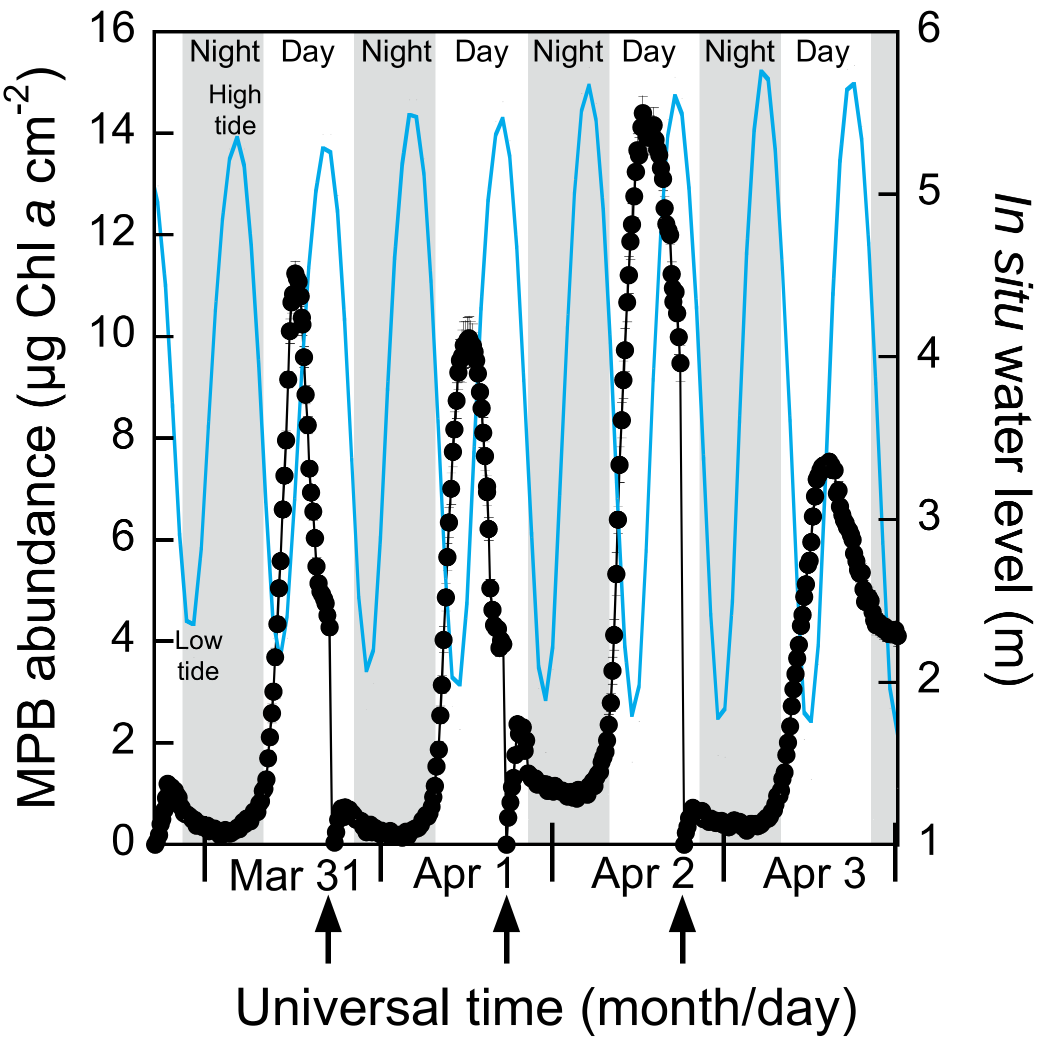
Supplementary Material

Supplementary Table S1. Dates of the sediment samplings with the corresponding lowest water level (m) and low tide timing (Universal Time-UT) at the sampling site.

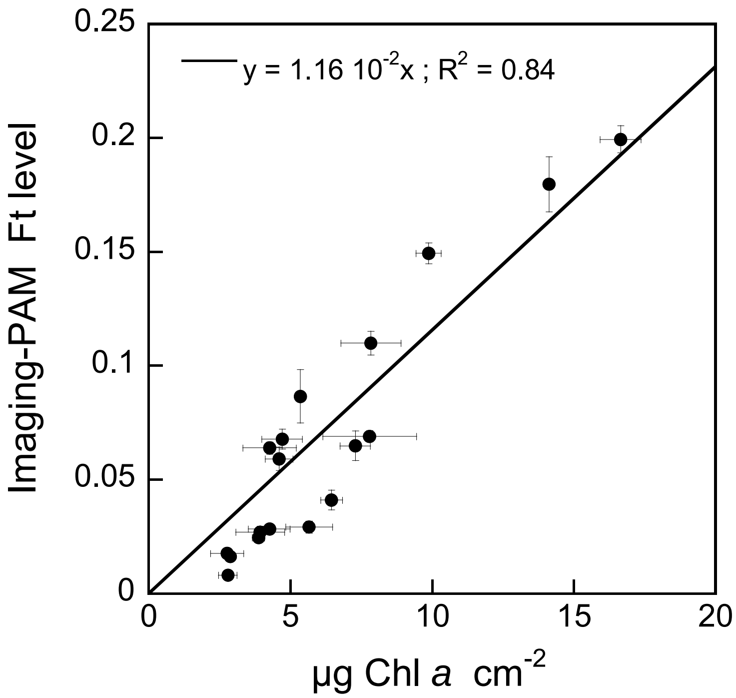
Date	Low waters level (m)	Low tide timing
2011-04-18	0.50	10:22 AM
2011-05-02	1.50	9:44 AM
2011-05-16	0.85	9:15 AM
2011-05-24	2.45	2:56 PM
2011-06-06	1.82	1:22 PM
2011-06-15	1.20	9:48 AM
2011-06-21	1.95	1:30 PM
2011-06-27	2.25	7:19 AM
2011-07-05	1.25	12:21 PM
2011-07-18	1.50	12:18 PM
2011-08-09	2.20	6:44 AM
2011-08-24	2.65	6:06 AM
2011-09-19	2.70	2:23 PM
2011-09-27	0.50	9:52 AM
2011-10-25	0.80	8:42 AM
2011-11-07	1.95	8:06 AM
2011-11-15	1.90	12:13 PM
2011-11-22	1.40	7:26 AM
2012-02-20	1.10	9:29 AM
2012-02-22	1.00	10:45 AM
2012-02-24	1.25	11:52 AM
2012-02-28	2.20	1:33 PM
2012-03-02	3.00	4:19 PM
2012-03-09	0.45	11:02 AM
2012-03-13	1.35	1:15 PM
2012-03-19	1.50	8:26 AM
2012-03-27	1.85	12:24 PM
2012-04-13	2.25	4:12 PM
2012-06-04	0.80	10:01 AM
2012-06-13	2.40	5:10 PM
2012-07-10	2.05	2:28 PM
2012-07-16	1.75	8:27 AM
2012-07-26	1.85	2:40 PM
2012-07-30	1.60	7:52 AM
2012-08-08	2.05	1:46 PM
2012-10-10	2.95	4:07 PM
2012-11-13	0.95	8:40 AM
2012-11-21	1.95	3:47 PM
2013-01-29	1.20	11:13 AM
2013-02-13	0.80	11:50 AM

Supplementary Figure S1. Microphytobenthos (MPB) abundance (µg Chl *a* cm^{-2}) and water level (m) at the site of sampling measured during 4 consecutive days (from March 30-16:30, to April 3-03:00, UT) under control light conditions (24 h natural photoperiod). Black line: MPB abundance (mg Chl *a* m^{-2}), blue line: water level at the site of sampling (m), in grey background the night periods and in white background the day periods, arrows indicate the timings for which the sediment was stirred with filtered fresh sea-water. MPB abundance values are the mean ± SD of Ft measurements over 5 Imaging-PAM 'areas of interest' on the sediment tray.

