

Supplemental information

S1 Calculation of n_s -values of Niemand et al. (2012) and DeMott et al. (2016)

At -25, -20, and -15 °C, the exponential function from Niemand et al. (2012) predicts n_s -values of 307263 cm⁻², 39092 cm⁻², 1810 cm⁻², respectively. Errors were calculated from the 95 % prediction band.

5 A linear fit was applied to the n_s -values reported in DeMott et al. (2016) for laboratory conditions only. At -25, -20, and -15 °C, the n_s -values were 123 cm⁻², 10 cm⁻², and 1 cm⁻², respectively. Data for laboratory bloom conditions were not accounted for in this study as the reported chlorophyll *a* concentrations during the bloom experiment in DeMott et al., (2016) were much higher than average monthly chlorophyll *a* concentrations during this cruise. Errors were calculated from the 95 % prediction band of the linear fit.

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DATE	Time mid-sample (UTC)	Longitude (°)	Latitude (°)
14 th July	12:51	-61.085	67.240
15 th July*	17:33	-64.847	69.359
16 th July*	21:52	-71.117	71.702
17 th July	19:29	-79.464	73.982
18 th July	20:37	-81.018	73.569
19 th July	16:18	-83.976	74.110
21 st July	14:21	-92.225	74.237
22 nd July	12:23	-94.859	74.324
23 rd July	14:41	-94.526	74.547
24 th July	21:48	-94.912	74.620
25 th July	19:50	-86.998	74.428
26 th July*	17:13	-75.270	73.926
27 th July	17:47	-63.609	73.281
28 th July*	22:08	-57.885	73.261
29 th July	13:40	-61.610	75.402
30 th July	19:59	-72.193	76.260
31 st July*	17:15	-73.272	76.317
1 st August	16:44	-76.097	76.340
2 nd August	20:03	-72.689	78.934
3 rd August	12:41	-64.180	81.367
4 th August	14:57	-69.213	80.150
5 th August	22:47	-71.690	79.078
7 th August	12:50	-78.381	74.701
8 th August	14:22	-96.151	74.191
9 th August	14:10	-98.507	74.421
10 th August	16:27	-96.235	72.926
11 th August	14:07	-99.243	70.090
12 th August	14:11	-105.472	68.971

Table S1: Dates, times, and locations of sampling.

*Indicates dates included in the DeMott et al. (2016) study.

Date	Total number of particles analysed	Fraction of total number of particles classified as sea salt	Fraction of total number of particles classified as dust
21 st July	2180	0.09	0.01
25 th July	1004	0.50	0.11
29 th July	516	0.32	0.08

Table S2: Total number of particles analysed, and fractions of the total number of particles classified as either mineral dust particles, and sea salt particles using CCSEM-EDX.

