

Air Quality - Climate Interaction in Urban Environment

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Recent studies show considerable effect of atmospheric chemistry and aerosols on climate on regional and local scale. For the purpose of qualifying and quantifying the magnitude of climate forcing due to atmospheric chemistry/aerosols on regional scale, the couple of regional climate model and chemistry/aerosol model was developed for the EC FP6 Project QUANTIFY and EC FP6 Project CECILIA. For this coupling, existing regional climate model and chemistry transport model have been used at very high resolution of 10km grid. Climate is calculated using RegCM while chemistry is solved by CAMx. The experiments with the couple have been performed for EC FP7 project MEGAPOLI assessing the impact of the megacities and industrialized areas on climate. Recently, UHI project within the Operation Programme Central Europe has been started where this couple will be used in high resolution for the Central Europe urban and industrialized areas.

A preprocessor utility was developed for transforming RegCM provided fields to CAMx input fields and format. New domain have been settled for MEGAPOLI purpose in 10km resolution including all the European “megacities” regions, i.e. London metropolitan area, Paris region, industrialized Ruhr area, Po valley etc. TNO emissions are adopted for this sensitivity study in 10km resolution for comparison of the results with the simulation based on merged TNO emissions, i.e. basically original EMEP emissions at 50 km grid. Results for year 2005 are presented and discussed to reveal whether the concept of effective emission indices could help to parameterize the urban plume effects in lower resolution models. The effect of interactive coupling is analysed to study the potential of possible impact of urban air-pollution chemistry to the urban area climate. Scenarios runs are compared for 2020, 2030 and 2050 years with respective emission changes. Sensitivity to urban emission impact is tested in all the simulations to discuss the effect of urban environment on regional scale.