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Combined organic and inorganic source apportionment on yearlong ToF-ACSM dataset at a suburban station in Athens

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Table S1. List of criteria applied for selecting environmentally reasonable runs.

Factor	Criterion	Threshold
HOA	HOA-eBCff correlation	p<=0.05
COA	Hourly contribution: $\frac{12}{9+10}$	>1
BBOA	BBOA-eBCwb correlation	p<=0.05
BBOA	BBOA-expl.var m60	p<=0.05
LO-OOA	Monitor m/z 43, 44	>0
MO-OOA	Monitor m/z 43, 44	>0

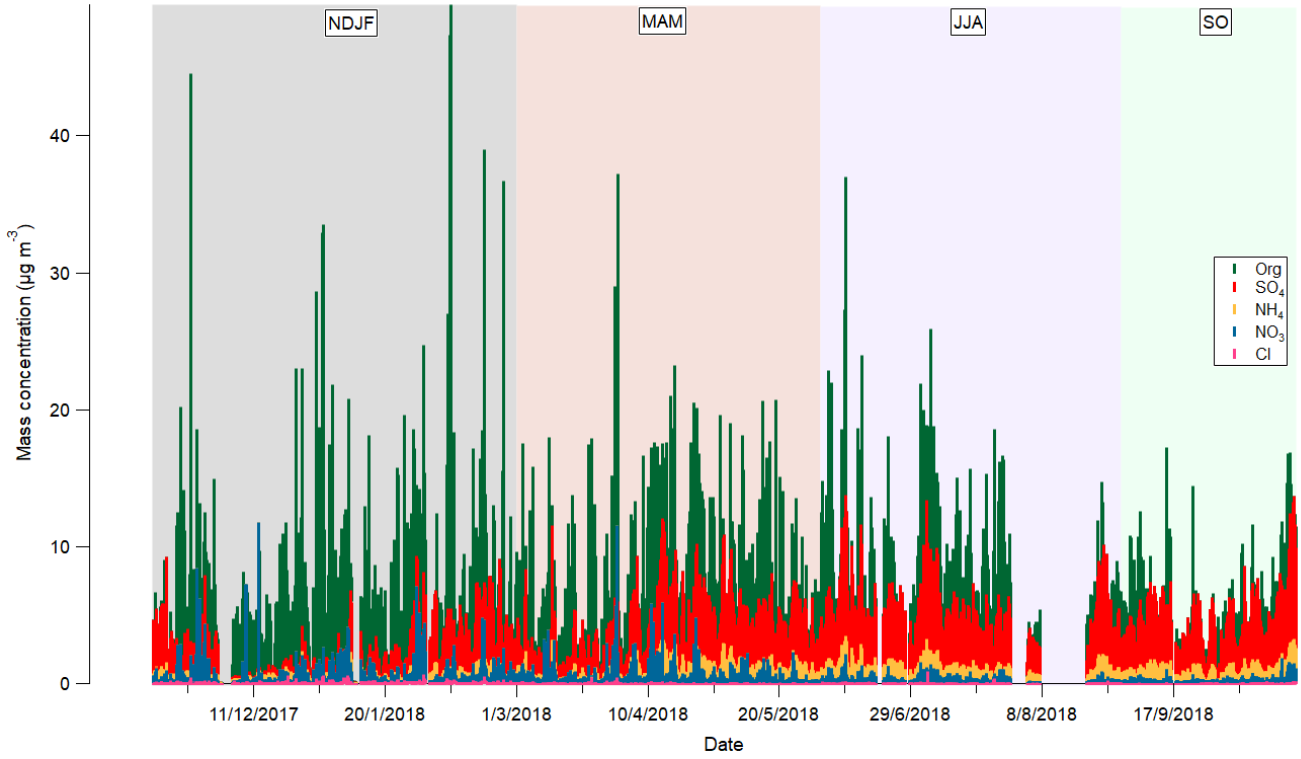
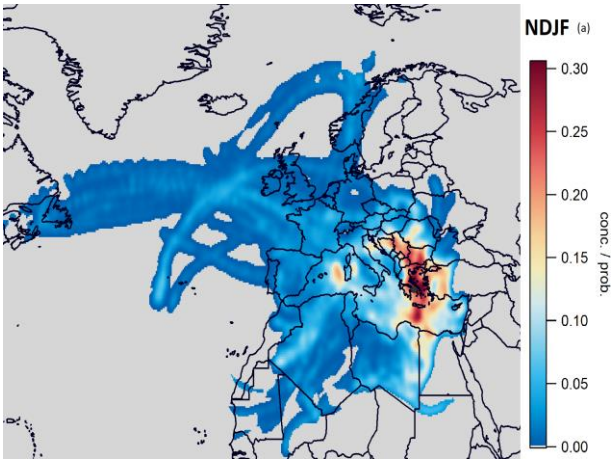


Figure S1. Time Series of the NRS(Organics, sulphate, ammonium, nitrate and chloride) from ToF-ACSM for November 2017 to October 2018 with shaded areas for each season: NDJF: November-February, MAM: March-May, JJA: June-August and SO: September-October.

Table S2. NRS mass concentration in µgm^{-3}for each period reported: (November 2017-February 2018 (NDJF), March-May (MAM), June-August (JJA) and September-October (SO).

µg m^{-3}	Yearly	NDJF	MAM	JJA	SO
Org	4.6	4.11	5.1	5.1	4.7
SO_4^{2-}	3.03	2.04	3.45	3.57	3.97
NO_3^-	0.38	0.47	0.47	0.26	0.28
NH_4^+	0.82	0.61	0.99	0.87	0.94
Cl^-	0.02	0.05	0.02	0.02	0.02
eBC	0.82	0.8	0.88	0.76	0.91
PM1	9.67	8.08	10.91	10.58	10.82



