Supplement of

Methane, carbon dioxide and nitrous oxide emissions from two clear-water and two turbid-water urban ponds in Brussels (Belgium)

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Table S1: Emergent, submerged, and total macrophyte cover and major species in summer 2023 in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium).

Pond	Emergent macrophyte (EM) cover (%)	Submerged macrophyte (SM) cover (%)	Total macrophyte cover (%)	Major species
Leybeek	6	0 (*)	6	*Caltha palustris* (EM), *Lythrium salicaria* (EM), *Phragmites australis* (EM), *Veronica beccabunga* (EM)
Pêcheries	9	0	9	*Phragmites australis* (EM)
Tenreuken	11	57	68	*Certophyllum demersum* (SM), I*ris pseudocorus* (EM), *Lythrum salicaria* (EM), *Mentha aquatica* (EM), *Phragmites australis* (EM), *Potamogeton pectinatus* (SM)
Silex	13	87	100	Lemna trisulca (SM), Phragmites (EM).

(*) Due to high turbidity, the bottom sediment of the Leybeek pond was not visible and the submerged macrophytes were assumed absent. This assumption is based on the fact that in the Pêcheries pond where the bottom sediment was visible owing to lower turbidity, the presence of submerged macrophytes was not observed.

Table S2: Recent operations in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium) (provided by Bruxelles Environnement).

Pond	Operation	Period
Leybeek	Riverbank redevelopment	Winter 2017-2018
Pêcheries	Dredging	Winter 2017-2018
Tenreuken	Draining	Winter 2014-2015
Silex	Partial draining	Winter 2015-2016

Table S3: Pearson correlation coefficients on logarithmically transformed data collected in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium) from June 2021 to December 2023 of partial pressure of CO_2 (pCO_2, ppm), dissolved CH_4 concentration (CH_4, nmol L^{-1}), and N_2O saturation level (%N_2O, %), versus water temperature (water temp., in °C), daily precipitations (mm d^{-1}), oxygen saturation level (%O_2,in %), concentration of soluble reactive phosphorus (SRP, in µmol L^{-1}), concentration of dissolved inorganic nitrogen (DIN, in µmol L^{-1}), concentration of chlorophyll-*a* (Chl-*a*, in µg L^{-1}), and concentration of total suspended matter (TSM, in mg L^{-1}) in individual pond and for all ponds "all". Only statistically significant correlations ($p < 0.05$) are reported; ns=non-significant correlations.

	Pond	Water temp. (°C)	Precipitations (mm d^{-1})	%O_2 (%)	SRP (µmol L^{-1})	DIN (µmol L^{-1})	Chl-*a* (µg L^{-1})	TSM (mg L^{-1})
pCO_2 (ppm)	Leybeek	**-0.39**	**0.55**	**-0.70**	ns	**0.47**	**-0.33**	ns
	Pêcheries	ns	**0.52**	**-0.71**	**0.33**	**0.45**	ns	ns
	Tenreuken	ns	**0.38**	**-0.61**	**0.40**	**0.48**	ns	ns
	Silex	ns	**0.30**	**-0.39**	ns	ns	ns	ns
	All	ns	**0.33**	**-0.63**	ns	**0.38**	ns	ns
CH_4 (nmol L^{-1})	Leybeek	**0.33**	ns	ns	ns	ns	ns	ns
	Pêcheries	**0.52**	**-0.35**	ns	ns	**-0.50**	ns	ns
	Tenreuken	**0.36**	ns	ns	ns	ns	ns	**-0.31**
	Silex	**0.45**	ns	ns	**0.48**	ns	**-0.29**	ns
	All	**0.32**	ns	ns	**0.14**	ns	ns	ns
%N_2O (%)	Leybeek	ns	ns	ns	ns	ns	ns	ns
	Pêcheries	ns	ns	ns	ns	ns	ns	ns
	Tenreuken	**-0.31**	ns	ns	ns	ns	ns	**0.33**
	Silex	ns	ns	ns	ns	ns	**-0.57**	ns
	All	ns	ns	ns	ns	ns	ns	ns

Table S4: Exponential regression of ebullitive and diffusive CH_4 fluxes (mmol m^{-2} d^{-1}) as function of water temperature (Temp, in °C) and corresponding Q_{10}, coefficient of regression r^2 and *p*-value in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium). Ebullitive CH_4 fluxes were measured in spring, summer, and fall in 2022 and 2023, totaling 8 days in Leybeek, Pêcheries and Tenreuken ponds and 24 days in Silex pond, with three bubble traps. Diffusive CH_4 fluxes were derived from CH_4 concentration data collected 46 times on each pond from June 2021 to December 2023.

