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Supporting Information for

Polybrominated Diphenyl Ethers (PBDEs) in Surface Soil across Five Asian Countries:

Levels, Spatial Distribution and Source Contribution

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S1. Materials and methods

S1.1. Chemicals and Reagents

The 23 PBDE congeners analyzed include BDE-17, -28, -47, -66, -85, -99, -100, -138, -153, -154, -183, -190, -191, -196, -197, -201, -203, -204, -205, -206, -207, -208 and -209, which can be classified into 8 homologue groups (**Table S2**, Supporting Information (SI)). The 23 congeners and the internal standard BDE-71 were purchased from AccuStandard Inc. (New Haven, CT, USA). The surrogate standards containing CB-155, $^{13}\text{C}_{10}$ -syn-DP, $^{13}\text{C}_{10}$ -anti-DP and $^{13}\text{C}_{12}$ -BDE209 were purchased from Cambridge Isotope Laboratories Inc (Tewksbury, MA, USA). All the organic solvents used in the present study were pesticide residue grade (J.T. Baker, Phillipsburg, NJ, USA).

S1.2. Soil samples collection

The study area encompasses 5 Asian countries (China, India, Japan, Vietnam and South Korea; **Figure S1**). Sampling sites were selected in 82 urban, 80 rural and 10 background locations, as well as locations affected by the emissions of industries (10 locations from vicinity of a BFR-factory (F) in China) and e-waste recycling activities (10 locations from vicinity of two e-waste recycling regions in China, 2 locations near two e-waste recycling regions in South Korea, and 1 locations near an e-waste recycling regions in Vietnam) (**Table S1**). The urban, rural and background area were classified by considering the local population density and gross domestic product (GDP). A total of 195 sampling locations were chosen to collect the soil samples, including 121 from China, 24 from India, 14 from Japan, 14 from Vietnam and 22 from South Korea. Soil samples were collected during the period of September to November, 2012. Details regarding soil sampling and pretreatment procedures have been reported in our previous studies.^{1,2} Briefly, each surface soil sample was collected at a depth of 0–20 cm and was collected manually in an area of approximately 100 m². Five subsamples were collected at the four corners and at the center of sampling

field. After collection, the subsamples were well mixed and transferred in an aluminum container and sealed. All the samples were shipped to Harbin Institute of Technology, Harbin, China and stored at -20 °C until analysis.

S1.3. Sample Preparation

Each soil sample (about 20 g, wet weight) was measured in a pre-cleaned filter paper bags and homogenized with anhydrous sodium sulfate to remove moisture. Another 10 g of soil were weighed to determine the soil organic carbon (SOC) and moisture contents. The SOC for each sample was measured by using a Shimadzu TOC Analyzer (Model TDC-VCPN, Kyoto, Japan). The soil samples were then spiked with the mixture of surrogate standards and Soxhlet extracted with acetone and hexane (1:1, v/v) for 24 h. The volume of extracts were reduced to 3.0 mL in a rotary evaporator and purified using silica gel column chromatography filled with 2.0 g of anhydrous sodium sulfate, 7.0 g of activated silica gel and 3.0 g of anhydrous sodium sulfate from bottom to top. The column was firstly pre-rinsed with 30 mL of hexane, and then eluted using 70 mL of 50% dichloromethane in hexane. The eluents were solvent-exchanged into isooctane under a gentle stream of purified nitrogen (99.999%). The mixture of internal standards was added and the final volume was adjusted to 0.5 mL for chemical analysis.

S1.4. Chemical Analysis

Identification and quantification of PBDEs was carried out on an Agilent 6890 gas chromatograph/5975 mass spectrometer connected with a DB-5MS column (15 m × 0.25 mm × 0.10 μm, J&W Scientific). The flow rate of helium was kept constant at 1.7 mL/min. A 2.0-μL sample was injected in splitless mode with the injector temperature maintained at 260 °C. The oven temperature program was: 110 °C for 0.5 min, 4.5 °C /min to 220 °C, 15 °C /min to 280 °C, 5.0 °C /min to 310 °C and held for 3.0 min. Target ions were monitored in the electron capture negative ionization mode with the ion source temperature of 150 °C. For

127 BDE-17 to BDE-190: 79 and 81; BDE-191: 79, 81 and 160.8; BDE-196: 79, 81 and 720.4; BDE-197 and
128 201: 408.7 and 406.7; BDE-203: 79, 81 and 801.4; BDE-204: 486.6 and 488.6; BDE-205: 79, 81 and 801.4;
129 BDE-206: 79, 81 and 800.4; BDE-207, 208 and 209: 484.5, 486.6 and 488.6; CB-155: 360 and 362;
130 ¹³C₁₂-BDE-209: 496.6 and 494.8; ¹³C₁₀-syn-DP and ¹³C₁₀-anti-DP: 665.8 and 667.8.

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S2. Supplementary Tables

Table S1. Statistics discription of area (km²), population (POP, 2015), GDP (USD/capita, 2015), human development index (HDI, 2014) and the number of soil samples collected from urban (U), rural (R), background (B), e-waste (E), and manufacture (F) regions from five Asian countries.

Country	Area	POP	GDP	HDI	U	R	B	E	F	Total sites
China	9.6E+06	1.4E+09	8,280	0.727	58	39	4	10	10	121
India	3.3E+06	1.3E+09	1,688	0.609	12	12	0	0	0	24
Japan	3.8E+05	1.3E+08	33,223	0.891	3	8	3	0	0	14
South Korea	1.0E+05	5.2E+07	27,513	0.898	5	13	2	2	0	22
Vietnam	3.3E+05	9.2E+07	2,321	0.666	4	8	1	1	0	14

140 **Table S2.** Summary of the full names, abbreviations, homologue groups, monitoring ions (m/z), logK_{OA} (at
141 25 °C) and MDLs for PBDEs.

Chemicals	Abbreviation	Homologue	m/z	logK _{OA}	MDLs (pg/g dw)
2,2',4-tribromodiphenyl ether	BDE-17	TriBDE	79/81	9.31 ^a	1.8
2,4,4'-tribromodiphenyl ether	BDE-28	TriBDE	79/81	9.51 ^a	1.3
2,2',4,4'-tetrabromodiphenyl ether	BDE-47	TetraBDE	79/81	10.54 ^a	2.4
2,3',4,4'-tetrabromodiphenyl ether	BDE-66	TetraBDE	79/81	10.83 ^a	1.0
2,2',3,4,4'-pentabromodiphenyl ether	BDE-85	PentaBDE	79/81	11.67 ^a	1.8
2,2',4,4',5-pentabromodiphenyl ether	BDE-99	PentaBDE	79/81	11.32 ^a	1.8
2,2',4,4',6-pentabromodiphenyl ether	BDE-100	PentaBDE	79/81	11.14 ^a	2.0
2,2',3,4,4',5'- hexabromodiphenyl ether	BDE-138	HexaBDE	79/81	13.27 ^b	1.0
2,2',4,4',5,5'-hexabromodiphenyl ether	BDE-153	HexaBDE	79/81	11.83 ^a	1.1
2,2',4,4',5,6'-hexabromodiphenyl ether	BDE-154	HexaBDE	79/81	11.93 ^a	1.0
2,2',3,4,4',5',6-heptabromodiphenyl ether	BDE-183	HeptaBDE	79/81	11.97 ^a	1.6
2,3,3',4,4',5,6-heptabromodiphenyl ether	BDE-190	HeptaBDE	79/81	14.56 ^b	1.0
2,3,3',4,4',5',6-heptabromodiphenyl ether	BDE-191	HeptaBDE	79/81/160.8	14.56 ^b	1.0
2,2',3,3',4,4',5,6'-octabromodiphenyl ether	BDE-196	OctaBDE	79/81/720.4	15.85 ^b	1.0
2,2',3,3',4,4',6,6'-octabromodiphenyl ether	BDE-197	OctaBDE	408.7/406.7	15.85 ^b	1.2
2,2',3,3',4,5',6,6'-octabromodiphenyl ether	BDE-201	OctaBDE	408.7/406.7	15.85 ^b	1.5
2,2',3,4,4',5',6'-octabromodiphenyl ether	BDE-203	OctaBDE	79/81/801.4	15.85 ^b	1.0
2,2',3,4,4',5,6,6'-octabromodiphenyl ether	BDE-204	OctaBDE	486.6/488.6	15.85 ^b	2.7
2,3,3',4,4',5',6'-octabromodiphenyl ether	BDE-205	OctaBDE	79/81/801.4	15.85 ^b	6.5
2,2',3,3',4,4',5,5',6-nonabromodiphenyl ether	BDE-206	NonaBDE	79/81/800.4	17.13 ^b	5.7
2,2',3,3',4,4',5,6,6'-nonabromodiphenyl ether	BDE-207	NonaBDE	486.6/488.6	17.13 ^b	4.4
2,2',3,3',4,5,5',6,6'-nonabromodiphenyl ether	BDE-208	NonaBDE	486.6/488.6	17.13 ^b	5.2
decabromodiphenyl ether	BDE-209	DecaBDE	484.5/486.5	18.42 ^b	83

^a The values of logK_{OA} at 25°C were determined by (Harner and Shoeib, 2002) ($\log K_{OA} = A+B/T$), where T is 25°C.³

^b The values of logK_{OA} at 25°C were calculated using the program of KOAWIN in EPI Suite v4.1.