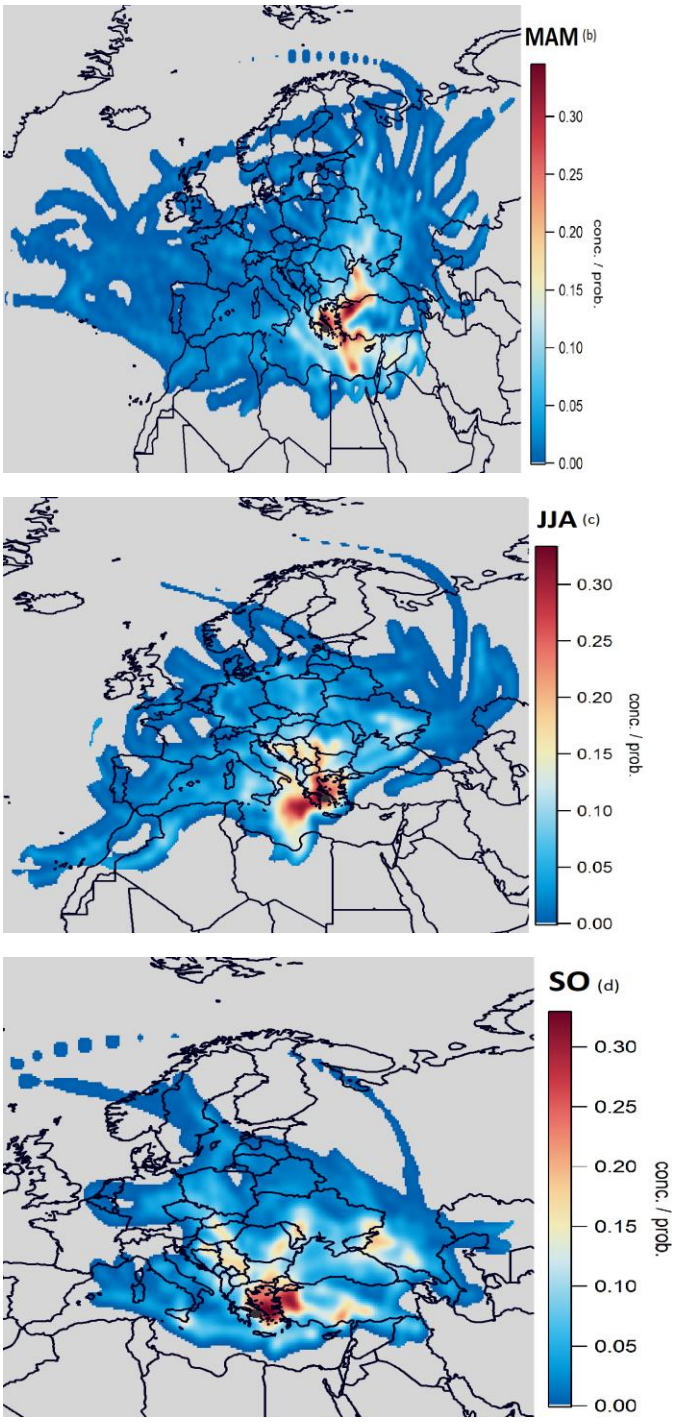


Figure S2. Back-trajectories for each season for sulfate: NDJF (a), MAM (b), JJA (c) and SO (d)

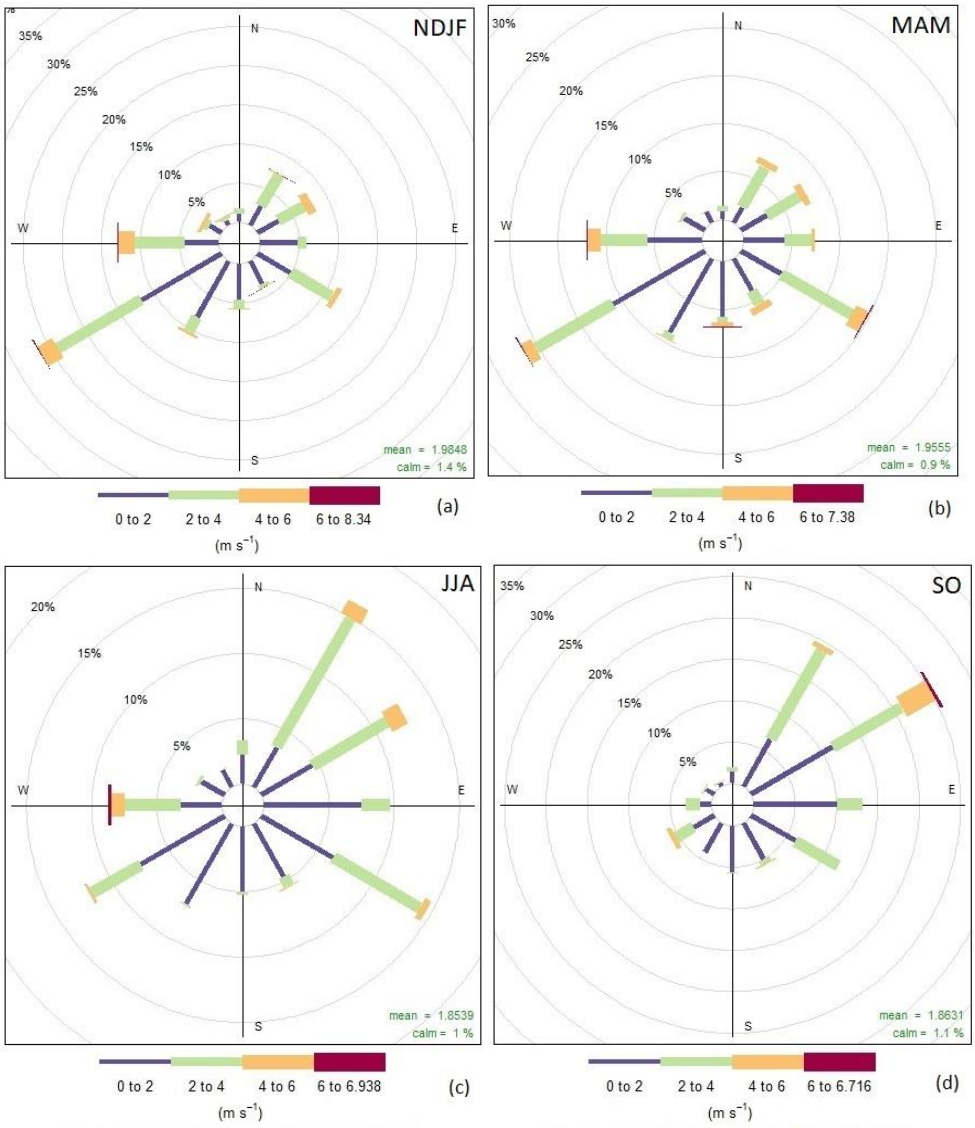


Figure S3. Wind rose plots for each season studied: NDJF (a), MAM (b), JJA (c) and SO (d).

