

Supplementary material for the manuscript “Dynamics of greenhouse gases in the river-groundwater interface in gaining river stretch (Triffoy catchment, Belgium)”.

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Figure A. Location of the groundwater sampling points: (a) micropiezometers and (b) springs.

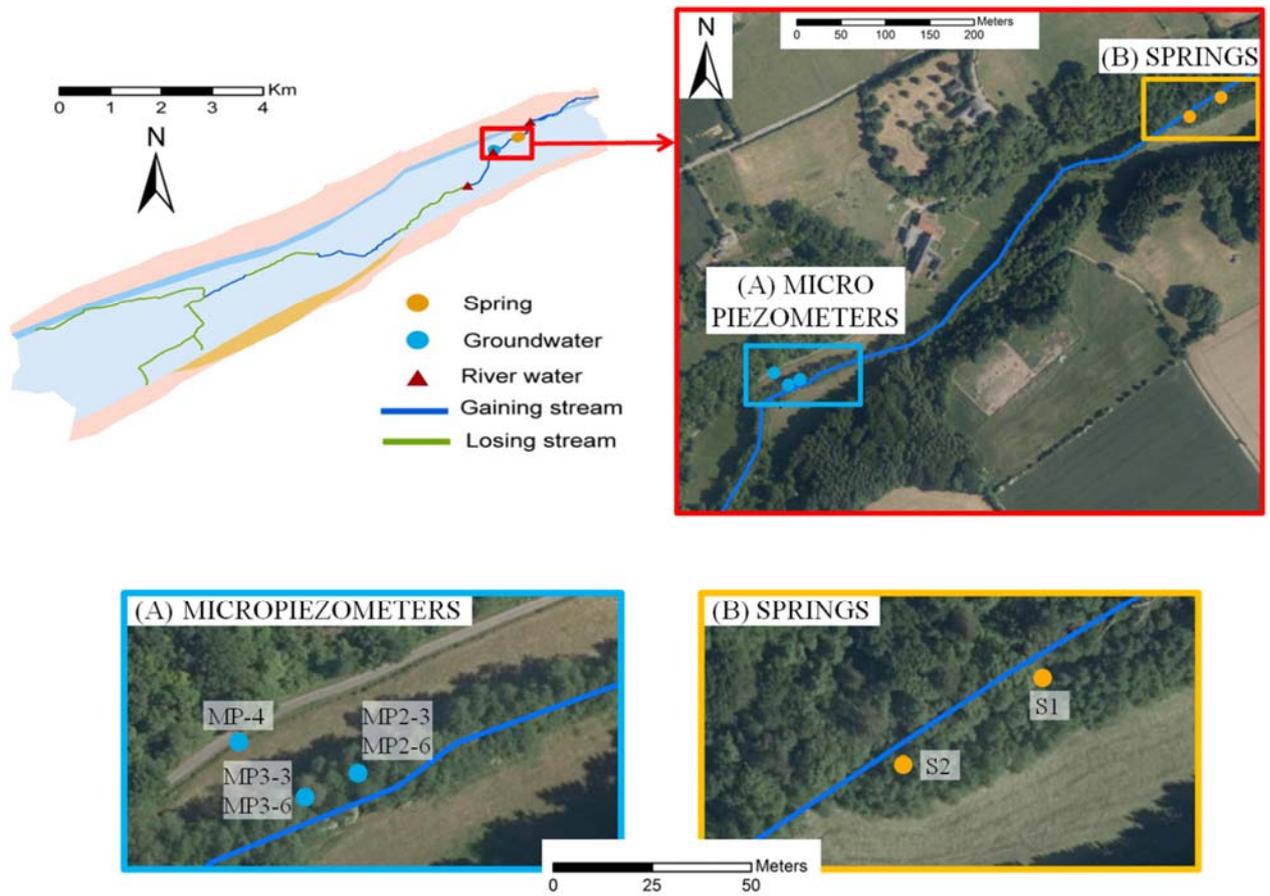
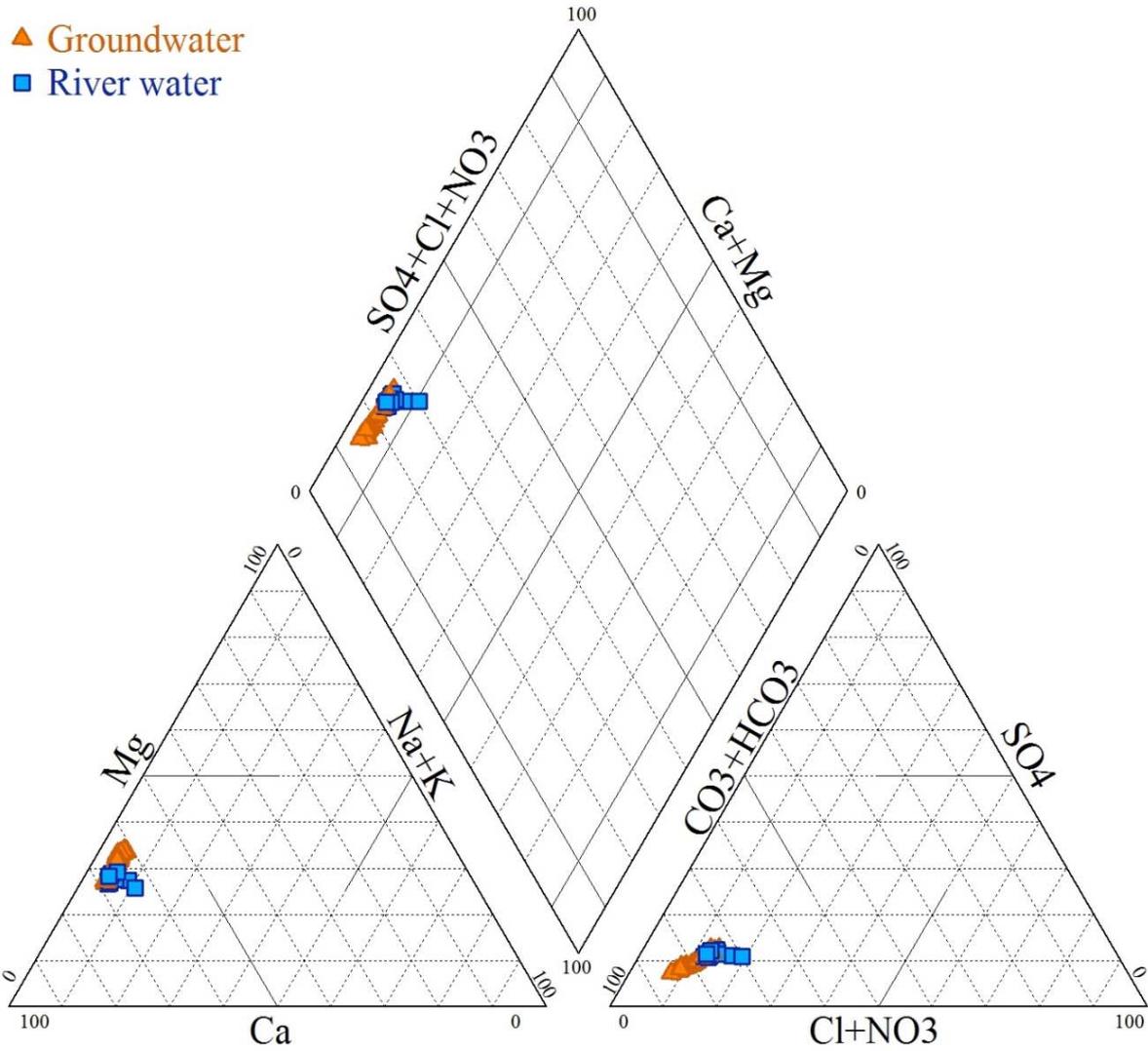