Pond	Ebullition				Diffusion			
	Function (Temp) (mmol m^{-2} d^{-1})	Q_{10}	r^2	p-value	Function (Temp) (mmol m^{-2} d^{-1})	Q_{10}	r^2	p-value
Leybeek	$0.01 \cdot e^{0.32 \cdot Temp}$	26.9	0.89	<0.0001	$0.22 \cdot e^{0.07 \cdot Temp}$	2.1	0.11	0.0012
Pêcheries	$0.16 \cdot e^{0.15 \cdot Temp}$	4.4	0.23	0.0032	$0.39 \cdot e^{0.02 \cdot Temp}$	1.2	0.13	0.0009
Tenreuken	$0.10 \cdot e^{0.23 \cdot Temp}$	9.7	0.72	<0.0001	$0.26 \cdot e^{0.06 \cdot Temp}$	1.9	0.10	0.0032
Silex	$0.54 \cdot e^{0.18 \cdot Temp}$	6.2	0.92	<0.0001	$0.22 \cdot e^{0.11 \cdot Temp}$	2.9	0.18	0.0004

Pond	Ebul/Tot (%)		
	Function (Temp) (%)	r^2	p-value
Leybeek	$\frac{1}{1 + 22 \times e^{-0.25 \cdot Temp}}$	0.71	<0.0001
Pêcheries	$\frac{1}{1 + 2.43 \times e^{-0.13 \cdot Temp}}$	0.17	0.0043
Tenreuken	$\frac{1}{1 + 2.60 \times e^{-0.17 \cdot Temp}}$	0.45	<0.0001
Silex	$\frac{1}{1 + 0.40 \times e^{-0.07 \cdot Temp}}$	0.30	<0.0001

Table S5: Outcomes of regressions between variables, number of values (n), equation of the regression, regression coefficient (r^2), and *p*-value. Transformations have been applied to the data to ensure a normal distribution and are indicated in the equation column.

Figure	Variable 1 (X)	Variable 2 (Y)	n	Equation	r^2	*p*-value
2	Precipitation anomaly (%)	Temperature anomaly (°C)	20	$Y = 3.29 - 0.03 \cdot X$	0.32	0.0147
4	Temperature (°C)	Bubbles flux (mL m^{-1} d^{-1})	139	$Y = 28 \cdot e^{0.14 \cdot X}$	0.65	<0.0001
	%CH_4 (%)	Bubbles flux (mL m^{-1} d^{-1})	123	$Y = 164 \cdot e^{0.03 \cdot X}$	0.36	0.0053
6	Water depth (cm)	CH_4 ebullition Q_{10}	6	$Y = 92 \cdot e^{-0.02 \cdot X}$	0.75	0.0263
8	Chlorophyll-*a* (Chl-*a*, in µg L^{-1})	Diffusive CH_4 flux (mmol m^{-1} d^{-1})	4	$Y = 3.5 - 4.1 \cdot \log(X) + 1.7 \cdot \log(X)^2$	0.96	0.0132
		Ebullitive CH_4 flux (mmol m^{-1} d^{-1})	4	$Y = 1.4 \cdot e^{-0.89 \cdot \log(X)}$	0.70	0.0432
		Ebul/Tot (%)	4	$Y = 94 - 21 \cdot \log(X)$	0.99	0.0021
	Total macrophyte cover in summer (%)	Diffusive CH_4 flux (mmol m^{-1} d^{-1})	4	$Y = 1.4 - 0.01 \cdot X + 0.0001 \cdot X^2$	0.69	0.0493
		Ebullitive CH_4 flux (mmol m^{-1} d^{-1})	4	$Y = 3.08 \cdot e^{0.013 \cdot X}$	0.72	0.0328
		Ebul/Tot (%)	4	$Y = 61.57 + 0.22 \cdot X$	0.81	0.0099
10	Chlorophyll-*a* (Chl-a, in µg L^{-1})	$\delta^{13}C$-CH_4 of perturbed sediments (‰)	4	$Y = -83.34 + 8.33 \cdot \log(X)$	0.67	0.1802
	Total macrophyte cover in summer (%)	$\delta^{13}C$-CH_4 of perturbed sediments (‰)	4	$Y = -69.94 - 0.11 \cdot X$	0.82	0.0878
12	Total suspended matter (TSM, in mg L^{-1})	$\delta^{13}C$-CH_4 of water (‰)	145	$Y = -57.58 + 11.33 \cdot X$	0.19	<0.0001
		FOX (%)	145	$Y = 45.08 + 23.94 \cdot X$	0.32	<0.0001
		MOX (mmol m^{-2} d^{-1})	145	$\log(Y) = 3.32 + 0.38 \cdot \log(X)$	0.23	<0.0001
	Chlorophyll-*a* (Chl-a, in µg L^{-1})	$\delta^{13}C$-CH_4 of water (‰)	145	$Y = -51.39 + 6.47 \cdot X$	0.16	<0.0001
		FOX (%)	145	$Y = 60.13 + 10.86 \cdot X$	0.17	<0.0001
		MOX (mmol m^{-2} d^{-1})	145	$\log(Y) = 3.57 + 0.17 \cdot \log(X)$	0.17	<0.0001
S5	Diffusive CH_4 flux (mmol m^{-1} d^{-1})	Ebullitive CH_4 flux (mmol m^{-1} d^{-1}) (Deemer & Holgerson, 2021)	41	$\log(Y) = 0.23 + 0.68 \cdot \log(X)$	0.39	<0.0001
		Ebullitive CH_4 flux (mmol m^{-1} d^{-1}) (Brussels ponds, this study)	4	$\log(Y) = 0.26 + 3.15 \cdot \log(X)$	0.76	0.0402
	Chlorophyll-*a* (Chl-*a*, in µg L^{-1})	Ebullitive CH_4 flux (mmol m^{-1} d^{-1}) (Deemer & Holgerson, 2021)	28	$\log(Y) = -0.45 + 0.62 \cdot \log(X)$	0.29	<0.0001

