Global Biogeochemical Cycles

Supporting Information for

Blue carbon storage capacity of eelgrass (*Zostera marina*) meadows: a global survey

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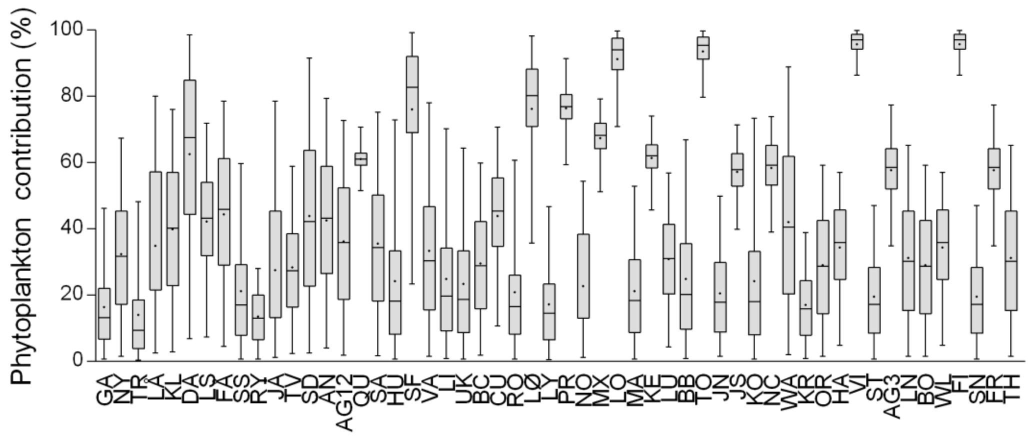

Figure S1. The relative contribution of phytoplankton to the δ^{13}C of the sediment surface layer (0-5 cm) at the sites. Box plots represents first and third quartiles and are shown with medians (horizontal line), means (+). The whiskers represent the 2.5-97.5 percentiles.

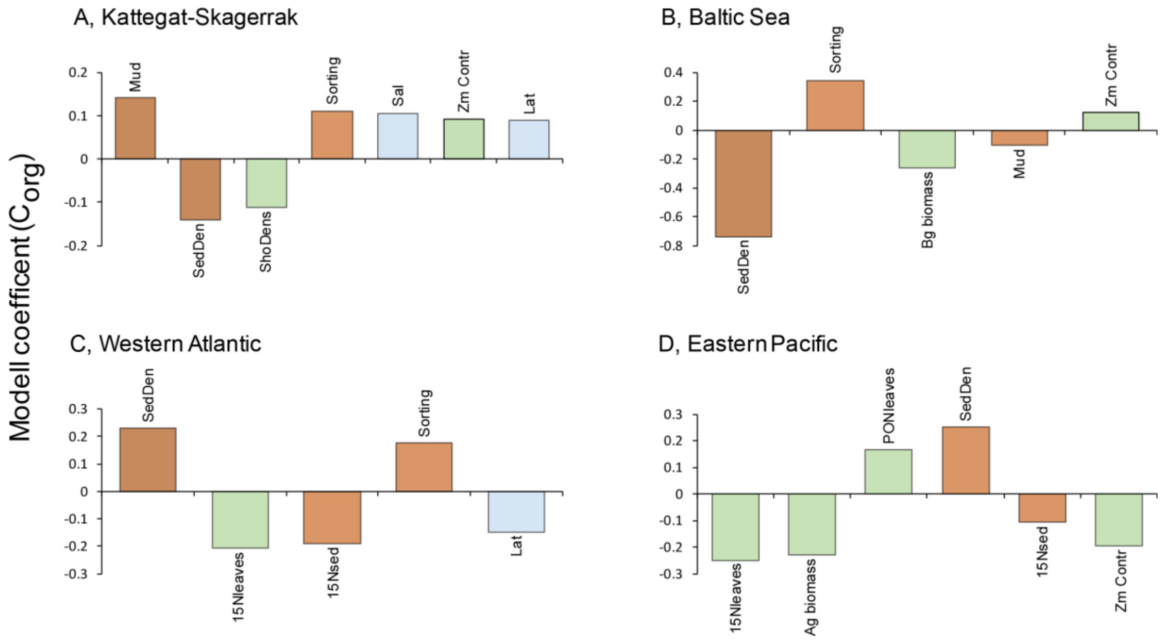

Figure S2. Partial least square (PLS) regression model coefficient plot showing the relative importance of different predictor variables in the different ocean margin/seas. (Mud= mud content (%), SedDens= sediment density, salinity, sorting= degree of sorting (φ), 15N leaves= $\delta^{15}N$ in *Z. marina* leaves, Zm Contr= *Z. marina* contribution to the sediment surface C_{org} pool (%), ShoDens= shoot density (shoots m^{-2}), Ag biomass= aboveground biomass (gDW m^{-2}), PON leaves= particulate organic nitrogen content of *Z. marina* leaves (%) and lat= latitude, (gDW m^{-2}) on *Z. marina* C_{org} stocks. Predictor variables are ranked in order of importance (from the left to the right). Brown bars represent sediment characteristics, green bars represent seagrass-associated variables and blue bars environmental variables.

