

SUPPLEMENT FOR:

Bulk deposition and source apportionment of atmospheric heavy metals and metalloids in agricultural areas of rural Beijing during 2016–2020

Yuepeng Pan^{1,2*}, Jin Liu^{1,2}, Lan Zhang³, Jing Cao^{1,2}, Jiabao Hu¹, Shili Tian^{1,4}, Xingyu Li⁵ and Wen Xu⁶

¹ State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China; liujin@mail.iap.ac.cn (J.L.); caojing315@mails.ucas.ac.cn (J.C.); hujiabao@nuist.edu.cn (J.H.); tianshili@mail.iap.ac.cn (S.T.)

² College of Earth and Planetary Sciences, University of Chinese Academy of Sciences, Beijing 100049, China

³ The Analysis and Test Center, Capital Normal University, Beijing 100048, China; zhanglan3761@sina.com

⁴ Beijing Center for Physical & Chemical Analysis, Beijing 100089, China

⁵ Key Laboratory of Cloud-Precipitation Physics and Severe Storms, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China; lxy@mail.iap.ac.cn

⁶ National Academy of Agriculture Green Development, Key Laboratory of Plant-Soil Interactions of MOE, College of Resources and Environmental Sciences, China Agricultural University, Beijing 100193, China; wenxu@cau.edu.cn

