Supplementary materials

Table S1. Contextualisation of meteorological parameters measured during the four seasonal 24-h cycles (in 2021) with regards to 3-year reference periods (from 2020 to 2022). Each meteorological parameter measured by the EC station during the 24-hour cycles was compared to a mean and standard deviation of the parameter measured continuously (i.e. every 10-min) over three full reference seasons (2020, 2021 and 2022). For all parameters, means and standard deviations were done in bold and ranges were done in brackets. Ta: air temperature (°C), PAR: photosynthetically active radiation (µmol photon m^{-2} s^{-1}), RH: relative humidity (%). n.a.: not available.

		Ta (°C)	Daytime PAR (µmol m^{-2} s^{-1})	Wind speed (m s^{-1})	RH (%)
Winter	3-year reference period	**9.3 ± 2.7** (-0.7 – 19.1)	**454 ± 375** (10 – 1770)	**4.59 ± 2.21** (0.05 – 14.01)	**83.3 ± 10.2** (41.4 – 99.5)
	C1-winter 01/03-02/03/2021	**11.4 ± 1.9** (8.7 – 15.3)	**762 ± 465** (10 – 1335)	**2.33 ± 1.19** (0.45 – 5.09)	**75.2 ± 10.0** (54.8 – 89.5)
Spring	3-year reference period	**14.8 ± 4.4** (2.5 – 35.7)	**946 ± 668** (10 – 2539)	**3.94 ± 1.96** (0.04 – 14.29)	**72.8 ± 14.2** (24.5 – 99.4)
	C2-spring 27/04-28/04/2021	**13.8 ± 2.9** (9.4 – 20.1)	**1134 ± 668** (10 – 1964)	**3.80 ± 1.29** (0.38 – 6.27)	**65.6 ± 14.4** (31.5 – 84.1)
Summer	3-year reference period	**19.9 ± 3.1** (12.2 – 36.3)	**970 ± 662** (10 – 2428)	**3.56 ± 1.54** (0.03 – 10.49)	**74.0 ± 13.9** (16.6 – 99.6)
	C3-summer 26/07-27/07/2021	**19.6 ± 0.6** (18.5 – 20.8)	**976 ± 728** (10 – 2216)	**3.11 ± 0.83** (1.14 – 5.05)	**78.6 ± 2.6** (73.2 – 88.9)
Fall	3-year reference period	**12.7 ± 4.1** (-0.5 – 23.7)	**476 ± 393** (10 – 2062)	n.a.	**81.9 ± 9.5** (42.2 – 99.4)
	C4-fall 06/12-07/12/2021	**10.3 ± 0.7** (7.9 – 11.3)	**160 ± 93** (10 – 340)	n.a.	**87.8 ± 6.5** (73.4 – 97.5)

Table S2. Seasonal comparisons of water pCO_2 measured every 10-min between the 5-day reference periods and the corresponding 24-h cycles (see section 2.2). Means and standard deviations are in bold and ranges are in brackets. n.a.: water pCO_2 could not be measured during low tide periods over the winter reference period (from 26/02 to 01/03/2021).

		Water pCO_2 (ppmv)
Winter	**Winter reference period** 26/02-02/03/2021	n.a.
	C1-winter 01/03-02/03/2021	**669 ± 327** (321 – 1461)
Spring	**Spring reference period** 23/04-28/04/2021	**296 ± 113** (106 – 596)
	C2-spring 27/04-28/04/2021	**239 ± 105** (106 – 416)
Summer	**Summer reference period** 23/07-27/07/2021	**307 ± 178** (85 – 668)
	C3-summer 26/07-27/07/2021	**271 ± 182** (89 – 597)
Fall	**Fall reference period** 03/12-07/12/2021	**452 ± 88** (260 – 753)
	C4-fall 06/12-07/12/2021	**422 ± 73** (311 – 541)