Table S1. Summary of site-specific sediment and environmental variables measured in this study. Country, location, abbreviation (Abb.), latitude (Lat.), longitude (Long.) in WGS 84 format, water depth (m), mean water temperature (°C), salinity (Sal.), mud content in the sediment surface (%), sediment dry density in the sediment surface (Dry dens. g cm^{-3}), sediment organic carbon content in the sediment surface (SedOC, % DW), δ^{13} C sediment surface, *Z. marina* contribution to the sediment surface C_{org} pool (*Z. marina* contrib.(%), degree of sorting (DS (φ)) and ocean margin/sea (WA= Western Atlantic, EA= Eastern Atlantic, WP= Western Pacific, EP= Eastern Pacific, MED= Mediterranean Sea, KS= Kattegat-Skagerrak , BS= Baltic Sea, BLS= Black Sea) at the sampling sites. SEM (n=3) is given.

Country	**Location**	**Abb.**	**Lat.**	**Long.**	**Water depth (m)**	**Mean water temp. (°C)**	**Sal.**	**Mud content (%)**	**Dry dens. (g cm^{-3})**	**SedOC (% DW)**
CAN	Tsawwassen	BC	49.00	-123.10	0.50	8.6	26.0	14.0±0.7	1.35±0.04	0.28±0.10
CAN	Prince Rupert	PR	54.19	-130.24	1.04	10.6	25.1	11.5±4.2	1.42±0.09	0.41±0.06
CAN	Baie-St-Ludger	QU	49.11	-68.17	1.75	8.0	21.0	26.6±2.2	1.42±0.09	0.45±0.08
USA	Bodega Bay	BB	38.32	-123.05	1.00	13.4	33.0	30.3±0.3	1.62±0.03	0.08±0.04
USA	Shinnecock Bay	LI	40.86	-72.45	0.54	12.3	30.3	15.5±5.2	1.30±0.02	0.27±0.07
USA	Dorothy Cove	MA	42.42	-70.91	2.00	14.0	32.4	34.2±4.3	1.46±0.04	0.29±0.04
USA	Yaquina Bay	OR	44.61	-124.01	0.15	12.3	36.0	15.6±2.9	2.04±0.02	0.62±0.04
USA	Coronado	SD	32.70	-117.17	1.82	18.5	35.0	7.6±2.1	1.28±0.11	0.22±0.03
USA	Point San Pablo	SF	37.95	-122.41	0.50	13.0	27.0	19.9±4.3	1.12±0.05	0.31±0.08
USA	Goodwin Islands	VA	37.22	-76.40	1.00	19.7	18.3	9.0±3.6	1.43±0.02	0.17±0.05
USA	Willapa Bay	WA	46.47	-124.02	3.16	12.6	23.0	36.9±1.8	0.93±0.07	0.77±0.10
USA	Shackleford Island	NC	34.67	-76.57	0.65	12.6	25.0	21.5±3.7	1.68±0.02	0.36±0.02
MEX	San Quintin Bay	MX	30.42	-115.96	1.15	17.6	34.0	24.3±16.7	1.45±0.06	0.55±0.07
JPN	Akkeshi-ko	JN	43.02	144.90	1.50	8.5	26.0	60.3±4.8	1.00±0.07	0.89±0.01
JPN	Ikunoshima	JS	34.30	132.91	2.00	15.3	32.5	75.9±5.6	0.95±0.09	1.22±0.11
KOR	Dongdae Bay	KO	34.89	128.02	0.40	16.5	31.3	81.3±0.5	1.02±0.05	1.28±0.06
FRA	Bouzigues	FR	43.45	03.66	2.10	16.5	38.8	76.3±0.7	1.33±0.21	2.34±0.06
UK	Porth Dinllaen	UK	52.94	-04.56	2.00	11.5	34.4	43.6±5.1	1.33±0.13	0.44±0.12