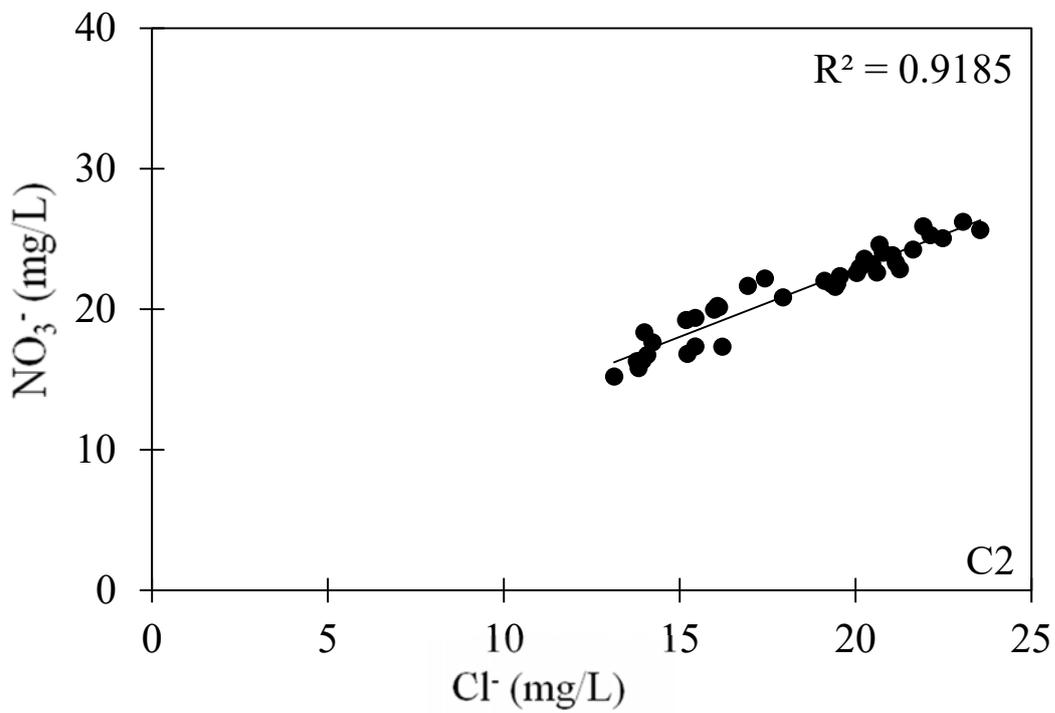
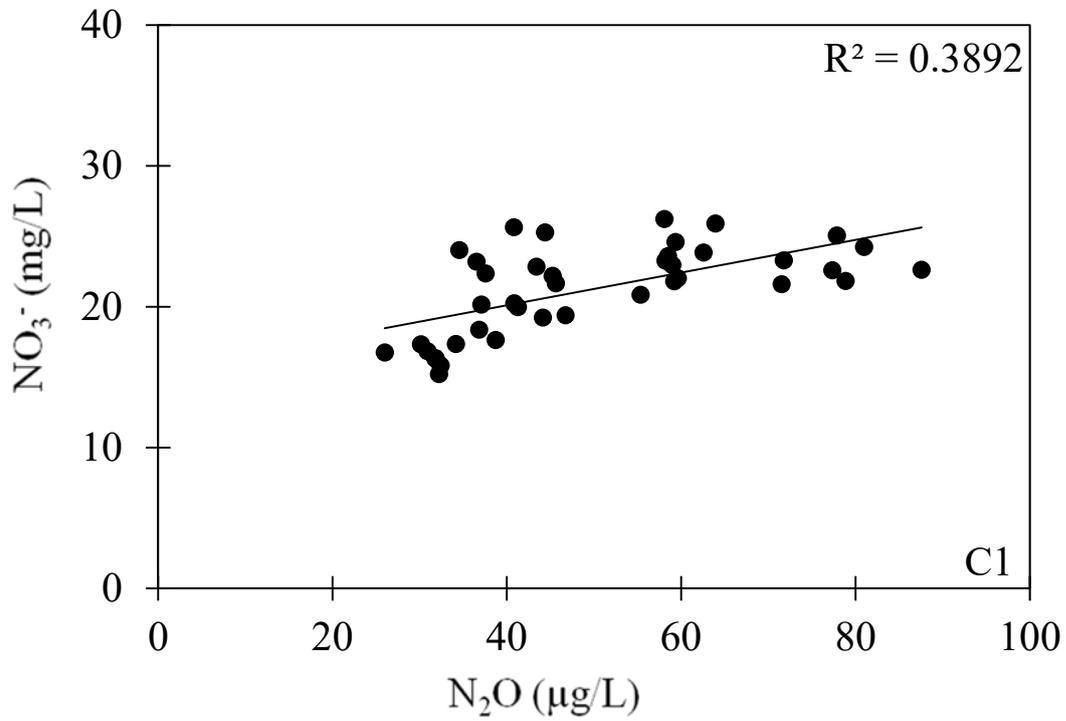
Figure B. Piper diagram (Simler, 2009) defining the hydrochemical facies of the river and groundwater samples of the Triffoy River Basin.



