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Supplement of

The ^{226}Ra–Ba relationship in the North Atlantic during GEOTRACES-GA01

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Figure S1: Comparison of the vertical profiles of dissolved ^{226}Ra at stations 1 and 13 of the GA01 section (black and red dots, respectively) and station 1 of the GA03 section (U.S.-GEOTRACES; blue dots) off Portugal.

Figure S2: Vertical profiles of dissolved ^{226}Ra activities and dissolved Ba concentrations with the conservative ^{226}Ra and Ba vertical profiles derived from the OMP analysis, $^{226}Ra/Ba$ ratios, $Si(OH)_4$ concentrations, salinity (black line) and potential temperature (red line) for (a) the Iberian margin and the West European Basin, (b) the Iceland Basin and the Irminger Sea, (c) the Greenland margin, and (d) the Labrador Sea and the Newfoundland margin. Note that the scale may be different from one station to the other and the vertical axis was cut to 1000 m. The bottom is represented by the bottom axis.

Figure S3: Location of each endmember source water types (SWTs) used for the OMP analysis (black circles). The surface of the basin, *S*, used to calculate the fluxes is represented by the grey hatched area.

Figure S4: Satellite Chlorophyll-a concentrations (MODIS Aqua from http://oceancolor.gsfc.nasa.gov), in mg m^{-3} during the GA01 cruise in (a) May 2014 and (b) June 2014. The dashed line indicates the location of the GA01 section. Stations investigated in this work are indicated by dots. White dots indicate the stations investigated during the corresponding month.

Figure S5: Schematic box model used to calculate the input fluxes in the West European Basin: $F_{Sed\text{-}x}$ is the flux diffusing out of bottom sediments, $F_{Part\ \text{-}x}$ is the vertical flux of particles entering the box from above, $F_{Accumulation\text{-}x}$ is the flux of particles accumulating in the sediment and $F_{H\text{-}In\text{-}x}$ and $F_{H\text{-}Out\text{-}x}$ represent horizontal fluxes of dissolved species or particles coming in and out of the box due to transport, respectively. *x* is either ^{226}Ra or Ba.

Table S1: Characteristics and location of each endmember source water types (SWTs).

Table S2: ^{226}Ra activities, Ba concentrations, $^{226}Ra/Ba$ ratios, potential temperature and salinity at the different stations of the GA01 section.

Figure S1

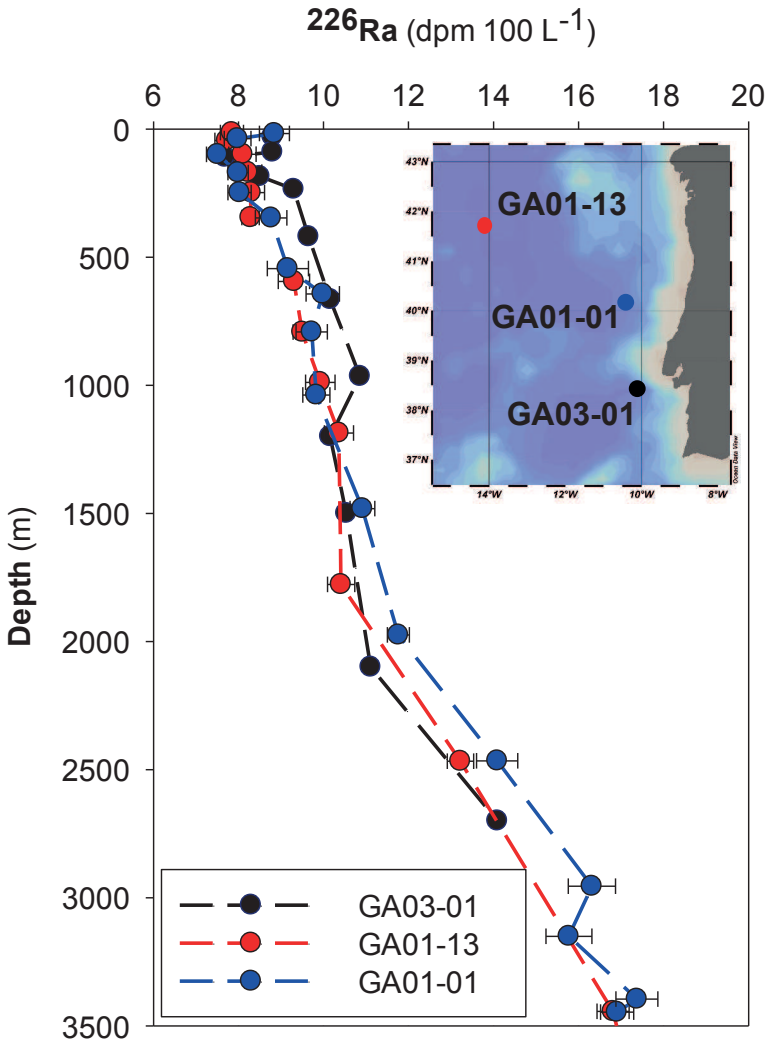
226Ra (dpm 100 L-1)
6
8
10
12
14
16
18
20
0
500
1000
1500
2000
2500
3000
3500
Depth (m)
GA01-13
GA01-01
GA03-01
GA03-01
GA01-13
GA01-01

Figure S2

A)

