

ANSWERS TO REFEREE #1

First of all, we thank Referee #1 for these positive remarks and comments on this topic. The comments have been addressed below and have been taken into account for revising a part of the text following recommendations of the referee. The responses to the referee points are below after the reviewer points that are in italics.

'Comment on egusphere-2022-1023', Brighton Mabasa

The study validates McClear model against 1-minute Global Horizontal Irradiance (G) and Direct normal Irradiance (BN) in areas where validation was never carried out before. The study reviewed literature related and followed the same procedures for easy comparison of the results. The article is well written and covers some research gaps in the previous studies which validated McClear model in different regions.

We thank you for your positive comments on the manuscript.

Minor comments

Line 18: Please put brackets on (G)

Done as requested. Thanks.

Line 19: please put bracket on (BN)

Done as requested. Thanks.

Please be consistent with abbreviations to refer Global Horizontal Irradiance (G) and Direct normal Irradiance (BN) so that the readers will not be confused, use those one throughout the article not SSI to refer Global Horizontal Irradiance as used in the abstract.

Thanks for this remark. We have defined the surface solar irradiance, abbreviated as SSI, as the irradiance received on a horizontal surface. We further used this abbreviation SSI as a general term when there was no possible confusion. We used the variable *G* in more specific cases. According to your remark, we have screened again our text and made a few changes to be more precise and avoid further confusion. Note that we have preferred to use the abbreviation SSI instead of GHI because the former is used in many domains while GHI is mostly used in the domain of solar energy.

Line 58: Please replace AOD 1020nm with AOD 1240nm since it is the input to the model.

Thanks for this remark. Done as requested.

Line 92: Please paraphrase the sentence, the word 'or' is and the wrong place, making the statement to be confusing

Thanks for this remark. Done as requested.

Line 97: Please paraphrase the sentence, they are a lot of 'and', making in unclear validated the model in which country or region.

Thanks for this remark. We have rewritten the relevant part accordingly as follows:

“Dev et al. (2017) performed a comparison in Singapore while Zhong and Kleissl (2015) performed their own in California”

*Line 120: Please add **horizontal** between direct and component because there is also direct normal component, so that the two components or parameters will be differentiated.*

Thanks for this remark. We have rewritten this part of the text as follows:

“One-minute ground-based measurements of irradiance received on a horizontal surface, namely the global irradiance G , its diffuse component D and its direct component B , or the direct component received at normal incidence B_N ,”

Line 219: Can you please summarise or elucidate how the visual check was implemented and applied, some practitioners or researchers might want to apply it in their studies as well.

There was no specific tool to perform a visual check. We have brought this precision:

“Then, time series of the retained measurements were plotted together with the corresponding irradiances at the top of the atmosphere and a visual check was performed to detect and scrutinize outliers that are possibly rejected. “

On the methodology to differentiate between night and day values its not clear which procedure was used, most studies remove everything that falls in a solar zenith angle greater

than 85 degrees, this helps to filter pyranometers and pyrheliometers noise and it influence the overall mean of G and BN. How did you calculate the mean averages of G and BN like the ones given in Table 5 ?

Thanks for this remark. The means reported in Table 5 were computed only for selected clear-sky instants after applying all criteria listed in the subsection 3.1. Their combinations remove systematically night values and filter out values for large solar zenith angle. In order to make clearer that we are dealing only clear-sky instants, we have changed the sentence:

“Only these 1 min clear-sky instants were retained for the validation.”

to:

“Only these 1 min clear-sky instants were retained for the validation and all computations in the following were made with this subset of clear-sky instants.”

Figure 3 in page 15: The 2 2D graphs seems like you only used G and BN values greater than 600 w/m2 ? was there no values less than 600 W/m2 in your comparison ?

Thanks for this remark. Of course, raw measurements include irradiances lower than 600 W m^{-2} . After applying all criteria listed in the subsection 3.1, the selected clear-sky instants are those with irradiances greater than 600 W m^{-2} .