

Fig. 1. The Fier d’Ars estuary (Ré Island, French Atlantic coast) and locations of the four studied stations along aquatic continuums: tidal estuary at station *a*, channel at station *b*, rewilded artificial salt marsh at station *c* (in green) and working artificial salt marsh at station *d* (in blue). The dyke (in red) delimits terrestrial and maritime areas. The locks in the two studied artificial marshes are represented within the two map expansions. An atmospheric Eddy Covariance station was deployed at station *e* on the tidal salt marsh downstream from the dyke. Station *F* is located in the centre of the Breton Sound continental shelf; station *a* is located at the entry of the estuary; stations *b*, *c* and *e* are within the National Natural Reserve to the west of the estuary; station *d* to the east of the estuary is within a salt-farm.

Fig. 2. Principal Component Analysis (PCA) of the biogeochemical parameters measured at each season along the studied aquatic continuums (stations *a*, *b*, *c* and *d*). The PCA is based on temperature (Temp), salinity, turbidity, dissolved oxygen concentration (DO), dissolved oxygen saturation level (DO-sat.) and pCO₂ mean values for each 24-h cycle. Stations *a*, *b*, *c* and *d* are represented in red, brown, green and blue, respectively. The additional station *F* is represented in light blue. Win: Winter; Spr: Spring; Sum: Summer; Aut: Autumn.

Fig. 3. Temporal variations at station *a* (tidal estuary) of water temperature (°C), salinity, DO saturation level (DO-sat., %), turbidity (NTU), pCO₂, NpCO₂ (pCO₂ variations related to non-temperature effects, ppmv) and TpCO₂ (pCO₂ variations related to temperature physical effects, ppmv) during each 24-h cycle from winter 2018 to autumn 2018. Parameters were autonomously measured once per minute by in situ probes. Water heights (H, m) were retrieved from the SHOM station (9 km away; Fig. 1). Grey areas correspond to night-time periods. Vertical dotted lines correspond to high tides. Horizontal dotted lines correspond to the CO₂ atmospheric concentration (411 ppm; NOAA 2018). Each graduation of the x-axis corresponds to one hour.

Fig. 4. Temporal variations at station *b* (channel) of water temperature (°C), salinity, DO saturation level (DO-sat., %), turbidity (NTU), pCO₂, NpCO₂ and TpCO₂ (ppmv) during each 24-h cycle from winter 2018 to autumn 2018. See the Fig. 3 caption for more details.

Fig. 5. Temporal variations at station *c* (rewilded artificial salt marsh) of water temperature (°C), salinity, DO saturation level (DO-sat., %), turbidity (NTU), pCO₂, NpCO₂ and TpCO₂ (ppmv) and *in situ* Chl *a* (µg L⁻¹) during each 24-h cycle from spring 2019 to winter 2020. Vertical dotted lines correspond to coastal water inflows to the marsh during incoming tide. Horizontal dotted lines correspond to the atmospheric CO₂ concentration simultaneously measured (i) by the Eddy Covariance (station *e*) during the summer and winter cycles and (ii) by NOAA during the spring and autumn cycles. *In situ* Chl *a* values are represented by black crosses (Chl *a*_{measured}); no water samples could be taken in spring 2019. See the Fig. 3 caption for more details.

Fig. 6. Temporal variations at station *d* (working artificial salt marsh) of water temperature (°C), salinity, DO saturation level (DO-sat., %), turbidity (NTU), pCO₂, NpCO₂ and TpCO₂ (ppmv) and *in situ* Chl *a* (µg L⁻¹) during each 24-h cycle from summer 2019 to winter 2020. Chl *a* values in green were derived from the C3-fluorometer every 10 min. (Chl *a*_{estimated}). See the Fig. 3 caption for more details.

Fig. 7. Derived temperature-normalized pCO₂ (seasonal NpCO₂, blue curves with empty blue dots) and thermally forced pCO₂ (seasonal TpCO₂, pink curves with empty pink dots) at the seasonal scale at stations *F*, *a*, *b*, *c* and *d*. Seasonal means of water temperature (in red dotted lines) and pCO₂ (red curves with filled red dots) are also represented. Horizontal dotted lines correspond to CO₂ atmospheric concentration (411 ppm; NOAA 2018).

Fig. 8. Diurnal/tidal correlation plots of temperature vs. salinity and water pCO₂ vs. salinity at stations *b* and *c* for each season. Only significant R² (slopes significantly different from zero; n = 1441; p < 0.05) are showed. HT/D: high tide day; LT/D: low tide day; HT/N: high tide night; LT/N: low tide night. At station *c*, HT periods correspond to coastal water inflows to the marsh. Note that the temperature and salinity ranges across the seasons are not the same. Horizontal dotted lines correspond to the atmospheric CO₂ concentration.

Fig. 9. Seasonal and spatial variations in estimated CO₂ fluxes (FCO₂, in mmol m⁻² h⁻¹) at the water-atmosphere interface at stations *F*, *a*, *b*, *c* and *d*. The means and associated standard deviations over each 24-h cycle are shown. *k*₆₆₀ and FCO₂ estimations were calculated according to the R22 parametrization. FCO₂ values at stations *a* and *b* are only given for high tide periods.

Fig. 10. CO₂ budget over the two aquatic sea - land continuums: (1) continental shelf - estuary - channel - rewilded artificial salt marsh and (2) continental shelf - estuary - working artificial salt marsh. Annual means (± SD) and ranges (min - max) of water pCO₂ (ppmv) and air-water FCO₂ (mmol m⁻² h⁻¹) are showed. The picture of station *c* in spring 2019 (© P. Polsenaere) allows to visualize the macroalgae bloom.

Fig. 1.

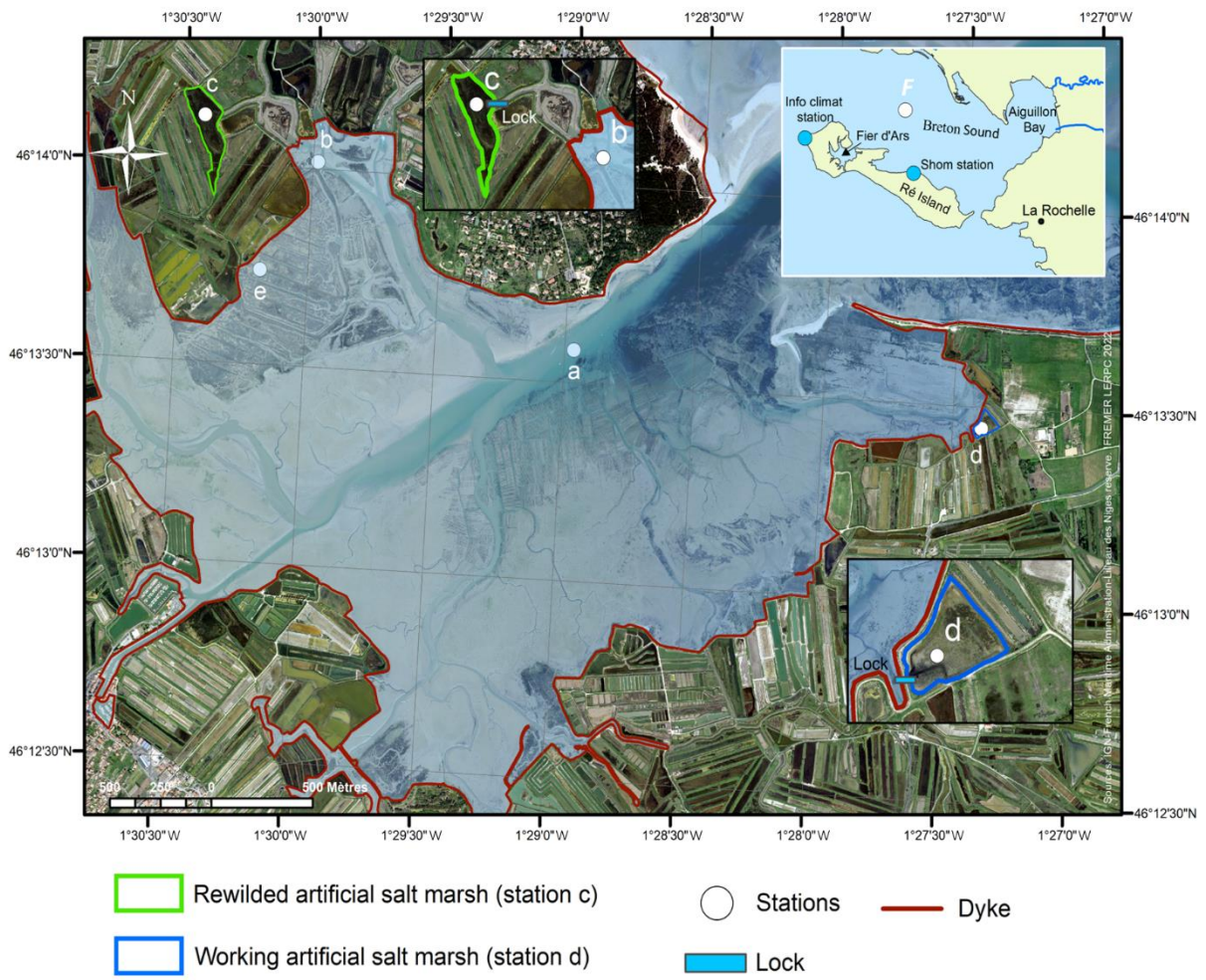


Fig. 2.

