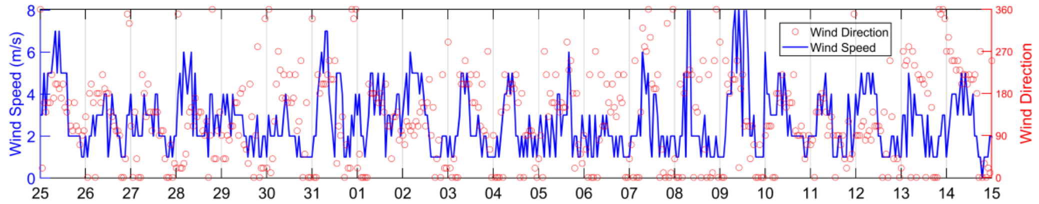

Figure S1. Time series of the wind speed and wind direction from 25 May to 15 June 2017

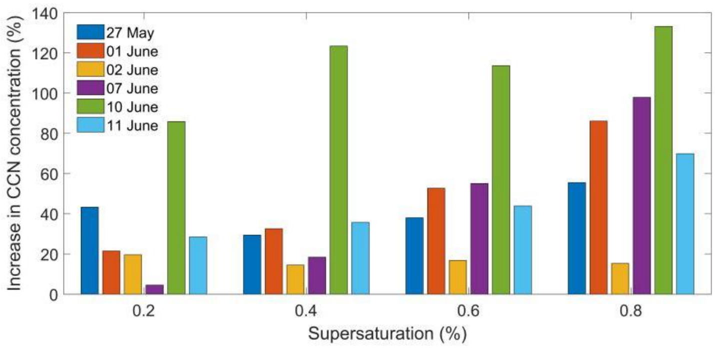

Figure S2. The average enhancement of CCN number concentration in all typical NPF days under different supersaturation

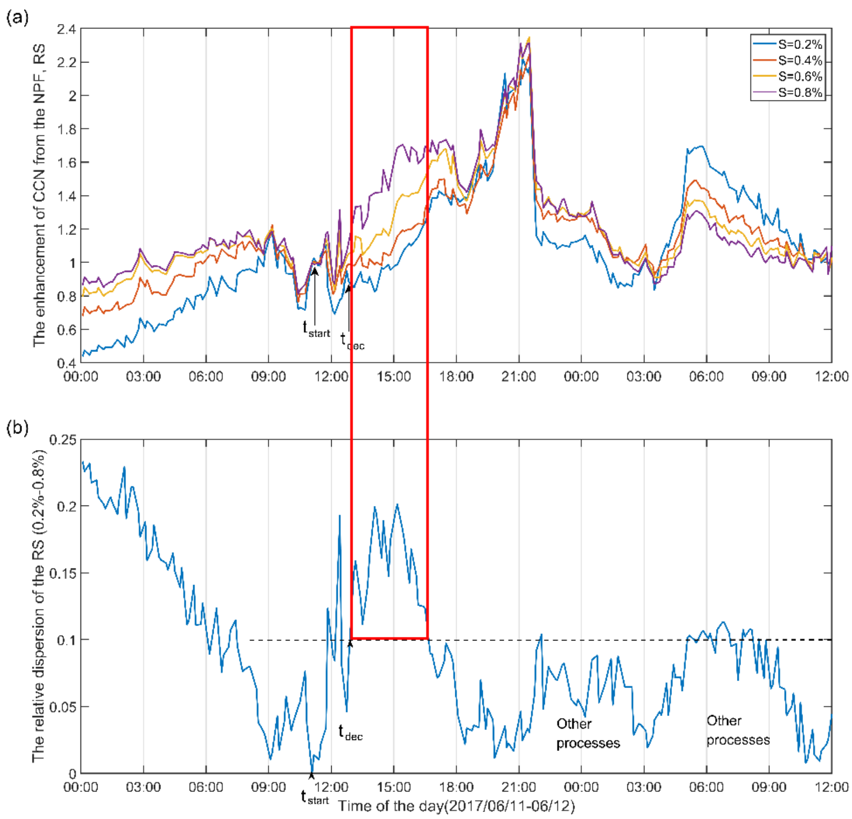

Figure S3. (a) Diurnal evolution of the *RS* (the $RS = N_{CCN}/N_{CCN,tStart}$) for supersaturation 0.2%, 0.4%, 0.6%, 0.8%; (b) Diurnal evolution of the relative dispersion (*RD*) of the *RS* for supersaturation 0.2%, 0.4%, 0.6%, 0.8%; and the red box represent the period when NPF begin impact CCN.