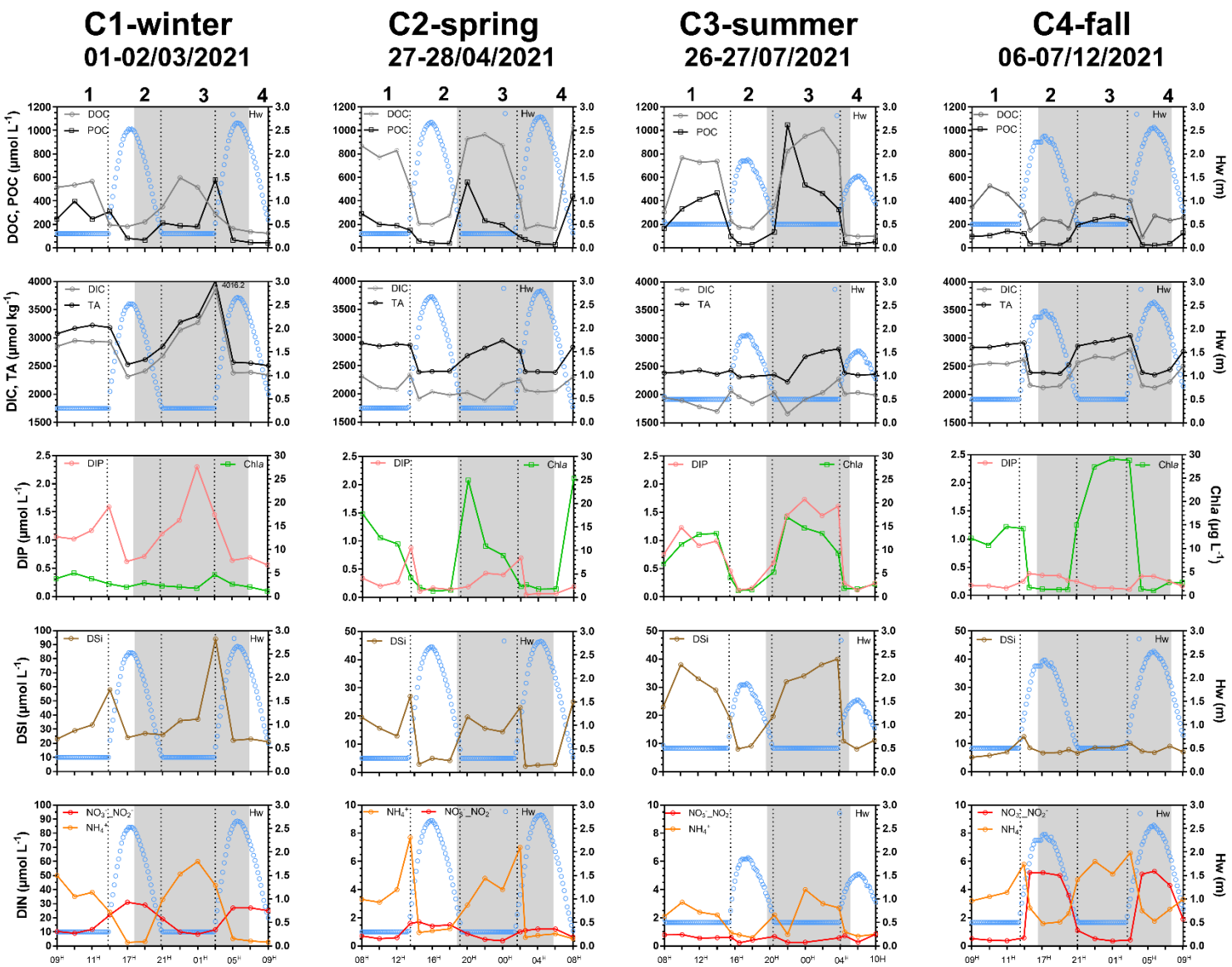
C1-winter
01-02/03/2021
C2-spring
27-28/04/2021
C3-summer
26-27/07/2021
C4-fall
06-07/12/2021
1
2
3
4
DOC, POC (μmol L-1)
DOC
POC
Hw
DIC, TA (μmol kg-1)
DIC
TA
4016.2
DIP (μmol L-1)
DIP
Chla
Chla (μg L-1)
DSi (μmol L-1)
DSi
DIN (μmol L-1)
NO3-_NO2-
NH4+
Hw (m)
09H
11H
17H
21H
01H
05H
08H
12H
16H
20H
00H
04H
10H