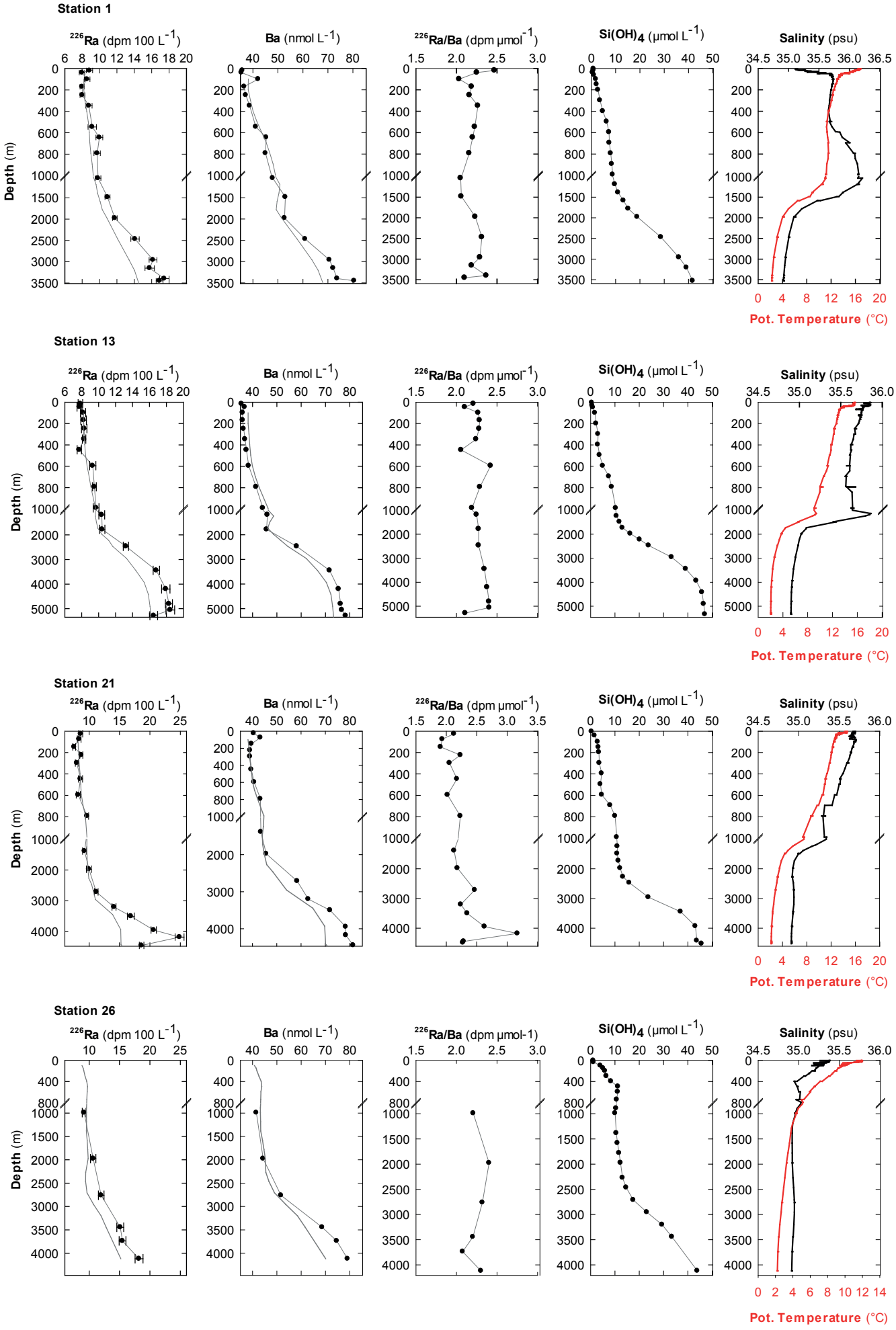
Station 1
Station 13
Station 21
Station 26
226Ra (dpm 100 L-1)
Ba (nmol L-1)
226Ra/Ba (dpm µmol-1)
Si(OH)4 (µmol L-1)
Salinity (psu)
Depth (m)
Pot. Temperature (°C)

Figure S2

B)

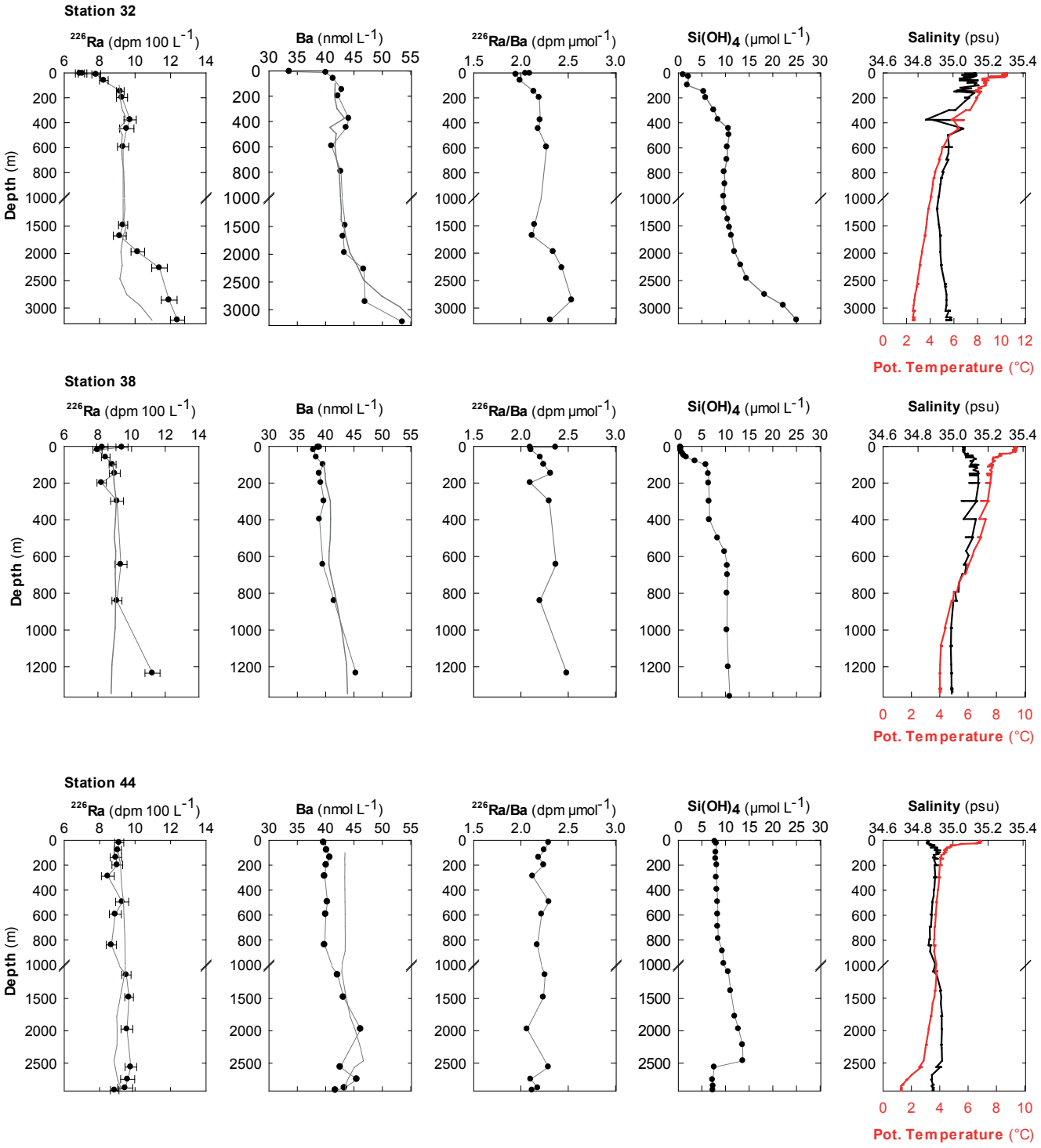
Station 32
^{226}Ra (dpm 100 L^{-1})
Ba (nmol L^{-1})
^{226}Ra/Ba (dpm µmol^{-1})
Si(OH)$_4$ (µmol L^{-1})
Salinity (psu)
Depth (m)
Pot. Temperature (°C)
Station 38
^{226}Ra (dpm 100 L^{-1})
Ba (nmol L^{-1})
^{226}Ra/Ba (dpm µmol^{-1})
Si(OH)$_4$ (µmol L^{-1})
Salinity (psu)
Depth (m)
Pot. Temperature (°C)
Station 44
^{226}Ra (dpm 100 L^{-1})
Ba (nmol L^{-1})
^{226}Ra/Ba (dpm µmol^{-1})
Si(OH)$_4$ (µmol L^{-1})
Salinity (psu)
Depth (m)
Pot. Temperature (°C)