* Correspondence: panyuepeng@mail.iap.ac.cn



Figure S1. Schematic image of the bulk deposition sampling. Credit: PAN Yuepeng

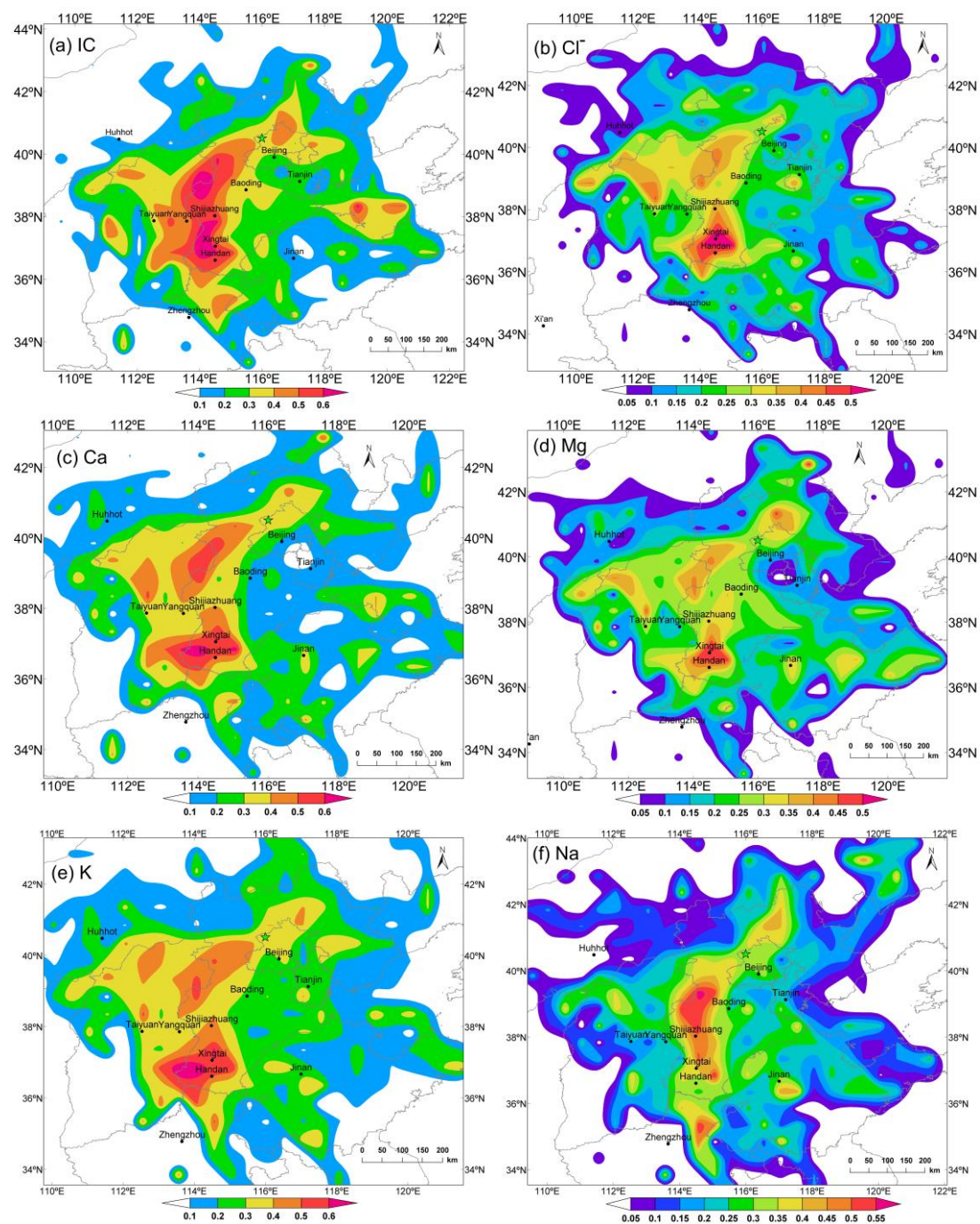


Figure S2. The potential agricultural source regions for atmospheric deposited chemical tracers of IC (a), Cl^- (b), Ca (c), Mg (d), K (e) and Na (f).

