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# Improved source apportionment of organic aerosols in complex urban air pollution using the multilinear engine (ME-2)

**Qiao Zhu et al.**

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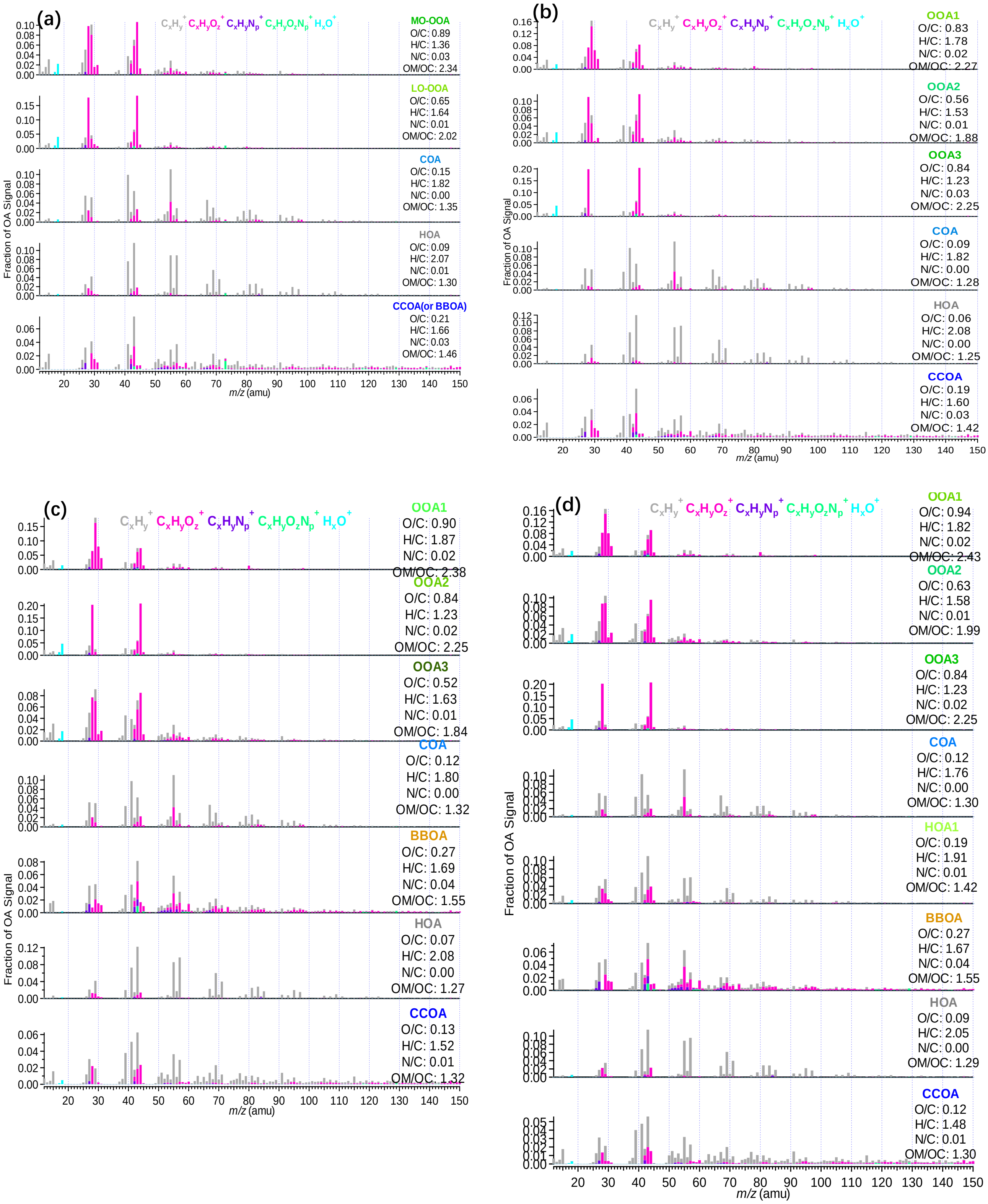


(a)
MO-OOA
O/C: 0.89
H/C: 1.36
N/C: 0.03
OM/OC: 2.34
LO-OOA
O/C: 0.65
H/C: 1.64
N/C: 0.01
OM/OC: 2.02
COA
O/C: 0.15
H/C: 1.82
N/C: 0.00
OM/OC: 1.35
HOA
O/C: 0.09
H/C: 2.07
N/C: 0.01
OM/OC: 1.30
CCOA(or BBOA)
O/C: 0.21
H/C: 1.66
N/C: 0.03
OM/OC: 1.46
Fraction of OA Signal
m/z (amu)
(b)
OOA1
O/C: 0.83
H/C: 1.78
N/C: 0.02
OM/OC: 2.27
OOA2
O/C: 0.56
H/C: 1.53
N/C: 0.01
OM/OC: 1.88
OOA3
O/C: 0.84
H/C: 1.23
N/C: 0.03
OM/OC: 2.25
COA
O/C: 0.09
H/C: 1.82
N/C: 0.00
OM/OC: 1.28
HOA
O/C: 0.06
H/C: 2.08
N/C: 0.00
OM/OC: 1.25
CCOA
O/C: 0.19
H/C: 1.60
N/C: 0.03
OM/OC: 1.42
Fraction of OA Signal
m/z (amu)
(c)
OOA1
O/C: 0.90
H/C: 1.87
N/C: 0.02
OM/OC: 2.38
OOA2
O/C: 0.84
H/C: 1.23
N/C: 0.02
OM/OC: 2.25
OOA3
O/C: 0.52
H/C: 1.63
N/C: 0.01
OM/OC: 1.84
COA
O/C: 0.12
H/C: 1.80
N/C: 0.00
OM/OC: 1.32
BBOA
O/C: 0.27
H/C: 1.69
N/C: 0.04
OM/OC: 1.55
HOA
O/C: 0.07
H/C: 2.08
N/C: 0.00
OM/OC: 1.27
CCOA
O/C: 0.13
H/C: 1.52
N/C: 0.01
OM/OC: 1.32
Fraction of OA Signal
m/z (amu)
(d)
OOA1
O/C: 0.94
H/C: 1.82
N/C: 0.02
OM/OC: 2.43
OOA2
O/C: 0.63
H/C: 1.58
N/C: 0.01
OM/OC: 1.99
OOA3
O/C: 0.84
H/C: 1.23
N/C: 0.02
OM/OC: 2.25
COA
O/C: 0.12
H/C: 1.76
N/C: 0.00
OM/OC: 1.30
HOA1
O/C: 0.19
H/C: 1.91
N/C: 0.01
OM/OC: 1.42
BBOA
O/C: 0.27
H/C: 1.67
N/C: 0.04
OM/OC: 1.55
HOA
O/C: 0.09
H/C: 2.05
N/C: 0.00
OM/OC: 1.29
CCOA
O/C: 0.12
H/C: 1.48
N/C: 0.01
OM/OC: 1.30
Fraction of OA Signal
m/z (amu)

