Supporting Information to "Direct quantification of total and biological ice nuclei in cloud water" by Joly et al.

Table S1. pH and ion composition of the 12 cloud water samples studied.

		Concentration (µM)										
Sample	**pH**	**Na^+**	**NH_4^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**NO_3^-**	**SO_4^{2-}**	**Acetate**	**Formate**	**Oxalate**
# 76	5.9	n.a.	n.a.	n.a.	n.a.	n.a.	16.9	126.0	52.2	n.a.	n.a.	n.a.
# 77	6.0	124.8	408.5	22.8	26.8	148.5	12.8	47.9	19.6	58.3	109.6	12.3
# 78	5.5	22.7	32.7	9.2	12.3	7.1	24.1	10.4	7.1	3.3	11.3	3.0
# 79	4.6	0.6	52.7	1.6	0.8	3.2	0.3	5.0	1.3	4.3	5.6	1.0
# 80	4.9	80.6	39.3	6.1	12.0	5.2	13.3	2.2	1.8	7.4	5.3	1.1
# 81	5.8	145.7	188.6	6.2	20.3	9.3	23.4	11.2	4.8	15.3	15.6	6.7
# 82	5.3	1.0	75.4	0.1	0.9	6.1	0.2	2.0	1.6	4.2	6.2	3.0
# 83	5.6	93.5	531.1	10.7	14.3	34.6	12.2	49.9	10.7	b.d.l.	39.0	6.5
# 84	5.5	36.0	38.1	1.4	6.0	5.2	5.9	1.9	1.6	3.9	7.7	1.2
# 85	5.5	6.0	77.8	4.0	2.2	4.3	0.9	3.0	1.1	b.d.l.	18.2	3.3
# 86	5.9	8.8	16.8	5.5	1.3	4.5	1.0	1.0	0.5	3.2	3.2	1.0
# 87	6.2	21.2	39.3	7.6	8.3	2.3	26.7	10.9	5.3	4.0	13.6	0.7

n.a.: not available

b.d.l.: below detection limit.

Table S2. Spearman's correlation matrices (p-values, correlation coefficients and n) linking the different variables considered in our analysis. Positive relationships are indicated in green, negative relationships in red. Significant rank correlations (at 95% confidence) are indicated in bold/red.

