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SOA formation from stress induced BVOC emissions

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Formation of secondary organic aerosols (SOA) from biogenic volatile organic compounds (BVOC) was investigated in laboratory experiments. BVOC mixtures as emitted from boreal tree species were used as SOA precursors. The mixtures were fed into a reaction chamber where SOA formation was induced by ozone photolysis and subsequent OH formation. Plots of the maximum particle volume versus the carbon fed to the reaction chamber led to linear relationships.

During stress situations for the plants the amount of emitted biogenic BVOC as well as the emission patterns changed. In cases when the emissions of mono- and sesquiterpenes were dominant no deviation from the linear behaviour was found even after stress application. From this we conclude that the potential of mono- and sesquiterpenes for particle growth is similar. Only the number of carbon atoms in the emitted BVOC has to be considered. In particular when the contribution of wound volatiles (LOX products) to the BVOC mixture was quite large, the maximum observed particle volume was lower than predicted by the linear behaviour. From this we conclude that the potential of LOX products to grow SOA is lower than that of mono- and sesquiterpenes. During plant louse attack on spruce, several volatiles containing 17 carbon atoms were observed. For the BVOC mixtures including the C_{17} compounds the efficiency to grow particles was much higher than for the mixture containing only

mono- and sesquiterpenes.