Comment on acp-2021-101

Anonymous Referee #1

Referee comment on "Impact of high- and low-vorticity turbulence on cloud–environment mixing and cloud microphysics processes" by Bipin Kumar et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-101-RC1, 2021

In this paper, analysis of the thermodynamic and microphysical characteristics of droplets and flow in high and low vorticity regions. The study performed direct numerical simulation of turbulent flow with droplet evaporation/condensation in a sub-meter cubed sized domain. The topic is interesting and the manuscript requires little improvement, especially the correction of grammatical mistakes. The introduction provides a good and concise (theoretical) background to the study.

The scientific merit of the study deserves publication. Yet, I recommend minor revision of the manuscript before its acceptance. This recommendation is based on the comments and remarks listed below:

- This work is exceptional for including the entrainment-mixing and resolving the Kolmogorov time scales but I am wondering why the authors chose k = 3500 as the optimal k value. I will suggest that the authors try larger values of k in figure 1c. Why is the maximum number of iteration chosen as 200?
- In figure 3, I guess the mean KE and vorticity is averaged over the slab or edge volume. It should written in the caption
- In line 159-160, the authors wrote that they investigated the evolution of the mixing ratio but there is no figure showing the evolution of the mixing ratio and the u_{rms}.
- In the introduction, the authors did not explicit write the scientific questions for this study. It is written in the conclusion. This can be confusing for the reader
- What is the time step for the simulation? Can you present the energy spectrum for the

flow field?

- In line 82-83, the authors wrote that "an initial setup of computational domain is presented by the Figure 1(a)". Figure 1(a) does not contain the initial setup. Are you referring to figure 1(d)?
- The authors wrote that the mono-dispersed droplet size distribution cases are idealized cases. These idealized cases should have been discussed first before the poly-dispersed cases. Why? The authors gave a short summary of these idealized cases in section 4 and table 2 with no figure to substantiate the conclusions in table 2.

Minor corrections

- In line 69, change "We compared …" to "We compare…"
- In line 72, change "we aims to look …" to "we aim to look…". Also, change "section provides details of methods employed …" to "section provides the details of all methods and data used"
- In line 83, change "is presented by …" to "is presented in …"
- This sentence "The next step is to find …" in line 92-93 should be rewritten. I will suggest you break this sentence into two.
- I will suggest the authors get a professional to correct all grammatical mistakes in the manuscript.