



Insights into aerosol formation chemistry from comprehensive gas-phase precursor measurement in the ACES chamber experiments

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Chemical Ionisation Reaction Time-of-Flight Mass Spectrometry (CIR-TOF-MS) was employed to observe, in real-time, the gas phase photooxidative evolution of eight different biogenic volatile organic compounds (BVOCs) believed to constitute precursors to secondary organic aerosol (SOA). As well as being used to monitor BVOC SOA precursor evolution, CIR-TOF-MS was also employed to monitor the formation of the multitudinous volatile and semi-volatile oxidation products formed. In total 27 different chamber style experiments were conducted at 'high' (ca. 250 ppbV) and 'low' (ca. 50 ppbV) initial concentrations as part of the ACES (Aerosol Coupling in the Earth System) project at the University of Manchester aerosol chamber facility along with 11 mesocosm experiments.

The work presented will focus upon the observations made of the limonene oxidation system. A number of limonene oxidation products were detected including primary aldehyde and acid species (e.g. MCM designation LIMAL). Experiments seeded with ammonium sulphate exhibited a similar distribution of gas phase species, implying that any differences in aerosol formation/composition are not a result of the gas phase chemistry of the system. A total of up to 40 ions were detected under high concentration levels compared to 20 ions during low concentration experiments.

During the mesocosm experiment, tropical Fig tree species were observed to emit large amounts of isoprene, with little monoterpene emission, whereas a reverse trend was observed from European birch species, signifying possible suppression of aerosol formation in the presence of high levels of isoprene.