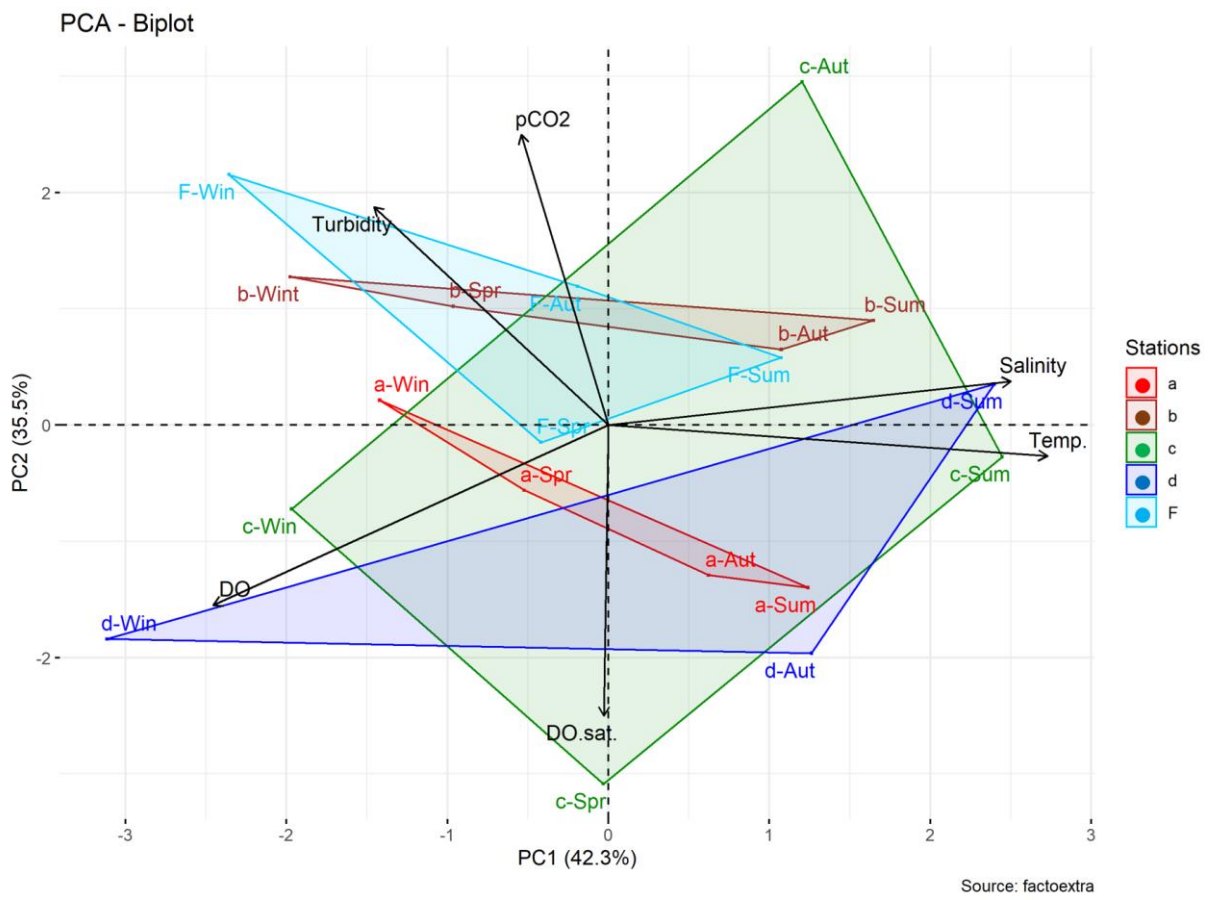


Fig. 3.

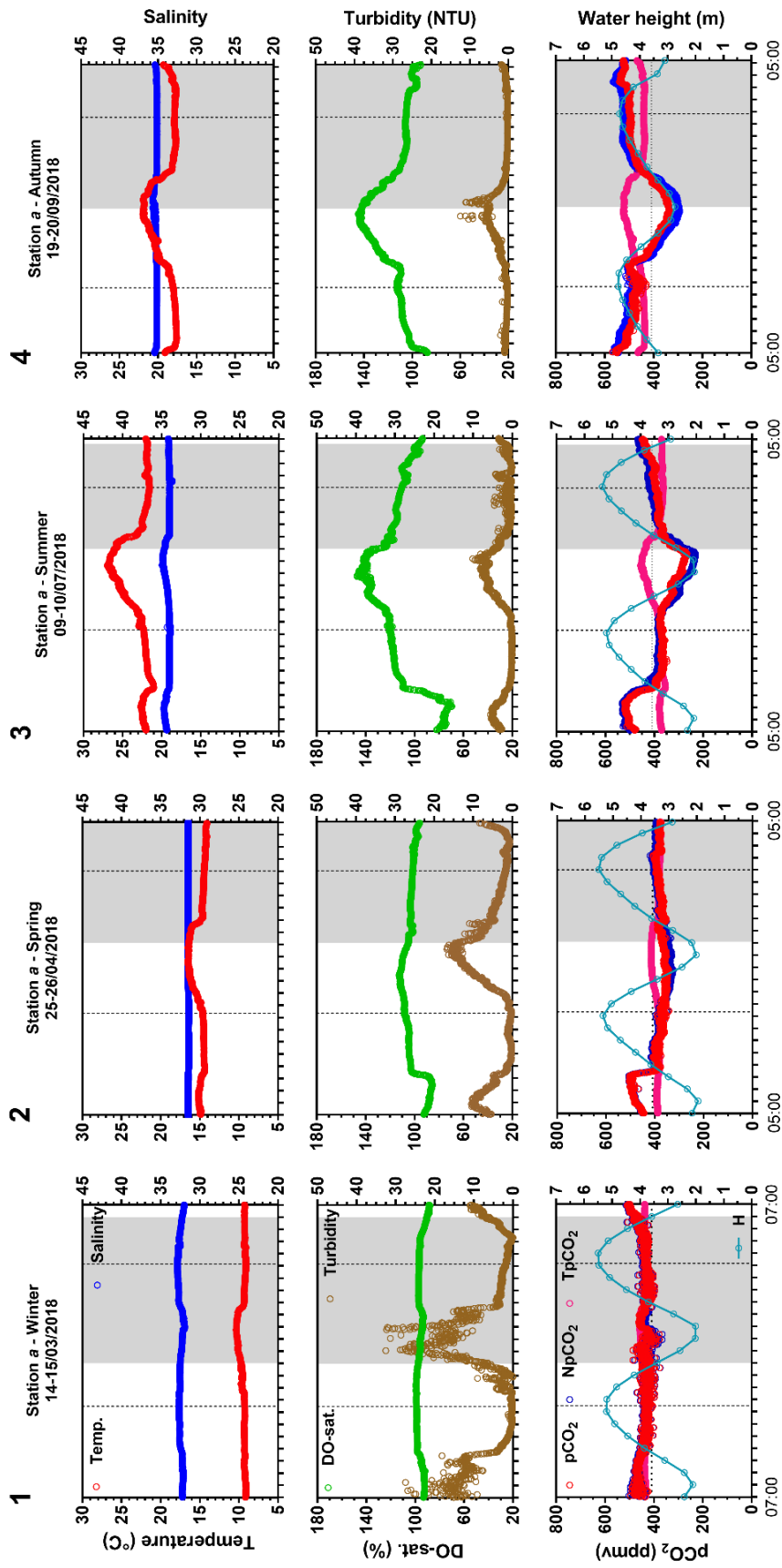


Fig. 4.