POR	Culatra	CU	37.00	07.83	1.18	18.1	35.3	25.0±1.6	1.20±0.05	1.65±0.15
BUL	Garden	GA	42.43	27.65	5.00	15.7	16.5	2.3±0.4	1.28±0.01	2.35±0.14
BUL	Ropotamo	RO	42.33	27.75	2.50	15.7	16.5	7.5±2.9	1.26±0.03	4.68±0.37
NOR	Rövika	NO	67.21	15.00	1.00	7.3	18.5	3.1±0.2	1.51±0.01	0.12±0.01
SWE	Snäckebackebukten	SN	58.36	11.56	0.20	10.0	24.0	40.4±8.2	0.51±0.08	5.37±0.86
SWE	Torgestad	TO	58.34	11.55	1.70	10.0	24.0	32.2±0.8	1.46±0.09	0.41±0.14
SWE	Lindholmen	LN	58.26	11.48	1.60	10.0	24.0	55.6±6.9	0.22±0.02	10.65±0.12
SWE	Bökevik	BO	58.25	11.45	1.60	10.0	24.0	61.1±7.6	0.89±0.09	0.66±0.09
SWE	Hakefjord	HA	58.04	11.80	1.60	10.0	24.0	61.0±17.3	1.37±0.06	0.86±0.11
SWE	Wallhamn	WL	58.01	11.71	1.10	10.0	24.0	29.7±23.1	0.59±0.06	3.96±0.54
SWE	Storebrorn	ST	57.89	11.66	2.50	10.0	24.0	27.6±5.6	0.45±0.05	2.44±0.15
SWE	Finnsbo	FI	58.30	11.78	1.70	10.0	24.0	68.1±13.5	0.42±0.05	3.78±0.75
SWE	Kristineberg	KR	58.25	11.45	2.00	10.0	24.0	52.0±13.5	0.96±0.15	2.61±1.05
SWE	Stora Sand	SS	58.81	11.66	3.80	8.8	6.4	2.6±0.4	1.21±0.02	0.26±0.05
SWE	Långskär	LS	58.80	11.70	2.30	8.8	6.4	4.3±0.7	1.50±0.07	0.45±0.08
SWE	Torö	TR	58.81	11.65	3.50	8.8	6.4	5.4±1.0	1.42±0.11	0.42±0.02
DEN	Nyborg	NY	55.30	10.83	2.50	10.0	20.0	0.5±0.3	1.17±0.03	0.10±0.01
DEN	Kertinge	KE	55.44	10.55	2.50	10.0	20.0	27.1±1.5	1.15±0.05	3.23±0.24
DEN	Løgstør	LØ	57.01	09.05	2.50	10.0	20.0	4.0±0.4	1.23±0.03	0.31±0.09
DEN	Lovns	LO	56.62	09.28	2.50	10.0	20.0	17.8±3.0	1.22±0.09	1.53±0.09
DEN	Agero 3	AG3	56.67	08.58	2.50	10.0	20.0	30.4±6.5	1.24±0.09	2.30±0.08
DEN	Visby	VI	56.77	08.48	2.50	10.0	20.0	23.0±4.2	1.25±0.02	2.18±0.20
DEN	Lunkebugt	LU	54.99	10.65	2.50	10.0	20.0	33.2±7.4	1.23±0.23	1.71±0.81
DEN	Thurøbund	TH	55.04	10.69	2.50	10.0	20.0	34.7±2.8	1.27±0.03	5.78±0.51
DEN	Agero 12	AG12	56.69	08.58	2.50	10.0	20.0	27.9±8.0	1.35±0.17	0.29±0.14
DEN	Dalby	DA	55.53	10.60	2.50	10.0	20.0	8.1±1.6	1.37±0.03	0.12±0.01
FIN	Sackholm	SA	60.12	21.86	2.50	10.0	6.5	12.5±2.0	1.36±0.04	0.26±0.03
FIN	Ängsö	ÄN	60.11	21.71	2.50	10.0	6.5	4.2±2.1	1.36±0.05	0.20±0.01
FIN	Kolaviken	KL	59.82	22.99	2.50	10.0	6.5	1.9±0.2	1.34±0.04	0.13±0.01
FIN	Ryssholmen	RY	59.83	23.08	2.50	10.0	6.5	2.7±0.6	1.34±0.05	0.16±0.01
FIN	Tvärminne	TV	59.84	23.24	2.50	10.0	6.5	9.2±1.9	1.33±0.03	0.20±0.02
FIN	Fårö	FÅ	59.92	21.81	2.50	10.0	6.5	5.1±1.4	1.32±0.03	0.13±0.01
FIN	Lyddaren	LY	60.13	21.44	2.50	10.0	6.5	3.2±2.4	1.34±0.17	0.45±0.09
FIN	Långören	LÅ	59.88	21.74	2.50	10.0	6.5	2.9±2.1	1.42±0.05	0.19±0.02

