1 **Supplementary Information for**

2 Primary emissions versus secondary formation of fine particulate matter in the top

3 polluted city, Shijiazhuang, in North China

4 Ru-Jin Huang[1], Yichen Wang[1], Junji Cao[1], Chunshui Lin[1,2], Jing Duan[1], Qi Chen[3], Yongjie Li[4],

5 Yifang Gu[1], Jin Yan[1], Wei Xu[1,2], Roman Fröhlich[5], Francesco Canonaco[5], Carlo Bozzetti[5],

6 Jurgita Ovadnevaite[2], Darius Ceburnis[2], Manjula R. Canagaratna[6], John Jayne[6], Douglas R.

7 Worsnop[6], Imad El-Haddad[5], André S. H. Prévôt[5], Colin D. O'Dowd[2]

8 [1]Key Laboratory of Aerosol Chemistry & Physics, State Key Laboratory of Loess and

9 Quaternary Geology, Institute of Earth Environment, Chinese Academy of Sciences, Xi'an

10 710061, China

11 [2]School of Physics and Centre for Climate and Air Pollution Studies, National University of

12 Ireland Galway, Galway, Ireland

13 [3]State Key Joint Laboratory of Environmental Simulation and Pollution Control, College of

14 Environmental Sciences and Engineering, Peking University, Beijing, China

15 [4]Department of Civil and Environmental Engineering, Faculty of Science and Technology,

16 University of Macau, Taipa, Macau, China

17 [5]Laboratory of Atmospheric Chemistry, Paul Scherrer Institute (PSI), 5232 Villigen, Switzerl

18 and

19 [6]Aerodyne Research, Inc., Billerica, MA, USA

20 *Correspondence to*: R.-J. Huang (rujin.huang@ieecas.cn)

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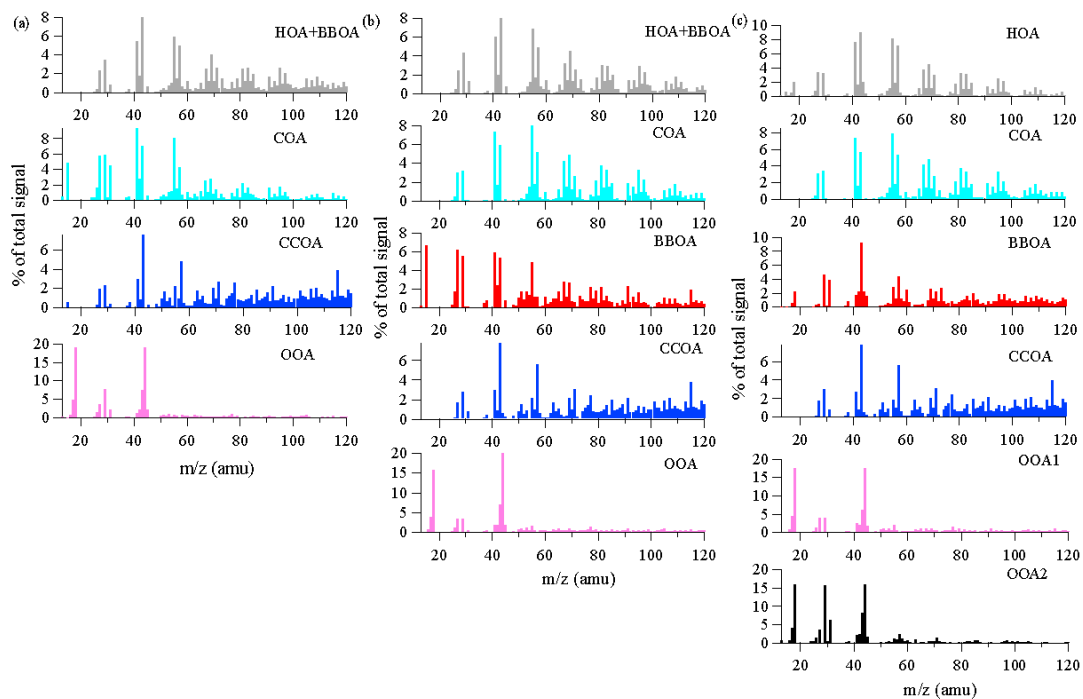
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Fig. S1. PMF profiles of OA sources for 4-, 5-, and 6-factor solutions.