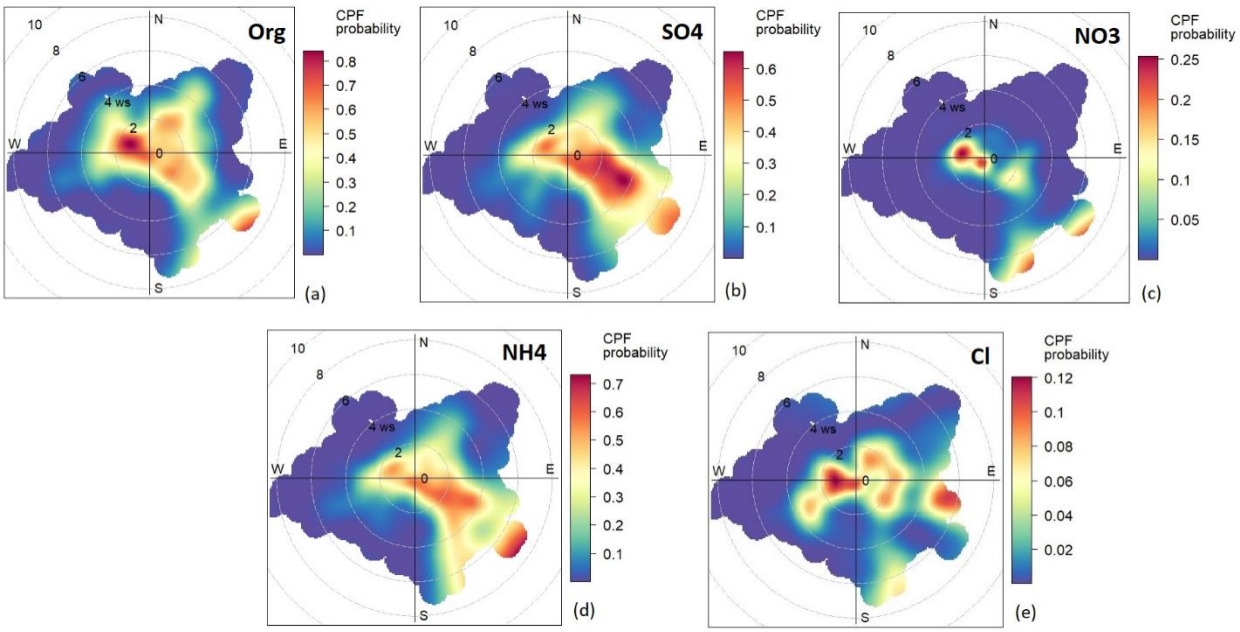
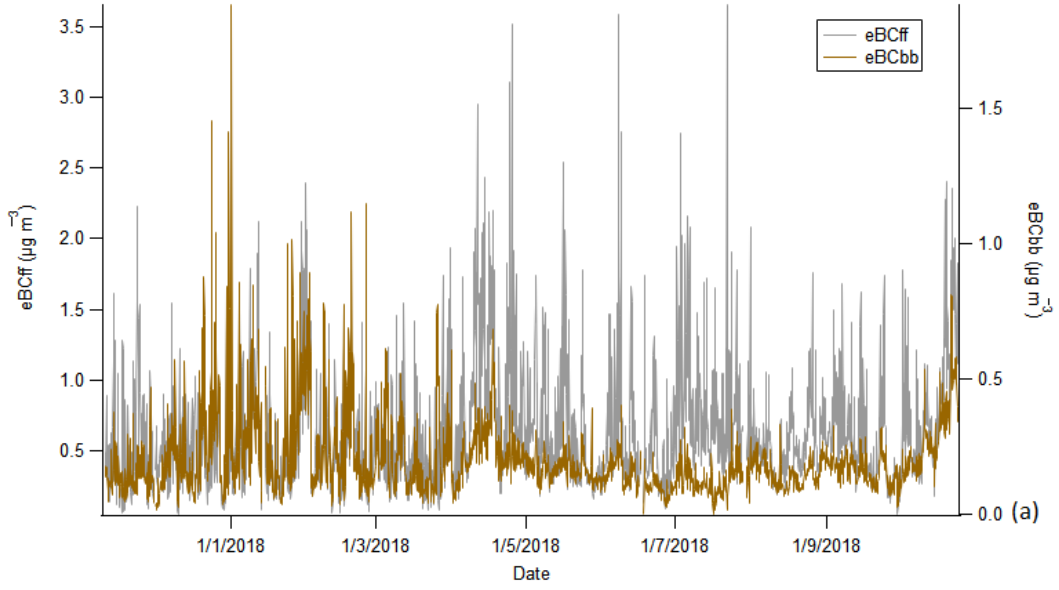
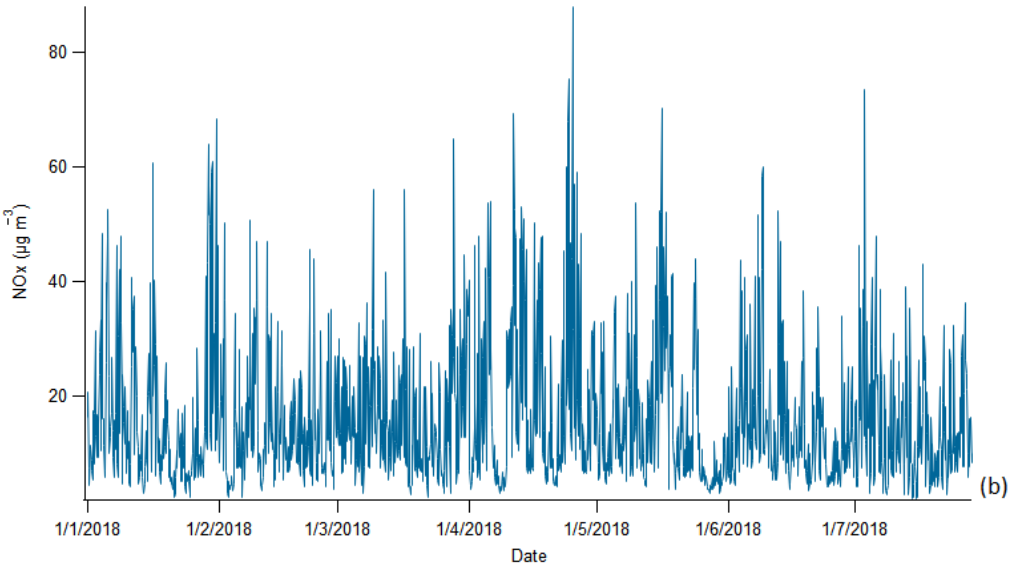