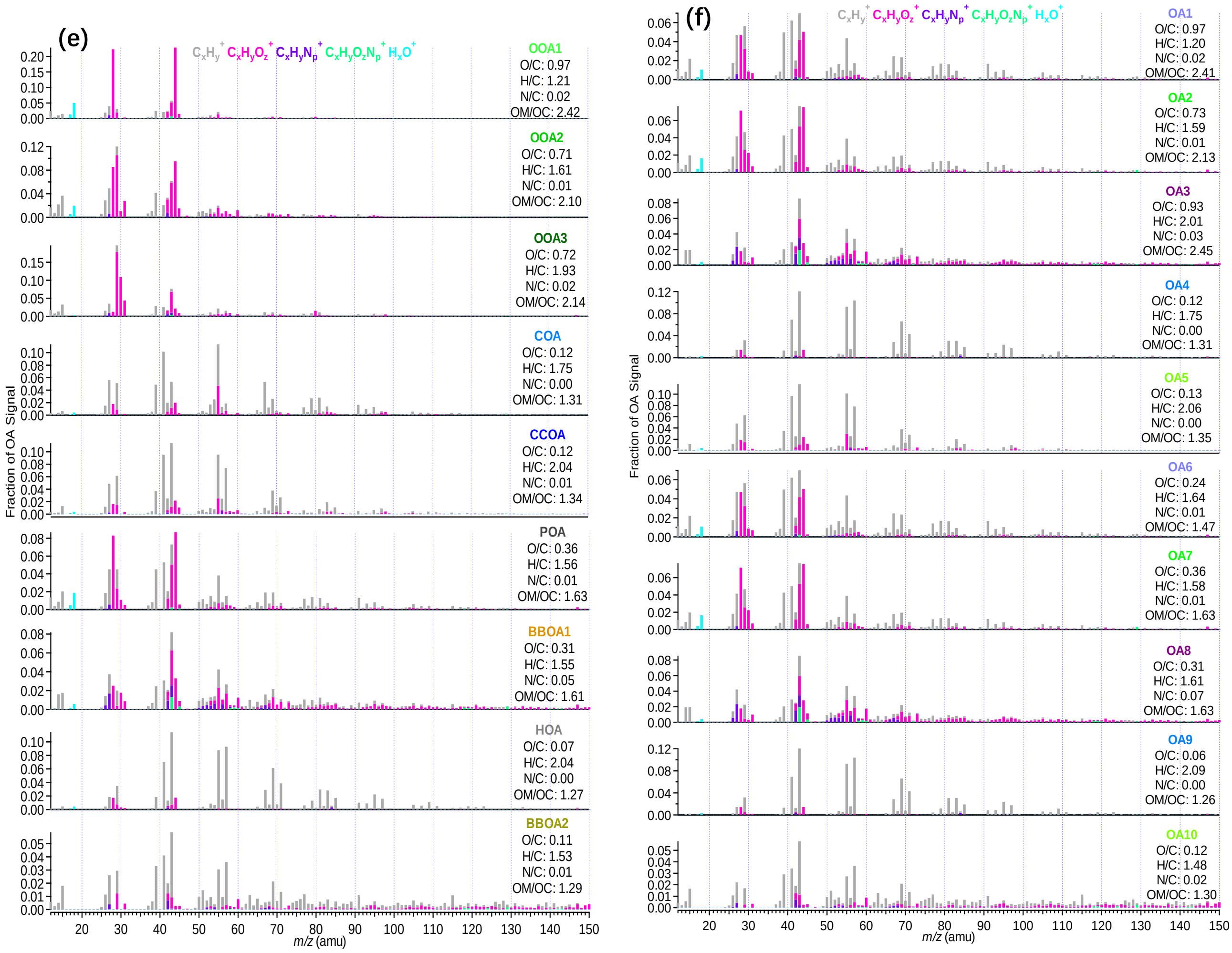
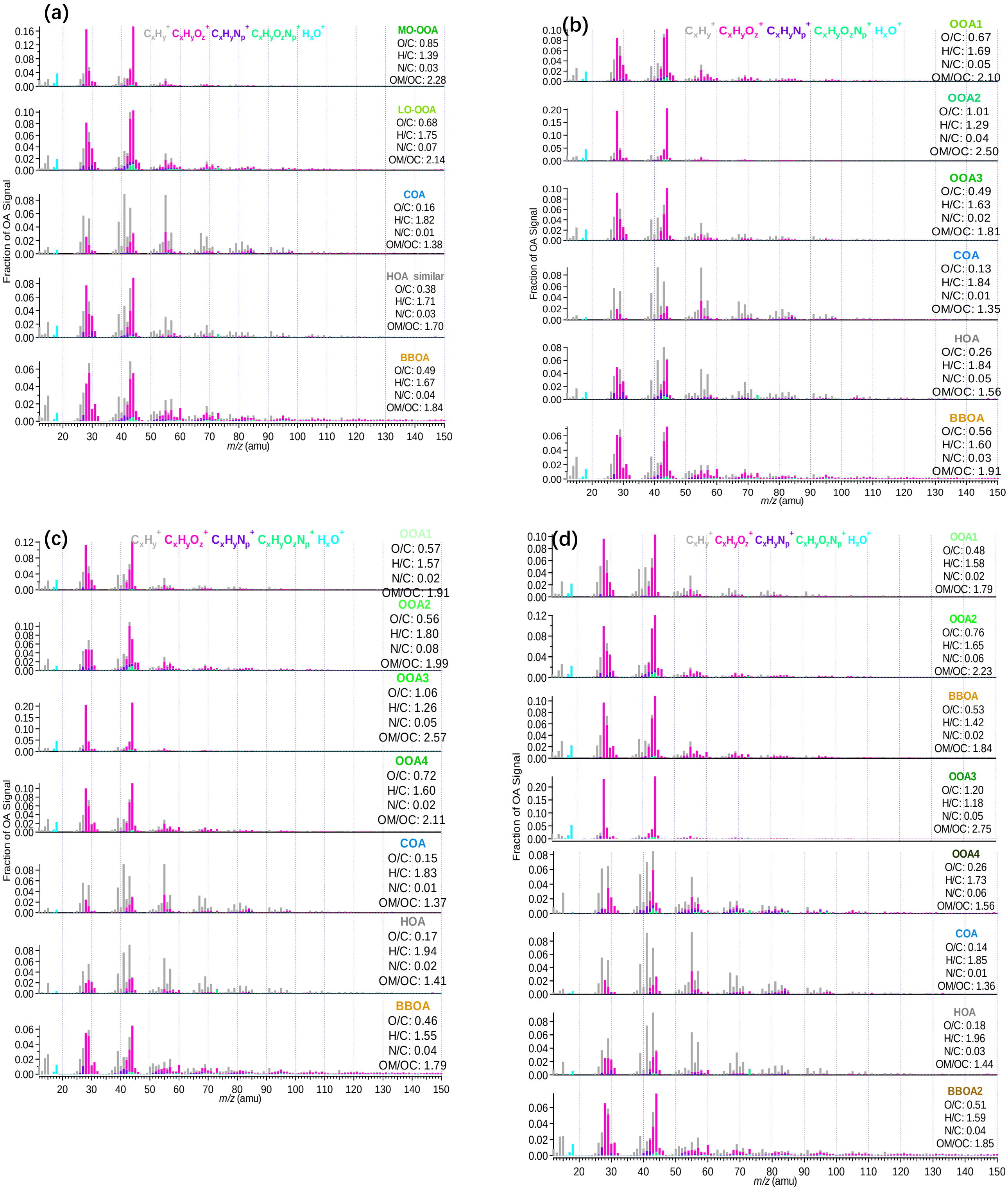



