

Table S1. Variations of TSP, PAH and NPAH concentrations in Shenyang

Compounds	M.W.	2001/2002		2007/2008		2010		2013/2014	
		Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
TSP ($\mu\text{g}/\text{m}^3$)		114 $\pm$ 29	194 $\pm$ 8.4	151 $\pm$ 37	171 $\pm$ 38	177 $\pm$ 17	171 $\pm$ 55	88 $\pm$ 36	178 $\pm$ 83
PAHs (pmol/m^3)									
FR	202.3	3.1 $\pm$ 1.2	260 $\pm$ 89	8.5 $\pm$ 2.5	67 $\pm$ 28	4.2 $\pm$ 1.9	33 $\pm$ 17	6.6 $\pm$ 1.7	120 $\pm$ 57
Pyr	202.3	3.0 $\pm$ 0.81	250 $\pm$ 71	7.5 $\pm$ 1.7	74 $\pm$ 27	2.7 $\pm$ 0.92	37 $\pm$ 20	6.0 $\pm$ 1.6	110 $\pm$ 47
BaA	228.3	1.3 $\pm$ 0.41	110 $\pm$ 31	7.0 $\pm$ 2.9	68 $\pm$ 27	2.3 $\pm$ 0.69	32 $\pm$ 13	3.8 $\pm$ 1.1	35 $\pm$ 14
Chr	228.3	3.0 $\pm$ 1.1	140 $\pm$ 48	13 $\pm$ 6.2	83 $\pm$ 25	3.9 $\pm$ 0.85	40 $\pm$ 17	6.9 $\pm$ 1.5	45 $\pm$ 20
BbF	252.3	7.7 $\pm$ 3.7	79 $\pm$ 25	36 $\pm$ 27	74 $\pm$ 25	9.1 $\pm$ 1.7	24 $\pm$ 11	11 $\pm$ 3.6	37 $\pm$ 15
BkF	252.3	2.5 $\pm$ 1.2	38 $\pm$ 10	12 $\pm$ 8.2	29 $\pm$ 9.5	3.4 $\pm$ 0.72	12 $\pm$ 5.6	4.2 $\pm$ 1.1	15 $\pm$ 5.8
BaP	252.3	2.6 $\pm$ 0.84	78 $\pm$ 19	12 $\pm$ 5.7	49 $\pm$ 17	3.4 $\pm$ 0.81	24 $\pm$ 11	5.1 $\pm$ 0.99	30 $\pm$ 12
BghiPe	276.3	5.6 $\pm$ 3.9	48 $\pm$ 16	27 $\pm$ 13	57 $\pm$ 18	5.0 $\pm$ 0.75	19 $\pm$ 6.7	12 $\pm$ 3.3	37 $\pm$ 12
IDP	276.3	4.0 $\pm$ 2.3	34 $\pm$ 11	16 $\pm$ 8.3	28 $\pm$ 9.4	6.9 $\pm$ 1.4	19 $\pm$ 7.4	5.1 $\pm$ 0.75	18 $\pm$ 5.5
NPAH (fmol/m^3)									
1-NP	247.3	150 $\pm$ 100	720 $\pm$ 77	170 $\pm$ 41	790 $\pm$ 330	96 $\pm$ 28	730 $\pm$ 340	90 $\pm$ 25	760 $\pm$ 390
6-NBaP	297.3	11 $\pm$ 2.1	100 $\pm$ 27	36 $\pm$ 12	120 $\pm$ 56	21 $\pm$ 3.1	83 $\pm$ 41	22 $\pm$ 6.6	140 $\pm$ 72