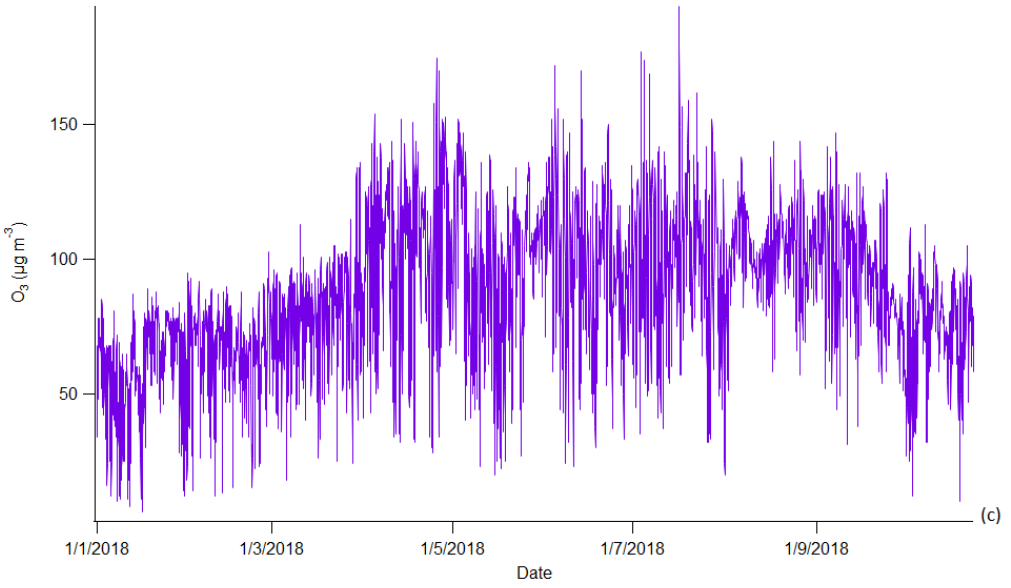
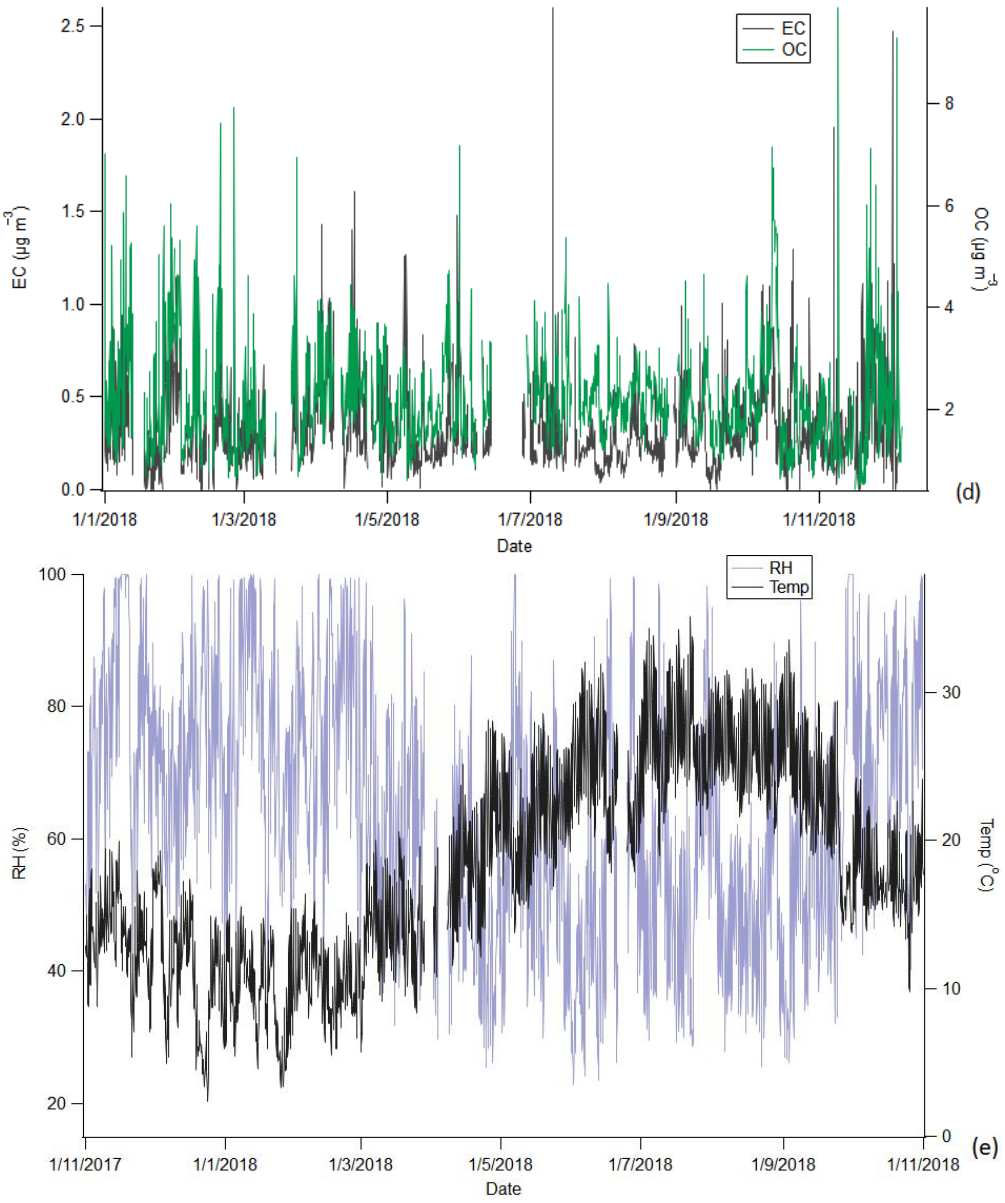