**Figure S1.** Mass spectra of the (a) 5-factor, (b) 6-factor, (c) 7-factor, (d) 8-factor, (e) 9-factor, (f) 10-factor solution using unconstrained PMF method in Qingdao


(a)
MO-OOA
O/C: 0.85
H/C: 1.39
N/C: 0.03
OM/OC: 2.28
LO-OOA
O/C: 0.68
H/C: 1.75
N/C: 0.07
OM/OC: 2.14
COA
O/C: 0.16
H/C: 1.82
N/C: 0.01
OM/OC: 1.38
HOA_similar
O/C: 0.38
H/C: 1.71
N/C: 0.03
OM/OC: 1.70
BBOA
O/C: 0.49
H/C: 1.67
N/C: 0.04
OM/OC: 1.84
Fraction of OA Signal
m/z (amu)
(b)
OOA1
O/C: 0.67
H/C: 1.69
N/C: 0.05
OM/OC: 2.10
OOA2
O/C: 1.01
H/C: 1.29
N/C: 0.04
OM/OC: 2.50
OOA3
O/C: 0.49
H/C: 1.63
N/C: 0.02
OM/OC: 1.81
COA
O/C: 0.13
H/C: 1.84
N/C: 0.01
OM/OC: 1.35
HOA
O/C: 0.26
H/C: 1.84
N/C: 0.05
OM/OC: 1.56
BBOA
O/C: 0.56
H/C: 1.60
N/C: 0.03
OM/OC: 1.91
(c)
OOA1
O/C: 0.57
H/C: 1.57
N/C: 0.02
OM/OC: 1.91
OOA2
O/C: 0.56
H/C: 1.80
N/C: 0.08
OM/OC: 1.99
OOA3
O/C: 1.06
H/C: 1.26
N/C: 0.05
OM/OC: 2.57
OOA4
O/C: 0.72
H/C: 1.60
N/C: 0.02
OM/OC: 2.11
COA
O/C: 0.15
H/C: 1.83
N/C: 0.01
OM/OC: 1.37
HOA
O/C: 0.17
H/C: 1.94
N/C: 0.02
OM/OC: 1.41
BBOA
O/C: 0.46
H/C: 1.55
N/C: 0.04
OM/OC: 1.79
(d)
OOA1
O/C: 0.48
H/C: 1.58
N/C: 0.02
OM/OC: 1.79
OOA2
O/C: 0.76
H/C: 1.65
N/C: 0.06
OM/OC: 2.23
BBOA
O/C: 0.53
H/C: 1.42
N/C: 0.02
OM/OC: 1.84
OOA3
O/C: 1.20
H/C: 1.18
N/C: 0.05
OM/OC: 2.75
OOA4
O/C: 0.26
H/C: 1.73
N/C: 0.06
OM/OC: 1.56
COA
O/C: 0.14
H/C: 1.85
N/C: 0.01
OM/OC: 1.36
HOA
O/C: 0.18
H/C: 1.96
N/C: 0.03
OM/OC: 1.44
BBOA2
O/C: 0.51
H/C: 1.59
N/C: 0.04
OM/OC: 1.85

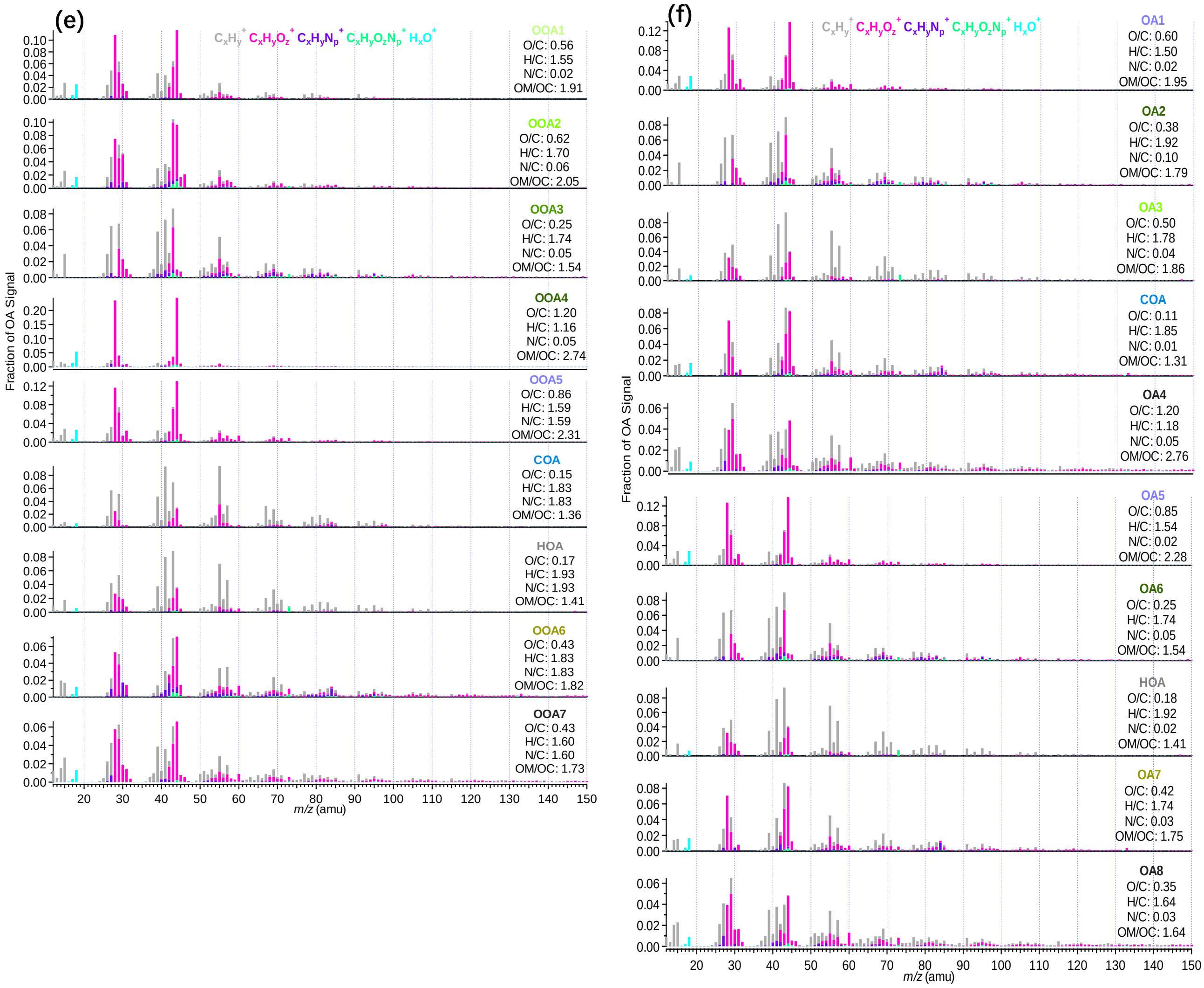



**Figure S2.** Mass spectra of the (a) 5-factor, (b) 6-factor, (c) 7-factor, (d) 8-factor, (e) 9-factor, (f) 10-factor solution using unconstrained PMF method in Dongguan

