Supplement of

On the Relationship Between Cloud Water Composition and Cloud Droplet Number Concentration

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Table S1. Limits of detection (LOD) for the species that were measured in this study. IC = Ion Chromatography, ICP = ICP-MS or ICP-QQQ.

Elements (ICP)	LOD (ppt)
Ag	0.74
Al	29.47
As	7.95
B	361.83
Ba	3.70
Br	[a]
C	[a]
Ca	543.10
Cd	4.19
Cl	[a]
Co	0.72
Cr	1.15
Cs	0.73
Cu	1.13
Fe	1.19
Ga	[a]
Hf	0.96
I	[a]
K	10.48
Li	103.65
Mg	14.38
Mn	1.62
Mo	2.26
Na	7.74
Nb	0.52
Ni	2.84
P	770.73
Pb	0.50
Pd	1.68
Rb	1.57
Rh	[a]
Ru	1.44
S	5823.00
Sb	[a]
Se	82.39
Si	126.47
Sn	1.77
Sr	1.10
Ta	0.20
Te	65.46
Ti	39.05
V	1.35
W	[a]
Y	0.5230
Zn	5.8800
Zr	1.0080

Inorganic ions (IC)	LOD (ppm)
Ammonium (NH_4^+)	0.0424
Bromide (Br^-)	0.0251
Calcium (Ca^{2+})	0.0452
Chloride (Cl^-)	0.0021
Fluoride (F^-)	[a]
Lithium (Li^+)	0.0349
Magnesium (Mg^{2+})	0.0369
Methanesulfonic acid (MSA)	0.0123
Nitrate (NO_3^-)	0.0089
Nitrite (NO_2^-)	0.0262
Potassium (K^+)	0.0262
Sodium (Na^+)	0.0435
Sulfate (SO_4^{2-})	0.0120

Organic ions (IC)	LOD (ppm)
Acetate	0.0027
Adipate	0.0227
Butyrate	[a]
Formate	0.0742
Glutarate	0.0063
Glycolate	0.0536
Glyoxylate	0.9448
Lactate	[a]
Maleate	0.0070
Malonate	0.3915
Oxalate	0.0123
Propionate	[a]
Pyruvate	0.0638
Succinate	0.0110

Amines (IC)	LOD (ppm)
Diethylamine (DEA)[b]	0.3152
Dimethylamine (DMA)	0.0527

[a] LODs were not available for these species.

[b] DEA co-elutes with Trimethylamine (TMA), so this LOD is an overestimate.

Table S2. Summary of the number of regressions that were statistically significant in Figure 4. A regression was considered statistical significance if all the p-values for a regression were < 0.05. There is a p-value associated to the overall regression, to each predictor, and to the intercept.

# of predictors	# of regressions	% of regressions that are statistically significant
1	9	100
2	35	66
3	77	22
4	105	10
5	91	8
6	49	0
7	15	0
8	2	0