Figure S4.CPF polar plotsfor NRS: Org (a), SO4 (b), NO3 (c), NH4 (d) and Cl (e).




80
60
40
20
NOx (µg m-3)
(b)
1/1/2018
1/2/2018
1/3/2018
1/4/2018
1/5/2018
1/6/2018
1/7/2018
Date


150
100
50
O3 (µg m-3)
(c)
1/1/2018
1/3/2018
1/5/2018
1/7/2018
1/9/2018
Date


EC
OC
EC (μg m-3)
OC (μg m-3)
2.5
2.0
1.5
1.0
0.5
0.0
8
6
4
2
1/1/2018
1/3/2018
1/5/2018
1/7/2018
1/9/2018
1/11/2018
Date
(d)
RH
Temp
RH (%)
Temp (°C)
100
80
60
40
20
30
20
10
0
1/11/2017
1/1/2018
1/3/2018
1/5/2018
1/7/2018
1/9/2018
1/11/2018
Date
(e)

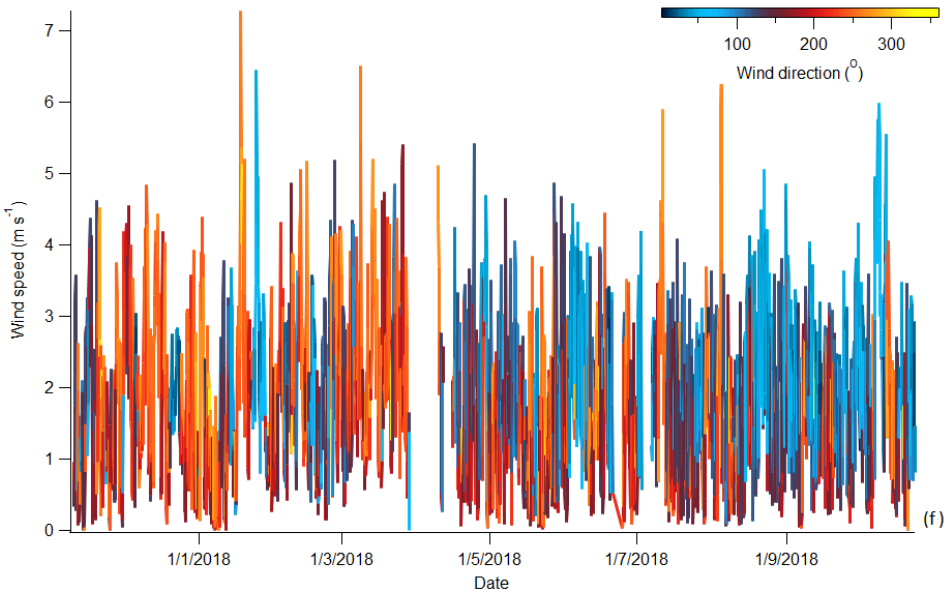


Figure S5. Supplementary data: equivalent black carbon apportioned to fossil fuel (eBC_{ff}) and wood burning (eBC_{wb}) (a), NOx (b), O_3 (c), EC/OC (d), relative humidity and air temperature (e) and wind speed and direction (f).

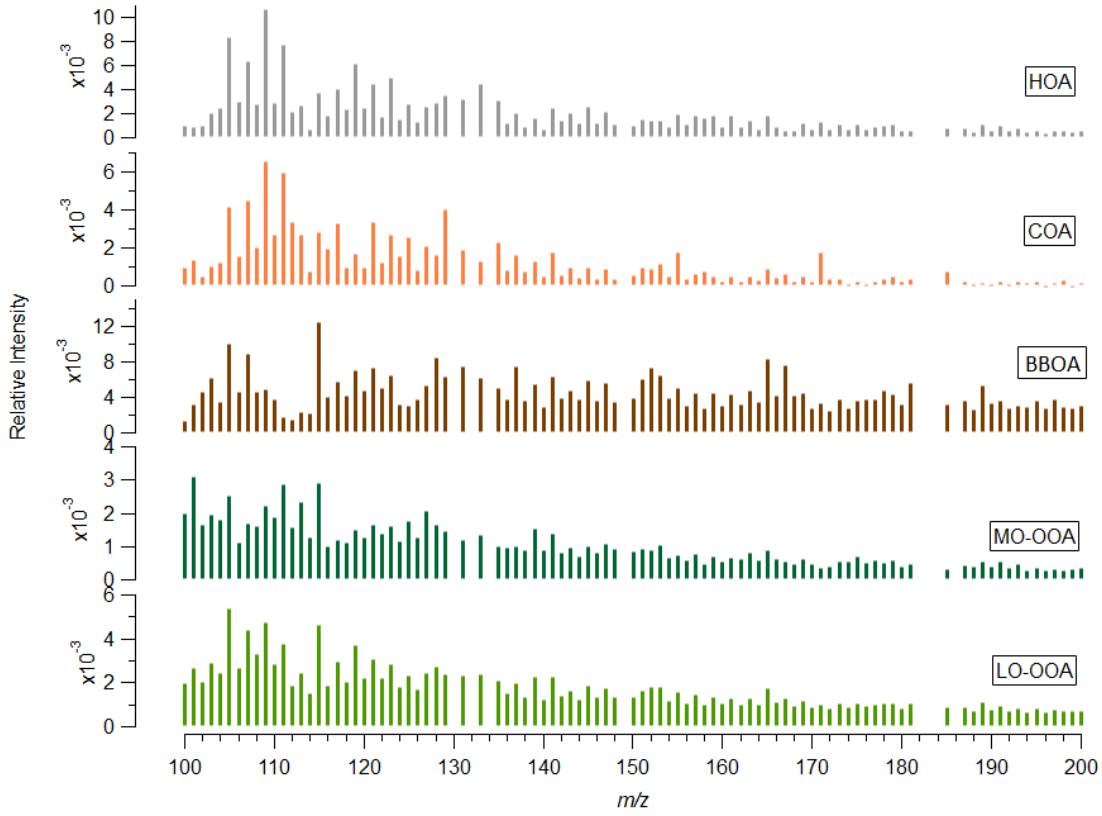
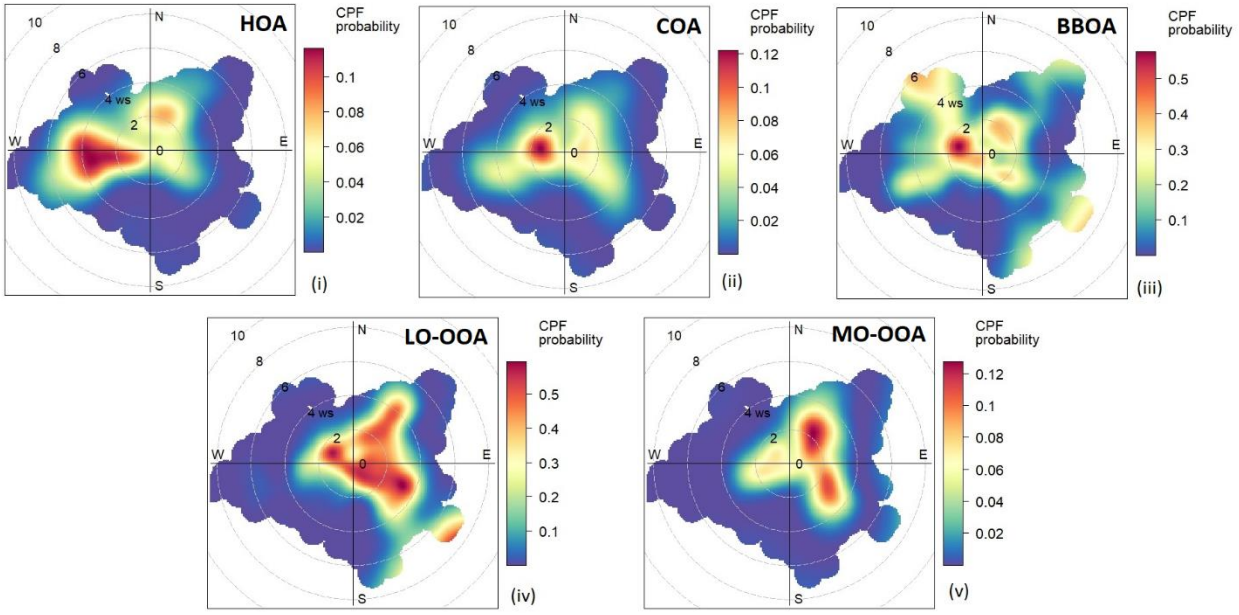


Figure S6. Mass spectrum of the five OA factors for mass to charge ratios 100 to 200.

