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Supplementary material to "**Iodine emissions from the sea ice of the Weddell Sea" Atkinson et al**

Table S1. Previous measurements of iodocarbons in polar and sub-polar waters (all values in pM) with date of publication.

Date	Author(s)	Compound	Location	Mean	Range
1992	Klick and Abrahamsson	CH_2ICl	Southern Ocean (Atlantic)	1.4	<23
		1-C_3H_7I		0.8	<16
		2-C_3H_7I		0.7	<21
1992	Moore and Tokarczyk	CH_3I	NW Atlantic 60-32°N		<0.7-61
		CH_2ICl			0.57-22
1992	Reifenhauser and Heumann	CH_3I	Antarctic 60-66°S	18	1.4-53
		CH_2ICl			<1.4
1993	Schall and Heumann	CH_3I	Arctic algae field	7	<0.07 - 38
		CH_2I_2		23	<2 - 102
		CH_2ICl		0.4	<0.02 -1
		1-C_3H_7I		7	<0.47 - 29
		2-C_3H_7I		9	<0.55 – 50
		CH_3I	Arctic coastal water 78°N	3.5	<0.07-11
		CH_2ICl		1.7	0.6 - 4
		CH_2I_2		6.3	<0.9-13
		1-C_3H_7I		2.4	0.35 – 6
		2-C_3H_7I		3.5	0.4 – 13
1995	Fogelqvist and Tanhua	CH_3I	Weddell Sea ice pore water	38	35 – 41
		C_2H_5I		27.3	26-18
		1-C_3H_7I		235	218-259
		2-C_3H_7I		7	
1996	Happell and Wallace	CH_3I	Greenland/Norwegian seas	0.43	0.2-0.9
1997	Schall et al	CH_3I	Southern Ocean 62-72°S	2.1	0.07-9
		CH_2ICl		0.6	0.05-1.8
		CH_2I_2		<0.8	
		1-C_3H_7I		1.2	<0.3-1.9
2005	Chuck et al	CH_3I	Atlantic 50N-65S	4.3	0.25-19
		CH_2ICl		2.5	0.09-14.2
2007	Carpenter et al	CH_2I_2	Southern Ocean (Weddell)	4.2	1.7-8.2
		CH_2IBr		0.8	0.2-1.4
		CH_2ICl		0.7	0.2-2.4

Table S2. Previous measurements of iodocarbons in the polar atmosphere, in pptv, with date of publication

Date	Author(s)	Compound	Location	Mean	Range
1982	Rasmussen	CH_3I	Global	2	1-3
1992	Reifenhauser and Heumann	CH_3I	Antarctic 60-66°S	2.4	0.6-8
1993	Schall and Heumann	CH_3I	Arctic	1	<0.004-2
		CH_2I_2		0.46	<0.08-1
		CH_2ICl		0.07	<0.004-0.2
		$1\text{-}C_3H_7I$		0.2	<0.02-0.3
		$2\text{-}C_3H_7I$		2.0	<0.02-6
2003	Carpenter et al	CH_3I	Cape Grim	2.6	1.0 – 7.3
		CH_2ICl		0.04	0.0 – 0.4
2005	Carpenter et al	CH_2I_2	Hudson Bay, Quebec	1.4	<3.3
		CH_2IBr		3.7	<3.7
		CH_2ICl			<0.4
2010	Mahajan et al	CH_3I	Hudson Bay, Quebec		<3.8
		CH_2IBr			<0.1
		CH_2ICl			<0.17

Table S3. Particle diameters (nm) at the centre of each bin of the differential mobility analyser used to measure particle size spectra. There are 44 bins, with widths of 10% of their value up to 100 nm rising to 15% at 875 nm.

9.8	10.7	11.7	12.8	13.9	15.2	16.6	18.2	19.9	21.7	23.8	26.0	28.5	31.2	34.1
37.4	41.0	45.0	49.4	54.2	59.6	65.6	72.2	79.6	87.8	97.0	107.3	118.9	132.0	146.7
163.5	182.6	204.5	229.6	258.6	292.1	331.1	376.6	429.8	492.2	565.7	652.2	754.2	874.8	

Table S4. Iodide and iodate concentrations in two Weddell Sea water samples.

Date	iodide, nM	error, nM	iodate, nM	error, nM	total, nM	error, nM	iodide / iodate	error, nM
16/02/2009	25.1	3.2	364.1	9.7	389.2	50.4	0.069	0.009
24/02/2009	97.6	6.3	351.2	9.6	449.8	31.4	0.278	0.019

Table S5. Saturation anomalies (%) based on simultaneous air and water concentrations

	CH_3I	C_2H_5I	$CHBr_3$	CH_2ICl	$2\text{-}C_3H_7I$	$CHBr_2Cl$	$1\text{-}C_3H_7I$	CH_2Br_2
ave	351	247	-21	-64	595	-37	479	95
max	1683	674	31	-32	1761	240	715	954
min	-38	-464	-67	-97	4	-305	243	-77

Table S6. Results from flux calculations on the dates where simultaneous air and water measurements were made, all values are in nmol m^{-2} d^{-1}.

