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Earth System Science Data Discussions

Interactive comment on "Monitoring of solar spectral ultraviolet irradiance in Aosta, Italy" *by* Ilias Fountoulakis et al.

Anonymous Referee #2

Received and published: 3 September 2020

General comments: The manuscript describes procedures and characteristics related to quality control (QC) and quality assurance (QA) of the reference spectroradiometer of the Italian UV network. The uncertainty budget related to radiometric uncertainty and the overall uncertainty of UV measurements is presented. As a result, a unique homogenized dataset is made available. Different data levels have been explained as well as reasons for differences between them. The performance of the instrument has been monitored by regular comparison campaign with the QASUME reference spectroradiometer from PMOD-WRC. The manuscript includes all relevant uncertainty sources and they are adequately presented. The importance of the work and the reference spectroradiometer measurements are well described and can serve as example for other national UV networks. It would have been good to see the transfer of the cali-

bration to the other instruments of the network and discussion of uncertainties related to the transfer process and the effect to the overall uncertainty of the site measurements. I am not a native English speaker, but I think the language can be improved. I think the manuscript is important for the UV scientific community and represent state of the art of QC/QA of solar UV measurements. The long UV time series is of high quality and multidisciplinary communities can benefit from it. I recommend the article to be published in Earth System Science Data.

Specific comments:

l. 34-38: Is it really so that people are adapted to proper sun-exposure behaviour? Do you have an example? I think there exist still many problems at areas of high exposure, e.g. cataracts in Tibet.

l. 46: Please check if Solomon et al. 1986 describes the Northern ozone depletion. If not, please find a reference for the Arctic ozone depletion and check the decade of the first signs of arctic spring-time ozone depletion.

l. 69: "for SZAs below 75° and wavelengths below 305 nm." Do you mean ABOVE 305 nm?

l. 100: "extremely high levels of 100the UV irradiance" , please add what are the extreme values in UV index (some number).

l. 132: within less THAN 0.5 °C?

l. 134: please discuss whether the humidity difference (10% in winter, 60% in summer) can introduce errors/uncertainties in measurements.

l. 164: at Saint Christophe -> at AAO?

l. 171: Do you have a web page for UV index prediction? If yes, please show the web address.

l. 186: If the Instrument characterization and measurement corrections of Section 3

are only about the reference spectroradiometer, please indicate it in the header of the Section 3

l. 194: Please add a sentence or two explaining what is dark current and from where does it come from.

l. 208: Teflon diffuser: In line 146 you write that the instrument has a quartz diffuser?

l. 224: Eq.3. cf=

l. 236-238: It is unclear what you actually did and how did you end up to the result. Please rephrase.

Section 3.2.: Please explain what is the typical effect (in %) of the temperature correction of the Teflon diffuser for a dataset during a winter month and a summer month.

l. 278: For which wavelengths are the results showed? Any wavelength dependency in the angular response?

l. 300: Header: Modelling the errors due to what, angular response? Please change the header to be more explanatory.

l 309: "Simulations for Davos were performed in order to show that at such high altitudes the error becomes more important", please explain why this is the case.

Section 3.5.1., l.370. I don't really understand how you can address this point by 200W lamp measurements as your 200W lamp has always the same intensity/irradiance, hasn't it? Shouldn't you vary the intensity of the lamp in order to address the point 2?

The same applies for Section 3.5.2., or do you mean that your PMT has a "memory"?

Section 4.1.: How do you take into account the possible drift of your 200W lamps? Do you rotate them, as you have three lamps?

Section 4.2.4: It is a little bit diffucult to follow what has happened during each p-period. Anyway, the message is unclear: is the Level 2 time series homogeneous? If

yes, which calibration scale has been used? Have you used a step-wise calibration change in calibration: change after each calibration? Have you taken into account that the instrument's reponse may have changed slowly between two calibration, and have this been taken into account e.g. by linear interpolation between two calibrations?

Fig 8. Please check the Figure Caption.

l. 630, This is not true for all years (2006 and 2013).

Section 5.2.5. I miss a table with all the uncertainty sources contributing the overall uncertainty (like you have in Table 1 for radiometric uncertainty).

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