Supplementary Material

Benthic deposition and burial of total mercury and methylmercury estimated using thorium isotopes in the high-latitude North Atlantic

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Table S1 The bottom conditions of the sediment sites, the sediment porosity and the specific activities of excess ^{234}Th ($^{234}Th_{ex}$) and surface-bound ^{228}Th

Station	Depth (cm)	Porosity	$^{234}Th_{ex}$ (dpm/g)*	^{228}Th (dpm/g)
Station 8	Core water		108±15.3	—
Water depth	0-0.5	0.78	1.45±0.22	0.397±0.010
2130 m	0.5-1	0.78	-0.20±0.16	
Temperature	1-2	0.78	0.04±0.16	0.252±0.008
1.16 ℃	2-3	0.79	-0.43±0.13	0.535±0.019
Salinity 34.9	3-4	0.79	-0.63±0.17	—
DO 300 μmol/L	4-5	0.79	-0.75±0.22	0.451±0.016
SPM: 9.93 g/m^3	6-7	0.80	-0.06±0.19	0.694±0.022
	8-9	0.81	—	0.489±0.014
Station 10	Core water		226±13.7	—
Water depth	0-0.5	0.75	0.18±0.12	0.234±0.007
1230 m	0.5-1		-0.20±0.12	
Temperature	1-2	0.76	0.39±0.10	0.271±0.009
1.08 ℃	2-3	0.76	0.48±0.13	0.385±0.014
Salinity 34.8	3-4	0.77	-0.62±0.13	—
DO 299 μmol/L	4-5	0.77	-0.51±0.13	0.416±0.015
SPM: 20.7 g/m^3	6-7	0.78	-0.54±0.16	0.284±0.010
	8-9	0.76	—	0.220±0.011
Station 15	Core water		62.5±14.2	—
Water depth	0-0.5	0.80	3.54±0.26	0.728±0.031
312 m	0.5-1	0.79	0.97±0.23	
Temperature	1-2	0.80	0.18±0.23	0.558±0.027
1.30 ℃	2-3	0.81	0.33±0.20	0.516±0.028
Salinity 34.8	3-4	0.81	0.24±0.18	—
DO 301 μmol/L	4-5	0.81	0.34±0.15	0.465±0.023
SPM: 8.04 g/m^3	6-7	0.80	-0.84±0.22	0.482±0.024
	9-10	0.78	—	0.510±0.023
Station 16	Core water		66.1±6.3	—
Water depth	0-0.5	0.88	4.13±0.37	1.433±0.041
495 m	0.5-1	0.87	2.31±0.26	
Temperature	1-2	0.86	2.09±0.21	0.582±0.019
1.31 ℃	2-3	0.85	0.30±0.20	0.605±0.032
Salinity 34.9	3-4	0.85	-0.09±0.22	—
DO 302 μmol/L	4-5	0.81	0.04±0.18	0.670±0.023
SPM: 26.6 g/m^3	6-7	0.85	-0.49±0.22	0.648±0.020
	9-10	0.84	—	0.443±0.016
Station 17	Core water		44.6±8.6	—
Water depth	0-0.5	0.78	2.46±0.24	0.892±0.025
819 m	0.5-1	0.81	0.17±0.14	

Temperature	1-2	0.80	0.14±0.15	0.442±0.015
0.17 ℃	2-3	0.80	0.04±0.09	0.297±0.011
Salinity 34.9	3-4	0.79	0.14±0.09	—
DO 308 μmol/L	4-5	0.79	0.00±0.10	0.251±0.010
SPM: 13.4 g/m^3	6-7	0.79	0.30±0.06	0.279±0.010
	9-10	0.80	—	0.300±0.011
Station 21	Core water		98.9±9.4	—
Water depth	0-0.5	0.84	2.77±0.27	1.021±0.030
505 m	0.5-1	0.83	1.59±0.15	
Temperature	1-2	0.83	0.28±0.14	0.710±0.023
0.89 ℃	2-3	0.83	-0.13±0.16	0.423±0.016
Salinity 34.9	3-4	0.83	-0.19±0.17	—
DO 299 μmol/L	4-5	0.82	-0.59±0.18	0.381±0.014
SPM: 9.41 g/m^3	6-7	0.81	-0.46±0.46	0.319±0.011
	9-10	0.81	—	0.372±0.013
Station 30	Core water		116±6.0	—
Water depth	0-0.5	0.84	0.41±0.29	0.857±0.025
1480 m	0.5-1		9.27±0.41	
Temperature	1-2	0.84	-0.34±0.16	0.311±0.012
-0.73 ℃	2-3	0.85	-0.36±0.18	0.252±0.012
Salinity 34.9	3-4	0.86	0.10±0.17	—
DO 293 μmol/L	4-5	0.84	-0.35±0.19	0.265±0.013
SPM: 23.2 g/m^3	6-7	0.84	—	0.173±0.009
	9-10	0.84	—	0.190±0.010
Station 36	0-1	0.79	—	0.152±0.005
Water depth	1-2	0.78	—	0.157±0.007
996 m	2-3	0.78	—	0.147±0.007
Temperature	4-5	0.78	—	0.134±0.005
1.17 ℃	6-7	0.78	—	0.129±0.004
Salinity 34.9	9-10	0.79	—	0.175±0.005
DO 291 μmol/L				

