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Interactive comment on "An investigation into the performance of three cloud droplet activation parameterisations" *by* E. Simpson et al.

Anonymous Referee #1

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This manuscript provides considerable insight into the performance of commonly used parameterizations of aerosol activation. Conditions of systematic biases are identified, and causes of the biases are suggested. One scheme is found to be clearly superior, though it has limitations as well. The presentation is quite clear. Only minor revision is needed before publication.

p. 1319, lines 13-20. Another relevant reference here is Ghan, S. J., G. Guzman, and H. Abdul-Razzak, 1998: Competition between sea-salt and sulfate particles as cloud condensation nuclei. J. Atmos. Sci., 55, 3340-3347.

p. 1324, lines 20-26. While it is true that assuming the aerosols have an infinite amount of time to activate is unrealistic for this case, is the large aerosol case realistic? Are there measured size distributions in which the number distribution is dominated by a

1.5 micron aerosol mode? I suspect not. If not, then a more realistic case should be chosen, or the conclusion here should be tempered. The point could certainly be made with a 1 micron aerosol mode, or perhaps even smaller.

p. 1328, lines 6-7. You've made the point about the infinite effective simulation time. Could you offer suggestions on how it might be overcome? I thought FN had a treatment of kinetic limitations.

Interactive comment on Geosci. Model Dev. Discuss., 7, 1317, 2014.