

Supplementary Table 1 (S1): Method detection limit (MDL), Limit of Quantification (LOQ), field blanks (soluble species only) and blanks descriptive statistics.

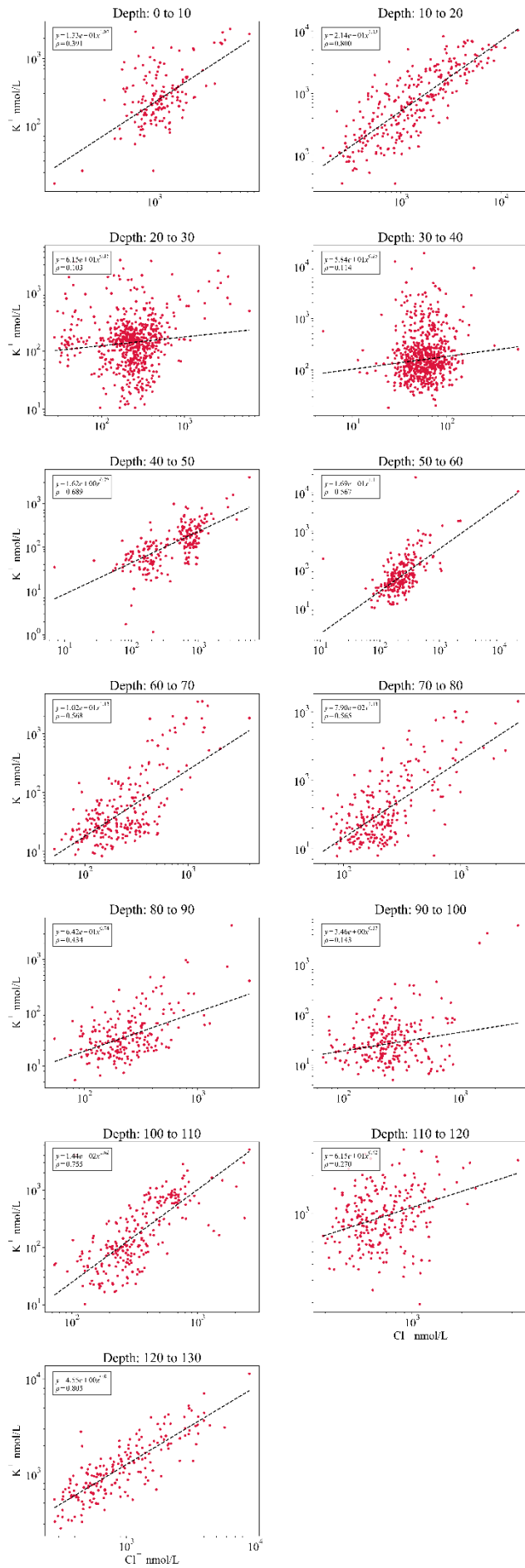
Chemical species	Method		Field Blanks		Blanks	
	Detection Limit (nmol/L)	LOQ (nmol/L)	Mean (nmol/L)	σ (nmol/L)	Mean (nmol/L)	σ (nmol/L)
Levogluconan	0.560	1.865	0.391	0.125	0.288	0.187
Na⁺	3.317	11.057	0.067	0.025	0.618	1.118
NH₄⁺	1.638	5.461	0.235	0.046	0.427	0.553
K⁺	2.860	9.534	0.060	0.031	0.565	0.964
Mg²⁺	0.476	1.586	0.198	0.012	0.111	0.160
Ca²⁺	3.679	11.931	0.720	0.059	0.804	1.211
Cl⁻	1.833	6.108	0.081	0.042	0.449	0.617
NO₃⁻	1.796	5.987	0.322	0.292	0.253	0.605
SO₄²⁻	0.320	1.066	0.087	0.020	0.073	0.108
MSA	1.029	3.431	0.731	0.080	0.129	0.332
Br⁻	0.082	0.274	0.004	0.002	0.015	0.028
BC	0.075	0.252	-	-	0.029	0.025

Supplementary Table 2 (S2): Descriptive statistics (mean, log₁₀ of variance and signal-to-noise ratio) for chemical species