* error = 1σ

— no sample.

Table S2 The decay coefficients fitted from the 'Exponential Decay' regression ($y = ae^{-bx}$) of the bulk $^{228}Th_{ex}$ profiles and $^{234}Th_{ex}$ profiles.

Stations	b-$_{234}$ (cm^{-1})	b-$_{228}$ (cm^{-1})
Station 15	-2.537±0.449 (R^2=0.972)	-0.943±0.065 (R^2=0.997)
Station 16	-0.825±0.205 (R^2=0.932)	-1.791±1.724 (R^2=0.467)
Station 17	-5.323±1.751 (R^2=0.976)	-1.519±0.110 (R^2=0.998)
Station 21	-1.379±0.276 (R^2=0.975)	-0.906±0.242 (R^2=0.956)
Station 30	-6.262±0.874 (R^2=1.000)	-1.786±0.161 (R^2=0.998)

Table S3 The concentrations of sediment total nitrogen (TN) and total organic carbon (TOC), and concentrations of MeHg and total Hg (THg) in the porewater (pw) and dry sediment.

	Sediment depth (cm)	TN (mg/g)	TOC (mg/g)	pw MeHg (pmol/L)	pw THg (pmol/L)	Sediment MeHg (pmol/g)	Sediment THg (pmol/g)
Station 08	Core water	0.73	10.51	0.17	0.26	0.182	111.8
	0-1	0.07	1.86	1.06	15.23	0.069	29.9
	1-2	0.07	1.55	0.58	11.32	0.061	61.2
	2-4	0.11	1.68	0.41	11.21	0.028	60.7
	4-6	0.17	1.51	0.03	6.96	0.029	65.7
	6-8	0.15	2.19	0.04	10.61	0.026	62.2
	8-10	—	—	0.49	29.66	—	102.0
Station 10	Core water	3.32	15.24	0.13	0.21	0.416	418.2
	0-1	0.12	1.28	0.22	10.39	0.022	19.4
	1-2	0.06	1.27	0.56	26.97	0.026	19.4
	2-4	0.08	1.32	0.75	20.03	0.026	19.9
	4-6	0.16	1.37	—	110.6	0.020	22.4
	6-8	0.16	1.24	—	32.87	0.018	23.4
	8-10	—	—	—	31.15	—	19.4
Station 15	Core water	0.66	12.83	0.23	1.69	3.636	109.6
	0-1	1.07	8.46	0.80	17.06	0.285	119.5
	1-2	1.11	8.20	—	—	0.232	125.9
	2-4	1.19	8.94	0.50	13.74	0.140	127.9
	4-6	0.98	7.25	0.96	19.53	0.142	99.1
	6-8	1.24	9.11	1.36	25.29	0.037	74.7
	8-9	—	—	—	—	—	50.3