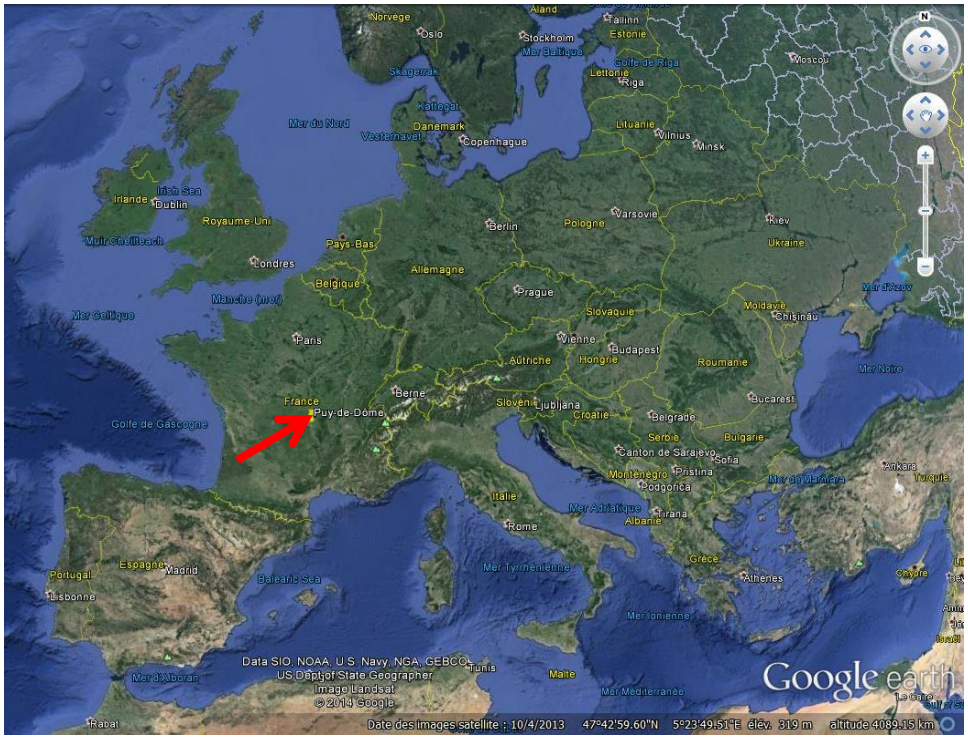
P-VALUES	Duration of sampling (h)	Sampling Temp. (°C)	Cumulated precipitation (mm)	Time in cloud before sampling (h)	Time in cloud after sampling (h)	Time event totale duration (h)	pH	Na^+ concentration (µM)	NH_4^+ concentration (µM)	K^+ concentration (µM)	Mg^{2+} concentration (µM)	Ca^{2+} concentration (µM)	NO_3^- concentration (µM)	SO_4^{2-} concentration (µM)	Cl^- concentration (µM)	Acetate concentration (µM)	Formate concentration (µM)	Oxalate concentration (µM)	Bact. Conc. (mL^{-1})	Onset temperature of freezing (°C)	Total IN concentration at -8°C (mL^{-1})	Total IN concentration at -9°C (mL^{-1})	Total IN concentration at -10°C (mL^{-1})	Total IN concentration at -11°C (mL^{-1})	Total IN concentration at -12°C (mL^{-1})	Bio IN concentration at -8°C (mL^{-1})	Bio IN concentration at -9°C (mL^{-1})	Bio IN concentration at -10°C (mL^{-1})	Bio IN concentration at -11°C (mL^{-1})	Bio IN concentration at -12°C (mL^{-1})	Proportion of biological IN at -8°C	Proportion of biological IN at -9°C	Proportion of biological IN at -10°C	Proportion of biological IN at -11°C	Proportion of biological IN at -12°C
Duration of sampling (h)		0.269	0.521	0.862	0.533	0.337	0.455	0.810	0.794	0.072	0.698	0.600	0.862	0.935	0.555	0.543	0.831	0.401	0.192	0.052	**0.045**	**0.050**	**0.025**	0.235	0.570	**0.045**	**0.042**	0.104	0.300	0.713	0.409	0.106	0.209	0.435	0.111
Sampling Temp. (°C)			0.405	0.055	0.067	0.051	0.183	0.574	0.739	0.385	0.937	0.304	0.391	0.601	0.075	0.649	0.355	0.789	0.855	**0.036**	0.051	0.075	0.067	0.229	0.087	**0.016**	0.124	0.270	0.162	0.082	0.206	0.087	**0.015**	**0.004**	**0.039**
Cumulated precipitation (mm)				**0.026**	**0.015**	**0.004**	0.265	0.758	0.747	0.426	0.933	0.351	0.288	0.307	0.557	0.889	1.000	0.715	0.845	0.785	0.599	0.343	0.506	0.358	0.696	0.946	0.355	0.498	0.358	0.665	0.314	0.398	0.975	0.740	0.862
Time in cloud before sampling (h)					0.085	**0.016**	0.191	0.873	0.518	0.298	0.650	0.492	0.255	0.307	0.665	0.154	0.142	0.338	0.533	0.954	0.957	0.452	0.572	**0.038**	0.120	0.957	0.334	0.297	**0.025**	0.150	0.114	0.332	0.854	0.143	0.483
Time in cloud after sampling (h)						**0.000**	0.075	0.272	0.640	0.790	0.467	0.527	0.572	0.888	0.471	0.811	0.750	0.936	0.855	0.360	0.282	0.513	0.360	0.701	0.712	0.282	0.488	0.277	0.726	0.829	0.495	0.201	0.758	0.372	0.528
Time event totale duration (h)							0.100	0.332	0.615	0.545	0.582	0.703	0.505	0.974	0.429	0.491	0.669	0.979	0.868	0.413	0.314	0.675	0.465	0.676	0.674	0.314	0.666	0.457	0.701	0.777	0.265	0.118	0.782	0.372	0.461
pH								0.212	0.640	**0.043**	0.117	0.649	0.159	0.194	0.101	0.863	0.102	0.572	0.162	0.407	0.591	0.559	0.535	0.829	0.464	0.591	0.627	0.719	0.777	0.603	0.685	0.252	0.782	0.332	0.461
Na^+ concentration (µM)									0.252	**0.023**	**0.000**	**0.012**	0.077	**0.017**	**0.035**	0.311	0.110	0.052	0.117	0.702	0.097	0.236	0.307	0.385	0.242	0.097	0.166	**0.032**	0.313	0.194	0.117	0.548	0.651	0.898	0.705
NH_4^+ concentration (µM)										0.325	0.184	0.110	**0.014**	0.177	0.759	0.535	**0.008**	**0.010**	0.466	0.660	0.105	0.314	0.730	0.098	0.163	0.105	0.391	0.874	0.165	0.110	0.369	0.886	0.692	0.209	0.187
K^+ concentration (µM)											**0.001**	0.102	**0.003**	**0.002**	**0.013**	0.790	**0.047**	0.221	**0.004**	0.295	0.883	0.879	0.867	0.912	0.326	0.883	0.906	0.510	0.810	0.250	0.770	**0.024**	0.156	0.394	0.280
