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VERTICAL TRANSPORT AND SINKS OF PERFLUOROALKYL SUBSTANCES IN THE GLOBAL OPEN OCEAN

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Leg*	Station	Ocean	Day	UTC Time	Longitude	Latitude	DCM Depth (m)
1	3	Atlantic	12/19/2010	10:30	-17.285	29.686	98
1	7	Atlantic	12/23/2010	12:40	-23.456	21.456	88
1	8	Atlantic	12/24/2010	10:30	-24.36	20.275	45
1	9	Atlantic	12/25/2010	12:40	-26.018	16.165	75
1	11	Atlantic	12/27/2010	11:53	-26.021	14.514	65
1	12	Atlantic	12/28/2010	10:25	-26.001	9.563	88
1	13	Atlantic	12/29/2010	10:20	-26.011	7.33	55
1	14	Atlantic	12/30/2010	10:35	-26.035	5.021	120
1	15	Atlantic	12/31/2010	10:55	-26.071	2.503	80
1	17	Atlantic	1/2/2011	11:17	-27.348	-3.024	75
1	18	Atlantic	1/3/2011	11:25	-28.167	-4.785	110
1	20	Atlantic	1/5/2011	11:19	-30.191	-9.069	150
1	21	Atlantic	1/6/2011	12:45	-31.465	-11.647	150
1	23	Atlantic	1/8/2011	11:50	-33.435	-15.801	152
1	24	Atlantic	1/9/2011	12:50	-34.669	-18.411	130
1	26	Atlantic	1/11/2011	11:48	-37.001	-23.054	125
2	28	Atlantic	1/20/2011	11:11	-33.366	-24.795	120
2	29	Atlantic	1/21/2011	10:50	-30.151	-25.402	120
2	30	Atlantic	1/22/2011	11:30	-27.591	-25.847	130
2	31	Atlantic	1/23/2011	11:00	-24.257	-26.409	140
2	32	Atlantic	1/24/2011	11:00	-21.433	-26.892	125
2	33	Atlantic	1/25/2011	11:05	-18.084	-27.556	120
2	34	Atlantic	1/26/2011	10:35	-14.792	-28.079	150
2	37	Atlantic	1/29/2011	10:30	-5.424	-29.675	110
2	38	Atlantic	1/30/2011	10:30	-2.441	-30.256	105
2	39	Atlantic	1/31/2011	16:00	1.475	-30.949	110
2	40	Atlantic	2/1/2011	10:40	3.841	-31.317	70
2	41	Atlantic	2/2/2011	10:45	6.752	-31.771	85
2	42	Atlantic	2/3/2011	10:40	9.92	-32.274	72
2	43	Atlantic	2/4/2011	10:35	12.734	-32.771	48
2	44	Atlantic	2/5/2011	10:50	15.479	-33.307	55
3	46	Indian	2/14/2011	8:52	27.494	-34.863	93
3	47	Indian	2/15/2011	7:03	31.05	-34.464	80
3	49	Indian	2/17/2011	8:52	36.981	-33.868	87
3	50	Indian	2/18/2011	6:42	39.872	-33.526	125
3	52	Indian	2/24/2011	5:30	61.483	-30.053	130
3	53	Indian	2/25/2011	6:00	63.259	-27.972	130
3	55	Indian	2/27/2011	5:00	69.424	-29.355	130
3	57	Indian	3/1/2011	5:00	76.066	-29.892	140
3	58	Indian	3/2/2011	4:30	79.612	-29.824	130
3	60	Indian	3/4/2011	4:57	86.252	-29.747	150
3	63	Indian	3/7/2011	3:20	96.416	-29.571	114

3	64	Indian	3/8/2011	3:15	99.999	-29.897	113
3	66	Indian	3/10/2011	3:50	107.25	-30.81	100
3	67	Indian	3/11/2011	2:20	110.22	-31.12	130
4a	70	Indian	3/20/2011	0:55	120.866	-36.634	100
4a	71	Indian	3/21/2011	1:50	124.878	-37.281	75
4a	73	Indian	3/24/2011	0:20	131.592	-38.515	70
4a	75	Indian	3/25/2011	22:21	138.791	-39.853	60
4a	77	Pacific	3/28/2011	23:54	150.436	-38.699	60
4a	78	Pacific	3/29/2011	22:16	150.949	-36.779	80
5	82	Pacific	4/20/2011		-178.24	-23.346	110
5	84	Pacific	4/22/2011		-175.864	-18.562	89
5	86	Pacific	4/24/2011		-173.397	-13.533	105
5	88	Pacific	4/26/2011		-172.367	-9.455	115
5	90	Pacific	4/28/2011		-170.816	-5.732	100
5	92	Pacific	4/30/2011		-168.385	-1.289	65
5	94	Pacific	5/2/2011		-165.734	3.943	80
5	97	Pacific	5/5/2011		-162.398	11.657	89
5	99	Pacific	5/7/2011		-159.443	17.982	140
6	102	Pacific	5/15/2011	19:56	-153.43	21.577	140
6	103	Pacific	5/16/2011	19:56	-150.442	21.063	105
6	106	Pacific	5/19/2011	18:47	-141.635	19.917	125
6	107	Pacific	5/20/2011	19:40	-138.977	19.287	130
6	109	Pacific	5/22/2011	18:30	-133.324	18.075	125
6	110	Pacific	5/23/2011	18:20	-130.634	17.39	110
6	112	Pacific	5/25/2011	17:48	-124.523	15.916	40
6	113	Pacific	5/26/2011	15:10	-121.998	15.31	137
6	114	Pacific	5/27/2011	15:35	-118.776	14.528	88
6	116	Pacific	5/29/2011	18:10	-113.267	13.187	70
6	117	Pacific	5/30/2011	18:50	-110.373	12.475	124
6	120	Pacific	6/2/2011	15:54	-102.459	10.76	37
6	121	Pacific	6/3/2011	15:25	-99.253	10.07	43
6	123	Pacific	6/5/2011	17:20	-93.143	8.809	24
6	124	Pacific	6/6/2011	15:10	-90.341	8.153	23
6	125	Pacific	6/7/2011	15:10	-87.9	7.207	20
7	128	Atlantic	6/21/2011	14:15	-71.772	14.226	97
7	129	Atlantic	6/22/2011	14:52	-69.384	15.068	95
7	131	Atlantic	6/25/2011	13:50	-59.833	17.427	90
7	132	Atlantic	6/26/2011	13:20	-57.845	18.094	160
7	134	Atlantic	6/28/2011	12:30	-52.691	20.014	130
7	135	Atlantic	6/29/2011	12:45	-50.178	20.79	135
7	137	Atlantic	7/1/2011	12:36	-44.531	22.862	137
7	138	Atlantic	7/2/2011	11:05	-41.918	23.766	130
7	140	Atlantic	7/4/2011	11:07	-35.324	26.111	140
7	141	Atlantic	7/5/2011	10:40	-32.924	26.925	150
7	143	Atlantic	7/7/2011	9:50	-26.97	28.874	120
7	144	Atlantic	7/8/2011	10:33	-23.71	29.978	100

7	146	Atlantic	7/10/2011	9:20	-17.286	32.084	110
7	147	Atlantic	7/11/2011	9:30	-14.678	32.846	90

*"Leg" term corresponds to transects: (1) Cadiz (Spain) – Rio de Janeiro (Brazil, (2) Rio de Janeiro (Brazil) – Cape Town (Republic of South Africa), (3) Cape Town (Republic of South Africa) – Perth (Australia), (4) Perth (Australia) – Sydney (Australia), (5) Sydney (Australia) – Honolulu (Hawaii, USA), (6) Honolulu (Hawaii, USA) – Cartagena de Indias (Colombia), (7) Cartagena de Indias (Colombia) – Cartagena (Spain).

Text S1. Sample treatment and analysis

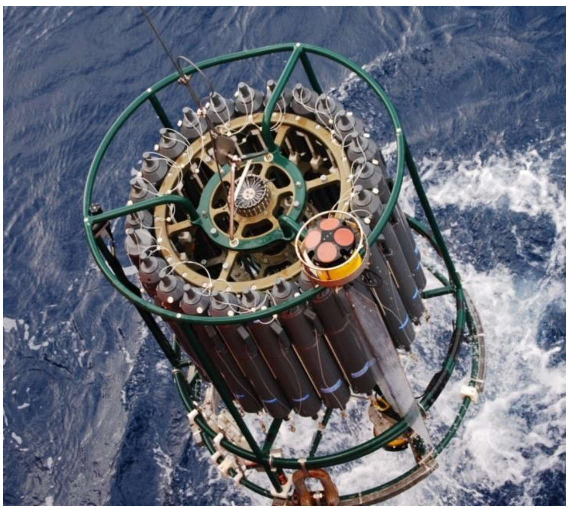
Reagents and standards

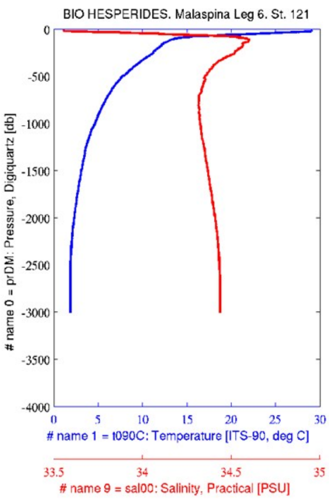
All the solvents and solutions used were of analytical grade and highest available purity. Methanol, acetone and water from Merk were of LiChrosolv quality. Likewise, acetonitrile (Fluka) and acetic acid (Scharlab) were of HPLC quality. Ammonia (30% for analysis) and Ammonium acetate (solid PRS) were provided by Panreac. Filtration and solid phase extraction were done with glass fiber filters (GF/F, 0.7 µm, Whatman) and OASIS WAX cartridges (150 mg, 6 cc, 30 µm, Waters).

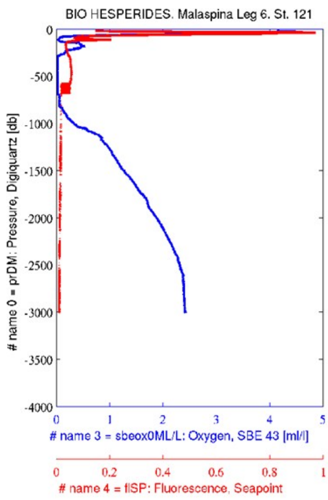
The native standard solution used was made of C_4-C_{14}, C_{16} and C_{18} PFCAs and C_4, C_6- C_8, C_{10} and C_{12} PFSAs (PFAC-MXB commercial solution), plus the perfluorooctane sulfonamide (FOSA) and N-methyl perfluorooctane sulfonamide (N-MeFOSA). The recovery standard solution contained ^{13}C labeled $C_{4,6,8-12}$ PFCAs, ^{18}O C_6 and ^{13}C C_8 PFSAs (MPFAC-MXA commercial solution). The injection standard consisted of a mixture of PFOA $^{13}C_8$, PFOS $^{13}C_8$, ^3D-N-MeFOSA and PFUnDA $^{13}C_7$. All standards were supplied by Wellington Laboratories (Ontario, Canada).

DCM sampling

Samples were gathered at the same locations were the previously published surface samples (Table S1). When the research vessel was stopped, a, oceanographic rosette structure containing a set of 30 L *niskin* bottles, a CTD (conductivity, temperature, depth) and an oxygen and chlorophyll (fluorescence) profiler was launched from board (figure bellow, left) towards the maximum sampling depth at each location. During the descent of the CTD, a vertical profile (figure below, right showing temperature, salinity, oxygen and fluorescence) was drawn for the station and the interesting depths (i.e. deep chlorophyll maximum, DCM) were noted. During the way up, the noted depths were sampled by the *niskin* automatic closing system. Once on board, the water from the DCM was transferred to 1 L polypropylene (PP) bottles for its subsequent filtration and solid phase extraction in the boat laboratory.







Sample treatment

Immediately after sampling, seawater samples were filtered through pre-combusted (450˚C, overnight) glass fiber filters (GF/F, Whatman). Samples were spiked with a solution containing seven ^{13}C labelled PFCAs, and two ^{18}O and ^{13}C labelled PFSAs, indicated in the reagents section. Then, samples were extracted on board by solid phase extraction using OASIS WAX cartridges (6cc, 150 mg, 30 µm, Waters) on a manifold system. The cartridges were conditioned with 4 mL methanol, 4 mL ammonia 0.1% in methanol and 4 mL of chromatographic-grade water. Then, the 1 L filtered sample was loaded and vacuum extracted at a constant slow flow. The cartridges were then washed with 4 mL of chromatographic-grade water to remove salts and matrix impurities, dried under vacuum aspiration for 30 minutes and kept at -20˚ C folded in aluminum foil and zip PP bags during the rest of the cruise, until their elution in the land laboratory. Once back in land laboratory (IQOG-CSIC, Madrid, Spain), cartridges were unfreezed, pH conditioned with 4 mL of ammonium acetate buffer 25 mM at pH 4 and vacuum dried to remove all aqueous phase. The target compounds were eluted with 4 mL methanol and 4 mL ammonia 0.1% in methanol, concentrated under a gentle nitrogen flux down to ~0.3 mL and then, transferred to self-filtration PP vials (Mini-UniPrep Syringeless Filters vials, Whatman) directly used for injection. Samples were injected always after the fewest time possible after elution (1 day maximum).

Instrumental analysis

The instrumental analysis was performed using a Waters Acquity Ultra Performance Liquid Chromatography system coupled with a Waters XEVO TQS, triple-quadrupole mass spectrometer (UPLC-MS/MS). To reduce instrumental contamination, a C18 hold-up column available as a PFC kit analysis from Waters was installed on the aqueous solvent line before the mixing chamber.