Table S6 : Outcomes of ordinary One-Way ANOVA comparisons (Figs. 3, 7, and 11), with log-transformed data, for chlorophyll-*a* (Chl-*a*, in µg L^{-1}), total suspended matter, (TSM, in mg L^{-1}), oxygen saturation level (% O_2, in %), partial pressure of CO_2 (pCO_2, ppm), dissolved CH_4 concentration (CH_4, nmol L^{-1}), N_2O saturation level (% N_2O, %), diffusive and ebullitive CH_4 fluxes (mmol m^{-2} d^{-1}), mean ratio of ebullitive CH_4 flux to total (diffusive + ebullitive) CH_4 flux (%), $^{12}C/^{13}C$ ratio of CH_4 in surface waters ($\delta^{13}C$-CH_4 in ‰), fraction of CH_4 removed by methane oxidation (FOX, in %), and methane oxidation (MOX, in mmol m^{-2} d^{-1}) in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium), and for each season. *p*-values less than 0.05 are in bold.

Boxplot 1		Boxplot 2		Chl-*a* (µg L^{-1})	TSM (mg L^{-1})	% O_2 (%)	pCO_2 (ppm)	CH_4 (nmol L^{-1})	% N_2O (%)	Diffusive CH_4 (mmol m^{-2} d^{-1})	Ebullitive CH_4 (mmol m^{-2} d^{-1})	Ebullitive CH_4 ratio (%)	$\delta^{13}C$-CH_4 water (‰)	FOX (%)	MOX (mmol m^{-2} d^{-1})
Pond 1	**Season 1**	**Pond 2**	**Season 2**	***p*-value**											
Leybeek	Spring	Pêcheries	Spring	**<0.0001**	0.8736	0.9942	0.9813	>0.9999	0.9757	>0.9999	>0.9999	0.9971	>0.9999	>0.9999	>0.9999
Leybeek	Spring	Tenreuken	Spring	**<0.0001**	0.0554	>0.9999	0.9994	0.9655	>0.9999	0.9804	**0.0175**	0.9762	0.253	**0.0064**	0.8877
Leybeek	Spring	Silex	Spring	**<0.0001**	**0.0018**	0.9955	0.1605	0.5663	>0.9999	0.5009	**<0.0001**	0.5115	0.1717	**0.0032**	0.9713
Leybeek	Spring	Leybeek	Summer	0.7674	0.286	>0.9999	>0.9999	>0.9999	0.9976	>0.9999	**<0.0001**	0.2833	0.9361	0.3962	0.8017
Leybeek	Spring	Leybeek	Fall	>0.9999	0.977	0.8568	0.4536	>0.9999	0.9996	>0.9999	**<0.0001**	**0.0071**	>0.9999	0.1533	0.1543
Leybeek	Spring	Leybeek	Winter	>0.9999	0.9995	0.5519	0.9315	0.4129	>0.9999	0.9129	**<0.0001**	**<0.0001**	0.9933	0.4845	0.9972
Leybeek	Summer	Pêcheries	Summer	**0.0001**	**0.0002**	0.3118	**0.0092**	>0.9999	**0.0028**	0.9921	0.8799	>0.9999	0.9641	>0.9999	>0.9999
Leybeek	Summer	Tenreuken	Summer	**<0.0001**	**<0.0001**	0.9976	0.7891	0.9998	0.0585	0.6007	0.2726	0.9962	**0.0172**	**<0.0001**	**<0.0001**
Leybeek	Summer	Silex	Summer	**<0.0001**	**<0.0001**	>0.9999	0.0501	0.6597	0.958	>0.9999	**<0.0001**	0.9996	**0.0043**	**0.0093**	0.9438
Leybeek	Summer	Leybeek	Fall	0.9961	0.9996	0.9645	0.1619	>0.9999	>0.9999	>0.9999	**<0.0001**	**<0.0001**	>0.9999	0.9999	0.9841
Leybeek	Summer	Leybeek	Winter	0.3777	0.99	0.7365	0.7566	0.0605	>0.9999	>0.9999	**<0.0001**	**<0.0001**	>0.9999	>0.9999	0.1054
Leybeek	Fall	Pêcheries	Fall	**0.0008**	**0.0148**	**0.0083**	0.9986	0.9904	0.3692	0.1755	**0.0066**	**0.0023**	>0.9999	>0.9999	0.998
Leybeek	Fall	Tenreuken	Fall	**<0.0001**	0.2055	>0.9999	>0.9999	0.9364	>0.9999	0.2267	**<0.0001**	**0.0001**	0.0553	>0.9999	0.556
Leybeek	Fall	Silex	Fall	**<0.0001**	**<0.0001**	>0.9999	>0.9999	>0.9999	>0.9999	0.6431	**<0.0001**	**<0.0001**	>0.9999	0.9748	0.4157
Leybeek	Fall	Leybeek	Winter	0.9954	>0.9999	>0.9999	>0.9999	0.1392	>0.9999	0.9999	**<0.0001**	**0.0001**	>0.9999	>0.9999	**0.0077**
Leybeek	Winter	Pêcheries	Winter	0.3472	0.2438	>0.9999	>0.9999	>0.9999	0.982	>0.9999	**<0.0001**	**<0.0001**	>0.9999	>0.9999	>0.9999
Leybeek	Winter	Tenreuken	Winter	0.757	>0.9999	>0.9999	>0.9999	>0.9999	>0.9999	0.8752	**<0.0001**	**<0.0001**	0.5268	>0.9999	>0.9999
Leybeek	Winter	Silex	Winter	**0.0086**	0.3998	>0.9999	>0.9999	0.9936	>0.9999	0.7667	**<0.0001**	**<0.0001**	0.9449	0.9979	>0.9999
Pêcheries	Spring	Tenreuken	Spring	>0.9999	0.986	>0.9999	>0.9999	0.9976	0.9765	0.4029	0.1702	>0.9999	0.2335	**0.004**	0.8333
