Supporting information for

Spatial distribution and source apportionment of PFASs in surface sediments from five lake regions, China

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Figure S2 | Concentrations (ng/g dw) of PFASs in surface sediments from China, Japan, Austria, Germany, Australia, the USA and Canada (including sample size ≥1; No bar: no corresponding values) [8--15]. (We created the map using the Microsoft Office 2010 software for windows 2003/XP/VISTA/7.)

Table S1 | Abbreviations, mass transitions, retention times (min) for the studied perfluoroalkyl substances (PFASs)

Analyte	Acronym	Precursor/product ion	Retention time	Quantification by internal standard
Target analytes				
Perfluorobutyric acid	PFBA	212.9/168.9	1.68	$^{13}C_4$-PFBA
Perfluoropentanoic acid	PFPeA	262.9/218.9, 262.9/69.0	2.19	$^{13}C_4$-PFBA
Perfluorohexanoic acid	PFHxA	312.9/268.9, 312.9/119.1	2.78	$^{13}C_2$-PFHxA
Perfluoroheptanoic acid	PFHpA	362.9/318.9, 362.9/168.9	3.41	$^{13}C_2$-PFHxA
Perfluorooctanoate acid	PFOA	412.9/368.9, 412.9/169.0	4.00	$^{13}C_4$-PFOA
Perfluorononanoic acid	PFNA	462.9/418.9, 462.9/218.9	4.53	$^{13}C_5$-PFNA
Perfluorodecanoic acid	PFDA	512.9/468.9, 512.9/268.9	5.03	$^{13}C_2$-PFDA
Perfluoroundecanoic acid	PFUnDA	562.9/518.8, 562.9/268.8	5.48	$^{13}C_2$-PFUnDA
Perfluorododecanoic aicd	PFDoDA	612.9/568.9, 612.9/318.8	5.83	$^{13}C_2$-PFDoDA
Perfluorotridecanoic acid	PFTrDA	662.9/618.9, 662.9/368.9	6.15	$^{13}C_2$-PFDoDA
Perfluorotetradecanoic acid	PFTeDA	712.9/668.9, 712.9/368.9	6.42	$^{13}C_2$-PFDoDA
Perfluorohexadecanoic acid	PFHxDA	812.9/768.9, 812.9/468.9	6.85	$^{13}C_2$-PFDoDA
Perfluorooctadecanoic acid	PFOcDA	912.9/869.1, 912.9/568.9	7.22	$^{13}C_2$-PFDoDA
Perfluorobutane sulfonic acid	PFBS	298.9/99, 298.9/79.9	2.29	$^{18}O_2$-PFHxS
Perfluorohexane sulfonic acid	PFHxS	398.9/99, 398.8/79.9	3.44	$^{18}O_2$-PFHxS
Perfluorooctane sulfonic acid	PFOS	498.9/99, 498.9/79.9	4.56	$^{13}C_4$-PFOS
Perfluorodecane sulfonic acid	PFDS	598.9/99, 598.9/79.9	5.46	$^{13}C_4$-PFOS
Internal standards				
Perfluoro-n-[1,2,3,4-$^{13}C_4$] butanoic acid	$^{13}C_4$-PFBA	216.9/171.9	1.67	$^{13}C_8$-PFOA
Perfluoro-n-[1,2-$^{13}C_2$] hexanoic acid	$^{13}C_2$-PFHxA	314.9/269.9	2.77	$^{13}C_8$-PFOA
Perfluoro-n-[1,2,3,4-$^{13}C_4$] octanoic acid	$^{13}C_4$-PFOA	416.9/371.9	3.99	$^{13}C_8$-PFOA
Perfluoro-n-[1,2,3,4,5-$^{13}C_5$] nonannoic acid	$^{13}C_5$-PFNA	467.9/422.9	4.52	$^{13}C_8$-PFOA
Perfluoro-n-[1,2-$^{13}C_2$] decanoic acid	$^{13}C_2$-PFDA	514.9/469.9	5.02	$^{13}C_8$-PFOA
Perfluoro-n-[1,2-$^{13}C_2$] undecanoic acid	$^{13}C_2$-PFUnDA	564.9/519.8	5.46	$^{13}C_8$-PFOA
Perfluoro-n-[1,2-$^{13}C_2$] dodecanoic acid	$^{13}C_2$-PFDoDA	614.9/569.9	5.82	$^{13}C_8$-PFOA
Perfluoro-1-hexane [$^{18}O_2$] sulfonate	$^{18}O_2$-PFHxS	402.9/103.0	3.43	$^{13}C_8$-PFOS
Perfluoro-1- [1,2,3,4-$^{13}C_4$] octanesulfonate	$^{13}C_4$-PFOS	502.9/99.1	4.57	$^{13}C_8$-PFOS

