

Ground-Based Atmospheric Measurements at the Onsala Space Observatory (Sweden): Data & Trends (2009–2025)

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Reply to the comments of the two referees

First of all, many thanks to the two reviewers for the time devoted to read this manuscript, for help and interesting comments. Below, we provide point-by-point responses (in blue). All changes and clarifications have been incorporated into the revised manuscript.

Referee #2 (RC2)

The manuscript presents a dataset of potential interest to the journal, as the topic is aligned with the scope of Earth System Science Data, and the effort invested in data generation and collection is evident. If properly documented and clarified, the dataset could represent a valuable resource for future studies.

However, there are numerous flaws in the presentation of this important set of results that could prevent its effectiveness in future impact. Most of them are related to poor level of details relevant to the presented data. I suggest the Authors to re-read their paper and keep in mind whether, for each of the important set of information they are providing, they are detailing all the quantities that are necessary for the Readers to understand their data.

We thank the reviewer for their thorough and constructive assessment. We agree that, for a dataset to be a valuable resource and fully reproducible, a high level of detail and clarity in the documentation is essential. We have therefore carefully revised the manuscript with the reader and data user in mind, expanding the description of all observed variables, sensor placement and heights, measurement resolution, and variable definitions. Sections 2 and 4, as well as Table 1, were substantially revised to ensure that all quantities necessary to understand and reuse the data are now explicitly documented.

(i) A glaring example is already present in Section 2.2, where the sampling frequency for the instrumentation, such as the temperature, relative humidity, pressure, wind sensor, is not provided. Other definitions, such as the gust wind velocity, is not provided. How is that defined? A similar example concerns the Rain Rate, how is that defined?

We thank the reviewer for this point. Sampling frequencies and variable definitions have now been clarified in Section 2.2, Table 1, and the figure captions.

Pressure, temperature, relative humidity, and wind measurements are provided at 1-minute resolution (see Sec. 2.2 and Table 1).

Wind measurements from the Vaisala WXT520 are based on an ultrasonic sensor (WINDCAP®), with wind gust defined as the maximum wind speed observed over a 3-second internal averaging interval.

Rain rate (RR) is provided at 1-minute resolution by the RAINCAP® sensor and corresponds to the estimated mm/h for that minute.

(ii) Fig. 1 may contain a better close-up of the tower, with the location of the sensors.

We replaced Figure 1 with a close-up view of the instrumented tower in the manuscript (see revised Fig.1).

(iii) Fig 2a, b, c: is the resolution of the data used for this subplots always the same? It is not clear from the text.

Panel (a) shows temperature and humidity at 1-minute resolution; panel (b) presents monthly averages derived from these data; and panel (c) shows a 1-minute resolution time series of atmospheric pressure at 16.1 m a.s.l., including monthly means (black dots). The figure caption has been clarified to make this explicit, and the text in Section 4 has also been updated.

(iv) Fig. 4/5 and relevant description: it is not clear which type of data are plotted in the graphs.

For Fig. 4, wind speed and wind direction measurements at 1-minute resolution are used to produce the wind roses and histograms.

For the seasonal wind roses, the data are divided into four categories (seasons) based on the measurement date (see text for details). For Fig. 5, the upper panel shows solar irradiance measured by the pyranometer at 1-minute resolution. The lower panel shows 3D scatter plots combining solar irradiance with cloud cover estimated from the sky camera. For these 3D scatter plots, irradiance values corresponding to the exact dates and times of available sky camera observations are used (i.e., every 15 minutes). This information has been clarified in the descriptive text and/or in the figure captions.