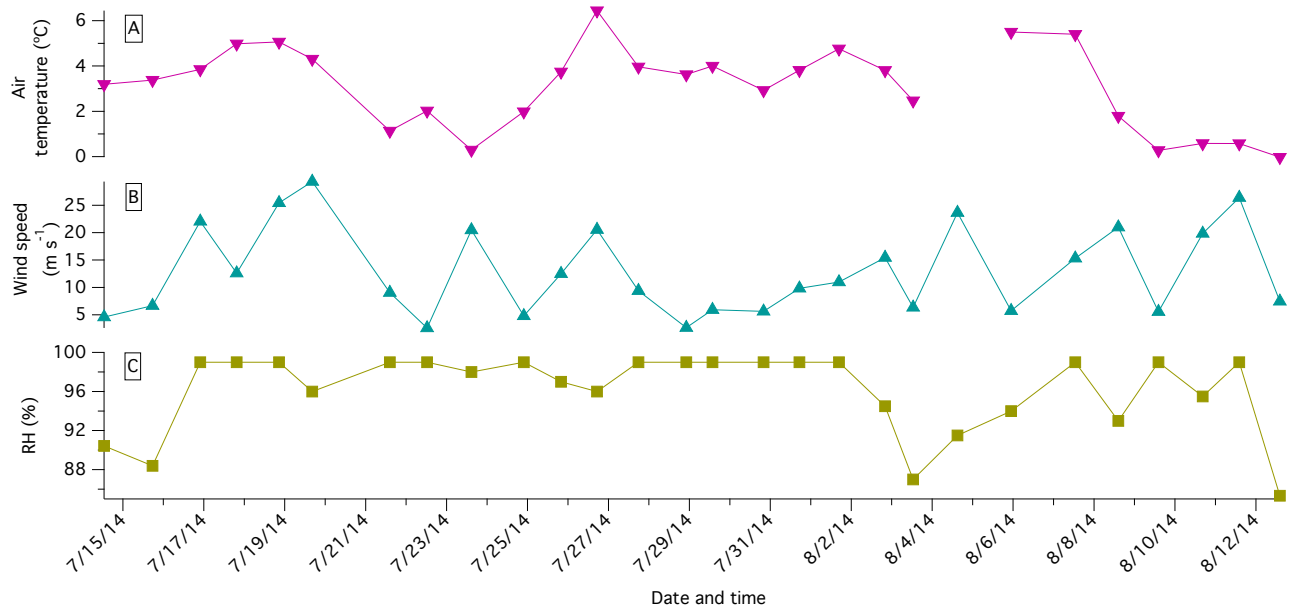


Figure S1 - Air temperature (A), wind speed (B), and RH (C) during sampling.

