

Interactive comment on “Inhibition of ice crystallisation in highly viscous aqueous organic acid droplets” by B. J. Murray

Anonymous Referee #2

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Review of Inhibition of ice crystallisation in highly viscous aqueous organic acid droplets by B. J. Murray

This is an important piece of work for understanding ice formation at the cold temperatures typical of the tropical tropopause. It complements the Zobrist et al. manuscript currently on ACPD. They, using a different technique, also found inhibition of ice crystallisation for a number of organic compounds in water. The power of the research presented here is that X-ray diffraction directly observes the crystal structure.

The manuscript is well written, the results are clear, and the atmospheric implications justify publication in ACP.

Minor comments:

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p. 8750: If the very concentrated droplets did not nucleate ice on warming (line 18), then the melting point means something different because the phase that is melting would have a different energy than the crystalline phase. Is there any information about the glassy phase that can be obtained from the lack of a big offset in the melting point curve for the solutions that never nucleated ice?

p. 8750: When the emulsion droplets froze on warming, did they freeze to cubic or hexagonal ice?

pp. 8756-8757: When the manuscript discusses the differences between particles in an emulsion and in the atmosphere, mass transfer is mentioned: unlike droplets in an emulsion an atmospheric particle can take up water and be diluted. There are also differences in heat transfer between particles in an emulsion and the atmosphere that should be mentioned. Probably these heat transfer differences are small in the absence of latent heat release, but they might change the way crystallisation on warming occurs.

p. 8757: Kärcher and Koop (2005) considered not only a lower condensation coefficient of water on organic solutions but also insoluble organics that would have less water uptake at equilibrium.

Zobrist, B., C. Marcolli, D. A. Pedernera, and T. Koop, Do atmospheric aerosols form glasses? *Atmos. Chem. Phys. Discuss.*, i, 9263-9321, 2008.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 8, 8743, 2008.

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