Mg^{2+} concentration (µM)												**0.010**	**0.011**	**0.001**	**0.011**	0.392	**0.023**	**0.028**	**0.029**	0.810	0.368	0.538	0.531	0.410	0.091	0.368	0.471	0.111	0.270	0.059	0.223	0.290	0.304	0.618	0.542
Ca^{2+}concentration (µM)													0.124	**0.024**	0.582	0.473	0.113	**0.001**	0.614	0.175	**0.035**	**0.019**	**0.021**	0.077	0.080	**0.035**	**0.024**	**0.011**	0.068	0.082	0.369	0.693	0.602	0.323	0.305
NO_3^- concentration (µM)														**0.000**	0.075	0.555	**0.003**	0.084	**0.002**	0.341	0.638	0.559	0.600	0.328	0.177	0.638	0.505	0.361	0.260	0.098	0.495	0.107	0.062	**0.016**	**0.039**
SO_4^{2-} concentration (µM)															**0.020**	0.383	**0.030**	0.128	**0.039**	0.502	0.530	0.160	0.157	0.235	0.154	0.530	0.132	0.054	0.185	0.093	0.893	0.143	0.249	0.371	0.471
Cl^- concentration (µM)																0.545	0.385	0.926	**0.013**	0.112	0.538	0.655	0.968	0.777	0.637	0.538	0.819	0.483	0.987	0.580	0.334	**0.016**	0.081	0.459	0.506
Acetate concentration (µM)																	0.947	0.658	0.544	0.501	0.600	0.786	0.775	0.810	1.000	0.600	0.839	0.867	0.912	0.644	0.222	0.775	0.345	0.789	0.280
Formate concentration (µM)																		**0.008**	0.214	0.832	0.600	0.879	0.920	0.097	**0.049**	0.600	0.853	0.776	0.076	**0.043**	0.555	0.616	0.438	0.061	0.185
Oxalate concentration (µM)																			0.750	0.357	0.092	0.145	0.216	**0.001**	**0.002**	0.092	0.164	0.173	**0.001**	**0.003**	0.221	0.877	1.000	0.881	0.797
Bact. Conc. (mL^{-1})																				0.277	0.934	0.430	0.483	0.058	0.565	0.934	0.457	0.834	0.171	0.703	0.122	0.083	0.121	0.255	0.143
Onset temperature of freezing (°C)																					**0.002**	**0.018**	**0.022**	0.609	0.676	**0.002**	**0.026**	0.124	0.749	0.517	0.558	**0.029**	**0.000**	**0.033**	**0.011**
Total IN concentration at -8°C (mL^{-1})																						**0.000**	**0.003**	0.148	0.812	**0.000**	**0.000**	**0.013**	0.244	0.787	0.638	0.102	0.077	0.344	0.323
Total IN concentration at -9°C (mL^{-1})																							**0.000**	0.105	0.552	**0.000**	**0.000**	**0.001**	0.165	0.537		0.194	0.161	0.343	0.221
Total IN concentration at -10°C (mL^{-1})																								0.204	0.563	**0.003**	**0.000**	**0.000**	0.241	0.601		0.250	0.171	0.186	0.057
Total IN concentration at -11°C (mL^{-1})																									**0.003**	0.148	0.084	0.132	**0.000**	**0.002**		0.650	0.727	0.415	0.827
Total IN concentration at -12°C (mL^{-1})																										0.812	0.559	0.395	**0.002**	**0.000**		0.747	0.318	0.479	0.799
Bio IN concentration at -8°C (mL^{-1})																											**0.000**	**0.013**	0.244	0.787	0.638	0.102	0.077	0.344	0.323
Bio IN concentration at -9°C (mL^{-1})																												**0.000**	0.121	0.527		0.265	0.230	0.511	0.314
Bio IN concentration at -10°C (mL^{-1})																													0.106	0.354		0.722	0.620	0.565	0.302
Bio IN concentration at -11°C (mL^{-1})																														**0.001**		0.849	0.548	0.352	0.774
Bio IN concentration at -12°C (mL^{-1})																																0.650	0.171	0.332	0.551
Proportion of biological IN at -8°C																																			
Proportion of biological IN at -9°C																																**0.016**	0.143	0.098
Proportion of biological IN at -10°C																																	**0.014**	**0.010**
Proportion of biological IN at -11°C																																		**0.000**
Proportion of biological IN at -12°C																																			

