

Supplemental material

Supporting Tables:

Table S1: Summary of background average, standard deviation, median, minimum and maximum n_{INPs} (L^{-1} air) associated with each sampling day during the MART experiment at two temperatures ($-30\text{ }^{\circ}\text{C}$ and $-25\text{ }^{\circ}\text{C}$), as measured using the CFDC.

MART Experimental day fraction	Background n_{INP} , $T = -30 (+/- 2)\text{ }^{\circ}\text{C}$					Background n_{INP} , $T = -25 (+/- 2)\text{ }^{\circ}\text{C}$				
	avg	stdev	med	min	max	avg	stdev	med	min	max
0.924	1.178	0.513	1.307	0.542	1.641	0.612	0.553	0.521	0.047	1.660
9.492	0.996	0.622	0.916	0.242	1.904	0.714	0.442	0.788	0.221	1.468
10.497	1.302	0.714	0.972	0.587	2.490	0.499	0.302	0.388	0.247	0.974
11.643	1.157	0.730	0.972	0.205	2.431	0.411	0.284	0.247	0.247	0.739
12.623	0.476	0.323	0.419	0.181	0.976	n/a	n/a	n/a	n/a	n/a
15.654	0.409	0.188	0.463	0.157	0.657	0.323	0.225	0.212	0.068	0.698
16.450	0.561	0.141	0.658	0.352	0.658	0.364	0.256	0.200	0.198	0.695
17.636	0.840	1.171	0.228	0.228	4.356	0.538	0.265	0.468	0.306	0.918
18.483	0.425	0.274	0.274	0.220	0.904	n/a	n/a	n/a	n/a	n/a
19.625	0.622	0.227	0.674	0.037	0.934	0.263	0.153	0.263	0.155	0.371
20.654	0.955	0.890	0.538	0.456	2.288	0.453	0.395	0.240	0.229	1.146
21.472	0.450	0.325	0.223	0.055	0.884	n/a	n/a	n/a	n/a	n/a

Table S2: Summary of background average, standard deviation, median, minimum and maximum n_{INPs} (L^{-1} air) associated with each sampling day during the IMPACTS experiment at two temperatures (-30 °C and -25 °C), as measured using the CFDC.

IMPACTS Experimental day fraction	Background n_{INP} , T = -30 (+/- 2) °C					Background n_{INP} , T = -25 (+/- 2) °C				
	avg	stdev	med	min	max	avg	stdev	med	min	max
7.440	0.234	*	0.234	0.234	0.234	n/a	n/a	n/a	n/a	n/a
8.432	0.702	**	0.702	0.702	0.702	0.586	0.060	0.605	0.519	0.633
9.439	0.820	0.533	0.948	0.225	1.732	1.403	0.135	1.325	1.307	1.583
14.015	0.301	0.091	0.291	0.230	0.476	1.352	0.411	1.558	0.735	1.558
15.025	1.121	0.625	0.993	0.182	1.943	5.052	**	5.052	5.052	5.052
17.004	0.377	0.537	0.179	0.048	1.572	0.486	0.302	0.486	0.211	0.762
18.022	0.252	0.047	0.248	0.189	0.306	n/a	n/a	n/a	n/a	n/a
20.005	0.879	0.229	0.982	0.470	0.982	0.470	**	0.470	0.470	0.470
21.013	2.460	0.903	2.489	1.326	3.537	n/a	n/a	n/a	n/a	n/a
22.971	0.892	*	0.892	0.892	0.892	n/a	n/a	n/a	n/a	n/a
23.958	2.212	0.928	2.621	1.281	3.393	n/a	n/a	n/a	n/a	n/a
25.968	1.324	0.100	1.315	1.218	1.617	n/a	n/a	n/a	n/a	n/a
26.946	2.805	1.829	2.103	1.500	5.515	n/a	n/a	n/a	n/a	n/a

* Background n_{INP} is same for all sampling periods

** Less than 3 sampling periods were used in calculation

Table S3. Summary of n_{INP} (L^{-1} air) from the IMPACTS study measured with the CFDC ($T = -30$ °C) and IS ($T = -22, -18, -10$ °C).