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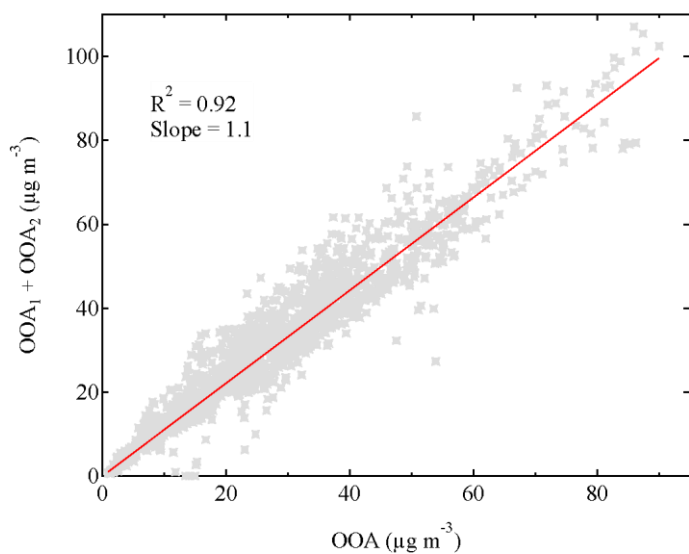
2 Fig. S2. Scattering plot of OOA_1+OOA_2 in the 6-factor solution vs OOA in the 5-factor solution.

4 Note: The resolved two secondary factors in the 6-factor solution, referred to as "OOA_1" and
5 "OOA_2", have the similar contributions from oxygenated fragment-related m/z (m/z 44) and the
6 strong correlation with each other ($R^2 = 0.72$). The sum of the contributions of OOA_1 and OOA_2
7 matches the OOA contribution from 5-factor solution ($R^2 = 0.92$ and slope = 1.1).

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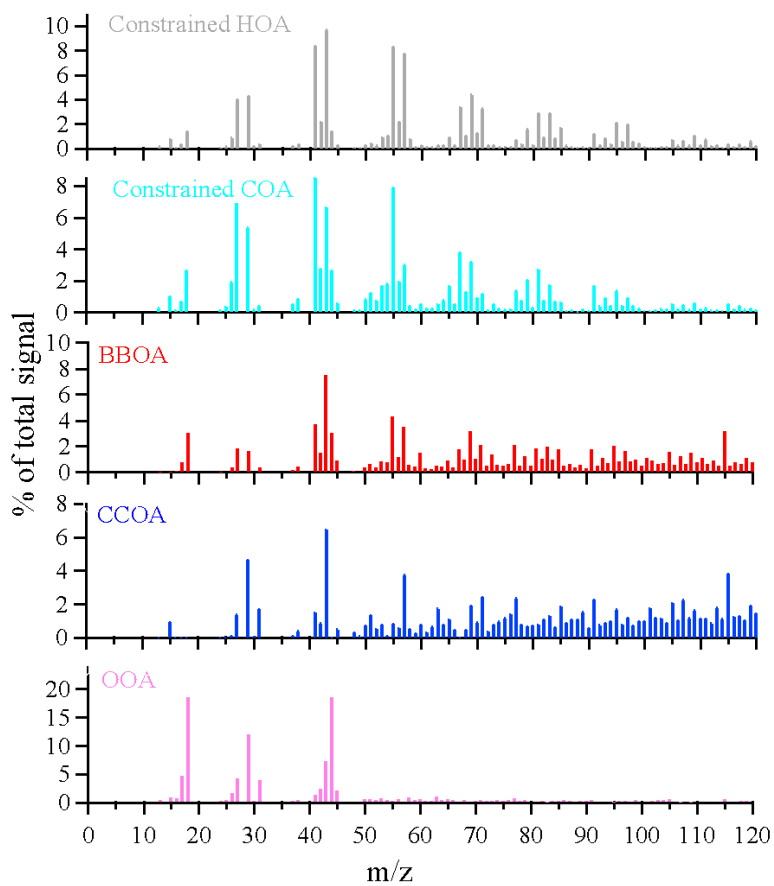
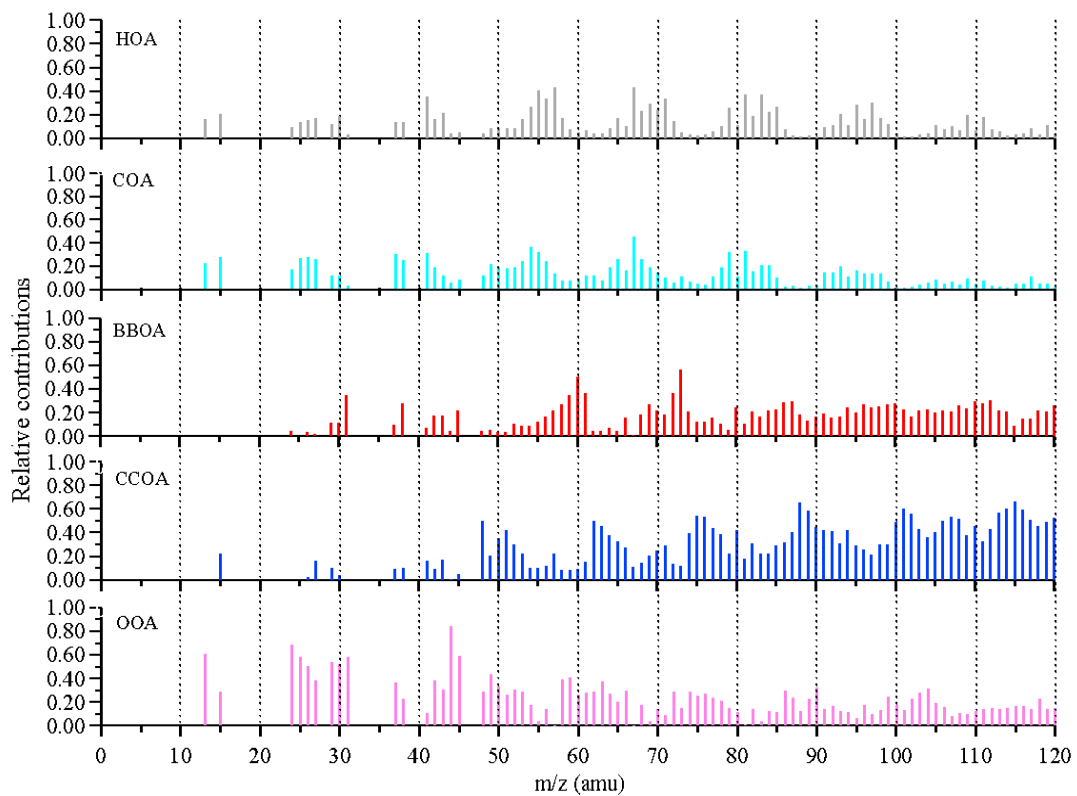


