Review of "Ten years of 1 Hz solar irradiance observations at Cabauw, the Netherlands, with cloud observations, variability classifications, and statistics" by Mol et al.

2 March 2023

Overview

This paper presents a rich dataset containing an entire decade of surface solar irradiance observations at the Cabauw station in the Netherlands at 1 second temporal resolution. Supporting information on the sky conditions and variability classifications is included that aids interpretation. Several compelling figures are presented that demonstrate the value of the dataset for scientific analyses. The paper is very well written and figures are mostly clear. After addressing the minor comments below I recommend publication.

Minor comments

Figure 1: For a reader unfamiliar with this part of the world, it is not immediately clear what is land and what is water. I suggest adding background colors of green for land and blue for water to improve clarity.

L65-66: The 7/5 second response time (95%) for the pyrheliometer/pyranometers is an important caveat given that a central focus of the paper is the 1 second data. While this caveat is already mentioned, I think it deserves more attention. Are there scientific applications where the effective temporal resolution of significantly less than 1 second will be impacted? Is there still a lot of value of data at this response time compared to one-minute data that is already widely available? Please add some discussion on this to the manuscript.

L75: Is linear interpolation used? It will not be exactly linear, but this is probably OK for interpolation within one minute. Either way, best to clarify.

L123-129: Several thresholds are introduced here (5% and 20%, 180 seconds, 10%, 20 W/m2, 15 minutes) without justification. Are these based on trial and error for this study, or an existing method? Please state in the manuscript.

L134: The official BSRN ones? If so, please add "BSRN" here.

Figures 4,5,6: Great visualizations of the dataset. Thank you for also releasing the code to produce these figures. It will be valuable for users to produce these quick looks.

Figure 6: When looking at the timeseries of shadow/sunshine/cloud-enh it seems that the shadows (grey) are always bounded by sunshine (yellow). I expected the opposite: immediately outside the cloud shadows should be the largest enhancement (red). Am I missing something here?

L246: Remove "doesn"

L268: “are” -> “as”

Figure 8: It looks like the DNI+DIF is systematically slightly less than GHI. Is that expected? Could it be related to the measurement, such as the blocking of the direct beam in the pyranometer to get DIF that also blocks a small amount of diffuse radiation that is scattered in the same direction as the direct beam?

Figure 9: I found the legend labels difficult to follow what is actually being plotted. I eventually got there after scanning back through earlier details in the manuscript. I suggest adding some details about each legend label in the caption so that the figure can be interpreted more easily.