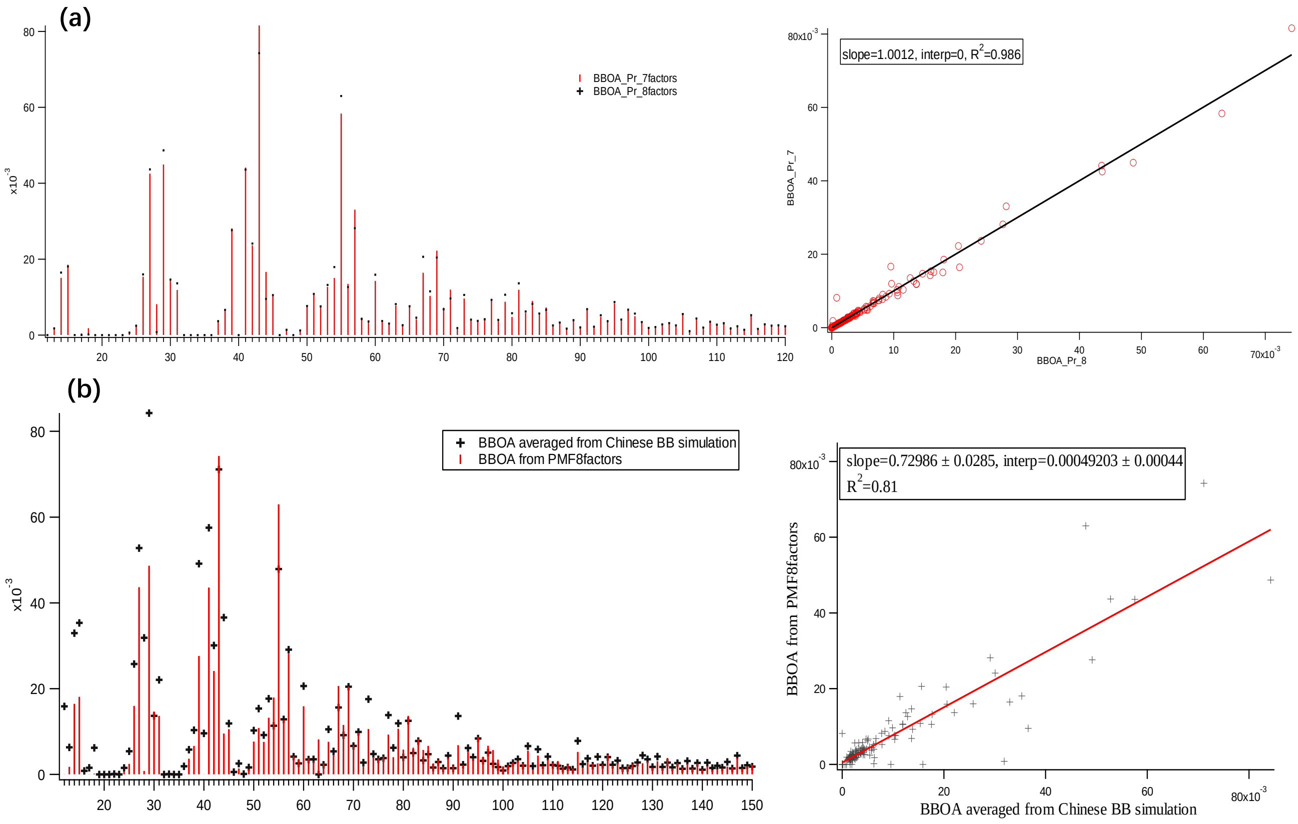



**Figure S3.** (a) Correlation between BBOA in 7- and 8-factor solution resolved from PMF in Qingdao; (b) Correlation between BBOA in 8-factor solution resolved from PMF in Qingdao and BBOA averaged from BB simulation.

