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Simulation of the formation of thin cirrus clouds in presence of different competing nucleation processes.

P. Spichtinger (1), and K. Gierens (1)

(1) German Aerospace Center (DLR), Institute of Atmospheric Physics , Oberpfaffenhofen, Germany

Cirrus clouds, including sub-species as condensation trails and subvisible cirrus, constitute now a well established research topic within the atmospheric sciences. But nevertheless there are many open questions, e.g. the impact of sedimentation on the evolution of cirrus clouds or the occurrence of high supersaturation inside cirrus clouds or even the formation of cirrus clouds in presence of different competing formation processes.

We have implemented a bulk ice microphysics (two moment scheme) into the anelastic non-hydrostatic 3D model EuLag (Smolarkiewicz and Margolin, 1997) to study the formation and evolution of thin cirrus clouds in cloud resolving simulations. This scheme also includes a new formulation of the sedimentation of ice crystals. In this contribution we present a systematic study concerning the formation and evolution of thin cirrus clouds in the presence of two competing formation mechanisms (heterogeneous vs. homogeneous nucleation) depending on the environmental conditions (e.g. vertical velocity, temperature, number of ice nuclei). Additionally, we found that high supersaturation inside cirrus clouds is possible and occurs frequently in the simulations, even after hours when formation of the cirrus took place.