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Table S3. The profiles of PBDE in three commercial mixtures: penta-BDE, octa-BDE and deca-BDE.⁴

Congener	penta-BDE ^a	octa-BDE ^b	deca-BDE ^c
BDE-17	0.05	nd ^d	nd
BDE-28	0.15	nd	nd
BDE-47	36.11	nd	nd
BDE-66	0.32	nd	nd
BDE-85	2.26	nd	nd
BDE-99	41.49	nd	nd
BDE-100	9.22	nd	nd
BDE-138	0.56	0.29	nd
BDE-153	4.79	4.07	nd
BDE-154	3.18	0.51	nd
BDE-183	0.20	25.50	nd
BDE-190	nd	nd	nd
BDE-191	nd	nd	nd
BDE-196	nd	6.36	0.23
BDE-197	nd	15.34	0.01
BDE-201	nd	0.36	nd
BDE-203	nd	5.97	0.03
BDE-204	nd	nd	nd
BDE-205	nd	nd	nd
BDE-206	nd	4.35	3.63
BDE-207	nd	10.73	2.14
BDE-208	nd	0.09	0.06
BDE-209	nd	24.61	93.89

^a mean value (%) of DE71 and Bromkal 705DE;^b mean value (%) of DE79 and Bromkal 798DE;^c mean value (%) of Saytex 102E and Bromkal 820DE;^d nd: not detected

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146 **Table S4.** Summary of minimum (Min), maximum (Max), mean, standard deviation (SD) concentrations of
147 PBDEs in the soil samples of Japan (in ng/g dw).

Compound	Urban (n=3)				Rural (n=8)				Background (n=3)			
	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
BDE-17	0.014	0.056	0.038	0.022	nd	0.033	0.016	0.009	0.011	0.030	0.020	0.010
BDE-28	0.020	0.086	0.042	0.038	nd	0.033	0.017	0.011	nd	0.019	0.009	0.009
BDE-47	0.061	1.0	0.40	0.56	0.018	0.41	0.13	0.14	0.010	0.025	0.017	0.007
BDE-66	0.018	0.16	0.069	0.080	0.005	0.057	0.026	0.018	nd	0.028	0.015	0.014
BDE-85	nd	0.028	0.019	0.015	nd	0.020	0.005	0.008	nd	0.001	0.001	0.000
BDE-99	0.25	1.6	1.0	0.69	0.118	3.6	1.0	1.2	0.072	0.33	0.17	0.13
BDE-100	0.036	0.20	0.096	0.090	0.017	0.12	0.060	0.040	0.008	0.054	0.034	0.024
BDE-138	nd	0.022	0.008	0.013	nd	0.022	0.005	0.008	nd	nd	nd	nd
BDE-153	0.036	0.34	0.14	0.17	0.007	0.096	0.040	0.032	0.007	0.032	0.016	0.014
BDE-154	0.024	0.18	0.098	0.076	0.006	0.099	0.040	0.038	0.006	0.011	0.008	0.003
BDE-183	0.044	0.47	0.22	0.22	0.015	0.29	0.11	0.092	0.010	0.041	0.022	0.017
BDE-190	0.081	0.36	0.20	0.14	nd	0.12	0.033	0.037	nd	0.046	0.019	0.024
BDE-191	0.043	0.11	0.071	0.032	nd	0.057	0.019	0.019	nd	nd	nd	nd
BDE-196	0.039	0.26	0.16	0.11	nd	0.12	0.041	0.042	0.007	0.062	0.030	0.029
BDE-197	0.083	0.20	0.13	0.060	nd	0.12	0.037	0.035	0.010	0.045	0.027	0.018
BDE-201	0.050	0.25	0.13	0.11	nd	0.11	0.042	0.035	0.015	0.074	0.045	0.030
BDE-203	0.12	0.32	0.22	0.10	nd	0.10	0.041	0.037	0.012	0.064	0.032	0.028
BDE-204	nd	0.18	0.061	0.10	nd	nd	nd	nd	nd	nd	nd	nd
BDE-205	nd	0.018	0.008	0.009	nd	nd	nd	nd	nd	nd	nd	nd
BDE-206	0.397	4.9	3.2	2.4	nd	5.0	1.00	1.7	0.052	0.64	0.28	0.31
BDE-207	0.339	5.6	2.9	2.6	nd	3.1	0.89	1.2	0.033	0.50	0.22	0.24
BDE-208	0.696	4.3	2.2	1.9	nd	3.1	0.83	1.1	0.065	0.69	0.36	0.31
BDE-209	29	730	430	360	nd	1000	160	350	1.3	47	21	24
$\sum_{22}$ BDEs	2.8	21	11	8.9	0.84	10	4.4	4.0	0.38	2.6	1.3	1.2
$\sum_{23}$ BDEs	32	740	450	370	1.0	1000	161	351	1.7	50	22	25
BDE-209%	91	99	95	3.7	4.1	99	77	32	78	95	88	9.5

nd: not detected.

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Table S5. Summary of minimum (Min), maximum (Max), mean, standard deviation (SD) concentrations of PBDEs in the soil samples of China (in ng/g dw).

Compound	Urban (n=58)				Rural (n=39)				Background (n=4)			
	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
BDE-17	nd	0.11	0.013	0.021	nd	0.017	0.004	0.004	nd	0.005	0.003	0.002
BDE-28	nd	0.22	0.033	0.038	0.005	0.17	0.029	0.031	0.002	0.008	0.006	0.002
BDE-47	nd	0.53	0.10	0.12	nd	0.46	0.058	0.083	nd	0.021	0.008	0.009
BDE-66	nd	0.15	0.023	0.031	nd	0.24	0.023	0.042	nd	0.005	0.003	0.002
BDE-85	nd	0.028	0.005	0.007	nd	0.044	0.004	0.008	nd	nd	nd	nd
BDE-99	0.016	3.4	0.41	0.58	0.005	1.5	0.30	0.39	0.005	0.035	0.019	0.016
BDE-100	nd	0.23	0.034	0.039	nd	0.16	0.033	0.043	nd	0.016	0.005	0.007
BDE-138	nd	0.093	0.012	0.018	nd	0.092	0.010	0.016	nd	0.003	0.001	0.001
BDE-153	nd	0.96	0.077	0.15	nd	0.64	0.039	0.10	nd	0.005	0.002	0.002
BDE-154	nd	0.21	0.028	0.033	nd	0.19	0.018	0.033	nd	0.002	0.001	0.001
BDE-183	0.002	0.84	0.11	0.15	nd	0.63	0.069	0.11	nd	0.008	0.004	0.004
BDE-190	nd	0.49	0.034	0.070	nd	0.16	0.015	0.026	nd	nd	nd	nd
BDE-191	nd	0.25	0.028	0.051	nd	0.043	0.009	0.010	nd	nd	nd	nd
BDE-196	nd	1.2	0.095	0.22	nd	0.37	0.035	0.060	nd	nd	nd	nd
BDE-197	nd	0.50	0.054	0.082	nd	0.13	0.027	0.031	nd	nd	nd	nd
BDE-201	nd	0.70	0.072	0.12	nd	0.13	0.031	0.030	nd	nd	nd	nd
BDE-203	nd	1.0	0.085	0.18	nd	0.23	0.035	0.047	nd	nd	nd	nd
BDE-204	nd	0.21	0.006	0.028	nd	0.025	0.002	0.004	nd	nd	nd	nd
BDE-205	nd	0.15	0.016	0.029	nd	0.020	0.004	0.004	nd	nd	nd	nd
BDE-206	nd	8.2	0.56	1.3	nd	0.96	0.17	0.22	nd	0.055	0.024	0.026
BDE-207	nd	20	0.72	2.7	nd	0.73	0.16	0.20	nd	0.032	0.010	0.015
BDE-208	nd	16	0.58	2.2	nd	0.75	0.16	0.19	nd	0.038	0.011	0.018
BDE-209	0.47	790	72	136	0.25	270	26	54	0.41	1.1	0.66	0.31
$\sum_{22}$ BDEs	0.076	45	3.1	6.8	0.13	6.7	1.2	1.3	0.078	0.14	0.11	0.024
$\sum_{23}$ BDEs	0.6	800	75	140	0.46	280	28	55	0.51	1.2	0.77	0.32
BDE-209%	72	99	93	5.9	54	99	90	8.9	80	90	85	5.3

nd: not detected

154 **Table S6.** Summary of minimum-maximum (Range), mean $\pm$ standard deviation (Mean $\pm$ SD)
155 concentrations of PBDEs in the soil samples of South Korea (in ng/g dw).