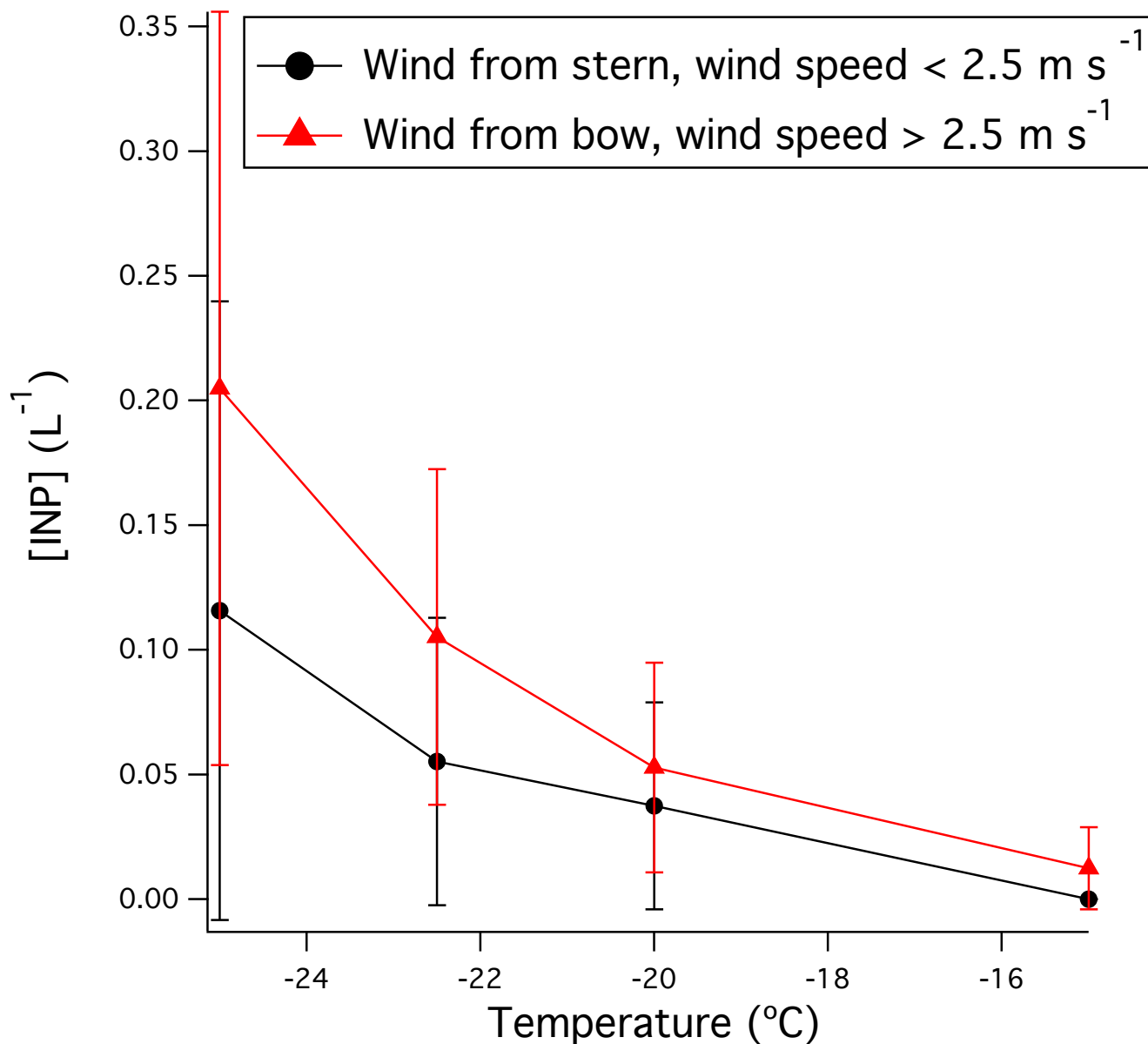


Figure S2: Comparison of [INP] (L⁻¹) when the wind direction measured on the ship was coming from the bow of the ship (between 0-90° and 270-360°, where 0°/360° = bow of ship) and when the minute average wind speed was higher than 2.5 m s⁻¹ (in red) to the [INP] (L⁻¹) when the wind direction was from the stern of the ship (between 90°-270°) or when the minute average wind speed was less than 2.5 m s⁻¹ (in black). Error bars represent the 95 % confidence interval.



Figure S3: WRF domain used in FLEXPART.