(a)



(b)

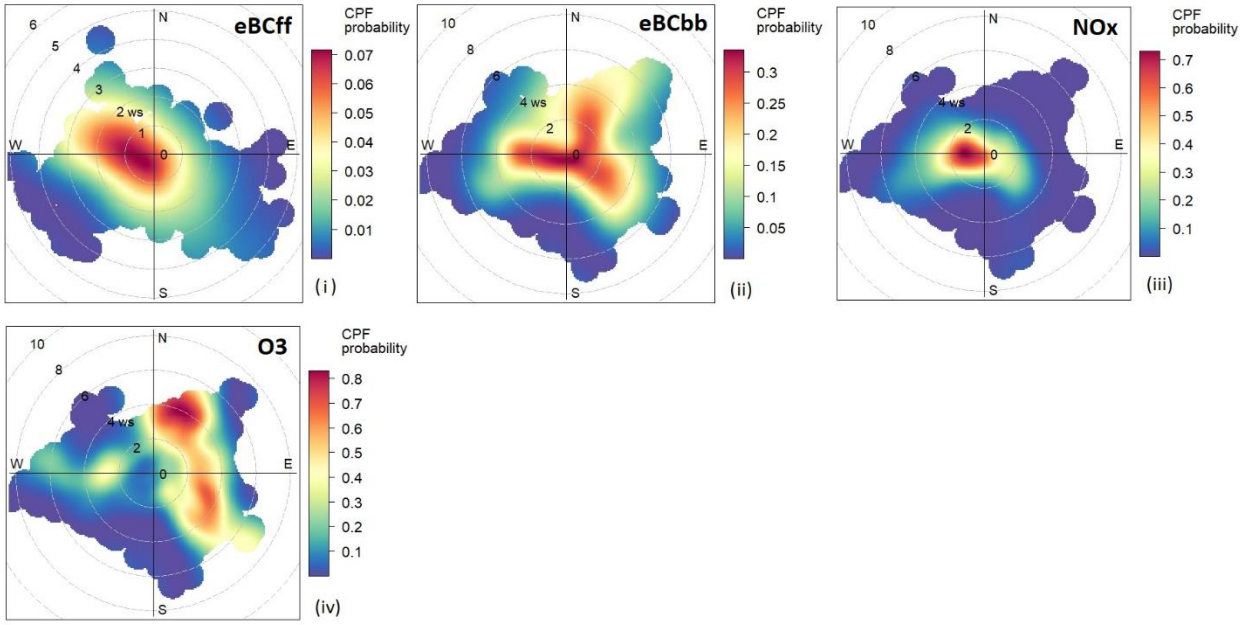


Figure S7.CPF polar plots for (a) organic aerosol factors (HOA (i), COA (ii), BBOA (iii), LO-OOA (iv) and MO-OOA (v)) and (b) external data (eBCff (i), eBCbb (ii), NOx (iii) and O3 (iv)).

Table S3. Relative contribution and actual mass loading of each organic factor in each period studied.

% / µg m^{-3}	Yearly	NDJF	MAM	JJA	SO
HOA	15 / 0.7	18 / 0.7	18 / 0.9	13 / 0.7	10 / 0.5
COA	18 / 0.8	19 / 0.8	19 / 1	16 / 0.8	14 / 0.7
BBOA	9 / 0.4	18 / 0.7	7 / 0.4	5 / 0.2	6 / 0.3
MO-OOA	34 / 1.6	31 / 1.3	33 / 1.6	35 / 1.8	39 / 1.8
LO-OOA	24 / 1.1	14 / 0.6	23 / 1.2	31 / 1.6	31 / 1.4

Table S4. R-Pearson correlations between organic aerosol factors and external tracers.

R-Pearson	Yearly	NDJF	MAM	JJA	SO
HOA/eBCff	0.69	0.68	0.78	0.70	0.67
HOA/NOx	0.69	0.56	0.73	0.75	N.A.
HOA/EC	0.58	0.53	0.66	0.55	0.53
BBOA/eBCwb	0.74	0.81	0.53	0.50	0.76
MO-OOA/SO_4^{2-}	0.67	0.63	0.67	0.44	0.76
MO-OOA/NO_3^-	0.35	0.52	0.32	0.39	0.76
LO-OOA/SO_4^{2-}	0.53	0.33	0.47	0.46	0.79
LO-OOA/NO_3^-	0.33	0.43	0.59	0.79	0.78

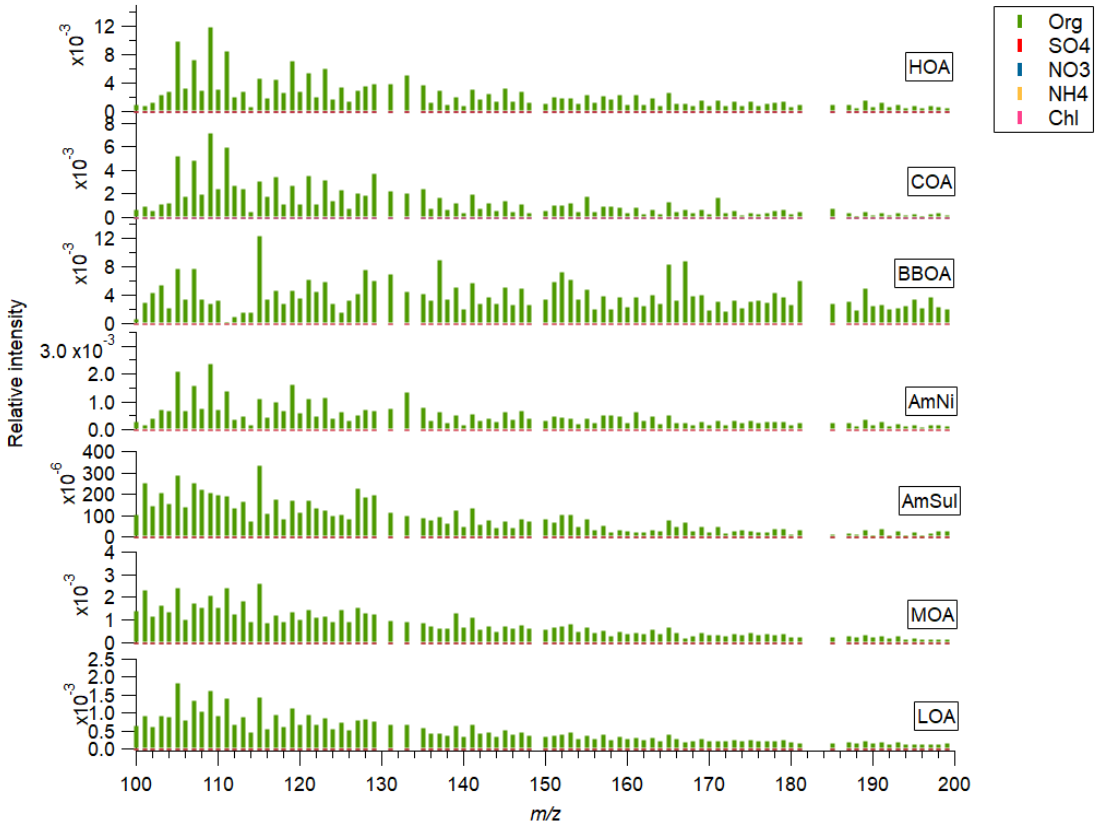


Figure S8. Mass spectrum of the seven NRS factors for mass to charge ratios 100 to 200.