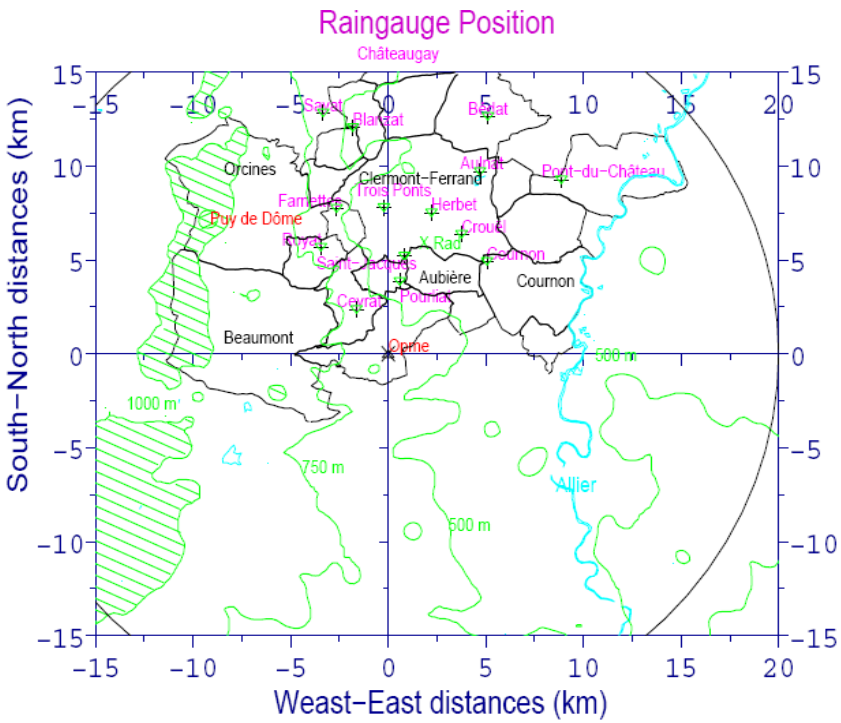
Spearman's r	Duration of sampling (h)	Sampling Temp. (°C)	Cumulated precipitation (mm)	Time in cloud before sampling (h)	Time in cloud after sampling (h)	Time event totale duration (h)	pH	Na^+ concentration (µM)	NH_4^+ concentration (µM)	K^+ concentration (µM)	Mg^{2+} concentration (µM)	Ca^{2+} concentration (µM)	NO_3^- concentration (µM)	SO_4^{2-} concentration (µM)	Cl^- concentration (µM)	Acetate concentration (µM)	Formate concentration (µM)	Oxalate concentration (µM)	Bact. Conc. (mL^{-1})	Onset temperature of freezing (°C)	Total IN concentration at -8°C (mL^{-1})	Total IN concentration at -9°C (mL^{-1})	Total IN concentration at -10°C (mL^{-1})	Total IN concentration at -11°C (mL^{-1})	Total IN concentration at -12°C (mL^{-1})	Bio IN concentration at -8°C (mL^{-1})	Bio IN concentration at -9°C (mL^{-1})	Bio IN concentration at -10°C (mL^{-1})	Bio IN concentration at -11°C (mL^{-1})	Bio IN concentration at -12°C (mL^{-1})	Proportion of biological IN at -8°C	Proportion of biological IN at -9°C	Proportion of biological IN at -10°C	Proportion of biological IN at -11°C	Proportion of biological IN at -12°C
Duration of sampling (h)																																				
Sampling Temp. (°C)	-0.347																																			
Cumulated precipitation (mm)	-0.206	0.265																																		
Time in cloud before sampling (h)	0.056	-0.566	-0.636																																	
Time in cloud after sampling (h)	0.200	-0.545	-0.679	0.517																																
Time event totale duration (h)	0.304	-0.574	-0.761	0.676	0.960																															
pH	-0.239	0.413	0.269	-0.406	-0.531	-0.497																														
Na^+ concentration (µM)	0.082	-0.191	-0.105	-0.055	0.364	0.323	0.409																													
NH_4^+ concentration (µM)	0.089	-0.114	0.110	-0.219	-0.159	-0.171	0.159	0.378																												
K^+ concentration (µM)	-0.562	0.291	0.268	-0.345	-0.091	-0.205	0.618	0.673	0.328																											
Mg^{2+} concentration (µM)	-0.132	0.027	-0.029	-0.155	0.245	0.187	0.500	0.936	0.433	0.845																										
Ca^{2+} concentration (µM)	0.178	-0.342	0.311	-0.232	0.214	0.130	0.155	0.724	0.509	0.519	0.738																									
NO_3^- concentration (µM)	-0.056	0.273	0.334	-0.357	-0.182	-0.214	0.434	0.555	0.711	0.800	0.727	0.492																								
SO_4^{2-} concentration (µM)	-0.026	0.168	0.322	-0.322	0.046	-0.011	0.403	0.697	0.438	0.825	0.843	0.669	0.858																							
Cl^- concentration (µM)	-0.189	0.182	-0.189	0.140	0.231	0.252	0.497	0.636	-0.105	0.718	0.727	0.187	0.531	0.658																						
Acetate concentration (µM)	-0.206	-0.155	0.048	0.460	0.082	0.233	-0.059	0.337	0.210	0.091	0.287	0.242	0.200	0.292	0.205																					
Formate concentration (µM)	-0.073	0.309	0.000	-0.473	-0.109	-0.146	0.518	0.509	0.752	0.609	0.673	0.506	0.800	0.651	0.291	-0.023																				
Oxalate concentration (µM)	0.282	-0.091	0.125	-0.320	0.027	-0.009	0.192	0.598	0.737	0.402	0.658	0.842	0.543	0.487	0.032	0.151	0.749																			
Bact. Conc. (mL^{-1})	-0.450	0.067	-0.071	0.224	0.067	0.061	0.479	0.527	0.261	0.818	0.685	0.182	0.855	0.657	0.745	0.219	0.430	0.116																		
Onset temperature of freezing (°C)	0.571	-0.608	-0.088	-0.019	0.290	0.261	-0.264	0.130	0.150	-0.348	-0.082	0.440	-0.302	-0.215	-0.483	-0.227	-0.072	0.308	-0.381																	
Total IN concentration at -8°C (mL^{-1})	0.588	-0.574	-0.169	-0.018	0.339	0.318	-0.173	0.525	0.515	-0.050	0.301	0.638	0.152	0.201	-0.198	0.178	0.178	0.532	-0.030	0.791																
Total IN concentration at -9°C (mL^{-1})	0.603	-0.558	0.317	-0.253	0.221	0.143	-0.198	0.412	0.355	-0.055	0.222	0.719	0.198	0.455	-0.152	0.099	0.055	0.495	-0.305	0.694	0.801															
Total IN concentration at -10°C (mL^{-1})	0.666	-0.571	0.225	-0.192	0.306	0.247	-0.210	0.360	0.125	-0.061	0.226	0.713	0.178	0.458	-0.014	-0.104	-0.037	0.429	-0.268	0.677	0.801	0.944														
Total IN concentration at -11°C (mL^{-1})	0.413	0.418	0.326	-0.661	-0.139	-0.152	0.079	0.317	0.594	-0.033	0.300	0.628	0.345	0.413	-0.103	0.083	0.583	0.941	-0.690	0.185	0.492	0.543	0.439													
Total IN concentration at -12°C (mL^{-1})	0.205	0.567	0.142	-0.524	-0.134	-0.152	0.262	0.437	0.511	0.370	0.605	0.620	0.463	0.486	0.171	0.000	0.681	0.908	-0.240	-0.152	0.087	0.214	0.209	0.835												
Bio IN concentration at -8°C (mL^{-1})	0.588	-0.674	0.022	-0.018	0.339	0.318	-0.173	0.525	0.515	-0.050	0.301	0.638	0.152	0.201	-0.198	0.178	0.178	0.532	-0.030	0.791	1.000	0.923	0.801	0.492	0.087											
Bio IN concentration at -9°C (mL^{-1})	0.620	-0.492	0.309	-0.322	0.235	0.147	-0.166	0.474	0.306	-0.043	0.258	0.701	0.225	0.484	-0.078	0.074	0.068	0.477	-0.288	0.664	0.921	0.984	0.938	0.572	0.211	0.921										
Bio IN concentration at -10°C (mL^{-1})	0.516	-0.364	0.229	-0.346	0.360	0.251	-0.123	0.675	0.058	0.237	0.535	0.759	0.305	0.594	0.237	-0.061	0.103	0.468	-0.084	0.492	0.719	0.834	0.902	0.511	0.303	0.719	0.892									
Bio IN concentration at -11°C (mL^{-1})	0.365	0.479	0.326	-0.697	-0.127	-0.139	0.103	0.383	0.510	0.083	0.400	0.644	0.394	0.456	-0.006	0.033	0.617	0.941	-0.548	0.117	0.406	0.475	0.409	0.988	0.994	0.406	0.523	0.541								
Bio IN concentration at -12°C (mL^{-1})	0.134	0.576	0.157	-0.491	-0.079	-0.103	0.188	0.483	0.577	0.417	0.650	0.619	0.552	0.559	0.200	0.167	0.700	0.882	-0.143	-0.233	0.098	0.222	0.189	0.842	0.982	0.098	0.228	0.328	0.867							
Proportion of biological IN at -8°C	-0.263	0.393	0.318	-0.480	-0.218	-0.350	-0.131	-0.500	-0.301	-0.100	-0.400	-0.301	-0.218	-0.044	-0.306	-0.401	-0.200	-0.402	-0.522	-0.188	-0.397					-0.397										
Proportion of biological IN at -9°C	-0.514	0.539	0.284	-0.324	-0.418	-0.499	0.378	0.216	0.052	0.701	0.372	-0.143	0.512	0.472	0.703	-0.104	0.182	-0.057	0.730	-0.654	-0.518	-0.424	-0.379	-0.164	0.117	-0.518	-0.368	-0.122	-0.069	0.164						
Proportion of biological IN at -10°C	-0.412	0.705	-0.011	-0.063	-0.105	-0.095	0.095	0.164	0.144	0.485	0.362	-0.188	0.579	0.380	0.548	0.277	0.335	0.000	0.584	-0.882	-0.554	-0.454	-0.444	0.127	0.353	-0.554	-0.394	-0.169	0.216	0.470		0.703				
Proportion of biological IN at -11°C	-0.279	0.821	0.120	-0.498	-0.317	-0.317	0.343	0.052	0.468	0.322	0.191	-0.376	0.731	0.318	0.265	0.104	0.670	0.057	0.464	-0.673	-0.335	-0.336	-0.455	0.291	0.254	-0.335	-0.236	-0.208	0.330	0.343		0.498	0.740			
Proportion of biological IN at -12°C	-0.535	0.656	0.064	-0.252	-0.227	-0.264	0.264	0.153	0.485	0.407	0.237	-0.383	0.656	0.258	0.239	0.407	0.492	-0.103	0.575	-0.756	-0.349	-0.425	-0.617	0.080	0.093	-0.349	-0.355	-0.363	0.104	0.215		0.552	0.762	0.948		

