Geophysical Research Abstracts, Vol. 8, 07799, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07799

Simulation chamber studies of the reaction of ozone with C6 biogenic VOCs

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Biogenic volatile organic compounds (BVOCs) account for 90% of hydrocarbon emissions into the Earth's atmosphere. In recent years an increasing number of oxygenated BVOCs have been detected in field measurements and plant emission studies. In particular a range of C_6 oxygenates have been identified including compounds such as cis-3-hexenyl acetate, cis-3-hexen-1-ol and cis-3-hexenal. The atmospheric fate of these oxygenated BVOCs is dominated by gas-phase reactions with three species in the troposphere: hydroxyl radical (OH), nitrate radical (NO_3) and ozone (O_3). Such reactions produce oxidized hydrocarbons, ozone and secondary organic aerosol (SOA) and as a result may affect the chemical composition of the gas and aerosol-phase in the troposphere.

The overall aim of this work is to investigate the reaction of ozone with the C_6 family of BVOCs under atmospheric conditions. Experiments on the O_3 initiated oxidation of cis-3-hexenyl acetate, cis-3-hexen-1-ol have been performed in a 3910 L atmospheric simulation chamber in our laboratory. The chamber is equipped with gas chromatography, GC-MS, and *in situ* FTIR spectroscopy for chemical analysis and a scanning mobility particle sizer for aerosol measurements. Gas-phase oxidation products have been identified and used to construct chemical mechanisms for the reactions. The SOA

formation from these reactions has also been investigated for the first time and shows a clear dependence on the relative humidity within the chamber. Preliminary work on chemical analysis of the SOA has been performed using PFBHA derivatization of carbonyl compounds combined with GC-MS analysis. The data obtained in this work will be used to further our knowledge of the atmospheric degradation of these naturally occurring compounds.