Research towards weather induced uncertainties for contrail persistence and mitigation strategies for contrail impact

Better Contrail Mitigation (BeCoM project)
(poster)

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Aviation contributes to about 3.5% of the total anthropogenic climate change when including non-CO_2 effects, e.g., contrail formation and the impact of NO_x emissions on ozone and methane. Among various non-CO_2 effects, the contrail-cirrus radiative forcing is the largest (~2/3) with large uncertainties. The most critical affecting factor is the huge weather-induced variability of the radiative impact of individual contrails, which imposes challenges on formulating adequate mitigation measures and develop policy-driven implementation schemes, stressing relevance of reliable forecasts.
The newly funded EU project BeCoM intends to address the uncertainties related to the forecasting of persistent contrails and their weather-dependent individual radiative effects. The project will focus on: 1) obtaining a larger and higher resolution database of relative humidity and ice supersaturation at cruise levels for assimilation into numerical weather prediction (NWP) models; 2) providing more adequate representation of ice clouds in their supersaturated environment in the NWP models; and 3) validation of the predictions to determine and reduce the remaining uncertainties of contrail forecasts. To facilitate the assimilation and validation process, a novel hybrid artificial intelligence algorithm will be developed. Based on the contrail prediction, the project will develop a policy framework for effective contrail avoidance through a trajectory optimization approach. The results will enable a better understanding of contrail's climate impact and formulate recommendations on how to implement strategies to enable air traffic management to reduce aviation's climate impact.

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