Supplementary Material

"Isoprene suppression of new particle formation in a mixed deciduous forest" by Kanawade, et al.

Condensation sink calculations

The condensation sink (*CS*), defined as the rate at which condensable vapors condense on existing particles, was calculated based on the following equations (Kulmala et al., 2001;Erupe et al., 2010);

$$CS = 2\pi D \cdot 10^{-7} \int_0^{\infty} d_p \beta_m(d_p) n(d_p) dd_p = 2\pi D \cdot 10^{-7} \sum_i \beta_m d_{p_i} N_i \quad \text{(S1)}$$

$$\beta_m = \frac{1 + Kn}{1 + 0.337Kn + \frac{4Kn}{3\alpha} + \frac{4Kn^2}{3\alpha}} \quad \text{(S2)}$$

$$Kn = \frac{2\lambda}{d_p} \quad \text{(S3)}$$

where d_p is particle diameter (nm), β_m is transition correctional factor (dimensionless) (Fuchs and Sutugin, 1971), *Kn* is the Knudsen number (dimensionless), *D* is diffusion coefficient [*D*=0.104 $cm^2\ s^{-1}$ under our typical RH, (Hanson and Eisele, 2000)], λ_v is the mean free path of the vapor molecules (123 nm), N_i is particle number concentration in size bin *i*, α is the mass accommodation (taken to be unity) and $n(d_p)$ is particle size distribution function. Aerosol sizes measured at UMBS were predominantly smaller than <100 nm and so we used NDMA data (3-109 nm) to calculate *CS*. We found that this *CS* values were only slightly different from those calculated sizes from NDMA and LDMA together (3-800 nm), with a 30% difference at maximum.

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Table S1. Comparison of *R* (ratio of isoprene to MT carbon) calculated from emission flux and concentrations. This table intends to show that *R* values calculated from emission flux and concentrations show the same trend as depicted in Table 1.

Parameters \ Locations		Michigan forest	Amazon forest[b]	Finland forest
Isoprene	emission flux ($mgC\ m^{-2}\ h^{-1}$)	1.32±0.7[a] 3.9±0.8 (Kim et al., 2009)[c] 2.5 (Ortega et al., 2007)	3.4±3.6 (Kuhn et al., 2007) 1.9-8.8 (Greenberg et al., 2004)[c]	0.03 (Spirig et al., 2004)[c]
	concentration (ppbv)	4.4±0.36[a] 4.8 (Kim et al., 2009)	9.0 (Kesselmeier et al., 2002) 2.2-9.8 (Greenberg et al., 2004)	0.05-0.25 (Hakola et al., 2003) 0.1-0.2 (Sellegri et al., 2005)
MT	($mgC\ m^{-2}\ h^{-1}$)	0.05±0.02[a] 0.18±0.07 (Kim et al., 2009)[c] 0.11 (Ortega et al., 2007)	0.36±0.58 (Kuhn et al., 2007) 0.22-0.76 (Greenberg et al., 2004)[c]	0.16 (Spirig et al., 2004)[c]
	(ppbv)	0.35±0.24[a] 0.2 (Kim et al., 2009)	0.6-0.7 (Kesselmeier et al., 2002) 0.27-0.69 (Greenberg et al., 2004)	0.1-0.3 (Hakola et al., 2003) 0.2-0.4 (Sellegri et al., 2005)
R (from emission flux)		26.4±4.5[a] 21.4±16 (Kim et al., 2009) 22.0 (Ortega et al., 2007)	9.4±6.2 (Kuhn et al., 2007) 15.2 (Greenberg et al., 2004)	0.18 (Spirig et al., 2004)
R (from concentration)[d]		6.3±0.8[a] 12.0 (Kim et al., 2009)	7.0 (Kesselmeier et al., 2002) 6.3 (Greenberg et al., 2004)	0.37 (Hakola et al., 2003) 0.25 (Sellegri et al., 2005)

[a]this study.

[b]data from wet season only.

[c]for unit conversion, the ratio of compound to carbon of 1.13 was used.

[d]the ratio calculated from isoprene and MT concentrations (ppbv) was ([Isoprene]×5)/([MT]×10), where 5 and 10 indicate the number of carbon atoms in a isoprene and MT molecule, respectively.