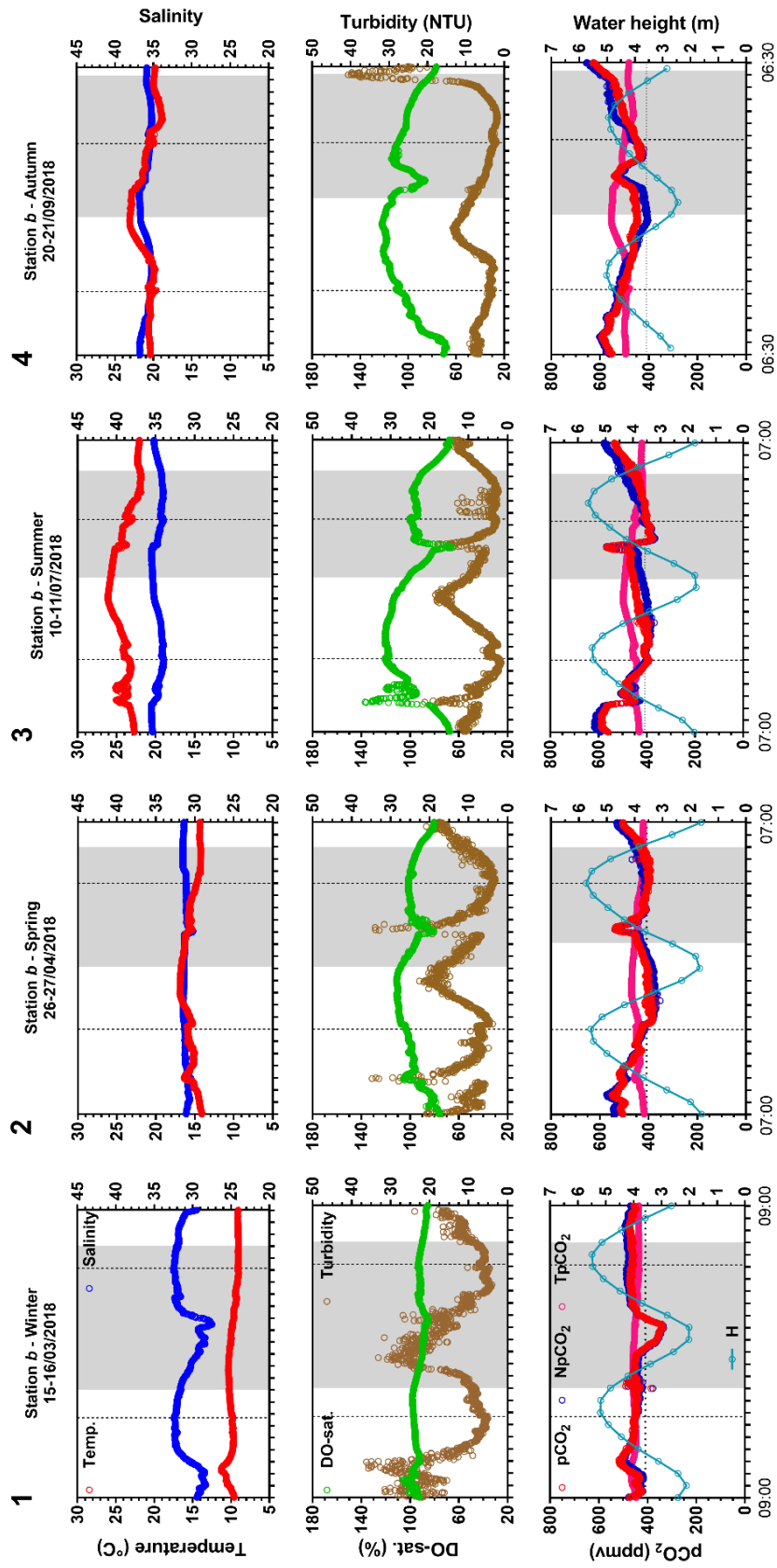


Fig. 5.

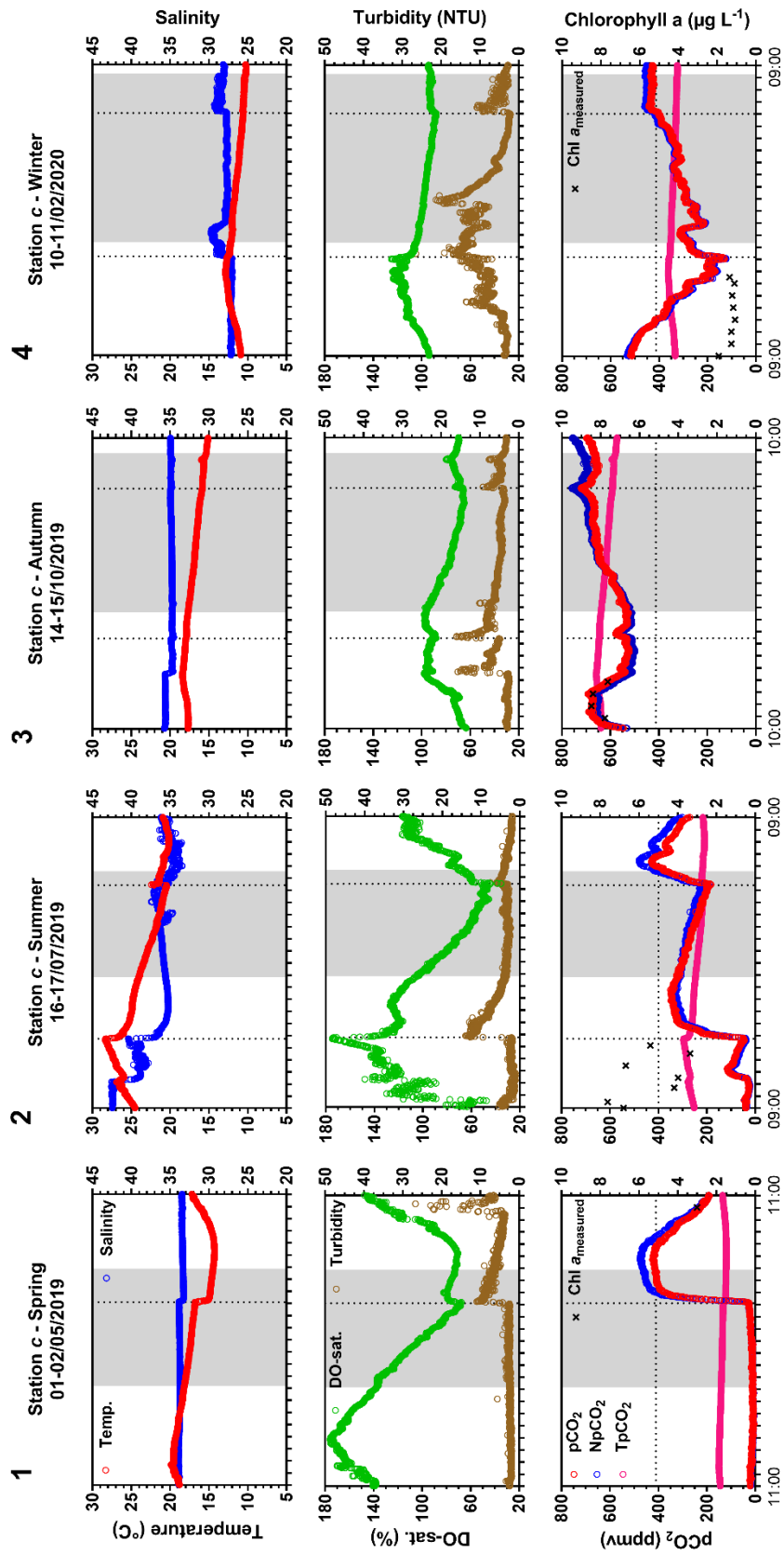


Fig. 6

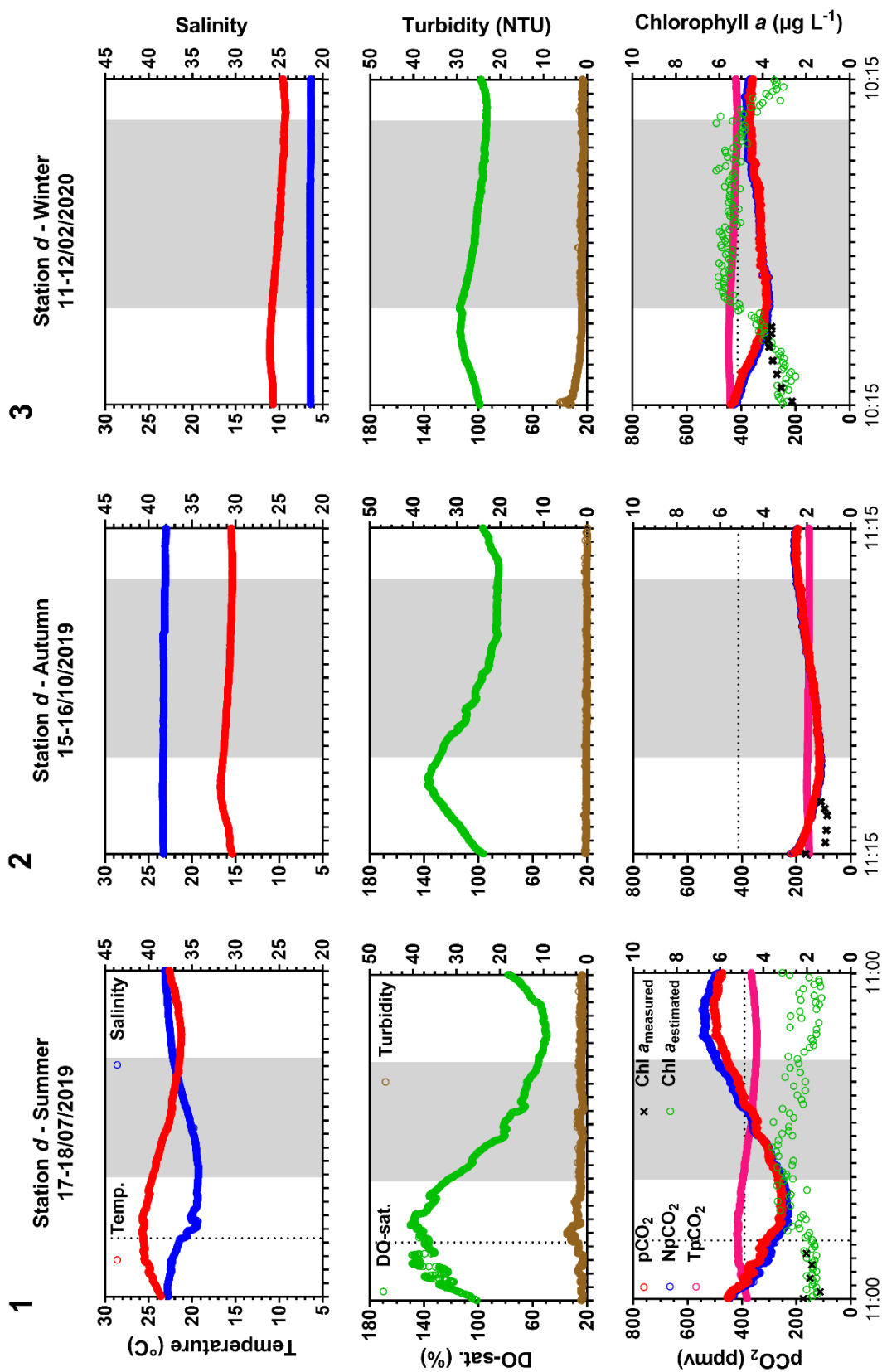


Fig. 7.

