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 ₂ I ₂	Southern Ocean (Atlantic)	1.4	<23
		1-C ₃ H ₇ I		0.8	<16
		2-C ₃ H ₇ I		0.7	<21
1992	Moore and Tokarczyk	CH ₃ I	NW Atlantic 60-32°N		<0.7-61
		CH ₂ I ₂			0.57-22
1992	Reifenhauser and Heumann	CH ₃ I	Antarctic 60-66°S	18	1.4-53
		CH ₂ I ₂			<1.4
1993	Schall and Heumann	CH ₃ I	Arctic algae field	7	<0.07 - 38
		CH ₂ I ₂		23	<2 - 102
		CH ₂ I ₂		0.4	<0.02 - 1
		1-C ₃ H ₇ I		7	<0.47 - 29
		2-C ₃ H ₇ I		9	<0.55 - 50
		CH ₃ I	Arctic coastal water 78°N	3.5	<0.07-11
		CH ₂ I ₂		1.7	0.6 - 4
		CH ₂ I ₂		6.3	<0.9-13
		1-C ₃ H ₇ I		2.4	0.35 - 6
		2-C ₃ H ₇ I		3.5	0.4 - 13
1995	Fogelqvist and Tanhua	CH ₃ I	Weddell Sea ice pore water	38	35 - 41
		C ₂ H ₅ I		27.3	26-18
		1-C ₃ H ₇ I		235	218-259
		2-C ₃ H ₇ I		7	
1996	Happell and Wallace	CH ₃ I	Greenland/Norwegian seas	0.43	0.2-0.9
1997	Schall et al	CH ₃ I	Southern Ocean 62-72°S	2.1	0.07-9
		CH ₂ I ₂		0.6	0.05-1.8
		CH ₂ I ₂		<0.8	
		1-C ₃ H ₇ I		1.2	<0.3-1.9
2005	Chuck et al	CH ₃ I	Atlantic 50N-65S	4.3	0.25-19
		CH ₂ I ₂		2.5	0.09-14.2
2007	Carpenter et al	CH ₂ I ₂	Southern Ocean (Weddell)	4.2	1.7-8.2
		CH ₂ I ₂ Br		0.8	0.2-1.4
		CH ₂ I ₂ Cl		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 ₃ I	Global	2	1-3
1992	Reifenhauser and Heumann	CH ₃ I	Antarctic 60-66°S	2.4	0.6-8
1993	Schall and Heumann	CH ₃ I	Arctic	1	<0.004-2
		CH ₂ I ₂		0.46	<0.08-1
		CH ₂ ICl		0.07	<0.004-0.2
		1-C ₃ H ₇ I		0.2	<0.02-0.3
		2-C ₃ H ₇ I		2.0	<0.02-6
2003	Carpenter et al	CH ₃ I	Cape Grim	2.6	1.0 – 7.3
		CH ₂ ICl		0.04	0.0 – 0.4
2005	Carpenter et al	CH ₂ I ₂	Hudson Bay, Quebec	1.4	<3.3
		CH ₂ IBr		3.7	<3.7
		CH ₂ ICl			<0.4
2010	Mahajan et al	CH ₃ I	Hudson Bay, Quebec		<3.8
		CH ₂ IBr			<0.1
		CH ₂ ICl			<0.17

Table S3. 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 S4. Saturation anomalies (%) based on simultaneous air and water concentrations

	CH ₃ I	C ₂ H ₅ I	CHBr ₃	CH ₂ ICl	2-C ₃ H ₇ I	CHBr ₂ Cl	1-C ₃ H ₇ I	CH ₂ Br 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 S5. 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 ₃ I	C ₂ H ₅ I	CHBr ₃	CH ₂ ICl	2-C ₃ H ₇ I	CHBr ₂ Cl	1-C ₃ H ₇ I	CH ₂ Br 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.