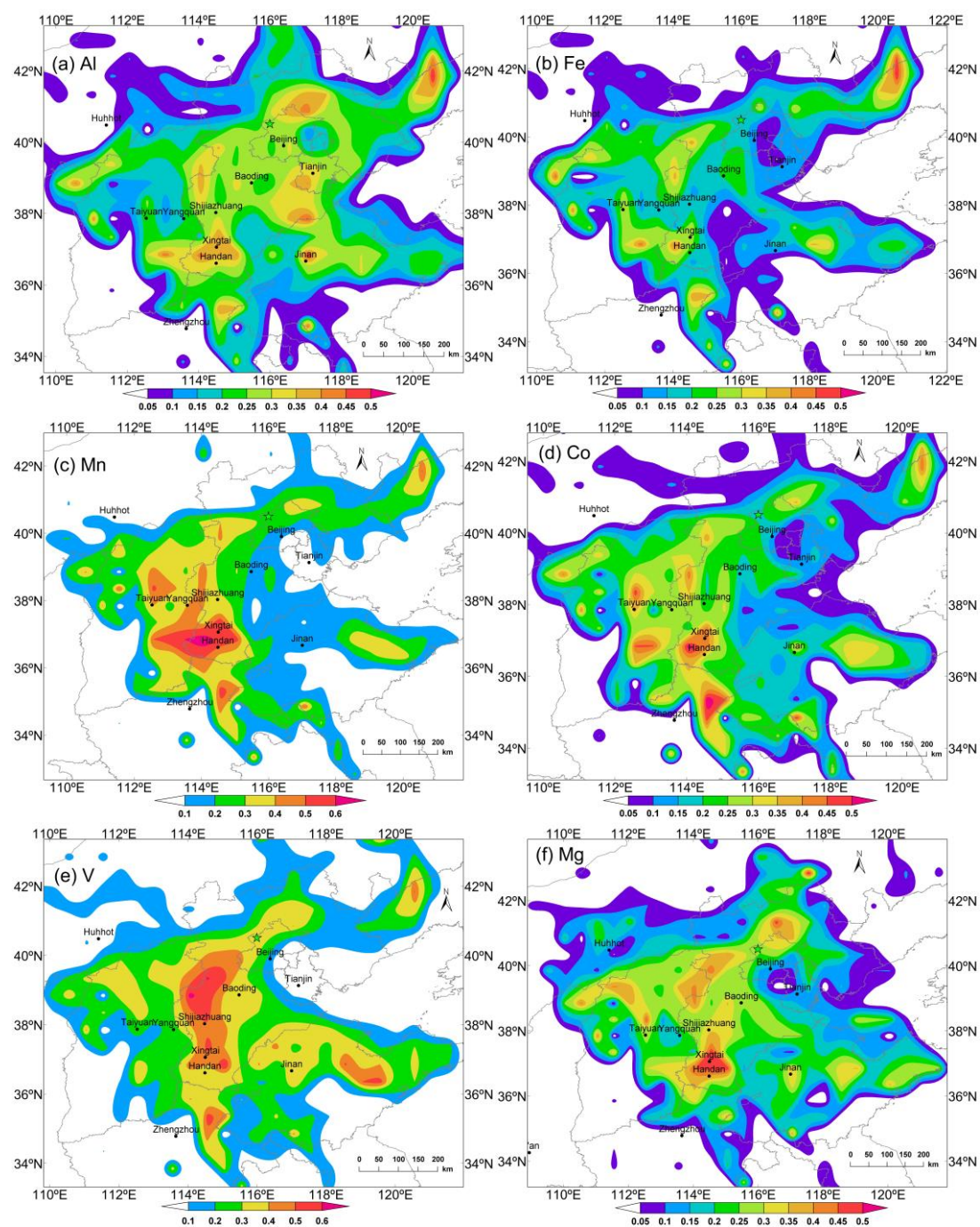


Figure S3. The potential dust source regions for atmospheric deposited chemical tracers of Al (a), Fe (b), Mn (c), Co (d), V (e) and Mg (f).