Compound	Urban (n=5)		Rural (n=13)		Background (n=2)	
	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD
BDE-17	nd-0.005	0.003 $\pm$ 0.002	nd-0.013	0.004 $\pm$ 0.004	nd	nd
BDE-28	0.003-0.013	0.008 $\pm$ 0.004	nd-0.011	0.004 $\pm$ 0.003	nd-0.004	0.003 $\pm$ 0.003
BDE-47	0.017-0.22	0.12 $\pm$ 0.076	0.005- 0.38	0.076 $\pm$ 0.13	0.003-0.005	0.004 $\pm$ 0.001
BDE-66	0.002-0.025	0.011 $\pm$ 0.009	nd-0.022	0.008 $\pm$ 0.007	0.002-0.004	0.003 $\pm$ 0.002
BDE-85	nd-0.047	0.012 $\pm$ 0.019	nd-0.035	0.004 $\pm$ 0.010	nd	nd
BDE-99	0.044-0.91	0.47 $\pm$ 0.35	0.011-1.5	0.25 $\pm$ 0.38	0.035-0.060	0.048 $\pm$ 0.018
BDE-100	0.012-0.089	0.053 $\pm$ 0.032	0.003-0.24	0.041 $\pm$ 0.068	0.010-0.025	0.018 $\pm$ 0.011
BDE-138	0.006-0.063	0.032 $\pm$ 0.028	nd-0.046	0.005 $\pm$ 0.013	nd-0.003	0.002 $\pm$ 0.002
BDE-153	0.012-0.90	0.24 $\pm$ 0.38	0.003-0.29	0.038 $\pm$ 0.078	0.008-0.025	0.016 $\pm$ 0.012
BDE-154	0.011-0.20	0.094 $\pm$ 0.077	0.003-0.15	0.022 $\pm$ 0.041	0.002-0.006	0.004 $\pm$ 0.003
BDE-183	0.060-4.0	1.2 $\pm$ 1.7	0.007-0.14	0.044 $\pm$ 0.044	0.007-0.196	0.10 $\pm$ 0.13
BDE-190	0.041-0.12	0.081 $\pm$ 0.027	nd-0.019	0.008 $\pm$ 0.006	nd-0.006	0.003 $\pm$ 0.004
BDE-191	nd-0.055	0.015 $\pm$ 0.023	nd-0.012	0.003 $\pm$ 0.004	nd-0.002	0.001 $\pm$ 0.001
BDE-196	0.013-0.40	0.15 $\pm$ 0.16	0.002-0.054	0.012 $\pm$ 0.014	nd-0.23	0.012 $\pm$ 0.016
BDE-197	0.020-0.79	0.34 $\pm$ 0.39	0.002-0.069	0.012 $\pm$ 0.018	0.005-0.031	0.018 $\pm$ 0.018
BDE-201	0.011-0.074	0.044 $\pm$ 0.027	nd-0.051	0.016 $\pm$ 0.016	0.004-0.008	0.006 $\pm$ 0.003
BDE-203	0.014-0.31	0.13 $\pm$ 0.12	0.002-0.041	0.011 $\pm$ 0.011	0.004-0.016	0.010 $\pm$ 0.008
BDE-204	nd	nd	nd	nd	nd-0.062	0.032 $\pm$ 0.043
BDE-205	nd-0.007	0.004 $\pm$ 0.002	nd	nd	nd	nd
BDE-206	0.124-1.0	0.51 $\pm$ 0.34	0.003-1.4	0.19 $\pm$ 0.39	0.041-	0.11 $\pm$ 0.099
BDE-207	0.086-1.6	0.95 $\pm$ 0.65	nd-1.1	0.17 $\pm$ 0.32	0.032-	0.034 $\pm$ 0.003
BDE-208	0.11-0.95	0.46 $\pm$ 0.33	0.003-0.80	0.14 $\pm$ 0.23	0.014-	0.059 $\pm$ 0.064
BDE-209	3.1-88	34 $\pm$ 35	0.042-38	8.7 $\pm$ 13	0.43-1.4	0.91 $\pm$ 0.68
Σ_{22} BDEs	0.65-9.3	4.9 $\pm$ 3.5	0.16-5.2	1.1 $\pm$ 1.5	0.46-0.52	0.49 $\pm$ 0.040
Σ_{23} BDEs	3.7-94	39 $\pm$ 36	0.46-41	10 $\pm$ 14	0.95-1.9	1.4 $\pm$ 0.64
BDE-209%	60-94	82 $\pm$ 13	3.9-97	77 $\pm$ 24	46 -75	60 $\pm$ 21

nd: not detected.

156
157

158 **Table S7.** Summary of minimum (Min), maximum (Max), mean, standard deviation (SD) concentrations of
159 PBDEs in the soil samples of Vietnam (in ng/g dw).

Compound	Urban (n=4)				Rural (n=8)				Background (n=1)
	Min	Max	Mean	SD	Min	Max	Mean	SD	
BDE-17	nd	0.015	0.008	0.007	nd	0.012	0.002	0.004	0.003
BDE-28	nd	0.011	0.006	0.004	nd	0.014	0.003	0.005	0.003
BDE-47	0.004	0.94	0.26	0.46	0.004	0.013	0.008	0.003	0.006
BDE-66	nd	0.04	0.012	0.019	nd	0.011	0.004	0.003	0.003
BDE-85	nd	nd	nd	nd	nd	0.004	0.001	0.001	nd
BDE-99	0.042	0.92	0.42	0.38	0.013	0.26	0.12	0.096	0.044
BDE-100	0.008	0.092	0.036	0.039	0.005	0.051	0.014	0.016	0.008
BDE-138	nd	nd	nd	nd	nd	nd	nd	nd	nd
BDE-153	nd	0.034	0.016	0.015	0.001	0.12	0.019	0.041	0.002
BDE-154	0.001	0.011	0.007	0.004	nd	0.011	0.004	0.004	nd
BDE-183	0.002	0.021	0.012	0.008	0.004	0.041	0.016	0.015	nd
BDE-190	nd	0.009	0.003	0.004	nd	0.003	0.001	0.001	0.005
BDE-191	nd	0.007	0.002	0.003	nd	0.004	0.001	0.001	nd
BDE-196	0.001	0.015	0.006	0.006	0	0.005	0.002	0.002	0.001
BDE-197	0.001	0.013	0.006	0.005	nd	0.014	0.004	0.004	0.002
BDE-201	0.001	0.016	0.007	0.006	nd	0.007	0.003	0.002	0.002
BDE-203	nd	0.008	0.003	0.003	nd	0.008	0.003	0.003	0.002
BDE-204	nd	nd	nd	nd	nd	nd	nd	nd	nd
BDE-205	nd	nd	nd	nd	nd	nd	nd	nd	nd
BDE-206	0.011	0.022	0.017	0.005	0.007	0.091	0.025	0.028	0.019
BDE-207	0.005	0.036	0.024	0.014	nd	0.031	0.014	0.01	0.012
BDE-208	0.01	0.04	0.03	0.01	nd	0.04	0.02	0.01	nd
BDE-209	0.10	0.37	0.22	0.11	0.08	1.5	0.48	0.46	0.10
$\sum_{22}$ BDEs	0.10	2.1	0.88	0.85	0.09	0.6	0.27	0.16	0.12
$\sum_{23}$ BDEs	0.20	2.4	1.1	0.96	0.24	1.8	0.75	0.51	0.23
BDE-209%	15	50	28	16	33	85	59	19	45

nd: not detected.

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161

162 **Table S8.** Summary of minimum (Min), maximum (Max), mean, standard deviation (SD) concentrations of
163 PBDEs in the soil samples of India (in ng/g dw).

Compound	Urban (n=12)				Rural (n=12)			
	Min	Max	Mean	SD	Min	Max	Mean	SD
BDE-17	nd	0.020	0.004	0.005	nd	0.004	0.001	0.001
BDE-28	nd	0.010	0.003	0.003	nd	0.004	0.002	0.001
BDE-47	nd	0.029	0.012	0.009	nd	0.006	0.003	0.002
BDE-66	nd	0.010	0.003	0.003	nd	0.002	0.001	0.001
BDE-85	nd	0.002	0.001	0.001	nd	0.031	0.003	0.009
BDE-99	0.003	0.13	0.049	0.046	nd	0.081	0.015	0.023
BDE-100	0.002	0.026	0.009	0.006	nd	0.006	0.003	0.002
BDE-138	nd	0.003	0.001	0.001	nd	0.003	0.001	0.001
BDE-153	nd	0.035	0.012	0.010	nd	0.006	0.002	0.002
BDE-154	nd	0.012	0.005	0.004	nd	0.004	0.001	0.001
BDE-183	nd	0.19	0.037	0.058	nd	0.009	0.003	0.003
BDE-190	nd	0.014	0.004	0.005	nd	0.004	0.001	0.001
BDE-191	nd	0.008	0.002	0.002	nd	nd	nd	nd
BDE-196	nd	0.022	0.008	0.009	nd	0.004	0.001	0.001
BDE-197	nd	0.036	0.009	0.012	nd	0.005	0.001	0.001
BDE-201	nd	0.022	0.009	0.007	nd	0.009	0.001	0.002
BDE-203	nd	0.019	0.008	0.008	nd	0.007	0.001	0.002
BDE-204	nd	nd	nd	nd	nd	nd	nd	nd
BDE-205	nd	0.007	0.004	0.001	nd	0.003	0.003	0.000
BDE-206	nd	0.13	0.044	0.042	nd	0.026	0.013	0.009
BDE-207	nd	0.11	0.036	0.043	nd	0.012	0.004	0.004
BDE-208	nd	0.12	0.036	0.039	nd	0.015	0.004	0.004
BDE-209	nd	12.3	3.1	4.0	nd	3.7	0.72	1.1
$\sum_{22}$ BDEs	0.054	0.75	0.30	0.25	0.023	0.15	0.066	0.039
$\sum_{23}$ BDEs	0.13	13	3.4	4.2	0.06	3.8	0.79	1.1
BDE-209%	32	95	83	17	33	98	71	22

nd: not detected.