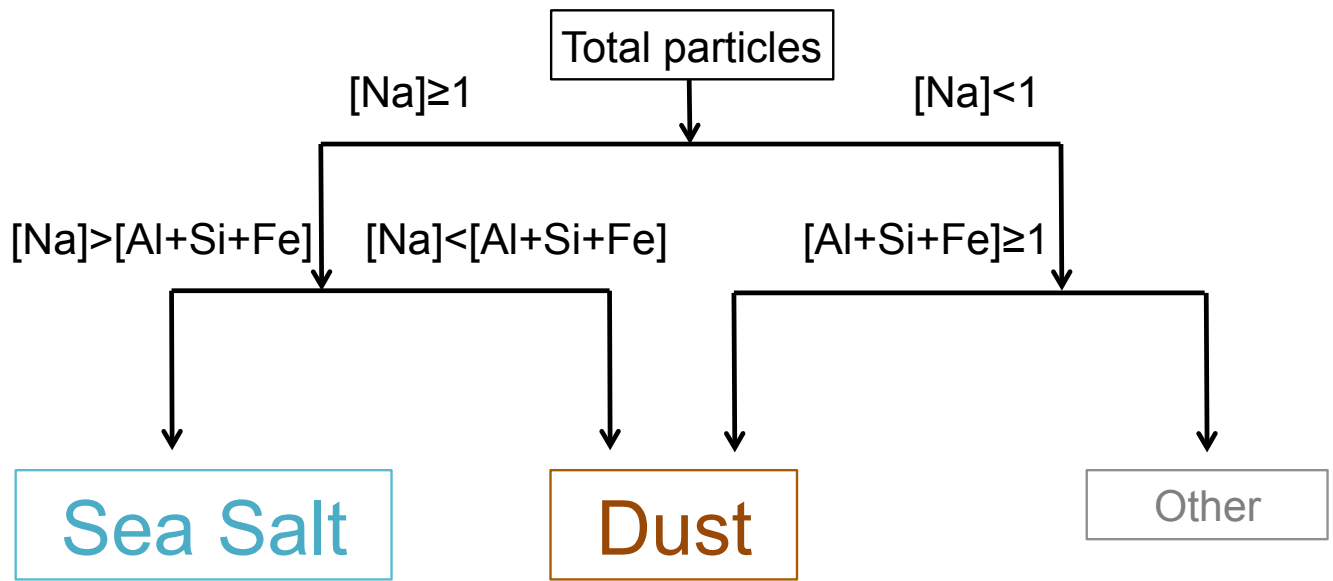


Figure S4: CCSEM-EDX particle classification scheme used in the current study. Numbers represent atomic percentage.

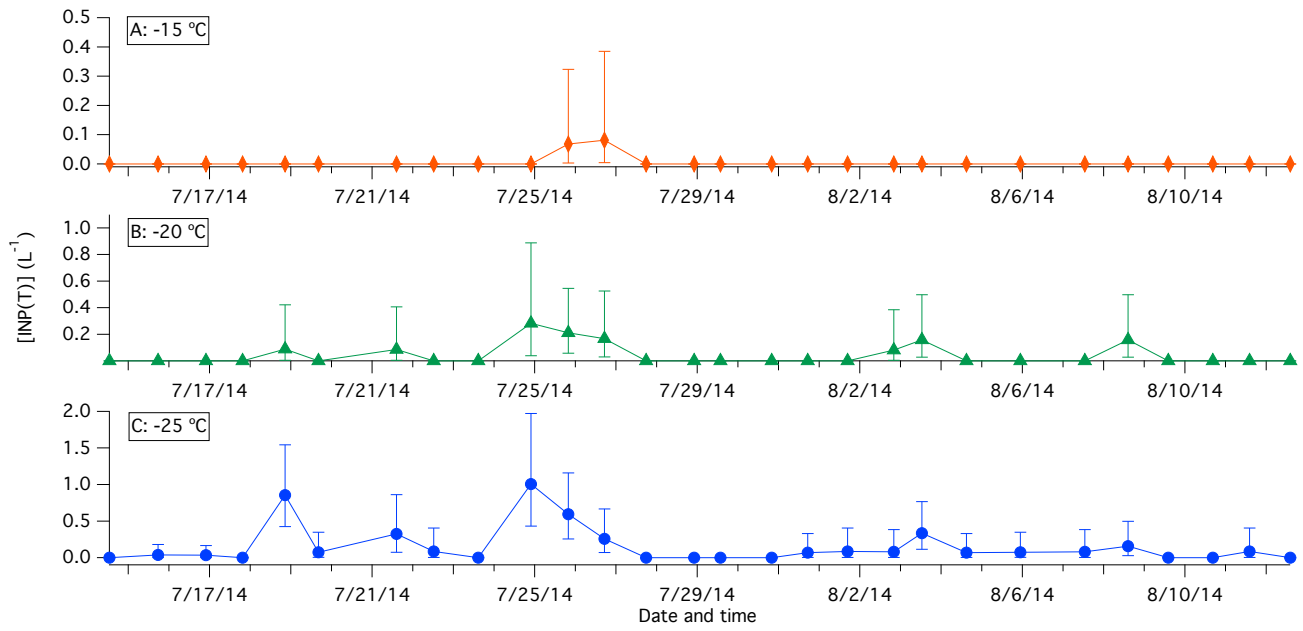


Figure S5: Time series of [INP(T)] (L⁻¹) at A) -15 °C, B) -20 °C, and C) -25 °C. Error bars were calculated using nucleation statistics following Koop et al. (1997).

