

Supplementary information

Persistent organic pollutants in air across the globe using a comparative passive air sampling method

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Table S 1: Geographic information for 42 sampling locations by region with country and ISO3 code, name of physical site, latitude, longitude, and altitude (m)

Country name	ISO3	Physical description of the site	Latitude	Longitude	Altitude (m)
Africa (15 sites)					
DR Congo	COD	Kinshasa	04° 21' 00" S	15° 17' 00" E	443
Egypt	EGY	New Cairo Development Administration Building, Eastern Cairo	29° 59' 36" N	31° 35' 7" E	439
Ethiopia	ETH	Central Ethiopia environment and forest Research center Nursery site in Addis Ababa city	9° 01' 06" N	38° 49' 7" E	2 376
Ghana	GHA	Accra Meteorological Agency	5° 39' 00" N	0° 10' 00" W	72
Kenya	KEN	Meteorological station, Nairobi	1° 14' 58" S	36° 44' 33" E	1 841
Mali	MLI	Bamako Centre	12° 39' 32" N	07° 56' 32" W	327
Morocco	MAR	Timdiqine, Ifrane, Pachalik d'Ifrane, Province d'Ifrane	33° 31' 36" N	5° 06' 27" W	1 673
Mauritius	MUS	Mauritius Meteorological Services	20° 17' 50" S	57° 29' 55" E	390
Nigeria	NGA	Federal Ministry of Environment, Brown Building, 432 Independence Avenue, Central Business District, Abuja	9° 02' 19" N	7° 28' 02" E	479
Senegal	SEN	Ngoye: zone rurale	14° 38' 6" N	16° 25' 47" W	23
Tanzania	TZA	Vikuge, Kibaha district , coast region	6° 47' 18" S	38° 51' 48" E	614
Togo	TGO	Kouma-Kondam, 140 km north-west Lomé	6° 57' 00" N	0° 35' 00" E	4
Tunisia	TUN	Tunis, Boulevard Leader Yasser Arafat, Charguia	36° 50' 12" N	10° 12' 41" E	161
Uganda	UGA	Soroti Flying School	1° 43' 15" N	33° 37' 00" E	1 124
Zambia	ZMB	Kenneth Kanuda, International Airport, Lusaka	15° 19' 33" S	28° 26' 51" E	1 170
Asia (7 sites)					
Cambodia	KHM	Sinhanuk province	10° 38' 10" N	103° 31' 7" E	116
Indonesia	IDN	Indonesian Agency for Meteorology, Climatology and Geophysics (IAMCG), Kemayoran, Jakarta	6° 9' 21" S	106° 50' 32" E	4
Lao PDR	LAO	Nalongkoun village	18° 29' 35" N	102° 26' 56" E	178
Mongolia	MNG	Peace avenue, Bayanzurkh district of Ulaanbaatar city	47° 55' 06" N	106° 58' 15" E	1 350
Philippines	PHL	National Agrometeorological (AGROMET) Station, Los Baños, Laguna, about 70.2 kilometers south of Manila	14° 9' 53" N	121° 15' 0" E	23
Thailand	THA	Wachiralongkorn Dam	14° 47' 1.2" N	98° 35' 59" E	142
Vietnam	VNM	Ba Vi, Hanoi	21° 05' 7.5" N	105° 22' 27" E	150
Pacific Islands (PAC) (9 sites)					
Fiji	FJI	Nausori meteo office	18° 02' 48" S	178° 33' 33" E	5
Kiribati	KIR	Bonriki airport area	1° 22' 46" N	173° 08' 42" E	2
Marshall Islands	MHL	Rearlaplap, Arno	7° 05' 13" N	171° 54' 25" E	15

Supplementary Information "POPs in PAS/PUFs"

Country name	ISO3	Physical description of the site	Latitude	Longitude	Altitude (m)
Niue	NIU	Alofi	19° 04' 37" S	169° 55' 33" W	60
Palau	PLW	Malakal	7° 20' 6.1" N	134° 27' 11" E	13
Samoa	WSM	Afiamalu area	13° 54' 31" S	171° 46' 55" W	723
Solomon Islands	SLB	MET Upper Air Station, Vavaya Ridge, Honaira	9° 26' 5.8" S	159° 57' 15" E	65
Tuvalu	TUV	Meteorological Station	8° 31' 31" S	179° 11' 48" E	6
Vanuatu	VUT	Tagabe Pump Station, Port Vila	17° 43' 27" S	168° 20' 17" E	2
GRULAC (11 sites)					
Antigua and Barbuda	ATG	Parroquia de Saint Peter	17° 4' 37" N	61° 45' 37" W	43
Argentina	ARG	INTI. Colectora Norte de, Av. Gral. Paz 5445, San Martín, Buenos Aires	34° 30' 27" S	58° 30' 53" W	24
Barbados	BRB	Caribbean Institute of Meteorology and Hydrology	13° 08' 56" N	59° 37' 29" W	153
Brazil	BRA	CETESB. Av. Prof. Frederico Hermann Jr. 345, São Paulo SP	23° 33' 13" S	46° 40' 22" W	820
Chile	CHL	Tomé, Región Bío Bío (23 km de distancia de Concepción)	36° 39' 48" S	72° 57' 49" W	171
Colombia	COL	Universidad de Antioquia. Cl. 62 #52-59, Medellín, Antioquia, Colombia	6° 15' 36" N	75° 34' 4.8" W	1 479
Ecuador	ECU	José Joaquín Olmedo & Juan José Flores, Quito	0° 13' 12" S	78° 30' 33" W	2 742
Jamaica	JAM	25 Dominica Dr, Kingston	18° 0' 28" N	76° 47' 29" W	89
Mexico	MEX	Loma Dorada, 81217 Los Mochis (Universidad de Occidente)	25° 48' 52" N	108° 57' 44" W	19
Peru	PER	R1, Comas 15316, Lima	11° 54' 57" S	77° 3' 19" W	149
Uruguay	URY	Facultad de Agronomía, Av. Garzon 780, Montevideo	34° 50' 13" S	56° 13' 21" W	43

Table S 2: POPs and their designation in this assessment (right column). The first column indicates the decision by the Conference of the Parties that listed the respective POP.