Note that through the 4 consecutive days, the timing of maximal MPB abundance shifted by a bit more than 2 h from 12:05 to 14:15 UT when the low tide *in situ* timing (i.e. at the site of sampling) shifted by 2 h from 10:00 to 12:00 UT.



Supplementary Figure S2. MPB Chl *a* fluorescence (Ft) measured by Imaging-PAM fluorimetry on the surface of muddy sediment versus the Chl *a* sediment content measured by HPLC. Values are the mean of 3 measurements ± SD.



The Chl *a* content (mg. g_{sed}^{-1} of dry sediment) of 22 cores was measured with HPLC (see the Materials and Methods section) whereas sediment concentration (C_{sed} in g_{sed} L^{-1}) was computed according to Avnimelech *et al.*, 2001):

$$C_{sed} = \frac{10^5}{W_{cont} + \left(100 / Sed_{poro}\right)}$$

where W_{cont} is the water content of sediment core in % and Sed_{poro} is the sediment porosity (= 2.65 g.cm^{-3}).

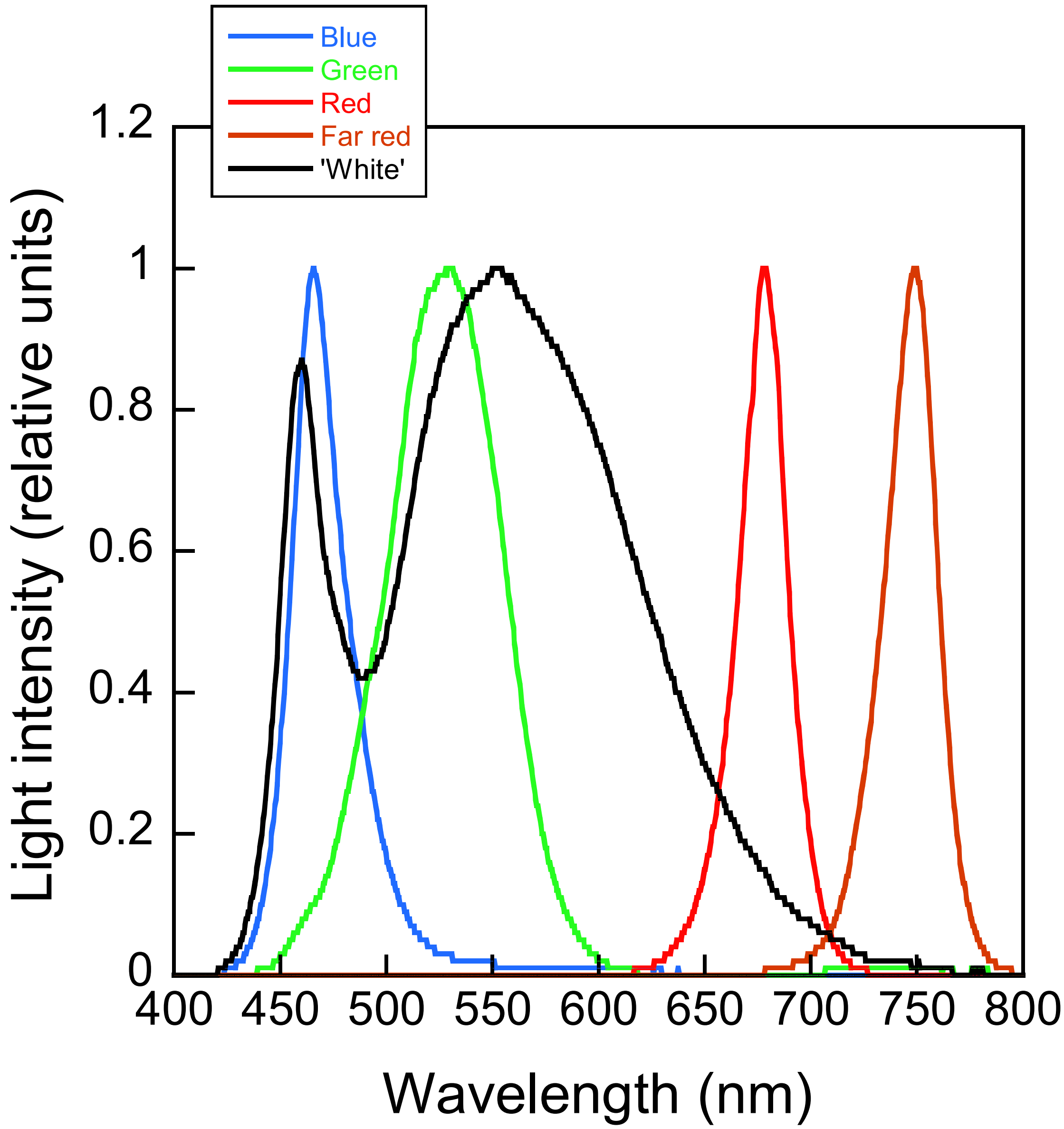
The Chl *a* content (mg. g^{-1} of dry sediment) of the sediment core 200 µm (0.002 dm) section was multiplied by the C_{sed} (g sediment. L^{-1}) to get the Chl *a* concentration in the sample (i.e. the whole volume of the core analyzed by HPLC; in mg. L^{-1} or mg. dm^{-3} of sediment). Chl *a* concentration in sediment was then multiplied by the sediment section depth (0.002 dm) to get the Chl *a* concentration recorded by the Imaging-PAM (mg Chl *a* dm^{-2} multiplied by 10 to be in µg Chl *a* cm^{-2}). A linear regression between Imaging-PAM Fluorescence and Chl *a* concentration was found with a coefficient of 81.23 (Pearson: 0.94, P-value < 0.001) (Fig. S2), allowing us to convert Imaging-PAM fluorescence (Ft) data in Chl *a* content per surface of sediment (µg Chl *a* cm^{-2}).

Reference: Avnimelech, Y., Ritvo, G., Meijer, L. E. & Kochba, M. 2001. Water content, organic carbon and dry bulk density in flooded sediments. *Aquac. Eng.* 25:25-33.

Supplementary Figure S3. Map of the intensity (in µmol photons m^{-2} s^{-1}) of the detecting beam provided by the blue (470 nm) LED measuring head of the Imaging-PAM fluorometer (Maxi-PAM M-series, Walz, Effeltrich, Germany) at the surface of a sediment tray with the settings used in the present study (i.e. intensity 0, frequency 1, measuring frequency: each 900 s). Each square is 4 cm^2. Measurements were performed with the quantameter ULM-500 (Walz, Effeltrich, Germany). Values are the mean of 4 measurements ± SD.

	1	2	3	4	5	6	7
A	0.90 ± 0.00	0.95 ± 0.06	0.80 ± 0.00	0.70 ± 0.00	0.70 ± 0.00	0.75 ± 0.06	0.80 ± 0.00
B	0.90 ± 0.00	0.90 ± 0.00	0.85 ± 0.06	0.75 ± 0.06	0.80 ± 0.00	0.78 ± 0.05	0.85 ± 0.06
C	0.85 ± 0.06	0.85 ± 0.06	0.88 ± 0.05	0.80 ± 0.00	0.83 ± 0.05	0.85 ± 0.06	0.85 ± 0.06
D	0.80 ± 0.00	0.90 ± 0.00	0.88 ± 0.05	0.85 ± 0.06	0.83 ± 0.05	0.90 ± 0.00	0.85 ± 0.06
E	0.70 ± 0.00	0.75 ± 0.06	0.70 ± 0.00	0.70 ± 0.00	0.70 ± 0.00	0.70 ± 0.00	0.70 ± 0.00

