Several SOA growth experiments with α-pine, β-pine, and toluene based precursors were performed with initial conditions and yields.

**SOA Growth Summary**

<table>
<thead>
<tr>
<th>Date</th>
<th>α-pine SOA</th>
<th>β-pine SOA</th>
<th>Toluene SOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Aug-09</td>
<td>14-Aug-09</td>
<td>11-Aug-09</td>
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<tr>
<td>9-Oct-09</td>
<td>14-Oct-09</td>
<td>13-Oct-09</td>
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</tr>
<tr>
<td>9/21/09</td>
<td>9/23/09</td>
<td>9/25/09</td>
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<tr>
<td>21-Sep-09</td>
<td>23-Sep-09</td>
<td>25-Sep-09</td>
<td></td>
</tr>
</tbody>
</table>

The particle concentration is very low until about 13:00 local time when the particles grow due to homogeneous nucleation of the aerosols. The polar nephelometer records the scattering intensities every 30 minutes. Also shown is the time evolution of the particle scattering coefficient measured by the integrating nephelometer.

Δref is a measure of the difference between the measurement (PDFmeas) and the lognormal assumption (PDFref(x,μ,σ)) given by:

\[ Δ_{ref} = \int (PDF_{meas})(x) - (PDF_{ref})(x,μ,σ) dx \]

and the distributions are normalized via:

\[ PDF_{meas}(x) = \int PDF_{ref}(x,μ,σ) dx = 1 \]

The GA determined m from PN measurements of these aerosols are within ±0.014 of the expected values despite Δref values up to 0.4. However, the GA required the size distribution search space to be increased to ±0.15, which is much higher than the SIMPS error of 10%. [9] This because the scattering is dependent on the actual particle size distribution which is not sufficiently described by the lognormal assumption.

### Refractive indices

The GA determined m for aerosols produced from the α-pine experiment of October 21, shown here as a 5% function of local time. The m increases rapidly from about 1.4 to a maximum value of 1.52 and then settles at about 1.48.

### Discussion

- The real refractive index of SOA particles changes as the particles grow, and also as it ages. The final m for the pine derived SOA is about 1.47 to 1.49, which are quite different for the final value of about 1.55 to 1.6 retrieved for the toluene based SOA.
- Toluene based m also drops during its initial growth and then increases, while the α-pine SOA m increases initially and then drops.
- Further study is underway to examine SOA particles of different precursors and developed under different conditions. We also plan to investigate the SOA m with another PN with a laser wavelength of 980 nm and also a higher powered laser allowing instrument sensitivity in ambient conditions.

### References