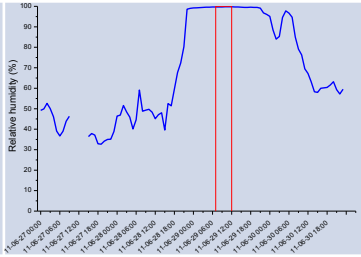
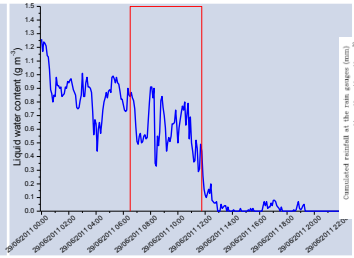
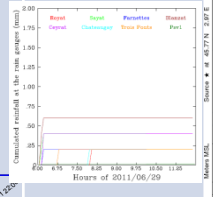
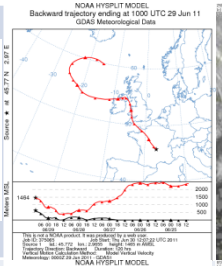
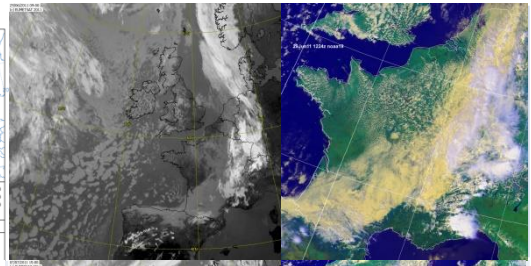
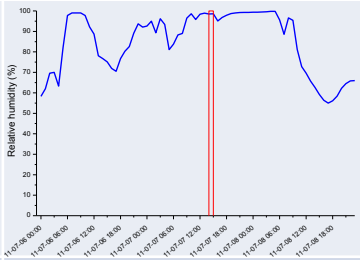
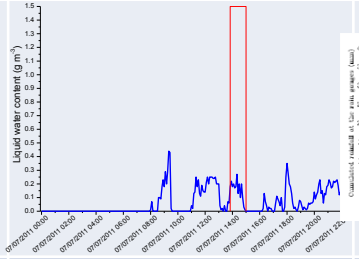
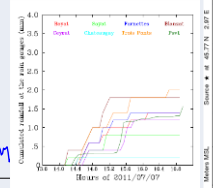
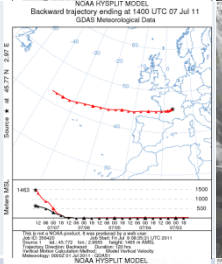
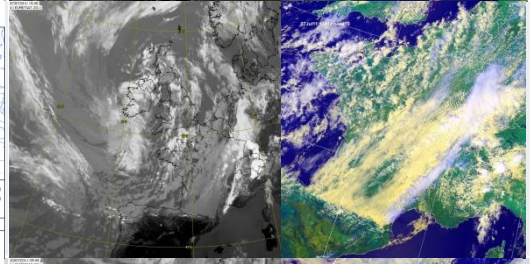
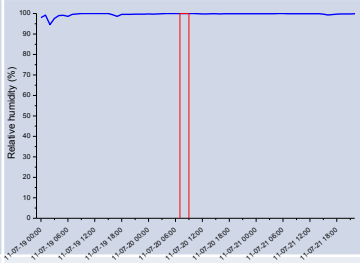
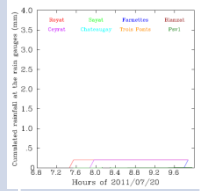
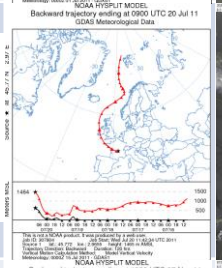
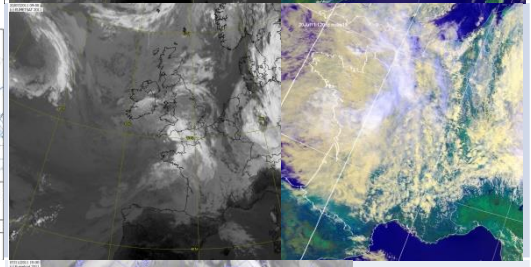
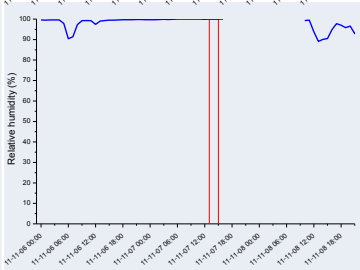
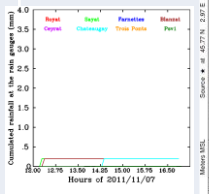
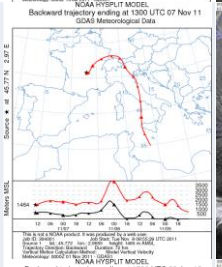
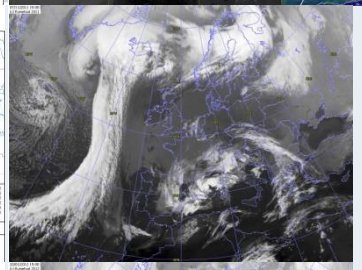
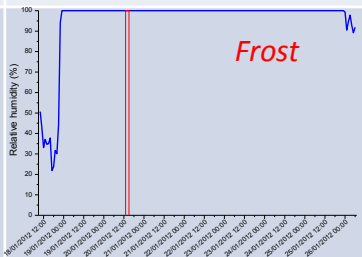
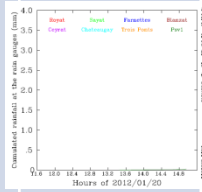
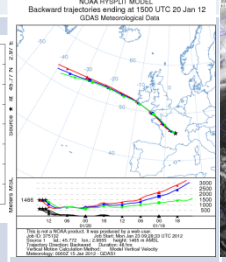
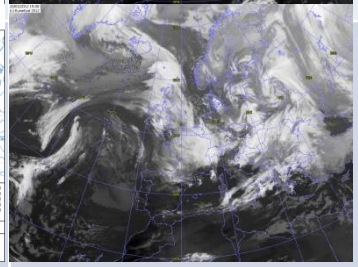
n	Duration of sampling (h)	Sampling Temp. (°C)	Cumulated precipitation (mm)	Time in cloud before sampling (h)	Time in cloud after sampling (h)	Time event totale duration (h)	pH	Na^+ concentration (µM)	NH_4^+ concentration (µM)	K^+ concentration (µM)	Mg^{2+} concentration (µM)	Ca^{2+} concentration (µM)	NO_3^- concentration (µM)	SO_4^{2-} concentration (µM)	Cl^- concentration (µM)	Acetate concentration (µM)	Formate concentration (µM)	Oxalate concentration (µM)	Bact. Conc. (mL^{-1})	Onset temperature of freezing (°C)	Total IN concentration at -8°C (mL^{-1})	Total IN concentration at -9°C (mL^{-1})	Total IN concentration at -10°C (mL^{-1})	Total IN concentration at -11°C (mL^{-1})	Total IN concentration at -12°C (mL^{-1})	Bio IN concentration at -8°C (mL^{-1})	Bio IN concentration at -9°C (mL^{-1})	Bio IN concentration at -10°C (mL^{-1})	Bio IN concentration at -11°C (mL^{-1})	Bio IN concentration at -12°C (mL^{-1})	Proportion of biological IN at -8°C	Proportion of biological IN at -9°C	Proportion of biological IN at -10°C	Proportion of biological IN at -11°C	Proportion of biological IN at -12°C
Duration of sampling (h)	12																																			
Sampling Temp. (°C)	12	12																																		
Cumulated precipitation (mm)	12	12	12																																	
Time in cloud before sampling (h)	12	12	12	12																																
Time in cloud after sampling (h)	12	12	12	12	12																															
Time event totale duration (h)	12	12	12	12	12	12																														
pH	12	12	12	12	12	12	12																													
Na^+ concentration (µM)	11	11	11	11	11	11	11	11																												
NH_4^+ concentration (µM)	11	11	11	11	11	11	11	11	11																											
K^+ concentration (µM)	11	11	11	11	11	11	11	11	11	11																										
Mg^{2+} concentration (µM)	11	11	11	11	11	11	11	11	11	11	11																									
Ca^{2+} concentration (µM)	11	11	11	11	11	11	11	11	11	11	11	11																								
NO_3^- concentration (µM)	12	12	12	12	12	12	12	11	11	11	11	11	12																							
SO_4^{2-} concentration (µM)	12	12	12	12	12	12	12	11	11	11	11	11	12	12																						
Cl^- concentration (µM)	12	12	12	12	12	12	12	11	11	11	11	11	12	12	12																					
Acetate concentration (µM)	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11																				
Formate concentration (µM)	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11																			
Oxalate concentration (µM)	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11																		
Bact. Conc. (mL^{-1})	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																	
Onset temperature of freezing (°C)	12	12	12	12	12	12	12	11	11	11	11	11	12	12	12	11	11	11	10	12																
Total IN concentration at -8°C (mL^{-1})	12	12	12	12	12	12	12	11	11	11	11	11	12	12	12	11	11	11	10	12	12															
Total IN concentration at -9°C (mL^{-1})	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	11														
Total IN concentration at -10°C (mL^{-1})	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	10	11													
Total IN concentration at -11°C (mL^{-1})	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	11	10	10	10												
Total IN concentration at -12°C (mL^{-1})	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	10	10	10	10	10											
Bio IN concentration at -8°C (mL^{-1})	12	12	12	12	12	12	12	11	11	11	11	11	12	12	12	11	11	11	10	12	12	11	11	10	10	12										
Bio IN concentration at -9°C (mL^{-1})	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	11	11	10	10	11	11									
Bio IN concentration at -10°C (mL^{-1})	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	11	11	10	10	11	11	11								
Bio IN concentration at -11°C (mL^{-1})	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	11	10	10	10	10	10	10	10	10							
Bio IN concentration at -12°C (mL^{-1})	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	11	10	10	10	10	10	10	10	10	10						
Proportion of biological IN at -8°C	12	12	12	12	12	12	12	11	11	11	11	11	12	12	12	11	11	11	10	12	12					12					12					
Proportion of biological IN at -9°C	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	11	11	10	10	11	11	11	10	10		11				
Proportion of biological IN at -10°C	11	11	11	11	11	11	11	10	10	10	10	10	11	11	11	10	10	10	9	11	11	11	11	10	10	11	11	11	10	10		11	11			
Proportion of biological IN at -11°C	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	11	10	10	10	10	10	10	10	10	10		10	10	10		
Proportion of biological IN at -12°C	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	9	9	9	8	10	11	10	10	10	10	10	10	10	10	10		10	10	10	10	

