Supplementary Information:

Table SI1. Location information for the sampling sites.

Region	City name	Longitude (°E)	Latitude (°N)	Population (million)	Sunshine (hour)	Precipitation (mm)	Humidity (%)	Temperature (ºC)	Altitude (m.a.s.l)
Northwest	Kashi	75.98	39.45	1.8		64.5		11.8	
Northwest	Kuerle	86.01	41.77	4.4		35		9.9	
Northwest	Kelamayi	84.85	45.6	2.2		254.6		8.7	300.5
Northwest	Jiayuguan	98.2	39.8	1.1		35		9.9	
Northwest	Urumchi	87.68	43.77	19.4	2528.7	276.3	60	7	653.5
Northwest	Ejinaqi	100.88	41.9	1.8		88		7.2	
Northwest	Lanzhou	103.73	36.03	31.2	2469.9	431.4		10.9	1517.2
Northwest	Xi'ning	101.74	36.56	21	2477.5	484.1	60	5.9	2261.2
North	Changchun	125.35	43.88	73.2	2324.6	681.0	61	9.1	215.7
North	Shenyang	123.38	41.8	69.9	2249.9	822.2	58	6.8	41.6
North	Beijing	116.47	39.9	118.1	2576.1	410.7	58	12.9	50
North	Tianjing	117.2	39.13	93.9	2348.2	618.5	68	12.8	5
North	Xi'an	108.95	34.27	74.2	1949.4	541.4	69	14.4	396.9
North	Shijiazhuang	114.48	38.03	92.7	2274.1	389.5	66	13.7	70
North	Taiyuan	112.53	37.87	34	2620.9	274.7	66	10.2	800
North	Hohhot	111.65	40.82	21.3	2816.8	248.3	58	7.2	1035
North	Xinxiang	113.39	34.9			456.9		9.6	
North	Zhengzhou	113.65	34.76	74.1	1740.9	728.8	69	14.5	
Southwest	Guiyang	106.71	26.57	108.2	1004.1	1067.5	80	14.9	1071.2
Southwest	Chongqing	106.54	29.59	14.7	903.9	1019.8	80	18.9	260.6
Southwest	Kunming	102.73	25.04	35.1	2054.3	976.0	67	16.5	1891.3
Southwest	Chengdu	104.06	30.67			921.2	76	16.7	505.9
Central	Wuhan	114.31	30.52	68	1829.7	1116.6	74	17.5	27.5
Central	Changsha	113	28.21	80.1	1423.1	1600.9	78	17.6	60
Central	Hefei	117.27	31.86	45.6	1834.1	1091.3	79	16.3	28
Central	Zhuzhou	113.16	27.83	80.1	1423.1	1600.9	78	17.6	60
Central	Nanchang	115.87	28.68	15.3	1794.5	1908.7	74	18.6	25
South	Guangzhou	113.25	23.13	62.1	1288.5	1986.2		22.8	18
South	Nanning	108.33	22.84	75.1	1423.2	1119.2	75	23	80
East	Hangzhou	120.19	30.26	66	1762.2	1138.6	73	17.4	10
East	Nanjing	118.83	32.03	59.6	1937.5	992.3	74	16.1	67.9
Coast	Dalian	121.62	38.92	56.5	2749.7	768.5		10.9	96.8
Coast	Tsingdao	120.33	36.07	59.7	2355.1	830.8	81	25.3	77
Coast	Fuzhou	119.3	26.08	61.5	1469.2	1705.4	80	22.1	88.4
Coast	Xiamen	118.1	24.46	4.7		1531.1		21.2	
Coast	Haikou	110.35	20.2	18.2	1840.5	1187.0	76	17.1	10
Coast	Beihai	109.12	21.49	4		1625.0		23.8	
BGS	Hok Tsui	114.1	22.2	69		2214.3		22.9	20
BGNW	Waliguan	100.9	36.28						3840
BGN	Xianghuangqi	113.83	42.25						1050

Data from China statistical year book 2005 and China statistical year book 2006;

BGS, BGNW, BGN represent background sites in south, northwest and north.

