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High resolution European emission grids for anthropogenic sources for the years 2003-2007

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To develop atmospheric services such as forecasting atmospheric composition a combination of meteorological models, atmospheric chemical transport models, satellite observational data and emission grids are needed. The latter are input for the predictive models and need to be as accurate as possible both in time and space. To support the new EU FP7 MACC (Monitoring Atmospheric Composition and Climate) we developed high resolution (1/8 degree x 1/16 degree lon-lat or $\sim$ 7 x7 km) emission grids for UNECE-Europe for the years 2003-2007. These years are the focus of a reanalysis exercise within MACC. Reanalysis datasets are produced with data assimilation and modelling systems applied to the best available observational datasets. Such reanalysed fields of climate and atmospheric composition can be used in other studies (e.g. IPCC) to make more accurate assessments. For the MACC reanalysis years we use a combination of official reported emission data as available from EMEP, the IIASA GAINS model and expert estimates resulting in a consistent emission data set by country by source category for these years. From 2003-2007 emissions of air pollutants decreased by about 5%, although the reduction of NH3 emission was less (2.3%) and SO2 reduction was more (13%). However, more remarkable than the overall changes are the regional differences as well as source sector differences. For example, NOx emissions changed by -12% in the EU15+NOR+CHE, -8% in the EU12 and + 6 % in the non-EU countries. The emissions are distributed using our newly developed year 2005 emission database which is partly developed in EU FP7 MEGAPOLI. This database distinguishes itself from previous emission databases by a much improved spatial allocation of emissions. To this end we checked and updated our point source database by adding new point sources and removing obsolete entries for power plants, refineries and industrial installations. For diffuse sources like transport, residential combustion and agriculture so-called proxy maps are made that spatially distribute the emissions from a particular source. In this paper we will present the emission grids and discuss the difference of this emission database with previous products and show the impact of the higher resolution and better allocation for model-predicted concentrations. To further improve the predictive capability of the models a speciated PM grid will be prepared that splits PM emissions into EC, OC, Sulfates and mineral components, partly based on the work done in EU FP6 EUCAARI. Since the Models will need biogenic emissions and anthropogenic sources a check is made on the possibility of double counting sources such as agricultural waste burning.