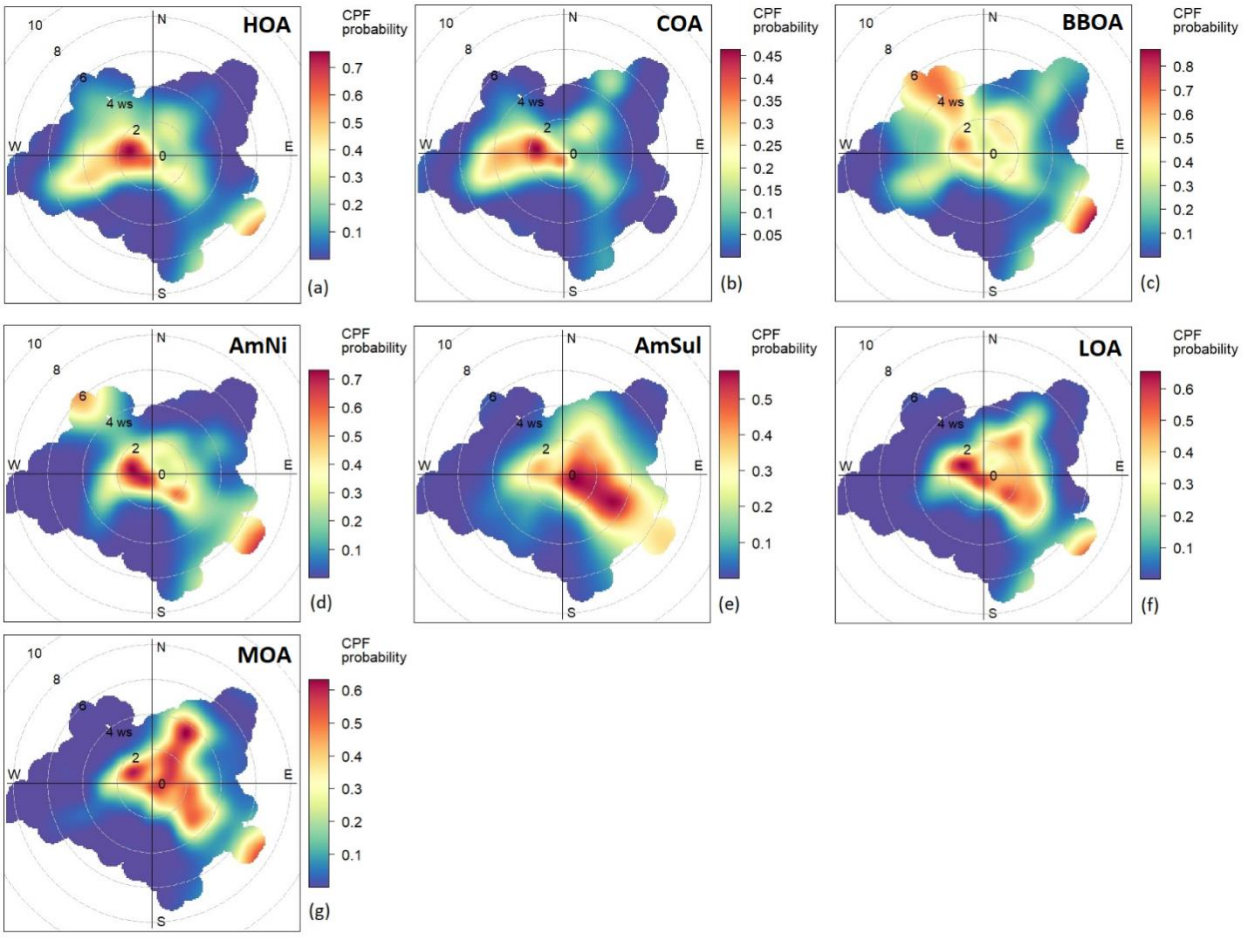


Figure S9. CPF polar plots for NRS factors fromcombined PMF analysis: HOA (a), COA (b), BBOA (c), AmNi (d), AmSul (e), LOA (f) and MOA (g).

Table S5. Relative contribution and actual mass loadings of each NRS factor in each period studied.

% / µg m^{-3}	Yearly	NDJF	MAM	JJA	SO
HOA	7 / 0.6	9 / 0.6	8 / 0.7	5 / 0.5	4 / 0.4
COA	9 / 0.8	11 / 0.7	10 / 0.9	8 / 0.8	5 / 0.5
BBOA	3 / 0.3	9 / 0.6	3 / 0.2	2 / 0.2	2 / 0.2
AmNi	3 / 0.3	6 / 0.4	5 / 0.4	2 / 0.1	1 / 0.2
AmSul	28 / 2.4	21 / 1.3	27 / 2.5	27 / 2.6	35 / 3.6
MOA	24 / 2.1	25 / 1.6	24 / 2.1	27 / 2.7	20 / 2.1
LOA	26 / 2.2	19 / 1.2	23 / 2	29 / 2.9	33 / 3.4

Table S6. R-Pearson correlations between NRS aerosol factors and external tracers.

R-Pearson	Yearly	NDJF	MAM	JJA	SO
HOA/eBCff	0.7	0.67	0.84	0.74	0.66
HOA/NOx	0.75	0.59	0.82	0.77	-
HOA/EC	0.64	0.68	0.73	0.59	0.44
BBOA/eBCwb	0.75	0.84	0.51	0.46	0.68
MOA / OC	0.77	0.81	0.74	0.75	0.86
MOA / SO_4^{2-}	0.47	0.31	0.53	0.33	0.5
MOA / MO-OOA	0.86	0.88	0.88	0.83	0.86
LOA/ SO_4^{2-}	0.74	0.73	0.75	0.52	0.97
LOA/ NH_4^+	0.74	0.74	0.76	0.49	0.96
LOA/ LO-OOA	0.68	0.41	0.73	0.4	0.83