Table SI2. Correlation coefficient matrix

	NAP	ACY	ACE	FLU	PHE	ANT	FLA	PYR	BAA	CHY	BBF	BKF	BEP	BAP	PER	INP	DAC	BGP	COR	ΣPAHs	PM10	Coal consumption	Temperature	Humidity	Sunshine	Precipitation	Altitude	Population
NAP	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**ng.d^{-1}**	**mg.m^{-3}**	**10^{4} ton**	**°C**	**%**	**hour**	**mm**	**m.a.s.l**	**million**
ACY	**-.426****																											
ACE	**.747****	-.299																										
FLU	**.778****	**-.413****	**.873****																									
PHE	**.748****	**-.438****	**.835****	**.967****																								
ANT	**-.377***	**.607****	-.065	**-.306**	-.328*																							
FLA	**.631****	**-.437****	**.740****	**.850****	**.931****	-.333*																						
PYR	**.418****	-.189	**.686****	**.670****	**.749****	.187	**.830****																					
BAA	-.258	.336*	.058	-.208	-.212	**.867****	-.176	.378*																				
CHY	**.517****	-.317*	**.674****	**.654****	**.730****	-.161	**.877****	**.804****	.059																			
BBF	**.383***	-.100	**.734****	**.581****	**.599****	.283	**.650****	**.849****	**.529****	**.788****																		
BKF	.137	.080	**.511****	.281	.293	**.591****	.333*	**.716****	**.814****	**.528****	**.907****																	
BEP	**.579****	-.230	**.836****	**.758****	**.781****	-.104	**.820****	**.740****	.068	**.873****	**.868****	**.613****																
BAP	**.382***	-.030	**.774****	**.575****	**.551****	.291	**.537****	**.685****	**.454****	**.653****	**.920****	**.847****	**.860****															
PER	.279	.054	**.710****	**.448****	**.423****	**.455****	**.418****	**.652****	**.585****	**.573****	**.889****	**.887****	**.758****	**.955****														
INP	**.622****	-.301	**.860****	**.823****	**.829****	-.216	**.841****	**.688****	-.070	**.837****	**.788****	**.496****	**.976****	**.815****	**.699****													
DAC	**.349***	.032	**.748****	**.498****	**.480****	.393*	**.483****	**.682****	**.541****	**.649****	**.925****	**.888****	**.830****	**.968****	**.971****	**.758****												
BGP	**.494****	**-.422****	**.688****	**.784****	**.839****	-.301	**.918****	**.741****	-.159	**.846****	**.645****	.281	**.957****	**.570****	**.364***	**.996****	**.428****											
COR	.204	.118	**.612****	**.415****	**.419****	**.528****	**.447****	**.723****	**.630****	**.575****	**.897****	**.913****	**.728****	**.898****	**.917****	**.640****	**.921****	**.414****										
ΣPAHs	**.763****	-.292	**.890****	**.928****	**.955****	-.103	**.914****	**.857****	.025	**.802****	**.760****	**.507****	**.854****	**.699****	**.605****	**.861****	**.661****	**.841****	**.608****									
PM10	**.447***	-.168	**.499****	**.478***	.486*	-.166	.402*	.277	-.276	.393*	.325	.160	.362	.279	.225	.385*	.284	.326	.247	**.456***								
Coal consumption	**.459****	-.100	.271	.271	.233	-.280	.185	-.050	-.251	.319	.101	-.068	.294	.177	.098	.315	.151	.034	.028	.236	.422*							
Temperature	**-.529****	.368	**-.637****	**-.728****	**-.691****	.134	**-.655****	**-.638****	.035	**-.549****	**-.530****	**-.437***	-.462*	-.477*	-.476*	**-.562****	-.400*	**-.719****	-.444*	**-.688****	-.408*	-.090						
Humidity	**-.547****	.282	**-.575****	**-.692****	**-.660****	.132	**-.587****	**-.571****	.077	**-.515****	-.447*	-.337	-.378	-.377	-.366	-.466*	-.312	**-.671****	-.354	**-.653****	-.473*	-.155	**.835****					
Sunshine	.289	.148	**.429***	**.454***	.391*	.102	.334	.340	.130	.354	.462*	**.453***	.405*	**.487****	**.494****	.455*	.425*	.452*	**.504****	.448*	.435*	.110	**-.626****	**-.779****				
Precipitation	**-.474****	.071	**-.410****	**-.539****	**-.453****	.190	-.384*	-.217	.196	-.342*	-.257	-.061	-.367*	-.232	-.145	**-.410****	-.192	**-.429****	-.131	**-.458****	-.416*	-.348	**.681****	**.719****	**-.722****			
Altitude	.341	-.194	**.407***	**.615****	**.626****	-.044	**.572****	**.595****	-.005	.428*	.387*	.277	.333	.228	.268	.344	.240	.437*	.278	**.587****	.127	-.184	-.460*	-.427*	.233	-.383*		
Population	-.003	.001	-.178	-.172	-.109	-.285	-.095	-.284	-.289	-.066	-.277	-.333*	-.133	-.212	-.264	-.095	-.257	-.084	-.293	-.176	.144	**.493****	.138	.075	-.134	.216	-.383	-