Table S2 | Geographic and limnological features of forty-eight lakes and two reservoirs studied

Lake region	Lake	Serial number	Sampling time	Sample site	Position	Lake area (km^2)	Mean depth (m)	Catchment area (km^2)
East Plain Lake Region	Lake Wabu [1]	1	2012.04	Anhui Province	116°48′～117°01′E 32°23′～32°33′N	163	2.42	800
	Lake Longgan [1]	2	2012.06	Anhui Province	115°19′～116°17′E 29°52′～30°05′N	316	3.78	5,511
	Lake Shengjin [1]	3	2012.07	Anhui Province	116°58′～117°14′E 30°15′～30°28′N	78.5	1.26	1,554
	Lake Xiangjian [1]	4	2011.10	Anhui Province	117°15′～117°45′E 33°06′～33°12′N	45.0	0.93	-
	Lake Chengdong [1]	5	2012.04	Anhui Province	116°18′～116°28′E 32°12′～32°22′N	120	1.50	2,128
	Lake Chengxi [1]	6	2012.04	Anhui Province	116°01′～116°18′E 32°11′～32°33′N	199	2.70	1,750
	Lake Huayuan [1]	7	2011.10	Anhui Province	117°45′～117°53′E 32°55′～33°02′N	34.0	1.35	875
	Lake Baidang [1]	8	2012.07	Anhui Province	117°19′～117°27′E 30°47′～30°51′N	39.7	3.06	775
	Lake Bohu [1]	9	2012.06	Anhui Province	116°19′～116°33′E 30°04′～30°15′N	180	4.41	-
	Lake Wuchang [1]	10	2012.06	Anhui Province	116°36′～116°53′E 30°14′～30°20′N	101	3.43	1,084
	Lake Huangdahu [1]	11	2012.06	Anhui Province	116°14′～116°33′E 29°56′～30°08′N	299	3.94	-
	Lake Tuohu [1]	12	2011.10	Anhui Province	117°45′～117°51′E 33°09′～33°17′N	40.0	1.20	-
	Lake Nvshan [1]	13	2011.10	Anhui Province	117°58′～118°14′E 32°50′～33°02′N	105	1.71	4,215
	Lake Chaohu [1]	14	2011.12	Anhui Province	117°16′～117°05′E 31°25′～31°43′N	770	2.69	9,258
	Lake Luoma [1]	15	2013.06	Jiangsu Province	118°04′～118°18′E 34°00′～34°14′N	260	3.30	51,215
	Lake Cheng [1]	16	2013.07	Jiangsu Province	120°48′～120°52′E 31°10′～31°14′N	45.0	1.83	-
	Lake Yuandang [1]	17	2013.07	Jiangsu Province	120°51′～120°54′E 31°03′～31°05′N	12.9	1.38	-
	Lake Yaohu [1]	18	2013.08	Jiangsu Province	119°30′～119°40′E 31°30′～31°40′N	89.0	1.10	-
	Lake Gucheng [1]	19	2013.08	Jiangsu Province	118°53′～118°57′E 31°14′～31°18′N	24.5	1.56	248
	Lake Gehu [1]	20	2013.08	Jiangsu Province	119°44′～119°53′E 31°29′～31°42′N	147	1.19	-
	Lake Yangcheng [1]	21	2013.07	Jiangsu Province	120°39′～120°51′E 31°21′～31°30′N	119	1.40	-
	Lake Sanjiu [1]	22	2013.08	Jiangsu Province	119°48′E 31°22′N	23.2	1.85	-
	Lake Shijiu [1]	23	2013.08	Jiangsu Province	118°46′～118°56′E 31°23′～31°33′N	210	4.08	18,600
	Lake Gaoyou [1]	24	2013.06	Jiangsu Province	119°06′～119°25′E 32°42′～33°04′N	675	1.44	158,148
	Lake Nansi [1]	25	2013.06	Jiangsu Province	116°34′～117°21′E 34°27′～35°20′N	1,098	1.46	30,453