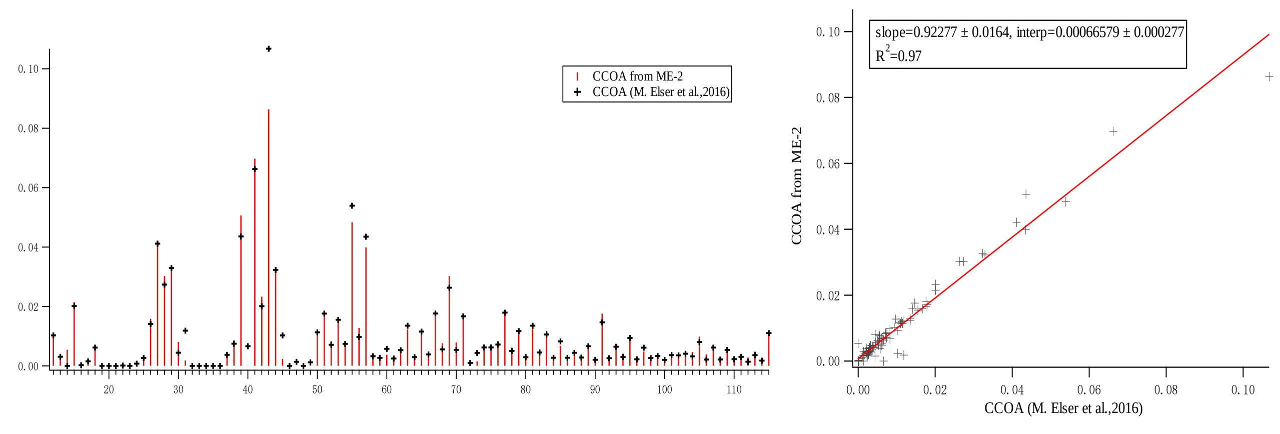



**Figure S4.** Correlation between CCOA resolved from ME-2 in Qingdao and CCOA reported in Elser et al.,2016

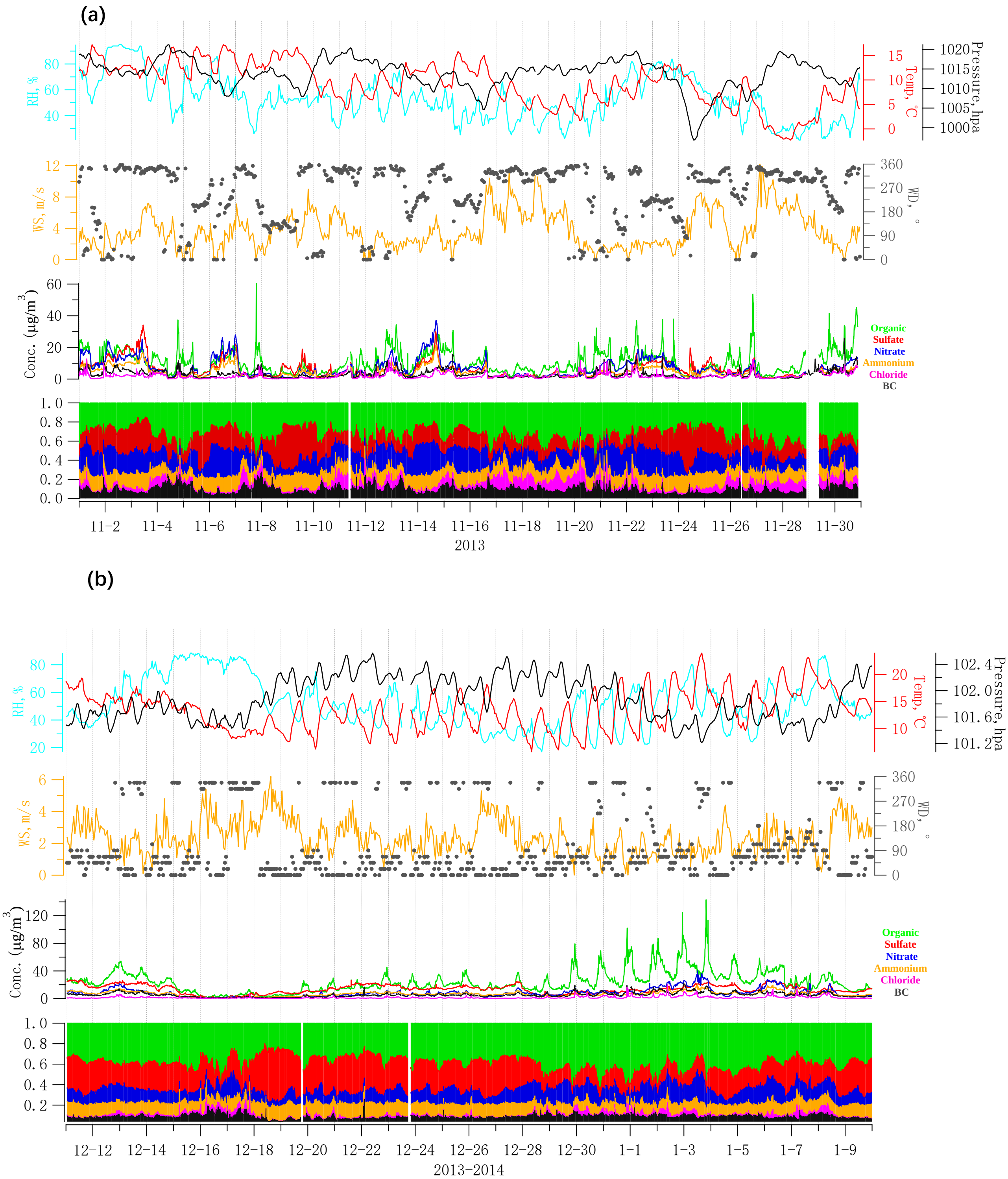



**Figure S5.** Time series of meteorological parameters (relative humidity, temperature, pressure, wind speed and wind direction), NR-PM$_1$ compounds and relative contribution of the different components in Qingdao (a) and Dongguan (b)

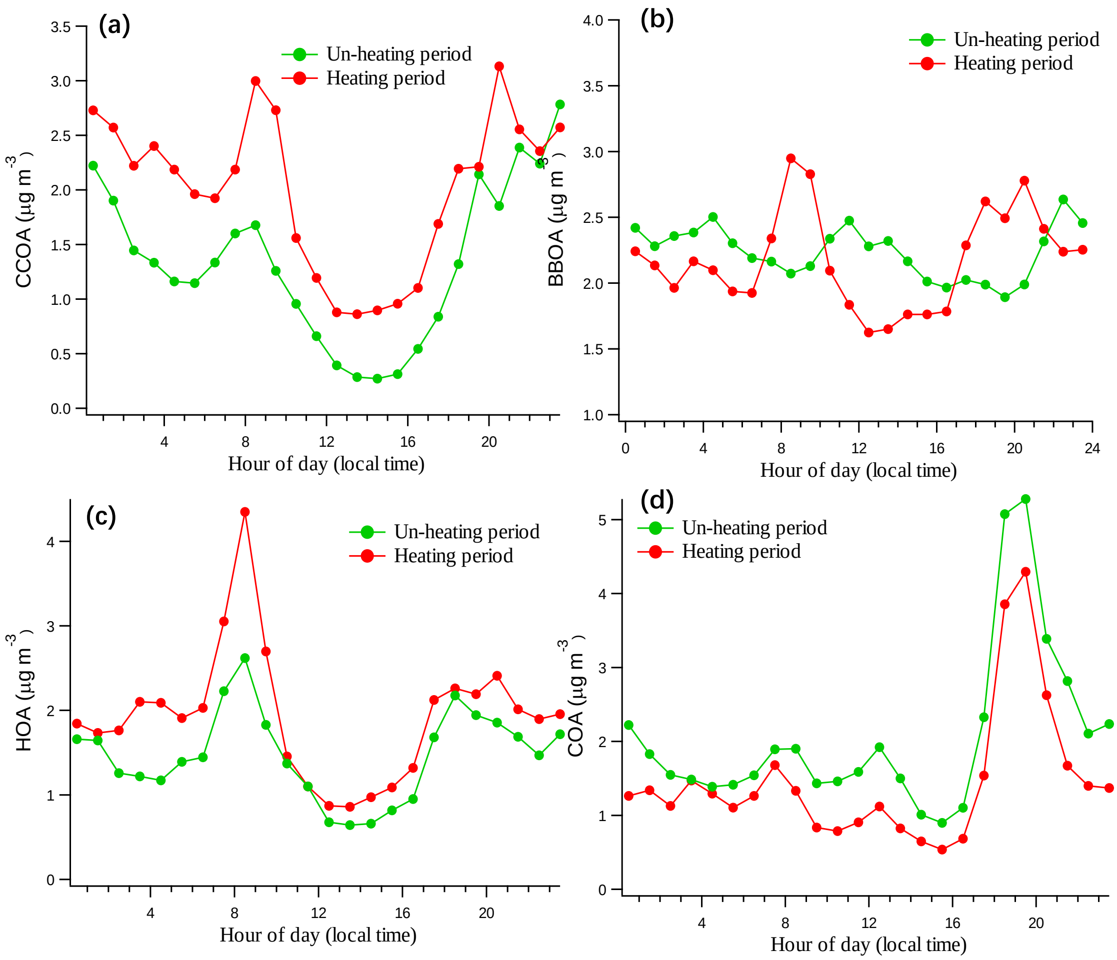



**Figure S6.** Diurnal variation of the (a) CCOA; (b)BBOA;(c) HOA and (d) COA before and during the central-heating period in Qingdao.