Group	POP listing	Single compounds or sum of analytes	Designated as
Organochlorine pesticides (OCPs):			
initial	aldrin	aldrin	aldrin
initial	dieldrin	dieldrin	dieldrin
initial	endrin	endrin	endrin
initial	chlordane	<i>cis</i> chlordane, <i>trans</i> -chlordane, <i>cis</i> -nonachlor, <i>trans</i> -nonachlor, oxychlordane	chlordane
initial	Dichlorodiphenyltrichloroethane	<i>o,p'</i> - and <i>p,p'</i> isomers of DDT, DDD, and DDE	DDT
initial	heptachlor	heptachlor, <i>cis</i> - and <i>trans</i> -heptachlorepoide	heptachlor
initial	mirex	mirex	mirex
initial	toxaphene	Parlar 26, 50, and 62;	toxaphene
4/12	Chlordecone	chlordecone	chlordecone
5/3	Endosulfan	α -endosulfan	endosulfan
4/10	alpha-hexachlorocyclohexane	α -HCH	a_HCH
4/11c	beta-hexachlorocyclohexane	β -HCH	b_HCH
4/15	lindane	lindane or γ -HCH	lindane
Chlorinated industrial chemicals (indChem)			
initial	polychlorinated biphenyls	6 indicator PCB: PCB 28, PCB 52, PCB 101, PCB 138, PCB 153, PCB 180	PCB ₆
initial	hexachlorobenzene	HCB	HCB
4/16	pentachlorobenzene	PeCBz	PeCBz
	hexachlorobutadiene	HCBD	HCBD
8/11	Short-chain chlorinated paraffins	as sum of homologues C ₁₀ -C ₁₄	SCCP
Brominated flame retardants (BFR)			

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4/13	Hexabromobiphenyl	PBB 153	PBB153
6/13	Hexabromocyclododecone	α -HBCD, β -HBCD, and γ -HBCD	HBCD
4/18	tetrabromodiphenyl ether and pentabromodiphenyl ether	PBDE 17, PBDE-28, PBDE 47, PBDE 99, PBDE 100, PBDE 153, PBDE 154, PBDE 175/183	PBDE ₈
4/14	hexabromodiphenyl ether and heptabromodiphenyl ether		
Dioxin-like POPs			
initial	polychlorinated dibenzo- <i>p</i> -dioxins	PCDD, seven 2,3,7,8-substituted PCDD	PCDD
initial	polychlorinated dibenzofurans	PCDF, ten 2,3,7,8-substituted PCDF	PCDF
initial	polychlorinated biphenyls	PCB, twelve non- or mono-ortho that were assigned a TEF	dl-PCB
Perfluoroalkyl substances (PFAS)			
4/17, 9/4	perfluorooctanesulfonic acid	PFOS, with linear and branched isomers	PFOS
9/12	perfluorooctanoic acid	PFOA, linear isomer only	PFOA
10/13	perfluorohexanesulfonic acid	PFHxS, linear isomer only	PFHxS

Initial POPs: 12 substances (UNEP, 2001)

Newly listed chlorinated POPs: SC-4/12 chlordecone (UNEP, 2009c), SC-4/10 α -HCH (UNEP, 2009a), SC-4/11 β -HCH (UNEP, 2009b), SC-4/15 lindane (UNEP, 2009f), SC-4/16 PeCBz (UNEP, 2009g), SC-7/12 and SC-8/12 hexachlorobutadiene (HCBd) (UNEP, 2015a, 2017b), SC-5/3 endosulfan (UNEP, 2011), SC-8/11 SCCP (UNEP, 2017a)

Newly listed brominated POPs: SC-4/13 HxBB (UNEP, 2009d); SC-4/14 hexa- and heptabromodiphenylether (UNEP, 2009e), SC-4/18 tetra- and pentabromodiphenyl ether (UNEP, 2009i), SC-6/13 HBCD (UNEP, 2013a)

Newly listed fluorinated POPs: SC-4/17 and SC-9/4 PFOS (UNEP, 2009h, 2019a), SC-9/12 PFOA (UNEP, 2019c), 10/13 PFHxS (UNEP, 2022)

Table S 3: Descriptive statistics for 381 PAS/PUF samples by region. Values in ng/PUF and 3-months exposure. N = number of samples.
Cells containing the maximum value are highlighted in yellow color

	Africa (N=149)	Asia (N=64)	PAC (N=64)	GRULAC (N=104)	Overall (N=381)
aldrin					
Mean (SD)	0.045 (0.091)	0.0490(0.099)	0.005 (0.026)	0.523 (0.669)	0.174 (0.422)
Median [Min, Max]	0 [0, 0.480]	0 [0, 0.370]	0 [0, 0.150]	0.326 [0, 2.65]	0 [0, 2.65]
dieldrin					
Mean (SD)	5.87 (9.33)	1.65 (2.58)	2.21 (3.12)	11.5 (20.1)	6.16 (12.8)
Median [Min, Max]	2.50 [0, 53.0]	0.480 [0, 9.70]	1.30 [0, 14.0]	4.32 [0, 87.5]	2.00 [0, 87.5]
endrin					
Mean (SD)	0.243 (0.561)	0.047 (0.144)	0.018 (0.073)	0.487 (0.655)	0.242 (0.526)
Median [Min, Max]	0 [0, 2.80]	0 [0, 0.590]	0 [0, 0.350]	0 [0, 3.07]	0 [0, 3.07]
chlordane					
Mean (SD)	2.87 (4.12)	5.66 (10.8)	2.44 (3.18)	9.22 (12.2)	5.06 (8.75)
Median [Min, Max]	1.32 [0, 22.8]	0.710 [0, 65.7]	1.13 [0, 14.2]	4.74 [0, 41.8]	1.74 [0, 65.7]
DDT					
Mean (SD)	38.6 (103)	10.9 (7.33)	55.4 (141)	17.0 (12.9)	30.7 (87.5)
Median [Min, Max]	14.1 [3.29, 895]	9.59 [2.75, 29.9]	1.43 [0, 667]	15.4 [0.303, 61.1]	11.8 [0, 895]
heptachlor					
Mean (SD)	1.40 (1.48)	0.596 (0.728)	0.584 (0.553)	1.21 (1.38)	1.08 (1.28)