Figure S2

C)

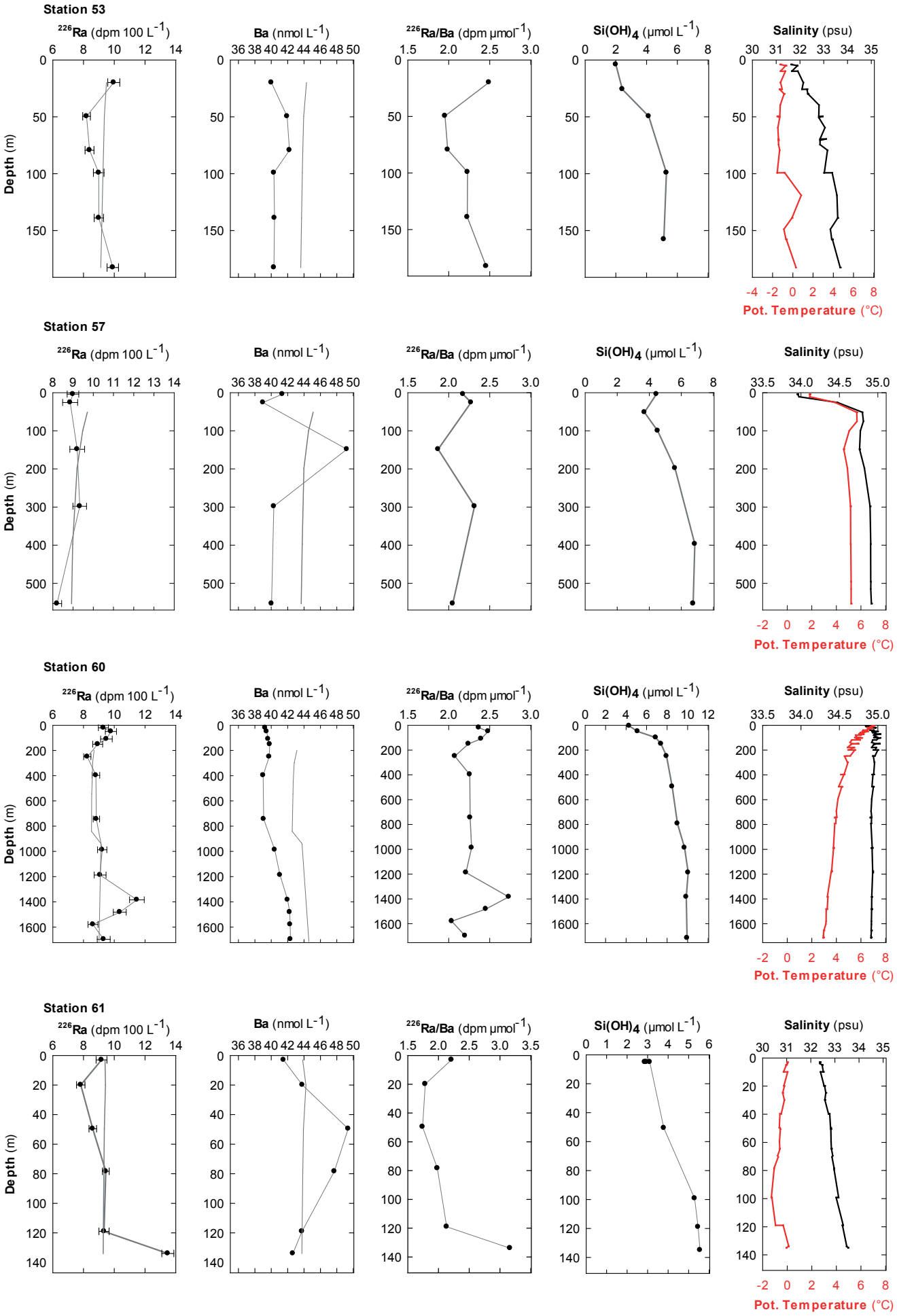
Station 53
Station 57
Station 60
Station 61
^{226}Ra (dpm 100 L^{-1})
Ba (nmol L^{-1})
^{226}Ra/Ba (dpm µmol^{-1})
Si(OH)$_4$ (µmol L^{-1})
Salinity (psu)
Depth (m)
Pot. Temperature (°C)

Figure S2

D)

