Supporting Information

Assessment of sorbent impregnated PUF disks (SIPs) for long–term sampling of legacy POPs

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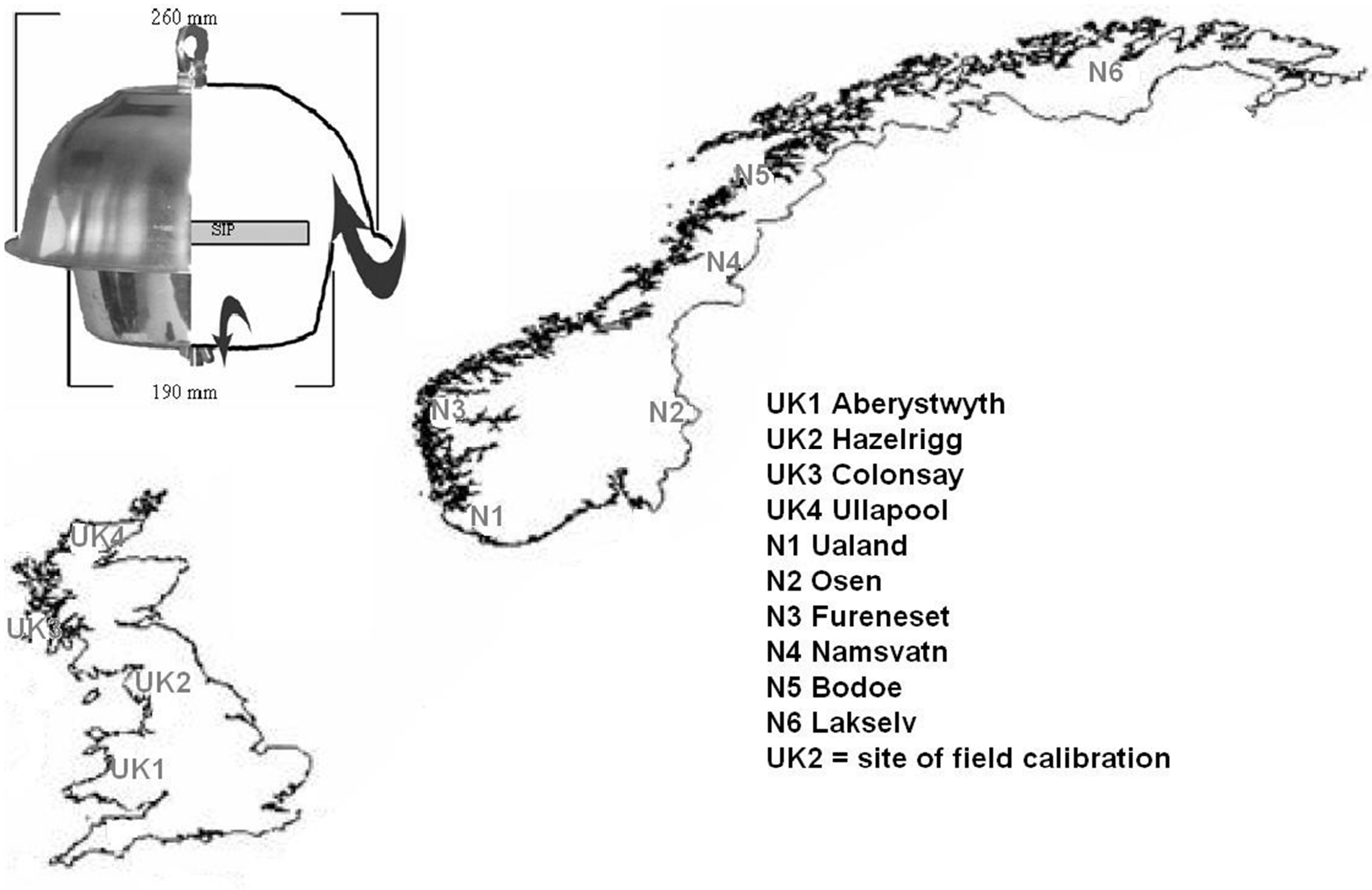
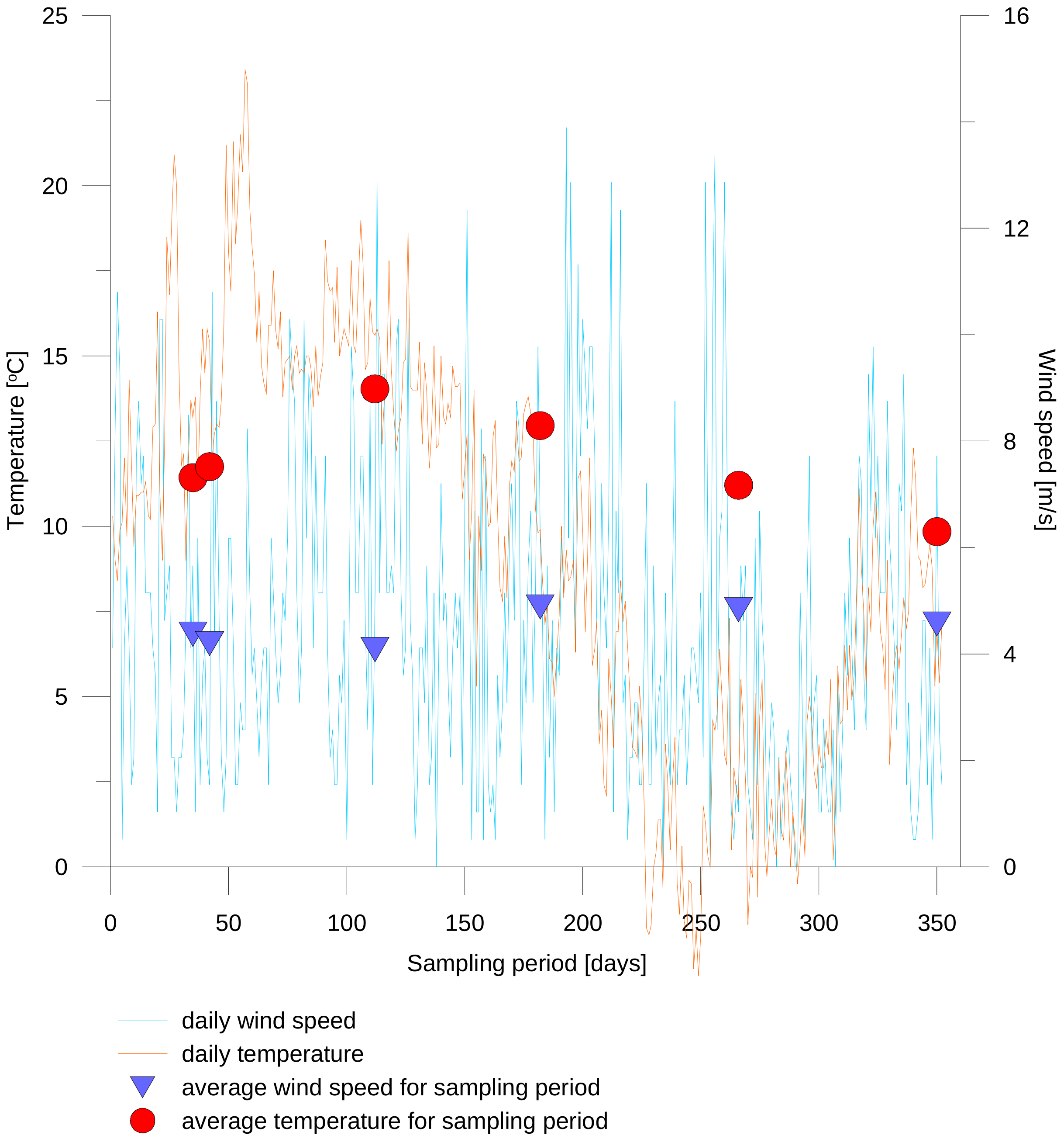
