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Organosulfate formation during the reactive uptake of monoterpene oxides on acidic seed particle

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It is well recognized that secondary organic aerosol (SOA) plays an important role in the climate and regional air quality. Monoterpenes react rapidly with atmospheric oxidants (O_3, OH and NO_3 radicals) in the gas-phase to form low volatile compounds that condense onto the pre-existing particles. Very recently, laboratory studies have demonstrated occurrence of organosulfates in SOA from the oxidation of monoterpenes and isoprene, and the reactive uptake of pinonaldehyde and glyoxal in the presence of acidic sulphate aerosol (either from seed aerosol or SO_2 photooxidation). Field evidence for the existence of organosulfates and nitrooxy-organosulfates originating from isoprene, α- and β-pinenes in ambient SOA are presented from field campaigns conducted in various parts of the world. These studies demonstrated that the organosulfates may contribute substantially to ambient SOA.

In the present study, the reactive uptake of monoterpene oxide on acidic sulfate aerosol was performed in a series of aerosol chamber experiments. Off-line analysis was performed using HPLC/ESI-TOFMS (electrospray ionization time-of-flight mass spectrometry). Organosulfates which were tentatively quantified in our previous study are quantified using a reference compound. In addition, evidence is provided for the isomerisation of monoterpene oxides over acidic sulphate aerosol.