Reference

Simler, R., 2009. DIAGRAMMES: Logiciel d'hydrochimie multilingue en distribution libre. Laboratoire d'Hydrogéologie d'Avignon, France.

Figure C1) Nitrous oxide vs. nitrate concentrations and **C2)** Chloride vs. nitrate concentrations in groundwater samples.



Text S1 Saturation indices

The saturation index (SI) is calculated by comparing the chemical activities of the dissolved ions of the mineral (ion activity product, IAP) with the solubility constant of the mineral (K_{sp}) as follows:

$$SI = \log (IAP/K_{sp}) \quad (1)$$

The SIs were assessed using PHREEQC (Parkhurst and Appelo, 2013) and they are useful to evaluate the equilibrium between water and minerals. If $SI < 0$ ($IAP < K_{sp}$), water is undersaturated and the mineral is dissolved. If $SI > 0$ ($IAP > K_{sp}$), water is oversaturated and precipitation of the mineral is possible. If SI is close to 0, water is in equilibrium with respect to the given mineral. SIs values between -0.5 and 0.5 are considered to indicate equilibrium (Welch et al., 1989).

References

Parkhurst, D. L., Appelo, C. A. J., 2013. Description of input and examples for PHREEQC version 3: a computer program for speciation, batch-reaction, one-dimensional transport, and inverse geochemical calculations (No. 6-A43). US Geological Survey.

Welch, A. H., Plume, R. W., Frick, E. A., & Hughes, J. L., 1989. Ground-water-quality assessment of the Carson River Basin, Nevada and California: Analysis of available water-quality data through 1987.

Table A. Characteristics of the micropiezometers

Name	Depth (m)	H (min)	H (max)	Aquifer	Lithology
MP-4	6	185.51	186.75	Carb. Limestone	Limestone and gravel
MP2-3	3	184.9	185.13	Carb. Limestone	Silts
MP2-6	4	184.95	185.18	Carb. Limestone	Limestone and gravel
MP3-3	3	185.14	185.36	Carb. Limestone	Silts
MP3-6	6	185.21	185.4	Carb. Limestone	Limestone

Table B. Comparison of the monthly precipitation from October 2016 to May 2017 with respect to average monthly precipitation for the period 2012-2015 (Av P). * Please, note that daily rainfall was measured by the Walloon Public Service at Modave station.

	P (mm)	Av P* (mm)
Oct-16	47.2	86.1
Nov-16	60	83.6
Dec-16	21.4	98.4
Jan-17	49.2	92.3
Feb-17	44.3	54.4
Mar-17	46.6	34.4
Apr-17	15.7	39.7
May-17	27.1	72.7

Table C. Average concentrations for selected tracers, pH and temperature in groundwater (GW) and Triffoy River (SW) for each sampling campaign (C1 to C6).

Sampling campaign	Water body	Physico-chemical parameters										
		HCO ₃ ⁻ (mg/L)	Ca ²⁺ (mg/L)	Mg ²⁺ (mg/L)	NO ₃ ⁻ (mg/L)	N ₂ O (µg/L)	CH ₄ (µg/L)	pCO ₂ (ppm)	DOC (mg/L)	DO (mg/L)	T (°C)	pH
C1	GW	353.3	99.8	28.0	22.4	55.2	0.2	14,238.3	0.9	5.7	10.7	7.5
	SW	335.7	101.9	24.7	22.9	9.9	2.9	3,506.8	1.6	8.3	9.1	8.2
C2	GW	358.5	99.6	28.6	21.9	50.2	0.3	14,266.5	1.7	4.2	9.5	7.3
	SW	337.9	102.6	25.3	24.1	9.3	3.4	2,932.2	2.0	7.9	4.9	7.9
C3	GW	361.7	99.8	29.7	20.1	46.1	0.7	14,140.7	1.1	4.4	7.9	7.6
	SW	356.5	108.9	27.6	25.8	8.2	4.5	3,173.0	1.5	8.9	4.5	8.1
C4	GW	355.5	99.0	29.0	19.4	48.6	0.4	14,272.1	0.5	4.6	9.4	7.4
	SW	322.3	97.9	24.8	20.9	8.4	1.4	2,830.4	0.9	8.9	7.4	7.8
C5	GW	360.9	100.0	29.3	18.6	47.6	0.2	14,997.2	0.5	5.0	10.4	7.3
	SW	324.2	99.0	24.4	20.0	7.9	24.3	3,062.5	0.9	10.5	10.3	8.1
C6	GW	359.9	99.5	28.7	19.8	54.0	0.8	15,402.5	0.9	5.1	10.5	7.3
	SW	319.4	94.4	24.8	18.5	16.5	4.8	3,505.3	1.0	10.6	11.4	8.0

Table D. Average saturation indexes for calcite and dolomite in groundwater (GW) and Triffoy River (SW) for each sampling campaign (C1 to C6).

Sampling campaign	Water body	Saturation index	
		Calcite	Dolomite
C1	GW	0.34	-0.35
	SW	0.97	0.81
C2	GW	0.13	-0.78
	SW	0.67	0.12
C3	GW	0.40	-0.27
	SW	0.89	0.56
C4	GW	0.27	-0.50
	SW	0.51	-0.13
C5	GW	0.16	-0.69
	SW	0.88	0.66
C6	GW	0.18	-0.67
	SW	0.81	0.57