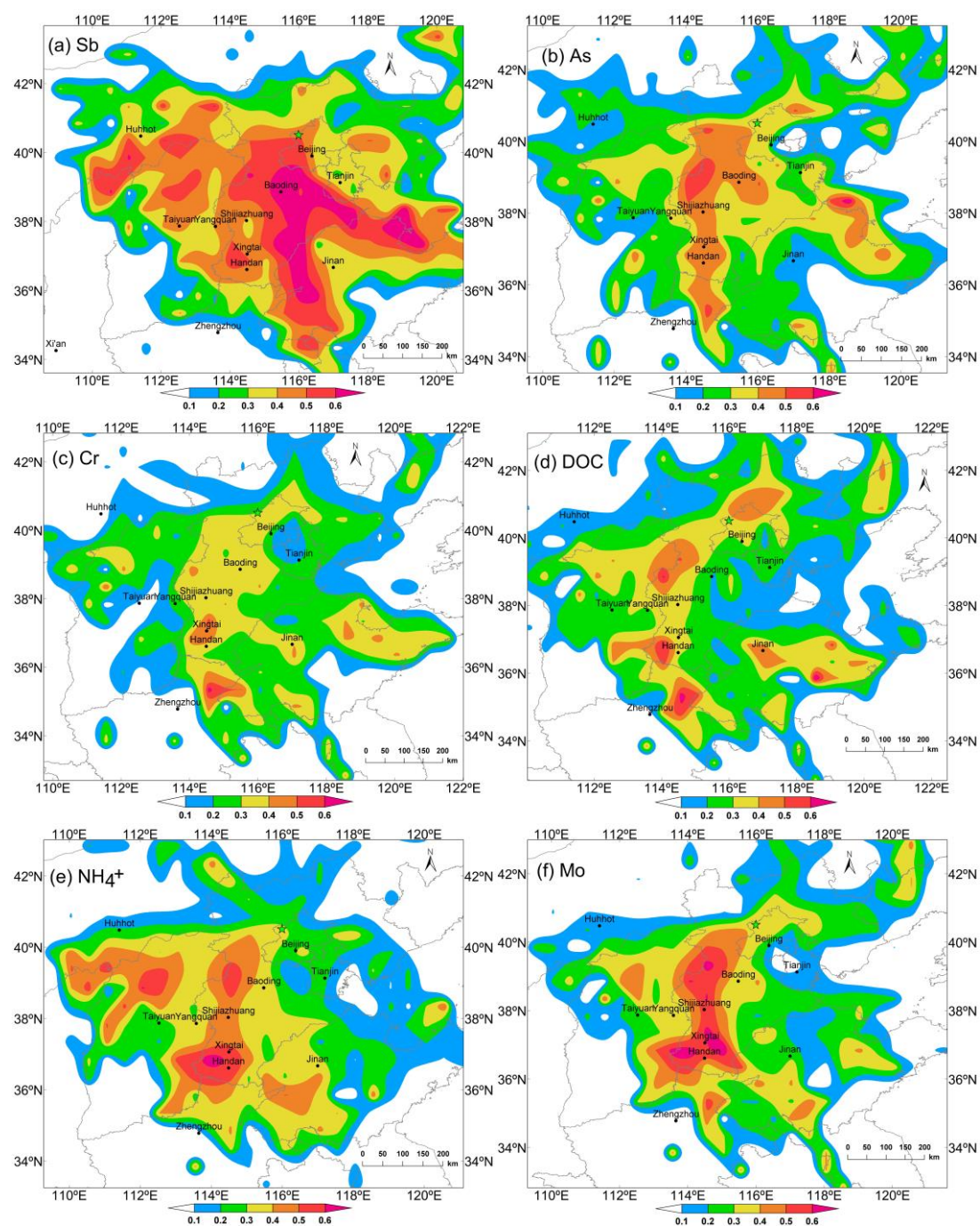


Figure S4. The potential coal combustion source regions for atmospheric deposited chemical tracers of Sb (a), As (b), Cr (c), DOC (d), NH_4^+ (e) and Mo (f).

