Carboxylic aerosols affect climate by direct (e.g. absorption/scattering) and indirect (e.g. CCN/N formation) processes. Our current work involves the application of new laboratory techniques for generating particles as complex surrogates of ambient carbonaceous aerosols: secondary organic aerosol (SOA), oxidized primary organic aerosol (OPA), and soot particles. A Pulsed Aerosol Mass (PAM) flow reactor simulates <10 days of equivalent atmospheric processing (Lamb et al., 2011). Instrumentation is used to characterize particle chemical, physical, and optical properties over a range of oxidant exposures that is unavailable by smog chamber techniques and that match ambient observations. Our goals are to identify correlations between associated chemical, physical, and optical properties that may help explain field measurements and enable more accurate climate modeling.

### Phase, CCN, and IN of SOA and OPA

<table>
<thead>
<tr>
<th>Particle Generation</th>
<th>Particle Processing</th>
<th>Particle Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### SOA Chemistry

**Photochemical Aging (days) at [OH] = 1.9x10^6 molec cm⁻³**

![Fig 2. SOA yields of carbon and oxygen generated from oxidation of \(n\)-C₆H₁₃ and \(p\)-C₆H₄ as a function of OH exposure in the PAM reactor (Lamb et al., 2012).](image)

#### SOA Aging

![Fig 3 (top). Van Krevelen diagram of laboratory SOA. Fig. 4 (bottom). Correlation of laboratory SOA with ambient HOA, SV-OOA, LV-OOA factors (Lambe et al., 2011, 2012).](image)

### Black Carbon Aging and Optics

![Fig 9. CCN curves of soot particles (a) heterogeneously oxidized by OH radicals in the PAM reactor and (b) oxidized and coated with SOA.](image)

### Ambient SP-AMS Measurements

![Fig 11. Chemistry-resolved mass distributions of track carbon particles measured by the SP-AMS during CalNEX 2010 for different outflow events from the LA Basin, showing increased NR-PM, O/C, and internal mixing with photochemical aging.](image)