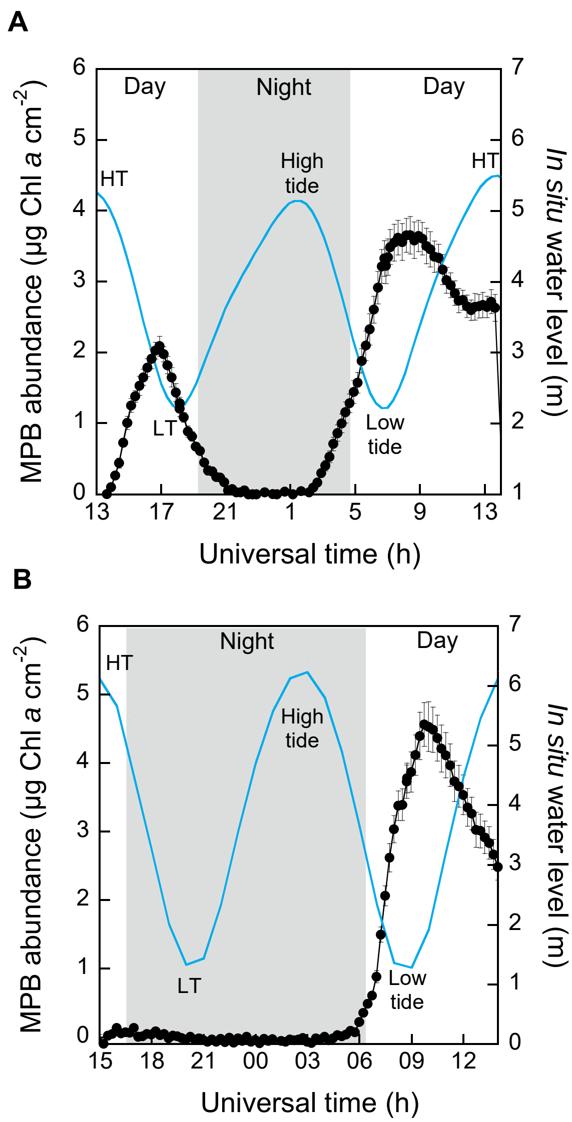
Supplementary Figure S4. Spectra of the 'light colors' used in the present study. All wavelengths were obtained with LED panels (FloraLEDs, Plant Climatics, Germany) except the green wavelength which was generated with the 'white' LEDs filtered with a green filter (124 Dark Green Lee filter, Andover England). The respective maximum wavelengths are: blue (465 nm), green (530 nm), red (677 nm), far-red (748 nm), 'white' (459 nm and 553 nm).



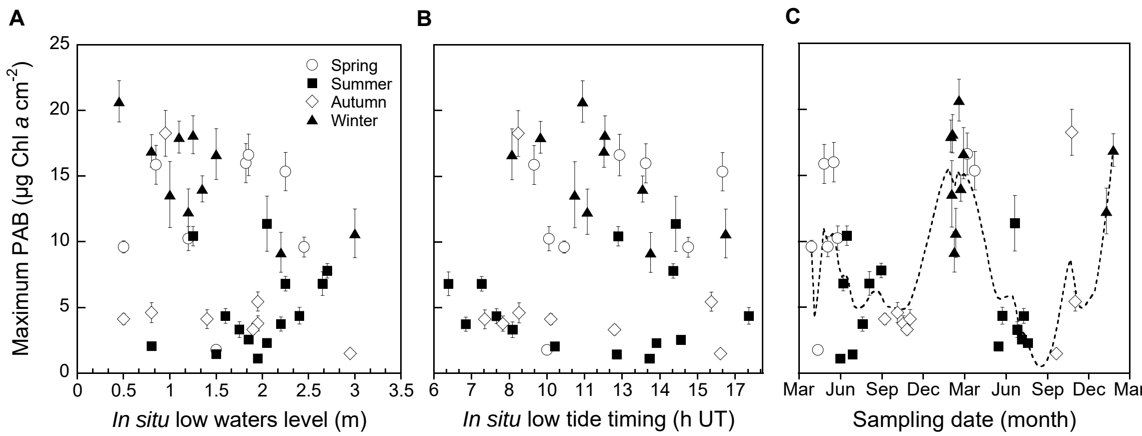
Supplementary Table S2. ΦPSII*inst* (instantaneous effective quantum yield of PSII photochemistry) recorded at the maximum PAB timing at the surface of sediment for all experiments described in this study. Data are the mean ± SD of 3 to 4 independent measurements (i.e. 3 to 4 different days).

Experiment Corresponding Figure	Remark	Light conditions	Day 1	Day 2 and following Days
Figure 2A		Control	0.689 ± 0.004	
Figure 2B		Control	0.666 ± 0.004	
Figure S1	All days pooled	Control	0.642 ± 0.031	
Figure S5A		Control	0.673 ± 0.003	
Figure S5B		Control	0.624 ± 0.007	
Figure 3 and S6	All experiments pooled	Control	0.681 ± 0.026	
Figure 4A		Control + continuous darkness	0.705 ± 0.001	0.701 ± 0.001
Figure 4B		Control + continuous light	0.681 ± 0.001	0.588 ± 0.037
Figure 4C		Control + inverted photoperiod	0.648 ± 0.008	0.671 ± 0.009
Figure 5 and S7		Control	0.661 ± 0.014	
		Darkness	0.690 ± 0.015	
		'White' (20)	0.619 ± 0.048	
		'White' (120)	0.651 ± 0.019	
		'White' (350)	0.620 ± 0.042	
		Blue (10)	0.648 ± 0.003	
		Blue (40)	0.637 ± 0.015	
		Blue (120)	0.585 ± 0.017	
		Green (10)	0.652 ± 0.006	
		Green (40)	0.606 ± 0.017	
		Red (180)	0.645 ± 0.046	
		Red +FR (180)	0.761 ± 0.025	

Supplementary Figure S5. Microphytobenthos (MPB) abundance (µg Chl *a* cm^{-2}) in muddy sediment and water level (m) at the site of sampling as a function of time (h, UT) measured continuously for 24 h under control light conditions (i.e. 24 h natural photoperiod) when the timing of low tide at the site of sampling (i.e. corresponding to the lowest water level) was close A) to sunset and sunrise (neap tide), B) to sunrise (spring tide). Black line: MPB abundance (µg Chl *a* cm^{-2}), blue line: water level at the site of sampling, in grey background the night periods and in white background the day periods. MPB abundance values are the mean ± SD of 5 Imaging-PAM 'areas of interest' on the sediment tray.