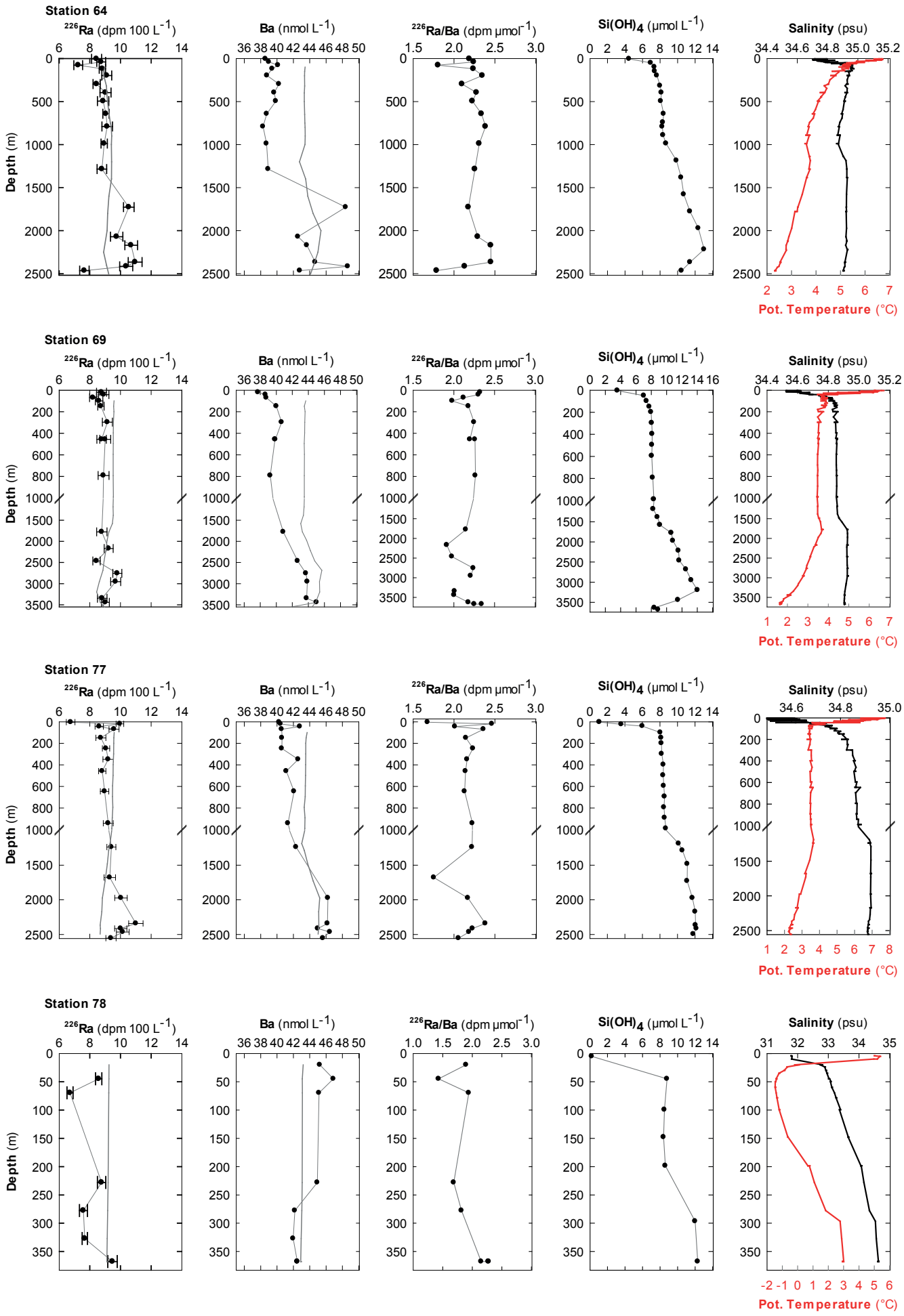
Station 64
Station 69
Station 77
Station 78
226Ra (dpm 100 L-1)
Ba (nmol L-1)
226Ra/Ba (dpm µmol-1)
Si(OH)4 (µmol L-1)
Salinity (psu)
Depth (m)
Pot. Temperature (°C)

Figure S3

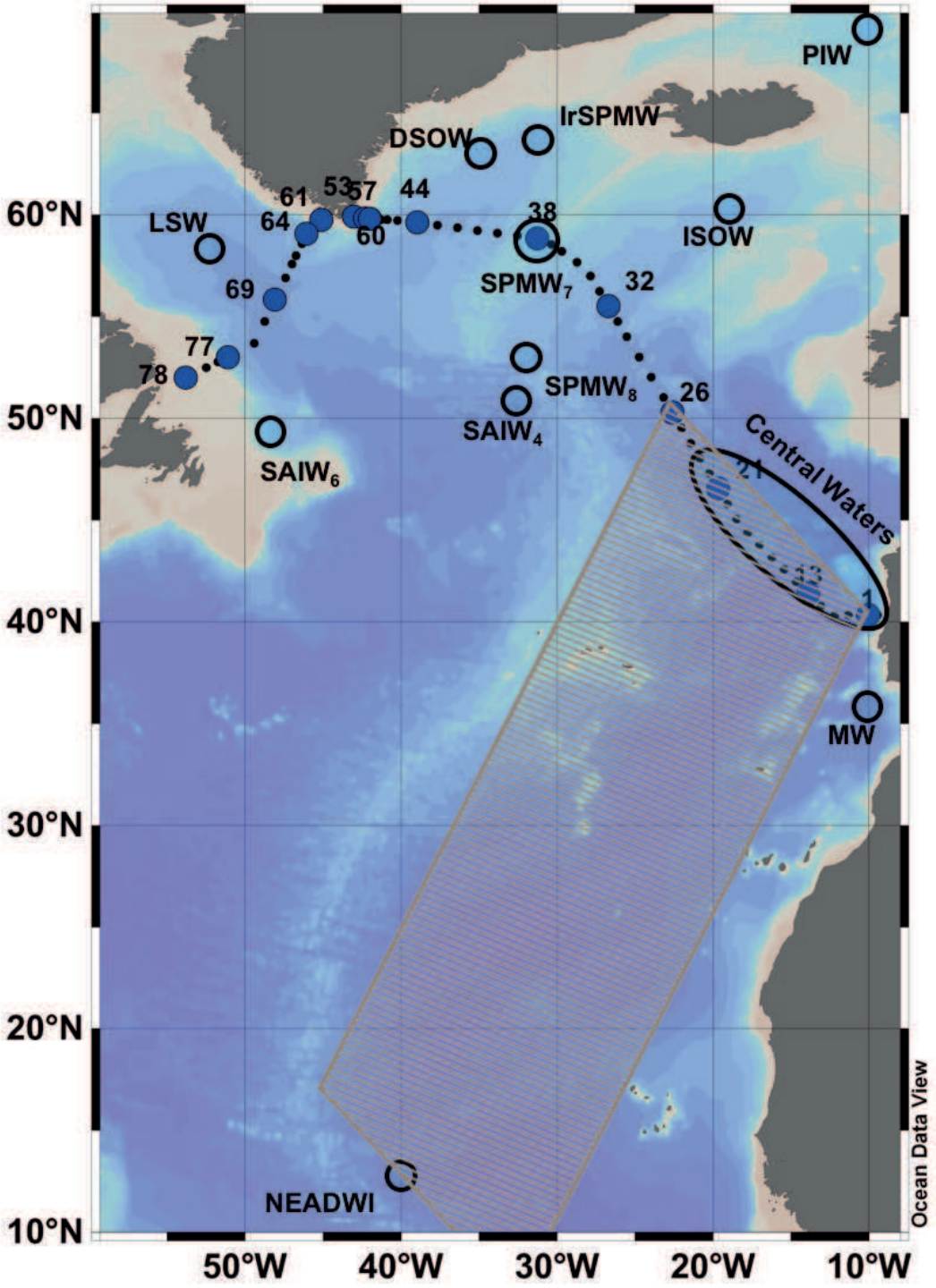
PIW
IrSPMW
DSOW
61
53
57
44
64
60
38
LSW
ISOW
69
SPMW7
32
77
78
SPMW8
26
SAIW4
SAIW6
Central Waters
MW
NEADWI
60°N
50°N
40°N
30°N
20°N
10°N
50°W
40°W
30°W
20°W
10°W
Ocean Data View