Fig. S1. Hourly variations of water biogeochemical parameters sampled during the seasonal 24-h cycle from March to December 2021: DOC and POC (µmol L^{-1}) as organic carbon parameters, DIC and TA (µmol kg^{-1}) as carbonate system parameters, Chl*a* (µg L^{-1}) as biological parameter, DSi, DIP and DIN as ecological parameters (nutrients, µmol L^{-1}). Simultaneously, water heights (Hw, m) were also measured every 10-min by the STPS probe (Fig. 1). Grey areas correspond to night-time periods. Each graduation of the x-axis corresponds to two hours. Graduations of DSi and DIN were not the same between C1-winter and other cycles to a better visualization of tidal variations. Vertical dotted lines allow to distinguish the periods of low tide day (LT/Day, **1**), high tide day (HT/Day, **2**), low tide night (LT/Night, **3**) and high tide night (HT/Night, **4**).

Table S3. Multiple factor variance analysis of biogeochemical parameters measured from hourly water samples during the four 24-h cycles (n = 59). Seasonal factor assesses variability between 24-h cycles (C1-winter, C2-spring, C3-summer and C4-fall); tidal factor assesses variability between high tide (Hw > 0.50 m) and low tide (Hw = 0.50 m); diurnal factor assesses variability between daytime (PAR > 10 µmol m^{-2} s^{-1}) and night-time (PAR < 10 µmol m^{-2} s^{-1}). Parameters that did not respect a normal distribution were transformed into $\log_{10}(x)$ or $\log_{10}(x+1)$ for variance analysis. The F values of the Fisher test were added. The higher the value of F, the greater the influence of the factor on the parameter.

	Seasonal factor	Tidal factor	Diurnal factor
$\log_{10}$(Chl*a*)	**Yes** F = 5.9 p < 0.001	**Yes** F = 30.2 p < 0.0001	No F = 0.1 p = 0.74
$\log_{10}$(DIC)	**Yes** F = 47.9 p < 0.0001	**Yes** F = 18.1 p < 0.0001	No F = 0.3 p = 0.61
$\log_{10}$(TA)	**Yes** F = 25.9 p < 0.0001	**Yes** F = 91.0 p < 0.0001	No F = 0.1 p = 0.79
$\log_{10}$(POC)	No F = 2.2 p = 0.10	**Yes** F = 161.2 p < 0.0001	No F = 0.8 p = 0.37
$\log_{10}$(DOC)	**Yes** F = 4.2 p < 0.05	**Yes** F = 188.5 p < 0.0001	No F = 0.8 p = 0.36
$\log_{10}$(PON)	**Yes** F = 5.1 p < 0.05	**Yes** F = 174.3 p < 0.0001	No F = 0.7 p = 0.41
$\log_{10}(NO_3\_NO_2 + 1)$	**Yes** F = 151.6 p < 0.0001	**Yes** F = 53.8 p < 0.0001	No F = 1.8 p = 0.19
$\log_{10}(NH_4 + 1)$	**Yes** F = 39.2 p < 0.0001	**Yes** F = 60.0 p < 0.0001	No F = 0.8 p = 0.39
$\log_{10}$(DIP + 1)	**Yes** F = 25.7 p < 0.0001	**Yes** F = 23.2 p < 0.0001	**Yes** F = 6.3 p < 0.05
$\log_{10}$(DSi +1)	**Yes** F = 28.0 p < 0.0001	**Yes** F = 40.8 p < 0.0001	No F = 1.1 p = 0.31

