

## Supplementary material

### Antimony leaching from contaminated soil under manganese- and iron-reducing conditions: column experiments

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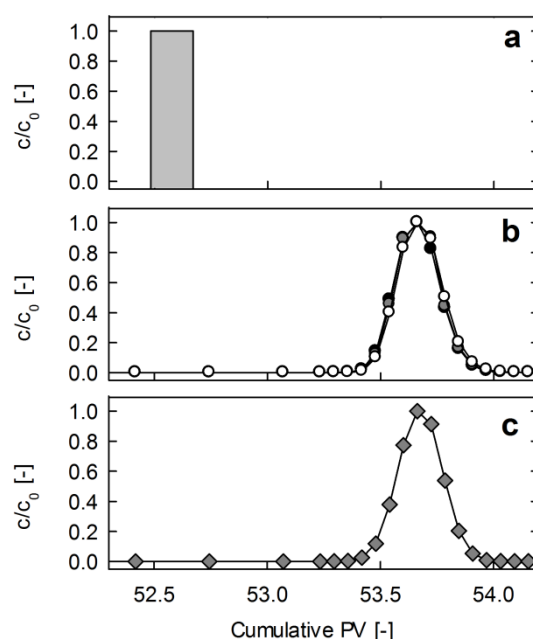
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### Bromide tracer experiment

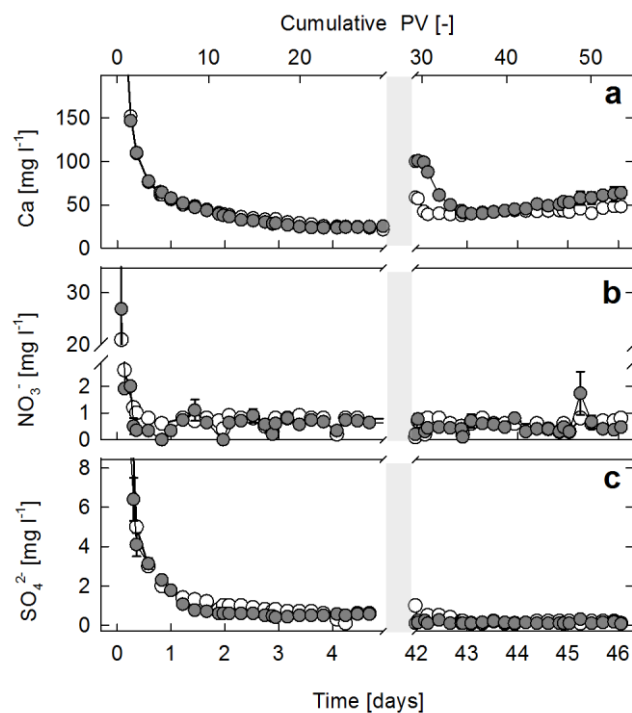
A 2 mM bromide solution prepared from KBr (Merck, Darmstadt, Germany) in 15-mM sodium lactate (Sigma–Aldrich, Steinheim, Germany) was applied as a step injection at the end of the experiment. Bromide concentrations were determined in non-acidified effluent fractions of 0.15 pore volume (PV) (~11 mL) by ion chromatography with 3.2 mM Na<sub>2</sub>CO<sub>3</sub> and 1 mM NaHCO<sub>3</sub> as mobile phase (861 Advanced Compact, Metrosep A Supp 5 150/4 column, Metrohm, Zofingen, Switzerland).



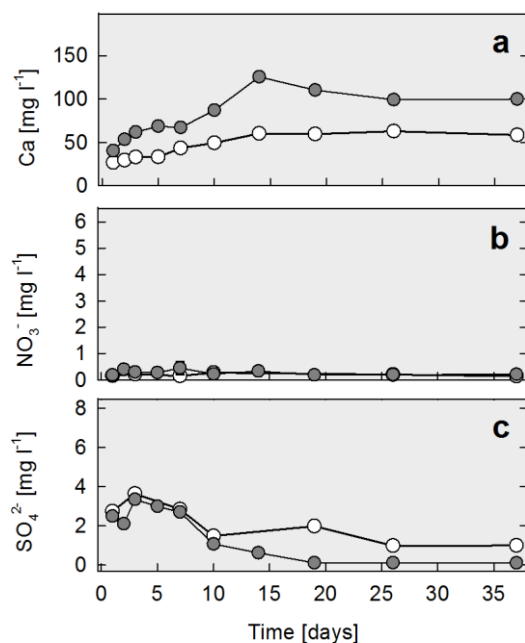
**Fig. S1.** Conservative tracer experiment using a bromide step injection (initial concentration ( $c_0$ ) = 2 mM Br<sup>-</sup>) at the end of the column experiment. (a) Br<sup>-</sup> concentration in the feeding solution, (b) Br<sup>-</sup> concentration in the effluent from the three non-sterilised soil columns, and (c) Br<sup>-</sup> concentration in the effluent from the sterilised soil column. Bromide concentrations were determined in effluent fractions of 0.15 pore volume (PV) (~11 mL) by ion chromatography.