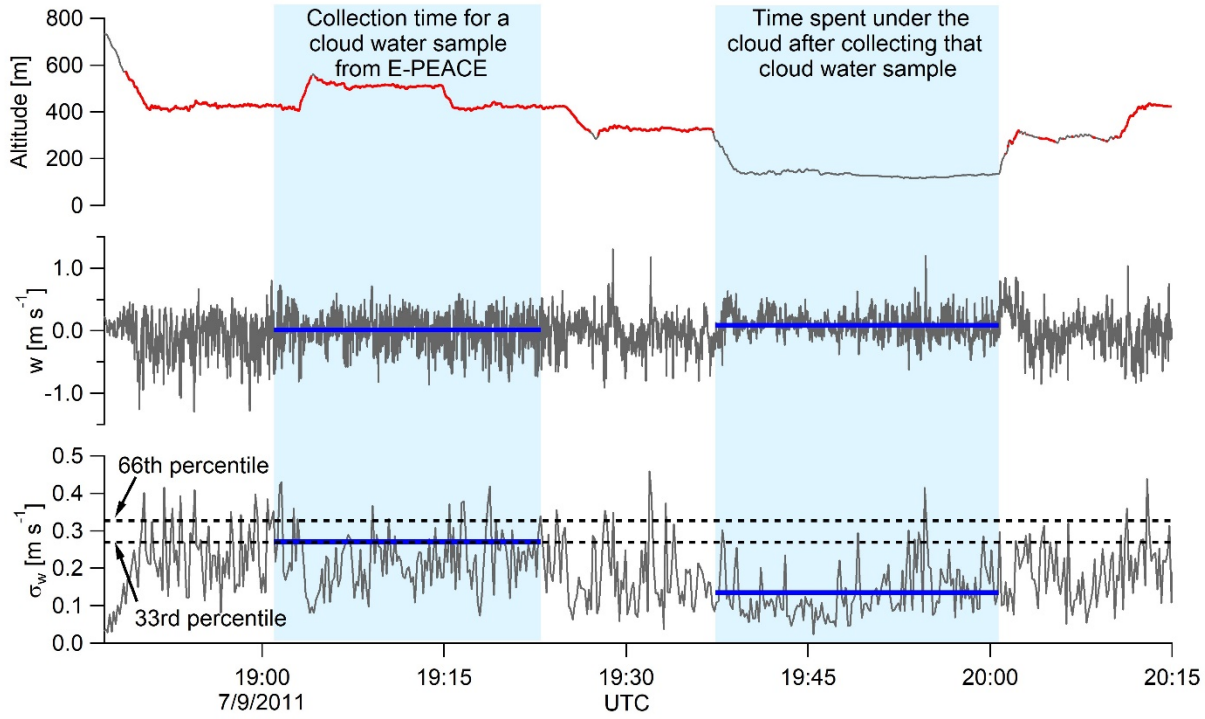

Figure S1. Time series of altitude (top), vertical wind speed (w) (middle), and the standard deviation of vertical wind speed (σ_w) (below) for a representative flight on 9 July 2011. The red trace in the top panel indicates when the aircraft was inside the cloud (i.e., LWC $\geq$ 0.02 g m^{-3}). The bold blue lines in the middle and bottom panels are the averages of w and σ_w, over the duration of the shaded blue boxes, respectively. The dashed lines in the bottom panel represent the 33rd percentile and 66th percentile of the data in this study.

