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Hygroscopic growth of secondary organic aerosol at high relative humidities and a sensitivity analysis to Köhler-theory parameters

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Secondary organic aerosol (SOA) is often a major constituent of the atmospheric aerosol. Therefore knowledge of SOA properties with respect to hygroscopic growth and activation are crucial parameters to understand their role in cloud formation processes. With this focus laboratory experiments on SOA from a biogenic precursor (α -pinene) were conducted at the PSI reaction chamber. The particles cloud forming potential was investigated with respect to varying precursor concentrations in a range between 10ppb and 240ppb.

The measurements at high relative humidities (97% to 99.3% RH) were performed applying the mobile version of LACIS (Leipzig Aerosol Cloud Interaction Simulator), LACIS-field. The gained data were used to derive hygroscopicity parameters (e.g. κ, ρ_{ion}), which are often used in Köhler-theory parameterizations, for the SOA particles. These parameterizations do not describe the observed behavior sufficiently in the high relative humidity range (RH > 95 %). This might be due to the one parameter approach not being sufficient describing occurring effects such as e.g. non-ideality of the solution or surface tension, which seem to become more important in this humidity range. A sensitivity analysis concerning this hypothesis will be presented.