	Lake Shaobo [1]	26	2013.06	Jiangsu Province	119°23′～119°30′E 32°30′～32°40′N	77.0	1.10	-
	Lake Hongze [1]	27	2013.06	Jiangsu Province	118°10′～118°52′E 33°06′～33°40′N	1,577	1.77	156,000
	Lake Kuncheng [1]	28	2013.07	Jiangsu Province	120°43′～120°46′E 31°33′～31°36′N	18.0	1.78	-
	Lake Baima [1]	29	2013.06	Jiangsu Province	119°03′～119°11′E 33°09′～33°19′N	108	0.97	950
Mengxin Plateau Lake Region	Lake Bositeng [1]	30	2011.10	Xinjiang Uygur Autonomous Region	86°41′～87°27′E 41°49′～42°08′N	992	8.08	27,000
	Lake Wulungu [1]	31	2011.10	Xinjiang Uygur Autonomous Region	87°02′～87°35′E 47°02′～47°25′N	753	8.00	32,000
	Lake Jili [1]	32	2011.10	Xinjiang Uygur Autonomous Region	87°20′～87°32′E 46°51′～47°00′N	174	9.90	-
	Lake Hulun [1]	33	2011.10	Inner Mongolia Autonomous Region	116°58′～117°48′E 48°30′～49°20′N	2,339	5.92	37,214
	Lake Wuliangsu [1]	34	2011.10	Inner Mongolia Autonomous Region	108°43′～108°57′E 40°47′～41°03′N	233	1.12	11,800
Tibetan Plateau Lake Region	Lake Qinghai [1]	35	2012.07	Qinghai Province	99°36′～100°47′E 36°32′～37°15′N	4,340	17.9	29,661
	Lake Basongcuo [2]	36	2012.07	Tibet Autonomous Region	93°57′E 30°01′N	27.0	120 (Max.)	-
	Lake Yamdrok [1]	37	2012.07	Tibet Autonomous Region	90°21′～91°05′E 28°16′～29°11′N	638	20.0～40.0	5,422
	Lake Namucuo [1]	38	2012.07	Tibet Autonomous Region	90°16′～91°03′E 30°30′～30°56′N	1,962	-	8,649
Yungui Plateau Lake Region	Lake Yihai [3, 4]	39	2010.08	Sichuan Province	102°14′E 28°44′N	1.00	9.80	-
	Daqiao Reservoir [5]	40	2010.08	Sichuan Province	102°12′E 28°41′N	23.5	-	796
	Lake Qionghai [1]	41	2010.08	Sichuan Province	102°16′～102°21′E 27°47′～27°52′N	31.0	10.3	109
	Lake Mahu [1]	42	2010.08	Sichuan Province	103°47′～103°48′E 28°23′～28°26′N	7.30	65.7	97
	Lake Shudu [6]	43	2010.06	Yunnan Province	99°57′E 27°55′N	1.70	7.80 (Max.)	14
	Lake Qilu [1]	44	2010.07	Yunnan Province	102°43′～102°49′E 24°08′～24°13′N	36.9	4.03	341
	Lake Chenghai [1]	45	2010.06	Yunnan Province	100°38′～100°41′E 26°27′～26°38′N	77.2	25.7	229
	Lake Lugu [1]	46	2010.06	Yunnan Province	100°45′～100°50′E 27°41′～27°45′N	48.5	40.3	171
Northeast Plain Lake Region	Lake Wudalianchi [1]	47	2012.07	Heilongjiang Province	126°06′～126°15′E 48°40′～48°47′N	16.4	1.00-12.00	-
	Lake Xingkai [1]	48	2012.07	Heilongjiang Province	131°58′～132°51′E 44°32′～45°21′N	1,080	6.28	56,000
	Dahuofang Reservoir [7]	49	2012.07	Liaoning Province	120°20′～125°15′E 41°31′～42°15′N	22.0-91.2	-	5,437
	Lake Jingbo [1]	50	2012.07	Heilongjiang Province	128°37′～129°03′E 43°46′～44°03′N	91.5	12.9	11,820