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	Africa (N=149)	Asia (N=64)	PAC (N=64)	GRULAC (N=104)	Overall (N=381)
Median [Min, Max]	1.00 [0, 8.20]	0.460 [0, 3.24]	0.600 [0, 2.20]	0.957 [0, 5.58]	0.775 [0, 8.20]
mirex					
Mean (SD)	0.058 (0.074)	0.199 (0.100)	0.138 (0.274)	0.146 (0.244)	0.120 (0.188)
Median [Min, Max]	0 [0, 0.370]	0.220 [0, 0.460]	0.120 [0, 1.90]	0 [0, 0.917]	0.100 [0, 1.90]
toxaphene					
Mean (SD)	0.218 (0.528)	0.173 (0.329)	0.0796 (0.190)	0.469 (1.25)	0.202 (0.557)
Median [Min, Max]	0 [0, 3.57]	0 [0, 1.59]	0 [0, 1.14]	0 [0, 4.77]	0 [0, 4.77]
α -HCH					
Mean (SD)	1.43 (2.48)	2.39 (3.35)	0.172 (0.176)	0.977 (1.00)	1.25 (2.22)
Median [Min, Max]	0.680 [0, 18.0]	0.68 [0.270, 15.0]	0.230 [0, 0.470]	0.557 [0, 4.10]	0.520 [0, 18.0]
β -HCH					
Mean (SD)	2.40 (11.0)	0.880 (1.58)	0 (0)	0.413 (0.603)	1.18 (6.90)
Median [Min, Max]	0 [0, 104]	0 [0, 5.50]	0 [0, 0]	0 [0, 2.07]	0 [0, 104]
lindane					
Mean (SD)	4.53 (10.5)	1.30 (1.70)	0.937 (1.51)	4.55 (4.68)	3.40 (7.18)
Median [Min, Max]	1.80 [0, 61.0]	0.720 [0, 7.10]	0.260 [0, 6.40]	2.68 [0, 19.6]	1.50 [0, 61.0]
endosulfan					
Mean (SD)	7.57 (20.4)	3.27 (3.39)	0.110 (0.480)	2.53 (3.86)	4.19 (13.2)
Median [Min, Max]	1.20 [0, 140]	1.90 [0, 12.0]	0 [0, 2.90]	1.04 [0, 18.4]	0.925 [0, 140]
PCB ₆					
Mean (SD)	15.1 (42.8)	5.57 (6.22)	3.97 (8.55)	10.3 (10.4)	10.3 (27.7)
Median [Min, Max]	3.69 [0.440, 290]	4.50 [0.520, 29.5]	2.46 [0.680, 60.6]	10.3 [0, 48.5]	3.49 [0, 290]
HCB					
Mean (SD)	5.11 (4.19)	6.61 (6.78)	2.24 (1.21)	5.14 (3.60)	4.89 (4.45)
Median [Min, Max]	3.90 [0.550, 23.0]	3.60 [1.60, 27.0]	2.00 [0.640, 7.70]	4.24 [1.06, 20.6]	3.59 [0.550, 27.0]
PeCBz					
Mean (SD)	1.97 (3.60)	2.51 (3.94)	0.695 (0.470)	13.0 (13.8)	4.95 (9.31)
Median [Min, Max]	1.20 [0.100, 31.0]	1.20 [0.310, 20.0]	0.520 [0, 2.60]	7.38 [0, 55.3]	1.37 [0, 55.3]
HCDB					
Mean (SD)	2.11 (1.93)	15.4 (52.4)	2.41 (1.65)	NA	5.26 (25.7)
Median [Min, Max]	1.60 [0, 15.0]	3.00 [0, 334]	2.20 [0, 6.80]	NA	2.00 [0, 334]
PCDD					
Mean (SD)	0.066 (0.105)	0.090 (0.220)	0.157 (0.410)	0.147 (0.258)	0.102 (0.225)
Median [Min, Max]	0.03 [0.004, 0.50]	0.036 [0.004, 1.2]	0.02 [0.002, 1.91]	0.07 [0.009, 1.29]	0.049 [0.002, 1.91]
PCDF					
Mean (SD)	0.0916 (0.126)	0.083 (0.070)	0.043 (0.084)	0.060 (0.048)	0.076 (0.098)
Median [Min, Max]	0.03 [0.001, 0.55]	0.06 [0.003, 0.27]	0.008 [0, 0.383]	0.05 [0.003, 0.27]	0.044 [0, 0.55]
dl-PCB					
Mean (SD)	1.47 (2.35)	2.10 (3.19)	1.25 (2.71)	2.34 (2.54)	1.78 (2.60)
Median [Min, Max]	0.94 [0.013, 20.7]	1.19 [0.050, 16.0]	0.556 [0.064, 13.3]	1.74 [0.10, 10.7]	0.94 [0.012, 20.7]
PBDE ₈					
Mean (SD)	1.62 (2.68)	0.769 (0.847)	2.52 (3.11)	3.17 (3.57)	2.06 (2.96)
Median [Min, Max]	0.580 [0, 16.3]	0.520 [0, 3.16]	1.08 [0, 14.9]	1.48 [0, 14.1]	0.98 [0, 16.3]
PBDE 209					
Mean (SD)	10.5 (21.2)	3.09 (7.07)	1.31 (2.82)	NA (NA)	6.64 (16.5)
Median [Min, Max]	3.00 [0, 130]	0 [0, 39.0]	0 [0, 12.0]	NA [NA, NA]	1.50 [0, 130]
HBCD					
Mean (SD)	2.44 (5.72)	5.14 (14.2)	1.50 (6.97)	3.02 (5.22)	2.90 (7.94)
Median [Min, Max]	0.440 [0, 39.4]	0.100 [0, 75.6]	0.0900 [0, 48.8]	1.38 [0, 35.7]	0.49 [0, 75.6]
PBB 153					
Mean (SD)	0.0240 (0.105)	0 (0)	0.009 (0.0375)	0.001 (0.009)	0.011 (0.068)
Median [Min, Max]	0 [0, 0.870]	0 [0, 0]	0 [0, 0.230]	0 [0, 0.067]	0 [0, 0.87]
PFOS					
Mean (SD)	1.58 (5.83)	0.136 (0.122)	0.277 (0.225)	0.339 (0.485)	0.796 (3.74)
Median [Min, Max]	0.102 [0, 36.0]	0.097 [0, 0.63]	0.234 [0, 0.827]	0.170 [0, 2.26]	0.12 [0, 36.0]
PFOA					
Mean (SD)	0.281 (0.453)	0.259 (0.198)	0.160 (0.100)	0.245 (0.134)	0.25 (0.31)
Median [Min, Max]	0.147 [0, 3.18]	0.175 [0, 0.965]	0.151 [0, 0.417]	0.224 [0, 0.655]	0.18 [0, 3.18]