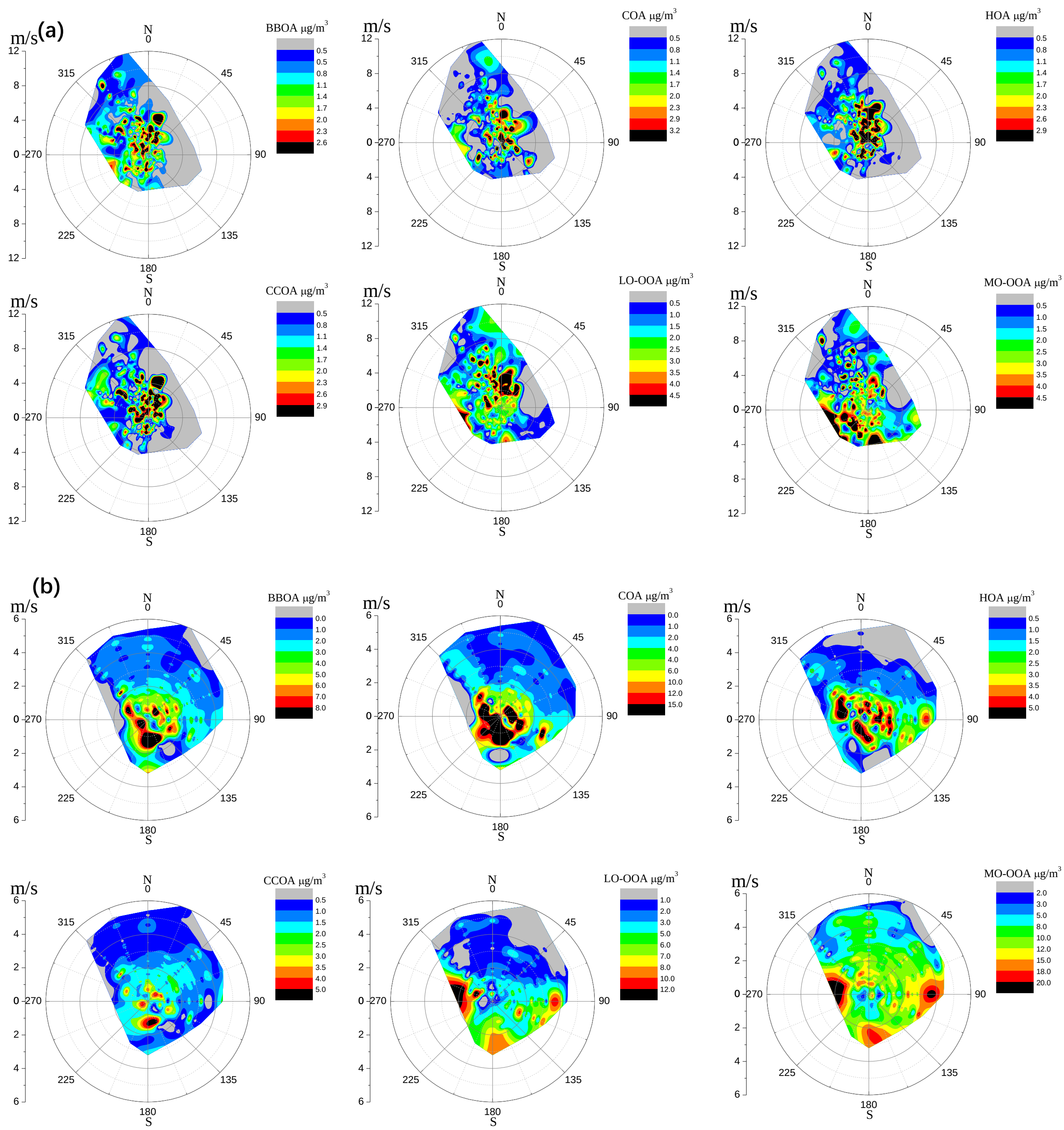



**Figure S7.** The variation of OA sources concentration with wind direction and speed in Qingdao (a) and Dongguan (b).

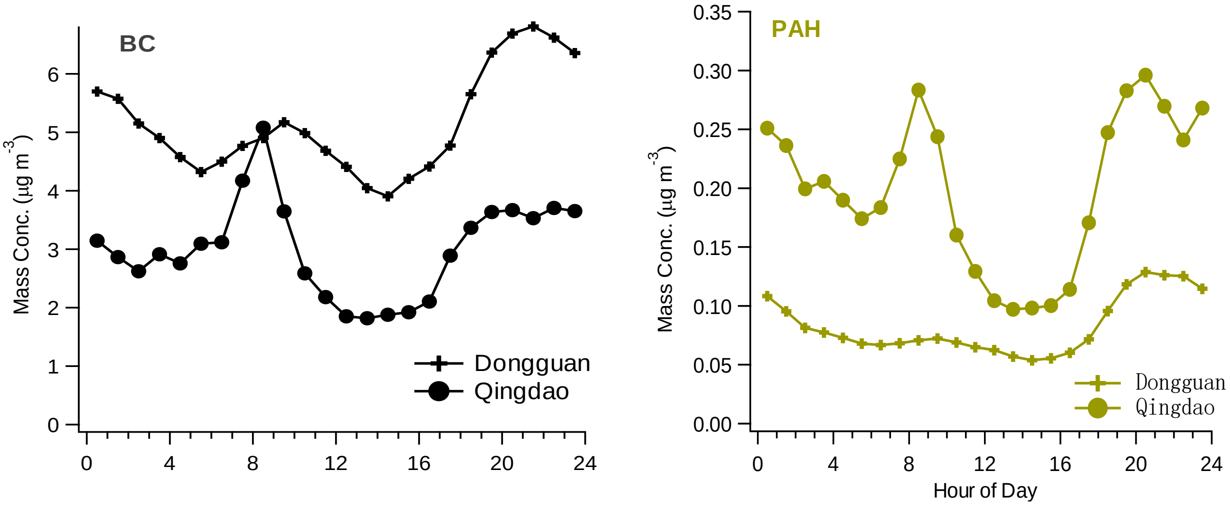



**Figure S8.** The diurnal trends of BC and PAHs in Qingdao and Dongguan.

**Table S1.** The O/C ratios for each resolved factor with an *a* value from 0 to 1 for CCOA and from 0 to 0.1 for HOA using the ME-2 method for Dongguan.

| ***a* value for HOA** / ***a* value for CCOA** | **HOA** | | **CCOA** | | **COA** | | **BBOA** | | **LO-OOA** | | **MO-OOA** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0.1** | **0** | **0.1** | **0** | **0.1** | **0** | **0.1** | **0** | **0.1** | **0** | **0.1** |
| **0** | 0.17 | 0.17 | 0.12 | 0.12 | 0.17 | 0.16 | 0.59 | 0.59 | 0.80 | 0.80 | 0.81 | 0.82 |
| **0.1** | 0.17 | 0.17 | 0.13 | 0.13 | 0.17 | 0.16 | 0.59 | 0.61 | 0.78 | 0.79 | 0.82 | 0.82 |
| **0.2** | 0.17 | 0.17 | 0.13 | 0.12 | 0.17 | 0.17 | 0.61 | 0.61 | 0.80 | 0.78 | 0.82 | 0.83 |
| **0.3** | 0.17 | 0.17 | 0.13 | 0.12 | 0.18 | 0.18 | 0.61 | 0.61 | 0.78 | 0.78 | 0.83 | 0.84 |
| **0.4** | 0.17 | 0.18 | 0.13 | 0.12 | 0.18 | 0.17 | 0.62 | 0.62 | 0.76 | 0.69 | 0.85 | 0.86 |
| **0.5** | 0.17 | 0.18 | 0.12 | 0.12 | 0.18 | 0.18 | 0.62 | 0.61 | 0.77 | 0.76 | 0.84 | 0.85 |
| **0.6** | 0.17 | 0.18 | 0.12 | 0.12 | 0.18 | 0.19 | 0.62 | 0.61 | 0.75 | 0.72 | 0.85 | 0.86 |
| **0.7** | 0.17 | 0.18 | 0.13 | 0.12 | 0.18 | 0.17 | 0.62 | 0.62 | 0.70 | 0.70 | 0.86 | 0.86 |
| **0.8** | 0.17 | 0.18 | 0.14 | 0.13 | 0.19 | 0.18 | 0.61 | 0.60 | 0.70 | 0.66 | 0.86 | 0.87 |
| **0.9** | **0.17** | **0.18** | **0.18** | **0.18** | **0.18** | **0.18** | **0.61** | **0.59** | **0.63** | **0.65** | **0.90** | **0.87** |
| **1** | 0.17 | 0.18 | 1.25 | 1.25 | 0.11 | 0.12 | 0.38 | 0.39 | 0.63 | 0.64 | 0.86 | 0.86 |

