Anthropogenic Emissions and Air Quality: Assessing the effect of the Standard Nomenclature for Air Pollution (SNAP) categories over Europe

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Air quality has been, for many years, a focus of attention because of its harmful effects on human health and the environment. Assessing the effect of different emission sources on gaseous and particle concentrations is very important for more effective adaptation and implementation guidelines in air quality planning. Within the recent decades actions have been taken to regulate emissions. For example, filters and catalysts have been installed in power plants and vehicles to reduce the amount of pollution emitted. The objective of this study is to estimate the contribution of different anthropogenic emission sources on ozone and $PM_{2.5}$ concentrations over Europe since anthropogenic activities (and the related emissions) are the reason of air quality degradation. Gridded yearly averaged anthropogenic emissions for the year 2006 over Europe are provided by TNO at a 0.1×0.1 degree resolution. Emission sources have been classified into different activities according to the Standard Nomenclature for Air Pollution (SNAP). The available data include annual total emissions of CH_4, CO, NH_3, NMVOC, NOx, PM_{10}, $PM_{2.5}$, and SO_2 for both area and point sources in ten (10) SNAP categories: power generation, residential-commercial and other combustion, industrial combustion, industrial processes, extraction distribution of fossil fuels, solvent use, road transport, other mobile sources, waste treatment and disposal, agriculture. Mobile sources and road transport are the major sources of NOx emissions followed by power generation units. Power generation is also the major source for SO_2 emissions followed by mobile sources. Agricultural activities dominate NH_3 emissions while combustion sources followed by mobile sources and road transport are the main sources for primary $PM_{2.5}$. Emissions are processed by the Sparse Matrix Operator Kernel Emissions (SMOKE) v2.6 modeling system to convert their resolution to the resolution needed by the air quality model

The Community Multiscale Air Quality (CMAQ) v4.7 Modeling System with the Carbon Bond mechanism (CB05) is used for the regional air quality modeling over Europe at 35km grid spacing. Results quantify the contribution of each SNAP category on ozone and $PM_{2.5}$ concentrations, locally, across Europe.