Table S2. Variations of TSP, PAH and NPAH concentrations in Beijing

Compounds	M.W.	2004	2007/2008		2009/2010		2013	
		Winter	Summer	Winter	Summer	Winter	Summer	Winter
TSP ($\mu\text{g}/\text{m}^3$)		171 ± 58	757 ± 438	211 ± 58	96 ± 30	207 ± 125	125 ± 55	667 ± 152
PAHs (pmol/m^3)								
FR	202.3	160 ± 110	5.4 ± 1.6	110 ± 27	2.9 ± 0.54	310 ± 240	2.8 ± 1.4	77 ± 51
Pyr	202.3	170 ± 110	4.9 ± 1.3	100 ± 31	2.5 ± 0.49	290 ± 20	2.4 ± 1.2	81 ± 54
BaA	228.3	95 ± 57	2.8 ± 0.88	55 ± 20	0.84 ± 0.19	210 ± 170	0.91 ± 0.46	31 ± 20
Chr	228.3	92 ± 51	4.5 ± 1.6	45 ± 19	1.9 ± 0.53	190 ± 150	2.0 ± 0.94	38 ± 24
BbF	252.3	65 ± 40	10 ± 3.2	52 ± 20	4.9 ± 1.8	91 ± 53	3.5 ± 1.8	37 ± 23
BkF	252.3	28 ± 15	3.9 ± 1.1	18 ± 8.0	1.5 ± 0.39	38 ± 23	1.2 ± 0.60	14 ± 8.2
BaP	252.3	60 ± 35	5.3 ± 1.7	35 ± 16	2.0 ± 0.48	69 ± 41	1.8 ± 0.91	35 ± 17
BghiPe	276.3	48 ± 25	13 ± 4.0	60 ± 21	3.2 ± 0.80	26 ± 30	4.3 ± 2.2	43 ± 26
IDP	276.3	30 ± 19	7.2 ± 1.9	24 ± 10	3.2 ± 0.89	55 ± 36	2.3 ± 0.95	19 ± 12
NPAH (fmol/m^3)								
1-NP	247.3	740 ± 300	78 ± 20	680 ± 140	48 ± 20	440 ± 150	32 ± 11	260 ± 93
6-NBaP	297.3	650 ± 350	14 ± 3.5	41 ± 9.7	23 ± 14	320 ± 190	4.7 ± 2.1	73 ± 48

Table S3. Variations of TSP, PAH and NPAH concentrations in Shanghai

Compounds	M.W.	2007		2010		2013	
		Summer	Winter	Summer	Winter	Summer	Winter
TSP ($\mu\text{g}/\text{m}^3$)		84	107	81 ± 39	154 ± 42	34 ± 11	128 ± 44
PAHs (pmol/m^3)							
FR	202.3	1.2	3.3	0.76 ± 0.32	7.0 ± 3.8	0.94 ± 0.28	15 ± 8.3
Pyr	202.3	1.1	2.9	0.75 ± 0.31	5.6 ± 2.6	0.74 ± 0.21	13 ± 6.2
BaA	228.3	0.33	1.8	0.30 ± 0.093	5.0 ± 2.2	0.34 ± 0.17	4.1 ± 2.2
Chr	228.3	0.82	3.4	0.57 ± 0.22	9.2 ± 3.8	0.63 ± 0.17	10 ± 5.3
BbF	252.3	1.6	7.5	1.4 ± 0.37	9.8 ± 3.2	1.0 ± 0.38	11 ± 5.5
BkF	252.3	0.55	2.5	0.53 ± 0.14	4.1 ± 1.2	0.36 ± 0.14	4.4 ± 2.1
BaP	252.3	0.65	2.9	0.69 ± 0.19	5.7 ± 1.9	0.47 ± 0.18	6.1 ± 3.1
BghiPe	276.3	2.1	7.8	1.8 ± 0.49	9.0 ± 3.0	1.2 ± 0.50	12 ± 5.8
IDP	276.3	1.2	4.7	1.2 ± 0.37	5.9 ± 1.9	0.52 ± 0.23	6.6 ± 3.1
NPAH (fmol/m^3)							
1-NP	247.3	150	150	34 ± 12	200 ± 88	19 ± 5.1	170 ± 67
6-NBaP	297.3	5.1	20	7.4 ± 3.8	13 ± 3.6	2.3 ± 1.2	27 ± 10