IMPACTS Day of Exp.	T = -30 °C				T = -22 °C			T = -18 °C			T = -10 °C		
	n	$n_{\text{INP, med}}$	$n_{\text{INP, 5\%}}$	$n_{\text{INP, 95\%}}$	$n_{\text{INP, med}}$	$n_{\text{INP, 5\%}}$	$n_{\text{INP, 95\%}}$	$n_{\text{INP, med}}$	$n_{\text{INP, 5\%}}$	$n_{\text{INP, 95\%}}$	$n_{\text{INP, med}}$	$n_{\text{INP, 5\%}}$	$n_{\text{INP, 95\%}}$
0	-	-	-	-	2.40E-01	9.97E-02	1.34E-01	7.70E-03	5.60E-03	1.91E-02	BDL	BDL	BDL
2	-	-	-	-	4.20E-02	1.92E-02	3.00E-02	1.30E-02	7.29E-03	1.57E-02	BDL	BDL	BDL
4	-	-	-	-	-	-	-	-	-	-	-	-	-
7	3	2.49E+00	1.19E+00	3.57E+00	4.50E-02	2.16E-02	3.49E-02	BDL	BDL	BDL	BDL	BDL	BDL
8	1	2.18E+00	2.18E+00	2.18E+00	-	-	-	-	-	-	-	-	-
9	4	2.71E+00	1.49E+00	3.19E+00	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-
13	6	5.10E+00	1.28E+00	9.13E+00	9.30E-03	6.78E-03	2.30E-02	BDL	BDL	BDL	BDL	BDL	BDL
14	10	8.58E+00	6.72E+00	1.42E+01	3.89E-01*	-	-	7.44E-02	3.24E-02	4.63E-02	1.08E-02	7.16E-03	1.96E-02
15	-	-	-	-	2.80E-02	1.71E-02	4.04E-02	BDL	BDL	BDL	BDL	BDL	BDL
16	6	3.63E+00	3.15E+00	1.52E+01	6.80E-03**	-	-	BDL	BDL	BDL	BDL	BDL	BDL
17	14	5.82E+00	4.04E+00	1.26E+01	2.80E-02	1.48E-02	2.78E-02	BDL	BDL	BDL	BDL	BDL	BDL
18	-	-	-	-	9.51E-02	4.68E-02	6.78E-02	2.20E-02	1.24E-02	2.48E-02	BDL	BDL	BDL
19	4	9.27E-01	8.64E-01	1.22E+00	-	-	-	-	-	-	-	-	-
20	4	2.88E+00	2.75E+00	7.56E+00	6.80E-02	3.03E-02	4.66E-02	1.60E-02	9.77E-03	2.32E-02	4.90E-03	4.07E-03	2.17E-02
21	-	-	-	-	4.50E-02	2.12E-02	3.48E-02	8.80E-03	5.84E-03	1.59E-02	BDL	BDL	BDL
22	4	4.95E+00	4.25E+00	1.01E+01	1.90E-01	9.09E-02	1.12E-01	4.50E-02	2.17E-02	3.52E-02	3.50E-03	2.87E-03	1.53E-02
23	6	4.99E+00	3.90E+00	9.51E+00	5.50E-02	2.39E-02	3.53E-02	1.30E-02	7.53E-03	1.62E-02	BDL	BDL	BDL
24	-	-	-	-	9.10E-03	6.04E-03	1.65E-02	4.30E-03	3.15E-03	1.07E-02	BDL	BDL	BDL
25	3	6.40E+00	5.68E+00	7.71E+00	4.50E-03	3.26E-03	1.11E-02	BDL	BDL	BDL	BDL	BDL	BDL
26	12	8.89E+00	4.35E+00	1.08E+01	4.30E-03**	-	-	3.60E-03	2.99E-03	1.56E-02	BDL	BDL	BDL
28	-	-	-	-	5.80E-03	4.24E-03	1.45E-02	BDL	BDL	BDL	BDL	BDL	BDL
29	-	-	-	-	8.50E-03	6.21E-03	2.12E-02	BDL	BDL	BDL	BDL	BDL	BDL
33	-	-	-	-	8.30E-03	6.03E-03	2.06E-02	BDL	BDL	BDL	BDL	BDL	BDL
36	-	-	-	-	1.09E-01	4.89E-02	7.43E-02	1.30E-02	8.85E-03	2.42E-02	BDL	BDL	BDL

All values are reported in INP per liter of air (stp); * IS measurement saturated before -22 °C, value indicates the n_{INP} measured at -21.5 °C; ** Value not above detection limit for that measurement day. “-” indicates measurements are unavailable; “BDL” indicates measurements were below detection limit of IS.