Table S3 | Limits of detection (ng/mL), limits of quantitation (ng/mL), blank spike recoveries (%, n=5) and matrix spike recoveries (%, n=5) for PFASs (n indicates the number of samples analyzed; mean ± SD) [a]

Acronym	Limits of detection	Limits of quantitation	Blank spike recoveries	Matrix spike recoveries	
				2 ng/mL	20 ng/mL
Target analytes					
PFBA	0.01	0.05	104±5	88±9	96±7
PFPeA	0.01	0.03	101±4	87±12	95±9
PFHxA	0.01	0.04	97±3	92±8	104±6
PFHpA	0.02	0.06	102±5	109±9	98±7
PFOA	0.02	0.05	96±4	114±8	102±6
PFNA	0.02	0.06	112±5	109±10	97±7
PFDA	0.02	0.05	98±9	91±13	95±10
PFUnDA	0.02	0.08	102±6	111±10	115±8
PFDoDA	0.01	0.03	99±4	91±10	105±7
PFTrDA	0.01	0.05	96±7	88±12	108±9
PFTeDA	0.01	0.03	92±9	82±14	90±11
PFHxDA	0.06	0.20	89±8	77±13	84±11
PFOcDA	0.11	0.39	77±10	69±15	75±13
PFBS	0.02	0.06	98±3	90±7	102±8
PFHxS	0.01	0.04	99±4	109±9	93±6
PFOS	0.01	0.04	101±4	94±9	97±7
PFDS	0.01	0.03	96±5	92±8	90±8
Internal standards					
$^{13}C_4$-PFBA				93±9	
$^{13}C_2$-PFHxA				92±7	
$^{13}C_4$-PFOA				90±4	
$^{13}C_5$-PFNA				87±8	
$^{13}C_2$-PFDA				85±5	
$^{13}C_2$-PFUnDA				89±7	
$^{13}C_2$-PFDoDA				83±9	
$^{18}O_2$-PFHxS				90±7	
$^{13}C_4$-PFOS				92±6	

[a] The spike recoveries of PFASs were calculated using the equation: spike recovery = ($C_{sample + spiked}$ - $C_{sample)}$ / C_{spiked} × 100%, where $C_{sample + spiked}$ is the concentration of PFASs in a spiked sample, C_{sample} is the concentration of PFASs in the sample (same as above without spiked target compounds, C_{spiked} is the concentration of the spiked target compound. The recoveries of the stable isotope-labeled internal standards were calculated by the ratio of concentrations in the samples compared with those in the standard solutions.