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165

166 **Table S9.** Summary of minimum (Min), maximum (Max), mean and standard deviation (SD) concentrations
167 (in ng/g dw) of PBDEs in the soil samples collected in e-waste regions (E) and factory regions (F) in China,
168 South Korea and Vietnam.

Compound	E, China (n=10)		F, China (n=10)		E, South Korea (n=2)		E, Vietnam (n=1)
	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD	
BDE-17	0.019-4.9	0.9 $\pm$ 1.5	0.010-1.2	0.18 $\pm$ 0.40	nd	nd	0.008
BDE-28	0.044-15	2.8 $\pm$ 5.0	0.087-14	2.3 $\pm$ 4.4	nd-0.006	0.003 $\pm$ 0.004	0.06
BDE-47	0.10-270	52 $\pm$ 100	0.090-38	8.6 $\pm$ 14	0.003-0.009	0.006 $\pm$ 0.004	0.45
BDE-66	0.034-15	3.0 $\pm$ 5.1	nd-3.3	0.70 $\pm$ 1.1	nd	nd	0.13
BDE-85	nd-6.2	1.5 $\pm$ 2.1	nd-2.1	0.70 $\pm$ 0.80	nd	nd	0.021
BDE-99	0.39-2000	240 $\pm$ 620	0.045-48	10 $\pm$ 16	0.029-0.039	0.034 $\pm$ 0.007	0.61
BDE-100	0.047-320	40 $\pm$ 100	0.035-4.8	1.4 $\pm$ 1.9	0.004-0.011	0.007 $\pm$ 0.005	0.049
BDE-138	nd-1.9	0.6 $\pm$ 0.8	nd-2.9	0.50 $\pm$ 0.90	nd	nd	nd
BDE-153	0.072-150	23 $\pm$ 46	0.14-140	35 $\pm$ 50	0.002-0.013	0.008 $\pm$ 0.008	0.13
BDE-154	0.070-160	23 $\pm$ 52	0.050-25	6.5 $\pm$ 9.1	0.002-0.004	0.003 $\pm$ 0.002	0.04
BDE-183	0.13-35	9.0 $\pm$ 13	0.13-460	100 $\pm$ 160	0.007-0.017	0.012 $\pm$ 0.007	0.27
BDE-190	0.038-4.1	1.3 $\pm$ 1.4	nd-10	2.5 $\pm$ 3.6	nd-0.009	0.005 $\pm$ 0.006	0.036
BDE-191	0.063-23	3.1 $\pm$ 7.2	0.33-17	2.9 $\pm$ 5.2	nd-0.004	0.002 $\pm$ 0.003	0.013
BDE-196	0.20-20	5.2 $\pm$ 6.5	nd-110	26 $\pm$ 38	nd-0.006	0.003 $\pm$ 0.004	0.087
BDE-197	0.23-19	4.5 $\pm$ 6.0	0.35-150	31 $\pm$ 53	0.003-0.010	0.006 $\pm$ 0.005	0.2
BDE-201	0.16-110	13 $\pm$ 32	0.70-38	5.9 $\pm$ 12	0.003-0.012	0.008 $\pm$ 0.006	0.13
BDE-203	0.12-19	4.6 $\pm$ 6.1	nd-130	35 $\pm$ 50	nd-0.010	0.005 $\pm$ 0.007	0.096
BDE-204	nd-1.3	0.28 $\pm$ 0.5	nd-97	23 $\pm$ 35	nd	nd	nd
BDE-205	0.16-4.0	1.0 $\pm$ 1.2	nd-18	4.4 $\pm$ 6.2	nd	nd	nd
BDE-206	0.66-110	26 $\pm$ 35	5.7-1200	360 $\pm$ 440	0.021-0.11	0.068 $\pm$ 0.066	1.1
BDE-207	0.33-87	18 $\pm$ 27	1.7-520	130 $\pm$ 180	0.008-0.057	0.033 $\pm$ 0.035	0.9
BDE-208	0.24-48	10 $\pm$ 15	0.82-160	44 $\pm$ 59	0.007-0.043	0.025 $\pm$ 0.025	0.53
BDE-209	57-13000	3400 $\pm$ 4200	270-16000	5600 $\pm$ 5600	1.2-16	8.8 $\pm$ 11	63
Σ_{22} BDEs	3.2-3100	490 $\pm$ 1000	11-3100	840 $\pm$ 1100	0.11-0.36	0.24 $\pm$ 0.18	4.9
Σ_{23} BDEs	60-14000	3900 $\pm$ 5100	280-19000	6400 $\pm$ 6700	1.3-17	9.0 $\pm$ 11	68
BDE-209%	74-98	93 $\pm$ 7.6	82-96	91 $\pm$ 5.1	91-98	94 $\pm$ 4.8	93

nd: not detected.

171 **Table S10.** Summary of mean concentrations (ng/g dw) of BDE-47, -99, -183, -209, total PBDEs (Σ BDEs
172 (exc209), excluding BDE-209) and total PBDEs (Σ BDEs), and of proportion of BDE-209 (BDE-209%) in
173 the soils from studies around the world.

Region	Year	N	Type ^b	-47	-99	-183	-209	Σ BDEs (exc209)	Σ BDEs	BDE-209%	Ref.
Chenab, Pakistan	2013	28	U+R	1.15	17.8	0.26	na ^c	21.1	na	na	5
China	2013	82	B	0.014	0.017	0.015	0.241	na	na	>60	6
UK West Midlands ^a	2013	8	U+R	1.0	0.93	na	5.5	na	9.8	na	7
Stockholm, Sweden ^a	2012	8	U+R	0.64	0.43	na	2.7	na	na	na	8
Qingyuan, China	2012	16	R	1.12	1.00	0.24	162.43	na	165	na	9
Hung Yen, Vietnam	2012	19	R	0.38	0.61	0.68	1.4	na	2.2	64	10
Hung Yen, Vietnam	2012	10	E	20	21	46	1700	na	1900	89	10
Shanghai, China	2012	37	U	0.924	0.189	0.459	28.6	3.8	32.5	88	11
Guiyu, China	2012	16	E	42.26	50.56	544.6	1946	na	2665	73	12
Yangtze River, China	2012	33	U+R	na	na	na	9.47	0.543	na	92	13
Indus River, Pakistan	2012	60	U+R	0.049	0.044	0.029	na	0.272	na	na	14
Tibet, China	2011	27	B	0.0098	0.0077	0.00075	0.00045	na	0.103	0.6	15
Kaixian, China	2011	7	R	0.02	0.01	0.01	101	2.3	na	94-98	16
Shandong, China	2011	23	F	na	na	na	51100	na	58700	>90	17
Qingyuan, China	2011	36	E	na	na	49.6	783.5	na	898.3	61-94	18
Zhaogezhuang, China	2011	40	E	0.29	0.37	1.82	665	na	690	93	19
Yangtze River, China	2011	33	U+R	0.113	0.107	0.094	9.48	na	10	91	20
North China	2011	87	U+R	4.14	1.72	0.22	188	13.7	202	96	21
Kocaeli, Turkey	2010	49	U	1.11	1.73	na	22.2	na	26.3	74	22
Tibet, China	2010	16	B	0.0024	0.0009	0.0005	0.0013	na	0.080	1.6	23
Iraqe-Kuwaite-Saudi	2010	11	U+R	0.251	0.367	0.0164	15.85	0.766	16.615	94	24
Thi Nai Lagoon, Vietnam	2010	7	R	na	na	na	na	1.40	na	na	25
Loess Plateau, China	2009	45	U+R	0.27	0.216	0.0127	0.538	0.911	1.55	44	26
Chongming Island, China	2009	22	R	0.09	0.23	0.03	12	0.76	na	>90	27
Shandong, China	2008	38	F	na	na	na	1062	na	1127	94	28
Yellow River Delta, China	2008	8	R	2.2	1.7	3.6	104.3	17	na	86	29
Shenzhen, China	2008	6	U	na	na	na	1.306	0.0187	1.325	85-99	30
Surabaya, Indonesia	2008	6	U	na	na	na	8.09	3.71	12.0	67	31
Surabaya, Indonesia	2008	4	R	na	na	na	10.5	4.5	15.3	71	31
Shanghai, China	2007	36	A	0.014	0.011	0.005	0.254	0.175	0.429	59	32
Laizhou Bay, China	2007	5	P	0.4	0.4	10.1	575.8	na	687.2	81-94	33
Guangzhou, China	2007	4	SU	na	na	0.16	62.5	0.84	63.3	99	34
Guiyu, China	2007	6	E	na	na	na	2246	663	na	77-86	35
Foshan, China	2007	9	U	na	na	na	64.3	5.97	na	90	35
Beijing, China	2007	26	A	na	na	na	1.44	0.099	1.54	93	36
Shanghai, China	2007	10	E	26.5	45.6	na	1800	na	1910	94	37
Harbin, China	2006	17	U+R	0.006	0.010	0.024	0.52	0.026	na	95	38
Shiawassee River, USA	2004	10	R	1.49	1.38	na	10.8	3.53	13.8	78	39
Saginaw River, USA	2004	10	R	0.14	0.12	na	2.77	0.29	3.03	91	39
Saginaw Bay, USA	2004	6	R	0.14	0.08	na	0.60	0.28	0.88	68	39

India	2004	5	R	0.01	0.01	nd	0.05	0.02	0.07	71	40
India	2000	6	D	0.19	0.33	0.15	5.4	0.81	7.3	74	40
Vietnam	2004	7	R	0.01	0.01	0.01	0.14	0.05	0.22	64	40
Vietnam	2004	5	D	0.14	0.66	7.3	56	11	95	59	40

^a: geometric mean, in ng/g organic matter;

^b: R: rural; U: urban; SU: suburban; B: background; E: e-waste; A: agriculture; P: production area; D: dumping site;

^c: na: not available.

