



Biogenic primary plant emissions influence on secondary organic aerosol formation: A comparison study between a boreal forest (Hyytiala-Finland) and a Central European rural area (Melpitz-Germany)

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Without a distinct designation of a source mechanism, atmospheric reactions of natural volatile organic compounds (VOCs), with OH and NO₃ radicals and ozone, are the major formation pathway of organic ultrafine particles. The direct chemical coupling between specific organic compounds and aerosol formation has been recently documented. Aerosol yields from these reactions depend on the composition of the hydrocarbons and the conditions under, which photo-oxidation occurs. We will present the investigation on the implication of gaseous and particulate organic compounds, measured in-situ over a Finnish boreal forest (Hyytiala) and a rural area in Germany (Melpitz) by using sophisticated sampling and analytical techniques, on secondary organic aerosol formation. A series of monoterpene-skeleton photo-oxidation carbonyl and acidic compounds were detected and quantified conjointly with high molecular weight n-alkan-1-ols, n-alkanoic, n-alkenoic and α,ω -dicarboxylic acids in both gas and particles over the two areas. In particular, limonaldehyde, nopinone and pinonaldehyde, nor-pinonic acid pinonic acid and pinic acids were identified on the basis of their CI and EI mass spectra and comparison with authentic standards. Pinonic, nor pinonic and pinic acids, particle concentrations were higher than the corresponding concentrations in the gas phase, while pinonaldehyde and nopinone have shown higher gas phase than particle concentrations in both areas. An observable temperature effect might have enhanced the growth of new particles by condensation of organic compounds of high-to-moderate volatility such as the secondary aerosol components.

Acetic and formic acid concentrations were also determined in the vapor phase in

both Hyytiala and Melpitz. In Hyytiala the concentration of acids were higher than in Melpitz. In Melpitz the concentration of formic acid was always lower than this of acetic acid indicating an anthropogenic emission (biomass burning is not excluded). Conversely, in Hyytiala the levels of formic acid were mostly higher than these of acetic acid denoting rather a biogenic emission.