Table S4. Variations of TSP, PAH and NPAH concentrations in Vladivostok

Compounds	M.W.	1999		2005	2007/2008		2010		2013/2014	
		Summer	Winter	Winter	Summer	Winter	Summer	Winter	Summer	Winter
TSP ($\mu\text{g}/\text{m}^3$)					95 $\pm$ 44	80 $\pm$ 22	41 $\pm$ 34	73 $\pm$ 33	50 $\pm$ 19	80 $\pm$ 18
PAHs (pmol/m^3)										
FR	202.3	0.49	30 $\pm$ 14	15 $\pm$ 4.1	1.1 $\pm$ 0.49	32 $\pm$ 8.9	1.1 $\pm$ 0.96	60 $\pm$ 18	0.33 $\pm$ 0.12	12 $\pm$ 6.4
Pyr	202.3	0.49	24 $\pm$ 13	16 $\pm$ 4.4	0.86 $\pm$ 0.34	26 $\pm$ 8.0	1.0 $\pm$ 0.81	52 $\pm$ 18	0.27 $\pm$ 0.098	8.1 $\pm$ 3.9
BaA	228.3	0.22	13 $\pm$ 10	6.5 $\pm$ 2.6	0.25 $\pm$ 0.091	10 $\pm$ 0.5	0.44 $\pm$ 0.30	26 $\pm$ 14	0.13 $\pm$ 0.071	6.7 $\pm$ 4.5
Chr	228.3	0.31	15 $\pm$ 9.9	10 $\pm$ 3.1	0.52 $\pm$ 0.17	13 $\pm$ 5.4	0.78 $\pm$ 0.50	32 $\pm$ 14	0.27 $\pm$ 0.11	9.6 $\pm$ 5.9
BbF	252.3	0.83	17 $\pm$ 10	11 $\pm$ 3.9	1.2 $\pm$ 0.60	18 $\pm$ 8.4	1.5 $\pm$ 0.92	31 $\pm$ 11	0.57 $\pm$ 0.26	12 $\pm$ 6.6
BkF	252.3	0.32	7.9 $\pm$ 5.1	5.7 $\pm$ 2.2	0.44 $\pm$ 0.23	8.7 $\pm$ 4.3	0.61 $\pm$ 0.39	15 $\pm$ 5.8	0.20 $\pm$ 0.10	6.0 $\pm$ 3.6
BaP	252.3	0.44	15 $\pm$ 10	9.6 $\pm$ 4.8	0.47 $\pm$ 0.41	16 $\pm$ 9.4	0.79 $\pm$ 0.57	25 $\pm$ 11	0.28 $\pm$ 0.099	10 $\pm$ 6.9
BghiPe	276.3	0.98	17 $\pm$ 12	8.6 $\pm$ 4.5	1.9 $\pm$ 1.4	24 $\pm$ 12	1.4 $\pm$ 0.99	12 $\pm$ 6.7	0.85 $\pm$ 0.31	16 $\pm$ 9.4
IDP	276.3	0.51	8.1 $\pm$ 7.0	10 $\pm$ 4.7	1.2 $\pm$ 1.2	18 $\pm$ 8.9	1.1 $\pm$ 0.86	20 $\pm$ 9.0	0.37 $\pm$ 0.15	8.1 $\pm$ 4.7
NPAH (fmol/m^3)										
1-NP	247.3	17	460 $\pm$ 230	290 $\pm$ 140	19 $\pm$ 2.5	350 $\pm$ 150	19 $\pm$ 9.7	340 $\pm$ 110	6.0 $\pm$ 3.9	150 $\pm$ 91
6-NBaP	297.3	8.7	N.D.	80 $\pm$ 84	3.1 $\pm$ 1.7	26 $\pm$ 18	4.4 $\pm$ 2.3	130 $\pm$ 74	1.4 $\pm$ 0.79	22 $\pm$ 15

Table S5. Variations of TSP, PAH and NPAH concentrations in Busan

Compounds	M.W.	2005	2007/2008		2010	
		Winter	Summer	Winter	Summer	Winter
TSP ($\mu\text{g}/\text{m}^3$)		44 ± 29	62 ± 16	39 ± 21	34 ± 7.3	50 ± 23
PAHs (pmol/m^3)						
FR	202.3	N.D.	0.40 ± 0.15	5.3 ± 2.7	0.57 ± 0.31	7.0 ± 3.2
Pyr	202.3	2.5 ± 1.4	0.37 ± 0.11	4.0 ± 2.6	0.54 ± 0.25	5.2 ± 2.4
BaA	228.3	1.1 ± 0.44	0.15 ± 0.056	1.9 ± 1.3	0.21 ± 0.12	1.5 ± 0.60
Chr	228.3	1.7 ± 0.62	0.27 ± 0.070	3.0 ± 1.6	0.41 ± 0.24	3.3 ± 1.1
BbF	252.3	1.9 ± 0.66	0.45 ± 0.12	2.7 ± 1.1	0.57 ± 0.27	3.2 ± 1.2
BkF	252.3	0.91 ± 0.36	0.17 ± 0.038	1.1 ± 0.47	0.21 ± 0.11	1.2 ± 0.41
BaP	252.3	1.9 ± 0.84	0.25 ± 0.056	1.8 ± 1.0	0.30 ± 0.17	1.6 ± 0.66
BghiPe	276.3	1.7 ± 0.75	0.55 ± 0.11	2.9 ± 1.4	0.43 ± 0.21	1.5 ± 0.56
IDP	276.3	N.D.	0.29 ± 0.033	1.7 ± 0.73	0.33 ± 0.16	1.9 ± 0.68
NPAH (fmol/m^3)						
1-NP	247.3	84 ± 47	20 ± 7.4	91 ± 44	12 ± 7.6	56 ± 22
6-NBaP	297.3	7.5 ± 3.8	0.87 ± 0.45	5.3 ± 1.6	2.0 ± 1.0	4.6 ± 2.8