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Glass Formation in Atmospherically Relevant Aqueous Droplets and its Impact on Cloud Formation

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Recent experiments employing X-ray diffraction (Murray, Atm. Chem. Phys, 8, 5423, 2008) and calorimetry (Zobrist et al. Atm. Chem. Phys. 8, 5221, 2008) have demonstrated that aqueous organic solutions can form glasses under atmospherically relevant conditions. In order to test the impact of glassy particles on cloud formation, glassy citric acid particles were recently produced within the AIDA cloud simulation chamber in Karlsruhe Germany. The results suggest the homogeneous nucleation route to ice particles was blocked in glassy citric acid aerosol. However, ice formed heterogeneously on the glassy particles at saturations of only 1.2. This represents an entirely new mechanism of ice particle production which is most likely relevant for the cold tropical tropopause region.