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	Africa (N=149)	Asia (N=64)	PAC (N=64)	GRULAC (N=104)	Overall (N=381)
PFHxS					
Mean (SD)	0.221 (0.973)	0.013 (0.020)	0.042 (0.049)	0.010 (0.019)	0.099 (0.623)
Median [Min, Max]	0 [0, 7.88]	0 [0, 0.096]	0.035 [0, 0.206]	0 [0, 0.101]	0 [0, 7.88]
FOSA					
Mean (SD)	0.066 (0.300)	0.009 (0.049)	0.037 (0.117)	0.061 (0.186)	0.052 (0.222)
Median [Min, Max]	0 [0, 1.89]	0 [0, 0.327]	0 [0, 0.669]	0 [0, 0.96]	0 [0, 1.89]

Table S 4: Descriptive statistics for 381 PAS/PUF samples by latitude from north (N_) to south (S_). Values in ng/PUF and 3-months exposure. N = number of samples
Cells containing the maximum value are highlighted in yellow color

	N_23+ (N=49)	N_10-23 (N=94)	Eq (N=144)	S_10-23 (N=54)	S_23+ (N=40)	Overall (N=381)
aldrin						
Mean (SD)	0.233 (0.480)	0.362 (0.679)	0.0829 (0.148)	0.108 (0.288)	0.0804 (0.191)	0.174 (0.422)
Median [Min, Max]	0 [0, 2.51]	0 [0, 2.65]	0 [0, 0.564]	0 [0, 1.20]	0 [0, 0.929]	0 [0, 2.65]
dieldrin						
Mean (SD)	1.87 (3.30)	10.7 (21.9)	6.00 (8.78)	4.04 (6.71)	4.43 (4.41)	6.16 (12.8)
Median [Min, Max]	1.29 [0, 19.1]	1.30 [0, 87.5]	3.30 [0, 53.0]	1.82 [0, 27.0]	3.49 [0, 14.2]	2.00 [0, 87.5]
endrin						
Mean (SD)	0.363 (0.623)	0.305 (0.598)	0.167 (0.486)	0.0202 (0.0764)	0.506 (0.557)	0.242 (0.526)
Median [Min, Max]	0 [0, 2.13]	0 [0, 3.07]	0 [0, 2.80]	0 [0, 0.370]	0.318 [0, 1.64]	0 [0, 3.07]
chlordane						
Mean (SD)	0.998 (0.836)	11.0 (15.0)	3.63 (3.48)	3.39 (5.82)	3.69 (2.51)	5.06 (8.75)
Median [Min, Max]	0.930 [0, 4.74]	1.94 [0, 65.7]	2.72 [0, 14.2]	1.08 [0, 22.8]	4.47 [0, 7.78]	1.74 [0, 65.7]
DDT						
Mean (SD)	11.4 (5.92)	16.4 (19.9)	58.3 (138)	14.6 (17.8)	13.1 (11.1)	30.7 (87.5)
Median [Min, Max]	9.63 [2.75, 26.9]	11.5 [1.72, 97.3]	14.1 [0, 895]	7.34 [0.350, 61.1]	11.8 [0.303, 38.8]	11.8 [0, 895]
heptachlor						
Mean (SD)	0.909 (0.693)	0.840 (0.781)	1.20 (1.55)	0.581 (0.556)	2.04 (1.79)	1.08 (1.28)
Median [Min, Max]	0.900 [0, 2.45]	0.645 [0, 3.24]	0.780 [0, 8.20]	0.530 [0, 2.20]	1.45 [0, 5.58]	0.775 [0, 8.20]
mirex						
Mean (SD)	0.0621 (0.089)	0.124 (0.109)	0.010 (0.202)	0.0555 (0.065)	0.334 (0.302)	0.120 (0.188)
Median [Min, Max]	0 [0, 0.310]	0.135 [0, 0.370]	0 [0, 1.90]	0 [0, 0.180]	0.266 [0, 0.917]	0.100 [0, 1.90]
toxaphene						
Mean (SD)	0.414 (0.997)	0.185 (0.372)	0.232 (0.560)	0.023 (0.061)	0 (0)	0.202 (0.557)
Median [Min, Max]	0.200 [0, 4.77]	0 [0, 1.70]	0 [0, 3.57]	0 [0, 0.220]	0 [0, 0]	0 [0, 4.77]
α -HCH						
Mean (SD)	2.58 (2.59)	0.771 (0.752)	1.29 (3.02)	0.582 (0.527)	1.55 (1.24)	1.25 (2.22)
Median [Min, Max]	1.50 [0, 12.0]	0.470 [0, 4.70]	0.360 [0, 18.0]	0.450 [0, 2.10]	1.51 [0, 4.10]	0.520 [0, 18.0]
β -HCH						
Mean (SD)	1.43 (1.85)	0.671 (1.75)	1.96 (11.2)	0.147 (0.488)	0.814 (0.606)	1.18 (6.90)
Median [Min, Max]	0.860 [0, 6.10]	0 [0, 9.90]	0 [0, 104]	0 [0, 1.95]	0.825 [0, 2.07]	0 [0, 104]
lindane						
Mean (SD)	1.82 (1.36)	1.01 (1.09)	5.29 (9.72)	4.01 (9.16)	3.38 (3.16)	3.40 (7.18)
Median [Min, Max]	1.70 [0, 6.80]	0.685 [0, 4.15]	1.80 [0, 61.0]	2.20 [0, 55.0]	2.37 [0.288, 11.5]	1.50 [0, 61.0]
endosulfan						
Mean (SD)	3.61 (5.14)	2.24 (3.12)	7.53 (20.8)	0.408 (0.811)	2.96 (2.57)	4.19 (13.2)
Median [Min, Max]	1.20 [0, 18.4]	1.02 [0, 12.0]	1.00 [0, 140]	0 [0, 3.22]	2.42 [0, 9.45]	0.925 [0, 140]