Pêcheries	Spring	Silex	Spring	>0.9999	0.5498	>0.9999	0.9747	0.8233	>0.9999	0.9928	**<0.0001**	0.998	0.1607	**0.002**	0.9461
Pêcheries	Spring	Pêcheries	Summer	**0.0225**	>0.9999	0.9938	0.9847	>0.9999	>0.9999	**0.0039**	0.1897	0.9967	0.2786	0.4317	0.5957
Pêcheries	Spring	Pêcheries	Fall	0.9989	>0.9999	**0.0008**	0.6986	0.9974	>0.9999	0.6761	0.94	>0.9999	>0.9999	0.5467	0.9662
Pêcheries	Spring	Pêcheries	Winter	0.9874	>0.9999	>0.9999	>0.9999	0.3253	>0.9999	0.1676	**0.0029**	>0.9999	0.9938	0.8622	0.9997
Pêcheries	Summer	Tenreuken	Summer	**<0.0001**	**0.0218**	0.9761	0.8433	>0.9999	>0.9999	**0.0096**	**0.0006**	0.9894	**<0.0001**	**<0.0001**	**<0.0001**
Pêcheries	Summer	Silex	Summer	**<0.0001**	**0.0002**	0.5902	>0.9999	0.3437	0.318	**0.0001**	**<0.0001**	0.9984	**<0.0001**	**0.001**	0.5863
Pêcheries	Summer	Pêcheries	Fall	0.5453	0.9959	**0.0091**	0.9996	0.9985	>0.9999	**0.0026**	**0.0003**	0.7374	0.8439	>0.9999	>0.9999
Pêcheries	Summer	Pêcheries	Winter	0.8477	>0.9999	>0.9999	0.9905	0.2529	0.9903	0.9964	**<0.0001**	0.9879	0.9993	>0.9999	0.0729
Pêcheries	Fall	Tenreuken	Fall	0.2802	>0.9999	0.078	0.9994	>0.9999	0.8882	>0.9999	0.9902	>0.9999	0.0578	>0.9999	0.9981
Pêcheries	Fall	Silex	Fall	0.6452	0.9789	**0.0066**	>0.9999	>0.9999	0.8449	0.3498	**0.0027**	0.8658	>0.9999	0.9923	0.9907
Pêcheries	Fall	Pêcheries	Winter	>0.9999	>0.9999	**0.0323**	0.7601	0.9659	>0.9999	**0.0203**	0.3416	>0.9999	>0.9999	>0.9999	0.4577
Pêcheries	Winter	Tenreuken	Winter	>0.9999	0.7514	>0.9999	>0.9999	>0.9999	0.9997	0.5932	>0.9999	>0.9999	0.3992	>0.9999	>0.9999
Pêcheries	Winter	Silex	Winter	0.9875	>0.9999	>0.9999	>0.9999	0.9983	>0.9999	0.9997	0.1784	0.9988	0.87	0.9993	>0.9999
Tenreuken	Spring	Silex	Spring	>0.9999	0.9998	>0.9999	0.8373	>0.9999	>0.9999	0.9968	0.4698	>0.9999	>0.9999	>0.9999	>0.9999
Tenreuken	Spring	Tenreuken	Summer	0.9889	>0.9999	>0.9999	>0.9999	0.721	0.9628	0.4961	**0.0468**	0.748	0.9963	0.8375	0.9976
Tenreuken	Spring	Tenreuken	Fall	0.9668	0.8032	0.8385	0.9759	0.2867	>0.9999	0.1765	0.1006	>0.9999	>0.9999	**<0.0001**	0.6359
Tenreuken	Spring	Tenreuken	Winter	0.8355	0.0512	0.9748	>0.9999	**0.0277**	>0.9999	>0.9999	**<0.0001**	0.9999	0.9954	**<0.0001**	>0.9999
Tenreuken	Summer	Silex	Summer	**0.0001**	0.9962	>0.9999	0.9873	0.0851	0.9024	0.1108	0.4934	>0.9999	>0.9999	0.9712	**0.0047**
Tenreuken	Summer	Tenreuken	Fall	>0.9999	0.2528	0.9895	0.9871	0.9994	0.8661	0.2039	**<0.0001**	0.5053	0.9896	**0.0001**	**0.0458**
Tenreuken	Summer	Tenreuken	Winter	0.0595	**0.0014**	0.9999	>0.9999	0.7076	0.8236	**0.0049**	**<0.0001**	0.2368	>0.9999	**0.0099**	0.9892
Tenreuken	Fall	Silex	Fall	>0.9999	0.5268	>0.9999	>0.9999	0.9997	>0.9999	**<0.0001**	0.2205	0.9982	0.2985	0.9985	>0.9999
Tenreuken	Fall	Tenreuken	Winter	0.0692	0.9619	>0.9999	0.9584	0.9996	>0.9999	>0.9999	**0.0026**	>0.9999	0.9878	>0.9999	0.901
Tenreuken	Winter	Silex	Winter	0.8729	0.8806	>0.9999	>0.9999	>0.9999	>0.9999	0.9909	0.0753	0.981	>0.9999	>0.9999	>0.9999
Silex	Spring	Silex	Summer	**0.0006**	>0.9999	>0.9999	>0.9999	>0.9999	>0.9999	>0.9999	0.3177	>0.9999	0.9993	**0.0357**	0.6524
Silex	Spring	Silex	Fall	>0.9999	>0.9999	>0.9999	>0.9999	0.4416	0.9994	0.7132	0.3391	>0.9999	0.2238	**<0.0001**	0.9139
Silex	Spring	Silex	Winter	>0.9999	0.4955	0.996	0.9995	0.0598	>0.9999	0.901	**<0.0001**	>0.9999	0.6554	**0.0001**	>0.9999
Silex	Summer	Silex	Fall	**0.0032**	0.9994	0.9981	>0.9999	0.4427	>0.9999	0.2083	**<0.0001**	>0.9999	0.7471	0.5318	>0.9999
Silex	Summer	Silex	Winter	**0.0001**	0.1109	0.8458	>0.9999	**0.0449**	>0.9999	>0.9999	**<0.0001**	>0.9999	0.9881	0.6988	0.8333
Silex	Fall	Silex	Winter	0.9998	0.857	>0.9999	0.9992	0.9997	>0.9999	>0.9999	0.0718	>0.9999	>0.9999	>0.9999	0.9663

