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Interactive comment on "Low-Temperature Triple-Capillary Cryostat for Ice Crystal Growth Studies" *by* Brian D. Swanson and Jon Nelson

Anonymous Referee #1

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This is a useful technical paper describing an advancement in the way that simulations of ice crystal growth in the laboratory are performed. A lot of work has gone into this chamber, and I'm happy to see all the considerations & analysis published so others can use it and understand the strengths and weaknesses of the technique.

I recommend publication, following some minor corrections.

Introduction "but each experiment seems to give different normal growth rates (i.e., rate of face advancement normal to itself), even under similar conditions and using similar techniques" - can you provide examples of this, and relevant citations here?

I felt section 2 was a very long unbroken section. It would benefit from being broken up a bit - for example spliting into subsections and including more of a "road map" at the

start of the section outlining the issues to be addressed

Equation 1 - I'd say \rho is more conventional notation for density... The analysis that follows could be spelled out more clearly. Why is the numerator proportional to dT?

You do a "back of the envelope" calculation here, with the Hertz-Knudsen equation - what assumptions does this calc make? e.g. regarding crystal + growth kinetics.

"If we assume that the onset of convection occurs with a Rayleigh number of about 1500,..." more background needed. can you justify this threshold, and define Ra physically

Page 5, last paragraph. Up to this point the anslysis seems to suggest that Sa can be estimated very precisely. But reading this last paragraph, I wasn't sure what to think. The authors conclusion needs to be more explicit here. You say the computed Sa in your "other experiments" was different to the real value (using droplet as a reference for the environmental saturation ratio). Can you be quantitative? How different? More than you would expect from the preceding estimates? If so, why might this be? And what is the implication for analysis of results from the chamber generally?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-137, 2019.