



## **Investigating the impact of aviation on climate change in Europe with a regional climate model**

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In 2004 aviation accounted for approximately 3% of total fuel use of the 25 countries of Europe but the total contribution of airplanes departing and landing in these countries to radiative forcing of climate is estimated to be between 5 and 12 % (based on figures from the IPCC special report on aviation and the global atmosphere).

This difference between the relative importance of direct emissions of CO<sub>2</sub> by airplanes and their real impact on climate is due to the fact that airliners also emit nitrogen oxides (NO<sub>x</sub>) and aerosols and that they produce condensation trails (contrails) which may develop into cirrus clouds, under certain meteorological conditions. The scientific knowledge about the impact of contrail-cirrus on climate is still very poor, nevertheless the European TRADEOFF project estimates that they contribute between 50 and 80% to global aviation radiative forcing in 2000.

This study is focused on analyzing their impact on the European climate with the climate version of the *Local Model* (CLM) (the *Local Model* has been developed by the *Deutscher Wetterdienst, DWD*). For this purpose a parameterization of contrail-cirrus will be introduced that will allow usage of actual flight information. This parameterization will take advantage of the model prognostic cloud scheme for cirrus clouds and will prescribe an additional coverage based on the distance flown in each grid box.

The model will be forced for present climate by ECMWF reanalysis, and scenario runs for the 21<sup>st</sup> century (A1B and B1) are planned with boundary conditions from the ECHAM5 model. The climate impacts we are interested in are changes in surface temperature as well as eventual impacts from high altitude clouds on low-level clouds

(e.g. via deep convection) and on precipitation.