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	N_23+ (N=49)	N_10-23 (N=94)	Eq (N=144)	S_10-23 (N=54)	S_23+ (N=40)	Overall (N=381)
PCB ₆						
Mean (SD)	17.3 (24.6)	4.01 (3.81)	12.0 (41.5)	6.34 (10.6)	15.4 (12.9)	10.3 (27.7)
Median	7.02	3.07	3.05	2.46	13.3	3.49
[Min, Max]	[2.03, 126]	[0, 15.8]	[0.440, 290]	[0.990, 60.6]	[0, 48.5]	[0, 290]
HCB						
Mean (SD)	10.9 (7.08)	3.92 (2.62)	3.77 (2.50)	3.03 (2.30)	6.27 (5.02)	4.89 (4.45)
Median	9.70	3.15	3.40	2.60	4.57	3.59
[Min, Max]	[2.62, 27.0]	[1.06, 19.0]	[0.550, 22.0]	[0.640, 11.7]	[1.24, 20.6]	[0.550, 27.0]
PeCBz						
Mean (SD)	6.35 (7.98)	5.24 (11.5)	3.14 (6.15)	1.11 (1.28)	14.0 (13.8)	4.95 (9.31)
Median	2.87	1.30	1.20	0.700	9.77	1.37
[Min, Max]	[0.470, 32.6]	[0, 54.5]	[0.100, 32.0]	[0, 6.03]	[0, 55.3]	[0, 55.3]
HCDB						
Mean (SD)	22.9 (66.1)	3.61 (4.50)	1.68 (1.25)	2.28 (2.46)	NA (NA)	5.26 (25.7)
Median	3.80	2.60	1.30	1.90	NA	2.00
[Min, Max]	[0.860, 334]	[0, 30.0]	[0, 6.80]	[0, 15.0]	[NA, NA]	[0, 334]
PCDD						
Mean (SD)	0.050 (0.031)	0.174 (0.314)	0.122 (0.279)	0.0338 (0.0394)	0.062 (0.0251)	0.102 (0.225)
Median	0.0420	0.074	0.029	0.012	0.059	0.049
[Min, Max]	[0.005, 0.109]	[0.0049, 1.29]	[0.0017, 1.91]	[0.002, 0.150]	[0.023, 0.142]	[0.002, 1.91]
PCDF						
Mean (SD)	0.101 (0.139)	0.097 (0.108)	0.068 (0.082)	0.021 (0.029)	0.0600 (0.0255)	0.0760 (0.0982)
Median	0.044	0.059	0.028	0.010	0.065	0.044
[Min, Max]	[0.004, 0.486]	[0.001, 0.553]	[0, 0.383]	[0, 0.128]	[0.005, 0.107]	[0, 0.553]
dl-PCB						
Mean (SD)	2.34 (2.71)	0.862 (0.828)	1.31 (2.76)	1.73 (3.14)	3.85 (2.67)	1.78 (2.60)
Median	2.02	0.700	0.566	0.558	2.89	0.943
[Min, Max]	[0.266, 16.0]	[0.013, 3.49]	[0.064, 20.7]	[0.197, 13.3]	[0.188, 10.7]	[0.013, 20.7]
PBDE ₈						
Mean (SD)	2.56 (3.76)	1.68 (2.61)	2.26 (2.92)	1.82 (3.24)	1.96 (2.31)	2.06 (2.96)
Median	0.890	0.715	1.08	0.680	1.43	0.980
[Min, Max]	[0, 14.1]	[0, 10.3]	[0, 16.3]	[0, 14.9]	[0, 9.82]	[0, 16.3]
PBDE 209						
Mean (SD)	13.4 (15.1)	1.71 (2.86)	3.60 (8.10)	15.1 (32.0)	NA (NA)	6.64 (16.5)
Median	7.85	0	1.50	0	NA	1.50
[Min, Max]	[0, 62.0]	[0, 14.0]	[0, 58.0]	[0, 130]	[NA, NA]	[0, 130]
HBCD						
Mean (SD)	8.17 (15.6)	0.914 (1.76)	2.17 (5.59)	3.81 (9.86)	2.45 (3.71)	2.90 (7.94)
Median	1.29	0.130	0.400	0.130	1.06	0.490
[Min, Max]	[0, 75.6]	[0, 9.20]	[0, 39.4]	[0, 48.8]	[0.180, 19.1]	[0, 75.6]
PBB 153						
Mean (SD)	0.0013 (0.008)	0.0009 (0.008)	0.023 (0.107)	0.015 (0.0455)	0 (0)	0.011 (0.068)
Median	0	0	0	0	0	0
[Min, Max]	[0, 0.048]	[0, 0.067]	[0, 0.870]	[0, 0.230]	[0, 0]	[0, 0.870]
PFOS						
Mean (SD)	0.251 (0.428)	0.176 (0.156)	0.225 (0.294)	4.91 (9.81)	0.257 (0.334)	0.796 (3.74)
Median	0.113	0.136	0.099	0.288	0.187	0.123
[Min, Max]	[0, 2.48]	[0, 1.01]	[0, 1.37]	[0, 36.0]	[0, 1.62]	[0, 36.0]
PFOA						
Mean (SD)	0.295 (0.215)	0.280 (0.176)	0.157 (0.098)	0.422 (0.751)	0.240 (0.170)	0.250 (0.310)
Median	0.232	0.226	0.151	0.123	0.207	0.182
[Min, Max]	[0, 1.19]	[0, 0.965]	[0, 0.482]	[0, 3.18]	[0, 0.655]	[0, 3.18]
PFHxS						
Mean (SD)	0.006 (0.015)	0.014 (0.019)	0.011 (0.021)	0.726 (1.66)	0.010 (0.0205)	0.099 (0.623)
Median	0	0	0	0.0485	0	0
[Min, Max]	[0, 0.0671]	[0, 0.0961]	[0, 0.0920]	[0, 7.88]	[0, 0.101]	[0, 7.88]
FOSA						
Mean (SD)	0.012 (0.051)	0.005 (0.019)	0.013 (0.035)	0.228 (0.522)	0.135 (0.284)	0.052 (0.222)
Median	0	0	0	0	0	0
[Min, Max]	[0, 0.327]	[0, 0.110]	[0, 0.251]	[0, 1.89]	[0, 0.964]	[0, 1.89]

