

Dry and wet deposition of gas-phase organics mediates SOA removal

A. HODZIC¹, S. MADRONICH¹, C. KNOTE¹,
P. KASIBHATLA², J. LEE-TAYLOR¹ AND B. AUMONT³

¹NCAR, USA

²Duke Univ., USA

³CNRS, France

The water solubility of condensable organic vapors is largely unexplored, and its effect on the atmospheric lifetime of secondary organic aerosols (SOA) is yet to be quantified. We apply the Generator of Explicit Chemistry and Kinetics of Organics in the Atmosphere (GECKO-A) to calculate Henry's law constants for oxidation products from major SOA precursors, and derive a simplified parameterization for use in 3D models. Results show a strong negative correlation between Henry's law constants and saturation vapor pressures, and indicate that chemically processed organic compounds are typically highly soluble.

Model simulations over the USA in summer, suggest that dry and wet deposition of condensable organic vapors leads to major reductions in SOA, decreasing surface concentrations by ~60% for biogenic and ~45% for short-chain anthropogenic precursors, for the volatility conditions considered. Losses via dry and wet removal of gases dominate over direct particle removal, dry or wet. Implications on SOA global budget and lifetime are also presented.