EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-688-RC1, 2022

Comment on egusphere-2022-688

Anonymous Referee #1

Referee comment on "Assessment of spectral UV radiation at Marambio Base, Antarctic Peninsula" by Klára Čížková et al., EGUsphere,
https://doi.org/10.5194/egusphere-2022-688-RC1, 2022

Anonymous Referee

Comments to the manuscript of Klára Ä□íÅ¾ková et al., Assessment of spectral UV radiation at Marambio Base, Antarctic Peninsula

The study aims to assess the relative effect of factors affecting surface spectral radiation, including SZA, total ozone, cloudiness, and albedo. The dataset is from Brewer spectrophotometer measurements at Marambio Base from the Antarctic Peninsula. Spectral measurements at those latitudes are rare and thus the spectral UV time series 2010-2020 is very valuable, and the manuscript gives a good overview of the statistical distribution of the data. The idea of studying the effect of each UV affecting parameter is not new as such, and that has been studied in several publications previously. However, in this study, the use of neural network makes the study interesting and unique, in addition to the Antarctic location. Unfortunately there is one clear mistake in the applied inputs to the model: the surface albedo data can not be taken from the OMUVB product. In the OMUVB product, the albedo is not the actual measured albedo, but it is the albedo climatology which is used to calculate the OMI UV data. I think the paper can not be published before this has been taken into account, either by excluding the part of the study related to albedo effect or by using other data reflecting the actual albedo situation of the site. I have also a concern on the quality and homogeneity of the time series, as there was so few calibrations (see specific comments here below). In addition I don't understand what is the purpose of Figure 11 and text related to that figure (please see specific comments here below).

I am not familiar with ANN modeling, but I have the impression, that some additional information could be given related to the ten different models which were used (Line 140). How did these models differed from each others.

Specific comments:

Line 28, Reference UNEP2010 could be changed to a more recent one, eg., UNEP2019

EEAP. 2019. Environmental Effects and Interactions of Stratospheric Ozone Depletion, UV Radiation, and Climate Change. 2018 Assessment Report. Nairobi: Environmental Effects Assessment Panel, United Nations Environment Programme (UNEP) 390 pp. https://ozone.unep.org/science/assessment/eeap

line 30: *incident UV irradiance* ☐ incident short wavelength UV irradiance. Or change the wording to describe that it prevents the short wavelength UVC and UVB part of the UV spectrum.

Line 33: *The recent positive stratospheric ozone trends*….

Please specify in which part of the globe? Or global mean?

Line 88: Please specify the method for calibration against the reference instrument. Usually a Brewer is calibrated using 1kW or 200W lamps. Please specify also the traceability of the irradiance scale. Any comparison with the PMOD-World reference QASUME spectroradiometer? Either between the IOS and QASUME or between Marambio's Brewer and QASUME? Only two calibration for 11 years of measurements is very little. There is a possibility that the response of the instrument has changed unexpectedly between the calibrations. Do you have any records to check if the instrument has been stable over the years? How did you take into account the change in calibration: linear interpolation between the two calibrations or stepwise? How much was the difference between the two calibrations? Did you perform any final calibration in 2020? Please explain these points in the text.

Line 96: Which method did you use for detection of spikes and wavelength shifts? Please add references.

Line 120: What did you use as inputs to LibRadtran? Please add the info in the text. And how did you calculated the CMF?

Line 123: This is not true. The albedo is the albedo climatoly used in calculation of the OMUVB product. Please see my General comments.

Line 154: Do you mean the 80% of data was within +-25%?

Line 156: What is R2?

Lines 156-157: What do you mean by shares variability and shared variability? Do you mean shared variance, covariance? Please use other wording.

Line 177: I suggest that you include the info of how many order of magnitude the UV irradiance changes between e.g., 300 nm and 400 nm.

Line 179: ……..it is steeper in low-SZA months…….. Explain why (longer atmospheric path – more ozone absorption)

Line 185: What do you mean with “overall median”. Yearly median? Something else?

Line 192: The vertical profile of atmospheric ozone affects the absorption in the optical path. This info could be added somewhere, and possibly discussed.

Lines 193-197: I think you should, in a couple of sentences, describe the effect of the Brewer-Dobson circulation and the lack of sunlight in winter ☐ ozone accumulates in polar region, but there is no sunlight for the photochemical ozone destruction which then leads to high TOC values at the end of the winter. You should also explain the year to year variation in Antarctic ozone depletion, otherwise it is quite strange that you find within during the same week the highest and the lowest ever measured TOC (6 November 2011, 3 November 2015).

Line 199: Where is the site of Lachlan-Cope (2010) located?

Lines 200-2004: I am not convinced why do you compare with these sites, and about the reasons for the differences. Is there differences in land-sea surroundings, glaciers

...topography, other meteorological reasons, typical synoptic scale phenomena?

Lines 228-229: *Alongside atmospheric gases, the surface UV irradiance is also affected by the absorption in the troposphere, which is in this study represented by the cloud cover.*

How about tropospheric O3, SO2 ? What do you mean by "*which is in this study represented by the cloud cover"?*

Lines 245->end of the section. Please specify what do you mean by "very high UV irradiances". Very high compared to what? Or higher than a certain limit value?

Line 277: *ozonosphere* This term doesn't exist.

Line 285: *in low-SZA conditions* ☐ Should this be in **high-**SZA..?

Lines 309-317 I think this discussion should be excluded if actual albedo values are not used (See general Comments)

From line 318 until the end of the section. I don’t understand what has been done. Why didn’t you keep in the model the same values than in the observation (Figure 11)?

Figures 7-9 caption: Include the information if the effect is the median effect, and if yes, to which quantity do you make the change (actual value during the measured spectrum?).

Figure 10. I think you should exclude this plot, as the albedo is not the actual one. You can not make any conclusion of it’s influence.