

Interactive comment on “Assessment of parameterizations of heterogeneous ice nucleation in cloud and climate models” by J. A. Curry and V. I. Khvorostyanov

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I am not convinced by using the background aerosol concentration as an input to the KC scheme in the mixed-phase clouds. I think it is more understandable to use aerosol concentrations in cloud. In the case of MPACE, most of background aerosols would serve as CCN and in-cloud aerosol concentration would be very low. In the cirrus cloud case, one can use background aerosol concentrations because aerosols do not serve as CCN to form cloud liquid. Maybe KC scheme can predict reasonable ice formation for the pure ice cloud case but not for the mixed-phase cloud case, since CCN takes the vast majority of the aerosols. Some other mechanisms such as droplet evaporation

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freezing may contribute to ice formation since IN is very low in the mixed-phase clouds. That is the whole point of Fridlind et al 2007 and Fan et al 2009 - trying to find other ice formation mechanisms possibly contributing to ice formation in the mixed-phase clouds where IN is low (because most of aerosols serve as CCN first). It is not well justified why the background aerosol concentration should be used in the mixed-phase clouds since most of aerosols are CCN instead of IN. Therefore, it is still too early to say for sure that it is wrong in Fan et al 2009 by using the very low IN concentration - that could be the case in the mixed-phase clouds.

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