

Article

# Assessment of Seasonal Changes on the Carbon Cycle in the Critical Zone of a Surface Water (SW) – Groundwater (GW) System

## Supplementary material

Igor Karlović <sup>1</sup>, Tamara Marković <sup>1,\*</sup>, Tjaša Kanduč <sup>2</sup> and Polona Vreča <sup>2</sup>

<sup>1</sup> Croatian Geological Survey, Sachsova 2, 10000 Zagreb, Croatia

<sup>2</sup> Department of Environmental Sciences, Jožef Stefan Institute, Jamova cesta 39, SI-1000 Ljubljana, Slovenia

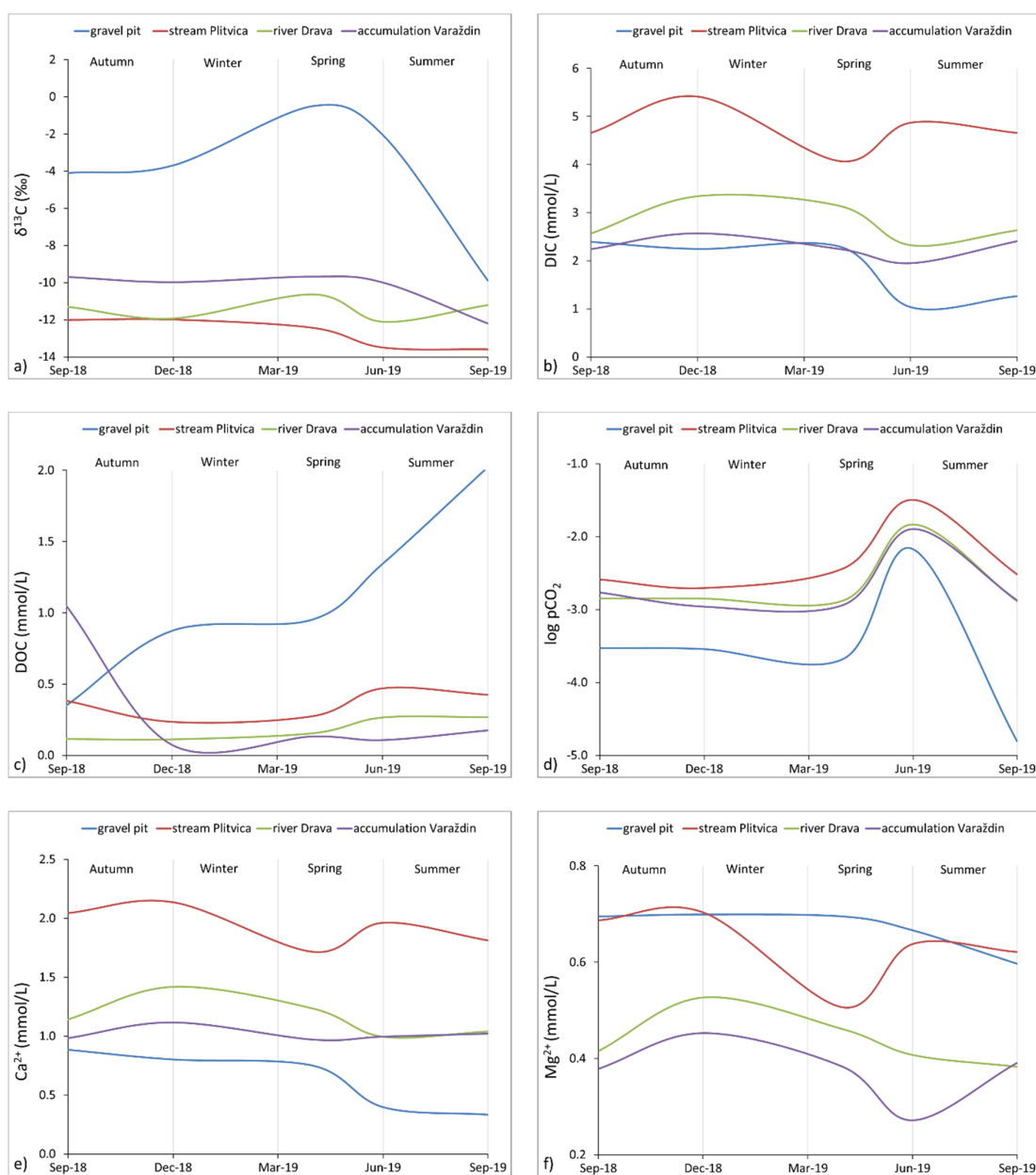
\* Correspondence: tmarkovic@hgi-cgs.hr

**Table S1.**  $\delta^{13}\text{C}_{\text{DIC}}$  values (‰) in water samples.

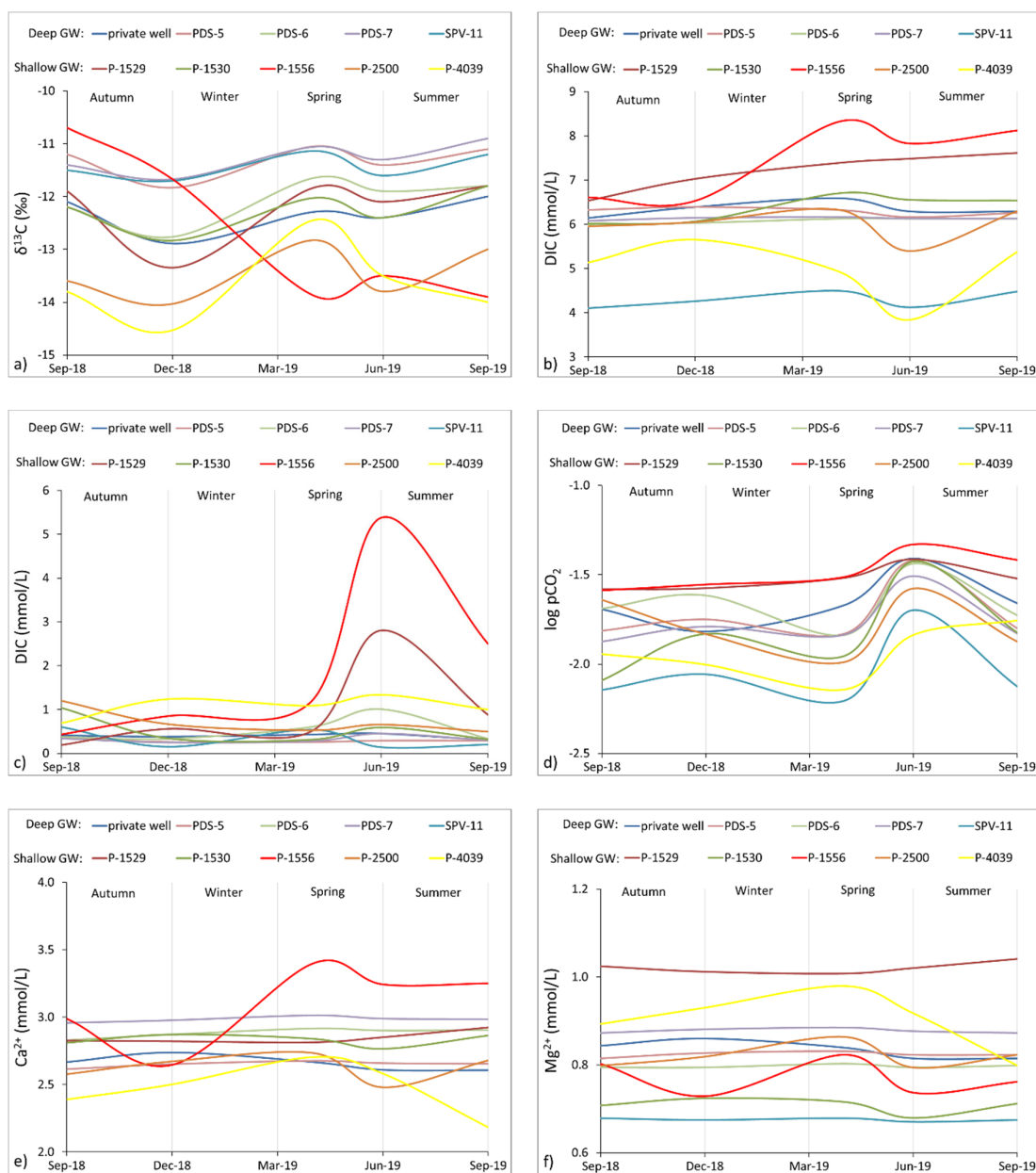
Site	Type	Date	$\delta^{13}\text{C}_{\text{DIC}}$ (‰)		Site	Type	Date	$\delta^{13}\text{C}_{\text{DIC}}$ (‰)	
			mean	SD				mean	SD
Hrašćica	GW	Sep-18	-12.1	0.2	P-1556	GW	Sep-18	-10.7	0.1
		deep	Dec-18	-12.9			Dec-18	-11.7	0.0
		Apr-19	-12.3	0.1		shallow	Apr-19	-13.9	0.0
		Jun-19	-12.4	0.1			Jun-19	-13.5	0.1
		Sep-19	-12.0	0.1			Sep-19	-13.9	0.1
PDS-5	GW	Sep-18	-11.2	0.1	P-2500	GW	Sep-18	-13.6	0.1
		deep	Dec-18	-11.8			Dec-18	-14.0	0.3
		Apr-19	-11.1	0.1		shallow	Apr-19	-12.8	0.0