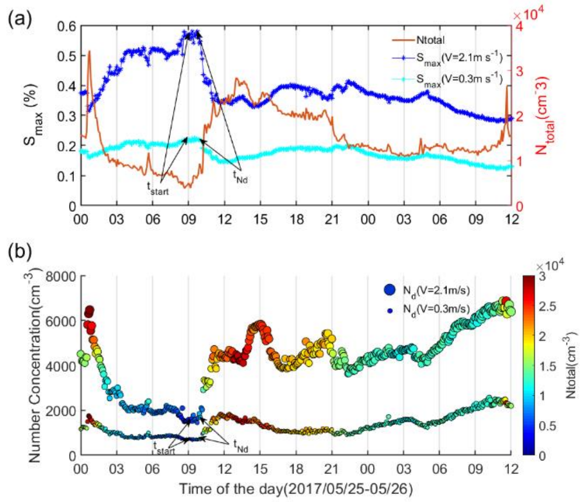

Figure S4. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on May 25-26.

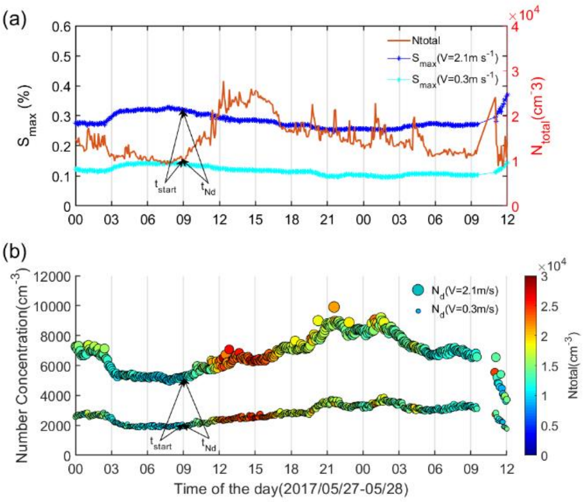

Figure S5. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on May 27-28.

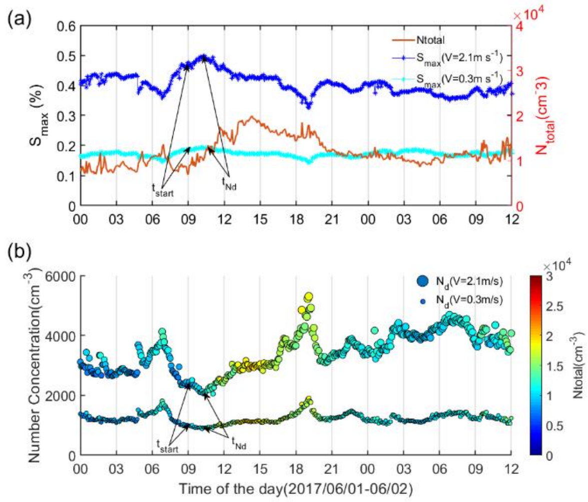

Figure S6. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on June 1-2.

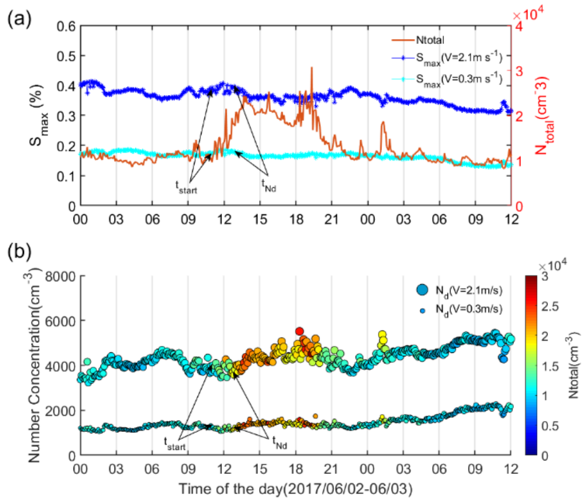

Figure S7. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on June 2-3.