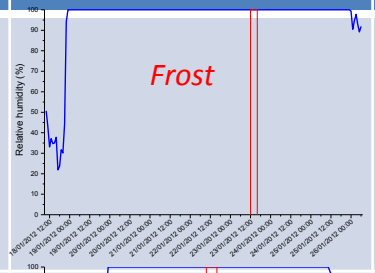
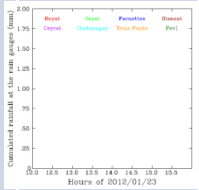
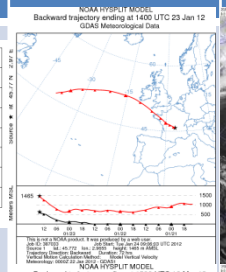
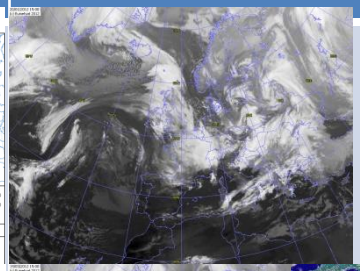
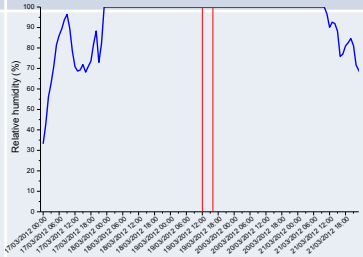
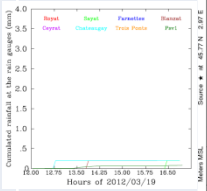
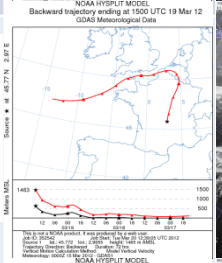
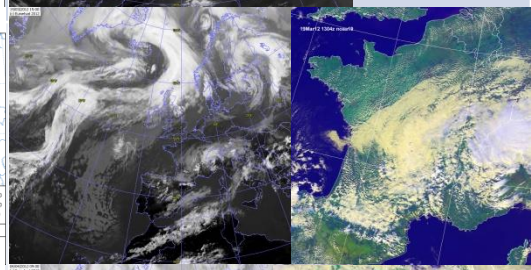
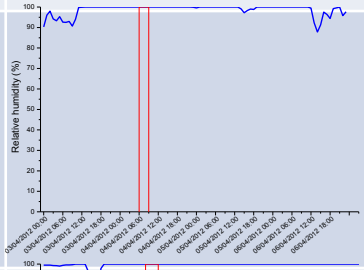
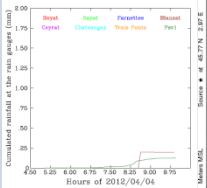
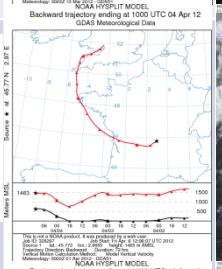
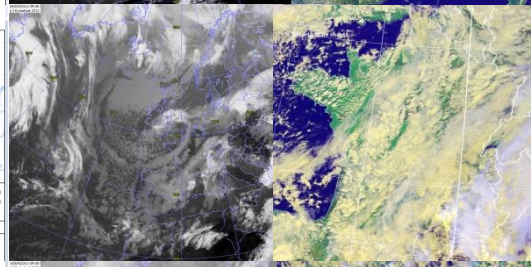
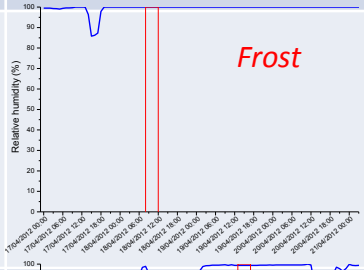
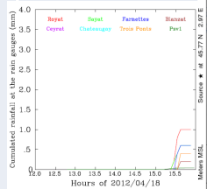
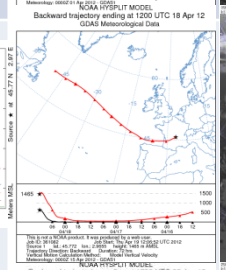
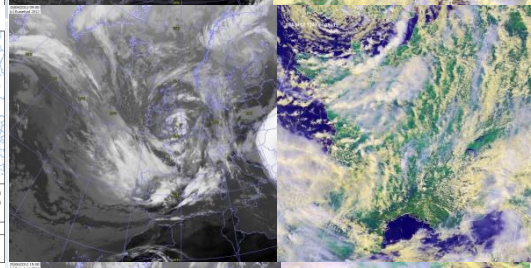
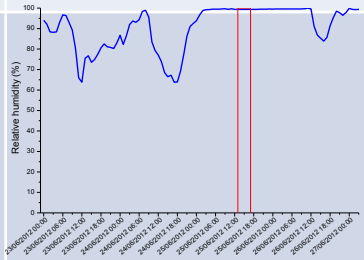
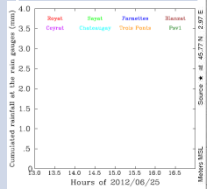
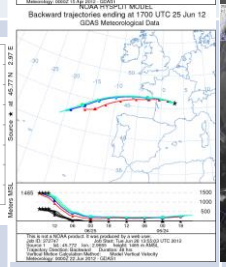
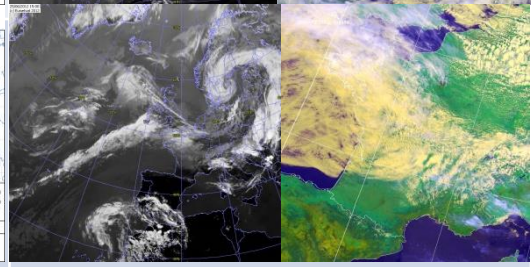
Figure S1: A- Maps locating (**left**) the sampling site (puy-de-Dôme Mountain, 45° 46' 20'' North, 2° 57' 57'' East) (Source: Google Earth) and (**right**) the rain gauge sites around puy-de-Dôme.