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176 **Table S11.** Correlation coefficients between natural logarithm concentrations of PBDEs in U/R/B sites in
177 China (n = 101) and other parameters, i.e. longitude (LONG, °E), latitude (LAT, °N), population density (PD,
178 natural logarithm of person/km²), and gross domestic product (GDP, natural logarithm of Chinese
179 Yuan/person).

	LONG	LAT	PD	GDP
TriBDE	0.20	-0.13	0.22*	0.30*
TetraBDE	0.22*	-0.08	0.41**	0.44**
PentaBDE	0.36**	-0.08	0.39**	0.44**
HexaBDE	0.14	-0.21*	0.44**	0.36**
HeptaBDE	0.18	-0.31**	0.49**	0.42**
OctaBDE	0.13	-0.34**	0.47**	0.38**
NonaBDE	0.11	-0.27**	0.48**	0.43**
DecaBDE	0.26**	-0.28**	0.57**	0.51**
Σ ₂₂ BDEs	0.22*	-0.26**	0.50**	0.48**
Σ ₂₃ BDEs	0.26**	-0.29**	0.57**	0.50**
BDE-209%	0.25*	-0.14	0.33**	0.17

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

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181

182 **Table S12.** Regression coefficients along with statistical errors, and significant levels for equation (3) for
183 Chinese samples (excluding E and F sites, n = 101).

Dependent Variable: TriBDE

Model (r = 0.20, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients ^a	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-10.743	4.739		0.026
$\log^2(PD)$, b_1	0.005	0.030	0.020	0.862
T , b_2	0.023	0.017	0.172	0.165
SOC , b_3	0.098	0.059	0.186	0.098

^a: Standardized coefficients are used in order to ignore the scale of units of independent variables, and to understand which of the independent variables have a greater influence on the dependent variable.

184

Dependent Variable: TetraBDE

Model (r = 0.50, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-10.831	6.524		0.100
$\log^2(PD)$, b_1	0.159	0.041	0.394	0.000
T , b_2	0.021	0.023	0.100	0.363
SOC , b_3	0.280	0.081	0.342	0.001

185

Dependent Variable: PentaBDE

Model (r = 0.47, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-5.688	6.370		0.374
$\log^2(PD)$, b_1	0.170	0.040	0.439	0.000
T , b_2	0.009	0.022	0.043	0.700
SOC , b_3	0.172	0.079	0.219	0.032

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187

Dependent Variable: HexaBDE

Model (r = 0.58, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-20.012	6.309		0.002
$\log^2(PD)$, b_1	0.174	0.040	0.419	0.000
T , b_2	0.052	0.022	0.241	0.021
SOC , b_3	0.292	0.078	0.348	0.000

189

Dependent Variable: HeptaBDE

Model (r = 0.58, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-24.427	6.194		0.000
$\log^2(PD)$, b_1	0.154	0.039	0.377	0.000
T , b_2	0.070	0.022	0.331	0.002
SOC , b_3	0.225	0.077	0.272	0.004

190

Dependent Variable: OctaBDE

Model (r = 0.54, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-23.224	6.534		0.001
$\log^2(PD)$, b_1	0.149	0.041	0.357	0.000
T , b_2	0.068	0.023	0.311	0.004
SOC , b_3	0.186	0.081	0.220	0.023

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Dependent Variable: NonaBDE				
Model (r = 0.53, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-15.515	7.791		0.049
$\log^2(PD)$, b_1	0.221	0.049	0.448	0.000
T , b_2	0.044	0.027	0.170	0.115
SOC , b_3	0.168	0.081	0.168	0.035

Dependent Variable: DecaBDE				
Model (r = 0.57, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-14.405	7.342		0.053
$\log^2(PD)$, b_1	0.225	0.046	0.467	0.000
T , b_2	0.053	0.026	0.212	0.043
SOC , b_3	0.130	0.091	0.133	0.156

199 **Table S13.** Regression coefficients along with statistical errors, and significant levels for equation (3) for
200 samples collected from South Korea (excluding E sites, n = 20).

Dependent Variable: TriBDE

Model (r = 0.74, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
1 (Constant), b_0	28.896	22.037		0.208
$\log^2(PD)$, b_1	0.072	0.029	0.426	0.024
T , b_2	-0.123	0.077	-0.300	0.127
SOC , b_3	0.496	0.183	0.504	0.015

201

Dependent Variable: TetraBDE

Model (r = 0.75, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	69.651	38.370		0.088
$\log^2(PD)$, b_1	0.159	0.050	0.534	0.006
T , b_2	-0.263	0.134	-0.365	0.066
SOC , b_3	0.659	0.319	0.381	0.055

202

Dependent Variable: PentaBDE

Model (r = 0.80, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	52.136	29.536		0.097
$\log^2(PD)$, b_1	0.134	0.039	0.525	0.003
T , b_2	-0.196	0.103	-0.318	0.074
SOC , b_3	0.752	0.245	0.509	0.007

203

204

Dependent Variable: HexaBDE

Model (r = 0.74, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	42.655	39.613		0.298
$\log^2(PD)$, b_1	0.222	0.052	0.732	0.001
T , b_2	-0.167	0.138	-0.228	0.244
SOC , b_3	0.198	0.329	0.113	0.555

Dependent Variable: HeptaBDE

Model (r = 0.83, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	16.112	37.115		0.670
$\log^2(PD)$, b_1	0.289	0.049	0.842	0.000
T , b_2	-0.074	0.129	-0.089	0.575
SOC , b_3	0.243	0.308	0.122	0.442

Dependent Variable: OctaBDE

Model (r = 0.80, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	29.809	32.919		0.379
$\log^2(PD)$, b_1	0.229	0.043	0.804	0.000
T , b_2	-0.118	0.115	-0.172	0.317
SOC , b_3	-0.133	0.273	-0.080	0.634

Dependent Variable: NonaBDE

Model (r = 0.79, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	51.324	41.715		0.236
$\log^2(PD)$, b_1	0.277	0.055	0.792	0.000
T , b_2	-0.190	0.145	-0.225	0.209
SOC , b_3	-0.091	0.346	-0.045	0.795

Dependent Variable: DecaBDE

Model (r = 0.77, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	98.763	53.767		0.085
$\log^2(PD)$, b_1	0.303	0.071	0.721	0.001
T , b_2	-0.349	0.187	-0.344	0.080
SOC , b_3	0.112	0.446	0.046	0.804

214 **Table S14.** Regression coefficients along with statistical errors, and significant levels for equation (3) for
 215 samples collected from Japan (n = 14).

Dependent Variable: TriBDE

Model (r = 0.70, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-9.205	14.850		0.549
$\log^2(PD)$, b_1	0.129	0.043	0.695	0.014
T , b_2	0.015	0.052	0.067	0.774
SOC , b_3	0.053	0.045	0.274	0.265

216

Dependent Variable: TetraBDE

Model (r = 0.76, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	6.221	29.139		0.835
$\log^2(PD)$, b_1	0.300	0.085	0.748	0.005
T , b_2	-0.042	0.101	-0.087	0.684
SOC , b_3	0.160	0.088	0.385	0.097

217

Dependent Variable: PentaBDE

Model (r = 0.66, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-8.768	27.721		0.758
$\log^2(PD)$, b_1	0.203	0.080	0.618	0.030
T , b_2	0.019	0.096	0.048	0.845
SOC , b_3	0.130	0.083	0.381	0.149

218

219

220

Dependent Variable: HexaBDE

Model (r = 0.74, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-5.200	26.799		0.850
$\log^2(PD)$, b_1	0.264	0.078	0.740	0.007
T , b_2	-0.003	0.093	-0.006	0.979
SOC , b_3	0.123	0.081	0.330	0.159

Dependent Variable: HeptaBDE

Model (r = 0.73, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-5.652	27.253		0.840
$\log^2(PD)$, b_1	0.268	0.079	0.750	0.007
T , b_2	0.003	0.095	0.006	0.978
SOC , b_3	0.066	0.082	0.178	0.439

Dependent Variable: OctaBDE

Model (r = 0.78, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-19.176	27.799		0.506
$\log^2(PD)$, b_1	0.234	0.081	0.592	0.016
T , b_2	0.056	0.096	0.115	0.577
SOC , b_3	-0.153	0.084	-0.372	0.097

Dependent Variable: NonaBDE

Model (r = 0.66, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-17.136	54.816		0.761
$\log^2(PD)$, b_1	0.302	0.159	0.466	0.087
T , b_2	0.054	0.190	0.069	0.780
SOC , b_3	-0.245	0.165	-0.363	0.169

227

Dependent Variable: DecaBDE

Model (r = 0.71, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-21.905	66.732		0.749
$\log^2(PD)$, b_1	0.375	0.194	0.444	0.081
T , b_2	0.083	0.232	0.080	0.728
SOC , b_3	-0.401	0.201	-0.457	0.073

228

229

230 **Table S15.** Regression coefficients along with statistical errors, and significant levels for equation (3) for
 231 samples collected from India (n = 24).