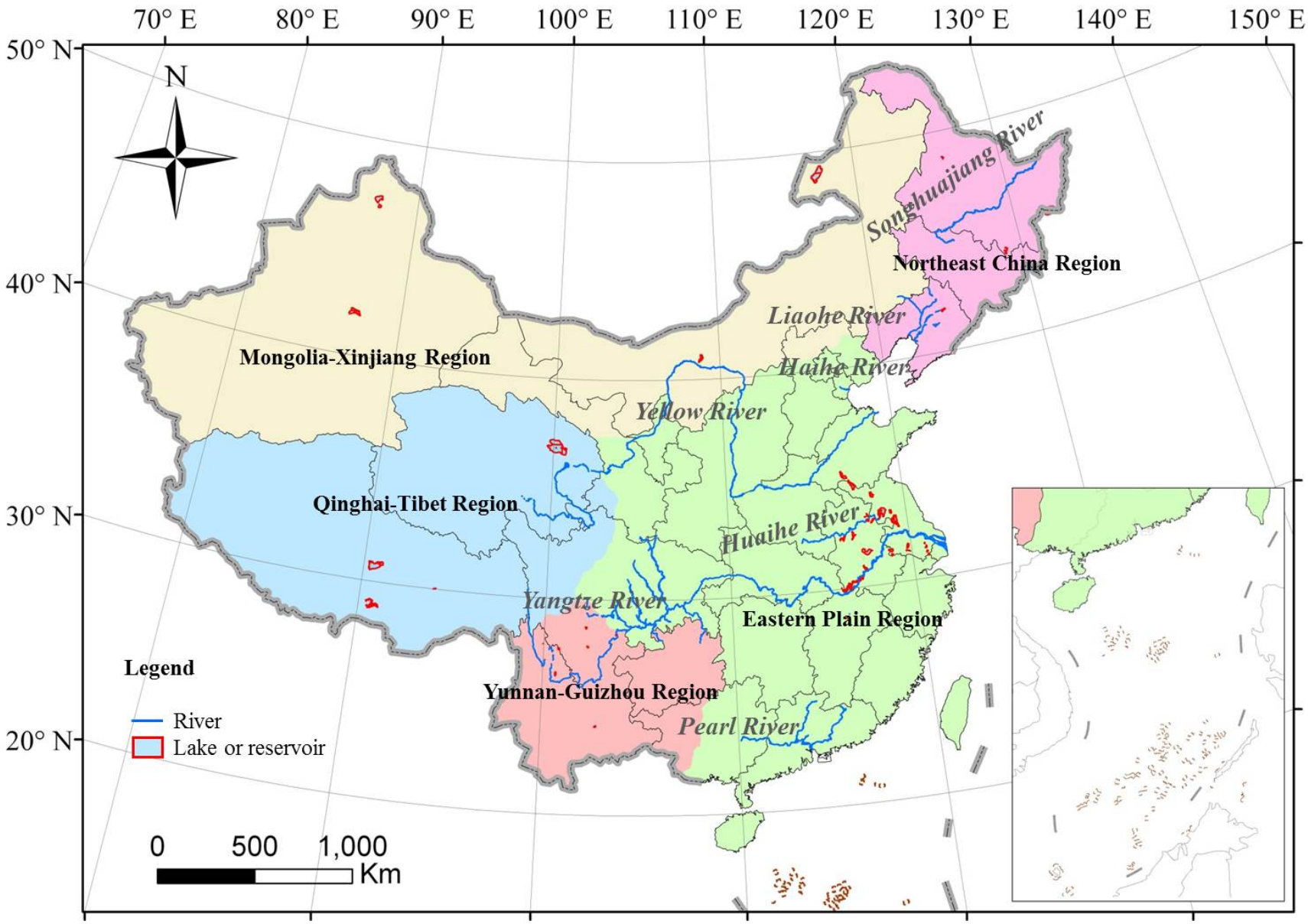

Figure S1 | A map plotting of forty-eight lakes and two reservoirs studied. (We created the map using the ArcGIS 9.2 software for windows 2000/XP/VISTA/7 and the Microsoft Office 2010 software for windows 2003/XP/VISTA/7.)