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Table S 5: Descriptive statistics for 381 PAS/PUF samples by increasing altitude (A₁). Values in ng/PUF and 3-months exposure. N = number of samples
Cells containing the maximum value are highlighted in yellow color

	A_0-49 (N=119)	A_50-249 (N=110)	A_250-999 (N=74)	A_1000-1999 (N=58)	A_2000+ (N=20)	Overall (N=381)
aldrin						
Mean (SD)	0.110 (0.327)	0.334 (0.660)	0.0681 (0.159)	0.128 (0.175)	0.215 (0.142)	0.174 (0.422)
Median	0	0	0	0	0.274	0
[Min, Max]	[0, 2.51]	[0, 2.65]	[0, 0.929]	[0, 0.564]	[0, 0.366]	[0, 2.65]
dieldrin						
Mean (SD)	3.37 (3.63)	9.76 (20.5)	3.44 (7.07)	9.22 (11.6)	4.75 (4.90)	6.16 (12.8)
Median	2.09	1.10	1.55	5.04	2.04	2.00
[Min, Max]	[0, 19.1]	[0, 87.5]	[0, 46.0]	[0, 53.0]	[0.849, 16.0]	[0, 87.5]
endrin						
Mean (SD)	0.264 (0.542)	0.251 (0.609)	0.407 (0.573)	0.0395 (0.103)	0.024 (0.0950)	0.242 (0.526)
Median	0	0	0	0	0	0
[Min, Max]	[0, 3.07]	[0, 2.80]	[0, 1.90]	[0, 0.370]	[0, 0.380]	[0, 3.07]
chlordane						
Mean (SD)	3.51 (3.68)	9.10 (14.3)	2.36 (2.50)	5.38 (5.91)	1.62 (1.73)	5.06 (8.75)
Median	1.52	1.84	0.990	2.50	0.649	1.74
[Min, Max]	[0, 14.9]	[0, 65.7]	[0, 8.86]	[0, 22.8]	[0, 4.40]	[0, 65.7]
DDT						
Mean (SD)	9.62 (8.45)	45.4 (111)	52.3 (139)	21.1 (14.4)	21.9 (15.9)	30.7 (87.5)
Median	7.37	8.64	14.6	16.0	17.5	11.8
[Min, Max]	[0, 38.8]	[0.303, 667]	[1.03, 895]	[2.75, 69.4]	[11.6, 77.4]	[0, 895]
heptachlor						
Mean (SD)	0.875 (1.06)	1.04 (1.32)	1.28 (1.26)	0.897 (0.558)	2.20 (2.61)	1.08 (1.28)
Median	0.610	0.668	0.900	0.880	0.500	0.775
[Min, Max]	[0, 4.56]	[0, 8.20]	[0, 5.58]	[0, 1.86]	[0, 6.68]	[0, 8.20]
mirex						
Mean (SD)	0.177 (0.219)	0.113 (0.226)	0.0957 (0.123)	0.0788 (0.0884)	0.0269 (0.0487)	0.120 (0.188)
Median	0.125	0	0.0450	0.0637	0	0.100
[Min, Max]	[0, 0.917]	[0, 1.90]	[0, 0.430]	[0, 0.310]	[0, 0.130]	[0, 1.90]
toxaphene						
Mean (SD)	0.303 (0.740)	0.151 (0.440)	0.158 (0.552)	0.212 (0.388)	0.0170 (0.0538)	0.202 (0.557)
Median	0.170	0	0	0.0850	0	0
[Min, Max]	[0, 4.77]	[0, 2.30]	[0, 3.57]	[0, 2.14]	[0, 0.170]	[0, 4.77]
α -HCH						
Mean (SD)	1.16 (2.16)	1.09 (2.70)	1.47 (1.56)	1.58 (2.44)	0.987 (0.661)	1.25 (2.22)
Median	0.406	0.370	0.650	0.595	0.775	0.520
[Min, Max]	[0, 15.0]	[0, 18.0]	[0, 7.10]	[0, 12.0]	[0.228, 2.60]	[0, 18.0]
β -HCH						
Mean (SD)	0.763 (1.62)	2.35 (12.7)	0.766 (1.10)	0.714 (1.57)	0.266 (0.569)	1.18 (6.90)
Median	0	0	0.257	0	0	0
[Min, Max]	[0, 9.90]	[0, 104]	[0, 6.10]	[0, 5.50]	[0, 1.90]	[0, 104]
lindane						
Mean (SD)	1.47 (1.48)	3.59 (10.5)	3.24 (2.98)	5.25 (9.39)	8.96 (5.77)	3.40 (7.18)
Median	0.995	0.735	2.30	1.90	7.55	1.50
[Min, Max]	[0, 7.10]	[0, 61.0]	[0, 13.0]	[0, 55.0]	[1.50, 19.6]	[0, 61.0]
endosulfan						
Mean (SD)	2.14 (3.68)	8.33 (22.7)	2.45 (3.01)	0.900 (0.868)	9.58 (15.0)	4.19 (13.2)
Median	0	0.950	1.39	0.810	2.83	0.925
[Min, Max]	[0, 18.4]	[0, 140]	[0, 12.0]	[0, 2.90]	[0, 58.0]	[0, 140]
PCB ₆						
Mean (SD)	11.0 (18.7)	4.49 (5.41)	21.7 (55.8)	7.73 (6.67)	2.20 (0.533)	10.3 (27.7)
Median	3.80	2.82	6.10	5.13	2.21	3.49
[Min, Max]	[0, 126]	[0, 25.4]	[1.31, 290]	[1.06, 29.5]	[1.15, 3.05]	[0, 290]
HCB						
Mean (SD)	4.44 (3.96)	3.77 (2.90)	4.97 (4.40)	7.63 (6.98)	5.54 (1.09)	4.89 (4.45)
Median	3.25	2.85	3.68	4.32	5.69	3.59