### Analysis of anions and Ca in the effluent and in the soil solution during the flow interruption

Non-acidified subsamples for nitrate ( $\text{NO}_3^-$ ), sulfate ( $\text{SO}_4^{2-}$ ) and phosphate ( $\text{PO}_4^{3-}$ ) measurements were stored at  $-20\text{ }^\circ\text{C}$  until analysis and determined by ion chromatography with  $3.2\text{ mM Na}_2\text{CO}_3$  and  $1\text{ mM NaHCO}_3$  as mobile phase (Metrohm 861 Advanced Compact, Metrosep A Supp 5 150/4 column). Calcium was measured on  $0.2\text{-}\mu\text{m}$  filtered (WICOM) and  $\text{HNO}_3$ -acidified samples by inductively coupled plasma–optical emission spectroscopy (ICP-OES; Vista-MPX CCS simultaneous, Varian, Heppenheim, Germany).



**Fig. S2.** Concentration of (a) calcium, (b) nitrate ( $\text{NO}_3^-$ ) and (c) sulfate ( $\text{SO}_4^{2-}$ ) in the effluent from the non-sterilised (closed circles) and sterilised soil columns (open circles). Phosphate concentrations were below the detection limit ( $0.2\text{ mg L}^{-1}$ ). The grey shaded area refers to the 37-days flow interruption. Error bars are the standard error of three non-sterilised columns (often smaller than the symbol).



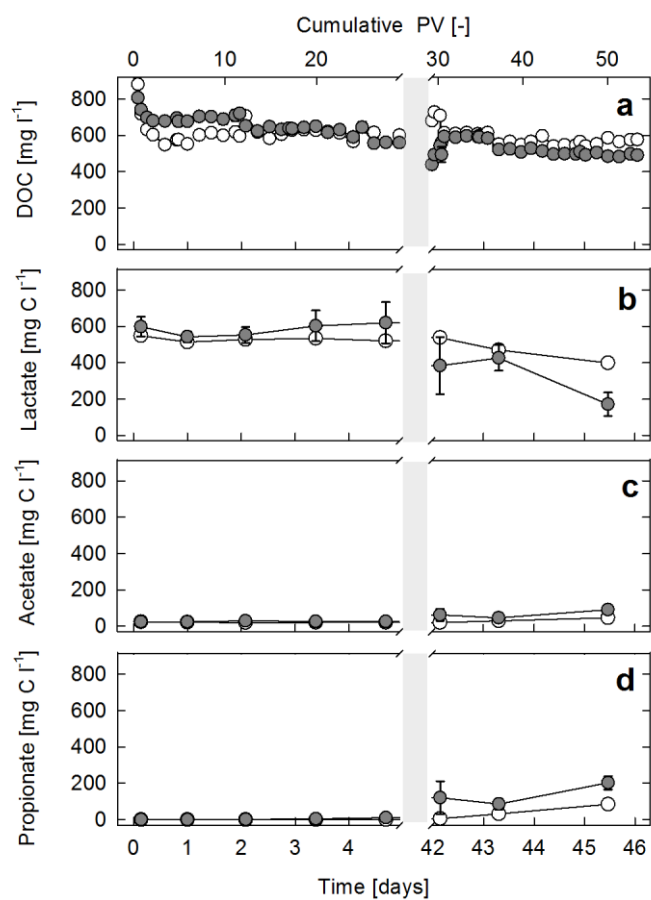
**Fig. S3.** Concentrations of (a) calcium, (b) nitrate ( $\text{NO}_3^-$ ) and (c) sulfate ( $\text{SO}_4^{2-}$ ) in the soil pore water during the flow interruption. Phosphate concentrations were below the detection limit ( $0.2 \text{ mg L}^{-1}$ ). Closed circles refer to non-sterilised and open circles to sterilised soil columns. Error bars are the standard error of three non-sterilised columns (often smaller than the symbol).