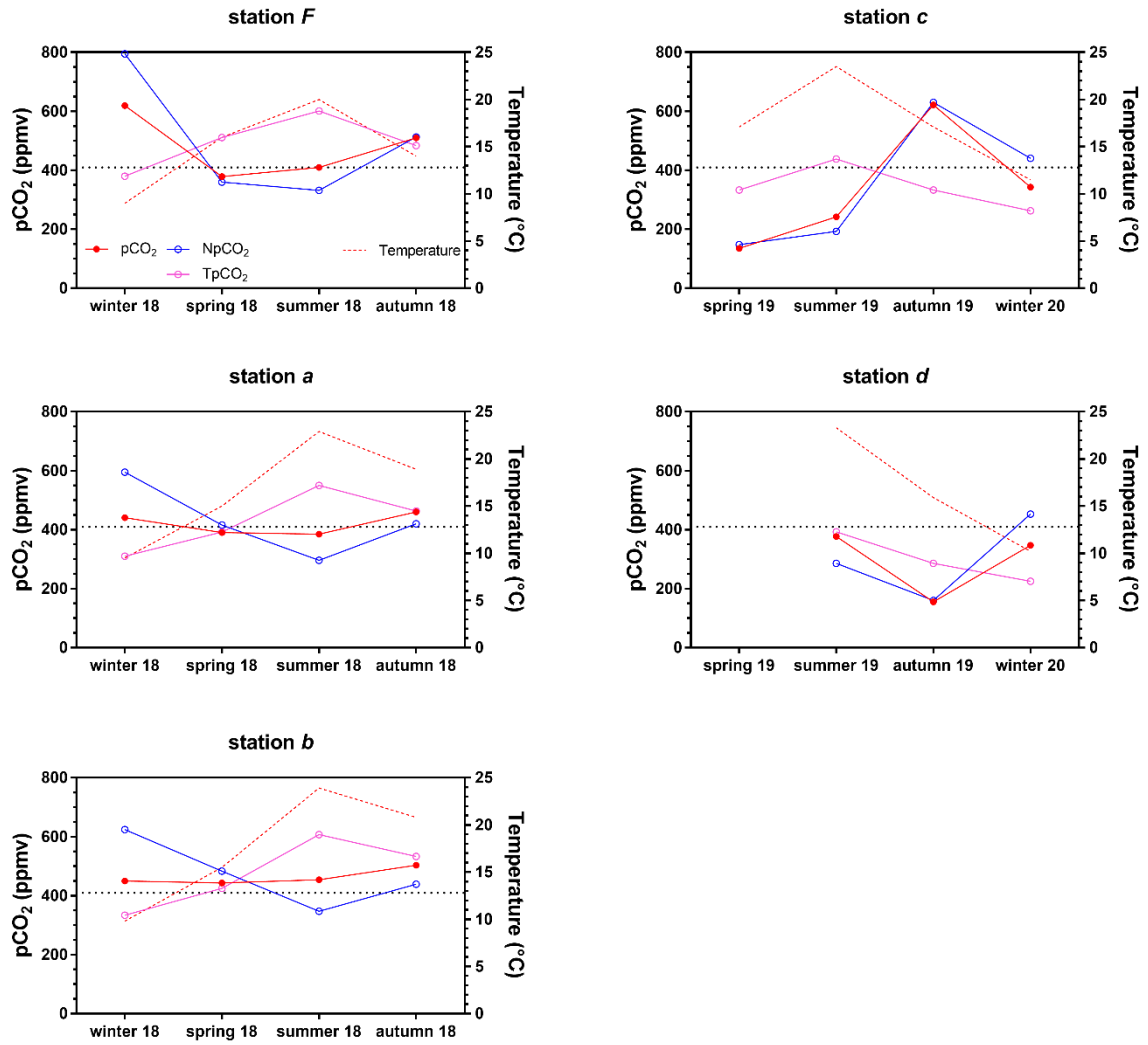


Fig. 8.

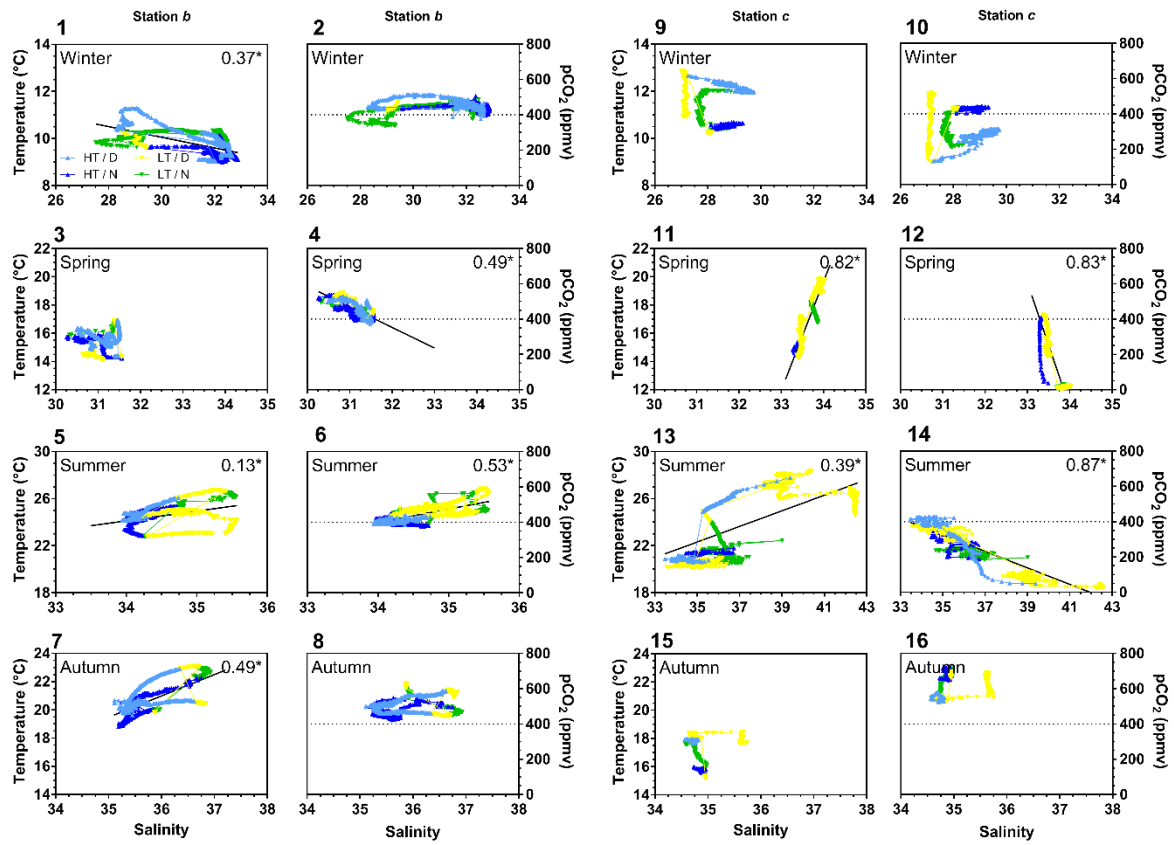


Fig. 9.

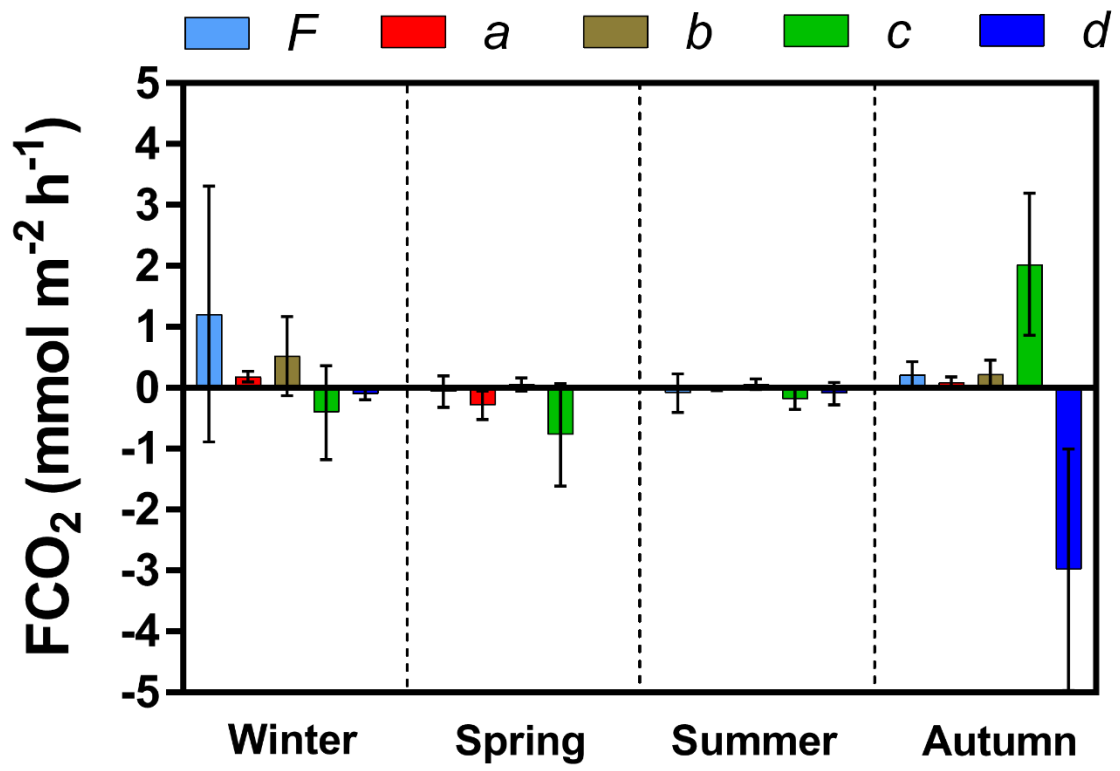


Fig. 10.