FIN	Hummelskär	HU	60.03	21.71	2.50	10.0	6.5	9.0±2.6	1.33±0.01	0.35±0.02
FIN	Jänisholm	JÄ	60.21	21.70	2.50	10.0	6.5	7.2±2.2	1.37±0.08	0.33±0.14

Table S2. Summary of site-specific plant variables measured in this study. Country, location, abbreviation (Abb.), shoot density (shoots m^{-2}), δ ^{13}C of *Z. marina* leaves, δ^{13}C of *Z. marina* rhizomes, C:N ratio of *Z. marina* (C:N), *Z. marina* above -and belowground biomass (AB and BB, gDW m^{-2}) and root:shoot- ratio (R:S) at the sampling sites. SEM (n=3) is given.

Country	**Location**	**Abb.**	**Shoot density (shoots m^{-2})**	**δ^{13}C *Z. marina* leaves**	**δ ^{13}C *Z. marina* rhizomes**	**C:N**	**AB (gDW m^{-2})**	**BB (gDW m^{-2})**	**R:S**
CAN	Tsawwassen	BC	265±46	-10.25±0.3	-9.37±0.2	15.5±0.0	305±34	71±22	0.22±0.04
CAN	Prince Rupert	PR	211±25	-11.46±0.2	-10.71±0.3	15.2±0.4	139±24	27±11	0.20±0.08
CAN	Baie-St-Ludger	QU	1215±185	-9.13±0.2	-9.76±0.3	18.3±0.1	163±26	142±12	0.90±0.10
USA	Bodega Bay	BB	456±122	-10.63±0.5	-9.09±0.4	13.5±0.3	71±30	94±18	1.70±0.43
USA	Shinnecock Bay	LI	1241±194	-8.55±0.5	-8.86±0.4	28.9±2.4	251±57	263±64	1.04±0.07
USA	Dorothy Cove	MA	372±56	-7.32±0.5	-9.27±0.2	36.5±0.6	307±9	237±35	0.77±0.10
USA	Yaquina Bay	OR	85±11	-8.91±0.1	-10.53±0.4	12.7±0.3	101±11	62±4	0.61±0.04
USA	Coronado	SD	2707±239	-10.62±0.2	-12.51±0.1	19.3±0.7	400±101	425±178	1.31±0.55
USA	Point San Pablo	SF	35±4	-12.51±0.3	-11.80±0.2	14.4±0.3	531±88	58±23	0.10±0.02
USA	Goodwin Islands	VA	153±16	-8.81±0.2	-11.89±0.9	21.7±1.1	41±10	39±4	1.20±0.48
USA	Willapa Bay	WA	51±15	-9.97±0.2	-10.16±0.1	14.4±1.0	54±26	20±11	0.34±0.03
USA	Shackleford Island	NC	137±19	-12.17±0.4	-10.77±0.5	12.9±3.7	151±19	218±0	1.44±0.00
MEX	San Quintin Bay	MX	488±118	-9.94±0.4	-10.46±0.1	17.4±0.7	258±71	129±4	0.62±0.23
JPN	Akkeshi-ko estuary	JN	340±65	-9.69±0.2	-9.36±0.2	15.7±0.6	131±20	57±6	0.45±0.04
JPN	Ikunoshima	JS	149±38	-8.72±0.1	-10.48±0.3	17.7±0.6	151±63	83±30	0.74±0.36
KOR	Dongdae Bay	KO	196±32	-11.20±0.3	-11.47±1.1	18.4±2.2	300±21	28±1	0.09±0.01
FRA	Bouzigues	FR	223±55	-5.85±0.1	-7.40±0.9	28.9±2.0	73±14	144±40	2.35±1.02
UK	Porth Dinllaen	UK	881±136	-9.51±0.3	-10.27±0.3	17.8±1.3	59±22	77±12	1.57±0.36
POR	Culatra	CU	348±33	-13.17±0.7	-13.15±0.3	31.8±0.4	76±25	660±216	10.60±4.57
BUL	Garden	GA	213±75	-17.15±0.5	-16.11±0.8	19.71±0.4	64±24	40±4	0.80±0.26
BUL	Ropotamo	RO	697±302	-18.49±0.1	-14.81±0.4	23.7±2.7	176±87	103±39	3.49±2.96
NOR	Rövika	NO	1019±175	-8.02±0.4	-8.68±0.43	27.3±2.0	105±21	174±11	1.85±0.50
SWE	Snäckebackebu kten	SN	59±23	-7.88±0.8	-8.80±0.3	26.1±1.2	76±30	28±16	0.41±0.16
SWE	Torgestad	TO	411±112	-8.68±0.8	-9.87±0.3	27.5±1.8	202±40	58±25	0.32±0.15
SWE	Lindholmen	LN	229±119	-7.33±0.8	-8.07±0.3	20.7±0.5	232±30	61±20	0.26±0.06
SWE	Bökevik	BO	203±60	-8.83±0.1	-9.55±0.9	29.2±4.8	179±31	81±19	0.45±0.05
SWE	Hakefjord	HA	267±32	-6.15±0.4	-8.27±0.1	21.2±1.2	76±25	54±24	0.79±0.25
SWE	Wallhamn	WL	213±35	-6.45±1.0	-7.58±0.7	25.7±7.2	48±13	43±14	0.86±0.14
SWE	Storebrorn	ST	133±19	-7.65±0.5	-8.22±0.3	19.0±1.4	114±42	70±28	0.60±0.16
SWE	Finnsbo	FI	164±30	-13.12±0.7	-14.88±0.2	19.0±2.3	14±7	237±59	29.20±13.55
SWE	Kristineberg	KR	123±42	-14.41±0.5	-14.19±0.3	22.6±1.8	57±6	265±56	4.55±0.52
SWE	Stora Sand	SS	180±28	-17.49±1.4	-16.23±1.8	20.4±0.5	41±19	121±7	4.53±2.49
SWE	Långskär	LS	324±26	-15.41±0.4	-14.68±0.4	24.3±0.5	228±50	168±46	0.90±0.44
SWE	Torö	TR	585±55	-18.69±0.2	-14.86±0.5	19.7±0.5	252±23	252±23	1.00±0.00
DEN	Nyborg	NY	652±30	-9.3±0.2	-10.6±0.3	28.7±1.8	203±24	214±50	1.00±0.14
DEN	Kertinge	KE	328±64	-9.2±0.1	-9.8±0.1	15.3±0.0	90±17	64±14	0.68±0.02