Station 16	Core water	0.22	6.25	0.20	0.34	0.748	297.2
	0-1	1.88	14.19	0.81	14.73	0.171	187.2
	1-2	1.53	11.02	—	—	0.117	191.6
	2-4	1.45	11.41	0.66	10.75	0.009	181.7
	4-6	1.29	10.06	0.42	12.09	0.002	154.3
	6-8	1.08	8.77	1.45	47.64	0.007	126.9
	8-10	—	—	1.32	28.83	—	113.0
Station 17	Core water	7.32	10.62	0.07	1.14	0.737	215.8
	0-1	0.70	8.09	0.89	65.14	0.377	109.0
	1-2	0.71	6.22	0.78	58.00	0.351	104.5
	2-4	0.29	2.62	0.36	65.65	0.115	63.7
	4-6	0.19	1.95	3.67	210.6	0.319	36.8
	6-8	0.20	1.74	0.63	23.29	0.018	49.3
	8-10	—	—	—	36.56	—	47.3
Station 21	Core water	0.55	7.36	0.09	0.36	0.550	61.7
	0-1	1.28	8.61	0.22	17.55	0.732	185.7
	1-2	1.12	8.20	0.46	17.01	0.845	193.6
	2-4	1.09	8.72	0.24	13.04	0.824	166.6
	4-6	2.95	9.96	—	31.22	0.183	140.4
	6-8	1.24	7.67	0.07	12.45	0.224	126.9
	8-10	—	—	—	—	—	128.4
Station 30	Core water	0.25	11.51	0.21	0.45	0.810	331.1
	0-1	4.06	34.46	0.53	10.31	0.557	94.6
	1-2	3.15	26.65	0.52	14.14	0.681	104.0
	2-4	2.70	19.76	0.58	9.25	0.707	102.5
	4-6	2.68	20.74	0.24	5.94	0.637	93.6
	6-8	2.05	15.46	0.42	7.35	0.135	84.1
	8-10	—	—	—	—	—	84.1
Station 36	0-1	0.24	1.81	—	—	0.089	11.0
	1-2	0.09	1.57	—	—	0.086	10.0
	2-4	0.16	1.84	—	—	0.066	9.0
	4-6	0.58	4.83	—	—	0.156	13.4
	6-8	0.42	4.83	—	—	0.096	14.9
	8-10	—	—	—	—	—	12.4

—: no samples.