		Jun-19	-11.4	0.1			Jun-19	-13.8	0.1
		Sep-19	-11.1	0.1			Sep-19	-13.0	0.0
PDS-6	GW	Sep-18	-12.2	0.0	P-4039	GW	Sep-18	-13.8	0.0
		deep	Dec-18	-12.8			Dec-18	-14.5	0.1
		Apr-19	-11.7	0.1		shallow	Apr-19	-12.5	0.0
		Jun-19	-11.9	0.0			Jun-19	-13.5	0.1
		Sep-19	-11.8	0.1			Sep-19	-14.0	0.1
PDS-7	GW	Sep-18	-11.4	0.1	Drava River	SW	Sep-18	-11.3	0.5
		deep	Dec-18	-11.7			Dec-18	-11.9	0.5
		Apr-19	-11.1	0.0			Apr-19	-10.6	0.2
		Jun-19	-11.3	0.2			Jun-19	-12.1	0.2
		Sep-19	-10.9	0.2			Sep-19	-11.2	0.1
SPV-11	GW	Sep-18	-11.5	0.1	Accum. lake Varaždin	SW	Sep-18	-9.7	0.3
		deep	Dec-18	-11.7			Dec-18	-10.0	0.2
		Apr-19	-11.1	0.1			Apr-19	-9.7	0.2
		Jun-19	-11.6	0.1			Jun-19	-10.0	0.0
		Sep-19	-11.2	0.1			Sep-19	-12.2	0.1
P-1529	GW	Sep-18	-11.9	0.1	Plitvica stream	SW	Sep-18	-12.0	0.0
		shallow	Dec-18	-13.3			Dec-18	-12.0	0.1
		Apr-19	-11.8	0.1			Apr-19	-12.4	0.1
		Jun-19	-12.1	0.1			Jun-19	-13.5	0.0
		Sep-19	-11.8	0.1			Sep-19	-13.6	0.1
P-1530	GW	Sep-18	-12.2	0.1	Šijanec	Gravel pit	Sep-18	-4.1	0.5
		shallow	Dec-18	-12.8			Dec-18	-3.7	0.2
		Apr-19	-12.0	0.1			Apr-19	-0.5	0.4
		Jun-19	-12.4	0.1			Jun-19	-2.1	0.3
		Sep-19	-11.8	0.2			Sep-19	-9.9	0.1

