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Comment on acp-2021-335

Anonymous Referee #2

Referee comment on "The ice–vapour interface during growth and sublimation" by Maria Cascajo-Castresana et al., Atmos. Chem. Phys. Discuss.,
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The authors observed the growth and sublimation of ice crystals using ESEM at temperatures between -10 and -20°C (n.b. the preprint has many missing negative signs) and pressures with over-and undersaturation. They describe their observations by ESEM images.

Pressures below the typical surface pressure occur in the atmosphere, and the paper may be therefore relevant for the formation of ice crystals in clouds. The paper investigates with similar methods but at lower temperatures and different pressures ice growth and sublimation as in Chen et al. (2017).

The paper is of a very descriptive nature, comparing the observations with literature. The interpretation is based on comparing specific observations with other authors. The observations are described in detail. However, quantitative data (e.g. detailed figures on ice growth and sublimation rates of repeated experiments) are missing.

I could not find a substantial conclusion. The author observed a transition from single crystal to polycrystalline film as their most relevant result. Such a result may be relevant for the icing of aeroplanes. However, ice crystals in the atmosphere are usually single crystals and do not grow on a substrate.

The paper is clearly structured although in parts lengthy. The first paragraph of the introduction is not relevant: ice on the ground is always at quite high atmospheric pressure. The only relevance of this paper is for ice clouds. If deposition and sublimation occur with the same morphology a higher air pressure is not clear and is not discussed in this paper.

The authors seem also not aware that ice at a temperature of -20°C is actually at a very high homologous temperature (about 8% below the melting point). The "low temperature" is only on a Celsius-temperature scale.

The paper is a very illustrative report on the growth and sublimation of ice crystals around -20°C. However, I can hardly find in its current form a reason to become published as a full paper in ACP.