Table S7 : Outcomes of ordinary One-Way ANOVA comparisons (Fig. 13), with log-transformed data (negative signs of $\delta^{13}C\text{-}CH_4$ were removed before transformation) of $^{12}C/^{13}C$ ratio of CH_4 ($\delta^{13}C\text{-}CH_4$ in ‰) in bubbles collected during ebullitive fluxes measurements ("trapped bubbles") in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) in the city of Brussels (Belgium), measured in spring, summer and fall in 2022 and 2023 (September 2023 and October 2023 in Leybeek; July 2023 and October 2023 in Pêcheries; August 2023 and October 2023 in Tenreuken; April 2022 and July 2022 in Silex), for each season. *p*-values less than 0.05 are in bold.

Boxplot 1		Boxplot 2		p-value
Pond 1	**Season 1**	**Pond 2**	**Season 2**	
Leybeek	Summer	Leybeek	Fall	**<0.0001**
		Pêcheries	Summer	0.9975
			Fall	**<0.0001**
		Tenreuken	Summer	>0.9999
			Fall	**<0.0001**
		Silex	Spring	0.1252
			Summer	0.3284
	Fall	Pêcheries	Summer	**<0.0001**
			Fall	0.0943
		Tenreuken	Summer	**<0.0001**
			Fall	0.2639
		Silex	Spring	**<0.0001**
			Summer	**<0.0001**
Pêcheries	Summer	Pêcheries	Fall	**<0.0001**
		Tenreuken	Summer	0.982
			Fall	**<0.0001**
		Silex	Spring	0.0764
			Summer	0.0853
	Fall	Tenreuken	Summer	**<0.0001**
			Fall	0.9992
		Silex	Spring	**<0.0001**
			Summer	**<0.0001**
Tenreuken	Summer	Tenreuken	Fall	**<0.0001**
		Silex	Spring	0.0887
			Summer	0.112
	Fall	Silex	Spring	**<0.0001**
			Summer	**<0.0001**
Silex	Spring	Silex	Summer	0.1012

Table S8: Outcomes of ordinary One-Way ANOVA comparisons (Fig. 13), with log-transformed data for bubble dissolution flux (Dissolution), methane oxidation (MOX), diffusive CH_4 emissions to atmosphere (Atmospheric), and sedimentary diffusive CH_4 flux (Sedimentary) computed from the other fluxes assuming steady-state (=MOX - Bubble dissolution + atmospheric emissions) in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) in the city of Brussels (Belgium) between June 2021 and December 2023. All fluxes are in mmol m^{-2} d^{-1}. *p*-values less than 0.05 are in bold.

