

## Comment on essd-2021-162

Anonymous Referee #2

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Referee comment on "JOANNE: Joint dropsonde Observations of the Atmosphere in tropical North atlAntic meso-scale Environments" by Geet George et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-162-RC2>, 2021

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### General Comments:

The manuscript presents an extensive data set of 1216 dropsondes launched from the research aircraft HALO and WP-3D during the EUREC4A field campaign in Barbados 2020. The measurement pattern and evaluation method is a consistent evolution of the concept which was tested during the NARVAL2 mission in 2016 and described by Bony & Stevens (2019). The regular drop pattern along circles with a diameter of around 222km allows to derive the mesoscale motion of airmasses in the trade wind region as described previously. In combination with the measured temperature and humidity profiles, this dataset can add crucial information to satellite measurements when assessing the structure and evolution of low clouds in the trades. The evaluation method is comprehensible and the intermediate product levels also allow for a wider use of the data by the scientific community. The paper is well written and provides a comprehensive description of the data and processing steps. Thus, I would recommend publication after minor comments are addressed.

### Specific Comments:

- Fig. 4: The abundance of RH measurements is always lower than the other PTU parameters (p and T). What is the reason for that? Additionally, the RH abundance for the HALO dropsondes in Fig. 4 (a) seems to be lower than for the P3 sondes in (b). Is that difference significant and if so, could that be a hint to problems in the HALO measurement procedure?
- Sec 3.3: What is the reasoning behind the specific QC limits assumed (especially Temperature and RH)? Is it based on e.g. ground measurement statistics or models or experience from previous dropsonde measurements?
- Table 6: Check for consistency:
  - # of HALO sondes = 895 compared to 896 stated in sec 2.2
  - # of P3 sondes: sec 2.2 states 320 sondes, the Id\_test column 316 sondes, the other

test columns 322 sondes

- P3 qc\_flag: how can 10 sondes be classified as bad? From table 5, it could either be a bad ld\_test resulting in 4 bad sondes or a combination of bad sat and bad low test. Since there was no sonde with a bad sat\_test, this criterion should produce no bad qc\_flag.
  
- Sec 4: Could you specify how the reconditioning procedure differs between the two aircraft? I would assume the initialization procedure should be very similar?
  - Could the "measurement history" of the HALO sondes also be a reason for the dry bias? Compared to the radiosondes and the P3 sondes, the HALO sondes all came down from the cold and rather dry upper troposphere. Maybe one could compare HALO soundings with lower drop altitudes if available?
  - 5 and text: You state that the multiplicative correction works well for all heights. However, there is some discrepancy in Fig.5 (c) where HALO and Meteor pdfs align pretty well (even without dry bias correction) and the BCO soundings which seem to be moister. Please comment or modify in the text.
  
- Sec 5.2.1:
  - To 4.: Could you explain the reason behind this procedure? Do you intend to get rid of short scale (adiabatic) vertical motion effects in the profile?
  - To 5.: Do you first calculate u and v from Level2 data (windspeed and direction) for the interpolation and then recalculate windspeed and direction?

#### **Technical Corrections:**

- l 203: less instead of lesser?
- l 300: ) missing