Table S4. Summary of n_{INP} (L^{-1} air) from the MART study measured with the CFDC ($T = -30, -24$ °C) and IS ($T = -22, -18, -10$ °C).

MART Day of Exp.	T = -30 °C				T = -24 °C				T = -22 °C			T = -18 °C			T = -10 °C		
	n	n_{INP} , med	n_{INP} , 5%	n_{INP} , 95%	n	n_{INP} , med	n_{INP} , 5%	n_{INP} , 95%	n_{INP} , med	n_{INP} , 5%	n_{INP} , 95%	n_{INP} , med	n_{INP} , 5%	n_{INP} , 95%	n_{INP} , med	n_{INP} , 5%	n_{INP} , 95%
0	9	5.34E+01	3.02E+01	8.28E+01	11	2.94E+00	2.10E+00	6.57E+00	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	1.08E+00	6.35E-01	1.31E+00	2.06E-02	1.40E-02	3.62E-02	BDL	BDL	BDL
9	12	8.66E+01	3.64E+01	9.80E+01	15	5.31E+00	2.26E+00	9.40E+00	1.65E-01	7.08E-02	9.35E-02	1.31E-02	9.29E-03	3.19E-02	BDL	BDL	BDL
10	14	4.22E+01	3.10E+01	5.00E+01	9	5.73E+00	3.66E+00	6.46E+00	1.76E-01	7.39E-02	1.08E-01	3.13E-02	2.09E-02	5.41E-02	BDL	BDL	BDL
11	14	4.39E+01	3.77E+01	5.55E+01	-	-	-	-	9.02E-02	4.63E-02	7.93E-02	BDL	BDL	BDL	BDL	BDL	BDL
12	7	5.34E+01	3.89E+01	8.53E+01	-	-	-	-	2.57E-02	1.68E-02	4.26E-02	4.25E-03	3.52E-03	2.92E-02	BDL	BDL	BDL
13	-	-	-	-	-	-	-	-	6.06E-02	3.05E-02	5.25E-02	3.55E-03	2.94E-03	2.43E-02	BDL	BDL	BDL
14	-	-	-	-	-	-	-	-	5.12E-02	2.69E-02	4.99E-02	6.48E-03	5.20E-03	2.82E-02	BDL	BDL	BDL
15	5	6.85E+01	4.29E+01	7.35E+01	-	-	-	-	3.93E-01	1.51E-01	1.75E-01	6.51E-03	5.22E-03	2.83E-02	BDL	BDL	BDL
16	26	6.83E+01	3.18E+01	8.17E+01	6	1.65E+00	1.50E+00	1.90E+00	1.72E+00	6.92E-01	9.46E-01	2.28E-02	1.54E-02	4.09E-02	BDL	BDL	BDL
17	25	3.27E+01	2.06E+01	7.08E+01	4	2.43E+00	1.23E+00	2.57E+00	4.54E-01	1.78E-01	1.96E-01	6.59E-03	5.29E-03	2.87E-02	BDL	BDL	BDL
18	3	2.53E+01	6.83E+00	2.74E+01	1	1.32E+00	1.32E+00	1.32E+00	2.57E-01	9.61E-02	1.23E-01	6.36E-03	5.10E-03	2.77E-02	BDL	BDL	BDL
19	31	2.41E+01	1.65E+01	2.88E+01	2	1.10E+00	9.80E-01	1.23E+00	7.42E-02	3.49E-02	5.73E-02	3.15E-03	2.53E-03	2.58E-02	BDL	BDL	BDL
20	3	1.25E+01	9.80E+00	1.79E+01	3	1.50E+00	1.09E+00	2.99E+00	4.58E-02	4.58E-02	4.62E-02	6.09E-03	4.88E-03	2.65E-02	6.09E-03	4.88E-03	2.65E-02
21	28	1.86E+01	2.81E+00	2.62E+01	-	-	-	-	-	-	-	-	-	-	-	-	-

All values are reported in INP per liter of air (stp); “-” indicates measurements are unavailable; “BDL” indicates measurements were below detection limit of IS.

