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## ***Interactive comment on “Laboratory studies of collection efficiency of sub-micrometer aerosol particles by cloud droplets on a single droplet basis” by K. Ardon-Dryer et al.***

**Anonymous Referee #2**

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This paper describes a new experimental method that is capable of measuring the collection efficiency of submicron particles by small cloud droplets on a single-droplet basis. Aerosol particles have great impact on the physics and chemistry of the atmosphere. One of the greatest effects of aerosol on atmosphere is their interaction with clouds (serving as CCN or IN, and scavenged by cloud particles), how and how many aerosol particles are scavenged by cloud droplets are important questions to answer before climate models can accurately assess aerosol effects on climate. The paper is clearly written and the conclusions are generally plausible. However, there are some concerns that need to be addressed before the paper is accepted for publication. Many

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of these have been mentioned by other reviewers, so I will just add two brief suggestions:

1. The authors should provide a motivation why there is a need to develop a new technique to measure CE. Are there discrepancies in previous results? Or the present technique can provide information that cannot be offered by previous researches? One of the papers they may want to refer to is Radke et al. (1980, J. Appl. Meteor., 19, 715) where discrepancies between CE measured in labs and derived from field observations are described. Also, the single-drop technique can potentially differentiate different factors influencing the CE which cannot be done by previous methods. The authors should give a more detailed description on this point.

2. One of the possible error sources of the CE results reported here is the droplet size which seems to be assumed constant. Given that the RH is very low, the evaporation and hence the change of drop size can be very quick, and this will affect the results of CE calculations. The authors should make estimates of the drop size during the aerosol collection and report errors.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 6207, 2015.

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