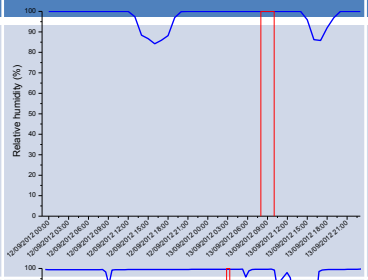
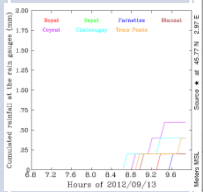
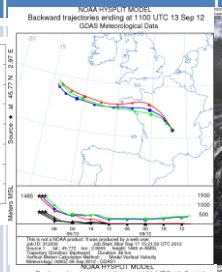
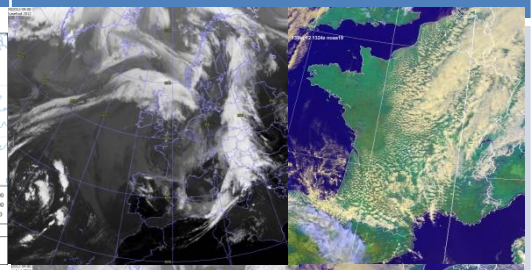
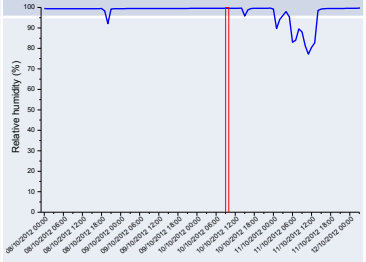
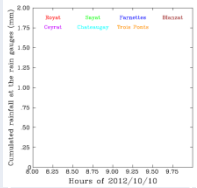
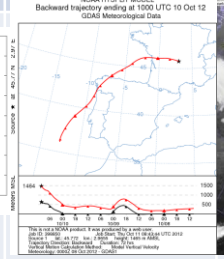
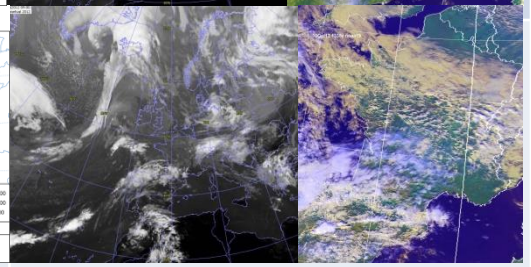
B- Table recapitulating meteorological data (relative humidity, LWC, downwind precipitation), backtrajectories and satellite visible images of each cloud event sampled. 72-hours backtrajectory plots were made using HYSPLIT model on GDAS1 meteorological data archive and default settings (Draxler and Rolph, 2010). Eumetsat satellite visible images were obtained from http://www.woksat.info/wwp.html.





