

Tropospheric Aqueous Phase Chemical Conversions: Field, Lab and Modelling Studies

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Tropospheric particles, i.e. solid and aqueous aerosols and the aqueous droplets of clouds, fog and rain constitute the physical matrix for a variety of aqueous phase and heterogeneous reactions. Such reactions lead to both a changed composition of the gas phase as well as to modified particle composition. Current knowledge on aerosol composition is presented and principles of laboratory experiments are described. Laboratory results are applied to develop chemical mechanism modules which are applied in multiphase models, which, in turn, are used to interpret recent ground-based cloud experiments.

The tropospheric multiphase environment may foster chemical conversions of initially emitted compounds of low toxicity into more harmful compounds which after their in-situ formation will be removed from the atmosphere by rainout, particle adsorption and sedimentation or dry deposition. Such a process chain will be outlined for the example of the formation of nitrophenols following emissions of NO_x and aromatic hydrocarbons.