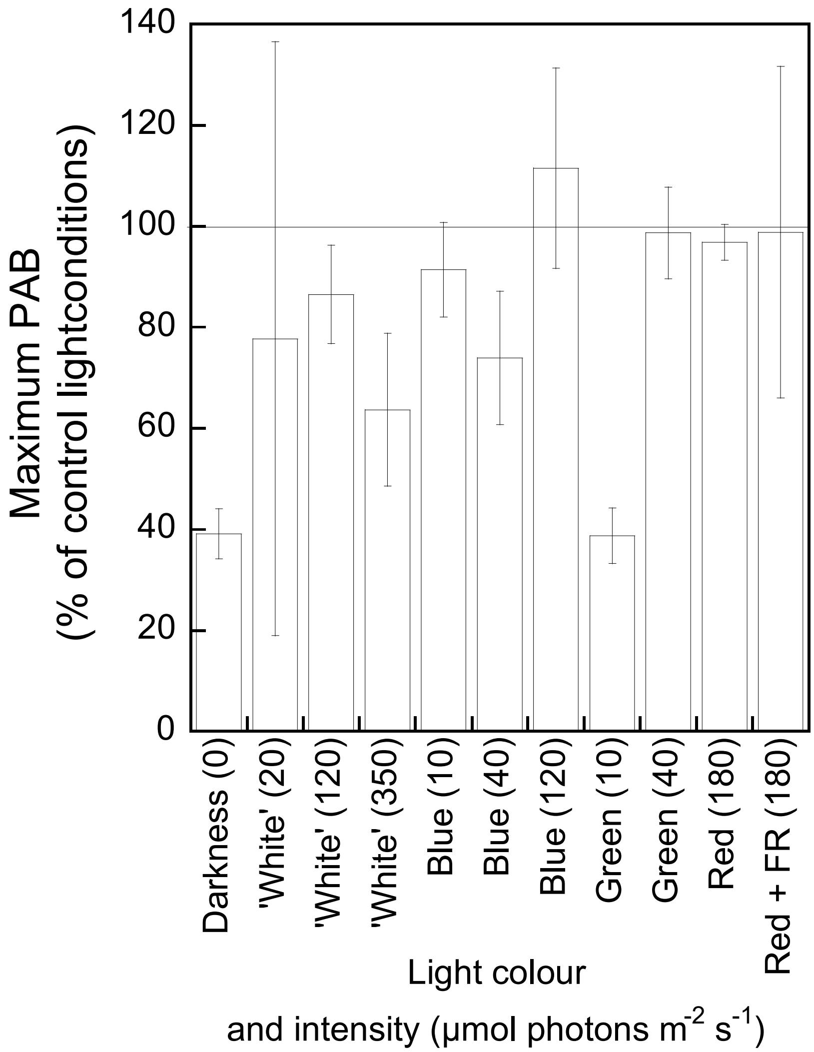
Supplementary Figure S6. MPB maximum photosynthetically active biomass (PAB) at the surface of muddy sediment as function of A) the low waters level at the site of sampling, B) the low tide timing (in h UT) at the site of sampling (i.e. corresponding to the lowest water level), and C) the date of sampling (month abbreviations are: Mar, March; Jun, June; Sep, September; Dec, December); in order to facilitate the reading months were pooled under season labels: spring (circles), summer (squares), autumn (diamonds), and summer (triangles). Values are the mean ± SD of 5 Imaging-PAM 'areas of interest' on the sediment tray. Water level and low tide timing data were retrieved from the Service Hydrographique et Océanographique de la Marine (SHOM, France) data-basis.



Supplementary Table S3. Significance (Tukey test, after one way ANOVA, $p \leq 0.001$) of the difference between the light conditions tested in Figure 5 relative to the Total PAB. Red boxes: $p > 0.05$, orange: $p \leq 0.05$, light green: $p \leq 0.01$, and dark green: $p \leq 0.001$. The light intensities (in µmol photons m^{-2} s^{-1}) of the different light conditions are given in-between brackets.

	Control	Darkness	'White' (20)	White (120)	'White' (350)	Blue (10)	Blue (40)	Blue (120)	Green (10)	Green (40)	Red (180)	Red + FR (180)
Control		0.5145	0.9877	0.7940	1.0000	0.9981	1.0000	0.0650	0.6695	0.9847	1.0000	0.9973
Darkness			0.9899	0.0107	0.6340	0.9602	0.2534	0.0001	1.0000	0.0323	0.2836	0.0706
'White' (20)				0.1474	0.9972	1.0000	0.9453	0.0027	0.9988	0.3743	0.8998	0.5511
White (120)					0.6734	0.2330	0.5552	0.8543	0.0199	0.9993	0.9619	0.9972
'White' (350)						0.9998	1.0000	0.0395	0.7809	0.9497	1.0000	0.9867
Blue (10)							0.9883	0.0052	0.9909	0.5329	0.9632	0.7101
Blue (40)								0.0049	0.3993	0.9332	1.0000	0.9888
Blue (120)									0.0002	0.2318	0.1786	0.2421
Green (10)										0.0599	0.4108	0.1217
Green (40)											0.9998	1.0000
Red (180)												1.0000
Red + FR (180)												

Supplementary Figure S7. MPB maximum photosynthetically active biomass (PAB in % of the control light conditions) at the surface of muddy sediment and under different light exposures of 24 h. Values are mean ± SD of n measurements for each light condition. The light conditions were: darkness (0 µmol photons m^{-2} s^{-1}, n = 2), 'white' light (emission maxima at 459 nm and 553 nm, 20 µmol photons m^{-2} s^{-1}, n = 2; 120 µmol photons m^{-2} s^{-1}, n = 2; 350 µmol photons m^{-2} s^{-1}, n = 2), blue light (465 nm, 10 µmol photons m^{-2} s^{-1}, n = 2; 40 µmol photons m^{-2} s^{-1}, n = 5; 120 µmol photons m^{-2} s^{-1}, n = 5), green light (530 nm, 10 µmol photons m^{-2} s^{-1}, n = 2; 40 µmol photons m^{-2} s^{-1}, n = 4) red light (180 µmol photons m^{-2} s^{-1}, 677 nm; without far-red-FR, 748 nm, n = 3 and with FR, n = 2). Control light conditions (24 h natural photoperiod) values were set to 100 % (performed before each light treatment). See Fig. S4 for the full emission spectrum of each LED color.



Supplementary Table S4. MPB pigment content (Chl *a* is in mg Chl *a* g^{-1} dry weight, and the other pigments are in relative content to Chl *a*, i.e. in mol 100 Chl a^{-1}) in the 0-200 µm, 200-400 µm and 400-600 µm layers of muddy sediments exposed to control (24 h natural photoperiod) and blue (465 nm) light conditions (intensity in-between brackets in µmol photon m^{-2} s^{-1}) harvested in winter and summer. Abbreviations: Chl *c*, chlorophyll *c*; Fx, fucoxanthin; DD, diadinoxanthin; DT, diatoxanthin; DES, DD de-epoxidation state [DES = DT / (DD+DT) x 100]; ß-Car, ß-carotene; Chl *a*, Chlorophyll *a*; BLT, 3 h before low tide; LT, low tide timing at the site of sampling (i.e. corresponding to the lowest water level); ALT, 3 h after low tide; NA, not available. Values are the mean ± SD of 3 measurements. Light intensities, in µmol photon m^{-2} s^{-1}, are in-between brackets.

Statistical analysis was performed using three way ANOVA to test the effect of the seasons, light conditions and sampling timing. Corresponding P-values are shown as follows: red boxes: $p > 0.05$, orange: $p \leq 0.05$, light green: $p \leq 0.01$, and dark green: $p \leq 0.001$. Post-hoc Tukey tests were performed to group values according to the probability of mean differences and alpha level (0.05). For each pigment value, conditions with the same letter are not significantly different.

Description of the data:

We found significant differences in winter *vs.* summer sediments exposed to light control conditions and for most sampling times (LT, BLT, ALT). In the upper sediment layer (0-200 µm), Chl *a* (as expected, see Fig. 3C) and Chl *c* were significantly higher in winter sediment, and DD+DT, DES and ß-carotene were significantly higher in summer. Most of the winter *vs.* summer pigment significant differences were observed down to 600 µm depth. In the upper sediment layer (0-200 µm), the most significant differences observed in the pigment content of MPB diatom cells under BL *vs*. control light conditions were: i) a significant decrease in DD+DT, mostly in summer and for BL-20 µmol photons m^{-2} s^{-1}, ii) a significant decrease in DES, mostly in winter and for BL-120 µmol photons m^{-2} s^{-1}. There were some significant differences in Fx and ß-carotene contents under some light conditions and at some timings of the *in situ* tidal cycle but no clear tendency was identified. Some of these significant differences were observed down to 600 µm depth, especially for DD+DT and DES.