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	A_0-49 (N=119)	A_50-249 (N=110)	A_250-999 (N=74)	A_1000-1999 (N=58)	A_2000+ (N=20)	Overall (N=381)
[Min, Max]	[0.820, 20.6]	[0.640, 19.0]	[2.00, 23.0]	[0.550, 27.0]	[2.99, 7.40]	[0.550, 27.0]
PeCBz						
Mean (SD)	7.10 (12.5)	2.95 (6.33)	3.91 (7.15)	3.96 (6.20)	9.65 (11.5)	4.95 (9.31)
Median	1.40	1.10	1.55	1.20	2.30	1.37
[Min, Max]	[0, 55.3]	[0, 54.5]	[0, 40.1]	[0.100, 27.9]	[1.20, 32.0]	[0, 55.3]
HCDB						
Mean (SD)	2.35 (1.79)	3.31 (4.37)	1.82 (0.897)	18.8 (60.9)	1.65 (0.316)	5.26 (25.7)
Median	2.00	2.45	1.75	2.20	1.70	2.00
[Min, Max]	[0, 7.70]	[0, 30.0]	[0, 4.40]	[0, 334]	[1.00, 2.10]	[0, 334]
PCDD						
Mean (SD)	0.095 (0.257)	0.170 (0.305)	0.091 (0.133)	0.0312 (0.023)	0.035 (0.045)	0.102 (0.225)
Median	0.054	0.071	0.056	0.027	0.009	0.049
[Min, Max]	[0.0017, 1.91]	[0.0029, 1.29]	[0.004, 0.503]	[0.005, 0.103]	[0.004, 0.122]	[0.002, 1.91]
PCDF						
Mean (SD)	0.051 (0.065)	0.084 (0.075)	0.132 (0.148)	0.031 (0.019)	0.01 (0.008)	0.076 (0.098)
Median	0.034	0.059	0.067	0.027	0.015	0.044
[Min, Max]	[0, 0.383]	[0, 0.265]	[0.002, 0.553]	[0.003, 0.071]	[0.0028, 0.028]	[0, 0.553]
dl-PCB						
Mean (SD)	1.96 (2.39)	1.05 (1.34)	2.37 (3.37)	2.09 (3.19)	0.261 (0.0863)	1.78 (2.60)
Median	1.01	0.679	2.11	0.946	0.225	0.943
[Min, Max]	[0.0125, 10.7]	[0.0504, 8.38]	[0.162, 20.7]	[0.318, 16.0]	[0.181, 0.399]	[0.0125, 20.7]
PBDE ₈						
Mean (SD)	2.85 (3.42)	2.07 (2.76)	2.07 (3.02)	0.884 (2.06)	0.676 (0.834)	2.06 (2.96)
Median	1.45	0.976	1.23	0.495	0.392	0.980
[Min, Max]	[0, 14.9]	[0, 10.3]	[0, 16.3]	[0, 13.1]	[0, 2.40]	[0, 16.3]
PBDE 209						
Mean (SD)	2.74 (3.64)	1.29 (2.94)	8.97 (15.3)	18.6 (31.9)	4.08 (2.32)	6.64 (16.5)
Median	1.50	0	2.50	3.45	5.15	1.50
[Min, Max]	[0, 14.0]	[0, 14.0]	[0, 62.0]	[0, 130]	[0, 6.10]	[0, 130]
HBCD						
Mean (SD)	1.90 (5.81)	1.34 (4.63)	2.26 (3.01)	9.14 (15.8)	1.53 (3.09)	2.90 (7.94)
Median	0.500	0.130	1.34	1.37	0.490	0.490
[Min, Max]	[0, 48.8]	[0, 39.4]	[0, 14.0]	[0, 75.6]	[0.180, 12.9]	[0, 75.6]
PBB 153						
Mean (SD)	0.0041 (0.027)	0.0055 (0.028)	0.038 (0.142)	0.0057 (0.023)	0 (0)	0.011 (0.068)
Median	0	0	0	0	0	0
[Min, Max]	[0, 0.230]	[0, 0.220]	[0, 0.870]	[0, 0.130]	[0, 0]	[0, 0.870]
PFOS						
Mean (SD)	0.217 (0.192)	0.246 (0.413)	0.264 (0.423)	3.91 (8.94)	0.0591 (0.0282)	0.796 (3.74)
Median	0.166	0.122	0.109	0.117	0.0596	0.123
[Min, Max]	[0, 0.827]	[0, 2.26]	[0, 2.48]	[0, 36.0]	[0, 0.112]	[0, 36.0]
PFOA						
Mean (SD)	0.244 (0.133)	0.207 (0.172)	0.217 (0.220)	0.419 (0.661)	0.152 (0.0913)	0.250 (0.310)
Median	0.224	0.169	0.151	0.181	0.128	0.182
[Min, Max]	[0, 0.833]	[0, 0.965]	[0, 1.19]	[0, 3.18]	[0, 0.383]	[0, 3.18]
PFHxS						
Mean (SD)	0.017 (0.026)	0.021 (0.037)	0.008 (0.015)	0.560 (1.51)	0 (0)	0.099 (0.623)
Median	0	0	0	0	0	0
[Min, Max]	[0, 0.101]	[0, 0.206]	[0, 0.0671]	[0, 7.88]	[0, 0]	[0, 7.88]
FOSA						
Mean (SD)	0.035 (0.137)	0.0225 (0.0867)	0.041 (0.168)	0.166 (0.469)	0.022 (0.028)	0.052 (0.222)
Median	0	0	0	0	0	0
[Min, Max]	[0, 0.894]	[0, 0.669]	[0, 0.964]	[0, 1.89]	[0, 0.0759]	[0, 1.89]

