ALTERNATIVE ROUTING: CLIMATE IMPACT MITIGATION STUDIES

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Abstract. The EU FP7 project REACT4C explored the feasibility of operational measures such as flight altitude and route changes to reduce the climate impact from aviation. For this purpose a feasibility study on climate-optimized flight planning was performed for the North Atlantic flight corridor (NAFC). In this paper we present results from an evaluation of climate impact of such climate-optimized trajectories with a set of chemistry-transport models.

Such climate-optimized flight routing is performed by taking into account prevailing synoptical weather pattern. For winter five distinct patterns were identified, hence accordingly five emission inventories were generated for the NAFC region. Subsequently an experiment design was developed, in order to evaluate climate impact of these optimized routings for a specific winter season. The weather-dependent optimized inventories were integrated in the chemistry-climate models by respecting corresponding prevailing pattern. Specifically, two study periods were selected, one, for the winter periods in 2004/2005 and, a second one, 2006/2007. On a daily basis prevailing weather patterns were analysed as defined in 5 distinct patterns, and the corresponding optimized traffic inventory was integrated in the time series of aviation emissions. Simulations were performed by a set of chemistry-climate models which are OSLO CTM2/3, ULAQ-CTM, EMAC and MOZART-3, producing a multi-model estimate. Each model simulated two numerical simulations, one using economically optimized inventories and another using climate-optimized inventories. The comparison of atmospheric concentrations between both simulations determines the impact of climate-optimal routing. Results will be shown of changes in atmospheric concentrations of reactive species, focusing in particular on NO_x, NO_y, O_3 and HO_x, of these weather-dependent climate-optimized inventories.