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Comment on essd-2021-162

Anonymous Referee #1

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-RC1, 2021

General comments:

This manuscript focuses on 1216 dropsondes, which were deployed during the EUREC^{4}A field campaign from two aircraft. These dropsondes were launched in consistent flight patterns, in particular a ~220 km diameter circular flight pattern, to yield estimates of mesoscale vertical motion and generate an unbiased statistical ensemble that characterizes the dynamic and thermodynamic environment of the trades. This dataset can then be used, together with co-located measurements of clouds, to better understand the large-scale environmental controls on cloudiness. This paper is well-written and clearly and concisely describes the different data and data products in JOANNE. The dataset is itself novel and produced with high quality. The acronym is also very clever and a nice tribute to a pioneer in this field. I would recommend publication with minor revisions.

Specific comments:

- Regarding the HALO dropsondes' dry bias, could other platforms from the campaign be included as well? In Sec. 4 and Fig. 5, the authors nicely demonstrate how a multiplicative correction of 1.06 can bring HALO dropsonde measurements in line with radiosonde measurements from the BCO and R/V Meteor, as well as Ron Brown radiosondes (not shown). They also provide a hypothesis for this offset (improper reconditioning and trace pollutants remaining on the humidity sensor). The ATR aircraft and remotely-piloted aircraft RAAVEN were, for instance, also measuring humidity in the vicinity, and could provide further confidence in this 1.06 correction factor.
- More generally, the authors could consider adding an 'uncertainty quantification' section that summarizes various sources of uncertainty in these data. This section could include: uncertainty related to measurement error (e.g. the 'repeatability' of dropsondes, as described in Table 1), which is expected to act like random error; the systematic offset (in specific humidity) of the HALO dropsondes; and the standard errors of regression products (divergence, vertical velocity). This information is already presented in the paper but could be grouped in a short section.
- Fig. 6 -- why only include the IQR? I think it would be useful to also include the 5-95% range, for instance, to better see variability in moisture. Given that cloudiness is relatively low in the trades, moisture variations will mostly be seen in the tails of this

distribution, and the IQR does not represent the full picture of moisture variability. I suspect that for temperature, the difference between IQR and a broader interval will be less noticeable.

- Could the authors include a bit more background of *in situ* observations of mesoscale dynamic and/or thermodynamic variability in the trades? Are there previous (smaller) dropsonde datasets for the trades? In the summary, the authors could potentially elaborate on some of the possible scientific applications of these data and data products, though it is not required for a data paper, and this is already a very nice piece of work.

Technical corrections:

- The epigraph from Joanne Simpson at the start of the manuscript is indeed prescient and fits perfectly!
- In the abstract, circle diameter is given as ~222 km, 223 km in summary. Suggest to choose one consistent notation.
- Similarly, suggest a consistent notation for the number of circle-means (85 vs. eight-five)
- In the matrix (A) in Eq. 3 and 4 in the regression, perhaps replace x1 and y1 with delta_x and delta_y for clarity that these are the distances from the circle center to the dropsondes.