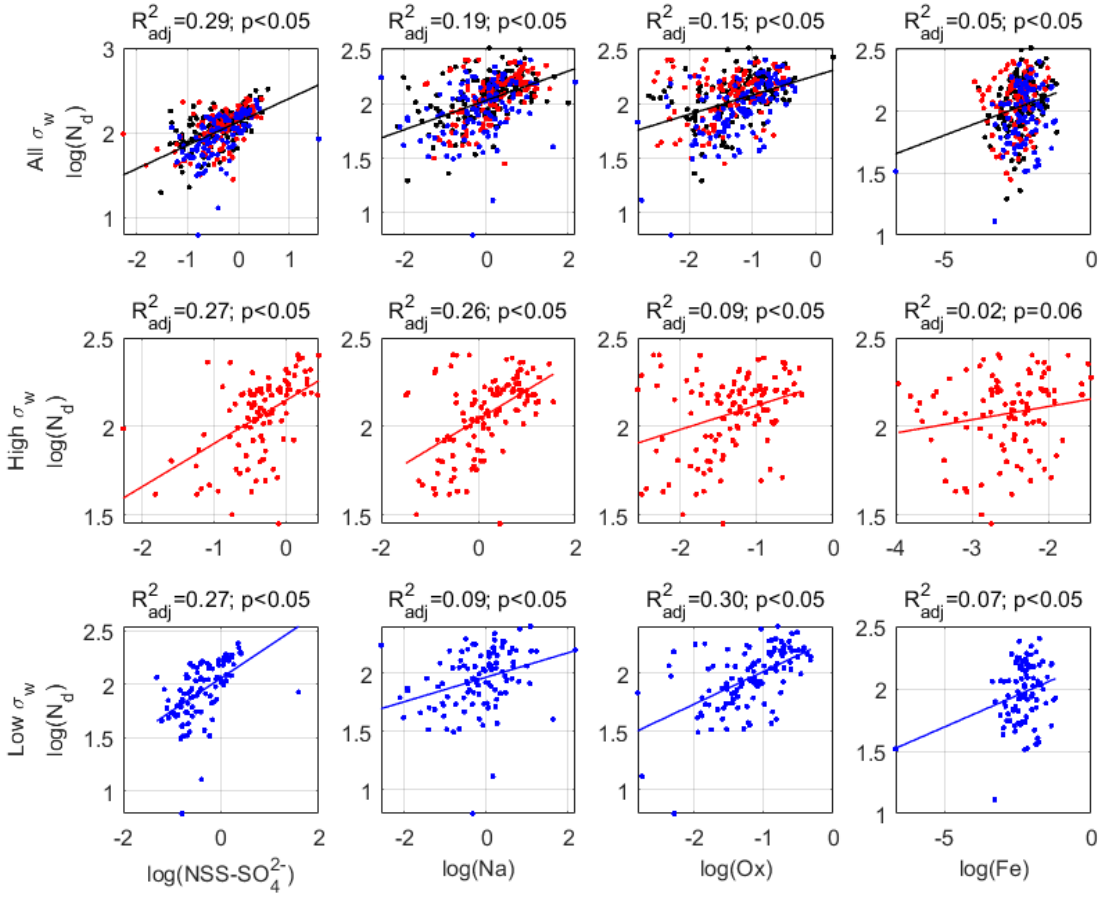

Figure S2. Scatterplots of four selected species when binning by σ_w. These four species were selected owing to their ability to represent distinct aerosol sources in the study region. Red: top 33rd percentile ($\sigma_w \geq 0.33$ m s^{-1}); Blue: bottom 33rd percentile ($\sigma_w \leq 0.27$ m s^{-1}); Black: between bottom and top percentiles (0.27 m s^{-1} $\leq \sigma_w \leq$ 0.33 m s^{-1}).

