

***Interactive comment on* “Effects of temporal averaging on short-term irradiance variability under mixed sky conditions” by Gerald M. Lohmann and Adam H. Monahan**

Anonymous Referee #1

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General comments:

Lohmann and Monahan present a clear study of irradiance variability as it relates to time averaging. The authors clearly identify the six datasets used in the study, the method used to time-average the data, and the sample standard deviation of clear-sky index and clear-sky index increment as measures of variability. The results and discussion present a clear case for why 1 s averaging may be optimal when variability and data management are a concern. Overall, the manuscript is understandable, organized well, and presents a useful comparison of time-averaged irradiance variability that is applicable across regions. The manuscript could be improved with minor clarifying

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points described below.

Specific Comments:

I do not think that Fontoynt et al. 1998 effectively describes the clear-sky model the authors use. Perhaps the more appropriate reference is Dumortier 1996?

Throughout the manuscript, the authors reference possible errors caused by an improper clear-sky model used to generate clear-sky indices. The manuscript would be greatly improved if the authors discussed the specific errors that their chosen clear-sky model introduces. Example time-series of sensor irradiance along with clear-sky model irradiances would be illustrative. The authors will likely find poor fit between the chosen model and some locations. I believe the peak of the distributions above 1.0 shown in Fig. 2 are a direct result of this poor fit, not over-irradiance events. While I do not believe the overall results will change substantially with improved clear-sky modeling, this issue should be addressed in a revised manuscript.

A brief discussion of cloud climatology in Sec. 2, in addition to the example on pg. 8, would be helpful in understanding the datasets. For example, Tucson likely experienced some frontal passages, shallow cumulus, and high cirrus during the study period.

Technical corrections:

Figure 1: The subplot labels (a, b,c, d) are hard to find in the plots. Perhaps moving them outside of the axes is best.

Fig 1 and discussion: after describing how time averaging is performed on 900 s blocks, why is 1000 s used in Fig 1? Perhaps this is only an illustrative example? To avoid confusion I recommend changing from $T=1000s$ to $T=900s$

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