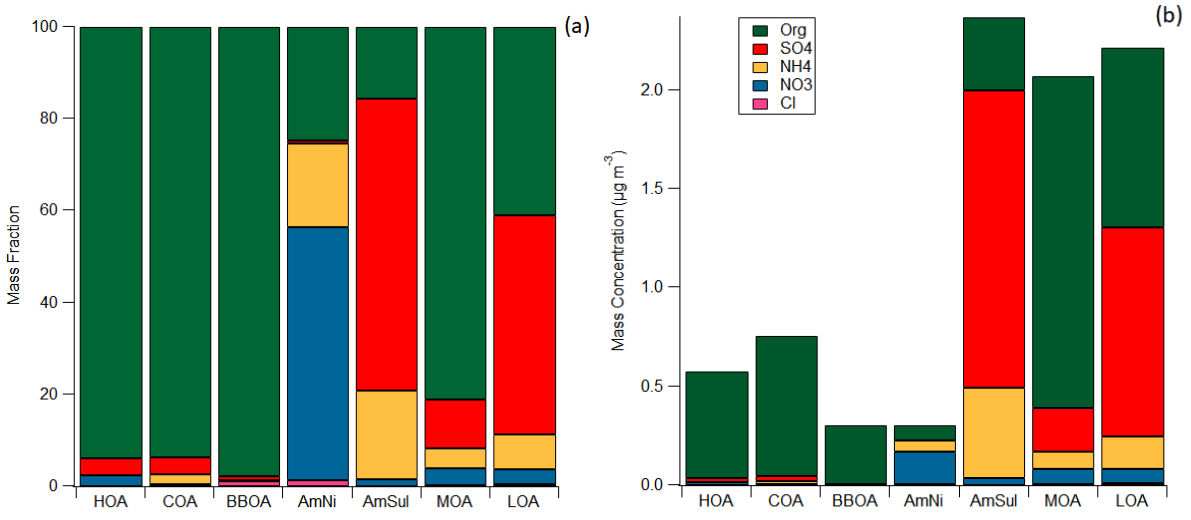


Figure S10. Mass fraction (a) and absolute concentration (b)of each species in each NRS factor.

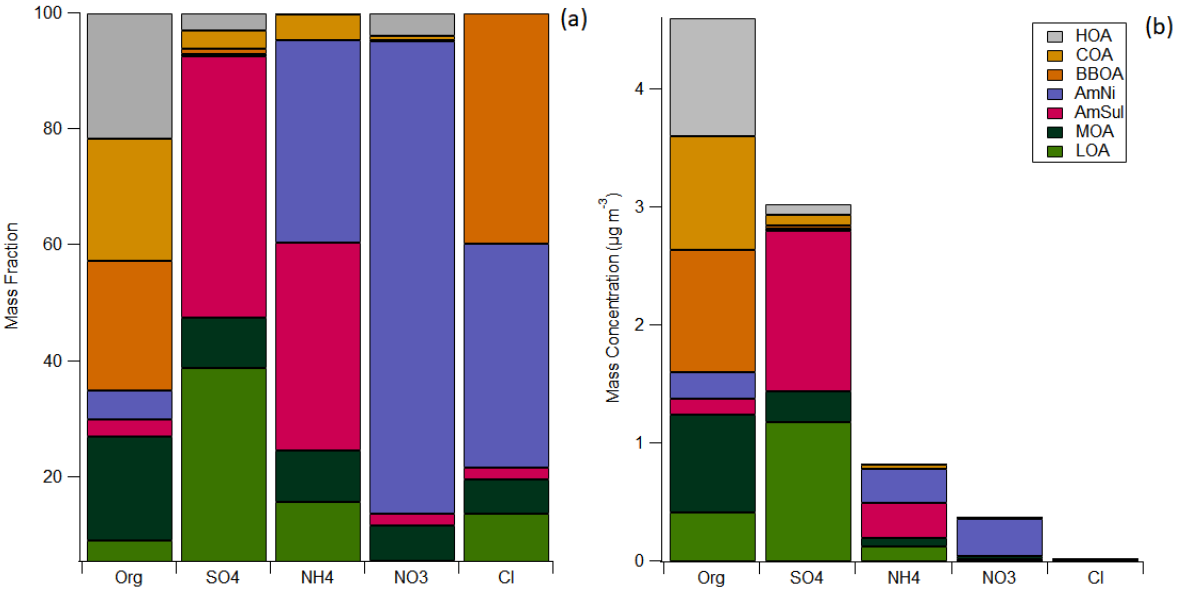


Figure S11. Mass fraction (a) and absolute concentration (b) of each NRS factor in each species.

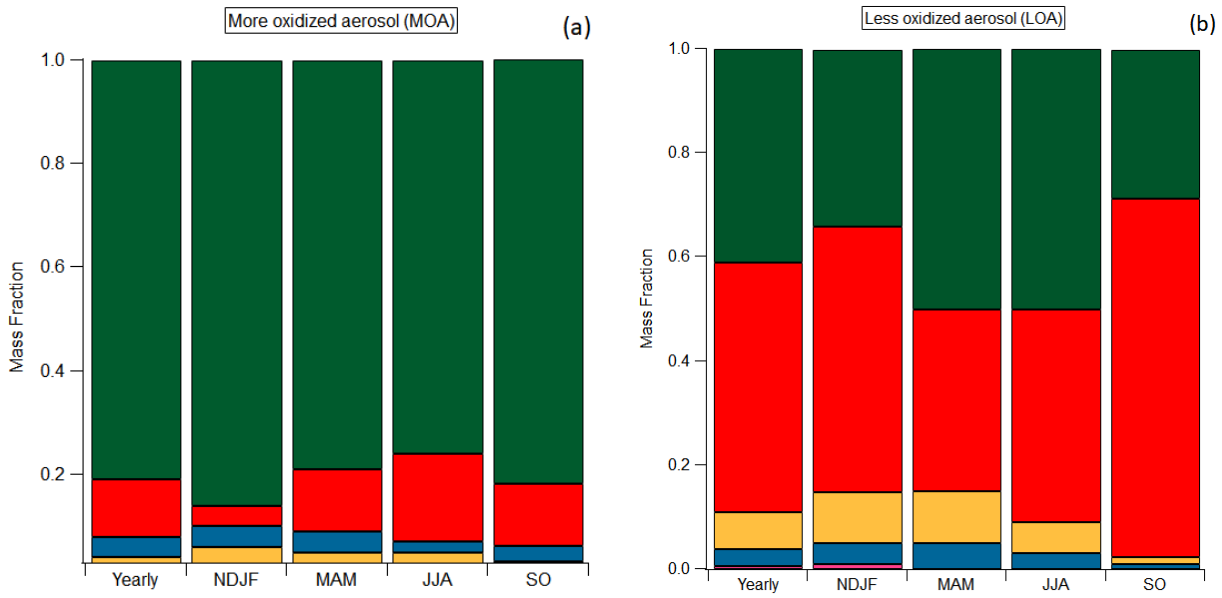


Figure S12. Mass fraction of each species in MOA (a) and LOA (b) in different seasons: Yearly, November-February (NDJF), March-May (MAM), June-August (JJA) and September-October (SO).