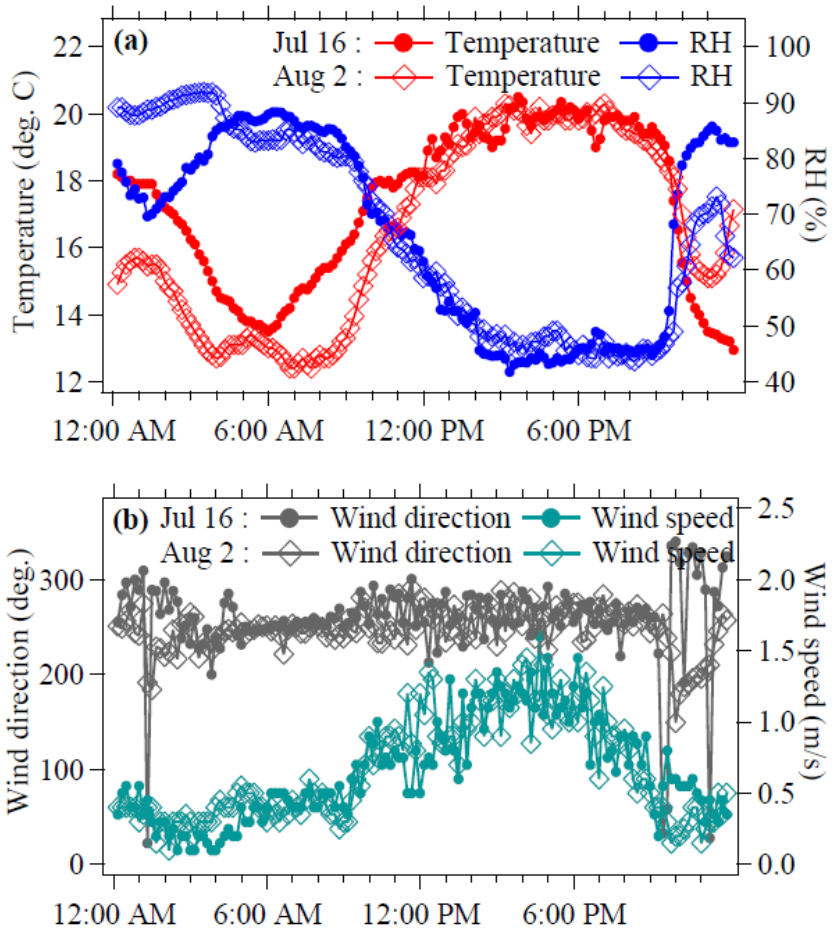

Figure S1. The meaured (a) temperature (red symboled line) and relative humidity (blue symboled ine), and (b) wind direction (grey symboled line) and wind speed (dark cyan symboled line) shown as a function of time on July 16 (solid circles) and August 2 (open diamonds).

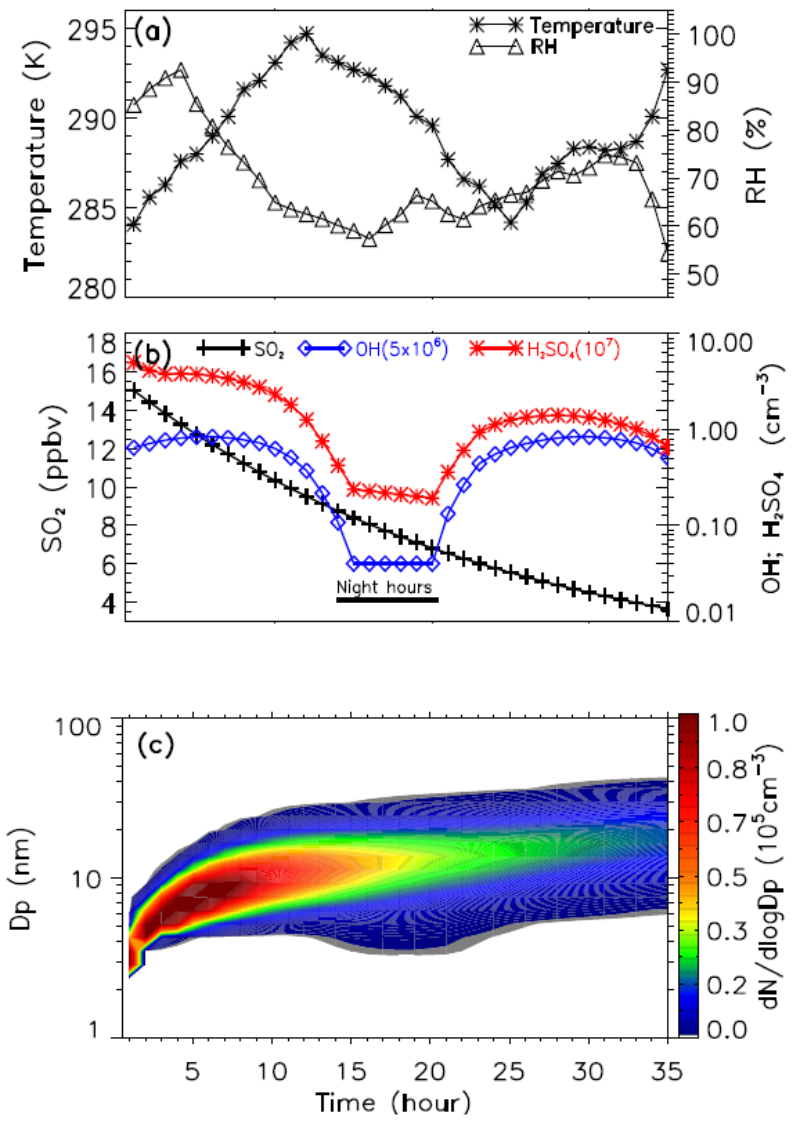

Figure S2. Time evolution of the key atmospheric parameters prescribed or simulated in the IIN box model for July 16 event. (a) Temperature (black asterisks) RH (black open triangles). (b) OH (blue open diamond), SO_2 (black plus signs), and H_2SO_4 (red asterisks). (c) The particle size distributions simulated from the IIN microphysical box model along the backward air trajectory for July 16 event, using prescribed key atmospheric parameters. The nucleation simulations were performed forward, whereas HYSPLIT backward trajectory calculations were backward; thus the time t = 0 corresponds to the time the model simulations start (near the power plant) and t = 35 hours corresponds to the time at the forest measurement site. Time evolution of the key atmospheric parameters prescribed or simulated in the IIN box model for August 2 event were also show similar results.