Fig. S3. ME-2 profiles of OA sources. The COA profile is from that of Crippa et al. (2013), and the HOA profile is from that of Ng et al. (2011b). The others are unconstrained factors.

2   Fig. S4. The relative contributions of OA factors to the *m/z*'s.

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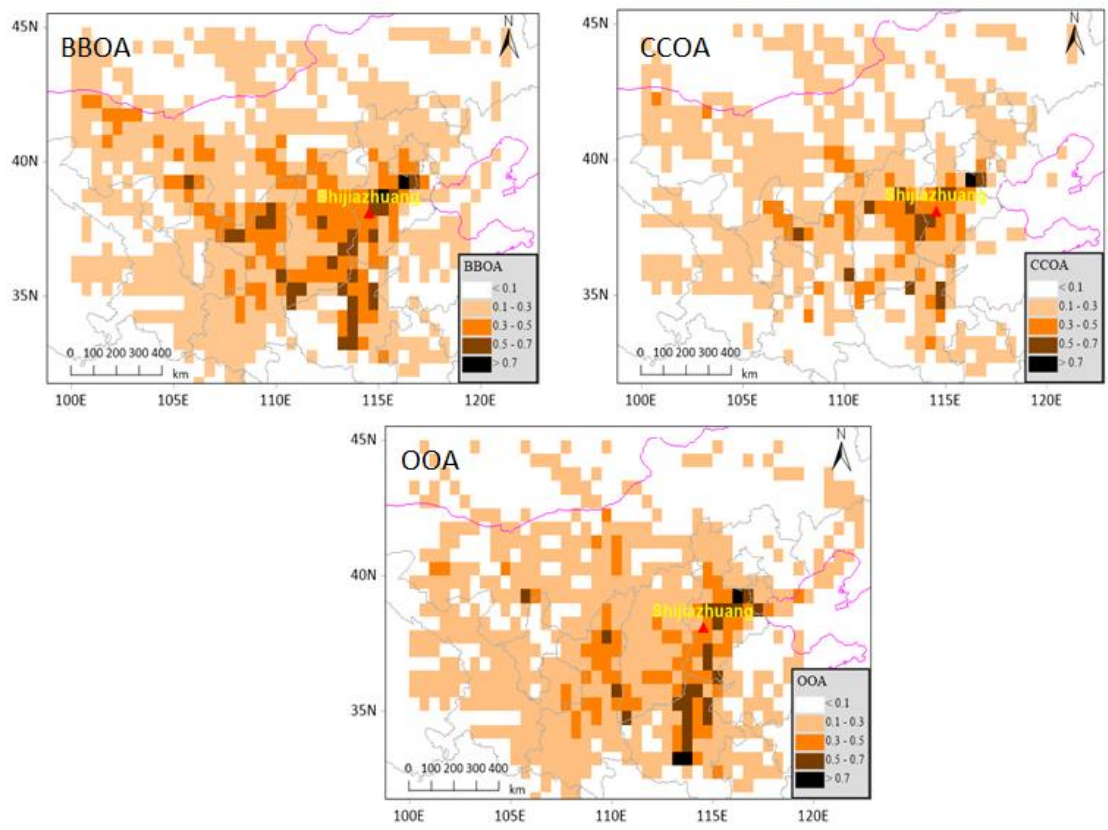
2   Fig. S5. The maps of potential source contribution function (PSCF) analysis for BBOA, CCOA, and
3   OOA.