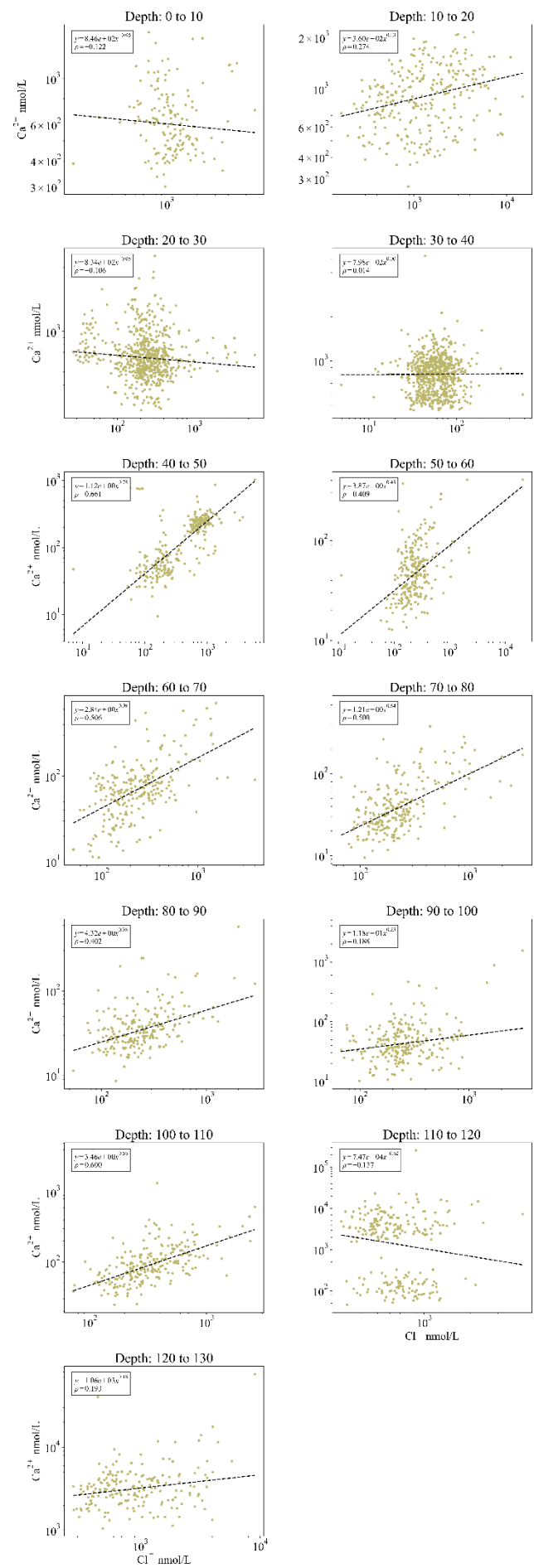
	levoglucosan			Sodium			Ammonium			Potassium			Magnesium			Calcium		
	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR
0-10	0.747	-0.430	11.872	1155.733	6.090	21.318	1970.560	6.008	25.859	425.428	5.404	25.006	300.793	4.251	52.479	668.180	4.852	23.401
10-20	0.830	-0.203	13.428	2017.413	6.789	38.337	2154.561	6.094	28.595	1362.751	6.441	84.306	381.298	4.648	67.647	954.056	5.184	34.261
20-30	0.185	-1.249	1.263	383.143	6.370	6.059	1449.824	6.191	18.115	245.942	5.265	13.650	412.661	4.831	73.556	717.924	5.065	25.290
30-40	0.309	-0.647	3.609	522.750	5.932	8.816	1593.440	5.942	20.251	406.223	6.097	23.791	276.047	4.345	47.816	837.290	4.925	29.825
40-50	0.355	-1.047	4.471	560.661	5.703	9.565	406.581	4.833	2.601	169.415	4.964	8.809	20.636	2.763	-0.306	172.827	4.468	4.582
50-60	0.166	-1.490	0.909	267.762	6.218	3.780	231.250	3.939	-0.006	178.326	5.750	9.373	25.739	2.566	0.656	59.363	3.481	0.271
60-70	0.153	-1.625	0.655	215.637	5.362	2.750	226.651	4.043	-0.075	182.106	5.381	9.612	22.945	2.139	0.129	95.290	4.005	1.636
70-80	0.238	-0.937	2.263	210.906	5.301	2.657	318.583	4.934	1.292	88.205	4.498	3.671	29.608	2.562	1.385	57.689	3.660	0.208
80-90	0.191	-1.236	1.376	164.350	5.093	1.737	632.564	5.520	5.962	88.475	5.002	3.688	24.414	2.100	0.406	46.687	3.407	-0.210
90-100	0.283	-0.921	3.106	154.864	5.324	1.550	1994.035	6.250	26.208	98.615	5.416	4.330	45.065	4.826	4.297	82.489	4.885	1.150
100-110	0.195	-1.045	1.455	403.685	5.591	6.464	1501.401	5.902	18.882	357.340	5.521	20.698	40.195	3.038	3.379	131.702	4.866	3.020
110-120	0.191	-1.531	1.384	743.461	5.670	13.175	872.725	5.505	9.533	1061.524	5.490	65.249	35.626	2.071	2.519	4601.506	8.450	172.830
120-130	0.254	-0.712	2.577	1288.529	6.389	23.941	780.435	4.929	8.161	1507.947	6.242	93.492	37.271	2.500	2.829	4226.543	7.596	158.585