Ten µL of each sample were injected onto an Acquity UPLC BEH C18 column (1.7 um, 2.1 × 50 mm; Waters) kept at 50 °C. Separation was achieved by the use of a gradient mobile phase of water and methanol with a constant 1% of acetonitrile buffer at a flow rate of 400 µL/min. Electrospray negative ionization (ESI) was used with the mass spectrometer operating in the multiple-reaction-monitoring (MRM) mode. Ionization and collision cell parameters were optimized for each individual analyte with commercial standards. MS/MS parameters for the target compounds can be fully found in González-Gaya et al. [1] Each sample was injected in triplicate. A calibration curve was made with 10 points from 0.001 pg to 100 pg injected on column. The quantification followed the internal standard procedure, using the labeled compounds indicated in the reagents section in this SI.

Text S2. Sample QA/QC

Average surrogate recoveries (%) in DCM samples

Standard	PFBA-$^{13}C_4$	PFHxA -$^{13}C_2$	PFHxS -$^{18}O_2$	PFOA -$^{13}C_4$	PFNA -$^{13}C_5$	PFOS -$^{13}C_4$	PFDA -$^{13}C_2$	PFUDA -$^{13}C_2$	PFDoDA -$^{13}C_2$
Average Recovery %	34	130	150	100	76	77	160	140	120

Note that recoveries in this database differs from the previously published values in Casal *el al*. 2017[2] as the previous recoveries are the average for the 28 samples included in that article, while here the complete 89 samples recoveries are averaged. As done in previous reports, samples concentrations were not recovery corrected.[1,2] Recoveries for $^{13}C_3$-PFBA, $^{13}C_2$-PFUnDA and $^{13}C_2$-PFDoDA were not considered to fulfill a minimum QA/QC boundary; PFBA was exhibited a very low recovery, and PFUDA and PFDoDA showed inconsistencies during the analysis. The latter appeared at the end of the chromatogram, showed bad peak shapes, long tails, very high variability within injection replicates, and therefore the values for those compounds are not given in the dataset.

QA/QC for DCM and surface samples, laboratory and field blanks, MDLs, MQLs (pg L^{-1})

	n	PFBS	PFHxA	PFHpA	PFHxS	PFOA	PFHpS	PFNA	FOSA	PFOS	N-MeFOSA	PFDA
Laboratory blanks												
Chromatography water	3	8.3	3.7	7.0	0.50	5.7	18	29	nd	4.3	2.7	12
SPE- Chromatography water	4	12	3.0	8.0	0.37	13	3.2	14	nd	4.8	3.3	25
Reagents	4	6.0	2.8	7.4	0.0	5.3	1.9	8.2	nd	3.3	2.7	8.5
Field blanks												
Niskin bottle	3	7.0	4.0	1.3	3.0	15	0.0	58	0.0	3.0	0.0	1.3
MDL		0.32	2.7	1.7	0.59	0.010	0.49	0.010	0.010	0.063	0.020	0.66
MQL		1.1	10	5.3	1.9	0.80	1.6	0.29	0.010	0.43	0.025	1.1

Field blank samples of the Niskin bottle were carried out with chromatography-grade water after washing the Niskin bottle with methanol and chromatography-grade water. Then, the Niskin field blanks were obtained subtracting the levels of PFAS present in the chromatographic grade water not in contact with the bottle. Laboratory blanks consisted on a) chromatographic-grade water (same accounted for field blanks, directly injected), b) SPE-extracted chromatographic-grade water and c) the reagents used for analysis. There were no substantial differences among field and laboratory blanks b and c, showing a negligible contamination effect by neither the Niskin bottle nor the sample treatment method.[1] Blanks concentrations were not subtracted to samples values, as the measured concentrations appeared to come from chromatography water, and no from the extraction and analytical procedure. Resemblance on the chromatograms between different type of blanks performed with chromatographic water and not with the “cleanest” samples, points to this reason. For the highest concentration found in chrom grade water, PFNA, half of the samples (49%) provided values with much lower concentrations with good recoveries of that congener labelled compound. Therefore, it can be assumed that the PFNA was found in the chrom. grade water, but did not come from the analytical procedure.

The method detection limit (MDL) and method quantification limit (MQL) were calculated as the mean of instrument detection limit (IDL) and instrumental quantification limit (IQL) (automatically calculated through iteration of all the analyzed samples and standards signal to noise ratio by MassLynx software package, Waters) of 20 random samples plus the standard deviation.

Table S2. Individual and total PFAS concentrations (pg L^{-1}) in DCM Ocean water samples and total PFAS concentrations (pg L^{-1}) in surface water samples

station	PFBS	PFHxS	PFHpS	PFOS	PFHxA	PFHpA	PFOA	PFNA	PFDA	FOSA	N-MeFOSA	ΣPFAS DCM	ΣPFAS surface[1]
2												No sample	1290
3	95.9	18.8	67.6	524	66.2	89.0	186	1050	2120	nd	0.18	4220	355
5												No sample	3130
7												No sample	516
8	32.5	8.54	27.4	99.0	11.9	37.4	78.5	363	1230	nd	0.36	1890	353
9	50.0	6.88	5.36	37.2	19.0	11.3	33.1	27.7	72.9	nd	nd	263	2940
11	68.0	7.14	24.6	34.2	46.4	11.9	32.0	24.9	50.5	nd	nd	300	285
12	119	5.10	2.34	74.3	90.4	25.3	51.4	254	525	nd	nd	1150	340
13	9.40	4.88	2.86	53.2	26.8	15.7	38.1	123	489	nd	0.39	763	4000
14	25.8	6.88	2.22	55.1	45.1	14.1	44.0	139	643	nd	nd	975	1140
15	4.62	2.65	1.34	16.2	26.4	6.33	22.2	22.4	97.9	nd	nd	200	300
17	95.3	316	85.4	3400	249	8.47	53.2	25.0	144	0.82	nd	4370	9040
18	106	193	56.3	1910	100	9.37	34.9	27.7	64.5	nd	nd	2500	5630
20	24.0	681	108	9580	12.0	21.0	77.0	40.0	149	17.0	3.00	10700	4480
21	57.8	140	96.4	1620	32.3	12.8	54.0	18.4	96.6	nd	nd	2130	7150
23	56.3	134	25.7	844	30.8	6.15	23.4	15.0	148	nd	0.03	1280	6230
24	83.9	138	27.7	902	51.5	19.7	49.2	84.3	629	nd	0.03	1990	10900
26	10.8	53.9	14.5	509	11.0	6.99	26.9	33.7	769	0.03	0.11	1440	500
28	26.9	21.3	5.34	404	nd	4.02	20.3	5.91	37.7	nd	nd	526	1630
29	103	36.2	6.83	506	17.7	16.1	43.2	90.5	78.9	nd	nd	898	3510
30	40.2	92.5	20.9	1340	71.0	10.3	46.1	45.1	14.4	nd	nd	1680	2750

station	PFBS	PFHxS	PFHpS	PFOS	PFHxA	PFHpA	PFOA	PFNA	PFDA	FOSA	N-MeFOSA	ΣPFAS DCM	ΣPFAS surface[1]
31	85.6	55.6	8.63	667	6.03	40.9	81.4	384	110	nd	nd	1440	2090
32	62.8	14.6	1.84	190	Nd	4.90	18.5	24.6	29.4	nd	Nd	346	1940
33	480	50.0	18.4	1100	39.0	54.0	32.0	10.0	Nd	6.00	9.00	1800	1130
35	46.1	19.2	4.08	319	Nd	8.49	18.4	4.24	4.77	Nd	Nd	424	733
37	32.2	19.8	2.17	220	Nd	10.8	23.2	8.46	6.56	Nd	Nd	323	305
38	72.3	40.8	4.58	275	Nd	5.93	27.8	9.32	7.96	Nd	Nd	444	732
39	59.3	18.9	2.73	209	Nd	6.38	19.8	7.61	1.08	Nd	Nd	325	409
40	67.8	32.0	1.07	277	Nd	10.2	20.8	9.58	4.59	Nd	Nd	423	620
41	39.5	44.1	6.87	325	3.06	10.8	31.6	15.0	6.16	Nd	Nd	482	1250
42	68.7	34.6	2.20	332	2.97	3.34	19.8	12.8	4.84	Nd	Nd	481	1100
43	149	77.4	8.70	547	13.3	6.72	34.4	9.20	4.25	Nd	Nd	849	645
44	14.1	20.5	1.33	337.	Nd	3.12	25.5	13.3	3.38	Nd	Nd	419	424
46	14.3	15.5	2.45	76.8	2.49	11.7	21.3	43.9	269	Nd	Nd	457	329
47	15.3	8.89	2.57	49.4	6.26	11.7	20.5	60.9	285	Nd	Nd	461	551
49	3.34	10.1	1.69	55.7	10.2	6.18	18.7	15.5	63.4	Nd	0.06	185	181
50	24.0	6.24	1.54	31.1	8.15	9.55	24.3	102	757	Nd	Nd	964	263
52	36.7	9.33	2.97	102	8.90	4.04	18.3	20.2	152	Nd	Nd	355	285
53	51.0	10.7	2.06	60.5	40.5	6.83	16.2	8.85	10.2	Nd	Nd	207	278
55	3.54	7.60	1.62	68.8	36.5	5.40	11.0	7.17	46.7	Nd	Nd	188	239
57	18.3	9.48	2.20	55.3	20.6	3.80	12.4	13.8	138	Nd	Nd	274	823
58												No sample	758
60	29.1	8.04	1.65	125	Nd	7.04	24.2	42.6	143	Nd	Nd	380	742
63	134	11.0	2.19	159	22.5	7.19	19.6	74.7	90	Nd	Nd	620	519
64	32.0	25.0	0.14	215	69.0	Nd	19.0	59.0	415	6.00	3.00	843	374
66	255	33.0	10.8	458	51.5	16.9	43.7	58.4	154	0.30	Nd	1080	1680
67	167	33.0	nd	631	Nd	175	40.0	124	2190	18.0	15.0	3400	1980

station	PFBS	PFHxS	PFHpS	PFOS	PFHxA	PFHpA	PFOA	PFNA	PFDA	FOSA	N-MeFOSA	ΣPFAS DCM	ΣPFAS surface[1]
70	14.5	5.34	2.34	84.6	22.6	0.90	20.1	8.34	13.8	Nd	0.29	173	245
71	8.36	4.21	1.71	85.5	Nd	Nd	14.9	4.57	10.5	Nd	0.230	130	176
74	29.3	8.57	1.52	146	14.0	8.54	34.3	88.2	110	Nd	0.255	440	429
75	23.7	5.27	1.52	59.4	36.3	7.35	21.5	33.5	100	Nd	0.230	289	480
77	82.5	16.3	3.21	198	21.2	6.41	31.6	94.0	64.7	Nd	0.240	518	256
78	14.2	11.0	5.76	122	7.80	Nd	34.6	14.4	34.9	Nd	0.250	245	No sample
82	120	15.0	3.84	201	30.5	3.54	33.3	16.6	40.7	Nd	0.350	465	372
84	Nd	7.00	130.6	185	75.0	Nd	25.0	47.0	335	6.00	9.00	820	622
86	Nd	Nd	2.16	357	85.5	34.5	31.0	19.0	109	6.00	9.00	653	640
88	3.00	14.0	4.98	102	Nd	106	24.0	32.0	353	6.00	9.00	654	967
90	Nd	6.00	42.2	227	18.0	156	21.0	6.00	34.0	6.00	18.0	534	552
92	15.0	7.50	13.7	264	Nd	116	44.0	16.0	140	6.00	9.00	631	585
94	26.1	137	40.0	220	Nd	29.6	32.7	16.3	61.8	2.89	3.16	570	852
97	8.77	24.2	2.96	109	Nd	37.1	28.8	48.3	324	2.23	2.75	588	490
99	116	96.3	226	233	Nd	120	59.4	28.5	185	2.69	2.71	1070	2500
102	141	124	14.5	146	Nd	13.4	39.2	24.9	98.2	2.61	3.25	607	493
103	41.8	48.4	Nd	85.9	217	49.7	27.8	23.8	22.5	2.22	3.14	522	470
106	27.4	37.2	Nd	122	Nd	25.9	18.5	16.8	18.7	2.54	2.79	272	497
107	66.3	22.6	55.4	128	129	30.2	21.0	17.7	10.8	2.85	3.31	488	413
109	26.8	126	4.71	102	Nd	33.7	34.7	40.6	21.7	2.10	3.03	395	573
110	43.8	72.9	Nd	134	Nd	15.5	32.8	13.0	35.9	2.63	2.66	354	824
112	29.5	19.1	19.7	103	94.4	45.0	22.8	19.9	35.7	3.29	3.15	396	376
113	25.6	Nd	13.9	68.2	139	86.4	8.38	Nd	7.94	2.51	3.05	355	527
114	Nd	Nd	19.0	86.0	Nd	50.0	40.0	17.0	29.0	6.00	9.00	256	896
116	34.9	71.9	Nd	91.9	Nd	84.1	17.3	11.6	5.25	3.05	3.63	324	359
117	18.0	36.3	10.4	26.5	Nd	26.9	5.33	Nd	15.5	2.50	2.74	144	548

station	PFBS	PFHxS	PFHpS	PFOS	PFHxA	PFHpA	PFOA	PFNA	PFDA	FOSA	N-MeFOSA	ΣPFAS DCM	ΣPFAS surface[1]
120	nd	6.00	12.3	20.0	96.0	147	17.0	9.00	22.0	6.00	9.00	344	636
121	51.2	nd	3.99	59.8	183	114	21.9	0.450	Nd	2.36	2.61	439	344
123	145	3.00	0.20	60.0	Nd	Nd	102	18.0	84.0	3.00	3.00	419	505
124	54.0	8.00	0.20	24.0	Nd	10.5	19.0	3.00	13.0	3.00	3.00	138	444
125	34.0	8.00	44.1	136	141	51.0	12.0	Nd	Nd	3.00	4.00	433	375
128	75.0	5.00	0.201	69.0	Nd	36.0	30.0	12.0	164	3.00	5.00	399	360
129	36.0	14.0	54.1	126	108	12.0	50.0	15.0	106	4.00	7.00	532	371
131	144	25.0	51.2	258	Nd	39.0	34.0	18.0	Nd	5.00	12.0	586	780
132	19.0	3.00	6.43	33.0	Nd	15.0	43.0	15.0	Nd	3.00	3.00	140	131
134	29.0	2.00	0.20	19.0	Nd	16.5	52.0	15.0	3.00	3.00	3.00	143	236
135	28.0	13.0	0.20	32.0	Nd	52.0	51.0	16.0	6.00	3.00	3.00	204	207
137	18.0	7.00	5.03	44.0	43.5	29.0	48.0	18.0	8.00	3.00	3.00	227	189
138	21.0	12.0	0.20	40.0	144	Nd	54.0	16.0	10.0	3.00	3.00	303	184
140	14.0	7.00	0.20	47.0	Nd	24.0	13.0	5.00	15.0	3.00	3.00	131	313
141	21.0	6.00	Nd	29.0	33.0	19.0	53.0	16.0	3.00	3.00	3.00	186	311
143	17.0	Nd	Nd	34.0	43.5	30.0	38.0	20.0	8.00	3.00	3.00	197	226
144	28.0	3.00	Nd	31.0	73.5	58.0	45.0	18.0	13.0	3.00	3.00	276	302
146	28.0	3.00	8.05	53.0	Nd	25.0	63.0	18.0	7.00	3.00	3.00	211	330
147	17.0	3.00	nd	37.0	nd	18.0	79.0	32.0	8.00	3.00	3.00	200	441