**Table S2.** The O/C ratio for each resolved factor and correlation parameters between POAs and their tracers with *a* value of 0 to 1 for BBOA using ME-2 method in Qingdao.

| *a* value for BBOA | BBOA | CCOA | HOA | COA | LO-OOA | MO-OOA | CCOA vs PAHs ($R^2$) | HOA vs BC ($R^2$) |
|---|---|---|---|---|---|---|---|---|
| **0** | 0.27 | 0.14 | 0.06 | 0.14 | 0.59 | 0.89 | 0.94 | 0.65 |
| **0.1** | 0.27 | 0.15 | 0.06 | 0.14 | 0.60 | 0.89 | 0.95 | 0.66 |
| **0.2** | 0.27 | 0.15 | 0.06 | 0.14 | 0.60 | 0.87 | 0.95 | 0.66 |
| **0.3** | 0.27 | 0.15 | 0.06 | 0.14 | 0.61 | 0.89 | 0.95 | 0.65 |
| **0.4** | 0.27 | 0.15 | 0.06 | 0.14 | 0.61 | 0.87 | 0.95 | 0.65 |
| **0.5** | 0.27 | 0.16 | 0.07 | 0.14 | 0.61 | 0.87 | 0.96 | 0.65 |
| **0.6** | 0.27 | 0.19 | 0.06 | 0.14 | 0.60 | 0.86 | 0.96 | 0.65 |
| **0.7** | 0.27 | 0.20 | 0.06 | 0.14 | 0.61 | 0.86 | 0.96 | 0.65 |
| **0.8** | 0.27 | 0.19 | 0.07 | 0.14 | 0.61 | 0.87 | 0.96 | 0.65 |
| **0.9** | 0.27 | 0.19 | 0.07 | 0.14 | 0.61 | 0.87 | 0.96 | 0.66 |
| **1** | 0.27 | 0.19 | 0.07 | 0.14 | 0.61 | 0.87 | 0.96 | 0.65 |

**Table S3(a).** The O/C ratio for HOA with different *a* value sets using ME-2 method in Dongguan.

| *a* value for CCOA \ *a* value for HOA | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.17 | 0.17 | 0.19 | 0.19 | 0.24 | 0.22 | 0.25 | 0.32 | 0.28 | 0.36 | 0.42 |
| **0.1** | 0.17 | 0.17 | 0.19 | 0.22 | 0.23 | 0.25 | 0.28 | 0.32 | 0.36 | 0.39 | 0.42 |
| **0.2** | 0.17 | 0.17 | 0.20 | 0.22 | 0.23 | 0.25 | 0.28 | 0.32 | 0.37 | 0.39 | 0.42 |
| **0.3** | 0.17 | 0.17 | 0.20 | 0.22 | 0.23 | 0.27 | 0.28 | 0.33 | 0.37 | 0.40 | 0.42 |
| **0.4** | 0.17 | 0.18 | 0.20 | 0.22 | 0.23 | 0.25 | 0.28 | 0.33 | 0.37 | 0.38 | 0.49 |
| **0.5** | 0.17 | 0.18 | 0.20 | 0.22 | 0.24 | 0.24 | 0.29 | 0.33 | 0.38 | 0.38 | 0.45 |
| **0.6** | 0.17 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.29 | 0.34 | 0.36 | 0.45 | 0.54 |
| **0.7** | 0.17 | 0.18 | 0.20 | 0.20 | 0.24 | 0.22 | 0.26 | 0.35 | 0.37 | 0.41 | 0.56 |
| **0.8** | 0.17 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.29 | 0.35 | 0.32 | 0.48 | 0.42 |
| **0.9** | 0.17 | 0.18 | 0.20 | 0.20 | 0.23 | 0.22 | 0.29 | 0.33 | 0.37 | 0.40 | 0.42 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 0.17 | 0.18 | 0.19 | 0.21 | 0.19 | 0.20 | 0.20 | 0.36 | 0.36 | 0.39 | 0.50 |

100 **Table S3(b).** The O/C ratio for CCOA with different *a* value sets using ME-2 method in Dongguan.

| ***a* value for HOA** / ***a* value for CCOA** | **0** | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.12 | 0.12 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **0.1** | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | 0.13 |
| **0.2** | 0.13 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| **0.3** | 0.13 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| **0.4** | 0.13 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.16 | 0.16 |
| **0.5** | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| **0.6** | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.18 | 0.12 | 0.19 |
| **0.7** | 0.13 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 | 0.12 | 0.20 |
| **0.8** | 0.14 | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **0.9** | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.19 |
| **1** | 1.25 | 1.25 | 1.19 | 0.38 | 1.22 | 1.22 | 1.00 | 0.98 | 0.99 | 0.81 | 0.94 |

101 **Table S3(c).** The O/C ratio for COA with different *a* value sets using ME-2 method in Dongguan.

| ***a* value for HOA** / ***a* value for CCOA** | **0** | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.17 | 0.16 | 0.17 | 0.16 | 0.16 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 | 0.17 |
| **0.1** | 0.17 | 0.16 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.17 |
| **0.2** | 0.17 | 0.17 | 0.18 | 0.16 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |
| **0.3** | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.16 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |
| **0.4** | 0.18 | 0.17 | 0.18 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.50 | 0.16 |
| **0.5** | 0.18 | 0.18 | 0.18 | 0.17 | 0.17 | 0.15 | 0.17 | 0.18 | 0.18 | 0.44 | 0.18 |
| **0.6** | 0.18 | 0.19 | 0.18 | 0.17 | 0.18 | 0.18 | 0.17 | 0.18 | 0.16 | 0.18 | 0.15 |
| **0.7** | 0.18 | 0.17 | 0.19 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.16 | 0.18 | 0.15 |
| **0.8** | 0.19 | 0.18 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.9** | 0.18 | 0.18 | 0.18 | 0.16 | 0.18 | 0.18 | 0.14 | 0.19 | 0.15 | 0.18 | 0.14 |
| **1** | 0.11 | 0.12 | 0.13 | 0.17 | 0.14 | 0.14 | 0.10 | 0.17 | 0.10 | 0.12 | 0.12 |

**Table S3(d).** The O/C ratio for BBOA with different *a* value sets using ME-2 method in Dongguan.

| ***a* value for HOA** / ***a* value for CCOA** | **0** | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.59 | 0.59 | 0.59 | 0.59 | 0.56 | 0.58 | 0.55 | 0.52 | 0.54 | 0.50 | 0.49 |
| **0.1** | 0.59 | 0.61 | 0.60 | 0.59 | 0.57 | 0.57 | 0.55 | 0.55 | 0.51 | 0.50 | 0.50 |
| **0.2** | 0.61 | 0.61 | 0.60 | 0.61 | 0.60 | 0.57 | 0.56 | 0.54 | 0.52 | 0.51 | 0.50 |
| **0.3** | 0.61 | 0.61 | 0.62 | 0.61 | 0.60 | 0.58 | 0.56 | 0.55 | 0.53 | 0.51 | 0.51 |
| **0.4** | 0.62 | 0.62 | 0.61 | 0.62 | 0.61 | 0.60 | 0.57 | 0.55 | 0.53 | 0.48 | 0.54 |
| **0.5** | 0.62 | 0.61 | 0.62 | 0.62 | 0.61 | 0.57 | 0.58 | 0.55 | 0.52 | 0.46 | 0.50 |
| **0.6** | 0.62 | 0.61 | 0.61 | 0.62 | 0.59 | 0.59 | 0.58 | 0.55 | 0.53 | 0.50 | 0.52 |
| **0.7** | 0.62 | 0.62 | 0.62 | 0.61 | 0.58 | 0.59 | 0.58 | 0.54 | 0.54 | 0.51 | 0.51 |
| **0.8** | 0.61 | 0.60 | 0.62 | 0.60 | 0.58 | 0.57 | 0.55 | 0.53 | 0.51 | 0.49 | 0.51 |
| **0.9** | 0.61 | 0.59 | 0.60 | 0.61 | 0.57 | 0.58 | 0.48 | 0.53 | 0.48 | 0.50 | 0.49 |
| **1** | 0.38 | 0.39 | 0.39 | 0.53 | 0.37 | 0.37 | 0.37 | 0.48 | 0.36 | 0.37 | 0.37 |