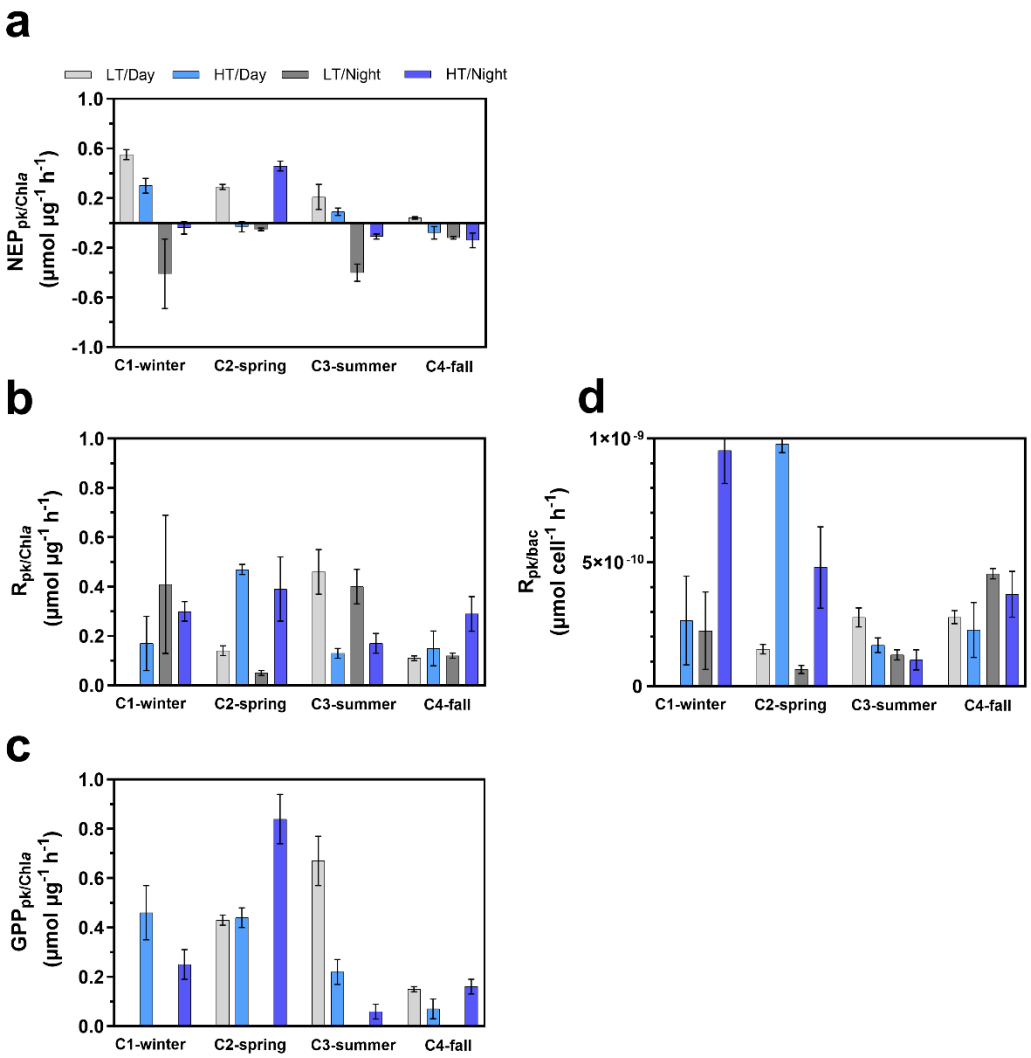

Fig. S2. Planktonic aquatic metabolism and associated standard errors at diurnal/tidal scale over the seasonal 24-h cycles: **(a)** $NEP_{pk/Chla}$ **(b)** $R_{pk/Chla}$ and **(c)** $GPP_{pk/Chla}$ are planktonic metabolism rates standardized per unit of Chl*a* biomass (µmol µg^{-1} h^{-1}). **(d)** $R_{pk/bac}$ are planktonic respiration rates standardized per unit of bacteria abundance (µmol cell^{-1} h^{-1}). $NEP_{pk/Chla} > 0$ corresponds to an autotrophy (C sink in water) and $NEP_{pk/Chla} < 0$ corresponds to a heterotrophy (C source in water). LT/Day: low tide day; HT/Day: high tide day; LT/Night: low tide night; HT/Night: high tide night.

Table S4. Seasonal medians of DIN:DIP, DIN:DSi and DSI:DIP molar ratios (medians in bold and ranges in brackets) measured from water samplings at the Bossys perdus salt marsh.

	DIN:DIP	**DIN:DSi**	**DSi:DIP**
C1-winter	**45.1** (29 – 57)	**1.5** (0.6 – 2.6)	**33.3** (16 – 65)
C2-spring	**17.0** (6.0 – 34)	**0.3** (0.0 – 0.9)	**37.1** (26 – 132)
C3-summer	**3.3** (0.2 – 8.4)	**0.1** (0.0 – 0.2)	**32.3** (20 – 67)
C4-fall	**23.1** (19 – 64)	**0.7** (0.5 – 1.0)	**31.7** (19 – 92)