



Atmospheric Chemistry
Observations & Modeling

ACOM Seminar

Investigating Ozone Formation in a Changing Urban Environment

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Link: <https://sundog.ucar.edu/public/page/ACOM>

ABSTRACT

Field studies focusing on the investigation of the net ozone production using measured concentrations of organic peroxy radicals (HO_2 and RO_2) showed large differences between what was calculated from the measured radicals and what was obtained from chemical models, particularly for nitrogen oxide (NO) mixing ratios above 1 ppbv. One reason for the observed discrepancies is the large underestimation of RO_2 radical concentrations by models at high NO levels in urban environments. Among the several hypotheses put forward to explain such differences, the lack of the correct alkoxy chemistry in the chemical mechanisms used was pointed out as a possible explanation.

To investigate this chemistry, we studied the photooxidation of five anthropogenic volatile organic compounds (VOCs) at different NO levels in the atmospheric simulation chamber SAPHIR, Forschungszentrum Jülich. The selected species are representative of VOCs that are abundant in urban areas, as well as of the different chemistry of the alkoxy (RO) radicals originated after the reaction of the primarily formed RO_2 radical with NO. The measured concentrations are compared with the results of zero-dimensional box model calculations using the Master Chemical Mechanisms. Finally, model calculations of the number of odd oxygen ($\text{Ox} = \text{O}_3 + \text{NO}_2$) molecules formed are compared with both measured radical concentrations or measured Ox concentrations.

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