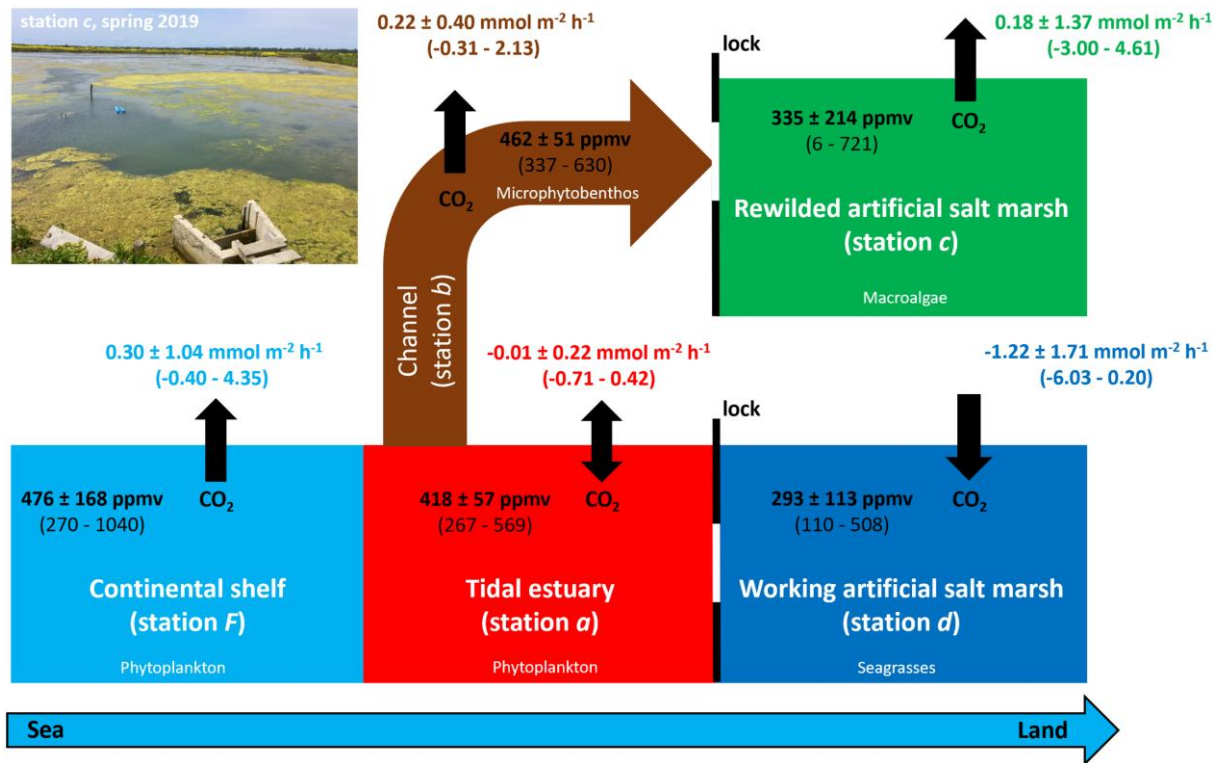


Table 1: Meteorological conditions (air temperature in °C and cumulative precipitation in mm) obtained from the “Infoclimat” station on Ré Island (Fig. 1; <https://www.infoclimat.fr>) at the monthly and annual scales over our measurement periods in 2018, 2019 and 2020 in bold compared to the reference period (1990-2020).

Year	Season	Month	Mean air temperature (°C)	Difference with the reference period (°C)	Cumulative precipitation (mm)	Difference with the reference period (mm)
2018	Winter	March	9.1	-0.7	127	+70
	Spring	April	13.4	+1.4	58	-3
	Summer	July	22.2	+1.7	59	+19
	Autumn	September	19.0	+1.0	9	-51
		Annual	14.3	+0.8	786	+32
2019	Spring	April	11.9	-0.1	57	-4
	Summer	July	22.5	+2.0	33	-7
	Autumn	October	15.8	+1.1	117	+33
		Annual	14.1	+0.6	827	+73
2020	Winter	February	10.4	+3.1	68	+12

Table 2: Seasonal means (\pm SD) and ranges (min - max) of temperature ($^{\circ}$ C), salinity, DO ($\mu\text{mol L}^{-1}$), pH (NBS scale) and pCO₂ (ppmv) values measured (i) once every two weeks in 2018 at station *F* (Coignot et al., 2020) and (ii) during each 24-h cycle from 2018 to 2020 at stations *a*, *b*, *c* and *d* in this study.

		Temperature ($^{\circ}$ C)	Salinity	DO ($\mu\text{mol L}^{-1}$)	pH (NBS)	pCO ₂ (ppmv)
Winter 2018	<i>F</i>	9.1 \pm 1.3 (7.5 - 10.6)	31.4 \pm 1.8 (28.9 - 33.0)	269.6 \pm 29.7 (225.0 - 285.3)	8.04 \pm 0.17 (7.79 - 8.17)	619 \pm 285 (415 - 1040)
March 2018	<i>a</i>	9.5 \pm 0.4 (9.1 - 10.4)	32.5 \pm 0.2 (31.9 - 32.9)	278.7 \pm 7.7 (257.2 - 288.8)	-	441 \pm 21 (377 - 510)
March 2018	<i>b</i>	9.8 \pm 0.5 (9.0 - 11.3)	31.0 \pm 1.4 (27.5 - 32.5)	269.7 \pm 9.3 (251.6 - 307.5)	-	450 \pm 33 (337 - 518)
February 2020	<i>c</i>	11.5 \pm 0.7 (10.2 - 12.9)	27.8 \pm 0.7 (27.0 - 29.7)	287.5 \pm 22.0 (256.9 - 350.0)	8.20 \pm 0.14 (7.94 - 8.53)	343 \pm 87 (130 - 519)
February 2020	<i>d</i>	10.2 \pm 0.6 (9.2 - 11.1)	21.4 \pm 0.0 (21.3 - 21.5)	314.5 \pm 15.9 (293.1 - 343.8)	8.27 \pm 0.04 (8.16 - 8.32)	347 \pm 30 (302 - 438)
Spring 2018	<i>F</i>	16.0 \pm 2.5 (13.2 - 19.1)	32.4 \pm 1.5 (30.8 - 34.2)	270.0 \pm 28.5 (245.3 - 308.2)	8.23 \pm 0.09 (8.11 - 8.33)	379 \pm 89 (279 - 495)
April 2018	<i>a</i>	15.0 \pm 0.7 (14.1 - 16.5)	31.5 \pm 0.0 (31.4 - 31.5)	265.8 \pm 16.4 (221.9 - 285.3)	8.17 \pm 0.03 (8.09 - 8.21)	390 \pm 40 (342 - 505)
April 2018	<i>b</i>	15.5 \pm 0.9 (14.1 - 16.9)	31.2 \pm 0.3 (30.3 - 31.6)	252.2 \pm 20.1 (200.3 - 279.4)	8.05 \pm 0.02 (7.98 - 8.09)	443 \pm 44 (371 - 551)
May 2019	<i>c</i>	17.1 \pm 1.8 (14.3 - 19.9)	33.7 \pm 0.2 (33.3 - 34.0)	287.5 \pm 78.4 (168.4 - 415.0)	8.78 \pm 0.43 (8.12 - 9.23)	135 \pm 165 (6 - 425)
-	<i>d</i>	-	-	-	-	-
Summer 2018	<i>F</i>	19.9 \pm 1.5 (18.2 - 21.7)	34.6 \pm 0.6 (34.0 - 35.2)	235.6 \pm 22.3 (204.4 - 253.1)	8.20 \pm 0.12 (8.05 - 8.34)	410 \pm 130 (270 - 572)
July 2018	<i>a</i>	22.9 \pm 1.6 (21.0 - 26.9)	34.2 \pm 0.3 (33.6 - 34.9)	249.4 \pm 35.9 (153.4 - 306.6)	8.22 \pm 0.07 (8.12 - 8.39)	385 \pm 60 (267 - 522)
July 2018	<i>b</i>	23.9 \pm 1.3 (21.9 - 26.1)	34.7 \pm 0.5 (33.9 - 35.6)	211.8 \pm 33.9 (139.7 - 291.9)	8.02 \pm 0.05 (7.89 - 8.12)	454 \pm 55 (374 - 590)
July 2019	<i>c</i>	23.5 \pm 2.5 (20.1 - 28.4)	36.8 \pm 2.3 (33.5 - 42.6)	206.8 \pm 58.5 (76.9 - 339.7)	8.31 \pm 0.23 (8.01 - 8.94)	242 \pm 116 (25 - 430)
July 2019	<i>d</i>	23.3 \pm 1.6 (21.2 - 28.1)	35.8 \pm 1.4 (33.3 - 38.1)	202.4 \pm 70.4 (108.8 - 314.4)	7.97 \pm 0.09 (7.84 - 8.11)	377 \pm 85 (250 - 508)
Autumn 2018	<i>F</i>	14.7 \pm 3.2 (10.3 - 17.5)	34.3 \pm 2.1 (30.6 - 35.4)	249.1 \pm 23.5 (225.0 - 284.4)	8.09 \pm 0.06 (8.04 - 8.18)	510 \pm 70 (403 - 580)
September 2018	<i>a</i>	18.9 \pm 1.5 (17.6 - 22.0)	35.2 \pm 0.1 (35.1 - 35.7)	267.4 \pm 25.9 (204.7 - 323.4)	7.98 \pm 0.07 (7.90 - 8.16)	460 \pm 58 (334 - 569)
September 2018	<i>b</i>	20.8 \pm 1.2 (18.8 - 23.1)	35.9 \pm 0.5 (35.1 - 36.9)	232.1 \pm 30.3 (153.8 - 275.3)	7.84 \pm 0.05 (7.74 - 7.94)	503 \pm 46 (422 - 630)
October 2019	<i>c</i>	17.1 \pm 0.9 (15.1 - 18.5)	35.0 \pm 0.3 (34.6 - 35.7)	194.3 \pm 24.4 (152.2 - 236.9)	7.82 \pm 0.04 (7.74 - 7.91)	622 \pm 57 (522 - 721)
October 2019	<i>d</i>	15.9 \pm 0.4 (15.4 - 16.8)	38.2 \pm 0.1 (38.0 - 38.4)	255.8 \pm 39.9 (210.6 - 331.9)	8.17 \pm 0.07 (8.07 - 8.28)	155 \pm 30 (110 - 218)

