EGU24-9732, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-9732
EGU General Assembly 2024

Using cloud chamber experiments and numerical simulations to investigate the complexities of cirrus cloud thinning effectiveness

Isabelle Steinke[1], Tobias Schorr[2], and Thomas Leisner[2]
[1]Department Geoscience and Remote Sensing, Delft University of Technology, Delft, the Netherlands
[2]Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany

In this study, we present a series of systematic AIDA cloud chamber experiments investigating the cloud microphysics governing cirrus cloud thinning effectiveness (i.e., the competition between heterogeneous and homogeneous ice nucleation) at temperatures below 230 K. Parcel model simulations based on our experimental studies show that the total ice crystal concentrations are very sensitive to the complex interplay between background aerosol, seeding and updraft velocities. We find regimes of successful cirrus thinning, as well as regimes resulting in thicker cirrus (overseeding). In addition, we also find that updraft fluctuations potentially play a critical role in influencing cirrus cloud thinning effectiveness.