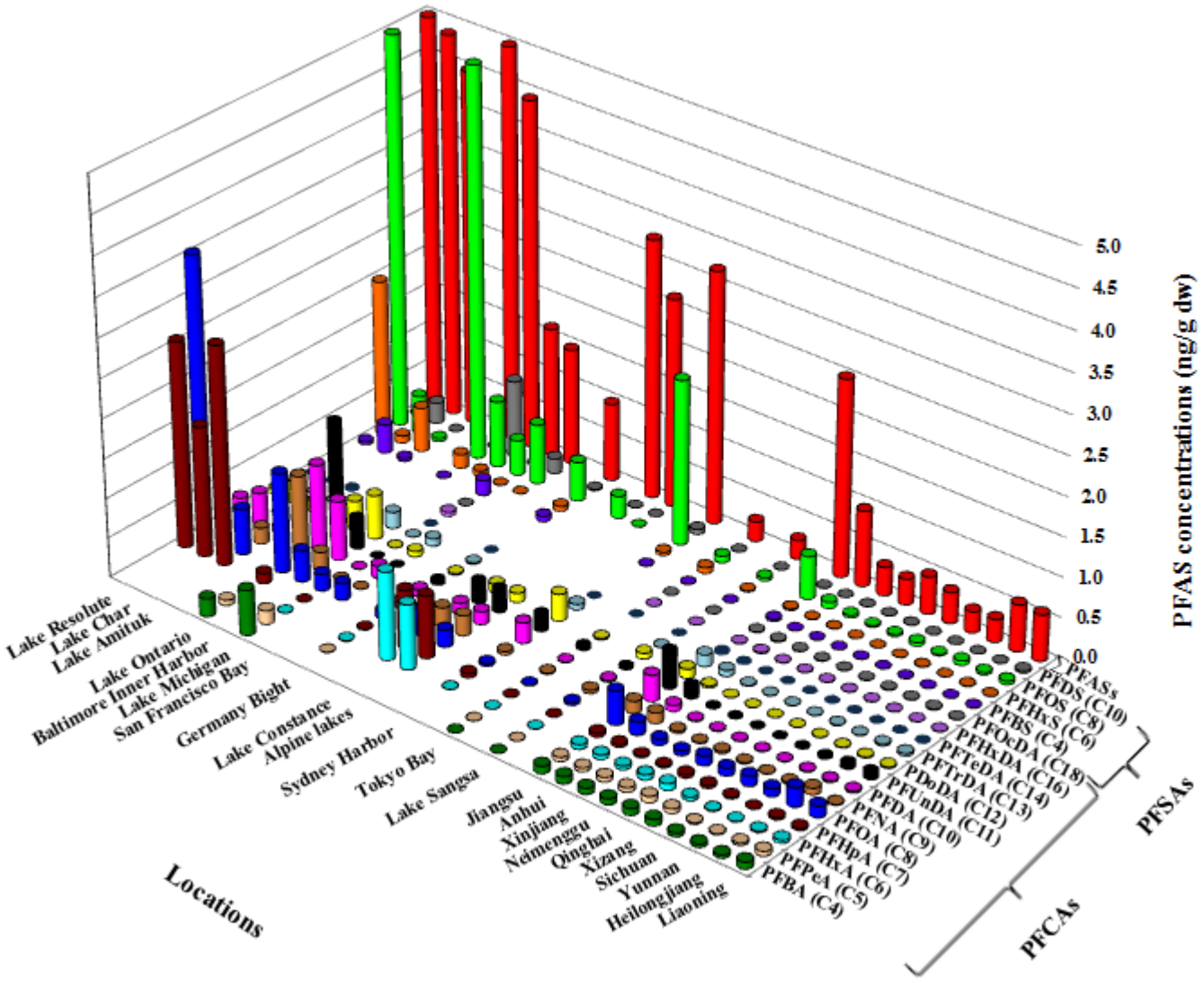

Figure S2 | Concentrations (ng/g dw) of PFASs in surface sediments from China, Japan, Austria, Germany, Australia, the USA and Canada (including sample size ≥1; No bar: no corresponding values) [8-15]. (We created the map using the Microsoft Office 2010 software for windows 2003/XP/VISTA/7.)

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