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Aromatic VOCs global influence in the ozone production

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Aromatic hydrocarbons are a subgroup of Volatile Organic Compounds (VOCs) of special interest in the atmosphere of urban and semi-urban areas. Aromatics form a high fraction of VOCs, are highly reactive and upon oxidation they are an important source of ozone. These group of VOCs are released to the atmosphere by processes related to biomass burning and fossil fuel consumption, while they are removed from the atmosphere primarily by OH reaction and by dry deposition. In addition, a branch of aromatics (*ortho*-nitrophenols) produce HONO upon photolysis, which is responsible of certain amount of the OH recycling. Despite their importance in the atmosphere in anthropogenic polluted areas, the influence of aromatics in the ozone production remains largely unknown. This is of particular relevance, being ozone a pollutant with severe side effects on air quality, health and climate.

In this work the atmospheric impacts at global scale of the most emitted aromatic VOCs in the gas phase (benzene, toluene, xylenes, ethylbenzene, styrene, phenol, benzaldehyde and trimethylbenzenes) are analysed and assessed. Specifically, the impact on ozone due to aromatic oxidation is estimated, as this is of great interest in large urban areas and can be helpful for developing air pollution control strategies. Further targets are the quantification of the NO_x loss and the OH recycling due to aromatic oxidation. In order to investigate these processes, two simulations were performed with the numerical chemistry and climate simulation ECHAM/MESSy Atmospheric Chemistry (EMAC) model. The simulations compare two cases, one with ozone concentrations when aromatics are present or the second one when they are missing. Finally, model simulated ozone is compared against a global set of observations in order to better constrain the model accuracy.