Supporting Information for

**Isoprene Suppression of New Particle Formation: Potential Mechanism and Implications**

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Introduction

Calculations of condensation and coagulation sinks

The measured particle size distributions were used to calculate condensation sink (CS) and coagulation sink (CoagS). CS was calculated based on [Dal Maso et al., 2002; Kulmala et al., 2001]:

\[
CS = 2\pi D \int_0^\infty \beta_m d_p N(d) dd = i \sum \beta_m d_p N_i
\]

(1)

where \(D\) is the diffusion coefficient, \(d_p\) the particle diameter, \(N\) the concentration of particles with diameter \(d_p\), \(i\) the measurement size bin with mean diameter \(d_{pi}\), and concentration \(N_i\). Parameter \(\beta_m\) is the transitional correction factor:

\[
\beta_m = \frac{1+Kn}{1+0.337Kn+ \frac{4 Kn}{\frac{3}{\alpha}} + \frac{4 Kn^2}{\frac{3}{\alpha}}},
\]

(2)

where \(Kn = \frac{2\lambda}{d_p}\) is the Knudsen number, with \(\lambda\) as the mean free path in air. Sticking coefficient \(\alpha\) is taken as 1.

Coagulation is considered here as the process of small (sub-10 nm) particles coagulating with larger “background” aerosol particles. Coagulation sink was determined from [Kulmala et al., 2001]:

\[
CoagS = \sum_j K_{ij} N_j,
\]

(3)

where \(N_j\) is the particle concentration of the “background” aerosol in measured size bin \(j\), \(K_{ij}\) the coagulation coefficient for particle with diameter \(d_i\) and “background” aerosol particle with diameter \(d_j\). \(K_{ij}\) is calculated as [Tammet and Kulmala, 2005]:

\[
K_{ij} = \frac{2\pi kT (B_i + B_j) (d_i + d_j + 2h)}{1+\gamma - \frac{0.299\gamma}{\gamma} \frac{1-\alpha}{\alpha}},
\]

(4)

\[
\gamma = 2 \frac{B_i + B_j}{d_i + d_j + 2h} \sqrt{\frac{2\pi kT m_i m_j}{m_i + m_j}}.
\]

(5)

\(B_i, B_j\) and \(m_i, m_j\) are mechanical mobilities given by the Millikan formula and masses of particles with diameters \(d_i, d_j\), accordingly. Correction factor \(h = 0.115\) nm was ignored due to the much higher uncertainty in particle diameter measurements.
Fig. S1. Monthly mean (July 2013) nucleation rates and particles larger than 10 nm (CN10) in the boundary layer. The current organic nucleation scheme (Eq. 1) is used here.
Fig. S2. The same as Fig. S1, except that NPF is shut off completely in the entire Southeastern U.S. (dark blue square in Fig. S2a) from the surface to the altitude of 1 km, to mimic the absence of NPF where $R > 1$. This case is referred to as Nucl-Org-test.
Fig. S3. Monthly mean (July 2013) CCN0.4 in the boundary layer (a) with the current organic nucleation scheme (Equation 1) (Fig. S1), and (b) when NPF is shut off in the Southeastern U.S. (Fig. S2).
Fig. S4. The measured aerosol size distributions with LDMA (upper panel) and NDMA (lower) on June 25, 2013 in the Alabama forest. This shows that the absence of 3-8 nm particles was not due to possible instrument artifacts.