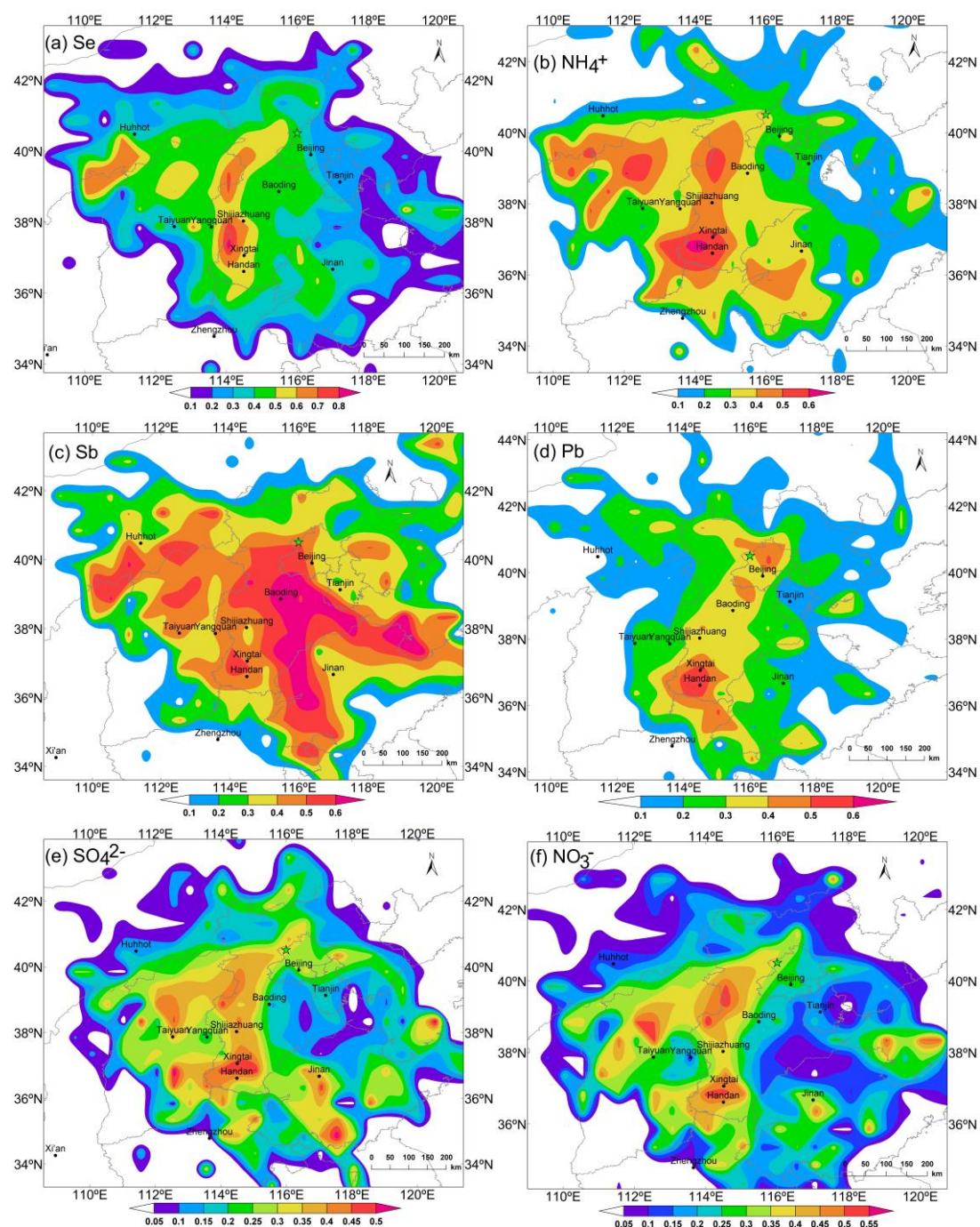


Figure S5. The potential industrial emissions source regions for atmospheric deposited chemical tracers of Se (a), NH_4^+ (b), Sb (c), Pb (d), SO_4^{2-} (e) and NO_3^- (f).

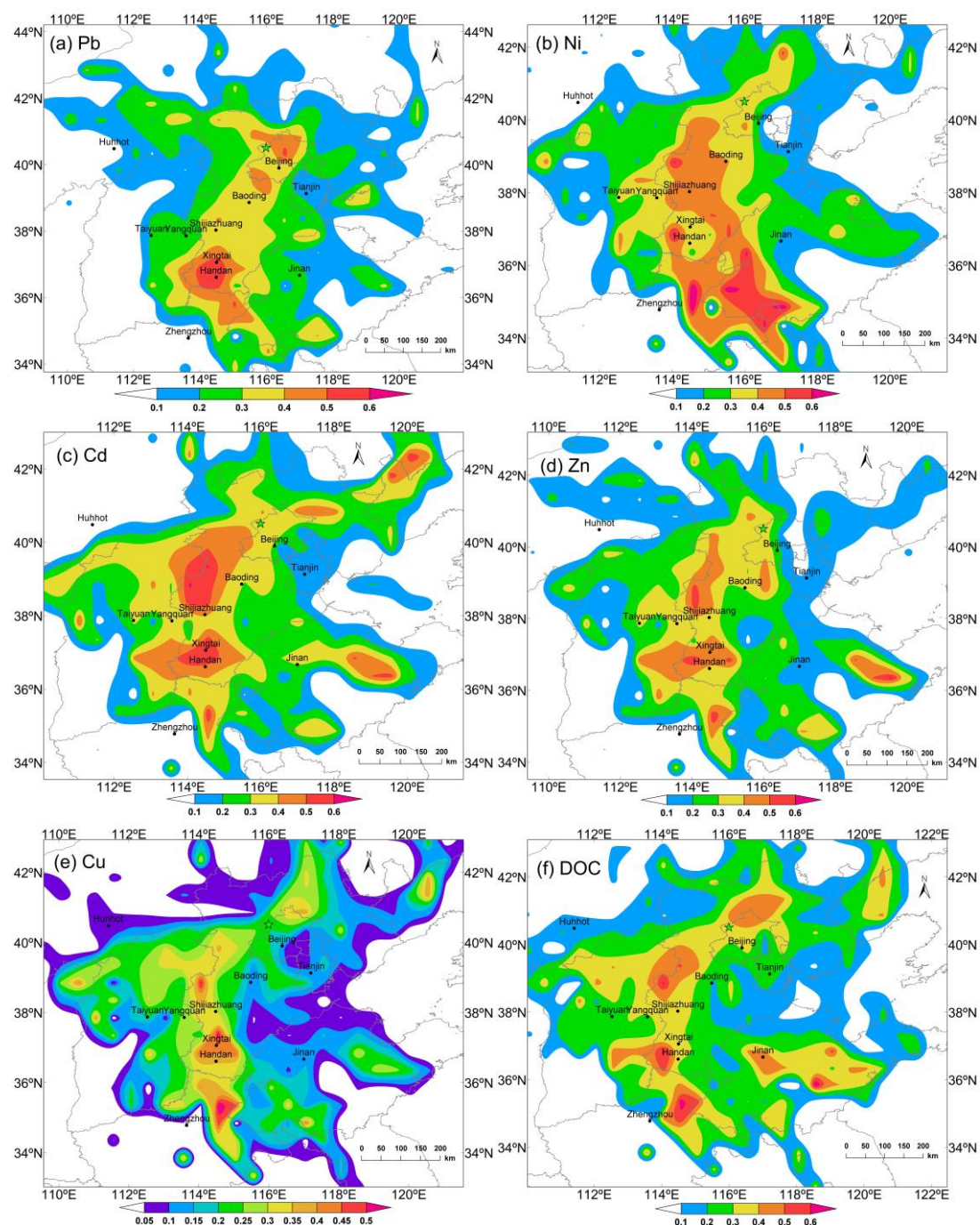


Figure S6. The potential traffic emissions source regions for atmospheric deposited chemical tracers of Pb (a), Ni (b), Cd (c), Zn (d), Cu (e) and DOC (f).