**Table S2.**  $\delta^{13}\text{C}$  values (‰) in solid samples.

Sample		Date	$\delta^{13}\text{C}$ (‰)	
Type	Description		mean	SD
Plant	Grass. mix	Sep-19	-29.5	0.1
	Wheat grain	Sep-19	-28.4	0.1
	Wheat straw	Sep-19	-29.9	0.1
	Maize leaf	Sep-19	-12.8	0.0
	Maize grain	Sep-19	-12.8	0.1
	Cabbage	Sep-19	-27.7	0.1
	Potato	Sep-19	-27.7	0.1
	Pumpkin	Sep-19	-26.7	0.0
Manure	Cow	Sep-19	-26.3	0.3
	Chicken	Sep-19	-19.6	0.0
Soil * $\delta^{13}\text{C}_{\text{bulk}}$	Orchard	Jul-18	-27.3	0.1
	Corn field	Jul-18	-22.5	0.3
	Cabbage field	Jul-18	-24.3	0.1
	Wheat field	Jul-18	-23.4	0.2
Soil * $\delta^{13}\text{C}_{\text{org}}$	Orchard	Jul-18	-27.1	0.1
	Corn field	Jul-18	-23.2	0.0
	Cabbage field	Jul-18	-25.2	0.5
	Wheat field	Jul-18	-23.5	0.2
Aquifer sediment * $\delta^{13}\text{C}_{\text{carb}}$	Sand	Sep-19	0.5	0.1
	Calcite	Sep-19	2.2	0.1
	Dolomite	Sep-19	-2.9	0.1



**Figure S1.** Time series of a)  $\delta^{13}\text{C}_{\text{DIC}}$ ; b) DIC; c) DOC; d)  $\log \text{pCO}_2$ ; e)  $\text{Ca}^{2+}$ ; f)  $\text{Mg}^{2+}$  in surface water



**Figure S2.** Time series of a)  $\delta^{13}\text{C}_{\text{DIC}}$ ; b) DIC; c) DOC; d) log pCO<sub>2</sub>; e) Ca<sup>2+</sup>; f) Mg<sup>2+</sup> in groundwater