Dependent Variable: TriBDE

Model (r = 0.64, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	0.058	30.957		0.999
$\log^2(PD)$, b_1	0.113	0.032	0.626	0.002
T , b_2	-0.023	0.104	-0.040	0.827
SOC , b_3	0.113	0.098	0.204	0.264

232

Dependent Variable: TetraBDE

Model (r = 0.68, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	10.756	34.896		0.761
$\log^2(PD)$, b_1	0.146	0.036	0.684	0.001
T , b_2	-0.058	0.117	-0.084	0.628
SOC , b_3	0.093	0.110	0.142	0.411

233

Dependent Variable: PentaBDE

Model (r = 0.56, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-3.466	49.163		0.945
$\log^2(PD)$, b_1	0.138	0.051	0.519	0.014
T , b_2	-0.006	0.165	-0.007	0.970
SOC , b_3	0.213	0.155	0.261	0.185

234

235

Dependent Variable: HexaBDE

Model (r = 0.76, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-12.536	36.937		0.738
$\log^2(PD)$, b_1	0.195	0.038	0.762	0.000
T , b_2	0.019	0.124	0.023	0.880
SOC , b_3	0.029	0.117	0.037	0.806

Dependent Variable: HeptaBDE

Model (r = 0.71, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	17.968	49.284		0.719
$\log^2(PD)$, b_1	0.228	0.051	0.723	0.000
T , b_2	-0.084	0.165	-0.082	0.618
SOC , b_3	0.086	0.156	0.089	0.588

Dependent Variable: OctaBDE

Model (r = 0.80, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-2.320	29.606		0.938
$\log^2(PD)$, b_1	0.180	0.031	0.808	0.000
T , b_2	-0.012	0.099	-0.017	0.905
SOC , b_3	0.059	0.093	0.086	0.535

Dependent Variable: NonaBDE

Model (r = 0.59, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-14.217	46.705		0.764
$\log^2(PD)$, b_1	0.147	0.049	0.573	0.007
T , b_2	0.032	0.157	0.038	0.842
SOC , b_3	0.081	0.147	0.103	0.590

Dependent Variable: DecaBDE

Model (r = 0.46, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-61.903	81.644		0.458
$\log^2(PD)$, b_1	0.160	0.085	0.388	0.076
T , b_2	0.199	0.274	0.150	0.475
SOC , b_3	0.232	0.258	0.184	0.380

245 **Table S16.** Regression coefficients along with statistical errors, and significant levels for equation (3) for
246 samples collected from Vietnam (excluding E sites, n = 13).

Dependent Variable: TriBDE

Model (r = 0.59, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-31.449	154.516		0.843
$\log^2(PD)$, b_1	0.128	0.098	0.452	0.225
T , b_2	0.086	0.520	0.057	0.873
SOC , b_3	-0.296	0.220	-0.366	0.212

247

Dependent Variable: TetraBDE

Model (r = 0.75, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-208.449	161.334		0.229
$\log^2(PD)$, b_1	0.174	0.102	0.481	0.122
T , b_2	0.681	0.543	0.352	0.241
SOC , b_3	-0.089	0.230	-0.085	0.709

248

Dependent Variable: PentaBDE

Model (r = 0.69, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	33.632	138.064		0.813
$\log^2(PD)$, b_1	0.205	0.087	0.725	0.044
T , b_2	-0.127	0.465	-0.084	0.791
SOC , b_3	0.071	0.197	0.088	0.726

249

250

Dependent Variable: HexaBDE

Model (r = 0.39, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	155.778	185.363		0.422
$\log^2(PD)$, b_1	0.145	0.117	0.487	0.248
T , b_2	-0.542	0.624	-0.341	0.408
SOC , b_3	-0.088	0.264	-0.103	0.748

Dependent Variable: HeptaBDE

Model (r = 0.34, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	98.032	122.743		0.445
$\log^2(PD)$, b_1	0.077	0.078	0.401	0.346
T , b_2	-0.345	0.413	-0.335	0.425
SOC , b_3	-0.068	0.175	-0.123	0.705

Dependent Variable: OctaBDE

Model (r = 0.53, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	84.252	77.626		0.306
$\log^2(PD)$, b_1	0.058	0.049	0.432	0.264
T , b_2	-0.297	0.261	-0.410	0.285
SOC , b_3	-0.164	0.111	-0.422	0.173

Coefficients^a

Model (r = 0.54, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	73.489	105.073		0.502
$\log^2(PD)$, b_1	0.082	0.067	0.445	0.248
T , b_2	-0.257	0.354	-0.261	0.485
SOC , b_3	-0.240	0.150	-0.453	0.143

a. Dependent Variable: NonaBDE

Coefficients^a

Model (r = 0.33, p < 0.001)	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant), b_0	-15.500	130.477		0.908
$\log^2(PD)$, b_1	0.037	0.083	0.183	0.662
T , b_2	0.045	0.439	0.041	0.920
SOC , b_3	0.136	0.186	0.232	0.483

a. Dependent Variable: DecaBDE

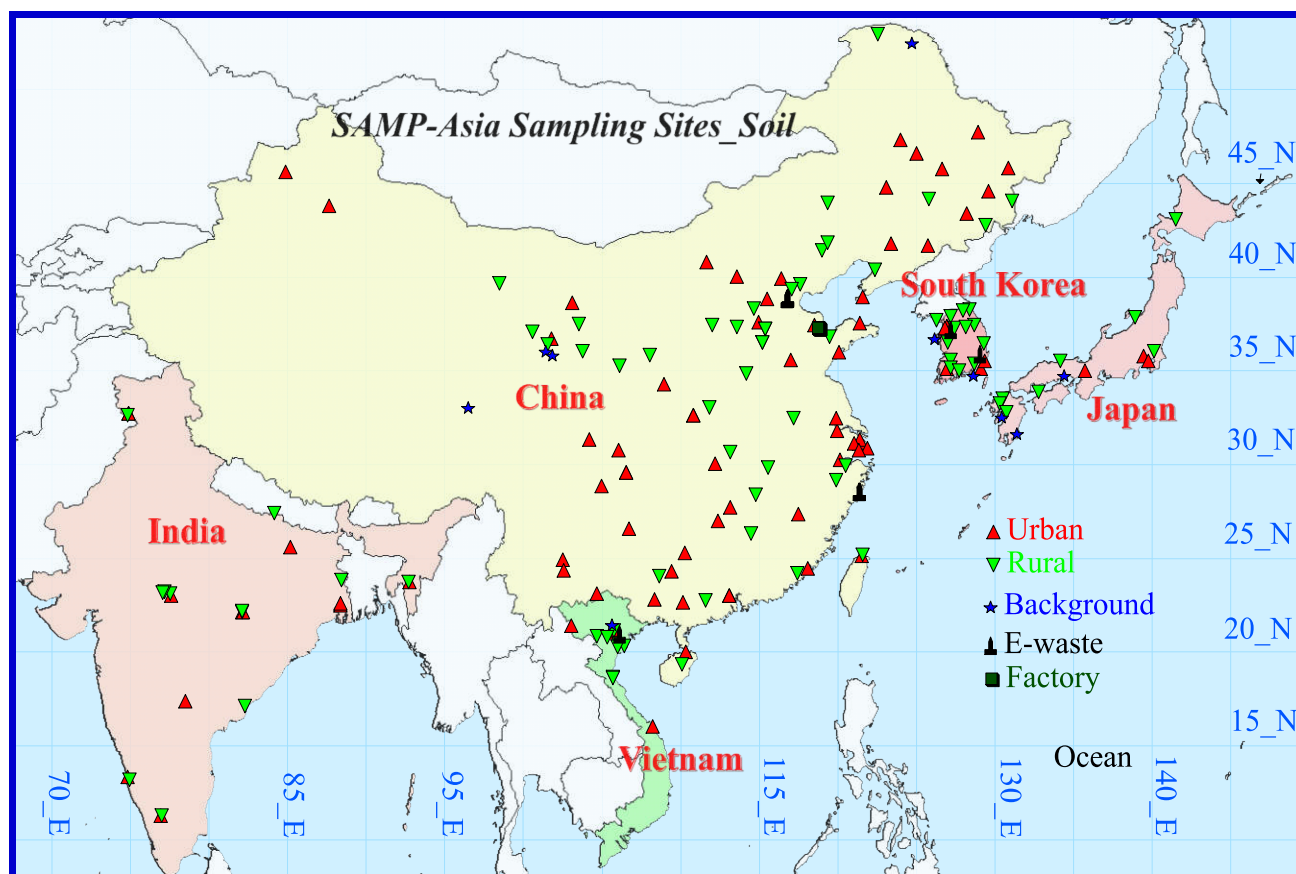


Figure S1. The soil sampling sites for SAMP-Asia.