Boxplot 1		Boxplot 2		p-value
Pond 1	**Flux 1**	**Pond 2**	**Flux 2**	
Leybeek	Dissolution	Leybeek	Atmospheric	**<0.0001**
			MOX	**<0.0001**
	MOX		Atmospheric	0.9628
	Sedimentary		Atmospheric	**0.0459**
			Dissolution	**<0.0001**
			MOX	0.9331
	Atmospheric	Pêcheries	Atmospheric	>0.9999
	Dissolution		Dissolution	**0.0037**
	MOX		MOX	**0.0027**
	Sedimentary		Sedimentary	0.3372
	Atmospheric	Tenreuken	Atmospheric	>0.9999
	Dissolution		Dissolution	**<0.0001**
	MOX		MOX	>0.9999
	Sedimentary		Sedimentary	0.9951
	Atmospheric	Silex	Atmospheric	0.8734
	Dissolution		Dissolution	**<0.0001**
	MOX		MOX	**<0.0001**
	Sedimentary		Sedimentary	**0.0002**
Pêcheries	Dissolution	Pêcheries	Atmospheric	**<0.0001**
			MOX	**<0.0001**
	MOX		Atmospheric	**<0.0001**
	Sedimentary		Atmospheric	**<0.0001**
			Dissolution	**<0.0001**
			MOX	>0.9999
	Atmospheric	Tenreuken	Atmospheric	>0.9999
	Dissolution		Dissolution	0.9057
	MOX		MOX	**0.0008**
	Sedimentary		Sedimentary	**0.0066**
	Atmospheric	Silex	Atmospheric	0.5764
	Dissolution		Dissolution	**0.0043**
	MOX		MOX	0.9753
	Sedimentary		Sedimentary	0.7736
Tenreuken	Dissolution	Tenreuken	Atmospheric	**0.0002**
			MOX	**<0.0001**
	MOX		Atmospheric	0.9624
	Sedimentary		Atmospheric	0.5642
			Dissolution	**<0.0001**
			MOX	>0.9999
	Atmospheric	Silex	Atmospheric	0.6803
	Dissolution		Dissolution	0.6254
	MOX		MOX	**<0.0001**
	Sedimentary		Sedimentary	**<0.0001**
Silex	Dissolution	Silex	Atmospheric	**0.0003**
			MOX	**<0.0001**
	MOX		Atmospheric	**<0.0001**
	Sedimentary		Atmospheric	**<0.0001**
			Dissolution	**<0.0001**
			MOX	>0.9999

Figure S1: Atmospheric pressure (atm) and pressure drop factor (atm d^{-1}) from 27 March 2022 to 15 April 2022 and from18 July 2022 to 23 July 2022 corresponding to the period of bubble flux measurements in the Silex pond in the city of Brussels (Belgium) (Fig. 5).

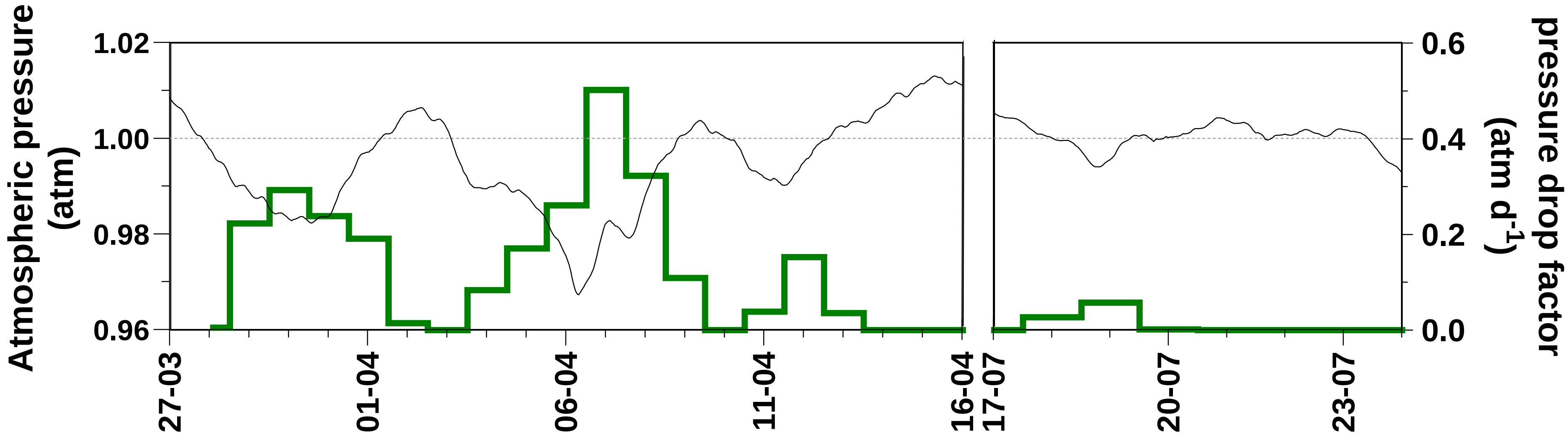

Figure S2: Daily mean air temperature (light grey line) and water temperature during sampling four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium), daily precipitation (dark grey line), monthly temperature anomaly (°C) relative to the period 1991-2020, and daily wind speed (m s^{-1}) from January 2021 to December 2023.