ΣPAHs: total PAHs

*P<0.05

**P<0.01

Table SI3: Seasonal ratios of PAHs in China

Compounds	Winter/summer							Spring/summer								Autumn/summer							
	NW	N	WS	M	S	EC	BGS	NW	N	WS	M	S	EC	BGNW	BGN	NW	N	WS	M	S	EC	BGNW	BGN
NAP	0.8	2.7	2.7	2.8	2.6	3.2	0.44	0.48	0.88	1.1	1.6	1.4	2.2	0.88	1.7	0.57	2.2	1.6	1.5	3.8	1.2	1.4	1.5
ACY	1.5	1.7	1.9	1.7	3	1.5	9.1	0.73	0.62	0.68	0.81	0.74	0.31	0.07	0.36	2.5	3.4	2.9	1.7	3.6	1.4	0.34	0.38
ACE	2.5	2.8	3.3	3.1	2.4	1.8	8.6	1	0.79	1.3	1.5	1.1	0.9	0.3	0.62	1.5	2.9	2.7	4.3	8.0	1.4	0.87	0.7
FLU	3.5	3.3	2.7	3.1	3.2	1.6	29	1.1	1.2	1.5	1.6	1.1	0.9	0.28	0.92	2	3.2	2.3	2.6	7	1.5	0.44	1.9
PHE	2.5	2	2.2	1.3	2.4	1.1	0.17	1	1.1	1.6	1.1	1.3	0.86	0.17	0.63	1.3	1.9	2	1.2	3.6	1.3	0.21	1.2
ANT	3.6	2.6	1.2	0.7	3.1	0.93	1.6	0.89	1	0.62	0.65	1.4	0.5	0.09	0.6	3	3.7	1.6	1.1	6.4	1.8	0.12	1
CAR	1.2	1.1	3.6	0.3	2.2	0.43	6.8	0.88	0.9	1.7	0.55	2.1	0.47	0.13	0.4	0.57	1	1.3	0.38	3.6	0.49	0.15	0.95
FLA	1.6	1.3	2.2	0.93	2.6	0.89	2.6	0.93	1.1	1.5	1.2	2	0.65	0.12	0.5	1.2	1.6	2.1	1.1	3.8	1.4	0.31	1.2
PYR	1.8	1.4	2.1	1	3.5	1	0.09	0.86	1	1.4	1.2	2.6	0.61	0.09	0.45	1.3	1.7	2.3	1.2	4.7	1.6	0.27	1.2
BAA	1.3	1.2	2.1	1.1	1.9	1	5.3	0.71	0.77	1	1.5	1.9	0.72	0.23	0.47	1.4	2	3.2	1.6	4.7	3.3	0.69	1.3
CHY	0.83	0.73	1.2	0.92	1.6	0.74	0.95	0.7	0.67	1.1	1.2	2	0.76	0.19	0.49	1	1.6	2.2	1.2	4	2	1.2	1.2
BBF	2.2	2.2	3.1	2.5	1.9	0.93	1.9	1.6	1.6	2.1	2.2	2.5	0.82	0.39	1.1	1.4	2.4	3.2	2	4.8	2.2	0.95	2.2
BKF	1.8	2.2	3.6	1.4	1.8	1.3	4.4	1.3	1.6	2.4	1.3	2	1.3	0.63	1.1	1.1	2.4	3.4	1.1	3.8	2.2	1.1	1.5
BEP	2.3	2.3	3.4	2.7	2.4	1.1	0.74	1.9	1.7	2.1	2.2	3.1	1.1	0.44	1.2	1.6	2.7	3.2	2	6.2	2.1	1.2	2.1
BAP	3.8	2.8	5.1	1.4	2	1.5	1.9	2	2	3.1	1	1.5	1.1	1.7	0.79	2.2	3.3	4.3	1.1	2.1	2.3	9	2.5
PER	3	2.7	3.8	4.7	4	1.6		1.9	1.2	1.9	3.1	1.7	1.3		1.2	2.3	3.4	4.4	3.8	8.7	2.7		2
INP	2.6	2.5	3.9	4.2	1.8	1		1.8	1.8	2.2	3	1.7	0.79		0.94	1.8	2.8	3.7	3.2	5.1	2.1		2.3
DAC	2.7	2.4	6.4	5.8	3.5	0.76		2.2	1.5	3.1	4.5	3.5	0.51			2.1	3.2	5.9	5.5	12.9	2.0		2.7
BGP	2.6	2.7	3.7	3.8	3	1.3		2	1.9	2.1	2.8	2.7	1		0.98	1.8	3	3.6	2.7	6.7	2.1		2.2
COR	5.8	4.4	5.1	7.1	15	3.7		3.7	3	3.9	5.8	8	1.6			2.3	3.2	2.9	2.1	17.1	3		
ΣPAHs	1.8	1.9	2.4	1.3	2.6	1.5	2.2	0.83	1	1.4	1.2	1.6	1	0.33	1.2	1.2	2	2	1.2	4.1	1.4	0.58	1.4