Table S1. Sampling logsheet covering the period of Nov 2016 to Nov 2020 (YQ or YQZ stands for the site name of Yanqing in rural Beijing, Date format: day month year).

Logsheet	Site	Sampling label	Start date	End date	Sampling days
1	YQZ	YQZ20161120	07 Nov 2016	20 Nov 2016	13
2	YQZ	YQZ20170221	20 Nov 2016	21 Feb 2017	93
3	YQZ	YQZ20170320	21 Feb 2017	20 Mar 2017	27
4	YQZ	YQZ20170323	20 Mar 2017	23 Mar 2017	3
5	YQZ	YQZ20170503	23 Mar 2017	03 May 2017	41
6	YQZ	YQZ201705A	10 May 2017	22 May 2017	12
7	YQZ	YQZ201705B	03 May 2017	10 May 2017	7
8	YQZ	YQZ201705C	22 May 2017	28 May 2017	6
9	YQZ	YQZ20170606	28 May 2017	06 Jun 2017	9
10	YQZ	YQZ20170618	06 Jun 2017	18 Jun 2017	12
11	YQZ	YQZ20170621	18 Jun 2017	21 Jun 2017	3
12	YQZ	YQZ20170625	21 Jun 2017	25 Jun 2017	4
13	YQZ	YQZ20170627	25 Jun 2017	27 Jun 2017	2
14	YQZ	YQZ20170704	27 Jun 2017	04 Jul 2017	7
15	YQZ	YQZ20170706	04 Jul 2017	06 Jul 2017	2
16	YQZ	YQZ20170720	06 Jul 2017	20 Jul 2017	14
17	YQZ	YQZ20170723	20 Jul 2017	23 Jul 2017	3
18	YQZ	YQZ20170726	23 Jul 2017	26 Jul 2017	3
19	YQZ	YQZ20170802	26 Jul 2017	02 Aug 2017	7
20	YQZ	YQZ20170808	02 Aug 2017	08 Aug 2017	6
21	YQZ	YQZ20170809	08 Aug 2017	09 Aug 2017	1
22	YQZ	YQZ20170812	09 Aug 2017	12 Aug 2017	3
23	YQZ	YQZ20170816	12 Aug 2017	16 Aug 2017	4
24	YQZ	YQZ20170822	16 Aug 2017	22 Aug 2017	6
25	YQZ	YQZ20170827	22 Aug 2017	27 Aug 2017	5
26	YQZ	YQZ20170831	27 Aug 2017	31 Aug 2017	4
33	YQZ	YQZ20170903	31 Aug 2017	03 Sep 2017	3
34	YQZ	YQZ20170904	03 Sep 2017	04 Sep 2017	1
35	YQZ	YQZ20171002	04 Sep 2017	02 Oct 2017	28
36	YQZ	YQZ20171009	02 Oct 2017	09 Oct 2017	7
37	YQZ	YQZ20171018	09 Oct 2017	18 Oct 2017	9
38	YQZ	YQZ20171021	18 Oct 2017	21 Oct 2017	3
40	YQZ	YQZ20180317	21 Oct 2017	17 Mar 2018	147
41	YQZ	YQZ20180403	17 Mar 2018	03 Apr 2018	17
42	YQZ	YQZ20180404	03 Apr 2018	04 Apr 2018	1
44	YQZ	YQ20180413	04 Apr 2018	13 Apr 2018	9

