On the role of aerosol characteristics and parameterization schemes on Arctic mixed-phase clouds

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Arctic low-level clouds are highly sensitive to microphysical processes, which can either sustain or break down the mixed-phase state and thereby determine the longevity of the clouds and their radiative impact. They are influenced by aerosol particles, which can act as ice nuclei (IN) or cloud condensation nuclei (CCN) and the parameterization schemes used for the aerosol-cloud interactions and the microphysical processes in the cloud. In this study we investigate:

1.) the influence of the chemical composition of CCN and IN

2.) the influence of different freezing parameterization schemes

on the cloud microphysics and the evolution of a mixed-phase Arctic cloud using the large-eddy simulation model MIMICA (Savre et al., 2014).

We show that in terms of CCN activation the aerosol size is more important than chemical composition. For INP the chemical composition has a strong influence on the cloud characteristics, but these results are highly dependent on the freezing parameterization.