ΣPAHs: total PAHs

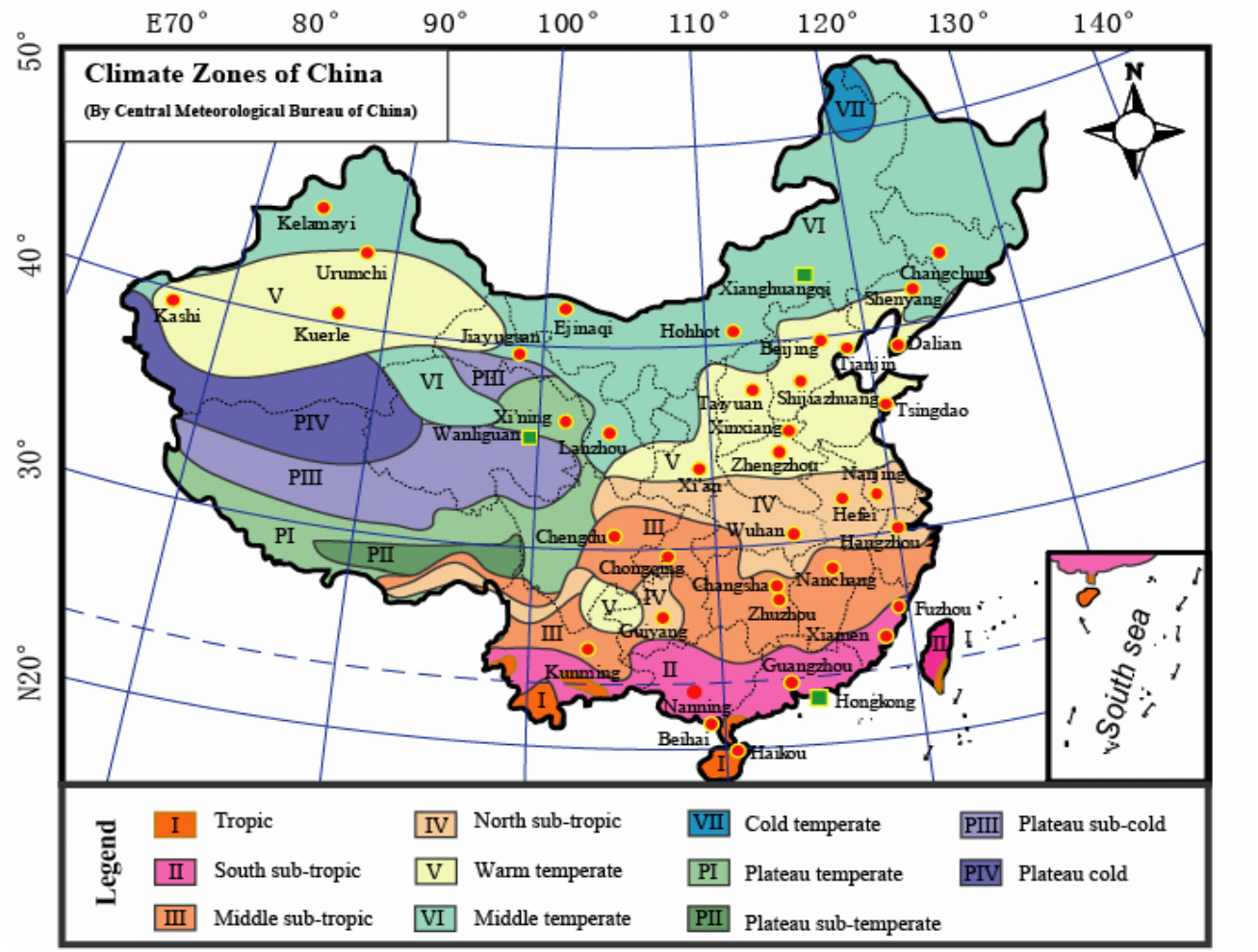
Table SI4. Selected PAH ratios in urban and background air of China