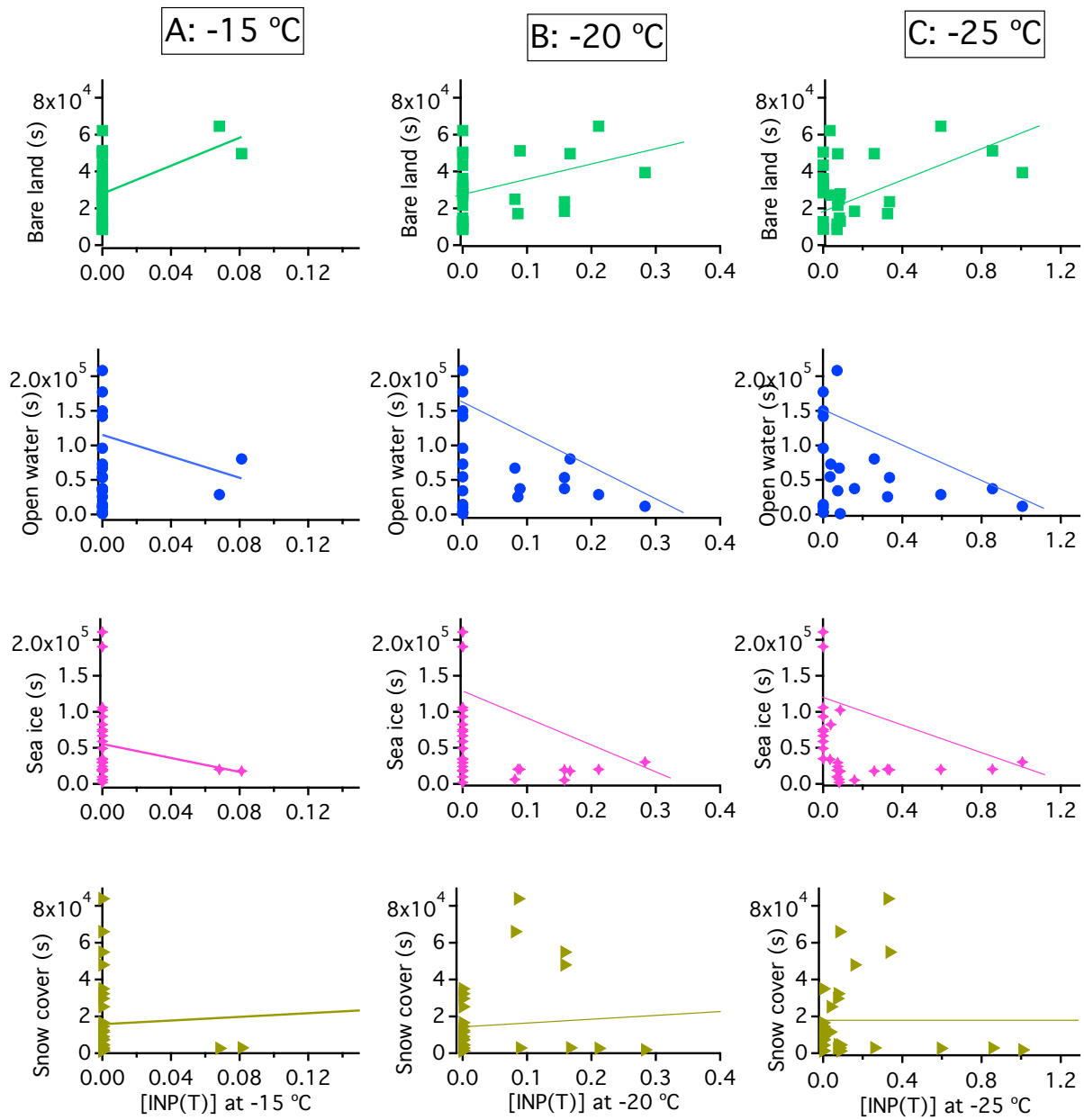


Figure S6: Plots for correlation analyses between the time the air mass spent over different surface types within 0-300 m of the surface and [INP(T)] at A) -15 °C, B) -20 °C, and C) -25 °C. A summary of the statistics from the correlation analysis can be found in Table 1.