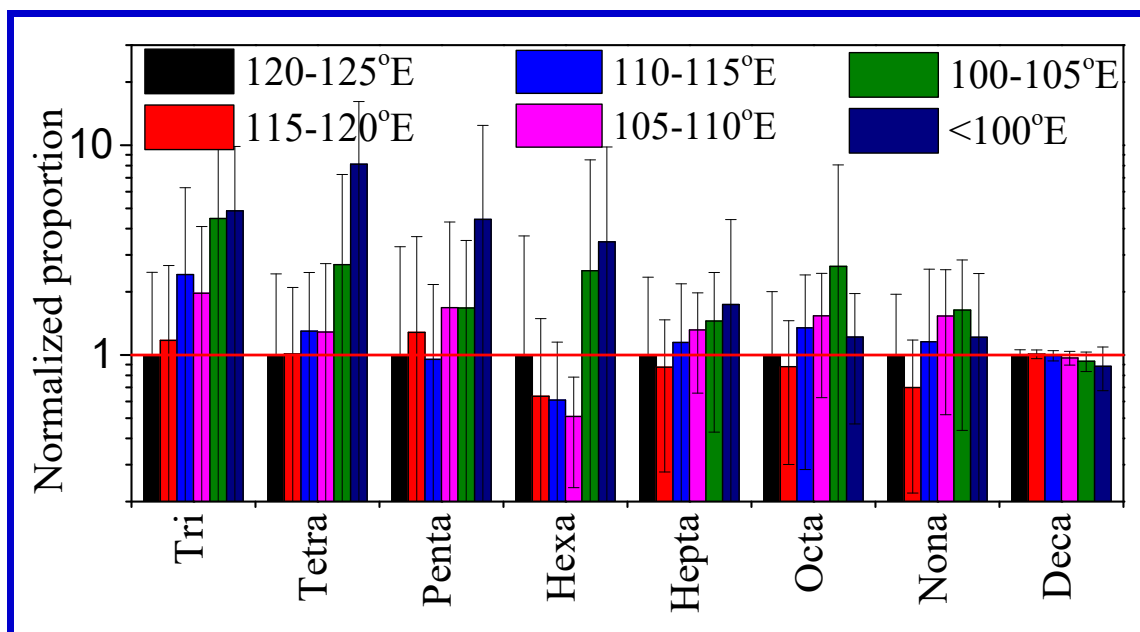


Figure S2. The proportions of PBDE homologues in different longitude ranges from east (120-125°E) to west (<100°E). The values of proportions in the longitude range of 120-125°E were normalized to 1.

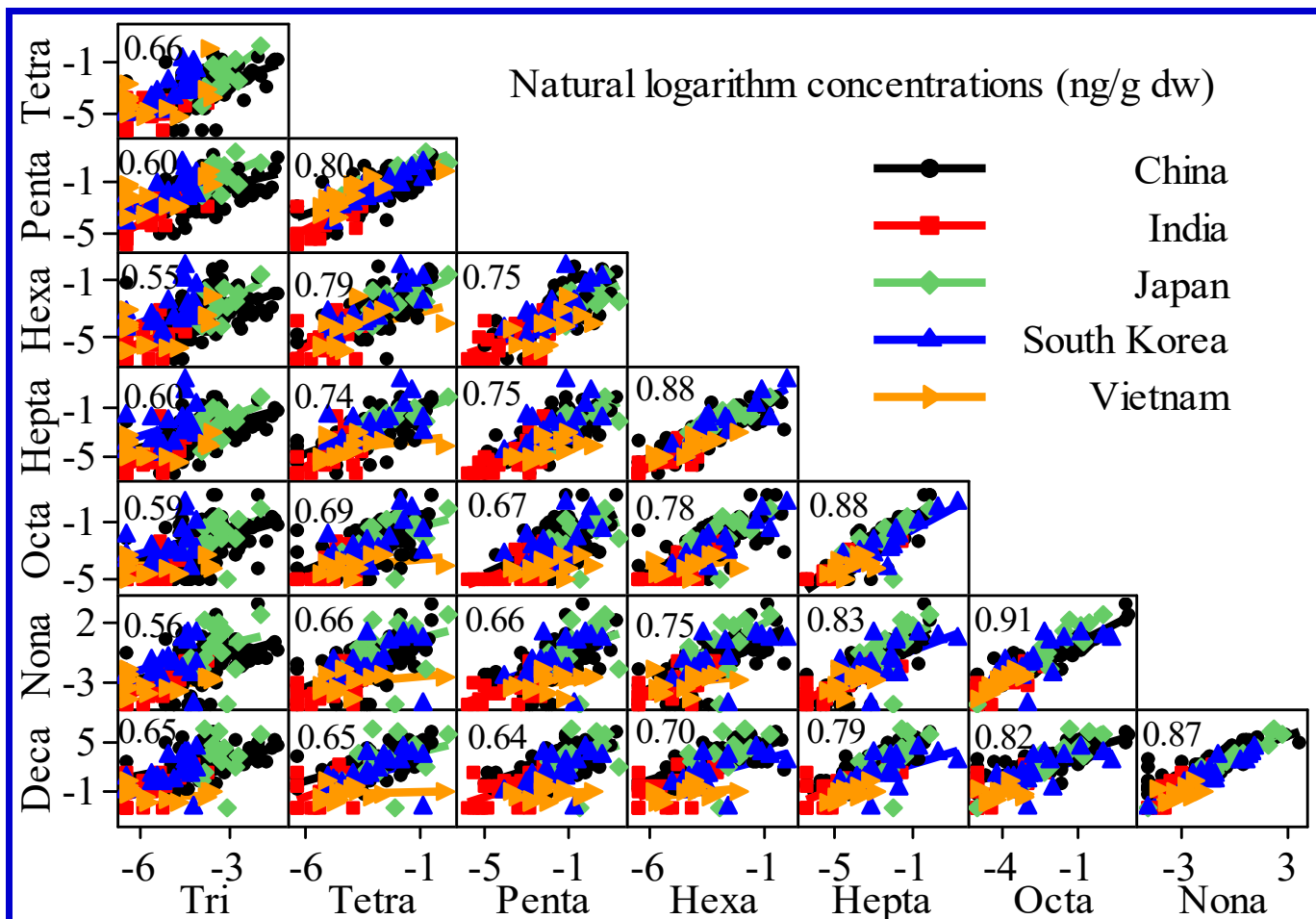
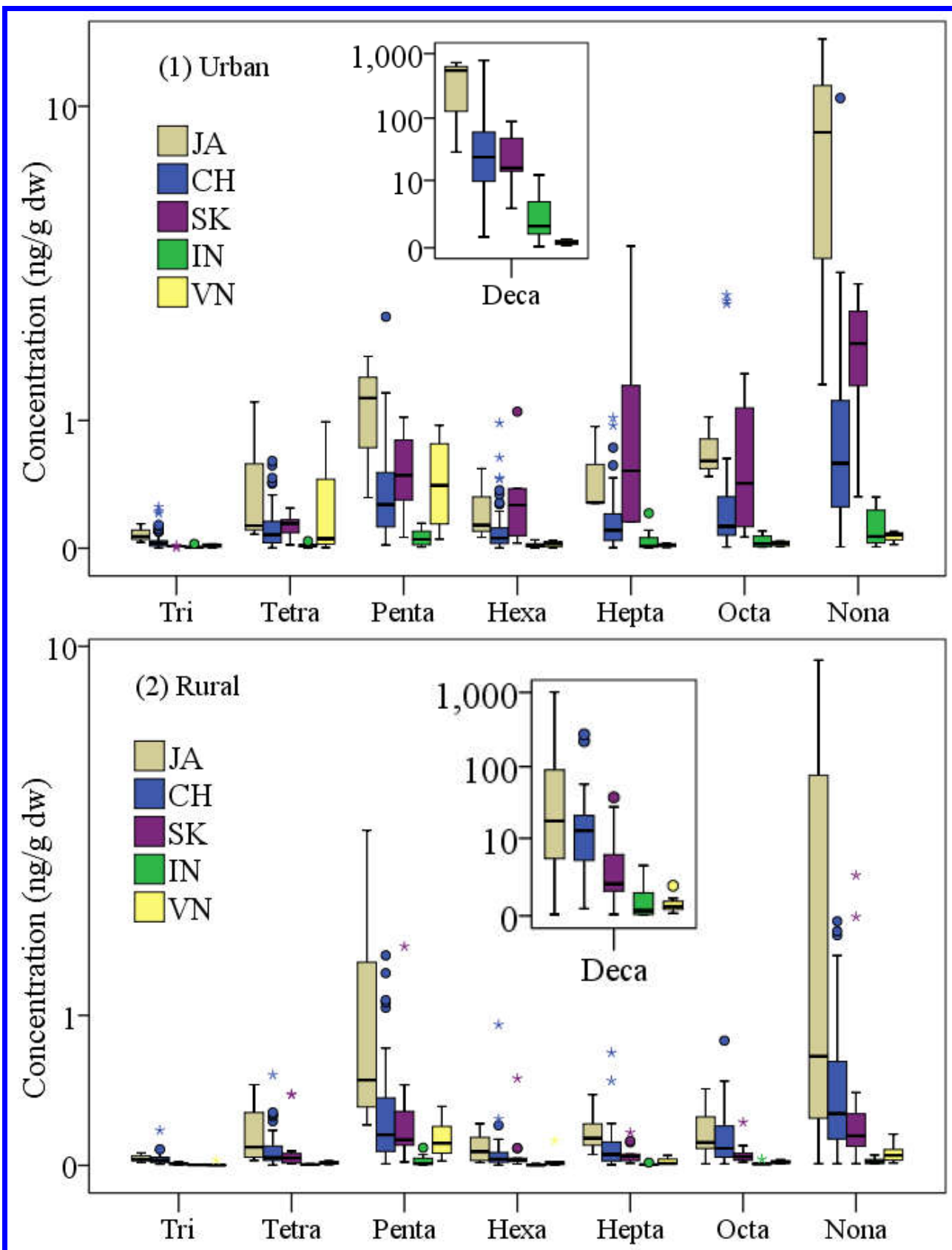


Figure S3. Correlations among natural logarithm concentrations (ng/g dw) of PBDE homologues in soil samples from U/R/B sites. The values inside the graph are Pearson correlation coefficients.



