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Comment on essd-2021-52

Anonymous Referee #2

Referee comment on "The EUREC^{4}A turbulence dataset derived from the SAFIRE ATR 42 aircraft" by Pierre-Etienne Brilouet et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-52-RC2, 2021

The EUREC^{4}A turbulence dataset derived from the SAFIRE ATR 42 aircraft

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This is a very interesting and useful dataset addressing the issue of cloud cover in the trade-wind region and its consequent variation in albedo -- among other things.

The temperature and humidity content of the air was ably measured by sophisticated sensors of both fast response and slow (stable) response. Considerable care was taken in testing and calibrating the instruments to ensure good absolute accuracy over the frequency range from 0 Hz to 12.5 Hz (25 samples per second). The wind determination over the similar bandwidth was not discussed, presumably because it is already well characterized by SAFIRE.

In Figure 2b some variance appears to be forgone in the method of calibration of the (fast) KH20 using the (0.4 Hz) WVSS2 and the (1Hz) 1011C as (competing) references. The cyan trace (1011C) is visible both above the pink trace on crests and below the pink trace in troughs. That may not be noise. Likewise in the spectra of Figure 6 the KH20 and the Li-Cor separate at about 0.4 Hz, just about the report frequency of the WVSS2. I would trust the Li-Cor at least up to 2 Hz. I recommend checking out complementary filtering as a way to link the WVSS2 at low frequencies to the KH20 at higher frequencies. Assuming the WVSS2 data are available from all of the EUREC^{4}A flights, this approach is possible using the existing data.

The data set is fully acceptable as it is, but the opportunity to pick up some additional variance, and hopefully covariance, may be attractive.

The color-coded flag system of figure 5 and Table 4 are very helpful as is the organization into characterized and defined ("stabilized") flight segments 30 km, 60 km, and longest possible (ragged sizes longer than 60 km). Turbulent departures are provided in two modes: detrended over a whole segment or high-pass filtered to pass only departures shorter than about 5 km (the ogive length). This two-tier system looks like a good way to supply turbulent departures for use by other researchers, especially for the strongly heterogeneous segments gathered from cloud base.

Figure 1: Useful to identify "R" as the red pattern and "L" as the blue pattern.

Table 1: Several edits: ShCu, StCu should be expanded in caption. Explain or define "flower clouds", L_{surf}, L_{flower}, L_{top}, R_{cb}, maybe others

Line 85: better to call 4 m the "sample spacing." The word "resolution" is somewhat ambiguous

Line 89: The angles of attack and sideslip are not the Euler angles. The Euler angles (roll, pitch, and yaw) describe the orientation of the aircraft with respect to the earth. The angles of attack and sideslip describe the orientation of the multiport (nose-cone) probe to the oncoming airstream in flight. This appears to be an editing issue rather than a sign of error in the actual calculations. It can be addressed most simply by consulting a team member who has made such calculations.

Line 152: subcloud (typographic error)

Line 202: Did you mean "lose" instead of "loose"?

Figure 13 Needs editing to make the caption fit with the figure.

Figure 14 Same: Also include definition of Z* in at least one of these figures

Bibliography: F. Saïd, G. Canut, P. Durand, F. Lohou, M. Lothon were not listed as authors of the reference given on line 423.