Nd: non detected

Figure S1. Average relative contribution of the individual PFAS at the DCM for each oceanic sub basin

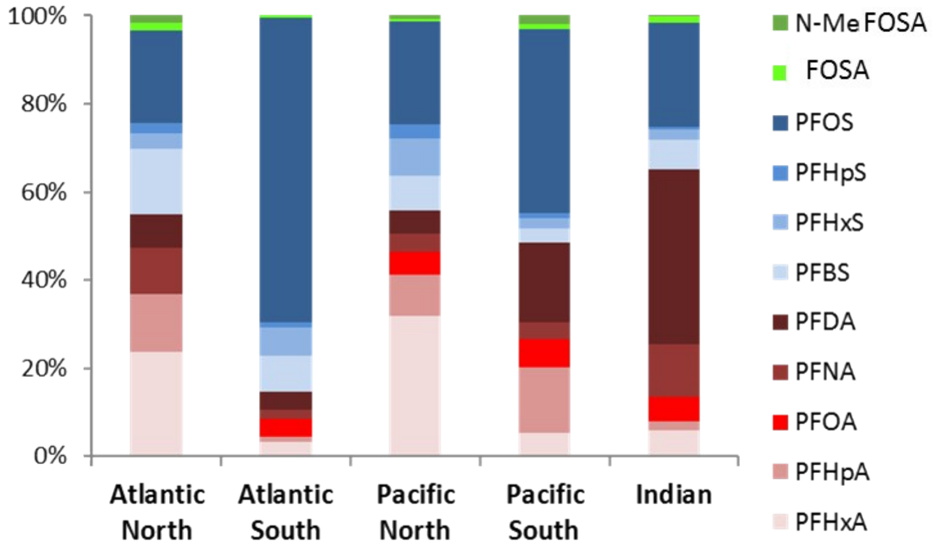


Figure S2. Concentration (pg L^{-1}) of the individual PFAS at the surface (a) and DCM depth (b) for each sample.

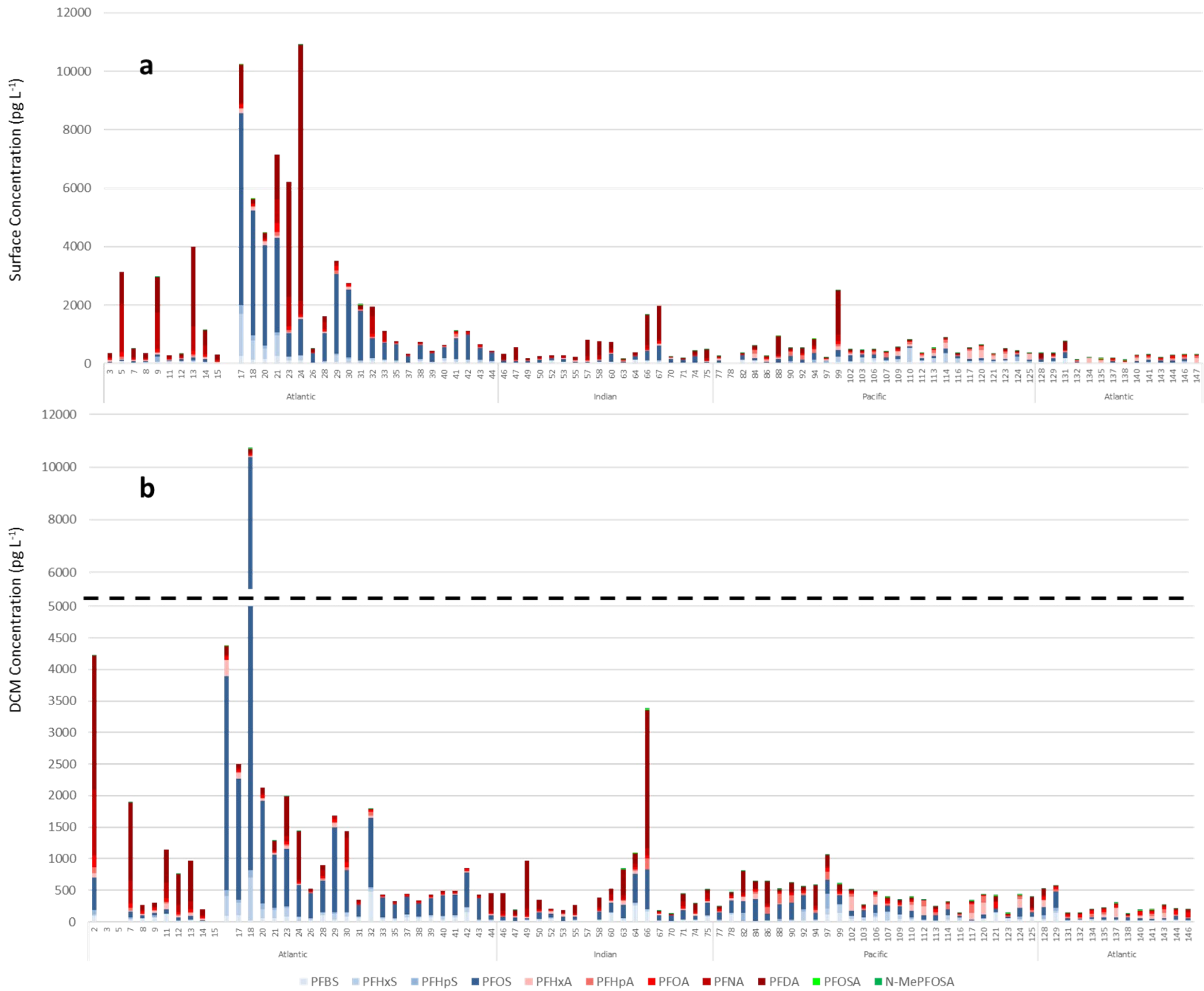
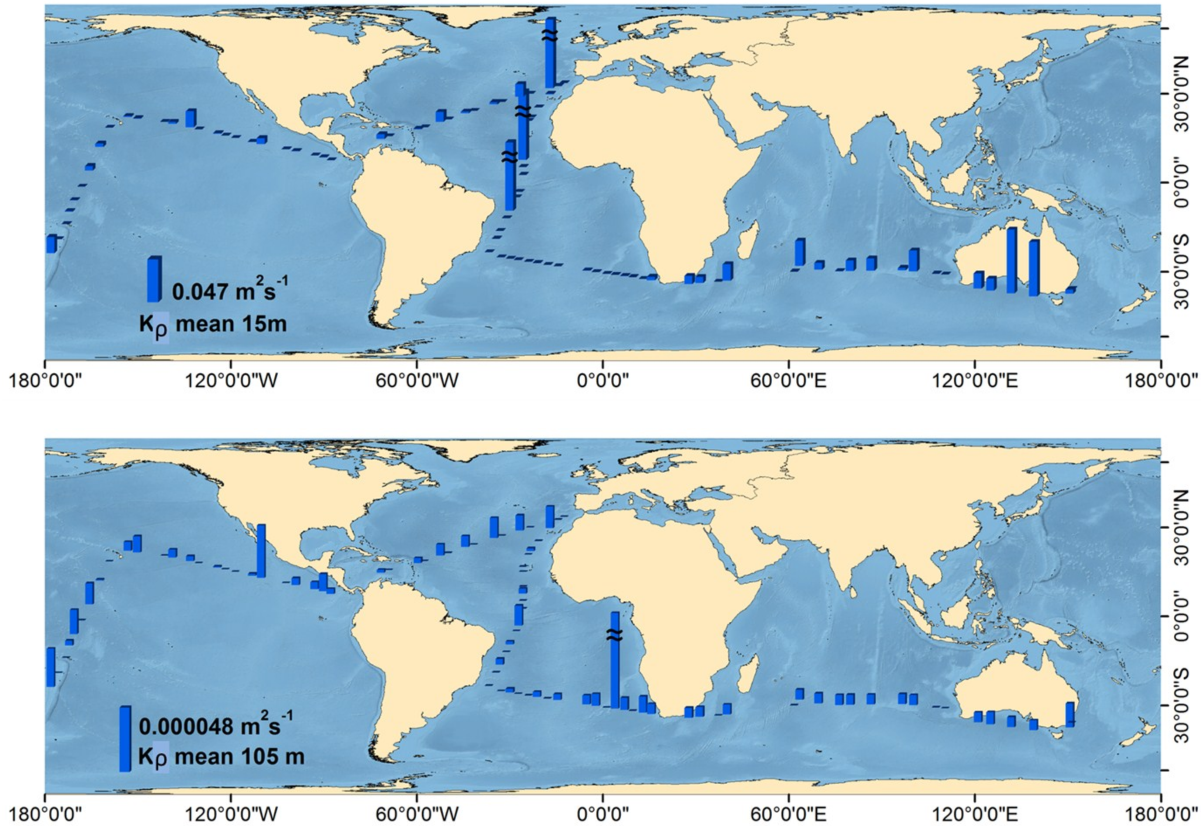


Table S3. Comparison of PFAS concentrations (pg L^{-1}) in deep seawaters from different ocean basins including values from the present study

Location	Position	Sample date	n	PFBS	PFHxS	PFOS	PFBA	PFPA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	FOSA	NMeFOSA
ARTIC AND GREENLAND																	
Labrador Sea[3]	56ºN-52º W	2004-2006		na	na	9-12	na	na	na	na	55-75	na	na	na	na	na	na
Bering straight[4]	76ºN-70ºW	2008	4	na	na	na	na	na	na	na	11-78	na	na	na	na	na	na
Central Arctic O. and Arctic Shelf[5] (top 100 m)	<70ºN	2012	47	<5-40	<5-22	<5-343	na	na	<5-150	<5-49	<5-294	<5-253	<5-142	<5-92	<5-88	<5-156	<5-36
ATLANTIC																	
Northeast Atlantic O. (DCM)	35-0º N	2011	20	4.6-140	0-25	0-68	16-520	ng	ng	0-140	0-89	13-190	5-1100	0-2100	ng	ng	ng
Southwest Atlantic O. (DCM)	0-40º S	2011	22	11-480	15-680	1-110	190-9600	ng	ng	0-250	3.1-54	18-81	4.1-380	0-770	ng	ng	ng
Mediterranean																	
Central Mediterranean[6] (1400 m)	40ºN-9ºE	2014	0	5.4		18.1	na	0	20	131	54	0	2.6	0	0	0	0
PACIFIC																	
Central to East Pacific O. (deep water 4000 m)[7]		2002-2003		na	0.4-0.6	3.2-3.4	na	na	na	na	45-56	na	na	na	na	na	na
North Pacific O. (DCM)	35-0º N	2011	19	0-145	0-140	0-226	20-230	ng	ng	0-220	0-150	5.3-100	0-48	0-320	ng	ng	ng
South Pacific O. (DCM)	0-40º S	2011	6	0-120	0-16	2.2-130	100-360	ng	ng	0-86	0-160	21-44	6-94	34-350	ng	ng	ng
Indian																	
Indian O. (DCM)	0-40º S	2011	14	3.3-260	4.2-33	0-11	31-630	ng	ng	0-69	0-180	11-44	4.6-120	10-2200	ng	ng	ng

Location with no citation and marked depth DCM refers to data from this study.

Figure S3. Eddy diffusion coefficients (K_ρ, m^2s^{-1}) at the surface and DCM depth



Top panel shows the value of K_ρ averaged for the top 5 to 15 m, corresponding to the surface diffusivity (shallower diffusivity is not considered due to variability induced by non-diffusion processes like waves and wind shear). Bottom panel shows the value of K_ρ at 105 m, close to the mean DCM depth during *Malaspina 2010* circumnavigation expedition.

Bars with ≈ symbol have been diminished by a factor of 10 in order to ease the global comparison of all the measurements.

Table S4. Mean relative error of modeled DCM concentration (%)

	Mean relative error (%)
PFBS	86
PFHxS	71
PFHpS	120
PFOS	65
PFHxA	65
PFHpA	89
PFOA	63
PFNA	88
PFDA	100
PFOSA	100
N-MePFOSA	100

The error is defined as,

$$\frac{C_{measured} - C_{predicted\ in\ the\ model}}{C_{predicted\ in\ the\ model}} \times 100$$

In absolute values.