0-200 µm		Winter			Summer			
	Pigments	Control	Blue (40)	Blue (120)	Control	Blue (10)	Blue (40)	Blue (120)
BLT	Chl *a*	2.24 ± 1.11[ab]	1.39 ± 1.20[a]	1.36 ± 0.72[abc]	0.25 ± 0.05[bc]	0.30 ± 0.02[bc]	0.47 ± 0.10[bc]	0.36 ± 0.02[c]
	Chl *c*	11.67 ± 1.39[ab]	13.66 ± 3.08[a]	9.97 ± 1.41[abc]	6.40 ± 0.89[bc]	6.71 ± 1.06[bc]	6.04 ± NA[bc]	5.67 ± 0.76[c]
	Fx	45.68 ± 7.15[a]	45.71 ± 4.33[a]	44.07 ± 0.41[a]	41.88 ± 3.27[a]	47.03 ± 1.75[a]	NA	45.12 ± 1.55[a]
	DD+DT	13.13 ± 2.45[abc]	12.57 ± 1.78[bc]	10.76 ± 0.97[c]	15.52 ± 0.87[ab]	13.70 ± 0.02[abc]	14.00 ± NA[abc]	10.54 ± 0.56[c]
	DES	5.64 ± 1.31[de]	4.60 ± 1.65[de]	2.38 ± 0.55[e]	11.91 ± 5.14[abcd]	11.72±2.69[abcd]	8.53 ± NA[bcde]	7.82 ± 2.03[cde]
	ß-Car	1.68 ± 0.29[cd]	1.36 ± 0.61[cd]	1.23 ± 0.19[d]	4.82 ± 1.30[ab]	4.37 ± 0.98[ab]	2.95 ± 0.83[abcd]	4.02 ± 0.33[abc]
LT	Chl *a*	2.14 ± 1.24[bc]	1.92 ± 1.31[ab]	2.12 ± 1.24[abc]	0.25 ± 0.04[bc]	0.30 ± 0.04[c]	0.45 ± 0.06[bc]	0.40 ± 0.03[c]
	Chl *c*	9.33 ± 1.88[bc]	11.74 ± 3.01[ab]	9.73 ± 0.85[abc]	6.20 ± 0.91[bc]	5.13 ± 0.21[c]	6.33 ± NA[bc]	4.39 ± NA[c]
	Fx	44.35 ± 5.42[a]	45.21 ± 3.01[a]	44.01 ± 1.62[a]	42.18 ± 1.93[a]	41.84 ± 9.94[a]	43.77 ± 0.10[a]	47.22 ± 0.35[a]
	DD+DT	12.91 ± 2.06[bc]	12.7 ± 0.54[bc]	10.78 ± 0.23[c]	13.8 ± 2.86[abc]	14.32 ± 1.92[abc]	13.37 ± 0.02[abc]	10.23 ± 0.19[c]
	DES	3.62 ± 1.04[e]	2.46 ± 0.29[e]	2.47 ± 0.55[e]	13.66 ± 1.53[abc]	13.42 ± NA[abcd]	10.10 ± 0.01[bcd]	12.09 ± 0.88[abcd]
	ß-Car	1.76 ± 0.46[cd]	1.62 ± 0.90[cd]	1.08 ± 0.51[d]	3.91 ± 0.96[abcd]	3.44 ± NA[abcd]	3.94 ± 0.13[abc]	3.13 ± 0.07[abcd]
ALT	Chl *a*	1.48 ± 1.16[abc]	1.80 ± 0.44[abc]	2.18 ± 0.84[ab]	0.16 ± 0.02[c]	0.21 ± 0.05[bc]	0.23 ± 0.05[bc]	0.25 ± 0.03[c]
	Chl *c*	9.97 ± 1.65[abc]	10.25 ± 3.52[abc]	11.71 ± 1.26[ab]	5.71 ± 0.52[c]	5.96 ± 0.45[bc]	6.29 ± 0.23[bc]	5.21 ± 0.81[c]
	Fx	42.23 ± 3.54[a]	46.18 ± 3.86[a]	43.66 ± 1.41[a]	40.12 ± 3.82[a]	46.91 ± 1.34[a]	42.57 ± 1.95[a]	44.56 ± 1.53[a]
	DD+DT	12.86 ± 1.55[bc]	11.45 ± 0.43[bc]	11.04 ± 0.87[bc]	16.48 ± 1.35[a]	14.99 ± 0.41[abc]	13.31 ± 0.54[abc]	12.05 ± 1.18[bc]
	DES	5.06 ± 1.78[de]	4.61 ± 2.35[de]	3.15 ± 0.54[e]	15.51 ± 2.99[ab]	18.43 ± 0.34[a]	15.24 ± 1.87[abc]	11.90 ± 6.25[abcd]
	ß-Car	3.23 ± 1.00[abcd]	2.65 ± 0.87[bcd]	3.37 ± 0.68[abcd]	3.91 ± 1.17[abcd]	5.59 ± 0.52[a]	3.91 ± 1.01[abcd]	3.89 ± 0.50[abcd]

ANOVA 0-200 µm	Chl *a*	Chl *c*	Px	Dd+Dt	DES	ß-Car
Season	0.0000	0.0000	0.9843	0.3061	0.0000	0.0000
Light	0.9348	0.1689	0.1980	0.0000	0.0012	0.1504
Time	0.5676	0.0290	0.4482	0.4072	0.0037	0.0013
Season:Light	0.7178	0.9721	0.2257	0.3369	0.8122	0.9008
Season:Time	0.5505	0.9729	0.8127	0.6461	0.0525	0.1625
Light:Time	0.7660	0.5995	0.8214	0.8173	0.7016	0.2978
Season:Light:Time	0.9812	0.2380	0.9845	0.9682	0.5729	0.4301

200-400 µm		**Winter**			**Summer**			
		Control	Blue (40)	Blue (120)	Control	Blue (10)	Blue (40)	Blue (120)
BLT	Chl *a*	1.70 ± 1.14[a]	1.23 ± 0.91[ab]	0.85 ± 0.48[ab]	0.24 ± 0.07[b]	0.29 ± 0.04[ab]	0.28 ± 0.07[b]	0.35 ± 0.03[ab]
	Chl *c*	9.97 ± 2.89[abc]	12.91 ±2.49[ab]	9.86 ± 2.49[abc]	6.81 ± 0.58[bc]	6.14 ± NA[bc]	5.71 ± 0.42[bc]	5.61 ± 0.58[bc]
	Fx	45.02 ± 6.77[ab]	47.49 ± 2.62[a]	44.22 ± 3.54[ab]	45.32 ± 2.19[ab]	48.56 ± 0.11[a]	33.62 ± 3.65[ab]	48.09 ± 1.73[a]
	DD+DT	13.24 ± 2.27[b]	12.25 ± 0.63[b]	11.65 ± 1.25[b]	15.28 ± 1.47[ab]	13.65 ± 0.45[ab]	15.32 ± 2.27[ab]	10.76 ± 1.09[b]
	DES	6.88 ± 0.40[de]	5.27 ± 0.61[e]	4.89 ± 1.99[e]	11.22 ± 1.85[cd]	14.67 ± 1.30[abc]	14.34 ±1.69[abc]	14.46 ± NA[abc]
	ß-Car	3.33 ± 1.02[abc]	3.21 ± 0.89[abc]	3.27 ± 1.11[abc]	4.19 ± 1.11[abc]	3.71 ± 0.59[abc]	4.19 ± 0.08[abc]	3.91 ± 0.32[abc]
LT	Chl *a*	1.49 ± 0.49[ab]	1.15 ± 0.90[ab]	1.20 ± 0.48[ab]	0.29 ± 0.07[b]	0.29 ± 0.02[b]	0.30 ± 0.01[ab]	0.32 ± 0.07[ab]
	Chl *c*	9.60 ± 2.26[abc]	13.53 ± 2.09[a]	9.34 ± 1.81[abc]	8.97 ± 3.15[abc]	6.65 ± 1.81[bc]	5.89 ± NA[bc]	5.20 ± 0.34[c]
	Fx	43.09 ± 3.23[ab]	47.04 ± 2.91[a]	45.04 ± 2.27[ab]	40.64 ± 3.17[ab]	42.37 ±11.42[ab]	45.16 ± 1.63[ab]	40.84 ± 8.57[ab]
	DD+DT	12.74 ± 0.92[b]	12.69 ± 0.88[b]	11.33 ± 0.85[b]	13.89 ± 3.00[ab]	12.04 ± 2.91[b]	12.5 ± 0.78[b]	9.32 ± 2.75[b]
	DES	4.86 ± 1.51[e]	5.78 ± 3.51[e]	3.5 ± 0.41[e]	11.94 ± 2.24[c]	16.66 ± NA[abc]	12.83 ± 0.26[bc]	15.83 ± 0.02[abc]
	ß-Car	2.17 ± 0.42[c]	3.78 ± 1.07[abc]	4.23 ± 0.25[abc]	3.65 ± 0.54[abc]	3.77 ± NA[abc]	3.7 ± 0.06[abc]	3.23 ± 0.29[abc]
ALT	Chl *a*	0.80 ± 0.51[ab]	1.50 ± 0.38[ab]	1.25 ± 0.66[ab]	0.14 ± 0.01[b]	0.14 ± 0.01[b]	0.21 ± 0.01[b]	0.21 ± 0.01[b]
	Chl *c*	10.39 ± 2.30[ab]	11.08 ±0.79[ab]	11.90 ± 4.31[ab]	5.24 ± 0.38[c]	5.63 ± 0.13bc	5.69 ± 0.26[bc]	4.96 ± 0.01[c]
	Fx	41.34 ± 2.95[ab]	44.76 ±2.41[ab]	42.3 ± 2.64[ab]	40.20 ± 2.41[ab]	47.7 ± 0.91[a]	38.83 ± 4.78[ab]	39.9 ± 1.17[ab]
	DD+DT	12.4 ± 1.04[b]	11.39 ± 1.81[b]	11.25 ± 0.60[b]	17.33 ± 1.69[a]	14.43 ± 0.86[ab]	14.1 ± 1.04[ab]	11.23 ± 0.24[b]
	DES	5.10 ± 1.47[e]	5.57 ± 2.28[e]	5.07 ± 1.30[e]	16.90 ± 1.99[ab]	19.93 ± 1.92[a]	18.29 ± 0.10[ab]	8.95 ± 0.11[cde]
	ß-Car	2.82 ± 0.66[bc]	2.90 ± 1.19[bc]	3.94 ± 1.34[abc]	5.10 ± 1.32[a]	4.82 ± 0.73[ab]	3.85 ± 0.50[abc]	4.15 ± 0.19[abc]