Figure S4

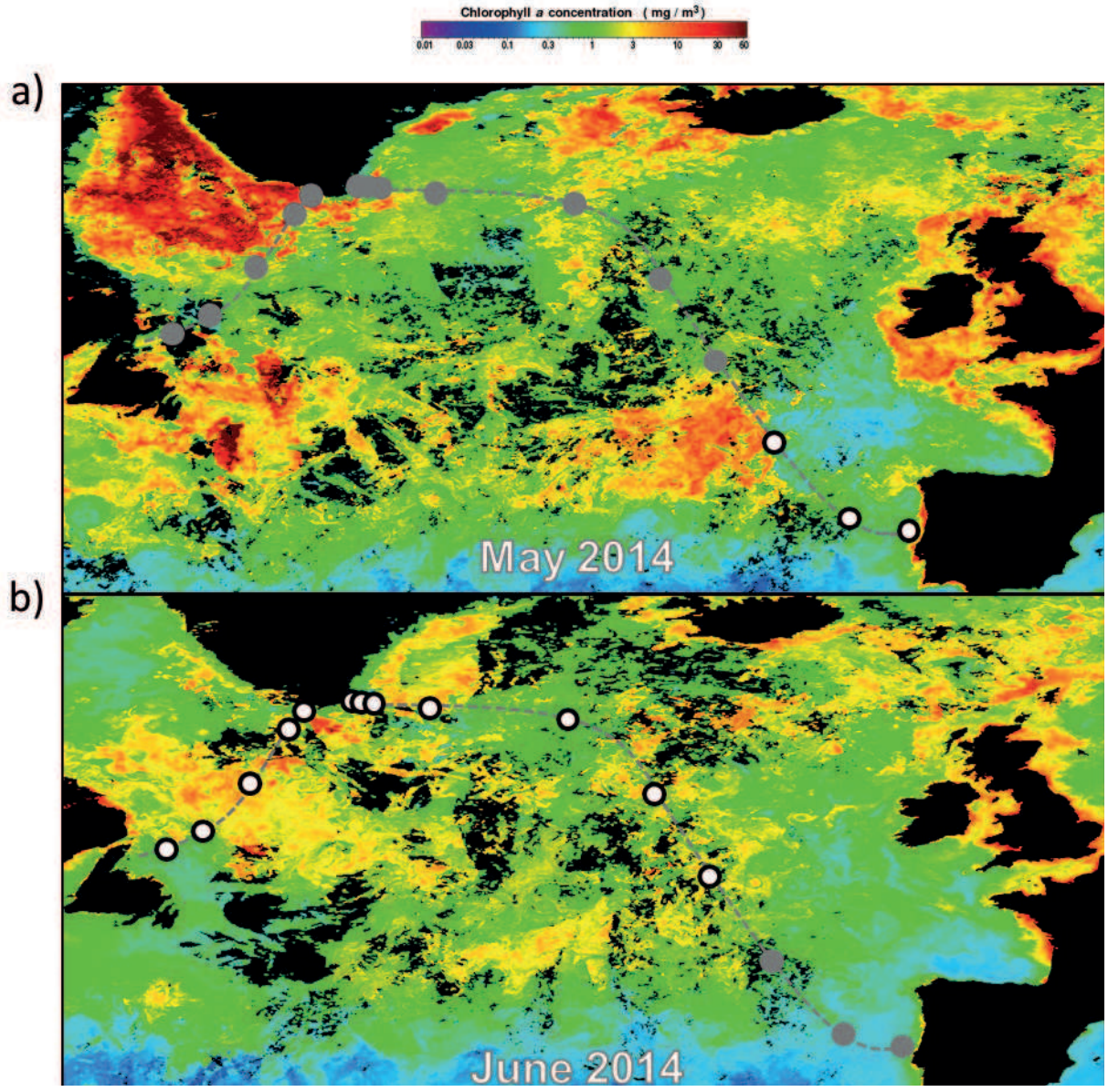
Chlorophyll a concentration (mg / m3)
0.01
0.03
0.1
0.3
1
3
10
30
60
a)
May 2014
b)
June 2014

