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Atmospheric Measurement Techniques Discussions

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

William Wandji Nyamsi et al.

william.wandji@fmi.fi

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First of all, we thank Referee #1 for these positive remarks on this topic. The authors believe that they have understood the concerns of the referee. Their remarks have been taken into account for revising a part of the text following recommendations of the referee.

Comment 1. In the introduction, few lines of text regarding the reasons for which the authors choose to perform the evaluation of the method using ground based measurements only from high latitude stations(and not from mid-latitudes or the tropics) would be useful.

Answer: Thank you for this remark. We fully agree with you. We have re-written the

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last part of the paragraph of the introduction as follows: “Stations have been selected to fulfill two main constraints as follows: (1) the measurement has to be carried out at cloud-free instant meaning that either it should be clearly marked or using algorithm for selecting cloud-free instants which most of the time needs broadband measurements as inputs, and (2) high quality control and assurance on the measurement. Five stations were such selected which are located at high latitudes.”

Comment 2. I suggest using abbreviations for phrases that are often referred in the manuscript (e.g. total column content of ozone could be written as TOC):

Answer: Thank you for this suggestion. We have used much more abbreviations in the manuscript.

Comment 3. I suggest including Figures 2-6 in a single figure, similar to figure 8.

Answer: Thank you for this suggestion. We have included Figures 2–6 in a single figure.

Comment 4. In Figures 2-6 the distribution of the data points around the y=x line is uneven. You claim that part of this uneven distribution is explained by the imperfect description of the effective UV albedo in the model. In some of the graphs (e.g. in figure 2) there seems to be a “branch” of data where the UV-A is importantly underestimated (20% or more) by the model, even for high values of the UV-A (which possibly do not correspond to low SZAs). This branch becomes clearer in the case of UV-B (in all graphs of figure 8). Could you be more specific on what is the cause of this branch (explain more accurately what its cause is, or even provide a graph which proves that this branch is for high/low values of a specific parameter)?

Answer: Thank you very much for this remark. We fully agree with you. We have done more investigations to explain these underestimations. We have found that these underestimations strongly depend on albedo values. We have added a paragraph in the text to better clarify these underestimations at the second paragraph of section 4.1

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as follows: “Even if the points follows quite well the perfect line (Figure 2a), a set of points is seen where the method underestimate noticeably by more than 20%. These underestimations occurs between ending May and mid-July. During that period, the shortwave albedo was less than the effective UV albedo by a factor 0.8. The effective UV albedo is part of the Version 2 dataset and was derived by comparing measured clear sky spectra with corresponding radiative transfer model results (Bernhard et al., 2007). As a smaller albedo means a smaller contribution to the diffuse part of the irradiance, the difference between the shortwave and effective UV albedo may explain these underestimations seen in Figure 2a.”

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