



Impact of road traffic emissions on tropospheric ozone in Europe for present day and future scenarios

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Road traffic is an important anthropogenic source of NO_x , CO and non-methane hydrocarbons (NMHCs) which act as precursors for the formation of tropospheric ozone. The formation of ozone is highly non-linear. This means that the contribution of the road traffic sector cannot directly be derived from the amount of emitted species, because they are also determined by local emissions of other anthropogenic and natural sources. In addition, long range transport of precursors and ozone can play an important role in determining the local ozone budget.

For a complete assessment of the impact of road traffic emissions it is therefore important to resolve both, local emissions and long range transport. This can be achieved by the use of the newly developed MECO(n) model system, which on-line couples the global chemistry-climate-model EMAC with the regional chemistry-climate-model COSMO-CLM/MESSy. Both models use the same chemical speciation. This allows a highly consistent model chain from the global to the local scale. To quantify the contribution of the road traffic emissions to tropospheric ozone we use an accounting system of the relevant reaction pathways of the different species from different sources (called tagging method). This tagging scheme is implemented consistently on all scales, allowing a direct comparison of the contributions.

With this model configuration we investigate the impact of road traffic emissions to the tropospheric ozone budget in Europe. For the year 2008 we compare different emission scenarios and investigate the influence of both model and emission resolution. In addition, results of a mitigation scenario for the year 2030 are presented. They indicate that the contribution of the road traffic sector can be reduced by local reductions of emissions during summer. During winter the importance of long range transport increases. This can lead to increased contributions of the road traffic sector (e.g. by increased emissions in the US) even if local emissions are reduced.