



Ice Nucleation by Aqueous and Crystalline Sulphate Particles: New Experiments in the Aerosol Chamber AIDA

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The cloud and aerosol chamber AIDA of Forschungszentrum Karlsruhe enables the production of ice clouds in the lab at realistic conditions with regard to temperature and cooling rate. A large set of instruments is available for observation and characterisation of aerosol and ice particles. Ice supersaturated conditions can be achieved by controlled pumping at initial temperatures as low as -90°C .

Different AIDA experiments were conducted to investigate the formation of ice particles from sulphate aerosols in the temperature range between -50°C and -70°C . Ammonium sulphate aerosol was produced by neutralisation of sulphuric acid aerosol by gaseous ammonia. At -55°C we observed both ice formation by homogeneous freezing of liquid particles in accordance with the activity parameterisation (Koop et al., Nature, 2000) and ice formation by deposition nucleation on solid ammonium sulphate particles at substantially lower ice supersaturation. At lower temperatures, a clearly different freezing behaviour was observed. Apparently, ice particles were solely formed heterogeneously.

This contribution presents results of AIDA experiments devoted to the ice-forming ability of sulphate aerosols and discusses possible mechanisms which could be responsible for the phase transformation of liquid to solid ammonium sulphate particles.