**Table S4.** The correlation parameters ($R^2$) between POA factors resolved from ME-2 and their tracers in Dongguan.

| ***a* value for HOA** / ***a* value for CCOA** | **0** | **0.1** | **0** | **0.1** |
|---|---|---|---|---|
| | **HOA vs. BC** | | **CCOA vs. PAHs** | |
| **0** | 0.53 | 0.52 | 0.57 | 0.58 |
| **0.1** | 0.54 | 0.54 | 0.60 | 0.59 |
| **0.2** | 0.55 | 0.54 | 0.57 | 0.61 |
| **0.3** | 0.56 | 0.57 | 0.61 | 0.61 |
| **0.4** | 0.56 | 0.57 | 0.62 | 0.61 |

| | | | | |
|---|---|---|---|---|
| **0.5** | 0.55 | 0.56 | 0.62 | 0.61 |
| **0.6** | 0.57 | 0.57 | 0.62 | 0.62 |
| **0.7** | 0.58 | 0.57 | 0.63 | 0.62 |
| **0.8** | 0.59 | 0.60 | 0.63 | 0.63 |
| **0.9** | 0.60 | 0.60 | 0.63 | 0.64 |
| **1** | 0.61 | 0.60 | 0.64 | 0.63 |

**Table S5.** Comparison of the correlations between POAs and their tracers and Q/Qexp values using four reference BBOA MS in ME-2 in Qingdao.

| **Reference MS** | **HOA vs. BC ($R^2$)** | **BBOAvs.$C_2H_4O_2^+$ ($R^2$)** | **COA vs. $C_6H_{10}O^+$ ($R^2$)** | **CCOA vs.PAHs ($R^2$)** | **$Q/Q_{exp}$** |
|---|---|---|---|---|---|
| This study | 0.65 | 0.81 | 0.82 | 0.94 | 1.72 |
| BBOA in Europe (Crippa et al.,2014) | 0.60 | 0.75 | 0.65 | 0.80 | 1.93 |
| BBOA in Xi'an and Beijing (Elser et al.,2016) | 0.61 | 0.78 | 0.69 | 0.79 | 1.84 |
| BBOA in Chinese BB simulation (He et al.,2010) | 0.62 | 0.80 | 0.84 | 0.90 | 1.85 |

**Table S6.** Comparison of the correlations between POAs and their tracers and Q/Qexp values using four reference HOA MS in ME-2 in Dongguan.

| **Reference MS** | **HOA vs. BC ($R^2$)** | **BBOAvs.$C_2H_4O_2^+$ ($R^2$)** | **COA vs. $C_6H_{10}O^+$ ($R^2$)** | **CCOA vs.PAHs ($R^2$)** | **$Q/Q_{exp}$** |
|---|---|---|---|---|---|
| This study | 0.60 | 0.71 | 0.93 | 0.64 | 2.85 |
| HOA in Paris | 0.57 | 0.71 | 0.86 | 0.60 | 3.42 |

| | | | | | |
|---|---|---|---|---|---|
| (Crippa et al.,2013) | | | | | |
| HOA in Xi'an and Beijing (Elser et al.,2016) | 0.58 | 0.70 | 0.85 | 0.57 | 3.40 |
| HOA in Chinese vehicle emission simulation (Zheng et al.,2016) | 0.60 | 0.70 | 0.84 | 0.60 | 3.41 |

## References


Crippa, M., DeCarlo, P. F., Slowik, J. G., Mohr, C., Heringa, M.F., Chirico, R., Poulain, L., Freutel, F., Sciare, J., Cozic, J., DiMarco, C. F., Elsasser, M., José, N., Marchand, N., Abidi, E.,Wiedensohler, A., Drewnick, F., Schneider, J., Borrmann, S.,Nemitz, E., Zimmermann, R., Jaffrezo, J.-L., Prévôt, A. S. H.,and Baltensperger, U.: Wintertime aerosol chemical compositionand source apportionment of the organic fraction in themetropolitan area of Paris, Atmos. Chem. Phys., 13, 961–981,doi:10.5194/acp-13-961-2013, 2013.

Crippa, M., F. Canonaco, V. a. Lanz, M. Äijälä, J. D. Allan, S. Carbone, G. Capes, D. Ceburnis, M. Dall'Osto, D. A. Day, P. F. DeCarlo, M. Ehn, a. Eriksson, E. Freney, L. Hildebrandt Ruiz, R. Hillamo, J. L. Jimenez, H. Junninen, A. Kiendler-Scharr, A. M. Kortelainen, M. Kulmala, A. Laaksonen, A. A. Mensah, C. Mohr, E. Nemitz, C. O'Dowd, J. Ovadnevaite, S. N. Pandis, T. Petäjä, L. Poulain, S. Saarikoski, K. Sellegri, E. Swietlicki, P. Tiitta, D. R. Worsnop, U. Baltensperger, and A. S. H. Prévôt: Organic aerosol components derived from 25 AMS data sets across Europe using a consistent ME-2 based source apportionment approach, Atmos. Chem. Phys., 14(12),6159-6176, doi: 10.5194/acp-14-6159-2014, 2014.

Elser, M., R. J. Huang, R. Wolf, J. G. Slowik, Q. Wang, F. Canonaco, G. Li, C. Bozzetti, K. R. Daellenbach, Y. Huang, R. Zhang, Z. Li, J. Cao, U. Baltensperger, I. El-Haddad, and A. S. H. Prévôt : New insights into PM2.5 chemical composition and sources in two major cities in China during extreme haze events using aerosol mass spectrometry, Atmos. Chem. Phys., 16(5), 3207-3225, doi: 10.5194/acp-16-3207-2016,2016.

He, L. Y., Y. Lin, X. F. Huang, S. Guo, L. Xue, Q. Su, M. Hu, S. J. Luan, and Y. H. Zhang : Characterization of high-resolution aerosol mass spectra of primary organic aerosol emissions from Chinese cooking and biomass burning, Atmos. Chem. Phys., 10(23), 11535-11543, doi: 10.5194/acp-10-11535-2010,2010.

Zheng J., Hu M., Gu F.T., Peng J.F., Zhang W.B., Xiao Y., Du Z.F., Qin Y.H., Deng L., Li M.R., Wu Y.S, Shuai S.J.: Characterization of High Resolution Source Profiles of Primary Organic Aerosol missions From Gasoline Vehicles. Proceedings of the CSEE., 36(16), 4466-4471,doi: 10.13334/j.0258-8013.pcsee.160358, 2016.