DEN	Løgstør	LØ	300±14	-9.7±0.4	-10.4±0.5	15.4±1.0	149±11	63±13	0.42±0.07
DEN	Lovns	LO	360±27	-11.5±0.4	-12.2±0.4	17.6±0.7	141±4	100±11	0.70±0.06
DEN	Agero 3	AG 3	448±89	-9.2±0.5	-11.1±0.2	26.5±1.9	181±33	84±8	0.52±0.07
DEN	Visby	VI	520±21	12.0±0.6	-12.4±0.7	13.4±0.4	193±13	49±4	0.25±0.01
DEN	Lunkebugt	LU	347±81	-8.9±0.9	-10.6±0.4	31.9±1.1	210±10	382±24	1.82±0.08
DEN	Thurøbund	TH	420±98	-8.2±0.1	-9.0±0.2	24.7±0.7	101±16	398±15	4.54±0.70
DEN	Agero 12	AG12	404±90	-10.7±0.3	-11.9±0.2	22.0±0.9	110±2	46±9	0.40±0.08
DEN	Dalby	DA	400±48	-9.7±0.3	-10.5±0.6	29.1±0.6	76±7	83±10	1.09±0.11
FIN	Sackholm	SA	774±234	-10.3±0.7	-9.9±0.3	16.9±0.8	110±18	37±9	0.31±0.04
FIN	Ängsö	ÄN	604±98	-10.3±0.1	-10.3±0.3	22.1±0.9	91±6	63±9	0.67±0.05
FIN	Kolaviken	KL	476±96	-10.3±0.3	-11.4±0.3	18.5±0.4	74±6	149±16	2.07±0.27
FIN	Ryssholmen	RY	756±57	-11.5±0.1	-11.5±0.3	19.2±0.6	160±3	136±16	0.86±0.11
FIN	Tvärminne	TV	112±11	-11.6±0.1	-11.5±0.3	15.4±0.6	99±16	38±7	0.37±0.01
FIN	Fårö	FÅ	304±32	-9.7±0.4	-9.0±0.2	16.1±0.3	138±20	167±28	1.27±0.13
FIN	Lyddaren	LY	228±42	-8.8±0.4	-9.6±0.3	18.0±0.5	86±7	57±12	0.64±0.09
FIN	Långören	LÅ	436±53	-8.5±0.1	-8.9±0.2	15.7±0.4	121±46	68±25	0.58±0.06
FIN	Hummelskär	HU	364±31	-9.3±0.3	-9.8±0.3	19.8±0.9	70±11	28±2	0.45±0.06
FIN	Jänisholm	JÄ	128±17	-10.8±0.4	-11.0±0.3	19.6±2.1	65±16	46±2	1.44±0.53