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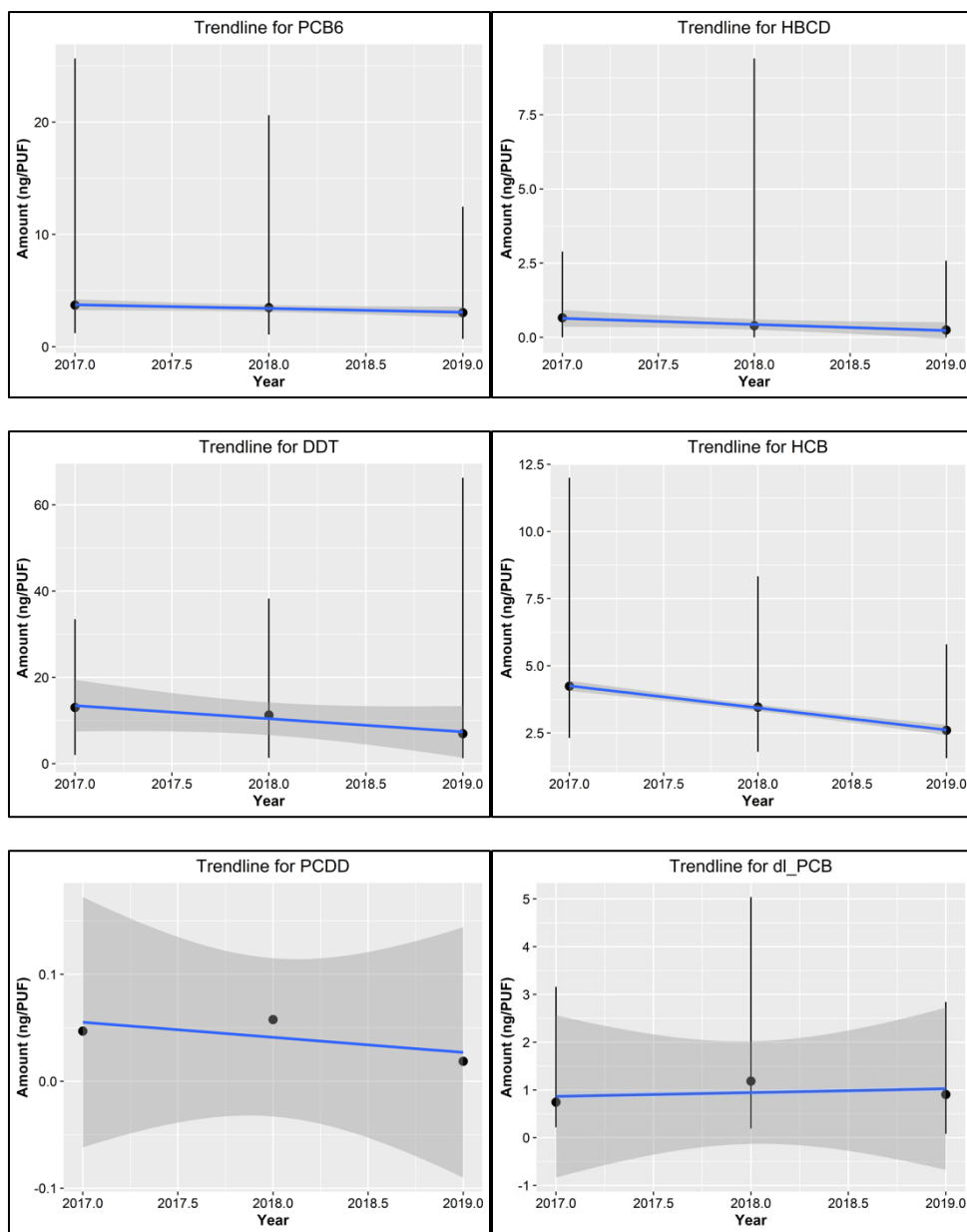


Figure S 1: Global trendlines (linear model) by year and POP across all samples (N=381)

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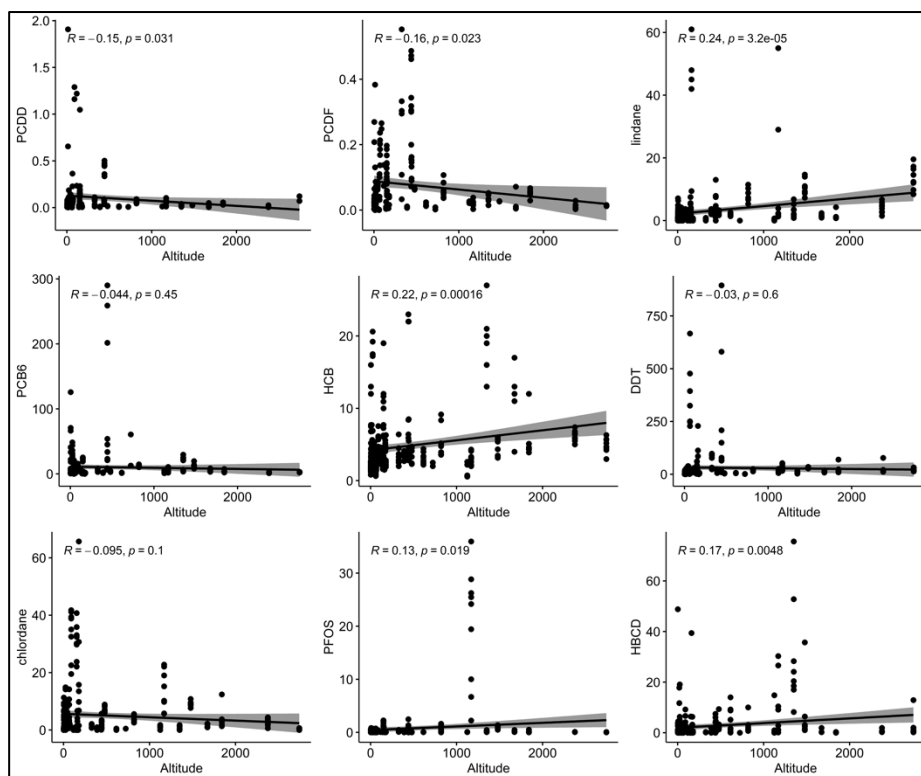


Figure S 2: Correlations across all samples between selected POPs and altitude (m)