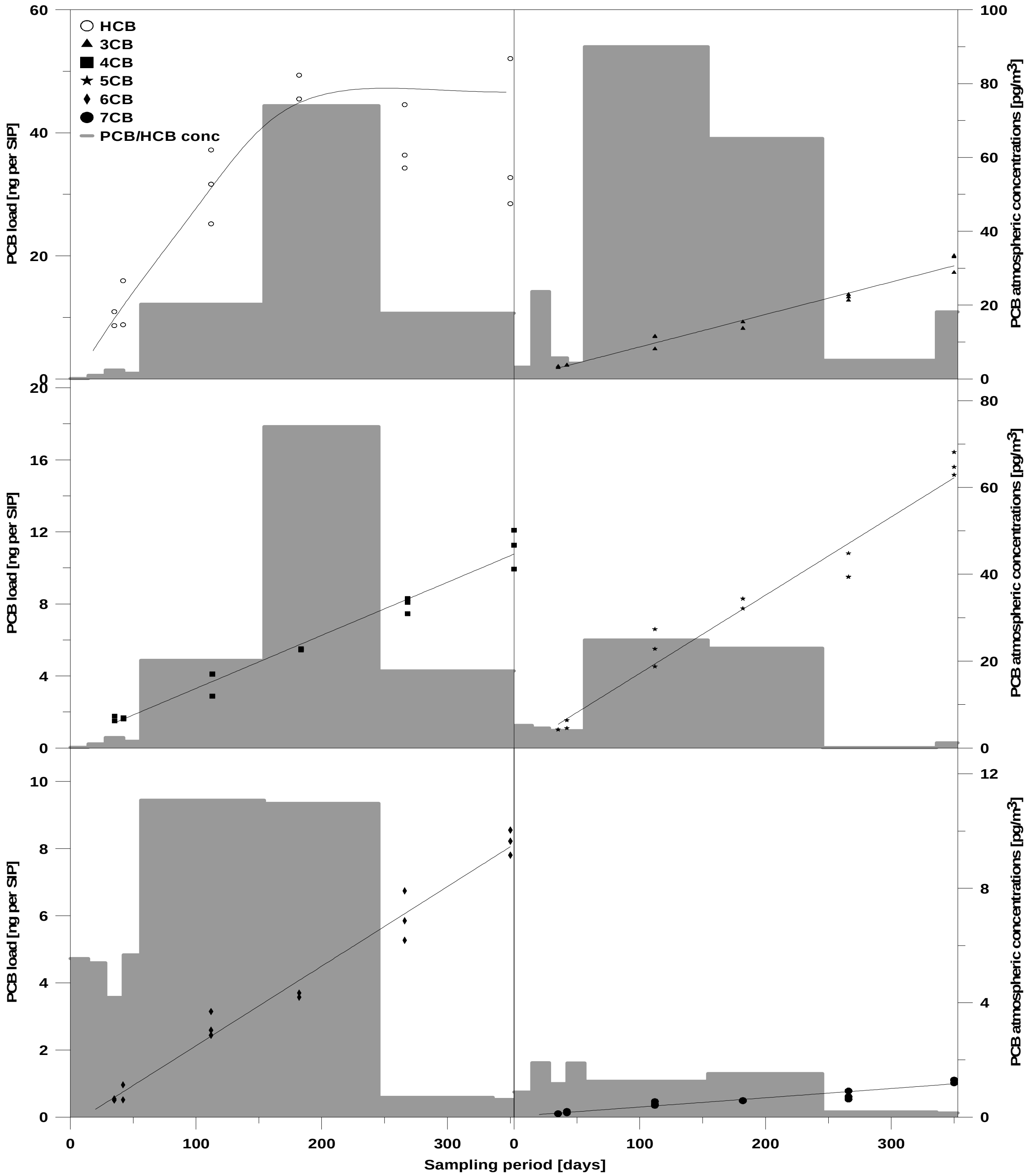
SI-Figure 1. Flying saucer device as sampling chamber for SIPs deployed at 10 sites in the UK and Norway