Logsheet	Site	Sampling label	Start date	End date	Sampling days
45	YQZ	YQ20180422	13 Apr 2018	22 Apr 2018	9
46	YQZ	YQ20180512	22 Apr 2018	12 May 2018	20
47	YQZ	YQ20180517	12 May 2018	17 May 2018	5
48	YQZ	YQ20180521	17 May 2018	21 May 2018	4
49	YQZ	YQ20180613	21 May 2018	13 Jun 2018	23
50	YQZ	YQ20180616	13 Jun 2018	16 Jun 2018	3
51	YQZ	YQ20180618	16 Jun 2018	18 Jun 2018	2
52	YQZ	YQ20180623	18 Jun 2018	23 Jun 2018	5
53	YQZ	YQ20180630	23 Jun 2018	30 Jun 2018	7
54	YQZ	YQ20180702	30 Jun 2018	02 Jul 2018	2
55	YQZ	YQ20180707	02 Jul 2018	07 Jul 2018	5
56	YQZ	YQ20180708	07 Jul 2018	08 Jul 2018	1
57	YQZ	YQ20180711	08 Jul 2018	11 Jul 2018	3
58	YQZ	YQ20180716	11 Jul 2018	16 Jul 2018	5
59	YQZ	YQ20180717	16 Jul 2018	17 Jul 2018	1
60	YQZ	YQ20180719	17 Jul 2018	19 Jul 2018	2
62	YQZ	YQ20180720	19 Jul 2018	20 Jul 2018	1
63	YQZ	YQ20180721	20 Jul 2018	21 Jul 2018	1
64	YQZ	YQ20180722	21 Jul 2018	22 Jul 2018	1
65	YQZ	YQ20180724	22 Jul 2018	24 Jul 2018	2
66	YQZ	YQ20180806	24 Jul 2018	06 Aug 2018	13
67	YQZ	YQ20180808	06 Aug 2018	08 Aug 2018	2
68	YQZ	YQ20180811	08 Aug 2018	11 Aug 2018	3
69	YQZ	YQ20180813	11 Aug 2018	13 Aug 2018	2
70	YQZ	YQ20180818	13 Aug 2018	18 Aug 2018	5
71	YQZ	YQ20180830	18 Aug 2018	30 Aug 2018	12
72	YQZ	YQ20180902	30 Aug 2018	02 Sep 2018	3
73	YQZ	YQ20180911	02 Sep 2018	11 Sep 2018	9
74	YQZ	YQ20180927	11 Sep 2018	27 Sep 2018	16
76	YQZ	YQ20190214	27 Sep 2018	14 Feb 2019	140
77	YQZ	YQ20190310	14 Feb 2019	10 Mar 2019	24
80	YQZ	YQ20190409	10 Mar 2019	09 Apr 2019	30
81	YQZ	YQ20190419	09 Apr 2019	19 Apr 2019	10
82	YQZ	YQ20190424	19 Apr 2019	24 Apr 2019	5
83	YQZ	YQ20190427	24 Apr 2019	27 Apr 2019	3
84	YQZ	YQ20190517	27 Apr 2019	17 May 2019	20
85	YQZ	YQ20190518	17 May 2019	18 May 2019	1
86	YQZ	YQ20190526	18 May 2019	26 May 2019	8

