?

- p. 11, line 334: Explain what “ordinary” means.

- p. 11, lines 334-336: The authors must explain why they have chosen different fittings (ordinary least squares and non-linear) for two groups of models.

- p. 12, lines 367-368 and Fig.3: The relative residuals are averaged by intervals of each variable, these intervals should be specified. In Fig. 3 the caption should mention “Mean relative residuals of each UVER diffuse fraction...”. Moreover dispersion bars around each mean are needed.

- p. 12, line 381-382: The authors state “. . . although the functional form can be generally suitable for other locations. . .”, did they check that ? If yes they must give examples, if not they must reconsider their statement.

Technical corrections:

- p. 4, line 110: Replace “without been affected” with “without being affected”.

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- p. 6, line 184-185: Replace “This new variable has been included by adding the a term. . .” with “This new variable has been included by adding a term” (“the” has been removed).

- p. 7, Eq. (8): In the left hand side term replace the superscript GC1 with GCU1.

- p. 7, Eq. (9): In the left hand side term replace the superscript GC2 with GCU2.

- p. 8, Eq. (10): In the left hand side term replace the superscript GC3 with GCU3.

- p. 9, line 291: “Ridley et al. [2008]” → “Ridley et al. [2010]”.

- p. 13, 422: “models” → “model”.

- The reference “Arola et al., 2003” cited p. 1, line 33 is missing.

- The reference “Craig et al., 2014” cited p. 2, line 40 is missing.

- Fig. 2: It is difficult to distinguish the various colors red, magenta and brown. Moreover I cannot see the yellow dot. I suggest making different symbols of various colors.

- Fig 3: Replace the x-axis caption of the right plot “Fraciton” with “Fraction”. Replace also “Relative residuals” with “Mean Relative residuals” on the y-axes.

- Table 1: The authors should add the number of cases for fitting and validation for each model.

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