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The effects of organic compounds on the hygroscopic properties of inorganic aerosols

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The hygroscopicity of the aerosols plays a major role for the direct and indirect effect on the climate. It is known that aerosols are often a mixture of inorganic and organic matter. A significant fraction of the organic matter is water soluble (WSOC) and affects light scattering, water uptake and phase transitions of multicomponent aerosols. Additionally, organic matter can act as a surfactant around an inorganic particle, affecting the evaporation-condensation time scale. This research project benefits from the combined measurements performed by two different instrumentations: the electrodynamic trap at IACETH, Zürich (CH), and a Tandem Differential Mobility Analizer (TDMA) at the Paul Scherrer Institute (CH). The Electrodynamic Trap consists of a chamber in which a levitated particle can experience all the atmospherically relevant conditions of temperature, pressure, and humidity. All these parameters can be continuously varied so that the hygroscopic curve of the aerosol particle can be measured. Additional tools help to better characterize the aerosol particle: 90 degrees angular scattering of lasers (for radius measurements) and intensity fluctuation of the scattered light with time (for phase changes detection). In this poster the results obtained through the Electrodynamic Balance technique will be shown and compared with the TDMA. In particular, bicomponent ammonium sulphate with glutaric and adipic acid bicomponent particles are studied, with different mixing ratios. Particular emphasis is put on assessing the water uptake and the phase changes of the particles.