

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2021-459**

Alan Blyth (Referee)

Referee comment on "EUREC⁴A observations from the SAFIRE ATR42 aircraft" by Sandrine Bony et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-459-RC1>, 2022

This paper describes the observations gathered by the SAFIRE ATR42 research aircraft during the EUREC4A field campaign. The paper is very clear, well written, and the figures are well chosen. I enjoyed reading it. It provides a very valuable and informative summary of the ATR aircraft operations and description of the datasets produced. The section on the consistency among observations is particularly interesting and important for the EUREC4A community.

The paper will be an excellent resource for scientists wishing to analyse SAFIRE ATR42 EUREC4A data now, and for many years to come.

A few relatively minor comments follow which the authors may wish to consider.

1205 I wondered what the actual description should be. The beginning and end of these episodes is a bit unclear in reality and also the second episode of elevated aerosols was over a few days, not just on 11 Feb. As far as I understand, there were two periods of mineral dust, with the second period containing significant biomass burning. I would suggest 30 Jan-6 Feb and 9-12 Feb based on data from Ragged Point (Peter Gallimore, personal communication), but it could be +/-1 day. Perhaps use the word "about"?

Section 3.1.3. It would be good to consider Lawson and Cooper (1990, JAOT, 7, p480), particularly with regard to the wetting caused by cloud drops.

l265. Is it correct that *both* the Rosemount and fine wire temperature data are processed at 1 Hz and at 25 Hz?

l285. Perhaps "sensors mentioned above"?

l285. Reference at this point for the WVSS-II?
Similarly for the Licor and KH20, and perhaps other instruments mentioned? Or collectively for a previous project?

l314. $g\ m^{-3}$

l321. Add "respectively"?

l415. ...subcloud layer and out of cloud at the cloud base level? Just to be clear? Likewise, in the next line, ... at the cloud-base level?

l417. Refer back to the last sentence of Section 2.

l430. References for the CDP-2 and 2D-S when they are first mentioned.

l474. It be would be useful to discuss the overlap size range for the two probes. Was there always good agreement that allowed there to be a unique distribution to be created?

l486. Semi-colon after Table 8.

l491. To be consistent, perhaps ... underestimate the LWC measurement when such large drops are present. Drizzle is defined in the previous paragraph.

I do wonder, for cloud lwc, how much of an error there will be due to this incomplete evaporation for such large drops which occur in relatively low concentrations. Is it larger than the error due to mis-sizing of large drops?

I497. It might be better to say the concentration of cloud drops is disproportionately less in a few cases with larger aerosol concentrations.

There are a few points where that is not true, which might suggest differences in hygroscopicity as mentioned.

Fig 11 caption. at the cloud base level?

I559. Unambiguous?

I563. I think it's better to start a new sentence for the text in parenthesis. Similar for I588 and elsewhere.

Figure 17 caption. It is obvious, but it might help some readers to explain the points and lines in the caption and say how the average was calculated.

Figure 18 caption. (in orange) should be blue.

Figure 19 caption. It would be good to describe the different lines.

I857. Add "more than" before 500 /cm³? It depends on size.

I894. Add (Figures B1 and B2)?

Similarly for App C.