Season	Group	M-PHE/ PHE	PHE/ ANT	FLA/ PYR	BAP/ BGP	BAP/ CHR	BEP/ BAP	INP/ BGP	O=FLU/ FLU	O=ANT=O/ ANT
Winter	NW	0.41	14	1.5	0.73	0.25	2.3	1.1	1.7	2.8
	N	0.47	28	1.7	0.73	0.29	2.2	1.1	2.1	4.5
	SW	0.35	30	1.7	0.83	0.15	2.4	1	1.8	3.5
	M	0.36	59	1.8	0.66	0.17	2.9	1.1	3.3	9.6
	S	0.52	23	1.3	0.59	0.09	2.8	1	3.3	2.2
	EC	0.46	26	1.6	0.72	0.18	2.1	1	2.1	5
	BG	24	1.4	32	-	0.12	1.4	-	0.2	13.5
	Mean	0.43	31	1.6	0.72	0.21	2.4	1.1	2.3	4.9
Spring	NW	3.08	38	5.1	0.51	0.13	5.2	1.1	3.1	12
	N	0.49	37	1.9	0.72	0.23	2.4	1.1	4.5	15
	SW	0.35	40	1.8	1.01	0.13	2.7	1.1	2.4	11
	M	0.42	56	1.7	0.51	0.09	3.9	1.1	5.3	25
	S	0.57	28	1.4	0.48	0.05	4.6	1	6	18
	EC	0.61	36	1.6	0.66	0.11	3.0	0.9	3.1	12
	BG	0.3	26	2.4	0.33	0.10	8.3	1	4.9	13
	Mean	0.49	39	1.8	0.63	0.13	3.8	1.1	3.9	15
Summer	NW	0.46	20	1.7	0.65	0.07	3.4	1.3	2.5	10
	N	0.51	58	1.8	0.72	0.08	2.8	1.2	3.3	38
	SW	0.38	19	1.7	0.65	0.05	3.2	1	1.9	7.7
	M	0.42	30	1.8	1.39	0.11	2.8	1.1	6.4	49
	S	0.48	30	1.8	1.93	0.15	1	1.6	5.6	9.0
	EC	0.52	21	1.6	0.67	0.07	2.7	1.2	3.6	14
	BG	0.68	16	1.7	0.55	0.05	17	1.1	4.4	13
	Mean	0.47	36	1.8	0.81	0.08	2.9	1.2	3.5	25
Autumn	NW	0.54	9	1.4	0.63	0.14	2.3	1.2	1.7	2.6
	N	0.49	20	1.7	0.75	0.15	2.4	1.2	1.7	6
	SW	0.44	20	1.5	0.8	0.08	2.5	1.1	1.7	4.9
	M	0.38	42	1.8	0.59	0.1	3	1.3	3.3	16.2
	S	0.47	18	1.5	0.62	0.08	3.2	1.2	2.1	5.3
	EC	0.58	20	1.5	0.7	0.12	2.4	1.1	2.5	6.1
	BG	0.4	26	2.2	0.57	0.11	4.4	1.2	2.9	14.7
	Mean	0.5	20	1.6	0.69	0.12	2.5	1.2	2.1	6.3

O=FLU: 9-Fluorenone

O=ANT=O: 9,10-Anthracenedione

Figure SI1. The climate zones of China, together with the sampling sites.



