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Atmospheric Measurement Techniques Discussions

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

O. Perpiñán (Referee)

oscar.perpinan@upm.es

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This paper is a evolution of a previous paper by the authors, which I also reviewed. The comments included in this revision are adapted from the comments submitted to that paper.

Once again, this paper is of excellent quality. Data and methods are clearly exposed. Data analysis is exhaustive, and the results are shown with a collection of superb figures. However, there are some issues that could be clarified or improved:

- Both the abstract and the introduction underline the variability of PV power. However,

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the analysis is focused on measurements of global irradiation on the horizontal plane (GHI). PV plants produce power with solar irradiance on a inclined plane. It must be noted that, at least on a daily basis, the variability of the effective irradiation incident on inclined planes has been reported to be higher than the variability of irradiation on the horizontal plane: Suri, M., Huld, T., Dunlop, E.D., Albuisson, M., Lefevre, M., Wald, L., 2007. Uncertainties in photovoltaic electricity yield prediction from fluctuation of solar radiation. In: 22nd European Photovoltaic Solar Energy Conference; Perpinan, O., 2009. Statistical analysis of the performance and simulation of a two-axis tracking PV system. Solar Energy 83 (11), 2074–2085.

- In order to remove trends in GHI variability, the authors compute the clear sky index from the GHI measurements. The problem with this index is that the subsequent results are model dependent. In fact, there is not a unique clear sky index because there are several clear sky models to choose. Moreover, most of the models require the use of aerosol measurements or estimations, or assumptions regarding the atmospheric conditions. Therefore, the clear sky model imposes additional uncertainties that were not present in the original data.

- The paper includes a good bibliographic review in the introduction section. However, afterwards the results of the paper are not related to the reviewed papers, and the analysis does not put the results in the context of that review. For example, the bi-modality behaviour (figure 2) and the fdp of increments (figure 5) are strongly related to the results reported in papers included in the bibliographic review. However, there is no comments about it.

- On the other hand, some of the assumptions seem to be arbitrary: for example, the 0.18 threshold in section 2.2 (line 25), and the 95% threshold in section 2.3 (line 5). In my opinion, the arguments provided by the authors should be improved with time series analysis techniques. Therefore, the results reported in the paper cannot be easily compared with others papers.

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- Equation 4 uses a simple increment to compute the fluctuations of k*. This approach could be improved as discussed (for example) in Gallego, Cristóbal, Alexandre Costa, Álvaro Cuerva, Lars Landberg, Beatrice Greaves, and Jonathan Collins. 2013. “A Wavelet-Based Approach for Large Wind Power Ramp Characterisation.” Wind Energy 16 (2): 257–78. doi:10.1002/we.550.

- The paper will be greatly improved if the authors could publish both the measurements data and the R code, following the recommendations on Reproducible Research: "When publishing computational results, including statistical analyses and simulation, provide links to the source-code (or script) version and the data used to generate the results to the extent that hosting space permits." The Yale Law School Roundtable on Data and Code Sharing. 2010. “Reproducible Research.” Computing in Science & Engineering 12 (5). Los Alamitos, CA, USA: IEEE Computer Society: 8–13. doi:10.1109/MCSE.2010.113

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