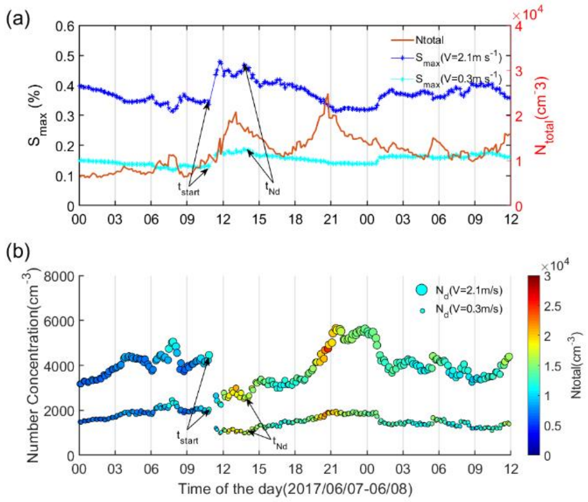

Figure S8. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on June 7-8.

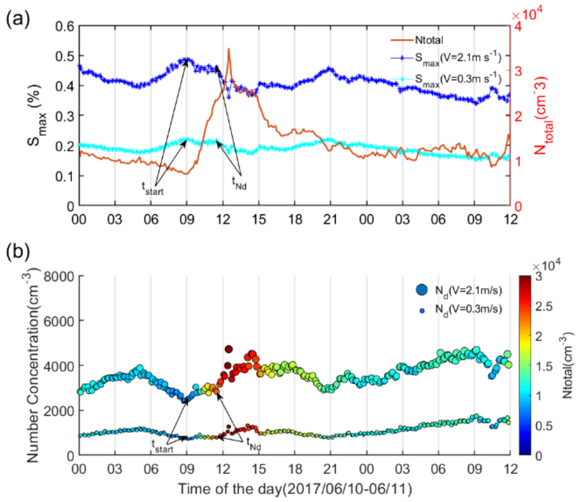

Figure S9. **(a)** Diurnal evolution of the maximum supersaturation (S_{max}) in the cloud for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1}, and the total aerosol particle number concentrations in cm^{-3} (N_{total}, right axis); **(b)** diurnal evolution of calculated cloud droplet number concentrations (N_d) (left axis) for updraft velocities of 2.1 m s^{-1} and 0.3 m s^{-1} on June 10-11.

Table S1. The enhancement of CCN under different supersaturation (from 0.2% to 0.8%)

		25 May	27 May	1 June	2 June	7 June	10 June	11 June
	N_{CCN}(cm^{-3})	645	3297	1060	1453	1278	667	1612

S=0.2%	(bef)							
	N_{CCN}(cm^{-3}) (aft)	2119	4725	1288	1738	1336	1240	2071
	Enhancement of CCN(cm^{-3})	1474	1428	228	285	58	573	459
	Enhancement of CCN(%)	228.5	43.3	21.5	19.6	4.5	85.9	28.5
S=0.4%	N_{CCN}(cm^{-3}) (bef)	1228	6033	2017	3953	2268	1820	3515
	N_{CCN}(cm^{-3}) (aft)	6131	7808	2674	4525	2685	4066	4769
	Enhancement of CCN(cm^{-3})	4903	1776	657	572	417	2246	1254
	Enhancement of CCN(%)	399.3	29.4	32.6	14.5	18.4	123.4	35.7
S=0.6%	N_{CCN}(cm^{-3}) (bef)	1575	7151	2752	5710	3017	3301	4890
	N_{CCN}(cm^{-3}) (aft)	10595	9868	4202	6670	4679	7054	7038
	Enhancement of CCN(cm^{-3})	9020	2717	1450	960	1661	3753	2148
	Enhancement of CCN(%)	572.7	38.0	52.7	16.8	55.1	113.7	43.9
S=0.8%	N_{CCN}(cm^{-3}) (bef)	1881	7891	3398	7129	3544	4297	5662
	N_{CCN}(cm^{-3}) (aft)	14097	12267	6323	8218	7014	10022	9619
	Enhancement of CCN(cm^{-3})	12215	4376	2925	1089	3470	5725	3957
	Enhancement of CCN(%)	649.4	55.5	86.1	15.3	97.9	133.2	69.9

