Geophysical Research Abstracts
Vol. 15, EGU2013-2731, 2013
EGU General Assembly 2013

Investigation of MACR oxidation by OH in the atmosphere simulation chamber SAPHIR at low NO concentrations.

Hendrik Fuchs (1), Ismail-Hakki Acir (1), Birger Bohn (1), Theo Brauers (1), Hans-Peter Dorn (1), Rolf Häseler (1), Andreas Hofzumahaus (1), Frank Holland (1), Xin Li (1), Keding Lu (1), Anna Lutz (2), Martin Kaminski (1), Sascha Nehr (1), Franz Rohrer (1), Ralf Tillmann (1), Robert Wegener (1), and Andreas Wahner (1)

(1) Forschungszentrum Jülich, Institute of Energy and Climate Research: Troposphere (IEK-8), Jülich, Germany (h.fuchs@fz-juelich.de), (2) Department of Chemistry and Molecular Biology, University of Gothenburg, Göteborg, Sweden

During recent field campaigns, hydroxyl radical (OH) concentrations were up to a factor of ten larger than predicted by current chemical models for conditions of high OH reactivity and low nitrogen monoxide (NO) concentrations. These discrepancies were observed in forests, where isoprene oxidation turnover rates were large. Methacrolein (MACR) is one of the major first generation products of isoprene oxidation, so that MACR was also an important reactant for OH. Here, we present a detailed investigation of the MACR oxidation mechanism including a full set of accurate and precise radical measurements in the atmosphere simulation chamber SAPHIR in Juelich, Germany. The conditions during the chamber experiments were comparable to those during field campaigns with respect to radical and trace gas concentrations. In particular, OH reactivity was as high as 15 per second and NO mixing ratios were as low as 200pptv. Results of the experiments were compared to model predictions using the Master Chemical Mechanism, in order to identify so far unknown reaction pathways, which potentially recycle OH radicals without reactions with NO.