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Discussions

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Interactive comment on "Evaluating the spatio-temporal performance of sky imager based solar irradiance analysis and forecasts" *by* T. Schmidt et al.

Anonymous Referee #2

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The interesting and ambitious purpose of this paper is to assess the ability of a system comprising: - an unique fish-eye camera - a single pyranometer - a ceilometer to forecast on a short term 20-m resolution global horizontal irradiance (GHI) maps over a 20 km x 20 km region in Germany.

This assessment is done by comparing these forecasted maps for 50+ locations equipped with 1 Hz pyranometer within a square of 20 km x 20 km.

** General comments:

It is an interesting and synthetically well written paper. The figures are globally ok. The references are up-to-date and relevant.

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Interactive Discussion

Discussion Paper

The major positive points are: - a very good experimental setup for the assessment (dense 1 Hz pyranometric grid, ceilometer, fish-eye camera) - a very interesting " scientific investigations" about the spatio-temporal performance of sky image - a "simple" but effective algorithm for the fish-eye based (+ on pyranometric station + ceilometer) - a very good idea to analyze performance with respect different cloud type situations.

The major concern I have about this paper is about the inherent uncertainty of the GHI measurements from the 50+ pyranometric sensors. Despite a "drastic" data flagging, authors do not give any uncertainty assessment of the GHI measurements. It is the basis of all the comparisons but, at 1 Hz or even lower freq., GHI measurements may be very noisy and these noises may have impact on the different comparisons. A good starting point would be to compare the different GHI measurements under clear sky and produce a MBE and RMSE diagramm with respect a given station as reference (just like the Fig 9, but for clear sky). I think this preliminary analysis is crucial for the rest of the comparisons (and may change some of the conclusions, maybe).

Another comment is about the criteria used for the comparisons. The accuracy criteria ACC is a nice and relevant idea (but the name "accuracy" is somewhere a little bit too "fuzzy" and confusing: it is in fact the accuracy of the sunny/cloudy classification). The RMSE analysis is mandatory of course but the square of deviations is very penalizing and a complementary analysis with MAE (Mean absolute error) would have been of interest as well.

** Technical comments:

* page 26998, lines 1-2: clouds are not "always" the source of variability for GHI. Aerosols, for example, can be also, in some places, dominant sources of variability. In the site of interest here, it is of course true (but aerosol and water vapor may have some temporal variability pattern: but maybe not spatial pattern for the spatial scales of interest here). * 27000, lines 3-5: occlusion of sun is only related to the direct and circumsolar part of the GHI * 27002, lines 13-16: authors should better explain and

discuss (briefly) the choice of this particular clear-sky modeling (compared to other more recent clear sky model). * 27004, line 7: where does the definition of intensity I come from? * 27004, lines 9-14: the discussion about a, b, and the threshold is too brief. "Empirically determined": ok but what is the criteria? Finally, what are the values for a, b and this threshold? * Section 3.1.2: references for this extrinsic/intrinsic calibration would be welcome * Section 3.1.6: author should discuss about the choice of a relatively large value of the spatial smoothness \sigma * 27008, lines 20-21: authors should briefly describe a summary of the possible improvements for the diffuse * 27010, line 4: "real changes ..." : I don't understand the scientific meaning of this sentence. * 27010, line 6-7: interesting: can we know a little bit more about this, please. * 27012, fig 7: Where are the 50 selected stations among the 99 possible represented in Fig 7? * 27014, eq. 12: Ok for this definition but I don't see the relevancy and the use of V in this paper, except for the Table 1. * 27015, line 18: do not need this ref to say that RMSE = sqrt(MBE^2+STDEV^2) !

** Typo errors:

* 27002, line 8: missing "height" in "cloud base from" * 27004, eq. 1: R_{orig} not defined (even if it is obvious, I agree) * 27007, line 6 (and others): acronym about Red Blue Ratio is sometimes RBR or RbR * 27005, line 20: missing "from the ceilometer", after "cloud base height" * 27007, line 4 : (SVC) * 27009, line 15: finally gray or colour :-) ? * 27011, line 14: missing Return Carriage before "To" * 27014, Table 1 and line 13: confusion between wind speed (in table 1) and cloud speed in the text * 27016, line 3 : "increase" instead of "enhance" * 27017, fig. 10: not ease to read and discriminate the different graphs (separate in two figures with heterogeneous/homogeneous clouds?) * Figure 1: didn't find the ref in the text. Maybe better if more focus on the pyranometric sensors

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