Table S5: Summary of concentrator factors (CF) associated with each sampling day during the IMPACTS experiment.

IMPACTS	
Experimental day fraction	CF
7.44	*
8.43	*
9.44	14.70
14.02	11.50
15.03	6.40
17.00	3.60
18.02	8.40
20.01	7.50
21.01	9.20
22.97	6.60
23.96	3.50
25.97	4.80
26.95	6.10
Study Avg	7.48
Study Stdev	3.38

* No concentrator used

Table S6: Summary of background n_{INP} associated with the ice spectrometer blank filters during the MART and IMPACTS studies.

MART		IMPACTS	
$T_{\text{IS}}, ^\circ\text{C}$	INP per filter	$T_{\text{IS}}, ^\circ\text{C}$	INP per filter
-15	1.98	-17	3.18
-16	3.01	-18	3.18
-17	3.01	-19	3.28
-18	3.04	-20	3.28
-19	3.04	-20.5	3.28
-20	4.03	-21	3.28
-20.5	4.03	-21.5	3.28
-21	4.14	-22	3.28
-21.6	4.17	-22.5	10.18
-22.6	4.19	-23	10.18
-23	4.63	-23.5	10.18
		-24	10.18
		-24.5	13.82
		-25	14.84

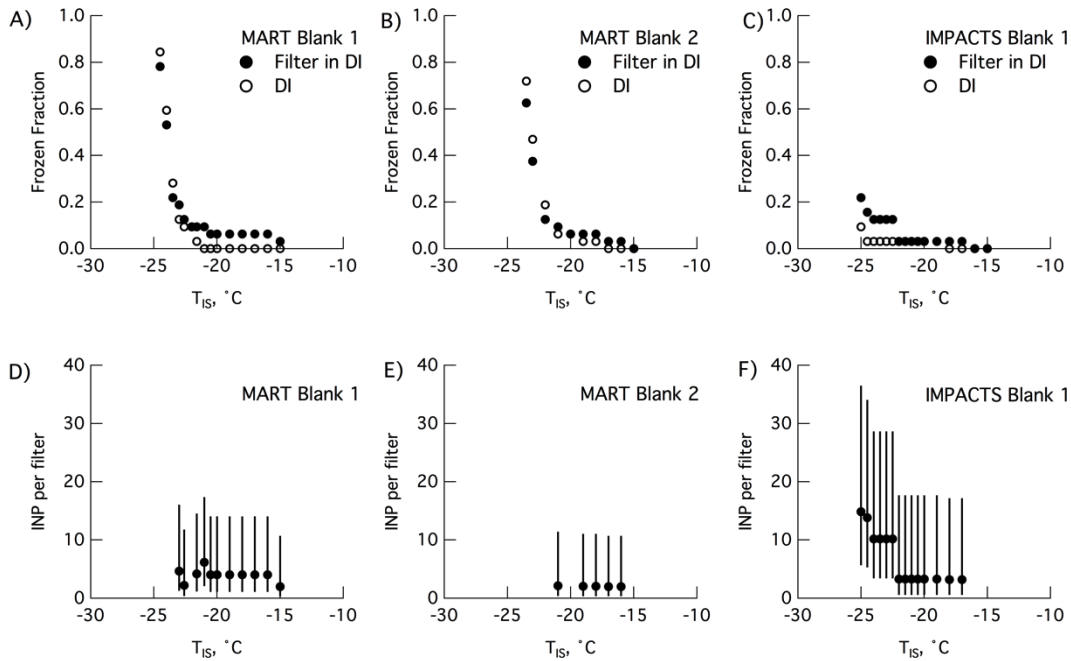


Figure S1. Frozen fraction temperature spectra for blank filters suspended in DI water and DI water alone (a-c); error bars are not shown for clarity, but there were no significant differences between numbers of INPs in DI in which blanks were washed and DI tested by itself. Temperature spectra for number of INPs per filter for both MART and IMPACTS studies (d-f).