Table S2. The enhancement of N_d and variance of S_{max} under different updraft velocity (from 0.3m s^{-1} to 3m s^{-1})

		25 May	27 May	1 June	2 June	7 June	10 June	11 June
	Nd(cm^{-3}) (bef)	703	1935	941	1169	1070	792	1506
	N_d(cm^{-3})	1471	2817	1164	1385	1581	1070	1785

V=0.3m/s	(aft)							
	Enhancement of N_d(cm^{-3})	768	882	223	216	511	278	279
	Enhancement of N_d(%)	109.2	45.6	23.7	18.5	47.8	28.4	18.5
	S_{max}(%) (bef)	0.22	0.14	0.19	0.18	0.18	0.21	0.16
	S_{max}(%) (aft)	0.17	0.11	0.17	0.17	0.15	0.19	0.15
	Variance of S_{max}(%)	-22.7	-21.4	-10.5	-5.6	-16.7	-9.5	-6.3
V=0.9m/s	N_d(cm^{-3}) (bef)	1143	3721	1546	2328	1776	1611	2759
	N_d(cm^{-3}) (aft)	2900	5135	1982	2648	2707	2239	3431
	Enhancement of N_d(cm^{-3})	1757	1414	436	320	931	628	672
	Enhancement of N_d(%)	153.7	38.0	28.2	13.7	52.4	40.0	24.4
	S_{max}(%) (bef)	0.36	0.22	0.31	0.27	0.29	0.33	0.25
	S_{max}(%) (aft)	0.25	0.18	0.28	0.25	0.25	0.28	0.23
	Variance of S_{max}(%)	-30.6	-18.2	-9.7	-7.4	-13.8	-15.2	-8.0
V=1.5m/s	N_d(cm^{-3}) (bef)	1405	4610	1946	3154	2223	2265	3591
	N_d(cm^{-3}) (aft)	3932	6388	2581	3563	3461	3103	4400
	Enhancement of N_d(cm^{-3})	2527	1778	635	409	1238	838	809
	Enhancement of N_d(%)	180.0	38.6	32.6	13.0	55.7	37.0	22.5
	S_{max}(%) (bef)	0.47	0.27	0.40	0.34	0.38	0.40	0.31
	S_{max}(%) (aft)	0.31	0.23	0.36	0.31	0.31	0.35	0.28
	Variance of S_{max}(%)	-34.0	-14.8	-10.0	-8.8	-18.4	-12.5	-9.7
	N_d(cm^{-3}) (bef)	1605	5245	2283	3822	2640	2827	4159
	N_d(cm^{-3}) (aft)	4783	7165	3099	4306	4098	3819	5129

V=2.1m/s	Enhancement of N_d(cm^{-3})	3178	1920	816	484	1458	992	970
	Enhancement of N_d(%)	198.0	36.6	35.7	12.7	55.2	35.1	23.3
	S_{max}(%) (bef)	0.56	0.32	0.48	0.39	0.45	0.46	0.36
	S_{max}(%) (aft)	0.36	0.28	0.42	0.36	0.37	0.40	0.33
	Variance of S_{max}(%)	-35.7	-12.5	-12.5	-7.7	-17.8	-13.0	-8.3
V=3m/s	N_d(cm^{-3}) (bef)	1835	5845	2687	4589	3161	3456	4824
	N_d(cm^{-3}) (aft)	5816	7953	3790	5166	4936	4646	6040
	Enhancement of N_d(cm^{-3})	3981	2108	1103	577	1775	1190	1216
	Enhancement of N_d(%)	216.9	36.1	41.0	12.6	56.2	26.3	25.2
	S_{max}(%) (bef)	0.68	0.39	0.57	0.46	0.53	0.54	0.43
	S_{max}(%) (aft)	0.41	0.33	0.50	0.43	0.44	0.46	0.39
	Variance of S_{max}(%)	-39.7	-15.4	-12.3	-6.5	-17.0	-14.8	-9.3