ANOVA 200-400 µm	Chl *a*	Chl *c*	Px	Dd+Dt	DES	ß-Car
Season	0.0000	0.0000	0.0084	0.4620	0.0000	0.3868
Light	0.8417	0.0441	0.0552	0.0000	0.0005	0.0543
Time	0.3396	0.5261	0.0524	0.0745	0.0140	0.1033
Season:Light	0.6087	0.4005	0.0367	0.0238	0.3755	0.3037
Season:Time	0.6738	0.9713	0.8921	0.2022	0.7968	0.2000
Light:Time	0.3293	0.6282	0.3276	0.9130	0.0037	0.1726
Season:Light:Time	0.8911	0.4077	0.0186	0.7743	0.0001	0.9362

400-600 µm		**Winter**			**Summer**			
		Control	Blue (40)	Blue (120)	Control	Blue (10)	Blue (40)	Blue (120)
BLT	Chl *a*	1.59 ± 0.92^{a}	1.34 ± 0.26^{ab}	0.32 ± 0.06^{ab}	0.22 ± 0.05^{ab}	0.24 ± 0.01^{ab}	0.25 ± 0.05^{ab}	0.29 ± 0.02^{ab}
	Chl *c*	11.24 ± 1.67^{a}	10.35 ±0.70^{ab}	8.44 ± 1.58^{ab}	7.40 ± 2.63^{ab}	6.38 ± 0.01^{ab}	5.27 ± NA^{ab}	6.18 ± NA^{ab}
	Fx	41.61 ± 3.35^{ab}	44.32 ±1.55^{ab}	43.19 ± 3.73^{ab}	44.2 ± 2.66^{ab}	47.61± 0.43^{ab}	37.55 ± 3.74^{b}	45.76 ± 2.12^{ab}
	DD+DT	13.59 ± 1.67^{ab}	11.87 ± 0.34^{ab}	11.03 ± 1.81^{b}	16.01 ± 1.33^{a}	14.40 ± 0.91^{ab}	15.71 ± 1.60^{ab}	10.3 ± 0.30^{b}
	DES	7.28 ± 1.41^{bc}	5.51 ± 1.39^{bc}	4.06 ± 0.55^{c}	16.8 ± 3.70^{a}	16.28 ± 2.78^{a}	14.13 ± 2.79^{a}	13.10 ± 3.87^{ab}
	ß-Car	3.46 ± 1.51^{ab}	2.18 ± 0.44^{b}	4.03 ± 0.86^{ab}	4.23 ± 0.55^{ab}	4.63 ± 0.11^{ab}	3.73 ± 0.34^{ab}	3.58 ± 0.49^{ab}
LT	Chl *a*	1.20 ± 0.65^{ab}	1.78 ± 0.35^{a}	1.30 ± 1.16^{ab}	0.25 ± 0.04^{ab}	0.23 ± 0.01^{ab}	0.26 ± 0.01^{ab}	0.22 ± 0.05^{ab}
	Chl *c*	8.76 ± 0.94^{ab}	8.84 ± 0.74^{ab}	9.02 ± 2.50^{ab}	5.78 ± 0.29^{ab}	5.14 ± 1.13^{ab}	5.52 ± 0.21^{ab}	5.7 ± NA^{ab}
	Fx	42.87 ± 1.39^{ab}	45.42 ± 2.12^{ab}	43.83 ± 1.63^{ab}	43.68 ± 1.20^{ab}	45.01 ± 3.49^{ab}	39.85 ± 4.35^{ab}	44.34 ± NA^{ab}
	DD+DT	12.63 ± 1.62^{ab}	12.45 ± 0.85^{ab}	10.79 ± 0.11^{b}	13.46 ± 2.91^{ab}	14.6 ± 2.04^{ab}	12.16 ± 1.40^{ab}	11.76 ± 0.40^{ab}
	DES	4.73 ± 1.15^{c}	3.03 ± 0.58^{c}	4.66 ± 0.75^{c}	14.78 ± 2.13^{a}	11.77 ± NA^{abc}	13.68 ± NA^{ab}	17.53 ± 2.35^{a}
	ß-Car	2.53 ± 0.70^{ab}	1.79 ± 0.40^{b}	3.50 ± 0.77^{ab}	3.65 ± 1.13^{ab}	5.29 ± 1.01^{a}	4.19 ± 0.85^{ab}	3.63 ± 0.04^{ab}
ALT	Chl *a*	0.74 ± 0.28^{ab}	1.03 ± 0.12^{ab}	0.54 ± 0.20^{ab}	0.14 ± 0.01^{b}	0.20 ± 0.01^{ab}	0.18 ± 0.04^{ab}	0.21 ± 0.06^{ab}
	Chl *c*	9.74 ± 2.58^{ab}	9.60 ± 2.37^{ab}	9.48 ± 1.83^{ab}	7.62 ± 3.47^{ab}	7.56 ± 3.82^{ab}	5.76 ± 0.14^{ab}	3.95 ± 1.16^{b}
	Fx	43.11 ± 1.99^{ab}	46.84 ± 3.40^{ab}	42.31 ± 1.79^{ab}	43.42 ± 4.38^{ab}	47.96 ± 0.53^{a}	41.69 ± 1.60^{ab}	46.25 ± NA^{ab}
	DD+DT	13.13 ± 0.98^{ab}	11.18 ± 1.73^{b}	11.68 ± 1.14^{ab}	16.14 ± 2.49^{a}	14.98 ± 0.19^{ab}	14.87 ± 1.05^{ab}	10.16 ± 3.07^{b}
	DES	6.41 ± 1.86^{bc}	6.94 ± 3.37^{bc}	4.73 ± 0.25^{bc}	18.55 ± 2.17^{a}	19.05 ± 2.65^{a}	17.77 ± 2.14^{a}	15.42 ± 1.52^{a}
	ß-Car	2.34 ± 0.77^{b}	3.07 ± 0.98^{ab}	3.61 ± 0.96^{ab}	4.64 ± 0.93^{ab}	5.38 ± 0.89^{a}	4.77 ± 0.58^{ab}	3.33 ± 1.57^{ab}

