Review of the study "**Observation of secondary ice production in clouds at low temperatures", authored by**

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The study provides the first in-situ observation of secondary ice production at temperatures as low as -27°C. These observations are unique and important. I recommend to accept the paper with minor revisions.

Minor comments are:

1. line 40. The formation of ice by droplet freezing is not mentioned. Since the temperature measured was higher than the temperature of homogeneous drop freezing, the standard immersion drop freezing takes place at T=-27C is. Can the authors evaluate the rate of this immersion freezing of drops (for instance using standard Bigg formula)? Note that according to the observations presented in this study, the zones of high concentration of ice crystals coincide with the zones of significant peaks in droplet concentration and LWC.

   Please discuss the possible role of the freezing of drops, which concentration is several orders higher than that of ice crystals, in production of cloud ice. It would be reasonable to refer in this context the study by Khain et al. (2022), in which A. Korolev is a co-author.

   Can you compare the rates of immersion drop freezing and the rates of the mechanisms of primary ice nucleation mentioned in the paper?

2. Line 68. The study Qu et al, (2019) is not presented in the reference list. If you mean the study published in J. Geophys. Res. (see list of references below), that study shows that only secondary ice production can explain in-situ observations. The fraction of ice produced by primary nucleation was evaluated as several per cents at all temperatures. In my view, the study by Qu et al, (2019) was the first paper that reproduced size distributions ice and water observed in-situ measurements and showed that SIP plays a crucial role in the formation of such distributions. So, the statement in the current study that "Such approach may lead to underrepresentation of the role of secondary ice and result in biases in simulations" is not attributed to the study by Qu et al. (2019).

3. Line 75. Here reference to Qu et al. (2019) as well as to Phillips et al. (2017) should be included. In these studies simulations with a bin-microphysics cloud model reproduced ice size distributions formed by SIP by drop-ice and ice-ice collisions.

4. Line 78. The important attempt to understand the fundamental mechanisms of SIP by drop freezing was carried out by Staroselsky et al., 2021.

5. Line 128. Fig. 1. Please pay attention on the high correlation between droplet concentration and LWC, on the one hand, and the concentration of ice particles. In my opinion, this correlation shows the key role of drops in the formation of ice particle concentration. I believe that this high correlation decreases the number of possible SIP mechanisms, at least in the present case study.

References

Khain A, Pinsky M., and A. Korolev, 2022: Combined effect of the Weber-Bergeron-Findeisen mechanism and large eddies on microphysics of mixed-phase stratiform clouds. J. Atmos. Sci, Volume 79: Issue 2, 383–407, https://doi.org/10.1175/JAS-D-20-0269.1

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