Table 3: Seasonal means (\pm SD) and ranges (min - max) of wind speed (km h^{-1}), gas transfer velocity (k_{660} , cm h^{-1}) and estimated water-atmosphere CO_2 flux (FCO_2 , $\text{mmol m}^{-2} \text{h}^{-1}$) values measured (i) once every two weeks in 2018 at station *F* (Coignot et al., 2020) and (ii) during each 24-h cycle from 2018 to 2020 at stations *a*, *b*, *c* and *d* in the present study. Air CO_2 concentrations used for FCO_2 calculations are: 408 ppm (stations *a*, *b* and *F* in 2018), 411 ppm (station *c* in spring 2019), 413 ppm (stations *c* and *d* in autumn 2019), 400 ppm (stations *c* and *d* in summer 2019) and 403 ppm (stations *c* and *d* in winter 2020; see M&M sections).

		Wind speed (km h^{-1})	k_{660} (cm h^{-1})		FCO_2 ($\text{mmol m}^{-2} \text{h}^{-1}$)	
			W22	RC01	W22	RC01
Winter 2018	<i>F</i>	19 ± 10 (7 - 29)	7.45 ± 6.30 (0.91 - 14.24)	11.29 ± 8.83 (2.79 - 21.62)	1.21 ± 2.10 (0.01 - 4.35)	1.85 ± 3.18 (0.02 - 6.60)
March 2018	<i>a</i>	29 ± 4 (22 - 37)	14.93 ± 4.04 (8.63 - 24.68)	24.75 ± 9.92 (12.08 - 52.53)	0.18 ± 0.09 (0.09 - 0.42)	0.28 ± 0.14 (0.13 - 0.69)
March 2018	<i>b</i>	32 ± 12 (13 - 54)	21.39 ± 15.99 (3.02 - 54.68)	66.17 ± 87.62 (5.06 - 285.40)	0.52 ± 0.65 (-0.31 - 2.13)	1.91 ± 3.45 (-0.46 - 11.11)
February 2020	<i>c</i>	27 ± 5 (16 - 34)	23.17 ± 10.28 (6.93 - 39.66)	30.36 ± 13.28 (9.21 - 50.44)	-0.40 ± 0.77 (-2.02 - 0.94)	-0.68 ± 1.31 (-3.58 - 1.58)
February 2020	<i>d</i>	15 ± 5 (4 - 24)	6.92 ± 3.17 (2.15 - 14.23)	9.46 ± 4.34 (2.96 - 19.78)	-0.10 ± 0.09 (-0.31 - 0.09)	-0.15 ± 0.13 (-0.41 - 0.13)
Spring 2018	<i>F</i>	15 ± 20 (11 - 20)	5.35 ± 3.44 (2.41 - 9.32)	7.78 ± 3.91 (4.43 - 12.40)	-0.06 ± 0.26 (-0.40 - 0.22)	-0.09 ± 0.34 (-0.54 - 0.30)
April 2018	<i>a</i>	33 ± 7 (24 - 43)	24.01 ± 9.56 (11.85 - 38.49)	51.64 ± 32.90 (16.94 - 108.70)	-0.29 ± 0.23 (-0.71 - 0.11)	-0.66 ± 0.65 (-1.81 - 0.18)
April 2018	<i>b</i>	14 ± 5 (4 - 22)	4.62 ± 2.96 (0.35 - 10.44)	7.23 ± 3.46 (2.55 - 13.62)	0.05 ± 0.11 (-0.06 - 0.33)	0.08 ± 0.15 (-0.08 - 0.46)
May 2020	<i>c</i>	18 ± 7 (6 - 31)	8.99 ± 6.31 (0.86 - 22.99)	12.86 ± 9.09 (3.17 - 37.67)	-0.77 ± 0.84 (-3.00 - 0.03)	-1.21 ± 1.30 (-5.09 - 0.04)
-	<i>d</i>	-	-	-	-	-
Summer 2018	<i>F</i>	20 ± 12 (4 - 32)	12.85 ± 10.75 (0.36 - 24.50)	20.41 ± 17.10 (2.56 - 40.89)	-0.09 ± 0.31 (-0.34 - 0.31)	-0.08 ± 0.49 (-0.50 - 0.51)
July 2018	<i>a</i>	11 ± 3 (6 - 17)	3.50 ± 1.97 (0.89 - 7.21)	6.35 ± 2.13 (3.55 - 10.40)	-0.02 ± 0.03 (-0.08 - 0.08)	-0.03 ± 0.06 (-0.14 - 0.16)
July 2018	<i>b</i>	18 ± 7 (7 - 30)	9.69 ± 6.37 (1.29 - 23.89)	14.66 ± 9.28 (4.15 - 39.18)	0.06 ± 0.08 (-0.07 - 0.22)	0.09 ± 0.13 (-0.11 - 0.37)
July 2019	<i>c</i>	13 ± 4 (4 - 19)	4.56 ± 2.59 (0.43 - 9.46)	7.59 ± 2.92 (3.16 - 13.32)	-0.19 ± 0.17 (-0.70 - 0.01)	-0.33 ± 0.24 (-1.01 - 0.02)
July 2019	<i>d</i>	15 ± 6 (2 - 23)	7.12 ± 4.60 (0.11 - 14.77)	10.77 ± 5.72 (2.41 - 20.96)	-0.09 ± 0.18 (-0.43 - 0.20)	-0.12 ± 0.27 (-0.60 - 0.29)
Autumn 2018	<i>F</i>	17 ± 5 (11 - 22)	6.37 ± 4.09 (2.25 - 10.83)	9.01 ± 4.98 (4.08 - 14.46)	0.21 ± 0.22 (-0.02 - 0.56)	0.30 ± 0.29 (-0.02 - 0.75)
September 2018	<i>a</i>	11 ± 6 (4 - 20)	3.55 ± 3.27 (0.36 - 8.98)	6.21 ± 3.66 (2.65 - 12.53)	0.09 ± 0.09 (0.01 - 0.30)	0.15 ± 0.11 (0.01 - 0.41)
September 2018	<i>b</i>	17 ± 6 (11 - 32)	7.32 ± 5.46 (2.90 - 24.27)	9.46 ± 7.91 (4.02 - 42.48)	0.22 ± 0.23 (0.07 - 1.00)	0.28 ± 0.33 (0.05 - 1.75)
October 2019	<i>c</i>	35 ± 8 (20 - 48)	27.39 ± 11.52 (9.01 - 48.79)	63.79 ± 42.95 (12.58 - 179.80)	2.03 ± 1.17 (0.61 - 4.61)	4.86 ± 4.22 (0.85 - 16.98)
October 2019	<i>d</i>	42 ± 7 (31 - 54)	38.22 ± 12.55 (20.54 - 62.36)	122.80 ± 84.13 (34.76 - 325.40)	-3.43 ± 1.09 (-6.03 - -1.79)	-10.91 ± 7.35 (-31.46 - -3.03)

Table 4. Stepwise multilinear regression analyses to test the contribution of physicochemical variables on water pCO₂ variations through the percentage of explained variance (adjusted R²). Each selected multilinear model (p < 0.001, n = 1441) had the highest adjusted R² value with all variables explaining at least 5% of the pCO₂ variation. In bold is indicated the parameter explaining at least 50% of the pCO₂ variation. Input variables: DO-sat. (dissolved oxygen saturation level), T (water temperature), S (salinity) and TU (turbidity). The statistic (F) and adjusted R² (adj. R²) are given.