Figure S4. Absolute error of modelled DCM concentration per sub basin

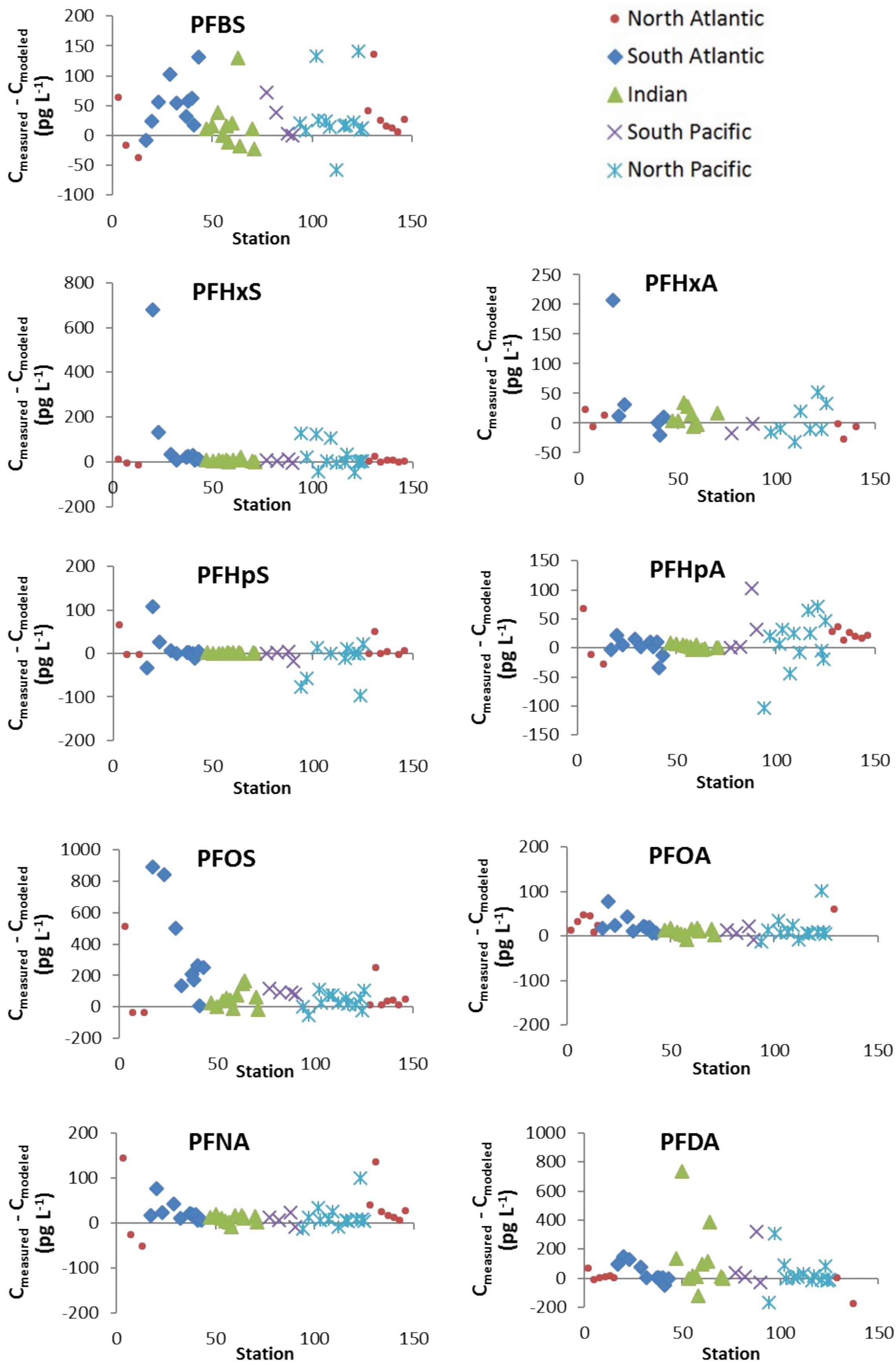


Figure S5. Modelled PFOS and PFOA concentrations versus measured concentrations (pg L^{-1}) at the DCM depth.

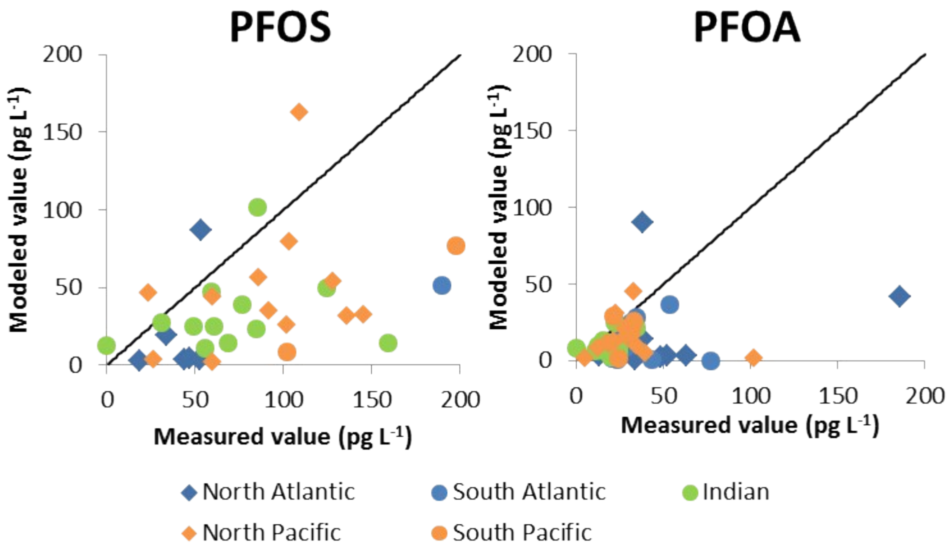


Table S5. Turbulent fluxes (F_{Eddy}, ng m^{-2} day^{-1})

Station	Surface Turbulent Fluxes									DCM Turbulent Fluxes								
	PFBS	PFHxS	PFHpS	PFOS	PFOA	PFHxA	PFHpA	PFNA	PFDA	PFBS	PFHxS	PFHpS	PFOS	PFOA	PFHxA	PFHpA	PFNA	PFDA
3	8.85×10^{-4}	3.81×10^{-4}	8.62×10^{-6}	3.81×10^{-4}	5.98×10^{-4}	2.16×10^{-4}	5.98×10^{-4}	8.03×10^{-4}	3.81×10^{-3}	9.67×10^{-4}	2.35×10^{-4}	1.61×10^{-5}	4.16×10^{-4}	1.28×10^{-3}	1.34×10^{-3}	6.53×10^{-4}	8.76×10^{-4}	4.16×10^{-3}
7	3.73×10^{-4}	7.95×10^{-4}	1.36×10^{-5}	7.95×10^{-4}	2.55×10^{-4}	1.03×10^{-4}	2.55×10^{-4}	7.60×10^{-4}	4.19×10^{-3}	1.00×10^{-4}	2.77×10^{-5}	1.59×10^{-5}	2.14×10^{-4}	1.58×10^{-4}	4.09×10^{-5}	6.85×10^{-5}	2.04×10^{-4}	1.13×10^{-3}
13	5.86×10^{-7}	1.08×10^{-6}	1.26×10^{-6}	1.08×10^{-6}	5.53×10^{-7}	2.03×10^{-7}	5.53×10^{-7}	7.39×10^{-6}	2.37×10^{-5}	2.07×10^{-4}	7.17×10^{-5}	2.01×10^{-5}	3.82×10^{-4}	3.99×10^{-4}	5.63×10^{-5}	1.95×10^{-4}	2.61×10^{-3}	8.39×10^{-3}
17	2.22×10^{-3}	5.42×10^{-2}	6.40×10^{-6}	5.42×10^{-2}	2.64×10^{-4}	1.17×10^{-2}	2.64×10^{-4}	2.49×10^{-4}	1.10×10^{-3}	8.01×10^{-4}	2.88×10^{-3}	6.24×10^{-4}	1.96×10^{-2}	2.68×10^{-4}	3.12×10^{-4}	9.53×10^{-5}	9.00×10^{-5}	3.98×10^{-4}
20	2.04×10^{-6}	4.52×10^{-5}	3.44×10^{-5}	4.52×10^{-5}	1.89×10^{-7}	4.84×10^{-6}	1.89×10^{-7}	4.32×10^{-7}	2.55×10^{-6}	2.75×10^{-6}	6.54×10^{-6}	1.73×10^{-6}	6.10×10^{-5}	1.08×10^{-6}	2.53×10^{-6}	2.56×10^{-7}	5.84×10^{-7}	3.45×10^{-6}
23	3.21×10^{-4}	2.54×10^{-3}	3.94×10^{-6}	2.54×10^{-3}	2.24×10^{-4}	4.00×10^{-4}	2.24×10^{-4}	3.25×10^{-3}	1.26×10^{-2}	7.03×10^{-6}	8.76×10^{-6}	1.26×10^{-6}	5.56×10^{-5}	9.17×10^{-6}	2.80×10^{-6}	4.90×10^{-6}	7.11×10^{-5}	2.77×10^{-4}
29	9.20×10^{-5}	3.75×10^{-3}	3.40×10^{-6}	3.75×10^{-3}	1.45×10^{-4}	3.11×10^{-4}	1.45×10^{-4}	1.51×10^{-4}	8.43×10^{-5}	3.49×10^{-6}	1.18×10^{-5}	2.38×10^{-6}	1.42×10^{-4}	8.70×10^{-6}	-	5.50×10^{-6}	5.73×10^{-6}	3.19×10^{-6}
32	4.97×10^{-4}	3.19×10^{-3}	3.31×10^{-5}	3.19×10^{-3}	1.80×10^{-4}	3.12×10^{-4}	1.80×10^{-4}	2.78×10^{-3}	1.49×10^{-3}	5.00×10^{-5}	3.14×10^{-5}	4.60×10^{-6}	3.20×10^{-4}	4.94×10^{-5}	-	1.81×10^{-5}	2.79×10^{-4}	1.50×10^{-4}
37	-	3.03×10^{-4}	4.40×10^{-6}	3.03×10^{-4}	8.22×10^{-6}	1.97×10^{-5}	8.22×10^{-6}	7.16×10^{-6}	8.12×10^{-6}	-	3.00×10^{-5}	4.36×10^{-6}	4.63×10^{-4}	5.67×10^{-5}	-	1.26×10^{-5}	1.09×10^{-5}	1.24×10^{-5}
38	1.56×10^{-4}	1.08×10^{-3}	2.84×10^{-5}	1.08×10^{-3}	3.77×10^{-5}	1.52×10^{-4}	3.77×10^{-5}	4.56×10^{-5}	3.49×10^{-5}	2.64×10^{-4}	2.57×10^{-4}	2.89×10^{-5}	1.83×10^{-3}	1.45×10^{-4}	-	6.38×10^{-5}	7.72×10^{-5}	5.91×10^{-5}
40	1.06×10^{-3}	3.65×10^{-3}	8.15×10^{-7}	3.65×10^{-3}	1.89×10^{-4}	7.92×10^{-4}	1.89×10^{-4}	8.51×10^{-5}	3.47×10^{-5}	1.48×10^{-4}	1.11×10^{-4}	6.12×10^{-6}	5.10×10^{-4}	4.11×10^{-5}	8.32×10^{-8}	2.65×10^{-5}	1.19×10^{-5}	4.85×10^{-6}
41	1.05×10^{-4}	1.51×10^{-3}	3.54×10^{-4}	1.51×10^{-3}	2.20×10^{-4}	1.79×10^{-4}	2.20×10^{-4}	9.84×10^{-5}	2.62×10^{-4}	2.87×10^{-4}	4.90×10^{-4}	2.41×10^{-4}	4.13×10^{-3}	3.28×10^{-4}	3.05×10^{-4}	6.00×10^{-4}	2.69×10^{-4}	7.16×10^{-4}
43	3.53×10^{-4}	5.86×10^{-3}	4.39×10^{-6}	5.86×10^{-3}	3.89×10^{-4}	1.27×10^{-3}	3.89×10^{-4}	2.87×10^{-4}	1.77×10^{-4}	3.63×10^{-4}	1.30×10^{-3}	9.38×10^{-5}	6.03×10^{-3}	5.65×10^{-4}	5.16×10^{-5}	4.00×10^{-4}	2.95×10^{-4}	1.82×10^{-4}
44	1.08×10^{-5}	7.77×10^{-5}	8.03×10^{-6}	7.77×10^{-5}	1.55×10^{-6}	9.19×10^{-6}	1.55×10^{-6}	2.18×10^{-6}	8.24×10^{-7}	2.70×10^{-4}	2.30×10^{-4}	1.33×10^{-5}	1.95×10^{-3}	1.51×10^{-4}	1.06×10^{-5}	3.88×10^{-5}	5.45×10^{-5}	2.06×10^{-5}
46	1.22×10^{-6}	1.40×10^{-5}	1.54×10^{-5}	1.40×10^{-5}	9.52×10^{-7}	9.34×10^{-7}	9.52×10^{-7}	5.27×10^{-6}	2.77×10^{-5}	3.58×10^{-5}	2.74×10^{-5}	1.79×10^{-5}	4.10×10^{-4}	1.03×10^{-4}	1.80×10^{-5}	2.79×10^{-5}	1.55×10^{-4}	8.12×10^{-4}
47	2.11×10^{-6}	1.14×10^{-5}	7.92×10^{-6}	1.14×10^{-5}	1.11×10^{-6}	1.18×10^{-6}	1.11×10^{-6}	8.61×10^{-6}	6.82×10^{-5}	5.18×10^{-5}	2.89×10^{-5}	1.09×10^{-5}	2.81×10^{-4}	7.66×10^{-5}	2.94×10^{-5}	2.73×10^{-5}	2.12×10^{-4}	1.68×10^{-3}
50	2.22×10^{-6}	7.53×10^{-6}	9.78×10^{-6}	7.53×10^{-6}	8.26×10^{-7}	1.21×10^{-6}	8.26×10^{-7}	1.76×10^{-6}	6.03×10^{-6}	9.15×10^{-5}	4.97×10^{-5}	8.17×10^{-6}	3.10×10^{-4}	6.55×10^{-5}	4.23×10^{-5}	3.40×10^{-5}	7.27×10^{-5}	2.48×10^{-4}
53	4.49×10^{-6}	2.92×10^{-8}	1.75×10^{-5}	8.38×10^{-6}	6.71×10^{-7}	1.17×10^{-6}	6.71×10^{-7}	8.05×10^{-7}	5.15×10^{-6}	2.30×10^{-4}	6.02×10^{-5}	1.52×10^{-5}	4.29×10^{-4}	1.14×10^{-4}	1.10×10^{-4}	3.44×10^{-5}	4.13×10^{-5}	2.64×10^{-4}
55	1.62×10^{-6}	8.38×10^{-6}	5.82×10^{-6}	8.07×10^{-6}	1.17×10^{-6}	1.09×10^{-6}	1.17×10^{-6}	2.48×10^{-6}	1.68×10^{-5}	3.22×10^{-5}	2.16×10^{-5}	4.62×10^{-6}	1.60×10^{-4}	7.41×10^{-5}	9.99×10^{-5}	2.32×10^{-5}	4.94×10^{-5}	3.33×10^{-4}
57	1.75×10^{-5}	8.07×10^{-6}	9.14×10^{-6}	7.88×10^{-5}	1.68×10^{-5}	9.52×10^{-6}	1.68×10^{-5}	1.93×10^{-4}	9.07×10^{-4}	2.88×10^{-5}	1.57×10^{-5}	6.42×10^{-6}	1.30×10^{-4}	1.12×10^{-4}	5.66×10^{-5}	2.76×10^{-5}	3.17×10^{-4}	1.49×10^{-3}
58	4.16×10^{-6}	7.88×10^{-5}	5.95×10^{-6}	4.71×10^{-6}	8.93×10^{-7}	5.88×10^{-7}	8.93×10^{-7}	1.09×10^{-5}	4.36×10^{-5}	1.36×10^{-4}	1.93×10^{-5}	4.72×10^{-6}	1.55×10^{-4}	1.01×10^{-4}	6.27×10^{-5}	2.93×10^{-5}	3.59×10^{-4}	1.43×10^{-3}
60	4.23×10^{-6}	4.71×10^{-6}	3.37×10^{-5}	2.49×10^{-5}	6.63×10^{-7}	4.45×10^{-7}	6.63×10^{-7}	8.28×10^{-6}	2.27×10^{-5}	1.41×10^{-4}	1.48×10^{-5}	2.25×10^{-5}	8.31×10^{-4}	1.30×10^{-4}	5.36×10^{-5}	2.21×10^{-5}	2.76×10^{-4}	7.56×10^{-4}
63	6.69×10^{-6}	2.49×10^{-5}	7.00×10^{-7}	2.14×10^{-5}	1.51×10^{-5}	3.35×10^{-6}	1.51×10^{-5}	1.10×10^{-5}	1.10×10^{-4}	9.82×10^{-5}	4.91×10^{-5}	6.80×10^{-7}	3.14×10^{-4}	5.40×10^{-5}	-	2.21×10^{-4}	1.62×10^{-4}	1.62×10^{-3}
64	2.50×10^{-5}	2.14×10^{-5}	3.97×10^{-6}	2.54×10^{-5}	9.61×10^{-7}	1.31×10^{-6}	9.61×10^{-7}	3.64×10^{-6}	1.49×10^{-5}	5.66×10^{-4}	2.96×10^{-5}	3.79×10^{-6}	5.75×10^{-4}	9.71×10^{-5}	-	2.18×10^{-5}	8.26×10^{-5}	3.37×10^{-4}
70	3.67×10^{-6}	2.54×10^{-5}	3.90×10^{-5}	2.29×10^{-5}	7.20×10^{-7}	1.56×10^{-6}	7.20×10^{-7}	1.92×10^{-6}	2.30×10^{-6}	2.04×10^{-4}	8.68×10^{-5}	3.93×10^{-5}	1.28×10^{-3}	2.39×10^{-4}	3.01×10^{-4}	4.00×10^{-5}	1.07×10^{-4}	1.28×10^{-4}
71	3.97×10^{-5}	2.29×10^{-5}	1.15×10^{-6}	1.28×10^{-4}	-	6.90×10^{-6}	-	9.22×10^{-6}	1.79×10^{-5}	4.07×10^{-4}	7.07×10^{-5}	2.15×10^{-5}	1.32×10^{-3}	1.65×10^{-4}	-	-	9.45×10^{-5}	1.84×10^{-4}
74	9.58×10^{-7}	1.28×10^{-4}	2.76×10^{-5}	5.08×10^{-5}	-	1.75×10^{-6}	-	6.82×10^{-6}	2.08×10^{-5}	4.11×10^{-5}	7.50×10^{-5}	3.65×10^{-5}	2.18×10^{-3}	2.24×10^{-4}	-	-	2.92×10^{-4}	8.91×10^{-4}
75	1.77×10^{-6}	5.08×10^{-5}	2.35×10^{-5}	8.72×10^{-6}	1.59×10^{-6}	6.71×10^{-7}	1.59×10^{-6}	1.20×10^{-5}	5.04×10^{-5}	1.05×10^{-4}	3.99×10^{-5}	3.15×10^{-5}	5.18×10^{-4}	2.68×10^{-4}	1.50×10^{-4}	9.43×10^{-5}	7.13×10^{-4}	2.99×10^{-3}