SI-Figure 2. Meteorological information for the sampling period May 2009 – April 2010



SI-Figure 3. POP loads plotted against the sampling period and the air concentrations monitored with the active air sampler for HCB and PCB homologue groups



SI-Table 1. Sampling rate ranges *R* reported for different compounds and PAS

(PUF = polyurethane foam disk, FSD = flying saucer device, SPMD = semi-permeable membrane device, SIP = sorbent-impregnated PUF disk, XAD = polymeric resin)

Compound	***R* range [m^3/day]**	**PAS**	**Source**
PCBs	2.0 – 8.3	PUF, no shelter, indoors	Shoeib and Harner 2002[1]
PCBs	4.5 – 14.6	PUF in FSD, wind tunnel	Tuduri et al. 2006[2]
PCBs	0.6 – 1.6	PUF in FSD, indoors	Hazrati et al. 2007[3]
PCBs	2.9 – 7.3	PUF in FSD, outdoors	Chaemfa et al. 2008[4]
PCBs	2.5 – 9.8	PUF (high density) in FSD, outdoors	Chaemfa et al. 2009[5]
PCBs	3.5 – 12	PUF (low density) in FSD, outdoors	Chaemfa et al. 2009[5]
PCBs	3.4 – 9.9	SPMD, no shelter, indoors	Shoeib and Harner 2002 [1]
PCBs	3.5 – 12	SPMD in Stevenson screen, outdoors	Ockenden et al. 1998 [6]
PCBs	2.3 – 12.5	SIP in FSD, outdoors	Genualdi et al. 2010 [7]
PBDEs	1.2 – 10.7	PUF (high density) in FSD, outdoors	Chaemfa et al. 2009[5]
PBDEs	1.4 – 12.5	PUF (low density) in FSD, outdoors	Chaemfa et al. 2009[5]
PBDEs	1.8 – 5.7	PUF in FSD, outdoors	Chaemfa et al. 2009[8]
HCB	7.0 ± 1.8	PUF in FSD, outdoors	Chaemfa et al. 2008[4]
OC pesticides	1	XAD sampler	Daly et al. 2007[9]
OC pesticides	0.52	XAD sampler	Shen et al. 2005[10]
OC pesticides	2.1	XAD sampler	Gouin et al. 2008[11]
PFCs	1.4 – 4.6	SIP in FSD, indoors	Shoeib et al. 2008[12]
PFCs	1.4 – 1.5	PUF in FSD, indoors	Shoeib et al. 2008[12]
Siloxanes	2.3 – 9.2	SIP in FSD, outdoors	Genualdi et al. 2011[13]

SI-Table 2. POP ranges and approximate sampling rates *R* for selected POPs

POPs	POPs monitored on SIPs [pg]			*R* [m^3/day]		
PCB 18	870	-	7716	2.16	±	0.35
PCB 22	343	-	2926	0.36	±	0.04
PCB 28/31	843	-	6099	0.90	±	0.11
PCB 41/64	254	-	3104	0.94	±	0.13
PCB 44	329	-	3062	2.85	±	2.77
PCB 49	275	-	2528	5.62	±	4.81
PCB 52	490	-	5200	3.19	±	0.35
PCB 60/56	192	-	1429	0.76	±	0.10
PCB 70	227	-	2755	2.09	±	0.31
PCB 74	274	-	2689	0.88	±	0.17
PCB 87	429	-	1642	2.24	±	0.22
PCB 90/101	355	-	4388	2.58	±	0.25
PCB 95	314	-	3876	1.62	±	0.74
PCB 99	82	-	1926	3.29	±	0.48
PCB 105	141	-	542	3.26	±	0.59
PCB 110	191	-	3000	2.95	±	1.56
PCB 118	63	-	1555	2.98	±	0.43
PCB 123	11	-	246	0.47	±	0.11
PCB 138	169	-	1570	2.62	±	0.46
PCB 141	40	-	882	2.36	±	0.81
PCB 149	239	-	2090	3.03	±	0.31
PCB 151	72	-	876	2.79	±	0.23
PCB 153/132	193	-	3707	4.18	±	0.34
PCB 174	76	-	189	7.73	±	0.22
PCB 180	56	-	366	3.62	±	0.34
PCB 183	28	-	151	1.40	±	0.33
PCB 187	45	-	425	3.52	±	0.35
PCB 199	2	-	21		NA	
PCB 203	44	-	81	6.26	±	1.46
BDE 47	41	-	1182	2.31	±	0.27
BDE 49	17	-	653	5.93	±	0.98
BDE 99	60	-	675	0.72	±	0.16
BDE 100	14	-	139	0.66	±	0.09
BDE 153	30	-	548	1.66	±	0.36

SI-Table 3. Monitored and estimated PCB concentrations at the field sites in the UK and Norway