Sample id.	Sampling date and time (UTC)	Relative Humidity (Sampling period framed in red)	Liquid Water Content (Sampling period framed in red)	Cumulated precipitation (mm)	HYSPLIT backtrajectory	EUMETSAT satellite visible images
#76	29 June 2011 6:30 AM – 11:45 AM					
#77	7 July 2011 1:50 PM – 3:00 PM					
#78	20 July 2011 7:30 AM – 9:10 AM		Not Available (estimated 0.3 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#79	7 Nov. 2011 1:00 PM – 2:30 PM		Not Available (estimated 0.6 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#80	20 Jan. 2012 12:45 PM – 3:00 PM		Not Available (estimated 0.3 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			

Sample id.	Sampling date and time (UTC)	Relative Humidity (Sampling period framed in red)	Liquid Water Content (Sampling period framed in red)	Cumulated precipitation (mm)	HYSPLIT backtrajectory	EUMETSAT satellite visible images
#81	23 Jan. 2012 1:00 PM – 4:00 PM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#82	19 Mar. 2012 12:10 PM – 4:10 PM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#83	4 Apr. 2012 6:10 AM – 9:20 AM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#84	18 Apr. 2012 8:10 AM – 12:15 PM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#85	25 June 2012 1:35 PM – 5:00 PM		Not Available (estimated 0.3 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			

Sam-ple id.	Sampling date and time (UTC)	Relative Humidity (Sampling period framed in red)	Liquid Water Content (Sampling period framed in red)	Cumulated precipitation (mm)	HYSPLIT backtrajectory	EUMETSAT satellite visible images
#86	13 Sep. 2012 7:50 AM – 9:50 AM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			
#87	10 Oct. 2012 8:40 AM – 9:50 AM		Not Available (estimated 0.1 g m^{-3} from sample collection rate and puy-de-Dôme data archive)			

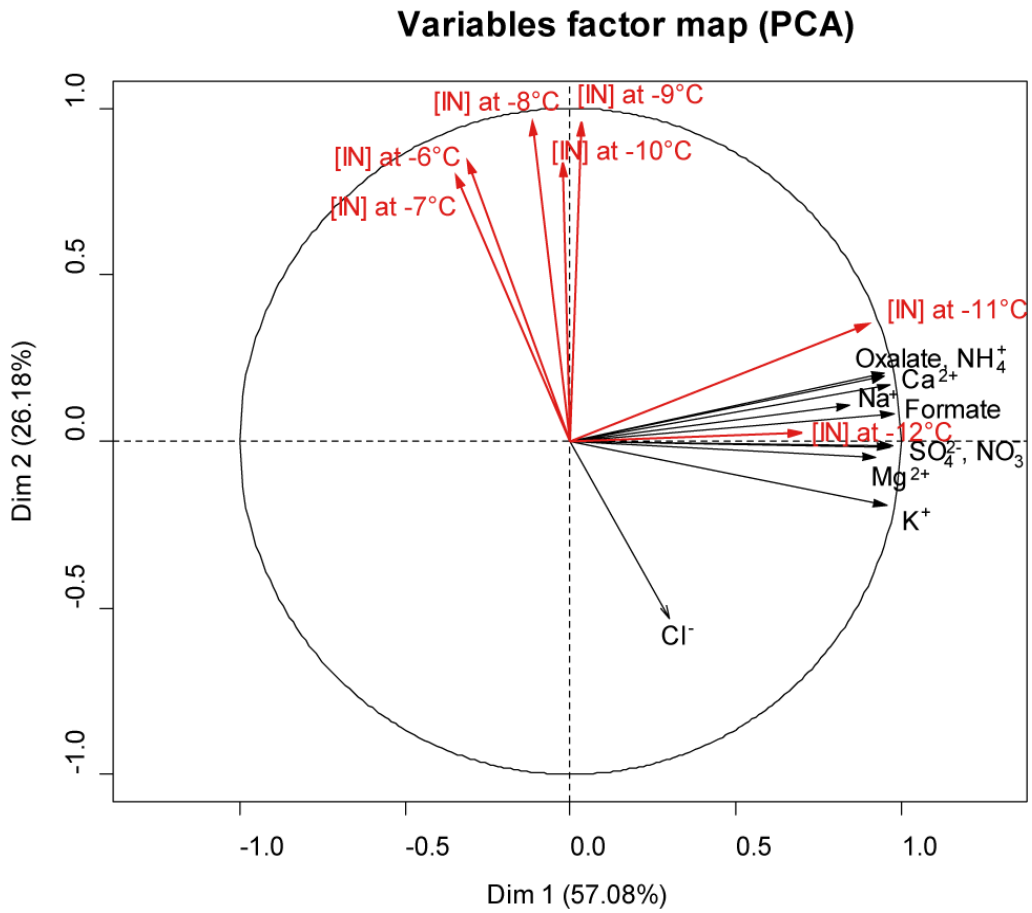


Figure S2. Principal component analysis (PCA) map of the chemical variables (black vectors) and of the concentrations of total IN measured at temperatures from -6°C to -12°C (red vectors). The analysis includes the samples for which all these data were available (n = 9).