Station	Surface Turbulent Fluxes									DCM Turbulent Fluxes								
	PFBS	PFHxS	PFHpS	PFOS	PFOA	PFHxA	PFHpA	PFNA	PFDA	PFBS	PFHxS	PFHpS	PFOS	PFOA	PFHxA	PFHpA	PFNA	PFDA
77	7.06 10^{-5}	8.72 10^{-6}	6.02 10^{-6}	4.94 10^{-4}	3.57 10^{-5}	4.32 10^{-5}	3.57 10^{-5}	1.28 10^{-4}	1.74 10^{-4}	1.40 10^{-4}	8.54 10^{-5}	2.64 10^{-5}	9.77 10^{-4}	2.37 10^{-4}	4.81 10^{-4}	7.05 10^{-5}	2.52 10^{-4}	3.43 10^{-4}
82	5.54 10^{-4}	4.94 10^{-4}	7.48 10^{-6}	7.33 10^{-4}	1.57 10^{-5}	6.72 10^{-5}	1.57 10^{-5}	8.68 10^{-5}	2.17 10^{-4}	2.33 10^{-4}	2.83 10^{-5}	7.02 10^{-6}	3.08 10^{-4}	7.40 10^{-5}	-	6.59 10^{-6}	3.65 10^{-5}	9.12 10^{-5}
88	-	7.33 10^{-4}	8.83 10^{-6}	1.34 10^{-4}	5.15 10^{-5}	8.44 10^{-6}	5.15 10^{-5}	3.88 10^{-5}	5.38 10^{-4}	-	1.23 10^{-6}	5.95 10^{-7}	1.96 10^{-5}	2.96 10^{-6}	1.11 10^{-6}	7.52 10^{-6}	5.67 10^{-6}	7.85 10^{-5}
90	-	1.34 10^{-4}	9.88 10^{-5}	3.34 10^{-4}	2.86 10^{-4}	2.11 10^{-5}	2.86 10^{-4}	2.49 10^{-5}	1.50 10^{-4}	-	3.13 10^{-5}	2.03 10^{-4}	4.95 10^{-4}	9.96 10^{-5}	-	4.24 10^{-4}	3.70 10^{-5}	2.22 10^{-4}
94	3.06 10^{-5}	3.34 10^{-4}	7.58 10^{-5}	1.48 10^{-3}	9.11 10^{-4}	7.48 10^{-5}	9.11 10^{-4}	4.83 10^{-4}	1.58 10^{-3}	1.92 10^{-6}	4.70 10^{-6}	4.99 10^{-5}	9.32 10^{-5}	1.92 10^{-5}	-	5.73 10^{-5}	3.03 10^{-5}	9.96 10^{-5}
97	-	1.48 10^{-3}	2.20 10^{-6}	1.55 10^{-3}	1.61 10^{-4}	4.17 10^{-5}	1.61 10^{-4}	7.74 10^{-5}	1.31 10^{-4}	-	3.31 10^{-5}	4.54 10^{-4}	1.23 10^{-3}	1.18 10^{-4}	1.13 10^{-4}	1.28 10^{-4}	6.14 10^{-5}	1.04 10^{-4}
102	3.54 10^{-5}	1.55 10^{-3}	6.06 10^{-5}	1.55 10^{-4}	3.17 10^{-5}	8.86 10^{-6}	3.17 10^{-5}	1.58 10^{-5}	3.08 10^{-5}	4.37 10^{-5}	1.09 10^{-5}	1.10 10^{-5}	1.91 10^{-4}	2.83 10^{-5}	4.93 10^{-5}	3.92 10^{-5}	1.95 10^{-5}	3.79 10^{-5}
103	5.69 10^{-5}	1.55 10^{-4}	-	2.05 10^{-4}	6.48 10^{-5}	3.26 10^{-4}	6.48 10^{-5}	4.15 10^{-5}	8.08 10^{-5}	3.42 10^{-4}	1.96 10^{-3}	-	1.23 10^{-3}	4.53 10^{-4}	-	3.89 10^{-4}	2.49 10^{-4}	4.85 10^{-4}
107	3.02 10^{-4}	2.05 10^{-4}	-	3.85 10^{-4}	5.23 10^{-4}	1.37 10^{-4}	5.23 10^{-4}	4.82 10^{-5}	6.05 10^{-5}	2.24 10^{-4}	1.02 10^{-4}	-	2.86 10^{-4}	6.57 10^{-5}	-	3.89 10^{-4}	3.58 10^{-5}	4.50 10^{-5}
109	3.45 10^{-5}	3.85 10^{-4}	1.86 10^{-4}	7.45 10^{-5}	2.56 10^{-5}	6.07 10^{-5}	2.56 10^{-5}	2.65 10^{-5}	3.19 10^{-5}	3.04 10^{-5}	5.35 10^{-5}	1.01 10^{-5}	6.57 10^{-5}	2.54 10^{-5}	7.99 10^{-5}	2.25 10^{-5}	2.33 10^{-5}	2.81 10^{-5}
112	1.32 10^{-4}	7.45 10^{-5}	-	1.19 10^{-4}	7.87 10^{-5}	3.68 10^{-5}	7.87 10^{-5}	1.89 10^{-5}	1.27 10^{-5}	5.78 10^{-5}	1.61 10^{-5}	-	5.22 10^{-5}	2.02 10^{-5}	4.85 10^{-5}	3.45 10^{-5}	8.29 10^{-6}	5.57 10^{-6}
116	2.33 10^{-4}	1.19 10^{-4}	1.33 10^{-5}	4.38 10^{-4}	2.36 10^{-4}	9.03 10^{-4}	2.36 10^{-4}	4.85 10^{-5}	2.86 10^{-4}	1.55 10^{-4}	6.01 10^{-4}	8.17 10^{-5}	2.91 10^{-4}	9.46 10^{-5}	-	1.57 10^{-4}	3.22 10^{-5}	1.90 10^{-4}
117	5.19 10^{-5}	4.38 10^{-4}	2.41 10^{-6}	1.67 10^{-4}	1.09 10^{-4}	1.39 10^{-4}	1.09 10^{-4}	8.58 10^{-6}	8.34 10^{-5}	1.73 10^{-5}	4.65 10^{-5}	3.86 10^{-6}	5.59 10^{-5}	1.80 10^{-5}	1.88 10^{-4}	3.63 10^{-5}	2.86 10^{-6}	2.78 10^{-5}
121	3.86 10^{-5}	1.67 10^{-4}	4.57 10^{-7}	5.79 10^{-5}	5.68 10^{-5}	6.41 10^{-5}	5.68 10^{-5}	-	1.68 10^{-5}	3.20 10^{-5}	5.30 10^{-5}	3.17 10^{-6}	4.79 10^{-5}	1.36 10^{-5}	1.43 10^{-4}	4.70 10^{-5}	-	1.39 10^{-5}
123	1.60 10^{-4}	5.79 10^{-5}	2.01 10^{-7}	9.06 10^{-5}	1.71 10^{-4}	7.15 10^{-5}	1.71 10^{-4}	-	1.38 10^{-4}	2.70 10^{-5}	1.21 10^{-5}	3.52 10^{-6}	1.53 10^{-5}	7.42 10^{-6}	6.86 10^{-5}	2.89 10^{-5}	-	2.33 10^{-5}
124	7.67 10^{-5}	9.06 10^{-5}	1.42 10^{-5}	7.88 10^{-5}	5.08 10^{-5}	7.25 10^{-6}	5.08 10^{-5}	1.04 10^{-5}	4.56 10^{-5}	2.57 10^{-4}	2.43 10^{-5}	5.58 10^{-4}	2.64 10^{-4}	5.90 10^{-5}	-	1.70 10^{-4}	3.47 10^{-5}	1.53 10^{-4}
125	4.15 10^{-5}	7.88 10^{-5}	1.42 10^{-6}	6.11 10^{-5}	9.83 10^{-6}	4.37 10^{-6}	9.83 10^{-6}	1.64 10^{-6}	1.53 10^{-5}	1.26 10^{-4}	1.33 10^{-5}	1.30 10^{-4}	1.86 10^{-4}	4.65 10^{-5}	6.41 10^{-4}	2.99 10^{-5}	4.98 10^{-6}	4.65 10^{-5}
128	8.75 10^{-5}	6.11 10^{-5}	3.83 10^{-7}	1.45 10^{-4}	1.98 10^{-5}	8.25 10^{-6}	1.98 10^{-5}	3.14 10^{-5}	2.42 10^{-4}	1.27 10^{-4}	1.20 10^{-5}	4.80 10^{-7}	2.10 10^{-4}	6.46 10^{-5}	-	2.87 10^{-5}	4.54 10^{-5}	3.51 10^{-4}
131	4.93 10^{-4}	1.45 10^{-4}	1.90 10^{-8}	5.43 10^{-4}	1.16 10^{-4}	3.40 10^{-5}	1.16 10^{-4}	2.55 10^{-5}	8.70 10^{-4}	2.17 10^{-5}	1.50 10^{-6}	2.50 10^{-8}	2.39 10^{-5}	2.99 10^{-6}	1.12 10^{-6}	5.12 10^{-6}	1.12 10^{-6}	3.83 10^{-5}
134	5.70 10^{-6}	5.43 10^{-4}	3.12 10^{-7}	5.36 10^{-6}	5.03 10^{-6}	1.34 10^{-6}	5.03 10^{-6}	-	1.01 10^{-6}	2.90 10^{-5}	6.82 10^{-6}	3.42 10^{-7}	2.73 10^{-5}	3.41 10^{-5}	2.64 10^{-4}	2.56 10^{-5}	-	5.12 10^{-6}
137	1.08 10^{-5}	5.36 10^{-6}	9.16 10^{-7}	2.20 10^{-5}	1.45 10^{-5}	7.04 10^{-6}	1.45 10^{-5}	8.91 10^{-6}	5.63 10^{-6}	1.38 10^{-5}	9.00 10^{-6}	1.20 10^{-7}	2.82 10^{-5}	2.16 10^{-5}	-	1.86 10^{-5}	1.14 10^{-5}	7.20 10^{-6}
140	5.89 10^{-5}	2.20 10^{-5}	-	1.55 10^{-4}	1.13 10^{-4}	7.07 10^{-6}	1.13 10^{-4}	4.71 10^{-5}	2.59 10^{-5}	1.20 10^{-5}	1.44 10^{-6}	-	3.17 10^{-5}	2.50 10^{-5}	3.94 10^{-5}	2.31 10^{-5}	9.61 10^{-6}	5.29 10^{-6}
143	5.96 10^{-5}	1.55 10^{-4}	3.59 10^{-5}	1.10 10^{-4}	7.63 10^{-5}	5.58 10^{-6}	7.63 10^{-5}	2.61 10^{-5}	3.35 10^{-5}	1.56 10^{-4}	1.46 10^{-5}	3.36 10^{-5}	2.87 10^{-4}	2.14 10^{-4}	-	1.99 10^{-4}	6.80 10^{-5}	8.75 10^{-5}
146	1.11 10^{-8}	1.10 10^{-4}	7.99 10^{-5}	2.92 10^{-8}	3.24 10^{-8}	7.85 10^{-9}	3.24 10^{-8}	8.20 10^{-9}	2.46 10^{-9}	5.51 10^{-5}	3.88 10^{-5}	7.94 10^{-5}	1.45 10^{-4}	1.29 10^{-4}	-	1.61 10^{-4}	4.08 10^{-5}	1.22 10^{-5}