	CH_3I	C_2H_5I	$CHBr_3$	CH_2ICl	$2\text{-}C_3H_7I$	$CHBr_2Cl$	$1\text{-}C_3H_7I$	CH_2Br_2
31/01/2009	0.012	1.54	-11.5	-15.2	0.372	0.773	0.811	-1.48
01/02/2009	3.82	2.80	-129	-0.424	0.137	-62.5	3.78	-38.8
03/02/2009	0.596	2.18	-81.4	0.000	1.91	0.531	0.000	-12.3
09/02/2009	0.667	2.25	110	0.000	4.76	2.77	3.25	-7.62
12/02/2009	-0.101	-0.053	-9.32	0.000	0.008	-0.010	0.607	-2.94
16/02/2009	0.511	0.175	-34.7	-0.828	-0.097	-2.23	0.000	5.82
20/02/2009	0.052	0.844	1.86	0.124	0.326	-1.11	0.431	0.020
24/02/2009	0.274	1.31	-6.73	0.000	0.000	2.31	1.15	-10.0
26/02/2009	-0.153	2.28	62.8	1.179	0.000	0.878	0.000	13.2
05/03/2009	0.463	2.00	32.6	2.890	0.000	4.64	0.000	12.7
Average	0.614	1.54	-6.60	-1.23	0.742	-5.40	1.00	-4.15

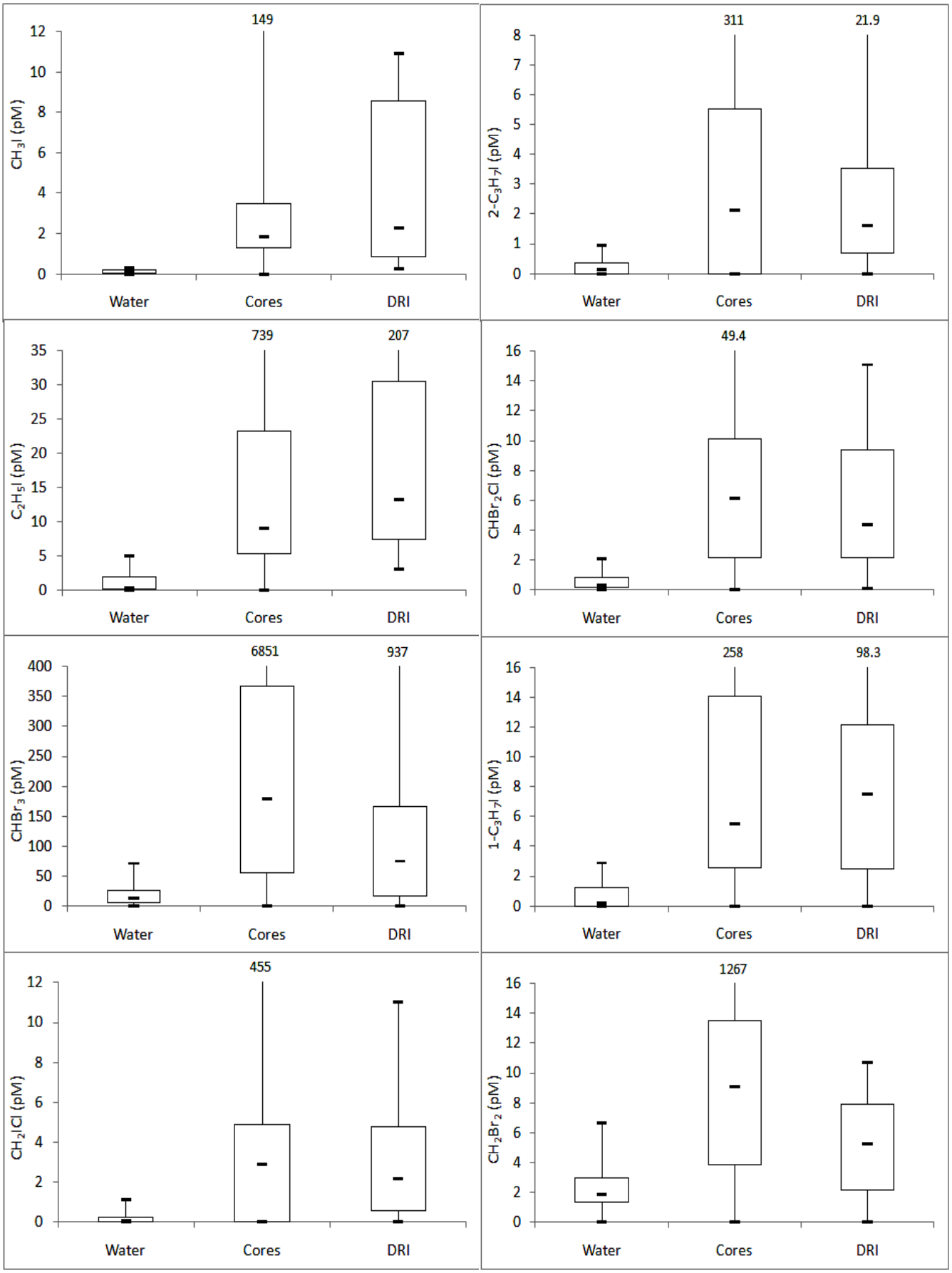

Fig. S1. Box whisker plots of halocarbon concentrations in all water (n=18), and ice core (n=43) and DRI (n=12) samples during the campaign. Boxes represent 20th to 80th percentiles and the median is shown by the dash within the box. Where no cap is present on the range bars, the value is off the scale and given above.

