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*Supplement of*

## **Spring phytoplankton communities of the Labrador Sea (2005–2014): pigment signatures, photophysiology and elemental ratios**

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Supplemental Material - Table S1. Final ratio matrix of accessory pigment to chlorophyll *a* for distinct algal classes for each cluster group. The root mean square error (RMSE) for the best output runs were < 10%.

Region Group / Pigment	I & II (Eastern Labrador Sea)									
	Chl <i>b</i>	Chl <i>c</i> <sub>3</sub>	Fuco	Peri	Zea + Lut	Allo	But- fuco	Hex- fuco	Pras	TChl <i>a</i>
Prasinophyte 1	0.459	0	0	0	0	0	0	0	0.075	1
Prasinophyte 2	0.650	0	0	0	0.008	0	0	0	0	1
CHLORO-1	0.168	0	0	0	0.040	0	0	0	0	1
Dinoflagellates	0	0	0	0.609	0	0	0	0	0	1
Cryptophytes	0	0	0	0	0	0.785	0	0	0	1
<i>Phaeocystis</i>	0	0.167	0.188	0	0	0	0	0	0	1
HAPTO-6	0	0.199	0.270	0	0	0	0.021	1.261	0	1
Chryso/Pelagophyte	0	0.120	0.454	0	0	0	0.589	0	0	1
Cyanobacteria	0	0	0	0	0.262	0	0	0	0	1
Diatoms	0	0	0.328	0	0	0	0	0	0	1
Region Group / Pigment	III & V (Central Labrador Sea)									
	Chl <i>b</i>	Chl <i>c</i> <sub>3</sub>	Fuco	Peri	Zea + Lut	Allo	But- fuco	Hex- fuco	Pras	TChl <i>a</i>
Prasinophyte 1	0.316	0	0	0	0	0	0	0	0.129	1
Prasinophyte 2	0.716	0	0	0	0.008	0	0	0	0	1
CHLORO-1	0.171	0	0	0	0.025	0	0	0	0	1
Dinoflagellates	0	0	0	0.681	0	0	0	0	0	1
Dino-2	0	0.290	0.348	0	0	0	0.060	0.168	0	1
Cryptophytes	0	0	0	0	0	0.674	0	0	0	1
HAPTO-6	0	0.081	0.202	0	0	0	0.018	1.549	0	1
Chryso/Pelagophyte	0	0.049	0.184	0	0	0	0.264	0	0	1
Cyanobacteria	0	0	0	0	0.142	0	0	0	0	1
Diatoms	0	0	0.512	0	0	0	0	0	0	1
Region Group / Pigment	IV (Western Labrador Sea)									
	Chl <i>b</i>	Chl <i>c</i> <sub>3</sub>	Fuco	Peri	Zea + Lut	Allo	But- fuco	Hex- fuco	Pras	TChl <i>a</i>
Prasinophyte 1	0.216	0	0	0	0	0	0	0	0.078	1
Prasinophyte 2	1.081	0	0	0	0.012	0	0	0	0	1
CHLORO-1	0.113	0	0	0	0.045	0	0	0	0	1
Dino-2	0	0	0	0.785	0	0	0	0	0	1
Dinoflagellates	0	0.028	0.049	0	0	0	0.018	0.040	0	1
Cryptophytes	0	0	0	0	0	0.703	0	0	0	1
Prymnesiophyte 1	0	0.030	0.389	0	0	0	0	1.218	0	1
Chryso/Pelagophyte	0	0.056	0.470	0	0	0	0.613	0	0	1
Diatoms	0	0	0.343	0	0	0	0	0	0	1

5 Supplemental Material - Table S2. Range of environmental and biological variables of each cluster group. MLD = mixed layer depth, SI= Stratification index, NO<sub>3</sub><sup>-</sup> = nitrate, PO<sub>4</sub><sup>3-</sup> = phosphate, Si(OH)<sub>4</sub> = silicate, DT= diatoxanthin, DD= diadinoxanthin, POC= particulate organic carbon, PON= particulate organic nitrogen, POC<sub>phyto</sub> = phytoplankton-derived particulate organic carbon,  $\alpha^B$  = initial slope of the photosynthesis-irradiance curve,  $P_m^B$  = maximum normalised photosynthesis,  $E_k$  = onset of saturation irradiance,  $E_s$  = saturation irradiance.