Zero values (-) attend for a null turbulence due to; i) a concentration of the compound under LOD, ii) a depletion of the quantified compound because of the calculated ongoing diffusion iii) a diminution of the measured concentration too low for appreciating a variation and thus quantifying a flux, or iv) to a missing value of the eddy

Figure S6 Turbulent fluxes at surface for PFOS and PFOA (F_{Eddy}, ng m^{-2}day^{-1})

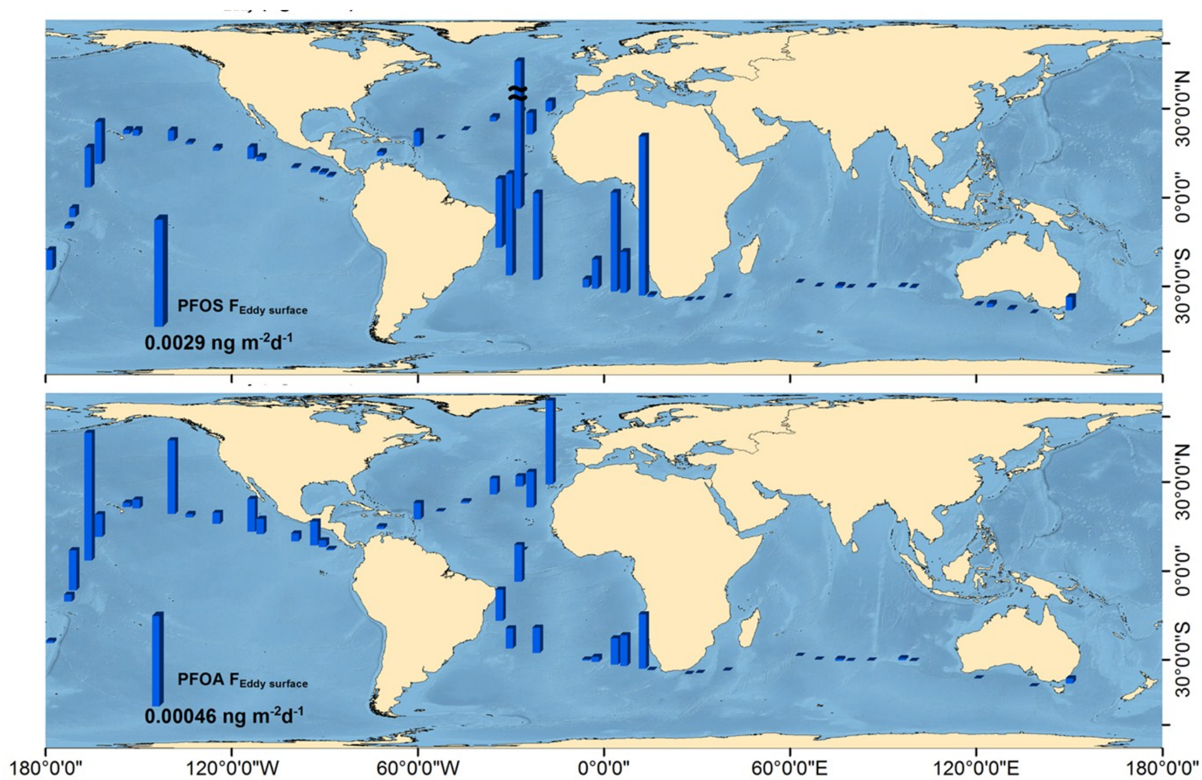


Table S6. Organic carbon sinking fluxes (F_{OC}, mg C $m^{-2}day^{-1}$)

Station	$F_{oc\ Phyto}$	$F_{oc\ Fecal}$	Total F_{oc}	Station	$F_{oc\ Phyto}$	$F_{oc\ Fecal}$	Total F_{oc}
2	5.24	26.5	31.7	**60**	0.19	18.9	19.1
3	2.96	29.7	32.6	**63**	0.19	15.4	15.6
5	5.10	44.0	49.1	**64**	0.28	18.7	19.0
7	6.33	50.9	57.3	**66**	0.95	29.1	30.1
8	6.66	53.9	60.6	**67**	0.98	39.8	40.8
9	11.4	79.2	90.7	**70**	3.70	42.0	45.7
11	11.0	79.3	90.3	**71**	2.68	39.3	41.9
12	8.59	53.5	62.1	**74**	7.24	48.6	55.9
13	11.1	62.9	74.0	**75**	9.13	49.8	58.9
14	13.7	68.1	81.7	**77**	20.7	88.5	109
15	9.01	61.3	70.4	**78**	13.1	71.5	84.6
17	2.06	55.3	57.3	**82**	1.28	37.9	39.1
18	1.18	55.2	56.4	**84**	2.46	43.3	45.8
20	0.21	35.8	36.0	**86**	0.50	40.1	40.6
21	0.14	28.6	28.8	**88**	0.49	39.6	40.1
23	0.27	34.8	35.1	**90**	2.26	54.4	56.7
24	0.49	43.9	44.4	**92**	10.6	97.1	108
26	0.75	43.4	44.2	**94**	9.42	74.9	84.3
28	0.38	35.4	35.8	**97**	0.63	34.7	35.4
29	0.47	34.3	34.8	**99**	0.68	36.8	37.5
30	0.53	34.6	35.2	**102**	0.60	42.1	42.7
31	0.24	27.5	27.7	**103**	0.54	40.2	40.7
32	0.16	27.5	27.7	**106**	0.53	37.6	38.2
33	0.10	24.5	24.6	**107**	0.39	36.9	37.3
35	0.10	21.2	21.3	**109**	0.30	33.0	33.3
37	0.05	19.3	19.3	**110**	0.79	35.8	36.6
38	0.07	22.3	22.4	**112**	0.61	40.8	41.5
39	0.09	26.7	26.8	**113**	1.75	44.8	46.6
40	0.13	25.4	25.5	**114**	1.20	42.8	44.0
41	0.21	24.2	24.4	**116**	2.91	53.0	55.9
42	0.31	25.5	25.8	**117**	3.56	56.5	60.0
43	0.79	31.3	32.1	**120**	3.53	48.0	51.5
44	2.43	41.2	43.7	**121**	5.88	52.7	58.6
46	4.19	51.0	55.2	**123**	33.0	127.1	160
47	2.27	43.4	45.6	**124**	48.6	176.7	225
49	0.97	38.6	39.6	**125**	21.8	93.3	115
50	0.60	384	39.0	**128**	4.34	52.2	56.5
52	0.25	20.8	21.1	**129**	4.77	48.6	53.4
53	0.87	31.3	32.1	**131**	3.34	46.5	49.8
55	0.21	19.0	19.2	**132**	1.25	32.8	34.1
57	0.18	17.0	17.1	**134**	0.37	20.9	21.2
58	0.18	16.8	17.0	**135**	0.26	19.0	19.3

Station	$F_{oc\ Phyto}$	$F_{oc\ Fecal}$	Total F_{oc}
137	0.40	18.2	18.6
138	0.24	14.2	14.4
140	0.14	12.2	12.3
141	0.14	13.4	13.6

Station	$F_{oc\ Phyto}$	$F_{oc\ Fecal}$	Total F_{oc}
143	0.19	14.9	15.1
144	0.26	16.6	16.8
146	0.64	28.1	28.7
147	0.69	26.2	26.9

All the values are extracted from Siegel et al. [8] database at the corresponding locations and month.

Table S7. Biological pump fluxes ($F_{Settling}$, ng $m^{-2}day^{-1}$)