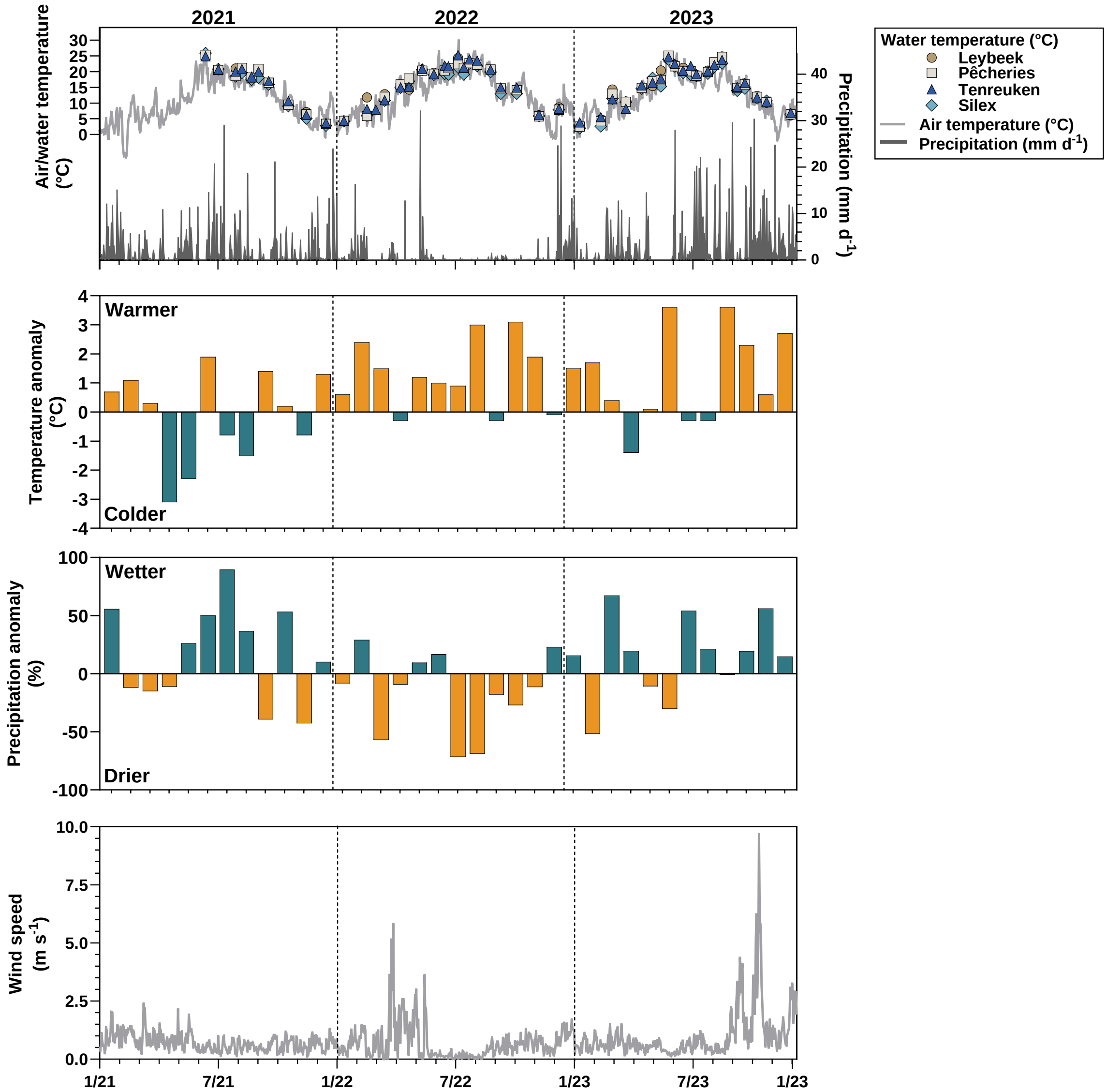

Figure S3: Comparison between measured bubble flux and predicted bubbles flux at low temperature (Temp < 15°C), high temperature (>15°C), and all temperatures from multiple linear models with temperature alone or both temperature and atmospheric pressure drop as predicted variables in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium). Bubble fluxes were measured at different seasons in 2022 and 2023, totaling 8 days in Leybeek, Pêcheries and Tenreuken ponds and 24 days in Silex pond, with three bubble traps.