Table S3. The literature source used for plankton δ^{13}C signal in the stable isotope mixing model analysis.

Site	δ ^{13C}	Country	Ocean margin/ Sea	Reference:
FR	-22.8	FR	Mediterranean Sea	Pernet et al. 2012
KO	-22.0	KO	Western Pacific	Keun-Kang et al.2015
PR	-20.6	CA	Eastern Pacific	Goering et al. 1990
MA	-21.0	US	Western Atlantic	Tagliabue and Bopp 2008
NO	nd.	NO	Eastern Atlantic	nd.
OR	-22.0	US	Eastern Pacific	Conway-Cranos et al. 2015
LI	-21.0	US	Western Atlantic	Tagliabue and Bopp 2008
QU	-21.8	CA	Western Atlantic	Winkler and Cabrol *unpublished data*
SN	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
TO	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
LN	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
BO	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
HA	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
WL	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
ST	-22.5	SWE	Kattegat-Skagerrak	Tiselius and Fransson. 2015
VA	-21.0	US	Western Atlantic	Tagliabue and Bopp 2008

WA	-22.0	US	Eastern Atlantic	Conway-Cranos et al. 2015
JS	-21.9	JP	Western Pacific	Miyayima et al. 2015
SD	-20.7	US	Eastern Pacific	Jorgensen et al. 2007
MX	-20.7	MX	Eastern Pacific	Jorgensen et al. 2007
SF	-23.0	US	Eastern Pacific	Tagliabue and Bopp 2008
NC	-21.0	US	Western Atlantic	Tagliabue and Bopp 2008
JN	-18.9	JP	Western Pacific	Kajihara et al. 2010
BC	-20.6	CA	Eastern Pacific	Conway-Cranos et al. 2015
UK	-26.0	UK	Eastern Atlantic	Tagliabue and Bopp 2008
BB	-23.0	US	Eastern Pacific	Tagliabue and Bopp 2008
NY	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
KE	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
LØ	-16.4	DK	Kattegat-Skagerrak	Röhr et al. 2016
LO	-17.3	DK	Kattegat-Skagerrak	Röhr et al. 2016
AG3	-18.6	DK	Kattegat-Skagerrak	Röhr et al. 2016
AG12	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
VI	-17.4	DK	Kattegat-Skagerrak	Röhr et al. 2016
LU	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
TH	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
DA	-17.5	DK	Kattegat-Skagerrak	Röhr et al. 2016
SA	-16.4	FIN	Baltic Sea	Röhr et al. 2016
ÄN	-15.3	FIN	Baltic Sea	Röhr et al. 2016
KL	-20.2	FIN	Baltic Sea	Röhr et al. 2016
RY	-22.1	FIN	Baltic Sea	Röhr et al. 2016
TV	-23.0	FIN	Baltic Sea	Röhr et al. 2016
FÅ	-22.1	FIN	Baltic Sea	Röhr et al. 2016
LY	-22.3	FIN	Baltic Sea	Röhr et al. 2016
LÅ	-22.9	FIN	Baltic Sea	Röhr et al. 2016
HU	-24.3	FIN	Baltic Sea	Röhr et al. 2016
JÄ	-24.6	FIN	Baltic Sea	Röhr et al. 2016
CU	-16.6	PO	Eastern Atlantic	Santos et al. *unpublished data*
FI	-22.5	SWE	Kattegat- Skagerrak	Tiselius and Fransson. 2015
GA	-21.8	BU	Black Sea	Fry et al. 1991
KR	-22.5	SWE	Kattegat- Skagerrak	Tiselius and Fransson. 2015
RO	-21.8	BU	Black Sea	Fry et al. 1991
SS	-22.9	SWE	Baltic Sea	Röhr et al. 2016

LS	-22.9	SWE	Baltic Sea	Röhr et al. 2016
TR	-22.9	SWE	Baltic Sea	Röhr et al. 2016