Station	PFHxS	PFOS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFDA	PFUnDA	PFDoA	PFTrA	PFTeA
	$F_{Settling\ Phyto}$												
6	$4.12\ 10^{-5}$	$1.47\ 10^{-2}$	-	-	$1.10\ 10^{-1}$	-	$1.78\ 10^{-1}$	$5.76\ 10^{-2}$	-	-	-	-	-
13	$1.91\ 10^{-2}$	$5.45\ 10^{-2}$	-	-	$3.59\ 10^{-2}$	-	$4.08\ 10^{-2}$	$4.72\ 10^{-2}$	-	-	-	-	-
17	$7.97\ 10^{-3}$	$3.29\ 10^{-1}$	$2.26\ 10^{-4}$	$6.59\ 10^{-2}$	$1.35\ 10^{-2}$	-	$2.83\ 10^{-2}$	$1.57\ 10^{-2}$	-	$1.00\ 10^{-3}$	-	-	-
18	$4.92\ 10^{-3}$	$2.83\ 10^{-1}$	$6.03\ 10^{-4}$	$3.91\ 10^{-2}$	$2.31\ 10^{-2}$	-	$2.08\ 10^{-2}$	$2.44\ 10^{-2}$	-	$3.47\ 10^{-4}$	-	-	-
29	-	$3.77\ 10^{-3}$	-	-	$1.43\ 10^{-2}$	-	$1.84\ 10^{-2}$	$7.08\ 10^{-3}$	-	$5.35\ 10^{-4}$	-	-	-
31	-	$1.72\ 10^{-3}$	-	$2.15\ 10^{-3}$	$6.24\ 10^{-3}$	-	$7.90\ 10^{-3}$	$5.92\ 10^{-3}$	-	$2.39\ 10^{-4}$	-	-	-
33	$2.83\ 10^{-5}$	$6.31\ 10^{-4}$	-	$2.20\ 10^{-4}$	$1.18\ 10^{-3}$	-	$1.13\ 10^{-3}$	$8.51\ 10^{-4}$	-	-	-	-	-
35	$7.58\ 10^{-6}$	$8.17\ 10^{-4}$	-	$7.25\ 10^{-4}$	$3.83\ 10^{-3}$	-	$4.49\ 10^{-3}$	$2.36\ 10^{-3}$	-	$8.44\ 10^{-5}$	-	-	-
43	-	$2.88\ 10^{-3}$	-	$1.32\ 10^{-2}$	$4.92\ 10^{-3}$	-	$6.83\ 10^{-3}$	$2.73\ 10^{-2}$	-	$9.63\ 10^{-5}$	-	-	-
46	$2.60\ 10^{-3}$	$2.33\ 10^{-1}$	-	-	$1.21\ 10^{-2}$	-	$1.41\ 10^{-2}$	$1.21\ 10^{-2}$	$1.25\ 10^{-3}$	$5.31\ 10^{-3}$	-	-	-
49	$1.63\ 10^{-4}$	$5.39\ 10^{-2}$	-	$3.42\ 10^{-3}$	$1.50\ 10^{-2}$	$1.67\ 10^{-4}$	$1.36\ 10^{-2}$	$1.46\ 10^{-2}$	-	$3.18\ 10^{-3}$	-	-	-
53	$1.18\ 10^{-4}$	$3.79\ 10^{-3}$	-	-	$1.83\ 10^{-2}$	-	$3.00\ 10^{-2}$	$1.28\ 10^{-2}$	-	$1.80\ 10^{-3}$	-	-	-
55	-	$2.96\ 10^{-3}$	-	-	$3.95\ 10^{-3}$	-	$4.47\ 10^{-3}$	$3.22\ 10^{-3}$	-	$1.15\ 10^{-5}$	-	-	-
57	$5.59\ 10^{-4}$	$1.34\ 10^{-2}$	-	$3.15\ 10^{-4}$	$1.79\ 10^{-3}$	$2.11\ 10^{-3}$	$2.33\ 10^{-3}$	$2.11\ 10^{-3}$	$2.53\ 10^{-5}$	$4.70\ 10^{-4}$	-	-	-
58	-	$3.13\ 10^{-3}$	-	$1.22\ 10^{-3}$	$9.19\ 10^{-3}$	-	$8.03\ 10^{-3}$	$5.47\ 10^{-3}$	-	-	-	-	-
71	-	$5.51\ 10^{-3}$	-	$8.11\ 10^{-3}$	$7.36\ 10^{-2}$	-	$1.23\ 10^{-1}$	$3.44\ 10^{-2}$	-	-	-	-	-
74	-	$2.63\ 10^{-1}$	-	$4.63\ 10^{-2}$	$2.83\ 10^{-1}$	-	$2.27\ 10^{-1}$	$2.67\ 10^{-1}$	-	-	-	-	-
77	$5.62\ 10^{-2}$	$8.13\ 10^{-1}$	-	$4.36\ 10^{-1}$	1.12 10+00	-	1.03 10+00	$9.14\ 10^{-1}$	-	-	-	-	-
82	-	$2.76\ 10^{-2}$	-	$4.77\ 10^{-3}$	$1.83\ 10^{-2}$	-	$1.76\ 10^{-2}$	$1.50\ 10^{-2}$	-	$8.94\ 10^{-5}$	-	-	-
84	-	$3.84\ 10^{-2}$	-	$2.51\ 10^{-2}$	$7.60\ 10^{-2}$	-	$6.54\ 10^{-2}$	$6.23\ 10^{-2}$	-	-	-	-	-
97	-	$2.69\ 10^{-3}$	-	$5.67\ 10^{-4}$	$4.65\ 10^{-3}$	-	$5.08\ 10^{-3}$	$5.36\ 10^{-3}$	-	$2.17\ 10^{-4}$	-	-	-
117	$3.93\ 10^{-3}$	$1.20\ 10^{-2}$	-	$1.65\ 10^{-3}$	$2.01\ 10^{-2}$	-	$2.19\ 10^{-2}$	$2.37\ 10^{-2}$	-	$2.47\ 10^{-3}$	-	-	-
121	$4.29\ 10^{-4}$	$2.75\ 10^{-2}$	$5.33\ 10^{-3}$	-	$3.55\ 10^{-2}$	-	$7.38\ 10^{-2}$	$8.62\ 10^{-2}$	$1.60\ 10^{-2}$	$4.33\ 10^{-2}$	$4.89\ 10^{-3}$	$4.31\ 10^{-3}$	-
125	-	$1.09\ 10^{-2}$	-	$4.65\ 10^{-2}$	$2.15\ 10^{-1}$	-	$1.72\ 10^{-1}$	$2.40\ 10^{-1}$	-	-	-	-	-
140	-	$1.92\ 10^{-4}$	-	$3.34\ 10^{-4}$	$2.33\ 10^{-3}$	-	$2.41\ 10^{-3}$	$2.34\ 10^{-3}$	-	$6.75\ 10^{-5}$	-	-	-
141	$3.38\ 10^{-6}$	$6.39\ 10^{-4}$	-	-	$2.34\ 10^{-3}$	-	$3.34\ 10^{-3}$	$1.05\ 10^{-3}$	$4.01\ 10^{-5}$	$3.35\ 10^{-4}$	-	-	-
144	$2.96\ 10^{-5}$	$9.28\ 10^{-4}$	-	$3.65\ 10^{-5}$	$1.16\ 10^{-3}$	-	$1.68\ 10^{-3}$	$1.85\ 10^{-3}$	$4.48\ 10^{-5}$	$4.24\ 10^{-4}$	$1.82\ 10^{-5}$	-	-
147	$9.99\ 10^{-5}$	$1.55\ 10^{-3}$	-	-	$2.50\ 10^{-3}$	-	$3.93\ 10^{-3}$	$6.57\ 10^{-3}$	$1.14\ 10^{-3}$	$6.42\ 10^{-3}$	-	-	$8.02\ 10^{-4}$

ion	PFHxS	PFOS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFDA	PFUnDA	PFDoA	PFTrA	PFTeA
	$F_{Settling\ Fecal}$												
6	3.43 10^{-4}	1.22 10^{-1}	-	-	9.16 10^{-1}	-	1.48	4.79 10^{-1}	-	-	-	-	-
13	1.09 10^{-1}	3.09 10^{-1}	-	-	2.04 10^{-1}	-	2.32 10^{-1}	2.68 10^{-1}	-	-	-	-	-
17	2.14 10^{-1}	8.83	6.06 10^{-3}	1.77 10	3.62 10^{-1}	-	7.61 10^{-1}	4.23 10^{-1}	-	2.70 10^{-2}	-	-	-
18	2.30 10^{-1}	1.32 10^{1}	2.81 10^{-2}	1.82 10	1.08	-	9.73 10^{-1}	1.14	-	1.62 10^{-2}	-	-	-
29	-	2.75 10^{-1}	-	-	1.04	-	1.34 10	5.15 10^{-1}	-	3.89 10^{-2}	-	-	-
31	-	2.01 10^{-1}	-	2.51 10^{-1}	7.29 10^{-1}	-	9.22 10^{-1}	6.91 10^{-1}	-	2.79 10^{-2}	-	-	-
33	6.60 10^{-3}	1.47 10^{-1}	-	5.14 10^{-2}	2.75 10^{-1}	-	2.63 10^{-1}	1.99 10^{-1}	-	-	-	-	-
35	1.65 10^{-3}	1.78 10^{-1}	-	1.58 10^{-1}	8.36 10^{-1}	-	9.79 10^{-1}	5.14 10^{-1}	-	1.84 10^{-2}	-	-	-
43	-	1.13 10^{-1}	-	5.19 10^{-1}	1.94 10^{-1}	-	2.69 10^{-1}	1.08	-	3.80 10^{-3}	-	-	-
46	3.17 10^{-2}	2.83 10	-	-	1.47 10^{-1}	-	1.71 10^{-1}	1.47 10^{-1}	1.52 10^{-2}	6.46 10^{-2}	-	-	-
49	6.54 10^{-3}	2.16 10	-	1.37 10^{-1}	6.02 10^{-1}	6.67 10^{-3}	5.45 10^{-1}	5.82 10^{-1}	-	1.27 10^{-1}	-	-	-
53	4.21 10^{-3}	1.35 10^{-1}	-	-	6.53 10^{-1}	-	1.07	4.56 10^{-1}	-	6.42 10^{-2}	-	-	-
55	-	2.68 10^{-1}	-	-	3.58 10^{-1}	-	4.05 10^{-1}	2.92 10^{-1}	-	1.05 10^{-3}	-	-	-
57	5.24 10^{-2}	1.26 10	-	2.95 10^{-2}	1.68 10^{-1}	1.98 10^{-1}	2.18 10^{-1}	1.98 10^{-1}	2.37 10^{-3}	4.41 10^{-2}	-	-	-
58	-	2.91 10^{-1}	-	1.13 10^{-1}	8.54 10^{-1}	-	7.46 10^{-1}	5.09 10^{-1}	-	-	-	-	-
71	-	8.07 10^{-2}	-	1.19 10^{-1}	1.08	-	1.81	5.03 10^{-1}	-	-	-	-	-
74	-	1.77 10	-	3.11 10^{-1}	1.90	-	1.52	1.80	-	-	-	-	-
77	2.40 10^{-1}	3.47 10	-	1.86 10	4.78	-	4.39	3.90	-	-	-	-	-
82	-	8.15 10^{-1}	-	1.41 10^{-1}	5.41 10^{-1}	-	5.20 10^{-1}	4.44 10^{-1}	-	2.64 10^{-3}	-	-	-
84	-	6.76 10^{-1}	-	4.42 10^{-1}	1.34 10	-	1.15	1.10	-	-	-	-	-
97	-	1.48 10^{-1}	-	3.11 10^{-2}	2.55 10^{-1}	-	2.79 10^{-1}	2.94 10^{-1}	-	1.19 10^{-2}	-	-	-
117	6.24 10^{-2}	1.90 10^{-1}	-	2.63 10^{-2}	3.20 10^{-1}	-	3.48 10^{-1}	3.77 10^{-1}	-	3.92 10^{-2}	-	-	-
121	3.85 10^{-3}	2.46 10^{-1}	4.77 10^{-2}	-	3.18 10^{-1}	-	6.61 10^{-1}	7.72 10^{-1}	1.43 10^{-1}	3.88 10^{-1}	4.38 10^{-2}	3.86 10^{-2}	-
125	-	4.64 10^{-2}	-	1.99 10^{-1}	9.17 10^{-1}	-	7.35 10^{-1}	1.02	-	-	-	-	-
140	-	1.63 10^{-2}	-	2.84 10^{-2}	1.98 10^{-1}	-	2.05 10^{-1}	1.99 10^{-1}	-	5.74 10^{-3}	-	-	-
141	3.22 10^{-4}	6.08 10^{-2}	-	-	2.23 10^{-1}	-	3.18 10^{-1}	1.00 10^{-1}	3.82 10^{-3}	3.19 10^{-2}	-	-	-
144	1.89 10^{-3}	5.94 10^{-2}	-	2.34 10^{-3}	7.45 10^{-2}	-	1.07 10^{-1}	1.18 10^{-1}	2.86 10^{-3}	2.71 10^{-2}	1.17 10^{-3}	-	-
147	3.79 10^{-3}	5.87 10^{-2}	-	-	9.47 10^{-2}	-	1.49 10^{-1}	2.49 10^{-1}	4.33 10^{-2}	2.43 10^{-1}	-	-	3.04 10^{-2}

Those were calculated based on the data published in Casal *et al.*[2]

Table S8. Biological pump fluxes for PFOS and PFOA branched isomers ($F_{Settling}$, ng m^{-2}day^{-1})