#### Dissolved organic carbon (DOC) and short chain organic acids in the effluent and in the soil solution during the flow interruption

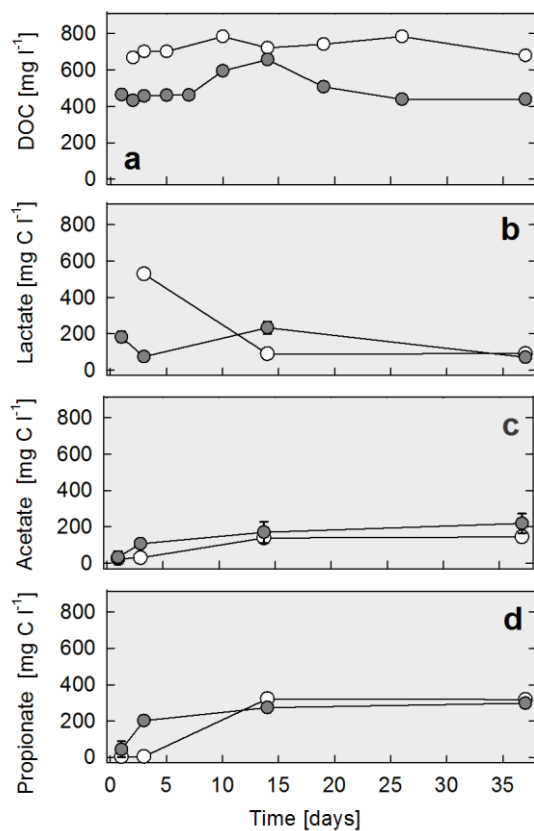
Acidified subsamples for lactate measurements were stored at  $-4 \text{ }^\circ\text{C}$  until analysis and determined by ion chromatography (Metrohm 861 Advanced Compact) with  $7.5 \text{ mM Na}_2\text{CO}_3$  and  $0.75 \text{ mM NaOH}$  as mobile phase (IonPac AS11 column, Dionex, Reinach, Switzerland).

Acetate and propionate were determined by gas chromatography–mass spectrometry (GC-MS) on a Hewlett–Packard system (model 5890 II, HP, Wilmington, USA) equipped with a  $30 \text{ m} \times 0.25\text{-mm}$  internal diameter capillary column (HP INNOWax;  $0.25\text{-}\mu\text{m}$  film thickness) and a flame ionisation detector. The samples were injected using an SSI injector in split mode (1:10) at  $200 \text{ }^\circ\text{C}$  with  $\text{N}_2$  as make-up gas. The oven temperature program was as follows:  $80 \text{ }^\circ\text{C}$  ( $0.5 \text{ min}$ ),  $80$  to  $150 \text{ }^\circ\text{C}$  ( $2.5 \text{ }^\circ\text{C min}^{-1}$ ),  $150$  to  $180 \text{ }^\circ\text{C}$  ( $30 \text{ }^\circ\text{C min}^{-1}$ ),  $180 \text{ }^\circ\text{C}$  ( $2 \text{ min}$ ). The carrier gas was  $\text{H}_2$  ( $1.4 \text{ mL min}^{-1}$ ).

DOC was determined in acidified samples ( $10 \text{ \% HNO}_3$ ) within 7 days after sampling using a TOC analyser (Shimadzu TOC-L, Reinach, Switzerland).



**Fig. S4.** Concentration of (a) ‘total’ dissolved organic carbon (DOC) and (b) lactate, (c) acetate and (d) propionate in the effluent from the non-sterilised (open circles) and sterilised soil columns. The grey shaded area refers to the 37-days flow interruption. Error bars are the standard error of three non-sterilised columns (often smaller than the symbol).



**Fig. S5.** Concentration of (a) 'total' dissolved organic carbon (DOC) and (b) lactate, (c) acetate, and (d) propionate in the soil pore water during the flow interruption. Closed circles refer to non-sterilised and open circles to sterilised soil columns. Error bars are the standard error of three non-sterilised columns (often smaller than the symbol).