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The Effect of VOC Speciation on Ozone and Carbon Monoxide Concentrations

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An update of the VOC speciation for use in models is needed, however, such an update is no small task. In order to understand the possible impact that an updated speciation might have on ozone formation and carbon monoxide concentrations an initial study focused on the VOC speciation within the solvent sector was carried out. NMVOC emissions from the solvent sector are typically among the largest contributions to total anthropogenic NMVOC emissions, along with the transport sector. In a number of cases disagreements have been found where attribution in emission inventories cite the largest sectoral contribution to solvents, while measurements indicate that the traffic sector remains the largest source of anthropogenic NMVOC emissions in urban areas. Regardless, solvent sector emissions remain substantial. And while some updates to the speciation of NMVOCs in the transport sector have been made, this has not been the case for solvents.

A variety of solvent sector profiles from the literature show significant differences in their speciation. These profiles were used to conduct an initial (box) modeling study to determine the influence of NMVOC solvent sector speciation on resulting ozone formation and carbon monoxide concentrations. The evolution of NMVOC speciation within the solvent sector over time was considered for countries where data was available, the UK and Greece. The scope of the effect of a change in speciation was also considered within the context of the general anthropogenic NMVOC speciation that included all anthropogenic sectors, and the relative contribution of the solvent sector to total NMVOC emissions.

These results will inform further work that aims to provide an updated VOC speciation for use in models. Such improvements could provide a more robust understanding and prediction capacity for air quality and ozone in particular, specifically for the quantification of ozone pollution over Europe. Given limited data, this research aims to provide guidelines for the most relevant improvements needed to optimize research efforts.