	Chloride			Nitrate			Sulfate			MSA			Bromide			BC		
	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR	mean	LV	SNR
0-10	1305.967	5.932	13.621	482.353	5.701	13.236	567.126	5.515	75.642	6.895	1.549	2.327	21.198	2.164	1.286	120.915	4.545	14.181
10-20	1929.960	6.576	21.390	403.699	5.434	10.794	337.300	5.289	44.117	7.628	2.660	2.872	17.501	2.324	0.611	67.525	3.831	7.132
20-30	315.865	5.238	1.293	311.076	5.065	7.918	139.454	4.562	16.978	334.596	5.517	246.160	17.029	2.327	0.525	82.106	5.202	9.058
30-40	62.843	3.053	-1.858	401.606	4.808	10.729	36.943	3.645	2.917	3.886	1.202	0.087	16.632	2.547	0.453	48.255	3.982	4.588
40-50	538.082	5.527	4.060	245.491	4.478	5.882	56.574	4.618	5.610	6.854	1.874	2.296	12.326	2.186	-0.333	38.713	3.903	3.328
50-60	368.243	6.265	1.945	130.215	3.951	2.303	21.934	2.807	0.858	3.810	1.231	0.031	13.027	1.733	-0.205	40.866	3.749	3.613
60-70	319.646	5.147	1.340	117.461	4.590	1.907	27.383	3.112	1.606	3.886	0.603	0.088	15.723	2.055	0.287	35.078	3.512	2.849
70-80	305.936	5.086	1.169	87.753	4.517	0.985	21.852	2.676	0.847	4.935	0.841	0.868	25.172	2.520	2.012	33.104	3.370	2.588
80-90	301.931	4.967	1.119	266.327	5.193	6.529	16.807	2.425	0.155	5.922	2.109	1.602	20.166	2.137	1.098	29.955	3.155	2.172
90-100	313.594	4.894	1.265	641.875	5.486	18.189	44.745	4.361	3.987	5.130	1.470	1.013	53.913	2.638	7.258	40.579	3.130	3.575
100-110	407.755	5.091	2.437	626.377	5.378	17.708	78.619	4.407	8.634	7.696	2.254	2.923	52.305	2.653	6.965	55.326	3.378	5.522
110-120	735.597	5.229	6.519	770.188	5.444	22.173	111.975	4.443	13.209	42.729	3.115	28.989	55.051	2.439	7.466			
120-130	1217.163	6.102	12.515	507.949	5.077	14.031	76.838	3.216	8.389	52.824	2.946	36.501	38.670	2.541	4.476			

Supplementary Figure 1: Spearman correlation between K^+ and Cl^- with depth.



Supplementary Figure 2: Spearman correlation between Ca^{2+} and Cl^- with depth.



Supplementary Figure 3: Spearman correlation between Mg^{2+} and Cl^- with depth.