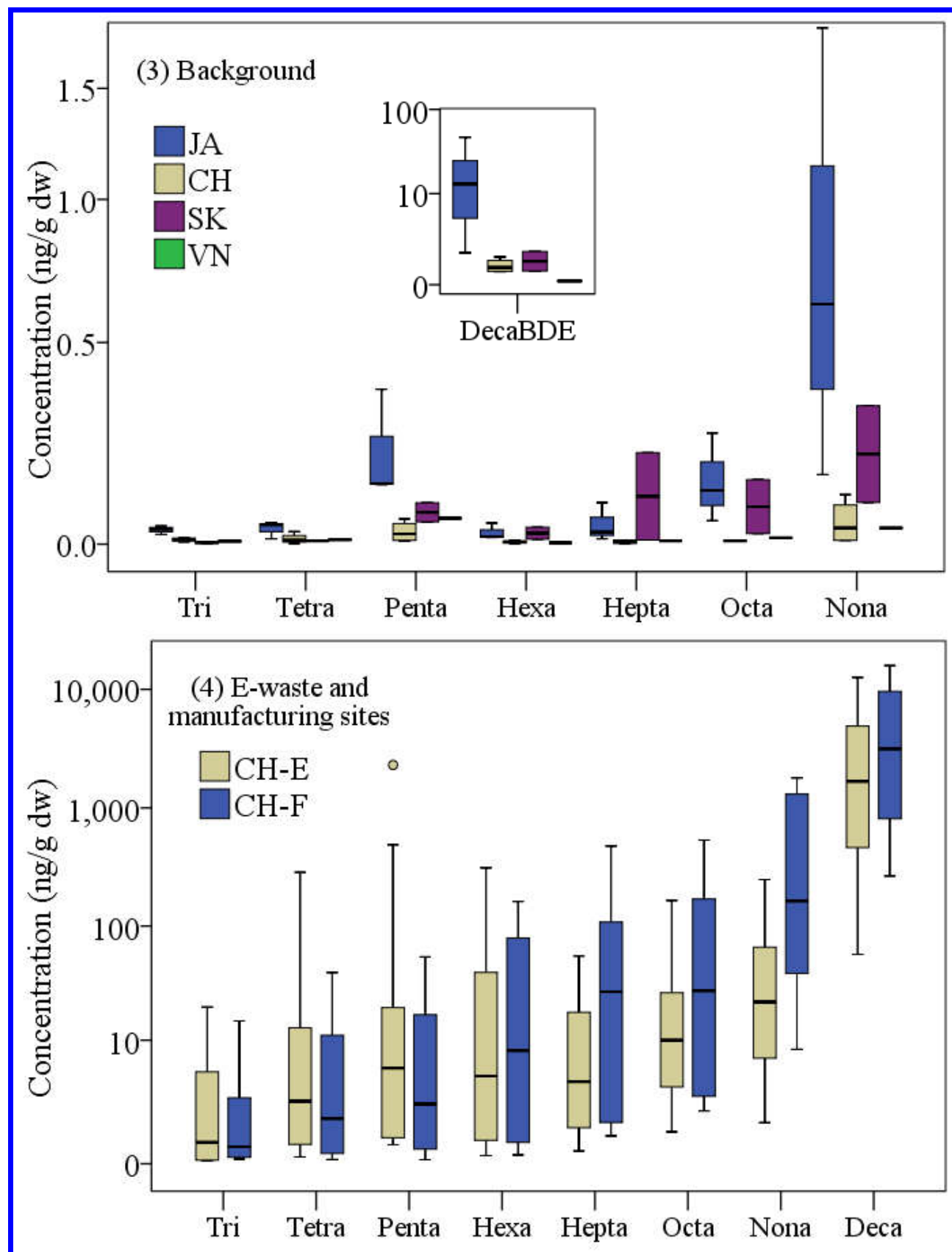


Figure S4. The concentrations of PBDE homologues in urban, rural, background, e-waste (CH-E) and industrial sites (CH-F) in five Asian countries.

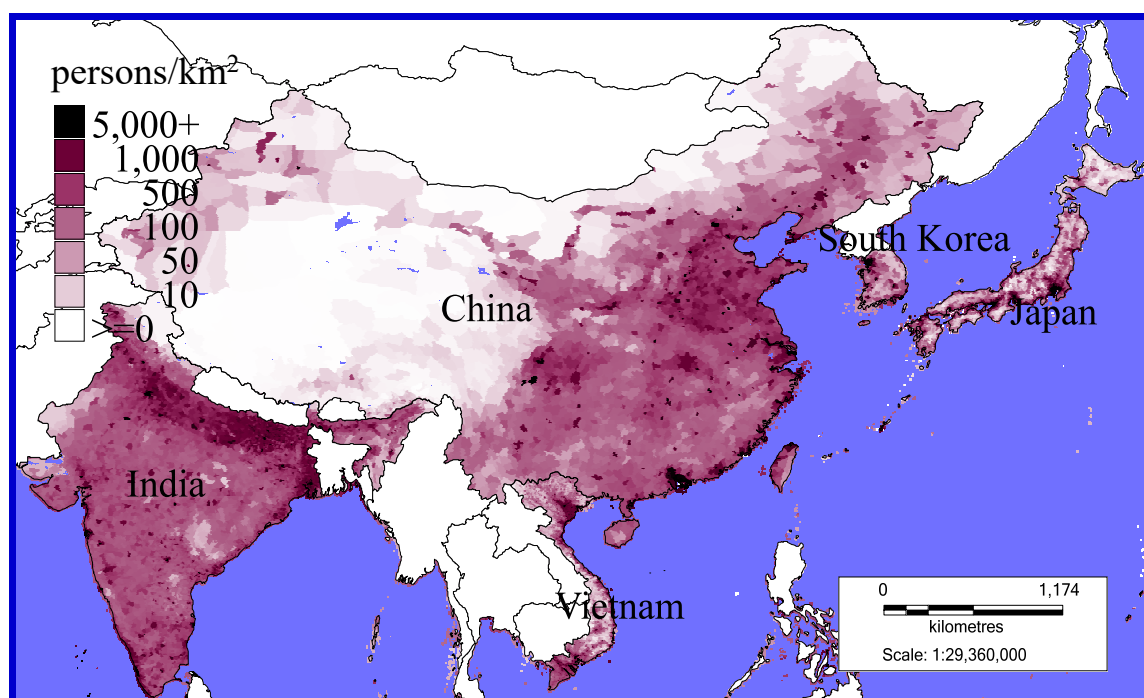


Figure S5. Population density (persons/km²) for Asian countries in 2015.

Population density

The population density data in 2015 were derived from the Socioeconomic Data and Applications Center, NASA (<http://sedac.ciesin.columbia.edu>), as well as the statistical data from the National Bureau of Statistics of the People's Republic of China (<http://www.stats.gov.cn/>), the Statistics Japan (<http://www.stat.go.jp/>), the Statistics Korea (<http://www.stat.go.jp/>), the General Statistics Office of Vietnam (http://www.gso.gov.vn/default_en.aspx?tabid=491), and the Ministry of Statistics and Programme Implementation of India (http://mospi.nic.in/Mospi_New/Site/Home.aspx).

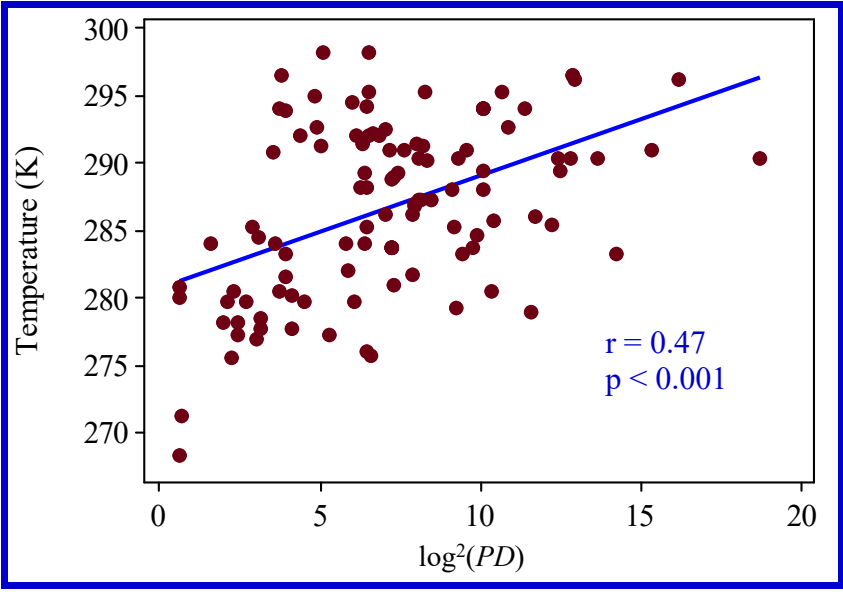


Figure S6. Correlations between the population density ($\log^2(PD)$, in persons/km²) and the annual average temperature (in K) for the five countries.

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