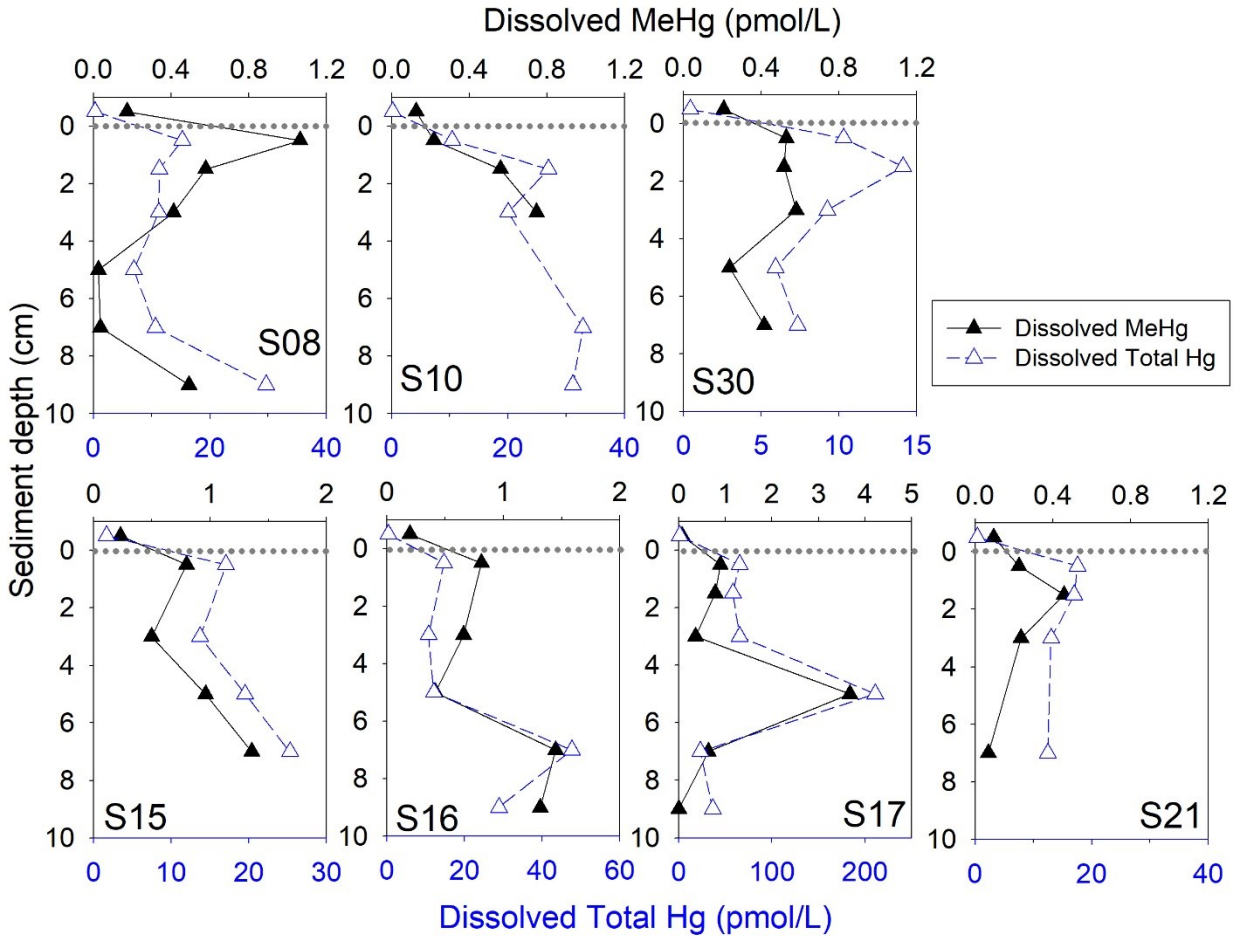

Fig. S1 Distributions of dissolved methylmercury (MeHg) and total mercury (Total Hg) in the core top water and in the sediment porewater

Fig. S2 A live sponge on the top of sediment core at Station 16

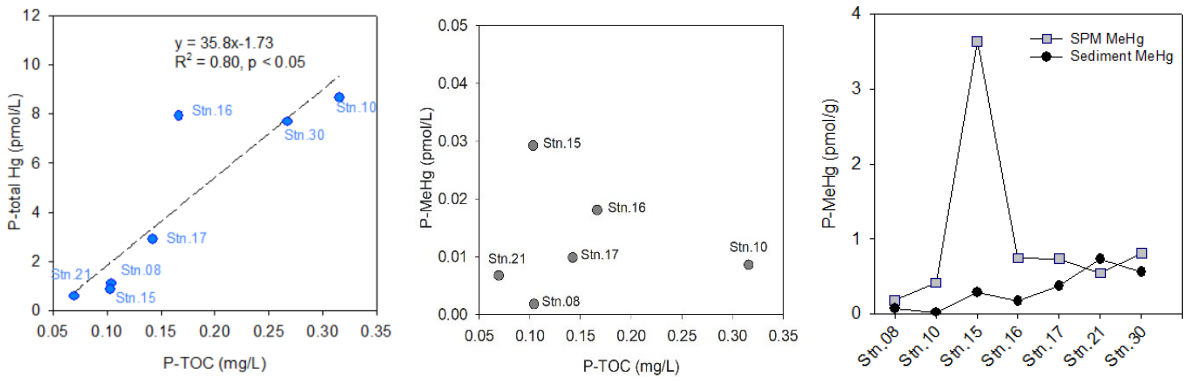

Fig. S3 Left panel: the correlation between the particulate total Hg and total organic carbon (TOC) in the core top water. Middle panel: the correlation between the particulate MeHg and total organic carbon (TOC) in the core top water. Right panel: the concentration of the particulate MeHg in the core water (squares) and in the top sediment (circles).