	Cluster A	Cluster B	Cluster C3a	Cluster	Cluster C2	Cluster C1
	DIAT (> 99%)	DIAT + PHAEO	DIAT + CHLORO	MIXED	DIAT + DINO	DIAT (> 93%)
Temperature (°C)	- 1.1 - 6.7	- 1.1 - 5.7	- 1.2 - 5.6	- 1.4 - 7.9	0.9 - 6.8	- 0.6 - 3.4
Salinity	30.2 - 34.9	31.8 - 34.8	30.4 - 34.8	31.3 - 35	32.8 - 34.8	31.4 - 34.7
MLD (m)	14 - 196	11 - 105	11 - 156	11 - 531	11 - 64	12 - 21
SI × 10 <sup>-3</sup> (kg m <sup>-4</sup> )	0.03 - 24	0.1 - 27	0.008 - 40	0.008 - 32	0.5 - 19	1 - 19
NO <sub>3</sub> <sup>-</sup> (μmol L <sup>-1</sup> )	0 - 15.2	0 - 16.0	0 - 15.9	0 - 15.1	0.2 - 13.7	0.1 - 13.9
Si(OH) <sub>4</sub> (μmol L <sup>-1</sup> )	0 - 7.8	0.3 - 8.5	0 - 8.6	0.9 - 8.8	0.4 - 8.0	0.2 - 7.4
PO <sub>4</sub> <sup>3-</sup> (μmol L <sup>-1</sup> )	0.1 - 1.1	0.1 - 1.0	0 - 1.0	0.2 - 1.0	0.1 - 0.9	0.2 - 0.9
Si(OH) <sub>4</sub> :NO <sub>3</sub> <sup>-</sup>	0.2 - 44.1	0.4 - 45.4	0 - 87.3	0.1 - 9.3	0.6 - 9.5	0.2 - 9.4
NO <sub>3</sub> :PO <sub>4</sub> <sup>3-</sup>	0.3 - 19.1	0 - 15.9	0 - 17.3	0 - 20.8	1.1 - 16.2	0.2 - 15.4
Chlorophyll a (mg Chl <sub>a</sub> m <sup>-3</sup> )	0.6 - 20.2	0.7 - 19.7	1.1 - 24.1	0.4 - 9.0	0.4 - 9.1	0.9 - 22.8
DT:(DT+DD)	0 - 0.1	0 - 0.2	0 - 0.2	0 - 0.4	0 - 0.3	0 - 0.1
(DD+DT):TChl <sub>a</sub>	0 - 0.3	0 - 0.1	0 - 0.1	0 - 0.2	0.1 0.2	0 - 0.1
POC (mg C m <sup>-3</sup> )	119 - 331	178 - 952	160 - 960	55 - 658	211 - 796	97 - 688
PON (mg N m <sup>-3</sup> )	20 - 54	29 - 109	24 - 154	4 - 138	38 - 154	13 - 71
POC <sub>phyto</sub> (%)	17.9 - 29.0	14.9 - 100*	8.0 - 100*	12.2 - 64.6	18.8 - 56.6	36.9 - 38.7
POC:PON	5.2 - 7.9	5 - 12.5	4.6 - 13.4	4.7 - 12.4	5.2 - 8.5	7.5 - 9.7
$\alpha^B \times 10^{-2}$ (mgC [mgChl <sub>a</sub> ] <sup>-1</sup> h <sup>-1</sup> [Wm <sup>-2</sup> ] <sup>-1</sup> )	-	2 - 18	4 - 17	2 - 17	5 - 9	-
$P_m^B$ (mgC [mgChl <sub>a</sub> ] <sup>-1</sup> h <sup>-1</sup> )	-	1.0 - 4.7	1.2 - 4.0	0.9 - 3.2	2.5 - 4.0	-
$E_k$ (Wm <sup>-2</sup> )	-	20 - 127	15 - 52	16 - 67	41 - 51	-
$E_s$ (Wm <sup>-2</sup> )	-	21 - 127	15 - 59	17 - 76	45 - 62	-
$\beta \times 10^{-4}$ (mgC [mgChl <sub>a</sub> ] <sup>-1</sup> h <sup>-1</sup> [Wm <sup>-2</sup> ] <sup>-1</sup> )	-	0 - 16	0 - 75	0 - 49	5 - 60	-

\* Values > 100% due to variability of the data was set to a maximum value of 100%.

10 Supplemental Material - Figure S1. Mean relative (%) concentration (after fourth-root transformation) of each of the selected pigments (e.g. Fuco) to the total selected pigments (i.e. sum of Fuco + Chl *c*<sub>3</sub> + Hex-fuco + Chl *b* + Peri + Allo + But-fuco + Pras + Zea+Lut) for each cluster. (a). Pigment abbreviations are described in Table 2. Spatial distribution of each cluster (I - V) along the section (km) and throughout the years (2005 - 2014), showing the distance from the star in Figure 2a (b).

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