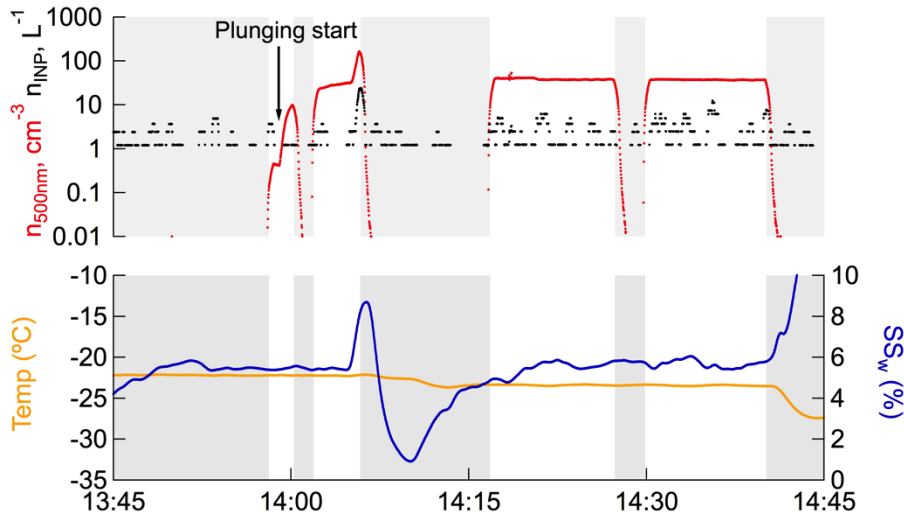


Figure S2. Timelines of CFDC conditions (temperature and water supersaturation) and number concentrations of larger particles ($D_p > 500\text{nm}$, $n_{500\text{nm}}$) and ice nucleating particles (n_{INP}) on two separate days illustrating the onset of aerosol production

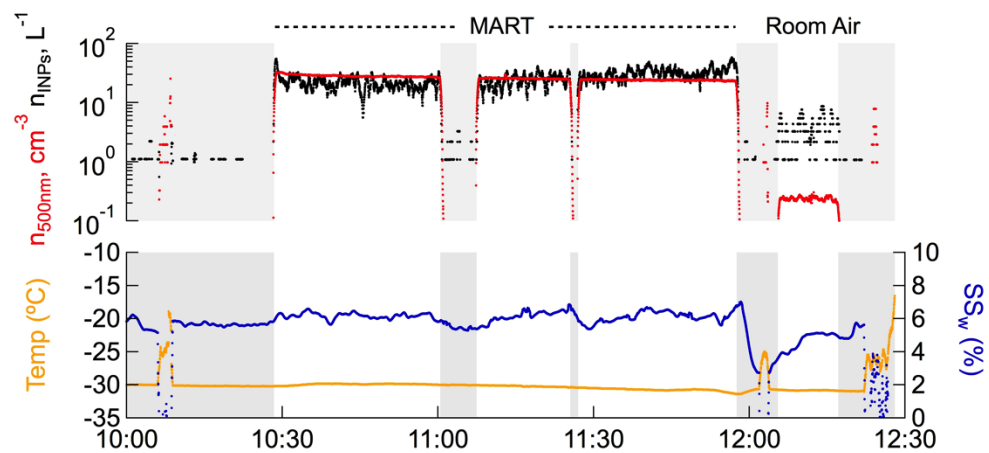


Figure S3. Timelines of CFDC conditions (temperature and water supersaturation) and number concentrations of larger particles ($D_p > 500\text{nm}$, $n_{500\text{nm}}$) and ice nucleating particles (n_{INP}) on two separate days illustrating the distinct behavior of aerosol in the MART compared to Room Air