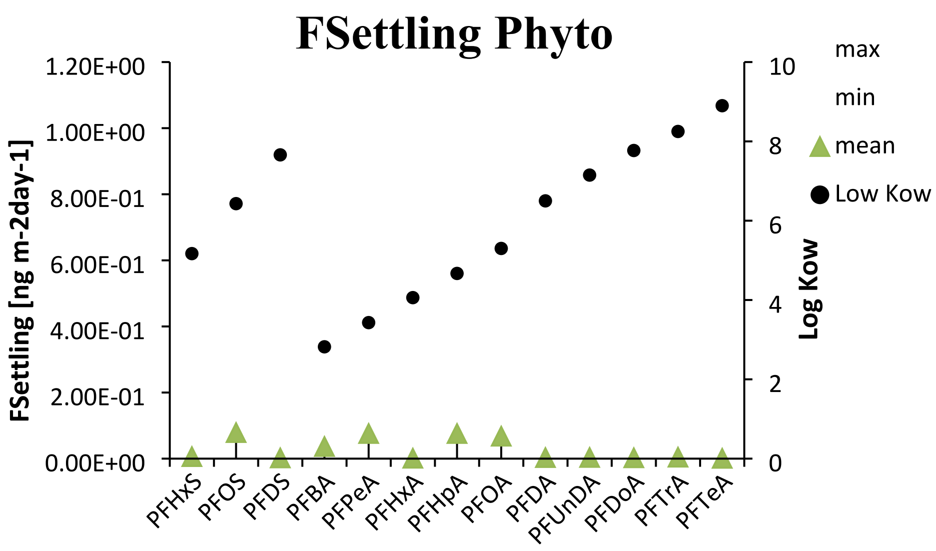
Station	*iso*-PFOS	*1m* -PFOS	*3m* -PFOS	*4m* -PFOS	*5m* -PFOS	*iso*-PFOA	*4m* -PFOA	*5m* -PFOA
				$F_{Settling\ Phyto}$				
6	1.01 10^{-3}	-	-	2.36 10^{-4}	6.44 10^{-4}	-	2.57 10^{-3}	7.85 10^{-3}
13	2.53 10^{-3}	-	4.56 10^{-4}	1.15 10^{-3}	1.02 10^{-3}	3.62 10^{-3}	3.23 10^{-3}	-
17	3.27 10^{-2}	8.98 10^{-3}	4.45 10^{-3}	8.60 10^{-3}	1.49 10^{-2}	6.22 10^{-4}	1.83 10^{-3}	5.87 10^{-4}
18	2.37 10^{-2}	5.33 10^{-3}	2.82 10^{-3}	7.96 10^{-3}	1.10 10^{-2}	1.60 10^{-3}	6.78 10^{-3}	-
29	2.88 10^{-4}	-	3.46 10^{-5}	5.44 10^{-5}	1.12 10^{-4}	2.02 10^{-4}	-	8.31 10^{-4}
31	8.84 10^{-5}	-	1.31 10^{-5}	2.41 10^{-5}	3.13 10^{-5}	4.65 10^{-4}	5.07 10^{-4}	-
33	3.82 10^{-5}	-	4.53 10^{-6}	8.07 10^{-6}	1.18 10^{-5}	6.32 10^{-5}	6.87 10^{-5}	-
35	6.13 10^{-5}	-	6.13 10^{-6}	5.86 10^{-6}	7.60 10^{-6}	2.00 10^{-4}	8.59 10^{-5}	1.93 10^{-4}
43	2.25 10^{-4}	-	3.85 10^{-5}	8.22 10^{-5}	6.33 10^{-5}	1.29 10^{-3}	1.56 10^{-3}	-
46	1.64 10^{-2}	1.71 10^{-3}	2.33 10^{-3}	5.68 10^{-3}	7.23 10^{-3}	5.39 10^{-4}	3.89 10^{-4}	-
49	4.10 10^{-3}	-	7.35 10^{-4}	1.54 10^{-3}	1.55 10^{-3}	1.37 10^{-3}	6.06 10^{-4}	3.33 10^{-4}
53	2.73 10^{-4}	-	4.68 10^{-5}	4.69 10^{-5}	8.35 10^{-5}	8.86 10^{-4}	3.03 10^{-4}	5.88 10^{-4}
55	2.48 10^{-4}	-	3.59 10^{-5}	7.50 10^{-5}	9.89 10^{-5}	2.97 10^{-4}	2.16 10^{-4}	-
57	1.51 10^{-3}	3.04 10^{-4}	3.20 10^{-4}	7.48 10^{-4}	8.45 10^{-4}	1.71 10^{-4}	2.04 10^{-4}	-
58	2.44 10^{-4}	-	3.16 10^{-5}	7.87 10^{-5}	1.01 10^{-4}	3.88 10^{-4}	3.64 10^{-4}	-
71	6.57 10^{-4}	-	3.29 10^{-4}	6.59 10^{-5}	8.55 10^{-5}	-	8.24 10^{-4}	-
74	1.72 10^{-2}	-	2.96 10^{-3}	8.32 10^{-3}	9.53 10^{-3}	1.81 10^{-2}	5.71 10^{-3}	2.71 10^{-3}
77	7.24 10^{-2}	5.63 10^{-3}	1.19 10^{-2}	3.04 10^{-2}	3.90 10^{-2}	6.03 10^{-2}	1.58 10^{-2}	2.87 10^{-4}
82	1.98 10^{-3}	4.86 10^{-4}	2.82 10^{-4}	6.53 10^{-4}	8.17 10^{-4}	1.13 10^{-3}	2.05 10^{-3}	-
84	2.81 10^{-3}	-	4.51 10^{-4}	9.00 10^{-4}	1.57 10^{-3}	4.37 10^{-3}	7.09 10^{-3}	-
97	1.47 10^{-4}	-	2.31 10^{-5}	6.22 10^{-5}	8.12 10^{-5}	3.35 10^{-4}	2.04 10^{-3}	-
117	1.09 10^{-3}	-	8.23 10^{-5}	2.10 10^{-4}	2.36 10^{-4}	1.85 10^{-3}	5.81 10^{-3}	-
121	2.32 10^{-3}	3.83 10^{-4}	3.28 10^{-4}	1.08 10^{-3}	1.45 10^{-3}	7.08 10^{-3}	7.02 10^{-3}	1.35 10^{-3}
125	5.73 10^{-4}	-	-	-	8.63 10^{-5}	1.85 10^{-2}	6.95 10^{-3}	2.66 10^{-3}
140	7.15 10^{-6}	-	-	-	-	2.22 10^{-4}	1.55 10^{-4}	-
141	3.02 10^{-5}	-	2.30 10^{-6}	-	-	-	3.90 10^{-5}	1.42 10^{-4}
144	3.13 10^{-5}	-	6.29 10^{-6}	2.24 10^{-5}	1.75 10^{-5}	1.44 10^{-4}	4.63 10^{-4}	-
147	-	-	2.05 10^{-5}	-	-	7.32 10^{-4}	2.25 10^{-3}	-
				$F_{Settling\ Fecal}$				
6	8.42 10^{-3}	-	-	1.96 10^{-3}	5.35 10^{-3}	-	6.52 10^{-2}	2.13 10^{-2}
13	1.44 10^{-2}	-	2.59 10^{-3}	6.52 10^{-3}	5.77 10^{-3}	2.06 10^{-2}	-	1.83 10^{-2}
17	8.78 10^{-1}	2.41 10^{-1}	1.19 10^{-1}	2.31 10^{-1}	4.00 10^{-1}	1.67 10^{-2}	1.58 10^{-2}	4.91 10^{-2}
18	1.10 10+00	2.49 10^{-1}	1.32 10^{-1}	3.72 10^{-1}	5.12 10^{-1}	7.48 10^{-2}	-	3.17 10^{-1}
29	2.09 10^{-2}	-	2.52 10^{-3}	3.96 10^{-3}	8.17 10^{-3}	1.47 10^{-2}	6.05 10^{-2}	-
31	1.03 10^{-2}	-	1.53 10^{-3}	2.82 10^{-3}	3.66 10^{-3}	5.42 10^{-2}	-	5.91 10^{-2}
33	8.90 10^{-3}	-	1.06 10^{-3}	1.88 10^{-3}	2.74 10^{-3}	1.47 10^{-2}	-	1.60 10^{-2}
35	1.34 10^{-2}	-	1.34 10^{-3}	1.28 10^{-3}	1.66 10^{-3}	4.35 10^{-2}	4.21 10^{-2}	1.87 10^{-2}
43	8.87 10^{-3}	-	1.52 10^{-3}	3.24 10^{-3}	2.50 10^{-3}	5.09 10^{-2}	-	6.17 10^{-2}
46	2.00 10^{-1}	2.08 10^{-2}	2.84 10^{-2}	6.91 10^{-2}	8.81 10^{-2}	6.56 10^{-3}	-	4.74 10^{-3}
49	1.64 10^{-1}	-	2.94 10^{-2}	6.14 10^{-2}	6.20 10^{-2}	5.49 10^{-2}	1.33 10^{-2}	2.42 10^{-2}
53	9.75 10^{-3}	-	1.67 10^{-3}	1.68 10^{-3}	2.98 10^{-3}	3.17 10^{-2}	2.10 10^{-2}	1.08 10^{-2}
55	2.25 10^{-2}	-	3.25 10^{-3}	6.79 10^{-3}	8.96 10^{-3}	2.69 10^{-2}	-	1.95 10^{-2}
57	1.41 10^{-1}	2.85 10^{-2}	3.00 10^{-2}	7.01 10^{-2}	7.92 10^{-2}	1.61 10^{-2}	-	1.91 10^{-2}
58	2.27 10^{-2}	-	2.93 10^{-3}	7.31 10^{-3}	9.39 10^{-3}	3.61 10^{-2}	-	3.38 10^{-2}
71	9.60 10^{-3}	-	4.82 10^{-3}	9.64 10^{-4}	1.25 10^{-3}	-	-	1.21 10^{-2}
74	1.15 10^{-1}	-	1.99 10^{-2}	5.59 10^{-2}	6.40 10^{-2}	1.22 10^{-1}	1.82 10^{-2}	3.83 10^{-2}
77	3.09 10^{-1}	2.41 10^{-2}	5.09 10^{-2}	1.30 10^{-1}	1.66 10^{-1}	2.58 10^{-1}	1.22 10^{-3}	6.75 10^{-2}
82	5.85 10^{-2}	1.44 10^{-2}	8.35 10^{-3}	1.93 10^{-2}	2.42 10^{-2}	3.33 10^{-2}	-	6.07 10^{-2}

ion	*iso*-PFOS	*1m* -PFOS	*3m* -PFOS	*4m* -PFOS	*5m* -PFOS	*iso*-PFOA	*4m* -PFOA	*5m* -PFOA
84	$4.94\ 10^{-2}$	-	$7.93\ 10^{-3}$	$1.58\ 10^{-2}$	$2.75\ 10^{-2}$	$7.68\ 10^{-2}$	-	$1.25\ 10^{-1}$
97	$8.06\ 10^{-3}$	-	$1.27\ 10^{-3}$	$3.41\ 10^{-3}$	$4.46\ 10^{-3}$	$1.84\ 10^{-2}$	-	$1.12\ 10^{-1}$
117	$1.74\ 10^{-2}$	-	$1.31\ 10^{-3}$	$3.34\ 10^{-3}$	$3.75\ 10^{-3}$	$2.93\ 10^{-2}$	-	$9.23\ 10^{-2}$
121	$2.08\ 10^{-2}$	$3.43\ 10^{-3}$	$2.94\ 10^{-3}$	$9.67\ 10^{-3}$	$1.30\ 10^{-2}$	$6.34\ 10^{-2}$	$1.21\ 10^{-2}$	$6.29\ 10^{-2}$
125	$2.45\ 10^{-3}$	-	-	-	$3.69\ 10^{-4}$	$7.89\ 10^{-2}$	$1.13\ 10^{-2}$	$2.97\ 10^{-2}$
140	$6.08\ 10^{-4}$	-	-	-	-	$1.88\ 10^{-2}$	-	$1.32\ 10^{-2}$
141	$2.88\ 10^{-3}$	-	$2.19\ 10^{-4}$	-	-	-	$1.35\ 10^{-2}$	$3.71\ 10^{-3}$
144	$2.00\ 10^{-3}$	-	$4.03\ 10^{-4}$	$1.43\ 10^{-3}$	$1.12\ 10^{-3}$	$9.20\ 10^{-3}$	-	$2.97\ 10^{-2}$
147	-	-	$7.77\ 10^{-4}$	-	-	$2.78\ 10^{-2}$	-	$8.54\ 10^{-2}$

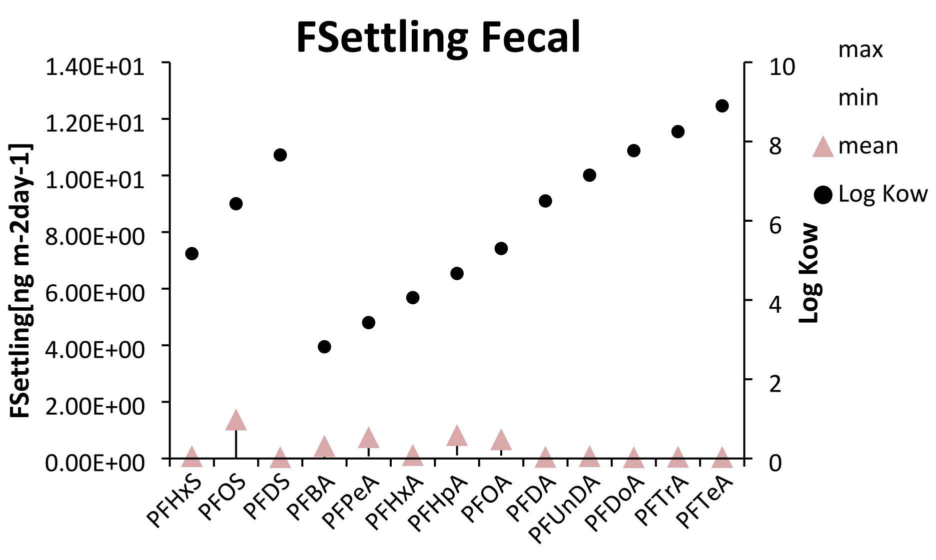
Those values were calculated based on the data published in Casal *et al*.[2]

Figure S7. Biological pump ranges (A) phytoplankton and B) zooplankton related fluxes) and PFAS K_{ow}

A

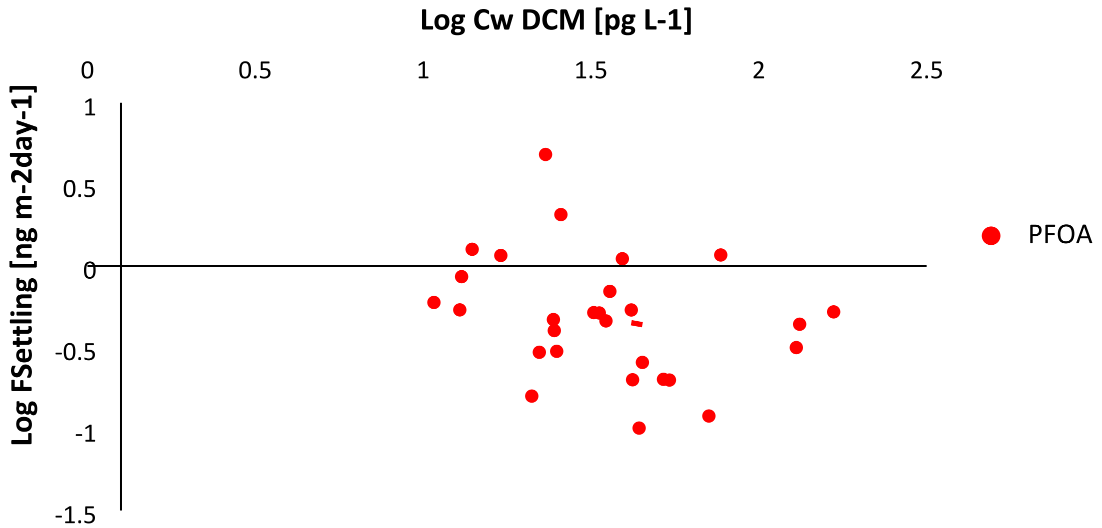


B



PFAS K_{ow} are taken from Wang *et al.*[9]

Figure S8. Relation between DCM water phase concentrations and $F_{Settling}$ for PFOA



*Non-parametric significant correlation (Spearman's Rho) is found for PFOA $F_{Settling}$ and DCM seawater concentration, $p<0.05$.

Table S9. Annual mean export of PFAS due to turbulent fluxes (F_{Eddy}) and biological pump fluxes ($F_{Settling}$) and calculated residence times (years)

Compound	Mean F_{Eddy}	Mean $F_{Settling}$	Average residence time accounting F_{Eddy}	Average residence time accounting F_{Eddy} and $F_{Settling}$
	(ng m^{-2} $year^{-1}$)		*(years)*	
PFHxS	0.066	24	890000	1300
PFOS	0.36	520	940000	360
PFHxA	0.057	38	650000	200
PFHpA	0.039	320	640000	22
PFOA	0.050	260	710000	32
PFDA	0.22	14	580000	5000

Inventory is calculated on an average concentration between surface and DCM concentrations over the first 100 m of the surface ocean. For F_{Eddy} fluxes at DCM depth are considered as representative for the selected column depth.

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