Figure S5

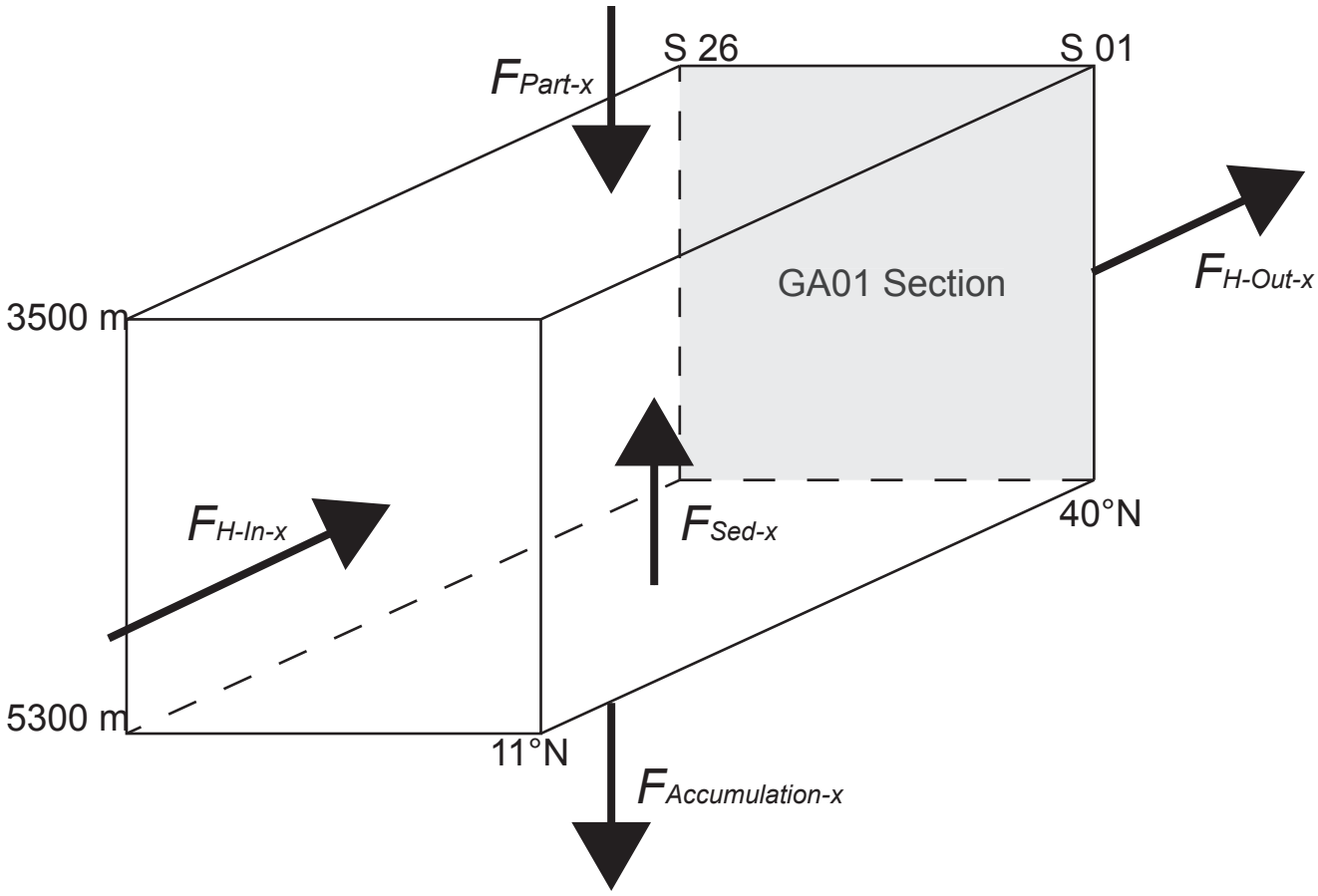
S 26
S 01
F_{Part-x}
GA01 Section
$F_{H-Out-x}$
3500 m
F_{H-In-x}
F_{Sed-x}
40°N
5300 m
11°N
$F_{Accumulation-x}$

Table S1

	OMP analysis characteristics		Used endmembers characteristics and location							
	Tpot (°C)	**S**	**^{226}Ra (dpm 100 L^{-1})**	**Ba (nmol L^{-1})**	**Longitude (°W)**	**Latitude (°N)**	**Depth (m)**	**Tpot (°C)**	**S**	**References**
Central Waters	14.15	35.93	8.19	38.17	GA01 Stations 1.1 and 21		100-600	14.15	35.93	GA01 (Stations 1-13-21)
SAIW6	6.00	34.70	9.85	44.99	33.66	52.69		5.73	34.89	TTO
SAIW4	4.50	34.80	9.77	45.86	43.07	16.94		3.39	34.82	TTO
SPMW7	7.07	35.16	8.88	39.57	GA01 Station 38		100	7.07	35.16	GA01 (Station 38)
SPMW8	8.00	35.23	9.70	43.09	33.62	53.76	5	8.23	35.05	GEOSECS
IrSPMW	5.00	35.01	8.52	40.03	33.31	64.09	200-400	5.20	34.99	TTO
LSW	3.40	34.87	9.51	43.30	52.74	58.65	1500-2300	3.26	34.91	TTO
MW	11.74	36.50	9.34	52.56	10.35	36.27	800-1700	11.9	36.3	(Schmidt and Reyss. 1996)
ISOW	2.70	34.98	8.18	46.98	18.62	60.41	2500	3.28	34.99	GEOSECS
DSOW	1.30	34.91	9.31	43.91	35.22	63.52	2300	1.56	34.89	GEOSECS
PIW	0.00	34.65	8.31	40.80	10.56	68.73	200-400	-0.28	34.88	TTO
NEADWL	1.98	34.90	16.76	75.74	39.30	12.00	5000-5400	1.77	34.87	TTO