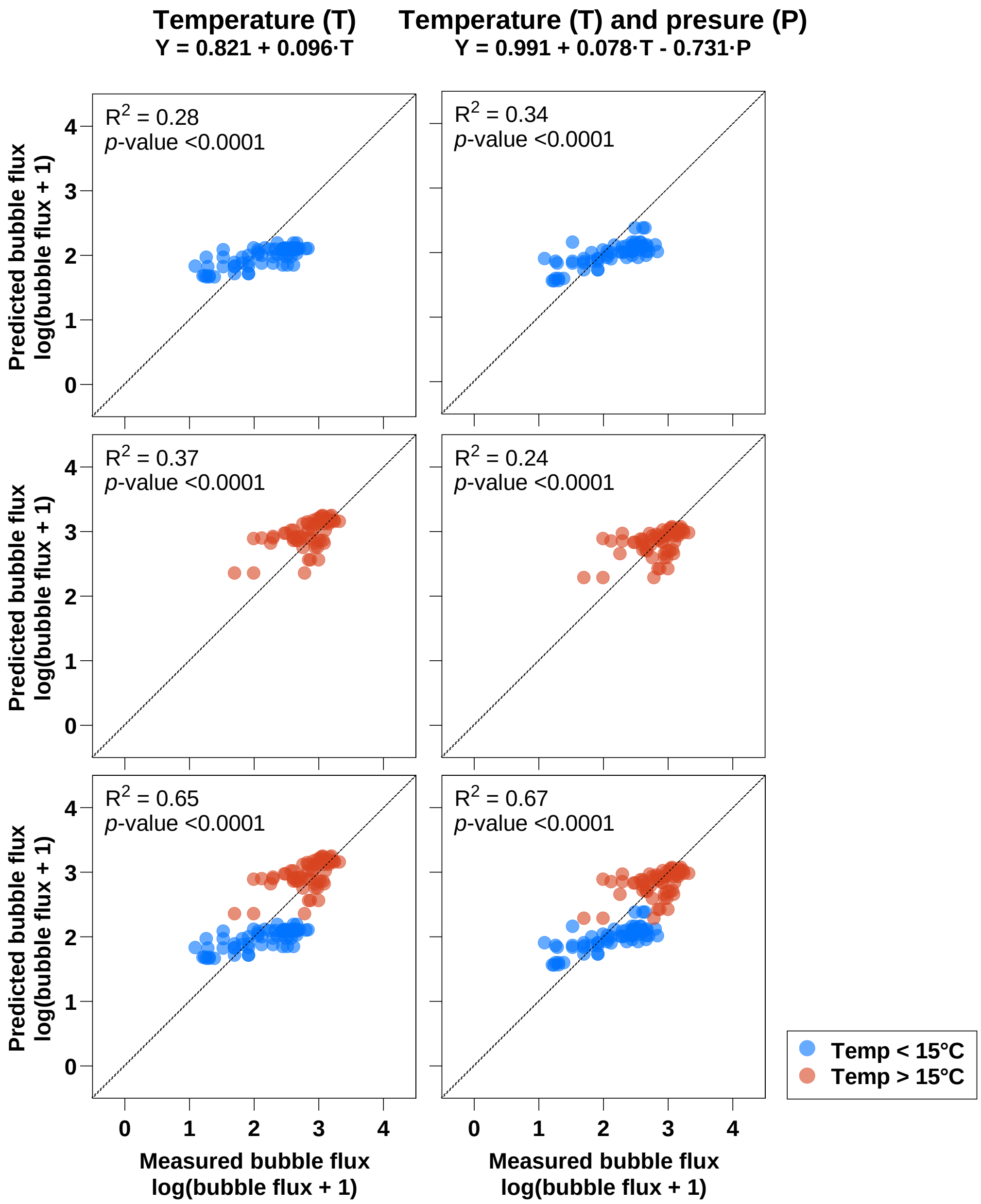

Figure S4: Relative contribution of ebullitive and diffusive CH_4 fluxes to total (ebullitive + diffusive) CH_4 flux as function of temperature in four urban ponds (Leybeek, Pêcheries, Tenreuken, and Silex) of the city of Brussels (Belgium). Ebullitive CH_4 fluxes were measured at different seasons in 2022 and 2023, totaling 8 days in Leybeek, Pêcheries and Tenreuken ponds and 24 days in Silex pond, with three bubble traps and data were collected 46 times on each pond from June 2021 to December 2023 for diffusive CH_4 fluxes. Regressions lines of fitted data of the relative contribution of ebullition to total (Ebul/Tot) are shown in light green and the relative contribution of diffusion to total (Diff/Tot) in dark green (Table S3).

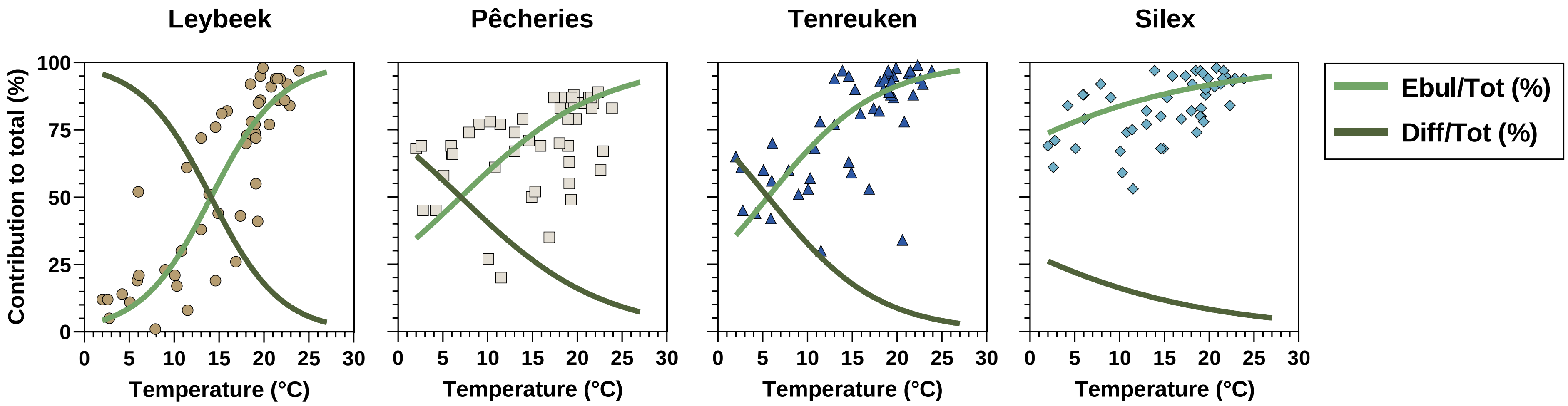

Figure S5: Ebullitive CH_4 fluxes (mmol m^{-2} d^{-1}) versus diffusive CH_4 fluxes (mmol m^{-2} d^{-1}) and chlorophyll-*a* (Chl-*a*, in µg L^{-1}) in ponds of similar surface area (0.4 to 4.0 ha) compiled by Deemer and Holgerson (2021), and in four ponds (Leybeek, Pêcheries, Tenreuken, and Silex) in the city of Brussels (Belgium) from June 2021 to December 2023. Regression lines of fitted data of ebullitive CH_4 flux from Deemer and Holgerson (2021) are shown in green and (Table S5).