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# *Interactive comment on* "High-resolution in situ observations of atmospheric thermodynamics using dropsondes during the Organization of Tropical East Pacific Convection (OTREC) field campaign" *by* Holger Vömel et al.

**Anonymous Referee #1**

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General comments:

The manuscript presents the dataset of the dropsonde measurements carried out as part of the OTREC field campaign in 2019, which targeted deep convection regimes in the tropical east Pacific and in the Caribbean Sea, to study the dynamics and distribution of atmospheric deep convection. The authors provide an overview of these measurements including the sampling strategy, the details about the sounding system as well as the sonde instrument itself, quality control steps undertaken in real-time and during post-processing of the data, as well as a brief look into the relevant statistics



and metrics regarding the measurements.

The dataset is unique, as it provides a rich characterisation of the atmosphere in these deep convective regimes. The novelty is in terms of the number of sondes, as well as in the consistency of the sampling patterns. The diverse environments that the regions (East Pacific and Carribean) provide for deep convection to develop, make this dataset of considerable interest in understanding the thermodynamics as well as dynamics of deep convection and its interplay with the environmental parameters. Fuchs-Stone et al (2020) already give a glimpse of efforts in this direction. The colocated measurements from the cloud radar, as well as the ground-based measurements in the campaign can greatly benefit from the use of this dataset.

The files are all available as NetCDF (CF v1.6) files from the provided DOI, and are upto the highest standards one would expect from dropsonde data files. The files also provide QC parameters as additional attributes, which are definitely helpful in getting an idea of the performance of any sounding. The data collection (AVAPS and NRD41), quality control and the post-processing steps (ASPEN) are all state-of-the-art. The article also gives a good statistical overview of the success rate of measurements over several aspects, which can be checked from the files.

All that said, there are some minor clarifications and specifications that would certainly help the reader understand the data collection and QC better. I have specified these as notes below. I have also noted a few typographical and grammatical errors which the authors can use to help improve the draft.

Specific Comments:

Line 12: Typo. "One of central data sets..." Here a 'the' is missing between 'of' and 'central'

Line 14: Typo. "648 dropsonde were . . ." Should have been 'dropsondes' (plural).

Line 16: Grammar. "Of these soundings, 636 provided . . ." Tense consistency. The

previous sentence says ‘provide’ (present tense) in a similar context.

Line 28: Specify the type of ground-based measurements for IWV. I am guessing these are microwave measurements?

Line 60: Could there be a bit more elaboration on what is different in the parachute release between the NRD41 and the RD41? What makes the NRD41 more reliable? Or if there is some reference where this can be understood in greater detail, please cite it here.

Line 87: “suspect data points” Are the bounds for these suspect points the same as that are part of the standard editsonde configuration?

Line 95: Which type of smoothing (bspline, I think) and over what windows/wavelengths is this smoothing done?

Line 122: “... were corrected in post processing ...” Was this a simple offset correction applied to the whole profile? Or was the offset scaled with altitude? Additionally, the pressure sensor’s uncertainty range (I checked for RS41 sensors) lies between 0.3 and 1 hPa (for 100 hPa and more). So to correct for a median offset of 0.35 hPa, there has to be a great confidence on the reference pressure sensor. What is the range of uncertainty for it? The model number of the same could be provided for the reader’s reference.

Line 127: For clarification, did one repetition instance happen once or multiple times? i.e. Were there always pairs of the same value or sometimes also groups of the repeated value? In case it was the latter, what was the interpolation window? Also, I assume that all repeated values were discarded and then interpolation was carried out. Or can it be confirmed from the firmware bug which measurements were "true" measurements and which ones were repetitions?

Line 164: Does the uncertainty of the GPS module depend only on the satellite connections? Or something else too?



Line 165: Specify what is meant by upper and lower “parts” (e.g. halves, terciles, quartiles, 15%, etc.)

Line 177: For these 4 profiles, how much was the equilibriation time extended to?

Line 179: Grammar. . . “may have been”?

Line 188: Till the sonde came to its intended orientation, could it be that the equilibriation might also have been affected? And consequently, the equilibriation time needed to start after the parachute properly opens?

Line 209: Typo. Extra full stop.

Line 225: What about the deep convective clouds? e.g. from Fig. 10, soundings in some parts of RF01, RF19 and some others seem to show an atmospheric column that is almost completely saturated. Considering that HCR might have detected deep convection, would it be possible to mention in the manuscript how high were their tops and if the flight altitude was above the tops usually? Could these soundings be distinguished in some way from the ones in which cirrus were sampled close to flight level?

Line 226: Typo. ‘inertia’

Line 228: Please include ‘northward and eastward’ before “wind components”

Figs. 1 & 2 : A scale is required. A lat/lon grid would be very much preferable. It would also be very helpful, if an additional scale shows the length of each leg and the gaps between each leg.

Fig. 6: This is only a recommendation. If the drift in sounding profiles can additionally be shown as deviation from launch locations (I have tried to plot it myself in figure attached), then one can also see that while the sondes did not drift much in the N-S direction, they did have a general east-ward drift. The current figure only provides displacement, but adding the drift in lat-lon can also give an idea of the direction of the

drift.

References:

FuchsâĂŘStone, Ž., Raymond, D. J., & Sentić, S., 2020: OTREC2019: Convection over the East Pacific and Southwest Caribbean. Geophysical Research Letters, 47, e2020GL087564. https://doi.org/10.1029/2020GL087564

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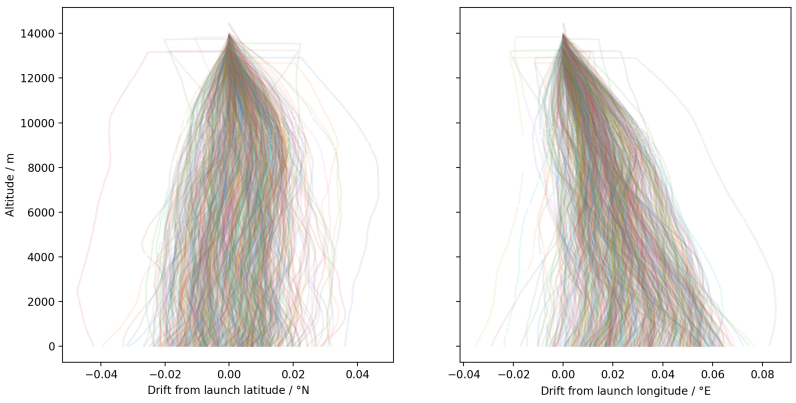


**Fig. 1.**