			Equations	F	adj. R ²
Winter	March 2018	<i>a</i>	pCO ₂ = 2227.7 - 3.7 DO-sat. - 19.9 T - 38.2 S	1004	67.7%
	March 2018	<i>b</i>	pCO ₂ = -373.8 + 21.1 S + 0.8 TU + 15.9 T	377	43.9%
	February 2020	<i>c</i>	pCO ₂ = 1460.5 - 158.3 T + 7.0 DO-sat.	1180	62.1%
	February 2020	<i>d</i>	pCO ₂ = 446.6 - 10.8 DO-sat. + 99.1 T	4723	86.8%
Spring	April 2018	<i>a</i>	pCO ₂ = 949.8 - 5.5 DO-sat.	8255	85.2%
	April 2018	<i>b</i>	pCO ₂ = 2542.0 - 4.0 DO-sat. - 61.7 S + 14.2 T	1923	80.0%
	May 2019	<i>c</i>	pCO ₂ = 21777.7 - 640.8 S - 0.6 DO-sat.	3668	83.6%
	-	<i>d</i>	-	-	-
Summer	July 2018	<i>a</i>	pCO ₂ = 747.2 - 3.2 DO-sat.	30524	95.5%
	July 2018	<i>b</i>	pCO ₂ = -2440.0 + 100.8 S - 25.4 T	3330	82.7%
	July 2019	<i>c</i>	pCO ₂ = 1961.5 - 46.7 S	9401	86.8%
	July 2019	<i>d</i>	pCO ₂ = -961.8 + 40.1 S - 1.2 DO-sat.	47983	98.5%
Autumn	September 2018	<i>a</i>	pCO ₂ = 923.1 - 4.1 DO-sat.	34905	96.4%
	September 2018	<i>b</i>	pCO ₂ = 782.0 - 2.8 DO-sat. + 1.1 TU	3066	81.0%
	October 2019	<i>c</i>	pCO ₂ = 1009.3 - 4.9 DO-sat.	8831	86.0%
	October 2019	<i>d</i>	pCO ₂ = 1932.7 + 1.6 DO-sat. - 122.7 T	3253	81.9%

Supplementary materials:

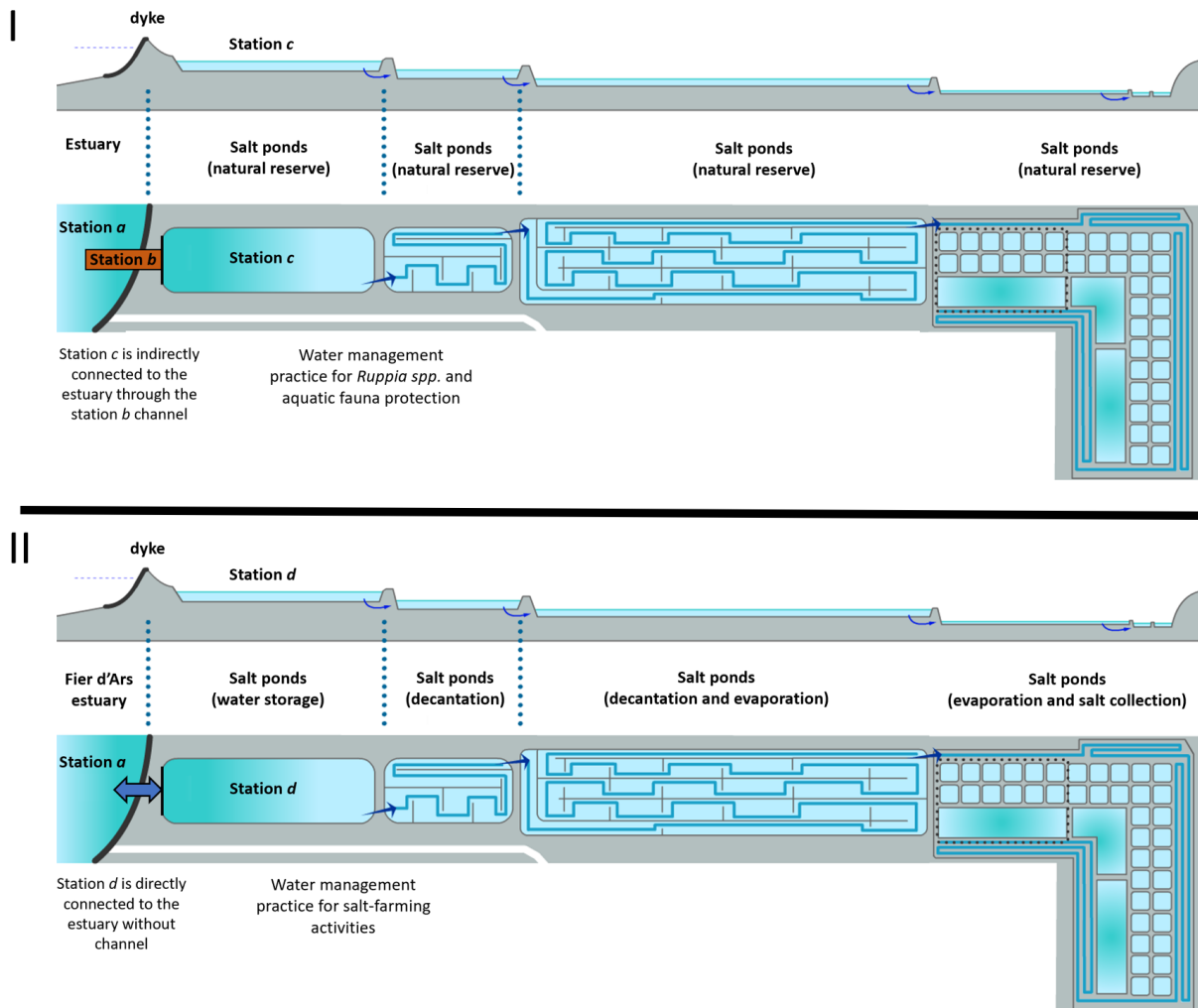


Fig. A.1. Artificial salt marsh complexes within the National Natural Reserve (I; location of station *c*) and within a salt-farm (II; location of station *d*). Station *c* is a rewilded marsh for which water management practices depend on the protection of *Ruppia spp.* and aquatic fauna in upstream ponds. Station *d* is a working marsh used for water storage and for which water management practices depend on the salt-farming activities in upstream ponds.

Table A.1: In situ 24-h measurements carried out in the present study across seasons from 2018 to 2020 at stations *a*, *b*, *c* and *d* along the two aquatic continuums on Ré Island (France). High tide and low tide for each 24-h cycle are indicated. Tidal information is taken from the SHOM station (9 km away from studied stations; Fig. 1; www.shom.fr). The same diurnal/tidal synchronism (high and low tides at the same period of the day) during each season and station was adopted. Over the Breton Sound continental shelf at station *F*, the same biogeochemical parameters were used for the present study and biweekly measured at high tide by Coignot et al. (2020) over the year 2018: four samplings in winter (17/01/2018 14:15; 30/01/2018 13:55; 15/02/2018 14:03; 03/03/2018 13:40), four samplings in spring (17/04/2018 14:25; 26/04/2018 12:20; 29/05/2018 13:40; 14/06/2018 14:00); four samplings in summer (28/06/2018 13:05; 11/07/2018 12:45; 09/08/2018 10:45; 11/09/2018 08:50) and five samplings in autumn (26/09/2018 13:45; 09/10/2018 13:25; 24/10/2018 12:50; 08/11/2018 08:15; 11/12/2018 09:50). U.T. Universal time.

		Date	24-h cycle start-end (U.T.)	Tidal amplitudes	High/Low tide hours (U.T.)
Winter	<i>a</i>	14/03- 15/03/2018	07:00 - 07:00	61	14:28 / 20:23
				67	02:34 / 08:41
	<i>b</i>	15/03 - 16/03/2018	09:00 - 09:00	73	14:57 / 21:01
				78	03:05 / 09:19
	<i>c</i>	10/02 - 11/02/2020	09:00 - 09:00	106	16:49 / 22:55
				108	05:05 / 11:25
	<i>d</i>	11/02 - 12/02/2020	10:15 - 10:15	108	17:30 / 23:41
				107	05:47 / 12:10
Spring	<i>a</i>	25/04 - 26/04/2018	05:00 - 05:00	58	12:52 / 18:16
				64	01:17 / 06:58
	<i>b</i>	26/04 - 27/04/2018	07:00 - 07:00	70	13:42 / 19:20
				76	02:05 / 07:54
	<i>c</i>	01/05 - 02/05/2019	11:00 - 11:00	61	14:06 / 20:01
				66	02:12 / 08:18
	<i>d</i>	-	-	-	-
				-	-
Summer	<i>a</i>	09/07 - 10/07/2018	05:00 - 05:00	57	12:46 / 18:26
				63	01:09 / 06:55
	<i>b</i>	10/07 - 11/07/2018	07:00 - 07:00	68	13:38 / 19:26
				75	02:04 / 07:52
	<i>c</i>	16/07 - 17/07/2019	09:00 - 09:00	75	15:31 / 21:50
				76	03:57 / 10:07
	<i>d</i>	17/07 - 18/07/2019	11:00 - 11:00	77	16:04 / 22:29
				78	04:28 / 10:37
Autumn	<i>a</i>	19/09 - 20/09/2018	05:00 - 05:00	33	12:24 / 17:53
				37	01:03 / 06:30
	<i>b</i>	20/09 - 21/09/2018	06:30 - 06:30	43	13:13 / 19:00
				49	01:46 / 07:27
	<i>c</i>	14/10 - 15/10/2019	10:00 - 10:00	87	15:51 / 22:20
				88	04:03 / 10:37
	<i>d</i>	15/10 - 16/10/2019	11:15 - 11:15	87	16:16 / 22:50
				86	04:28 / 11:08