Table S2

Sample Depth (m)	^{226}Ra (dpm 100L^{-1})	^{226}Ra error (dpm 100L^{-1})	Ba (nmol L^{-1})	Ra/Ba (dpm µmol^{-1})	T (°C)	S (psu)
Station 1						
3449.8	16.91	0.391	80.48	2.10	2.56	34.92
3398.0	17.46	0.54	73.71	2.37	2.58	34.92
3153.6	15.77	0.541	72.10	2.19	2.71	34.94
2957.9	16.16	0.45	70.57	2.29	2.84	34.95
2467.9	14.09	0.483	60.89	2.31	3.36	35.01
1976.8	11.76	0.259	52.68	2.23	4.35	35.11
1483.5	10.92	0.291	52.97	2.06	8.70	35.83
1039.4	9.83	0.319	47.92	2.05	11.12	36.14
792.2	9.72	0.369	45.05	2.16	11.69	36.07
644.7	9.98	0.393	45.37	2.20	11.51	35.89
545.7	9.16	0.486	41.16	2.23	11.34	35.72
347.5	8.77	0.369	38.71	2.26	11.92	35.67
248.3	8.03	0.275	37.14	2.16	12.30	35.69
169.9	7.99	0.239	36.52	2.19	12.65	35.71
99.4	8.56	0.328	42.11	2.03	13.16	35.74
37.8	7.98	0.316	35.44	2.25	15.06	35.50
17.9	8.84	0.352	35.82	2.47	15.85	35.24
Station 13						
5283.8	16.51	0.45	78.30	2.11	2.56	34.90
5053.2	18.46	0.51	76.73	2.41	2.54	34.90
4802.8	18.30	0.42	76.22	2.40	2.52	34.90
4202.1	17.93	0.49	75.40	2.38	2.50	34.91
3446.5	16.81	0.38	71.69	2.34	2.64	34.93
2468.6	13.22	0.31	58.15	2.27	3.31	34.98
1779.8	10.41	0.32	45.81	2.27	4.44	35.08
1187.4	10.36	0.34	46.09	2.25	9.36	35.85
989.9	9.70	0.34	44.22	2.19	9.22	35.62
793.1	9.50	0.22	41.49	2.29	10.28	35.60
595.1	9.31	0.37	38.43	2.42	11.39	35.61
446.5	7.71	0.26	37.48	2.06	11.82	35.62
346.4	8.28	0.20	36.94	2.24	12.11	35.65
248.2	8.29	0.32	36.37	2.28	12.38	35.68
168.8	8.22	0.33	35.94	2.29	12.73	35.73
98.3	8.15	0.30	35.94	2.27	12.99	35.75
45.7	7.74	0.29	36.78	2.10	13.56	35.77
14.9	7.85	0.27	35.50	2.21	15.48	35.85
Station 21						
4486.9	18.28	0.62	80.41	2.27	2.57	34.91
4447.1	18.63	0.38	81.50	2.29	2.57	34.91
4175.8	24.87	0.74	78.47	3.17	2.56	34.91
3948.0	20.62	0.45	78.43	2.63	2.56	34.91
3502.4	16.86	0.57	71.93	2.34	2.69	34.93
3199.7	14.10	0.34	62.98	2.24	2.83	34.94
2712.4	11.17	0.30	58.38	2.47	3.09	34.94
1975.6	9.96	0.41	45.65	2.18	3.70	34.93
1386.0	9.25	0.33	43.46	2.13	5.00	35.06
793.7	9.66	0.26	43.29	2.23	0.12	32.74
595.8	8.22	*0.34*	40.68	2.02	10.60	35.44
447.3	8.58	0.34	39.47	2.17	11.13	35.52
297.6	8.00	0.27	38.97	2.05	11.76	35.60
223.3	8.71	0.25	39.03	2.23	12.02	35.63
147.9	7.55	0.23	39.59	1.91	12.34	35.68
74.5	8.36	0.29	43.25	1.93	12.70	35.66
24.8	8.61	0.33	40.48	2.13	13.76	35.68

Station 26							
	4118.5	18.21	0.66	79.07	2.30	2.58	34.91
	3735.9	15.50	0.56	74.63	2.08	2.67	34.93
	3444.3	15.13	0.57	68.67	2.20	2.97	34.95
	2760.1	11.99	0.46	51.69	2.32	3.42	34.92
	1974.6	10.66	0.44	44.37	2.40	4.40	34.95
	989.7	9.18	0.31	41.58	2.21	2.60	34.92
Station 32							
	3222.0	12.39	0.40	53.56	2.31	2.80	34.96
	2855.6	11.92	0.44	46.96	2.54	2.90	34.96
	2268.0	11.38	0.44	46.74	2.43	3.28	34.93
	1973.6	10.15	0.38	43.33	2.34	3.48	34.93
	1679.7	9.14	0.36	43.10	2.12	3.69	34.93
	1482.0	9.32	0.25	43.45	2.15	3.80	34.92
	793.7	*6.74*	0.29	42.72	1.58	4.49	34.95
	594.1	9.32	0.31	41.05	2.27	5.06	34.98
	447.8	9.53	0.40	43.63	2.18	6.46	35.06
	376.5	9.72	0.34	44.11	2.20	6.40	34.96
	198.3	9.26	0.31	42.21	2.19	7.94	35.08
	148.7	9.17	0.22	42.86	2.14	8.23	35.12
	60.5	8.24	0.24	41.34	1.99	8.64	35.06
	12.9	7.81	0.24	40.07	1.95	10.32	35.13
	6.0	6.89	0.25	33.60	2.05	10.33	35.13
	6.0	7.04	0.24	33.60	2.09	10.33	35.13
Station 38							
	1235.3	11.87	0.52	43.91	2.70	4.00	34.99
	1235.3	10.62	0.37	46.81	2.27	4.00	34.99
	840.9	9.13	0.30	41.48	2.20	4.84	35.00
	643.4	9.37	0.36	39.51	2.37	5.94	35.07
	298.2	9.14	0.38	39.73	2.30	7.44	35.14
	198.2	8.23	0.28	39.19	2.10	7.57	35.14
	147.7	9.01	0.32	38.90	2.32	7.66	35.15
	99.1	8.88	0.21	39.57	2.24	7.66	35.13
	59.5	8.47	0.25	38.39	2.21	7.93	35.11
	19.8	7.98	0.27	37.86	2.11	9.23	35.06
	5.0	9.44	0.36	38.95	2.10	9.30	35.06
	5.0	8.27	0.33	38.67	2.37	9.29	35.06
Station 44							
	2917.9	8.85	0.24	41.75	2.19	1.26	34.88
	2883.7	9.44	0.42	43.31	2.29	1.27	34.88
	2748.7	9.58	0.40	45.53	2.31	1.74	34.88
	2560.9	9.76	0.33	42.58	2.23	2.57	34.90
	1973.7	9.54	0.34	46.20	2.05	3.23	34.93
	1481.2	9.66	0.24	43.15	2.16	3.63	34.93
	1136.6	9.51	0.26	42.13	2.20	3.77	34.90
	839.7	8.66	0.29	39.83	2.23	3.57	34.86
	593.8	8.89	0.34	40.03	2.26	3.66	34.87
	494.9	9.27	0.37	40.33	2.16	3.76	34.88
	288.2	8.47	0.36	39.83	2.19	3.96	34.90
	199.1	9.00	0.30	40.11	2.03	4.10	34.91
	137.7	8.92	0.32	40.75	2.25	4.10	34.90
	78.3	9.03	0.20	40.19	2.47	4.47	34.90
	18.8	9.11	0.26	39.69	2.29	6.70	34.85
Station 53							
	182.4	9.91	0.37	40.32	2.46	0.32	33.69
	138.9	9.00	0.30	40.40	2.23	0.13	32.74
	99.2	8.99	0.35	40.32	2.23	-0.79	33.36
	79.4	8.39	0.29	42.23	1.99	-1.30	33.16
	49.6	8.20	0.25	41.93	1.95	-1.52	32.96

