Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC2
https://doi.org/10.5194/acp-2021-338-RC2, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on acp-2021-338

Anonymous Referee #2

Referee comment on "Supercooled liquid water and secondary ice production in Kelvin–Helmholtz instability as revealed by radar Doppler spectra observations" by Haoran Li et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-338-RC2, 2021

Comments on the "Supercooled liquid water and secondary ice production in Kelvin-Helmholtz instability as revealed by radar Doppler spectra observations" by H. Li et al.

Using observations by vertical pointing C- and W-band radars, scanning weather radar, and radiosondes, the authors analyzed dynamics and microphysics of supercooled liquid water and secondary ice in a stratiform drizzling cloud. It is a unique and interesting case that K-H cloud has developed in the stratiform cloud. The authors point out that the K-H instability is induced mainly by wind shear. They also revealed that the number concentration of ice columns is higher than the INP concentration by several degrees of magnitude, which indicates the secondary ice production in the K-H billows.

The manuscript is well written, the subject is relevant, the observation data is most advanced, and the results are well presented and discussed. I believe the manuscript is suitable for publication after a minor revision.

Minor points:

- Page 2, line 30: The description of the dual-polarization Doppler radar technique should go to the data and methodology section, and what do you find from this study should go to the discussion or conclusion sections. The content of this paragraph does not fit the "introduction".
- Page 4, line 20: (Hogan et al., 2002) -> Hogan et al. (2002).
- Figure 1: The text, for example, "Vertically pointing (HYDRA-W)", is not visible.
- Figure 2: a potential temperature profile in Kelvin other than temperature is better to interpret the stability in the boundary layer.
- Figure 4: use the same y-axis limits for heights in (a), (b), (c), and (e).
- Page 11, line 9: iss -> is.

- Page 11, line 18-21: Could you explain why your results are different from previous studies?
- Page 11, line 25: (Majewski and French, 2020) -> Majewski and French (2020).
- Page 14, line 23: What is “mass” in the equation “N = mass/IWC”, and double-check if the equation is correct.
- Page 16, line 6: “W band” -> “W-band”.