

## ***Interactive comment on “Solar irradiances measured using SPN1 radiometers: uncertainties and clues for development” by J. Badosa et al.***

**J. Badosa et al.**

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Here we supply responses to the editor comments EC C3206 :

1. Minor language corrections

P8153 L19 "Bias" → "A bias"... "was found"

Authors' response: Correction applied.

P8153 L29 "tracker based" → "tracker-based" I recommend to check the hyphenation in other parts of the document as well.

Authors' response: Correction applied here and for three other occurrences in the

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manuscript.

P8154 L11/19 "safety", not "security"

Authors' response: Correction applied.

P8158 L18 "in next section" → "in the next section". Also check grammar/English of the next sentence. Consider combining with the previous one?

Author's response: The two sentences have been changed to: "The asymmetry seen in the DNI histograms is related to the proportion of time during which these conditions are present. This will be discussed in more detail in the next section."

P8161 L6 "cloud-free"/"clear" instead of "cloudless"?

Author's response: "cloud-free" has been adopted.

P8162 L25 "heavy" → "optically thick"

Author's response: Correction applied.

P8163 27 "falls away" - find better wording

Author's response: The first two sentences of section 5.2.2 have been changed to improve the message: "Considering the sky radiance, there is always a zone close to the Sun where the radiance reduces with distance from the Sun, from that of the bright solar disk towards the average brightness of the diffuse sky. The shape of this curve depends largely on the aerosol and water content of the atmosphere, with liquid water or ice having a large effect. Gueymard (2001) shows some good examples of this variation for different atmospheric constituents, and Segal-Rosenheimer (2013) describes some modelling of the effect of cirrus clouds on the solar aureole". This new reference has been added: Segal-Rosenheimer, M., Russell, P. B., Livingston, J. M., Ramachandran, S., Redemann, J., & Baum, B. A. (2013). Retrieval of cirrus properties by Sun photometry: A new perspective on an old issue. *Journal of Geophysical Research: Atmospheres*, 118(10), 4503-4520.

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2. Other comments:

P8164 aureole: Would it make sense to cite a paper by Segal-Rozenheimer (JGR)? To my knowledge, it is one of the most recent publications in this area: Segal-Rozenheimer, M., et al. (2013), Retrieval of cirrus properties by Sun photometry: A new perspective on an old issue, J. Geophys. Res., 118, 4503-4520, doi:10.1002/jgrd.50185.

Author's response: Thanks for the proposal. The reference has been included, as mentioned in the previous response.

P8157 L18 Could you provide more text on the solar aureole statement?

Author's response: Text in the lines 16 to 22 have been changed: "These two oceanic sites also show significantly higher average DHI values (Table 6) than the other sites. Marine aerosols typically cause more scatter, and hence a larger solar aureole, than land-based aerosols (Gueymard, 2001), and this will increase the average DHI, as will a greater proportion of bright cloudy conditions. We show in section 5.2.2 that these conditions tend to give the greatest DHI underestimation with SPN1. Slope values for DNI after correcting SPN1 data for the GHI slope are close to 1.05 for all sites except Golden, which is lower at 1.033. Golden also has the highest average DNI of all the sites (Table 6), which we attribute to its high altitude and continental climate. This means that when the sky is clear, there is little aerosol scatter, and hence low solar aureole values. We show in section 5.2.2 that these conditions tend to give the smallest DNI overestimation. This can be seen in the DNI graph for Golden in Fig.2, where there is a distinct concentration of high value DNI points close to the 1:1 line, and this will reduce the overall slope".

P8156: STDE, RMSE: Is there a reason for not using N-1 in the denominator?

Author's response: Strictly speaking N-1 is the correct denominator given this is only a sample of the complete distribution. In practical terms N is so large it makes no difference

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