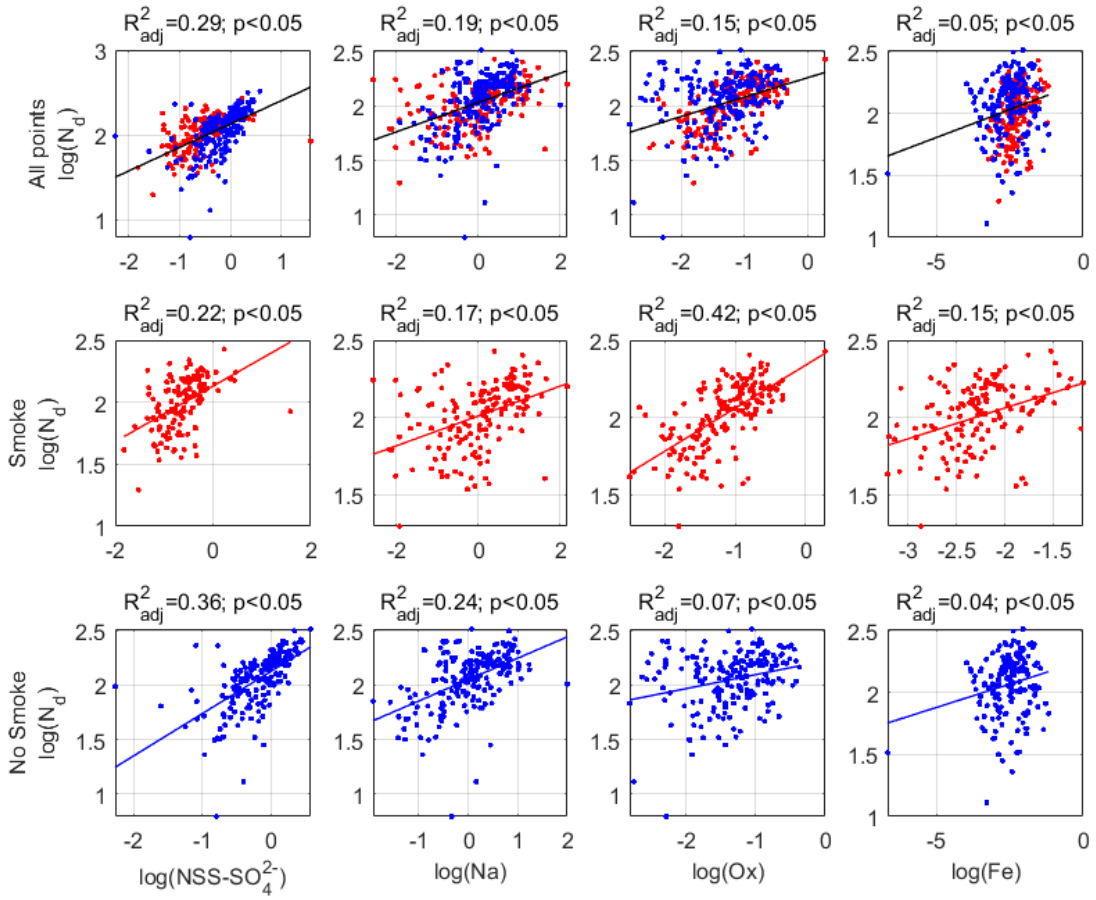

Figure S3. Scatterplots of four selected species when binning by smoke influence. Red: smoke influence; Blue: no smoke influence.

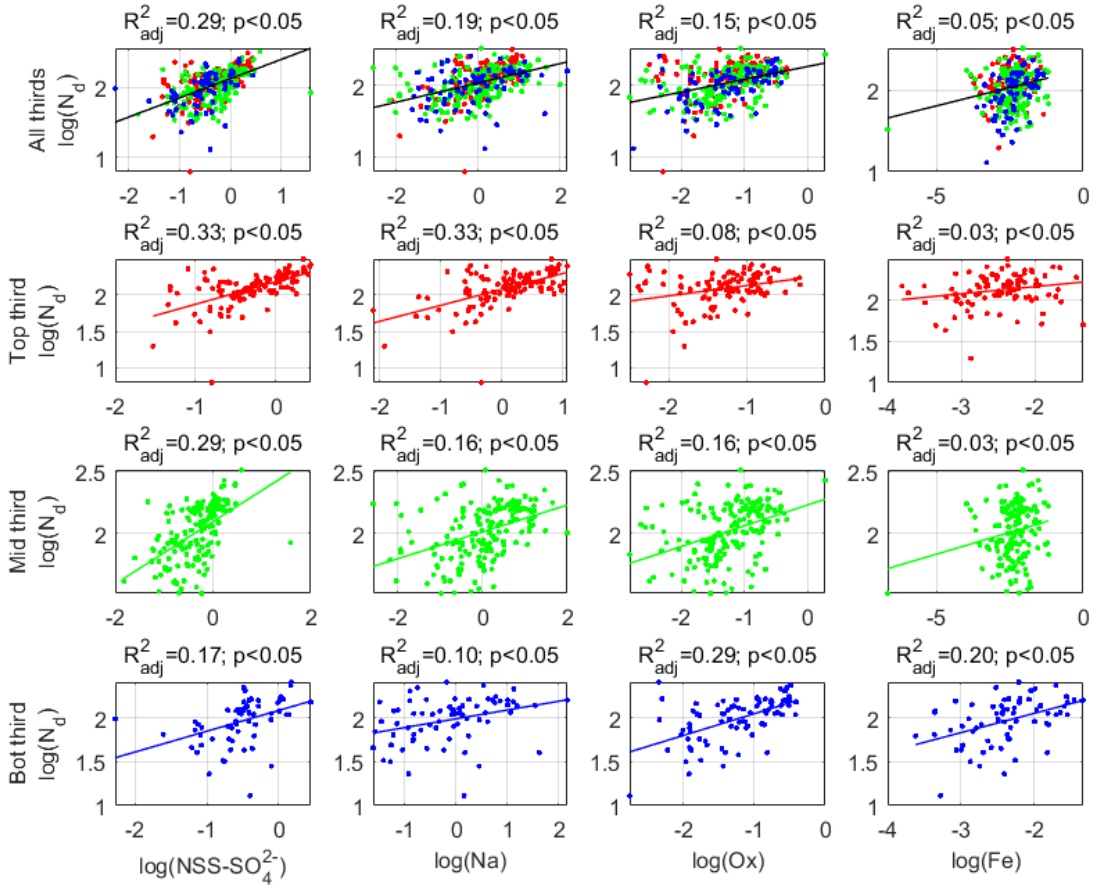

Figure S4. Scatterplots of four selected species when binning by normalized in-cloud height. Red: top third; Green: mid third; Blue: bottom third.