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Nucleation, life cycle and climate impact of contrail cirrus - new insights — ●CHRISTIANE VOIGT — Deutsches Zentrum für Luft- und Raumfahrt (DLR) — Johannes Gutenberg-Universität Mainz

Current growth rates in aviation demand a profound scientific data base in order to accurately assess the aviation impact on climate. A major contribution results from contrail cirrus and their radiative forcing is suggested to outbalance aviation CO₂ and NO_x effects. Direct observations of contrail cirrus throughout their life cycle are scarce and prone to substantial ambiguities currently limiting our understanding of the climate impact by aviation.

Here, we give new insights into the nucleation, growth, life cycle and climate impact from contrail cirrus based on results from suite of recent aircraft experiments. NASA's ACCESS-II mission focusses on aircraft emissions and initial stages of contrail formation. Nascent contrails were detected at cruise altitudes near 100 m distance to the engine exit. Contrail growth to 10-min contrail age is investigated during DLR's CONCERT campaigns. Finally, the objective of the ML-CIRRUS experiment with the HALO research aircraft is to study the life cycle and climate impact of contrail cirrus with a novel in-situ/remote sensing payload. The contrail measurements are related to previous observations and discussed in the context of recent developments in contrail modeling. Highlights include the quantification of the effects of aircraft type, engine technology and alternative fuels on contrail microphysics and climate.

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