Table S3. Variance of Nd and relative contribution to this variance of aerosol number and chemical composition under different updraft velocities

Updraft Velocity (m/s)	Contribution_N_{CN}	Contribution_κ	Variance_N_d
0.3	60%	40%	679
0.9	64%	36%	1210
1.5	67%	33%	1467
2.1	71%	29%	1634
3	76%	24%	1830

Table S4. The average suppression rate of S_{max} under different updraft vertical velocities in all NPF days.

Date	0.3m/s	0.9m/s	1.5m/s	2.1m/s	3m/s
25 May	15.0%	13.3%	15.8%	12.2%	14.3%
27 May	14.2%	9.7%	7.7%	6.5%	7.9%
1 June	11.9%	11.9%	10.8%	11.0%	7.4%
2 June	9.1%	8.2%	9.0%	7.8%	6.9%
7 June	21.3%	21.5%	20.6%	20.0%	17.3%
10 June	16.4%	14.8%	14.5%	14.3%	13.6%
11 June	13.7%	13.5%	15.2%	12.6%	14.3%
Average	14.51±3.525%	13.27±3.972%	13.37±4.152%	12.057±4.115%	11.67±3.863%

Table S5. The average suppression rate of N_d under different updraft vertical velocities in all NPF days

Date	0.3m/s	0.9m/s	1.5m/s	2.1m/s	3m/s
25 May	21.30%	19.55%	22.85%	14.16%	15.43%
27 May	16.75%	8.32%	5.59%	4.29%	3.47%
1 June	16.38%	15.55%	13.00%	11.78%	9.97%
2 June	10.63%	10.22%	9.69%	8.22%	7.86%
7 June	21.84%	21.72%	20.82%	20.80%	20.39%
10 June	25.56%	19.64%	17.26%	15.27%	12.74%
11 June	20.69%	15.05%	14.51%	11.80%	12.79%
Average	19.02±4.48%	15.72±4.65%	14.82±5.62%	12.33±4.87%	11.80±5.03%

A formula worked on the relative contribution of aerosol number concentration εN_{CN} and aerosol chemical composition $\varepsilon\kappa$, to the variance of N_d include the representation of the average sensitivity of N_d to aerosol number and hygroscopicity:

$$\sigma^2 N_d = \sigma N_{CN} \overline{\frac{\partial N_d}{\partial N_{CN}}} + \sigma\kappa \overline{\frac{\partial N_d}{\partial N\kappa}} \quad \text{(S1)}$$

where $\sigma^2 N_d$ is the variance of number concentration of cloud droplets, σN_{CN} is the standard deviation of the total aerosol number and $\sigma\kappa$ is the standard deviation of the hygroscopicity parameter, $\mathrm{d}N_d / \mathrm{d}N_{CN}$ and $\mathrm{d}N_d / \mathrm{d}\kappa$ represnet the average of the partial derivatives. The relative contribution of N_{CN} and hygroscopicity parameters can be expressed as follows:

$$\varepsilon N_{CN} = \frac{\left(\overline{\frac{\partial N_d}{\partial N_{CN}}} \sigma N_{CN} \right)^2}{\sigma^2 N_d} \tag{S2}$$

$$\varepsilon\kappa = \frac{\left(\overline{\frac{\partial N_d}{\partial \kappa}} \sigma\kappa \right)^2}{\sigma^2 N_d} \tag{S3}$$

where εN_{CN} and $\varepsilon\kappa$ represent the relative contribution of N_{CN} and hygroscopicity parameters κ to the N_d.