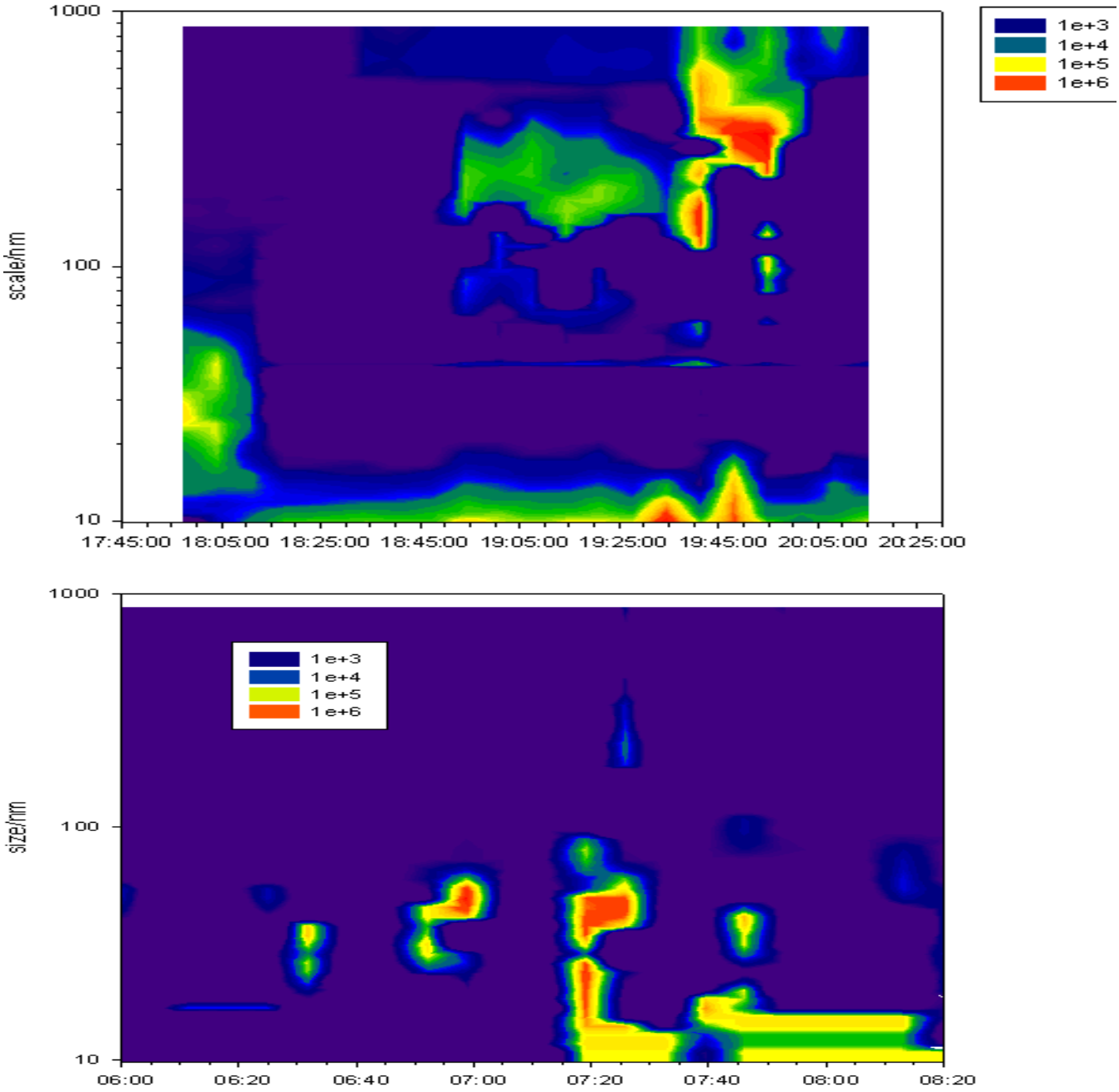

Fig. S2. Sample particle spectra: (upper) on 3 Feb, showing clear evidence of pollution from the ship smoke at diameter 300 nm at 19:50; (lower) on 21 Feb showing background amounts at diameter 10 nm before 07:00. Examination of the data file for 21 Feb shows particle densities at diameter 12.8 nm of less than 10 cm^{-3} between 06:40 and 07:00.