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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Charge induced stability of water droplets in subsaturated environment" *by* J. K. Nielsen et al.

**Anonymous Referee #2**

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This paper presents an interesting discussion on the possible effect of electric charge on iceparticles on the saturation vapor pressure. The authors also provide a simple theory and some experimental results to support their arguments. Though the theory is somewhat preliminary andthe experimental data contain considerable scatter, the argument for the case seems to be plausible. I would recommend acceptance provided that the authors can address the following comments.

(1)While the overall flow of the writing is very good, the authors tend to skip some clarifications and that sometimes makes the lines a bit hard to follow. The reading will be easier if they can provide more background before jumping to the statement.

(2)Line 21, p.25744: "these measurements must prompt speculations. . ."âĂŤcould you provide some of these speculations? Have you performed calculations that make you



feeling that these ice particles should have evaporated? After all, the lower stratosphere is very cold and cold ice evaporate slowly. Some references would be appropriate here.

(3)Can you provide a simple sketch of the EDB with the indication where the water drops and the ice surfaces are so that the readers don't have to look up in other journals?

(4) Equation (1): please define $\mu$0 (T), KB and e(r) here. I know you have defined e(r) later,but this is where it appears first.

(5) Line 8, p. 25746: "For droplet radii above 1 $\mu$m. . ."âĂŤare you making the assumption that the surface energy effect is less important for larger drop cases? If so, maybe you should cite, e.g., Prupapcher and Klett (1997), to justify the statement.

(6)Line 10:" saturation pressure over a plane liquid water surface. . ."âĂŤbut I thought you are talking about a spherical drop?

(7) Line 19: right before the equation, you may need to add "RHw can be expressed".

(8)Line 21: Why does $\sigma$q have to be the same on all droplets?

(9) Line 1, p.25748: how do you make sure that the drop is in an environment of saturation vapor pressure over ice?

(10) Line 18, p. 25749: please explain Coulomb fission.

(11) Sec. 5, Perspectives: since you really want to apply the conclusions to the case of ice(though you say you are not making any claim yet), it's useful to provide a short discussion here why or why not your conclusions may apply there. Charges on ice lattice may behave differently than that on water and hence the effect may or may not be the same.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 25743, 2010.