

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-354

Anonymous Referee #1

Referee comment on "On the impact of dropsondes on the ECMWF Integrated Forecasting System model (CY47R1) analysis of convection during the OTREC (Organization of Tropical East Pacific Convection) field campaign" by Stipo Sentić et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-354-RC1>, 2021

Review of the manuscript "On the impact of dropsondes on the EC IFS model (Cy47r1) analysis of convection during OTREC", gmd-2021-354.

General comments:

This manuscript made an overall evaluation of the fitting of the dropsonde observations and the model states with or without these observations assimilated and the influence on convection-related variables. These field campaign data are novel and valuable though the conclusions in this study are intuitive to me. I would recommend a minor revision before it can be published.

Minor comments:

1. I think the major conclusion from this study is the accuracy of u and v winds are improved by assimilating the dropsonde observations, while the thermodynamic variables has only limited influence, especially the moisture. I think it should be discussed in the conclusion section on the potential approaches to improve the assimilation of moisture variables. Does it mean the critical problem for moisture variables is the deficiency of model physics?

2. In Data and methods section, please introduce what the control variables are in the DA

system. Are they u, v wind or the stream function and velocity potential? Will the selection of control variables influence the fitting of the u, v wind and the vortex and divergence?

3. The manuscript has no obvious grammatical problems. However, some descriptions are not clear enough, especially the Data and methods section, for example,

3.1 Line 56-58, please reword the sentence. Is the resolution of dropsonde observations 13 km? What does it mean "spaced about 1 degree horizontally"? Please introduce more information about the dropsondes in the data and method section, like the flight altitude, the vertical sampling frequency of the observations.

3.2 Line 79, in Data and methods section, what is the approximate model resolution of the version Cy47r1?

3.3 The model run is from Aug 7 to Sep 30, 2019. How many samples totally are used in this study? What is the output frequency?

3.4 Are all the operational observations assimilated in YDPS and NDPS? Please briefly list their types?

4. Eq. 1, I think it should be the departures of the observations from the model state.

5. Lines 88-90, "... this only gives estimates of vorticity departures and not real vorticity departures ...", what does it mean here? Please reword the sentence.

6. Lines 136-137, The sentence is not clear, please reword.

7. Lines 149-150, why do the largest departures for zonal and horizontal wind occur around 700 hPa?

8. The description of Fig. 7 is unclear. It seems that Fig. 7b was not discussed. Why does profile is shown for the experiment NDPS but not YDPS?

9. Line 139, which region does Figure 4 show? Averaged over all the regions?

10. Please discuss in the conclusion section what potential studies can be done with these valuable dropsonde observations. Can they be used to adjust the model bias though small as suggested in the evaluation?