Transformations and aging of sea spray aerosol: Water uptake and heterogeneous chemistry of model and authentic sea spray particles

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In this study we have investigated water uptake and heterogeneous chemistry of model and authentic sea spray aerosol particles. Results of multi-component model systems (mixed inorganic and mixed organic/inorganic) show size dependent water uptake of model systems when comparing small (100 nm) versus large (micrometers) sized particles. AFM phase imaging, Raman spectral maps and SEM/EDX analysis of encapsulated particles show that these differences are attributed to size dependent mixing states, i.e. whether particles are homogeneously mixed or phase separated. These data are used to better understand and analyze the water uptake of authentic sea spray aerosol particles generated in a unique ocean-atmosphere wave channel. Similarly, heterogeneous chemistry of model systems including pure sodium chloride, lipopolysaccharides and long chain carboxylic acids are used to better understand the range of reactivities of nitric acid recently reported for sea spay aerosol particles generated in the wave channel. These studies provide important insights into the transport, transformations and aging of sea spray aerosol particles as they are transported in the atmosphere.