19.9	9.97	0.39	40.02	2.49	-1.21	32.14
Station 57						
553.3	8.21	0.23	40.04	2.05	5.20	34.92
298.1	9.33	0.34	40.31	2.32	5.16	34.90
148.6	9.21	0.37	49.23	1.87	4.60	34.76
25.8	8.86	0.37	38.99	2.27	3.91	34.48
4.0	9.00	0.29	41.36	2.18	1.85	33.96
Station 60						
1696.6	9.31	0.42	42.35	2.20	3.07	34.91
1579.6	8.62	0.33	42.31	2.04	3.29	34.91
1482.2	10.36	0.42	42.25	2.45	3.37	34.92
1383.8	11.47	0.48	41.99	2.73	3.41	34.92
1187.8	9.08	0.38	41.07	2.21	3.66	34.93
987.7	9.21	0.30	40.43	2.28	3.83	34.92
743.9	8.84	0.21	39.08	2.26	3.92	34.90
397.0	8.80	0.25	39.01	2.26	4.39	34.92
249.6	8.25	0.24	39.75	2.07	4.69	34.94
150.6	8.92	0.32	39.83	2.24	5.32	34.97
109.0	9.49	0.38	39.62	2.39	5.63	34.99
49.6	9.78	0.36	39.43	2.48	6.12	34.96
19.8	9.29	0.33	39.26	2.37	6.69	34.89
133.9	13.49	0.39	42.63	3.16	0.11	33.48
119.0	9.33	0.33	43.75	2.13	-0.32	33.31
78.4	9.45	0.22	47.70	1.98	-1.06	32.96
49.6	8.60	0.24	49.38	1.74	-0.63	32.81
19.9	7.82	0.27	43.80	1.79	-0.23	32.57
3.0	9.17	0.35	41.50	2.21	0.03	32.37
Station 64						
2464.0	7.65	0.31	42.79	1.79	2.33	34.90
2414.1	10.37	0.42	48.65	2.13	2.49	34.91
2365.1	10.96	0.45	44.68	2.45	2.54	34.91
2169.0	10.70	0.42	43.65	2.45	2.78	34.92
2069.9	9.75	0.41	42.56	2.29	2.89	34.92
1727.2	10.54	0.35	48.42	2.18	3.26	34.92
1284.4	8.79	0.31	38.93	2.26	3.75	34.92
988.7	8.94	0.20	38.71	2.31	3.55	34.86
790.4	9.14	0.35	38.29	2.39	3.68	34.87
643.2	9.06	0.21	38.74	2.34	3.85	34.89
495.0	8.87	0.37	39.87	2.23	4.09	34.91
396.1	9.02	0.36	39.65	2.28	4.30	34.93
297.1	8.44	0.24	40.24	2.10	4.49	34.93
198.1	9.10	0.32	38.77	2.35	4.76	34.94
118.9	8.82	0.21	39.42	2.24	5.06	34.95
77.3	7.24	0.29	40.12	1.81	5.40	34.96
39.7	8.74	0.29	39.01	2.24	5.79	34.77
4.0	8.44	0.33	38.58	2.19	6.37	34.73

Station 69							
	3672.3	9.46	0.36	40.40	2.34	1.64	34.90
	3672.3	9.09	0.32	40.40	2.25	1.64	34.90
	3624.6	8.62	0.20	39.58	2.18	1.67	34.90
	3440.4	9.02	0.26	45.02	2.00	2.07	34.90
	3343.8	8.81	0.31	43.79	2.01	2.29	34.91
	2952.1	9.69	0.33	43.87	2.21	2.76	34.92
	2756.5	9.80	0.29	43.70	2.24	2.92	34.92
	2464.8	8.44	0.24	42.67	1.98	3.13	34.92
	2169.6	9.23	0.30	48.25	1.91	3.37	34.92
	1776.8	8.78	0.34	40.88	2.15	3.69	34.92
	791.6	8.89	0.35	39.25	2.27	3.47	34.85
	456.5	9.01	0.36	39.85	2.26	3.52	34.85
	456.5	8.77	0.31	39.90	2.20	3.52	34.85
	296.2	9.15	0.33	40.66	2.25	3.63	34.86
	148.7	8.72	0.21	40.01	2.18	3.77	34.85
	99.1	8.60	0.25	43.46	1.98	3.65	34.81
	69.4	8.21	0.23	38.76	2.12	3.70	34.80
	40.7	8.90	0.34	38.66	2.30	3.97	34.74
	19.8	8.76	0.33	37.72	2.32	5.41	34.61
Station 77							
	2553.4	9.38	0.33	45.62	2.06	2.34	34.91
	2464.3	10.15	0.41	46.48	2.18	2.41	34.91
	2414.3	10.02	0.40	44.99	2.23	2.43	34.91
	2340.8	11.00	0.47	46.17	2.38	2.53	34.92
	1973.8	10.03	0.41	46.22	2.17	2.85	34.92
	1677.9	9.30	0.38	53.04	1.75	3.16	34.92
	1238.7	9.41	0.30	42.33	2.22	3.64	34.92
	941.8	9.20	0.32	41.34	2.23	3.50	34.87
	645.5	8.97	0.28	42.09	2.13	3.63	34.88
	458.6	8.81	0.24	41.14	2.14	3.57	34.86
	348.8	9.20	0.34	42.59	2.16	3.52	34.85
	247.8	9.06	0.24	40.59	2.23	3.45	34.83
	149.7	8.72	0.33	40.62	2.15	3.48	34.81
	69.4	9.58	0.33	40.57	2.36	3.40	34.75
	44.6	8.61	0.27	42.81	2.01	3.58	34.72
	18.8	9.96	0.25	40.44	2.46	5.74	34.58
	4.0	6.75	0.28	40.26	1.68	6.36	34.53
Station 78							
	367.8	9.68	0.36	42.48	2.28	2.94	34.62
	367.8	9.65	0.37	42.48	2.27	2.94	34.62
	367.8	9.14	0.31	42.48	2.15	2.94	34.62
	277.7	7.67	0.26	42.19	1.82	1.83	34.34
	228.1	7.58	0.27	44.93	1.69	1.09	34.16
	69.5	8.77	0.20	45.14	1.94	-1.40	33.20
	44.7	6.71	0.21	46.91	1.43	-1.37	33.04
	19.9	8.58	0.19	45.23	1.90	0.11	32.73