Logsheet	Site	Sampling label	Start date	End date	Sampling days
87	YQZ	YQ20190613	26 May 2019	13 Jun 2019	18
88	YQZ	YQ20190616	13 Jun 2019	16 Jun 2019	3
89	YQZ	YQ20190617	16 Jun 2019	17 Jun 2019	1
90	YQZ	YQ20190628	17 Jun 2019	28 Jun 2019	11
92	YQZ	YQ20190705	28 Jun 2019	05 Jul 2019	7
93	YQZ	YQ20190711	05 Jul 2019	11 Jul 2019	6
94	YQZ	YQ20190719	11 Jul 2019	19 Jul 2019	8
95	YQZ	YQ20190722	19 Jul 2019	22 Jul 2019	3
96	YQZ	YQ20190729	22 Jul 2019	29 Jul 2019	7
97	YQZ	YQ20190804	29 Jul 2019	04 Aug 2019	6
98	YQZ	YQ20190805	04 Aug 2019	05 Aug 2019	1
99	YQZ	YQ20190809	05 Aug 2019	09 Aug 2019	4
100	YQZ	YQ20190812	09 Aug 2019	12 Aug 2019	3
101	YQZ	YQ20190820	12 Aug 2019	20 Aug 2019	8
102	YQZ	YQ20190910	20 Aug 2019	10 Sep 2019	21
103	YQZ	YQ20190911	10 Sep 2019	11 Sep 2019	1
104	YQZ	YQ20190912	11 Sep 2019	12 Sep 2019	1
105	YQZ	YQ20191004	12 Sep 2019	04 Oct 2019	22
106	YQZ	YQ20191102	04 Oct 2019	02 Nov 2019	29
107	YQZ	YQ20191109	02 Nov 2019	09 Nov 2019	7
108	YQZ	YQ20191129	09 Nov 2019	29 Nov 2019	20
109	YQZ	YQ20191217	29 Nov 2019	17 Dec 2019	18
110	YQZ	YQ20200105	17 Dec 2019	05 Jan 2020	19
111	YQZ	YQ20200202	05 Jan 2020	02 Feb 2020	28
112	YQZ	YQ20200206	02 Feb 2020	06 Feb 2020	4
113	YQZ	YQ20200214	06 Feb 2020	14 Feb 2020	8
114	YQZ	YQ20200302	14 Feb 2020	02 Mar 2020	17
115	YQZ	YQ20200308	02 Mar 2020	08 Mar 2020	6
116	YQZ	YQ20200415	08 Mar 2020	15 Apr 2020	38
117	YQZ	YQ20200507	15 Apr 2020	07 May 2020	22
118	YQZ	YQ20200508	07 May 2020	08 May 2020	1
119	YQZ	YQ20200521	08 May 2020	21 May 2020	13
120	YQZ	YQ20200523	21 May 2020	23 May 2020	2
121	YQZ	YQ20200531	23 May 2020	31 May 2020	8
122	YQZ	YQ20200610	31 May 2020	10 Jun 2020	10
123	YQZ	YQ20200624	10 Jun 2020	24 Jun 2020	14
124	YQZ	YQ20200625	24 Jun 2020	25 Jun 2020	1
125	YQZ	YQ20200702	25 Jun 2020	02 Jul 2020	7

Logsheet	Site	Sampling label	Start date	End date	Sampling days
126	YQZ	YQ20200703	02 Jul 2020	03 Jul 2020	1
127	YQZ	YQ20200704	03 Jul 2020	04 Jul 2020	1
128	YQZ	YQ20200705	04 Jul 2020	05 Jul 2020	1
129	YQZ	YQ20200709	05 Jul 2020	09 Jul 2020	4
130	YQZ	YQ20200712	09 Jul 2020	12 Jul 2020	3
131	YQZ	YQ20200717	12 Jul 2020	17 Jul 2020	5
132	YQZ	YQ20200727	17 Jul 2020	27 Jul 2020	10
133	YQZ	YQ20200731	27 Jul 2020	31 Jul 2020	4
134	YQZ	YQ20200801	31 Jul 2020	01 Aug 2020	1
135	YQZ	YQ20200808	01 Aug 2020	08 Aug 2020	7
136	YQZ	YQ20200809	08 Aug 2020	09 Aug 2020	1
137	YQZ	YQ20200813	09 Aug 2020	13 Aug 2020	4
138	YQZ	YQ20200817	13 Aug 2020	17 Aug 2020	4
139	YQZ	YQ20200818	17 Aug 2020	18 Aug 2020	1
140	YQZ	YQ20200824	18 Aug 2020	24 Aug 2020	6
141	YQZ	YQ20200827	24 Aug 2020	27 Aug 2020	3
142	YQZ	YQ20200831	27 Aug 2020	31 Aug 2020	4
143	YQZ	YQ20200907	31 Aug 2020	07 Sep 2020	7
144	YQZ	YQ20200911	07 Sep 2020	11 Sep 2020	4
145	YQZ	YQ20200915	11 Sep 2020	15 Sep 2020	4
146	YQZ	YQ20200921	15 Sep 2020	21 Sep 2020	6
147	YQZ	YQ20200923	21 Sep 2020	23 Sep 2020	2
148	YQZ	YQ20200928	23 Sep 2020	28 Sep 2020	5
149	YQZ	YQ20201001	28 Sep 2020	01 Oct 2020	3
150	YQZ	YQ20201119	01 Oct 2020	19 Nov 2020	49