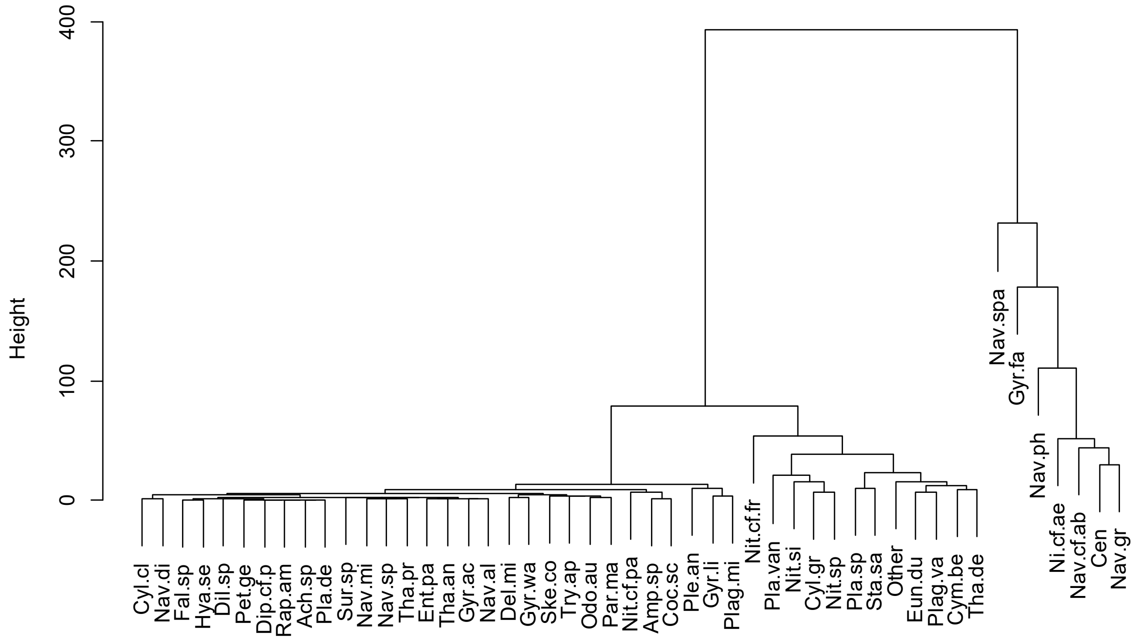
ANOVA 400-600 µm	Chl *a*	Chl *c*	Px	Dd+Dt	DES	ß-Car
Season	0.0001	0.0001	0.0764	0.1327	0.0000	0.0329
Light	0.3182	0.3105	0.0080	0.0000	0.2232	0.0657
Time	0.0434	0.1513	0.5820	0.1230	0.0014	0.2529
Season:Light	0.0931	0.9796	0.0006	0.0268	0.6753	0.0061
Season:Time	0.1954	0.7965	0.8143	0.8757	0.3148	0.7161
Light:Time	0.3457	0.8446	0.7913	0.7668	0.0640	0.4625
Season:Light:Time	0.7793	0.6092	0.8155	0.0874	0.8513	0.9820

Supplementary Table S5. Full and shortened names of the species identified in the upper layer (0-250 µm) of muddy sediment during the same experiments as shown in Fig. S4.

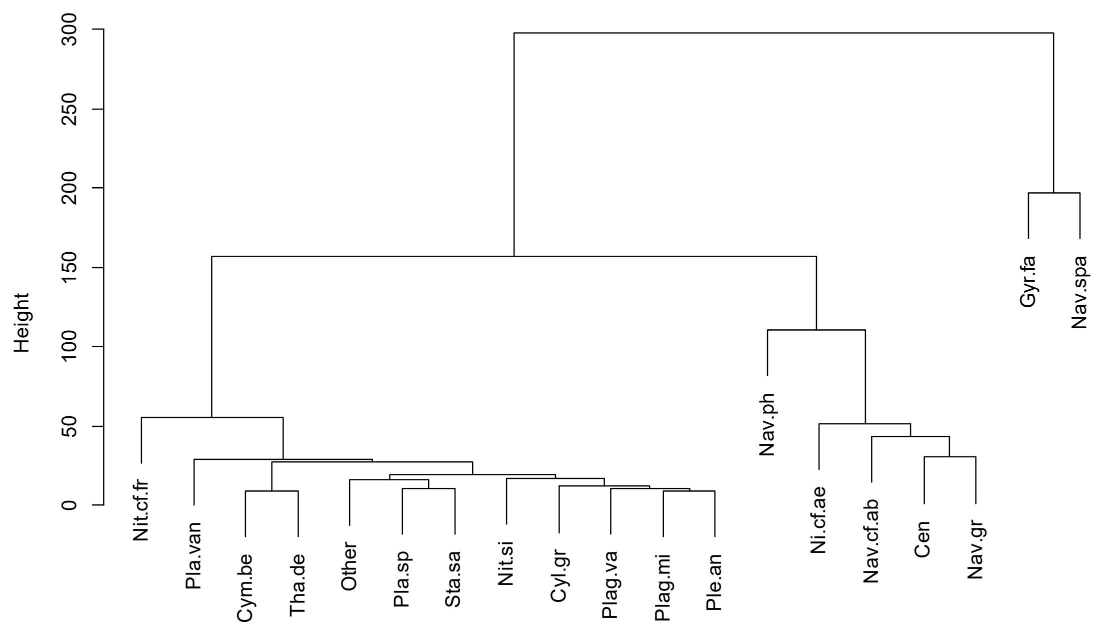
Achnantes sp.	*Ach.sp*
Amphora sp.	*Amp.sp*
Centrics < 5µm	*Cen*
Cocconeis scutellum	*Coc.sc*
Cylindrotheca closterium	*Cyl.cl*
Cylindrotheca gracilis	*Cyl.gr*
Cymatosira belgica	*Cym.be*
Delphineis minutissima	*Del.mi*
Dilponeis sp.	*Dil.sp*
Diploneis cf. parca	*Dip.cf.p*
Entomoneis paludosa	*Ent.pa*
Eunotogramma dubium	*Eun.du*
Fallacia sp.	*Fal.sp*
Gyrosigma acuminatum	*Gyr.ac*
Gyrosigma fasciola	*Gyr.fa*
Gyrosigma limosum	*Gyr.li*
Gyrosigma wansbekii	*Gyr.wa*
Hyalodiscus senarius	*Hya.se*
Navicula aleksandrae	*Nav.al*
Navicula cf. abscondita	*Nav.cf.ab*
Navicula diserta	*Nav.di*
Navicula gregaria	*Nav.gr*
Navicula microdigitoradiata	*Nav.mi*
Navicula phyllepta	*Nav.ph*
Navicula sp.	*Nav.sp*
Navicula spartinetensis	*Nav.spa*
Nitzschia cf. aequorea	*Nit.cf.ae*
Nitzschia cf. frustulum	*Nit.cf.fr*
Nitzschia cf. panduriformis	*Nit.cf.pa*
Nitzschia sigma	*Nit.si*
Nitzschia sp.	*Nit.sp*
Odontella aurita	*Odo.au*
Paralia marina	*Par.ma*
Petrodyction gemma	*Pet.ge*
Plagiogrammopsis minima	*Plag.mi*
Plagiogrammopsis vanheurckii	*Plag.va*
Plagiotropis sp.	*Pla.sp*
Plagiotropis vanheurckii	*Pla.van*
Planothidium delicatulum	*Plan.de*
Pleurosigma angulatum	*Ple.an*
Raphoneis amphiceros	*Rap.am*
Skeuletonema costatum	*Ske.co*
Staurophora salina	*Sta.sa*
Surirella sp.	*Sur.sp*
Thalassiosira angulata	*Tha.an*
Thalassiosira decipiens	*Tha.de*
Thalassiosira proskinae	*Tha.pr*
Tryblionella apiculata	*Try.ap*
Other	*Other*

Supplementary Figure S8. Hcluster performed with the Ward.D method (Ward, 1963) on A) the whole MPB community (49 species, see Table S5), and B) the 19 species that were present at least once > 5% of the relative MPB abundance. Reference: Ward, J.H. jr. (1963) Hierarchical Grouping to Optimize an Objective Function. J. American Statistical Association, 58: 236-244.