Cities (●) and back ground sites (■)

Figure SI2. Geographical distributions of PAH patterns in China through the seasons, 2005

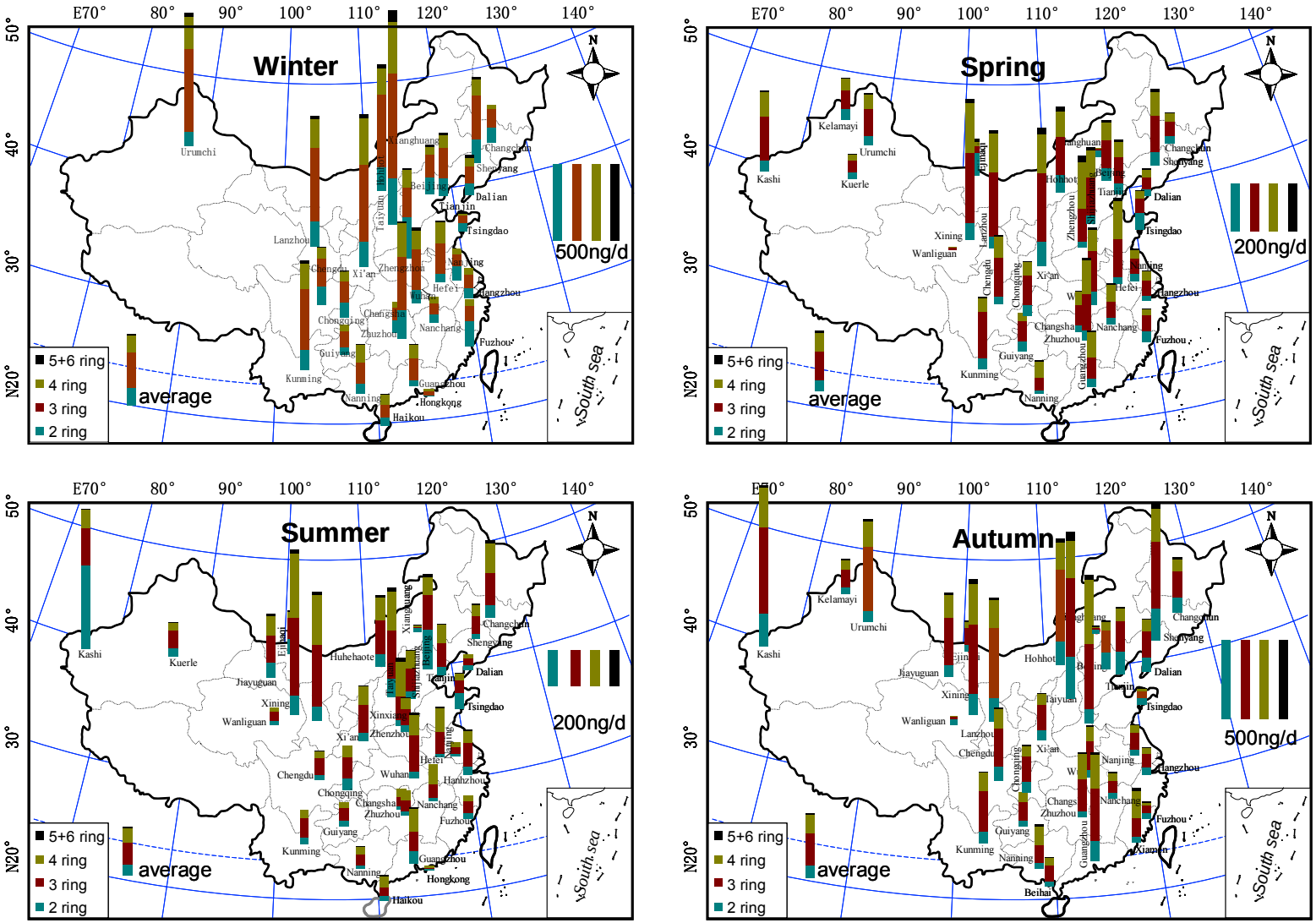
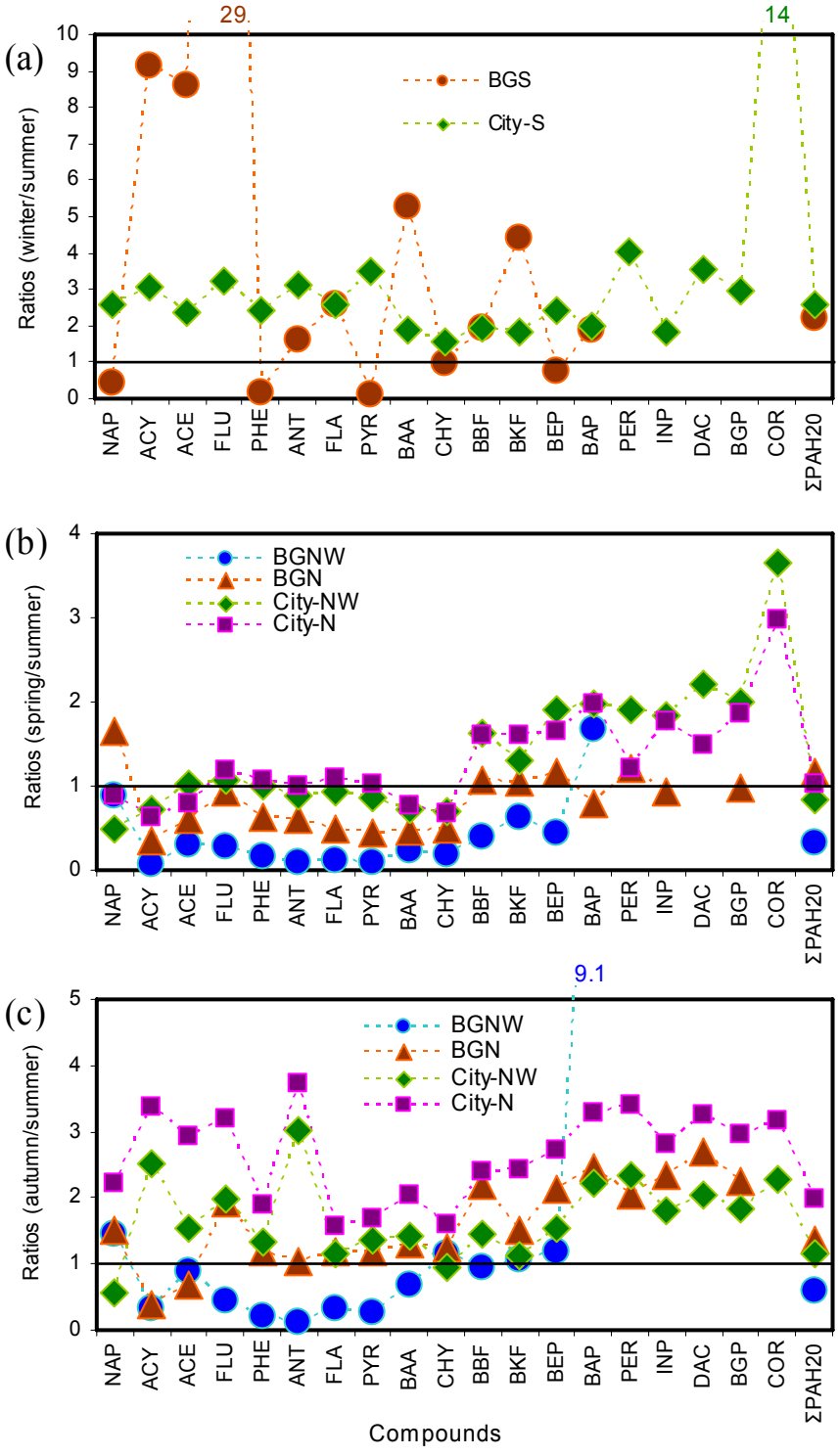


Figure SI3. Seasonal ratios for PAH compounds in city and background locations (winter, spring and autumn versus summer ratios are shown).



City-S, City-NW, City-N represent average ratios of cities in south, northwest, and north China, respectively. BGS, BGNW, BGN represent the south (Hok Tsui), northwest (Waliguang) and north (Xianghuangqi) China sites, respectively.