SIP monitored concentrations [pg/m^3]

Sites	3CBs	4CBs	5CBs	6CBs	7CBs	8CBs	ΣCBs
UK1	11.3	5.7	7.3	3.5	0.7	0.003	28.6
UK2	22.5	14.6	13.4	5.8	1.2	0.007	57.5
UK3	7.2	4.1	3.5	2.0	0.4	0.002	17.2
UK4	6.0	2.2	1.6	0.9	0.2	NA	10.8
N1	7.2	3.5	4.1	2.1	0.3	0.001	17.2
N2	4.9	1.4	2.0	1.2	0.3	0.001	9.7
N3	2.9	1.5	1.8	0.9	0.3	0.001	7.3
N4	5.4	1.9	1.9	1.2	0.3	0.001	10.7
N5	4.0	2.1	1.7	1.1	0.2	0.001	9.2
N6	2.1	1.3	1.3	0.7	0.1	NA	5.4

Estimated concentrations [pg/m^3]

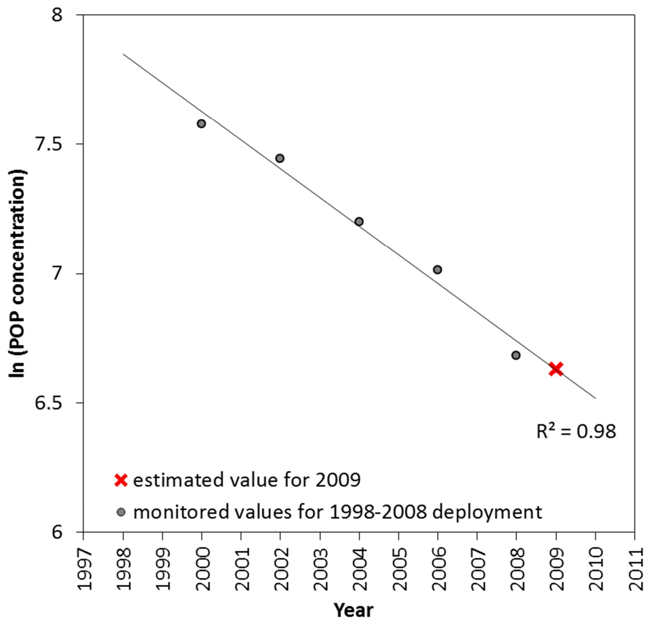
Sites	3CBs	4CBs	5CBs	6CBs	7CBs	8CBs	ΣCBs
UK1	1.3	2.1	5.0	3.9	0.9	0.030	13.3
UK2	2.7	6.4	14.3	10.0	2.4	0.170	36.0
UK3	1.6	1.4	1.9	1.5	0.6	0.317	7.2
UK4	1.6	1.2	1.5	1.0	0.2	0.026	5.5
N1	0.9	2.9	4.7	4.5	1.1	0.076	14.2
N2	0.6	1.3	1.8	0.9	0.2	0.026	4.8
N3	0.0	1.5	1.8	0.9	0.1	NA	4.4
N4	1.1	2.0	1.7	1.2	0.2	0.082	6.4
N5	0.5	1.5	2.4	1.2	0.1	0.196	5.9
N6	2.9	1.1	1.2	0.5	0.1	NA	5.9

Electronic Supplementary Material (ESI) for Journal of Environmental Monitoring

SI-Text 1. Estimation of atmospheric concentrations for background sites

SIPs were deployed at passive air sampling sites that were established in 1994. Two year average values for atmospheric POP concentrations are available for the period of 1998-2008[14-17] derived from SPMDs. The atmospheric concentrations were calculated from SPMD loads and site specific sampling rates considering the annual mean temperature[1] and the possible equilibrium approach for the lighter congeners.

It was established that the POP concentrations for 1998 – 2008 follow a first order decline in the atmosphere. The slope and intercept of the natural logarithm of the atmospheric concentrations versus the sampling years were determined for each individual site. It was assumed that the atmospheric decline rate for 1998-2009 is not different from the decline rate observed 1998 – 2008. Therefore the average atmospheric concentrations for the sampling period of summer 2008 – 2009 were estimated from the slopes and intercept for the period of 1998 – 2008 (as illustrated below).



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