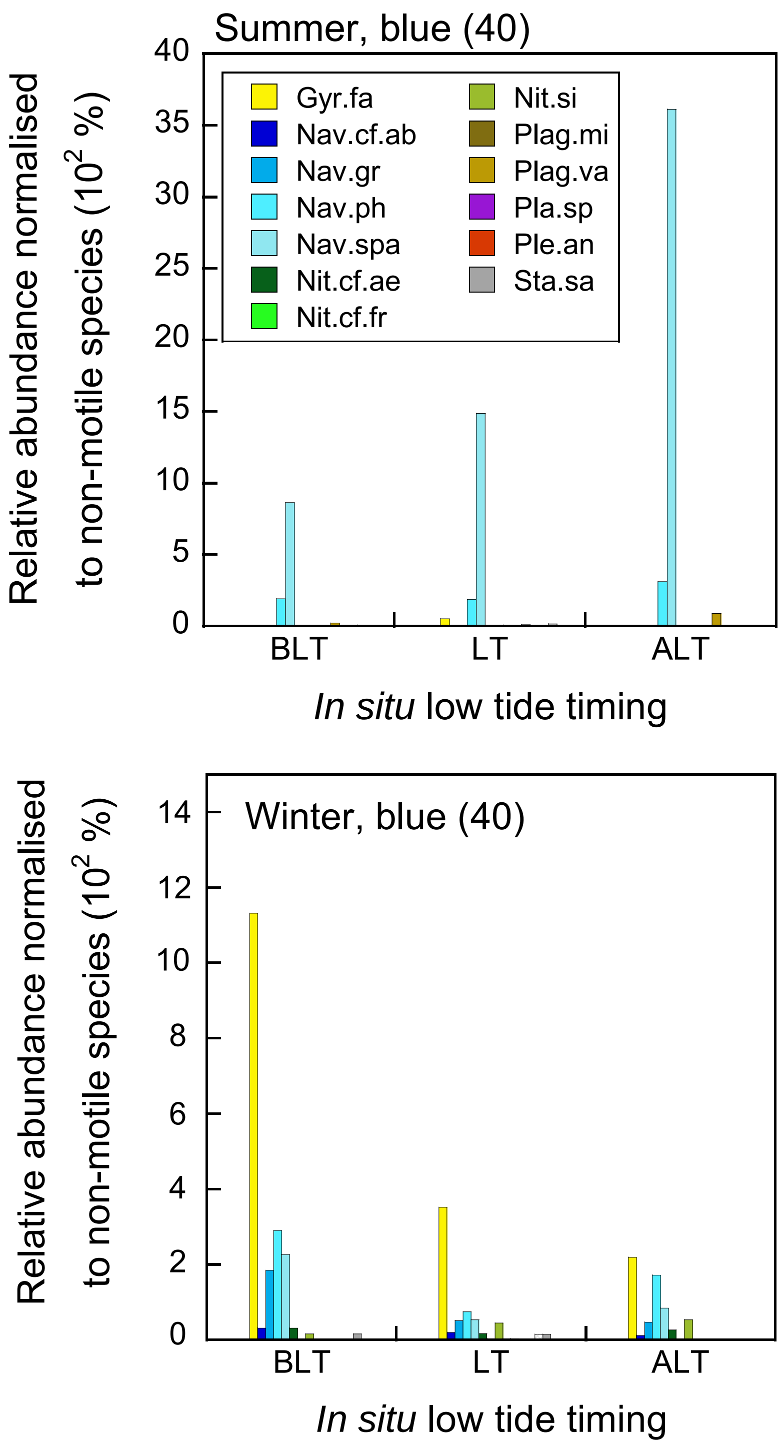
A)



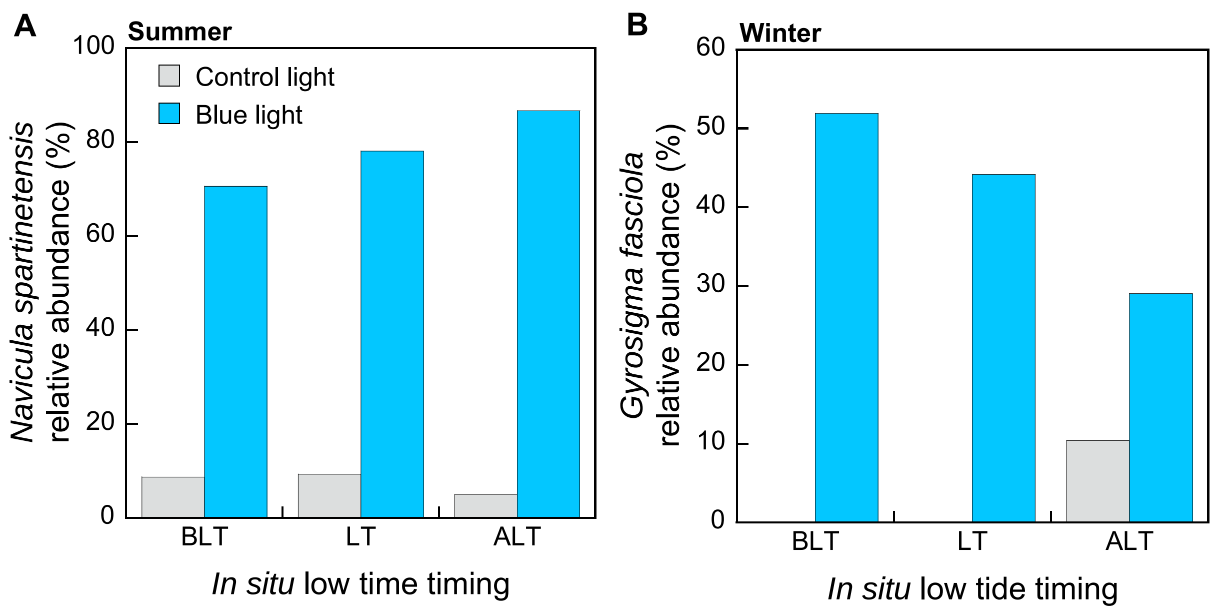
B)



Supplementary Figure S9. Cumulative relative abundance of the 13 motile epipelic species normalised to the sum of relative abundance of the non-motile species (i.e. *Cylindrotheca gracilis*, *Cymatosira belgica*, *Plagiotropis vanheurckii*, *Thalassiosira decipiens*, 'centric' species, and 'others') in the upper layer of muddy sediment (0-250 µm), and for the three timings of the tidal cycle at the sampling site (BLT-3 h before low tide, LT-low tide timing, ALT-3 h after low tide), for: A) Summer blue light conditions (465 nm, 40 µmol photons m^{-2} s^{-1}) and B) Winter blue light conditions (465 nm, 40 µmol photons m^{-2} s^{-1}) experiments; note the Y-axis difference in values. The full list of species with their full names are found in Table S5.



Supplementary Figure S10. Relative abundance in the upper layer of muddy sediment (0-250 µm), and for the three timings of the tidal cycle at the sampling site: BLT-3 h before low tide, LT-low tide timing at the site of sampling (i.e. corresponding to the lowest water level), ALT-3 h after low tide, of A) *Navicula spartinetensis* in summer, and B) *Gyrosigma fasciola* in winter, and under blue light conditions (465 nm, 40 µmol photons m^{-2} s^{-1}), and their respective control light conditions (24 h natural photoperiod). Data are extracted from Fig. 6.



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