



On the Evolution of Organic Aerosol Water-Uptake Properties in an Aging Plume in the Marine Atmosphere

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During the Eastern Pacific Emitted Aerosol Cloud Experiment (E-PEACE 2011), a plume of organic aerosol was produced and released into the marine atmosphere. The water uptake properties (CCN concentrations and hygroscopic growth factor) and the chemical composition of the aging plume were studied. Fresh plume particles were hydrophobic. With increasing plume age, hygroscopic growth factors and CCN concentrations increased, together with increasing O:C ratios. Differences in plume particle development between sunny and foggy conditions were examined: In sunny conditions, new SOA particles were produced in large quantities (several 10,000 cm⁻³), likely from VOCs evaporated from larger primary plume particles, and lead to substantially increased CCN concentrations after aging. In foggy conditions, VOCs from the plume likely diffused to fog droplets, and thus did not lead to new particle formation and provided only moderate amounts of new CCN. This study shows that meteorological conditions have a profound impact on size, mixing state and CCN yield of the aging organic aerosol.