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Model calculations for the airborne Fast Ice Nuclei CHamber FINCH-HALO

B. Nillius (1), H. Bingemer (1), U. Bundke (1), R. Jaenicke (2), B. Reimann (1), and T. Wetter (1)

(1) Johann Wolfgang Goethe-Universität Frankfurt, Institute for Atmospheric and Environmental Sciences, Frankfurt, Germany, nillius@iau.uni-frankfurt.de, (2) Johannes Gutenberg-University Mainz, Institute for Atmospheric Physics, Mainz, Germany

Ice nuclei (IN) initiate the formation of primary ice in tropospheric clouds. In mixed phase clouds the primary ice crystals can grow very fast by the Bergeron-Findeisen process (Findeisen, 1938) at the expense of evaporating water droplets, and form precipitation. Thus, IN are essential for the development of precipitation in mixed phase clouds in the middle latitude. However, the role of IN in the development of clouds is still poorly understood and needs to be studied (Levin and Cotton, 2007).
A Fast Ice Nuclei CHamber (FINCH-HALO) for airborne operation on the High And LOng Range research aircraft (HALO) is under development at the Institute for Atmosphere and Environment University Frankfurt. IN particles are activated within the chamber at certain ice super-saturation and temperature by mixing three gas flows, a warm moist, a cold dry, and an aerosol flow. After activation the particles will grow within a processing chamber. In an optical depolarisation detector droplets and ice crystals are detected separately.
The setup of the new FINCH-HALO instrument is based on the ground based IN counter FINCH (Bundke, 2008). In FINCH-HALO a new cooling unit is used. Thus, measurements down to -40°C are possible. Furthermore minor changes of the inlet section where the mixing occurs were done.
The contribution will present 3D model calculations with FLUENT of the flow conditions in the new inlet section for different pressure levels during a flight typical for HALO. Growth rates of ice crystals in the chamber at different temperature and super-saturation will be shown.

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