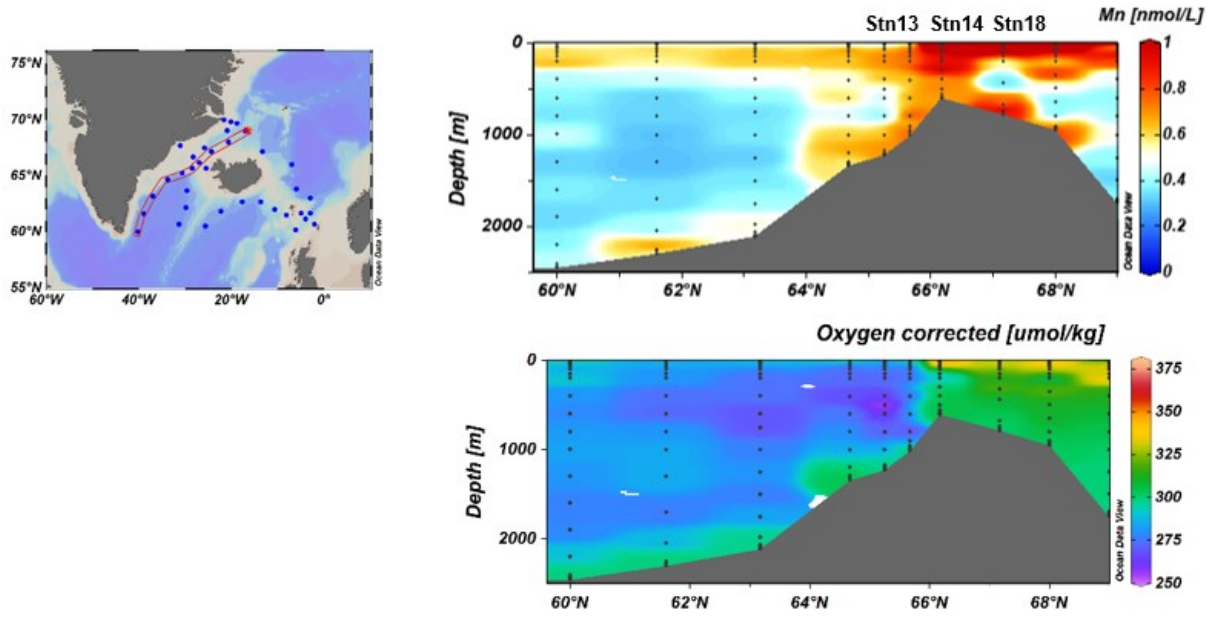

Fig. S4 Distributions of dissolved Mn (top) and dissolved oxygen (bottom) in water column along the East Greenland Current (marked with red square in the left panel).

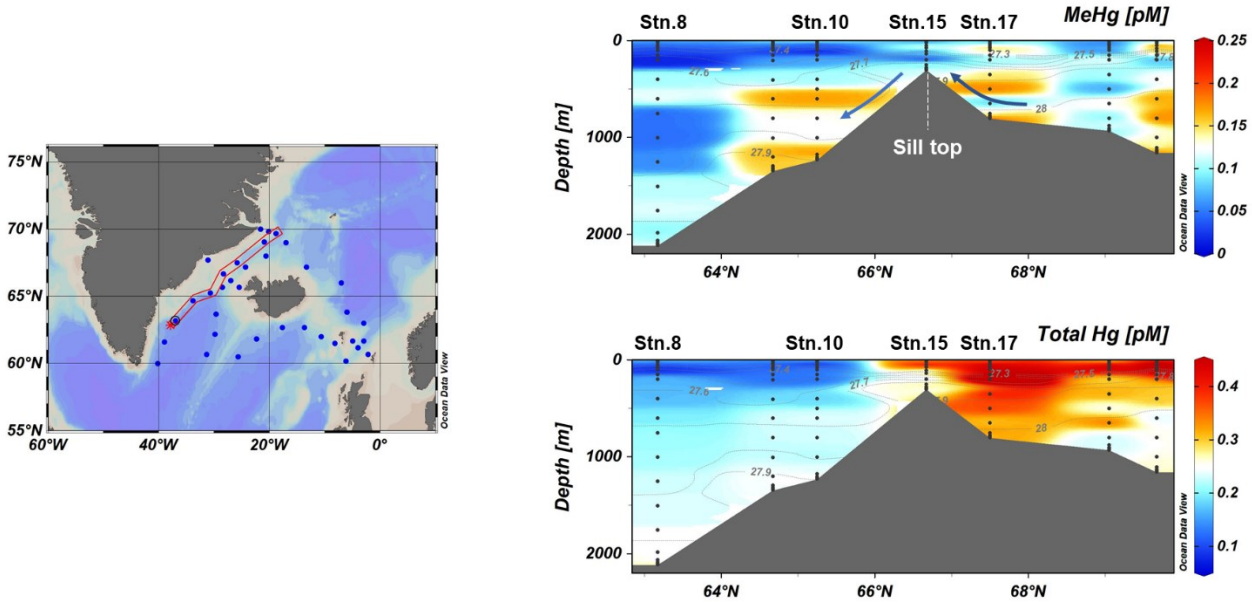

Fig. S5 Distributions of dissolved MeHg (upper panel) and total Hg (lower panel) in seawater along the Denmark Strait (left panel). The contour lines represent the potential density.