Station *F* (continental shelf)

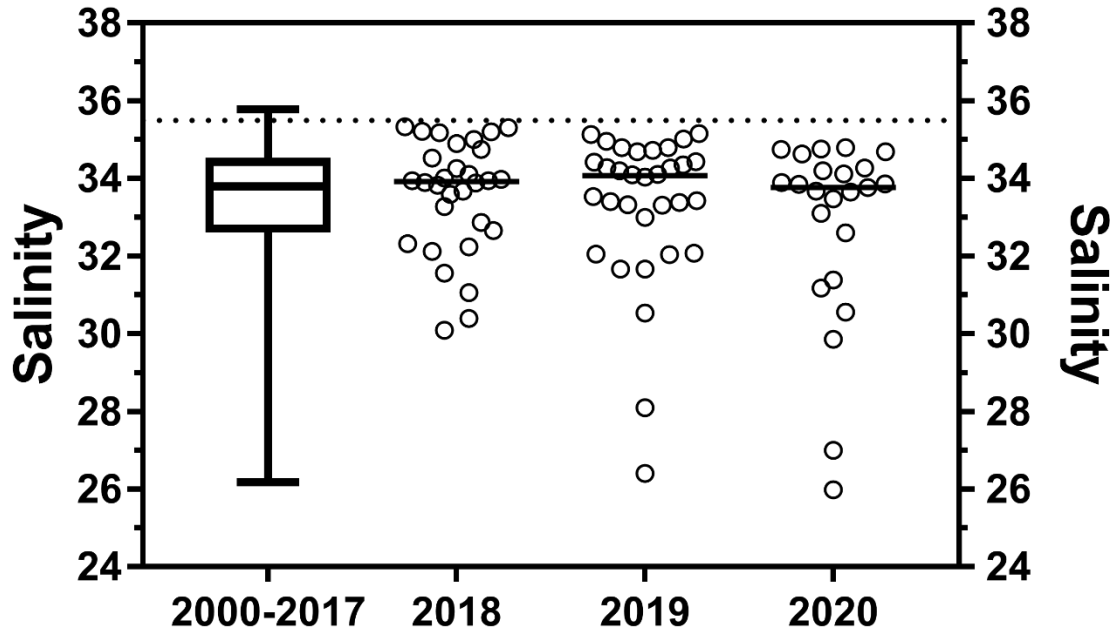


Fig. A.2. Water salinity at station *F* over the Breton Sound continental shelf (France) measured biweekly by the REPHY monitoring network (Belin et al., 2021) over the 2000-2017 period (boxplot) and over the years 2018, 2019 and 2020 (values and medians). The horizontal dotted line corresponds to the salinity of the Atlantic Ocean (35.6; Vandermeirsch, 2012).

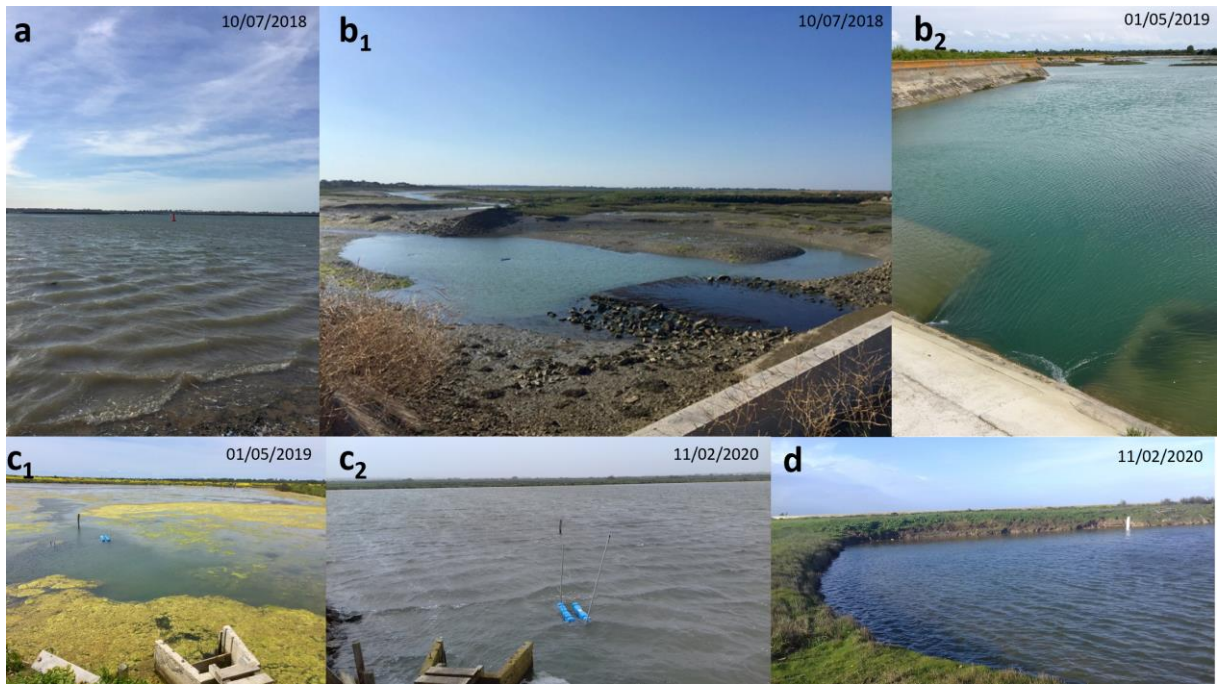


Fig. A.3. Station *a*, *b*, *c* and *d* pictures (© P. Polsenaere). **a** shows station *a* (Fier d’Ars estuary at low tide). **b₁** and **b₂** show station *b* (channel) at low and high tide, respectively. **c₁** and **c₂** show station *c* (rewilded artificial salt marsh) at two contrasting seasons with and without macroalgae bloom, respectively. **d** shows station *d* (working artificial salt marsh).

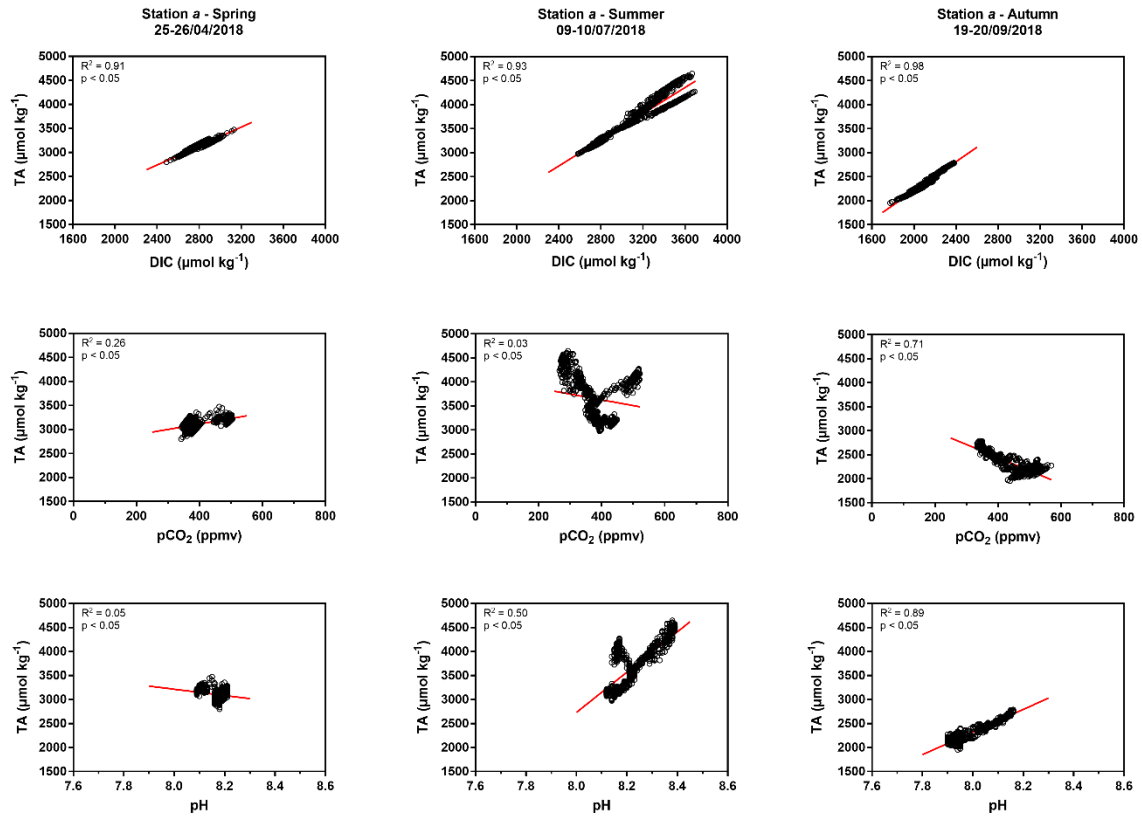


Fig. A.4. Significant linear regressions (slopes significantly different from zero; $n = 1441$; $p < 0.05$) between estimated TA and estimated DIC values, between estimated TA and measured pCO₂ values and between estimated TA and measured pH values from spring to autumn 2018 at station *a* estuary. See M&M section for TA and DIC estimations.