Additional/Improved tables

Table 1. K_d-values for UR and SRB adsorption in topsoil, subsoil and sediment at pH 5.5, 6.5 and 7.5 with different clay and OC treatments. The OC treatment "high OC" represents the untreated samples and "low OC" the H_2O_2-treated samples. The clay treatments Clay0, Clay1 and Clay2 represent the sediment with 0 %, 1 % and 2 % clay additions, respectively.

pH (-)	Substrate	Treatment	K_d [a] ($L \cdot kg_{soil}^{-1}$) UR	conf.low	conf.high	K_d [a] ($L \cdot kg_{soil}^{-1}$) SRB	conf.low	conf.high	R^2 (-) UR	R^2 (-) SRB
5.5	Subsoil	high OC	28.2 ± 2.9 ***	20.1	36.2	19.3 ± 1.2 ***	16.1	22.6	0.96	0.99
5.5	Topsoil	high OC	73.2 ± 12.8 **	37.7	108.6	5.3 ± 0.3 ***	4.5	6.1	0.89	0.99
6.5	Subsoil	high OC	13.9 ± 2.3 **	7.5	20.3	13.2 ± 1.1 ***	10.3	16.2	0.90	0.98
6.5	Topsoil	high OC	46.7 ± 7.7 **	25.3	68.2	4.2 ± 0.3 ***	3.4	5.1	0.90	0.98
7.5	Subsoil	low OC	2.3 ± 0.5 **	1.0	3.6	16.4 ± 1.4 ***	12.4	20.3	0.86	0.97
7.5	Subsoil	high OC	2.3 ± 0.2 **	1.6	2.9	9.3 ± 0.3 ***	8.3	10.2	0.96	0.99
7.5	Topsoil	low OC	0.6 ± 0.3 *	-0.3	1.4	8.4 ± 0.6 ***	6.8	10.0	0.46	0.98
7.5	Topsoil	high OC	3.3 ± 0.4 ***	2.2	4.4	2.8 ± 0.3 **	1.9	3.7	0.95	0.95
7.5	Sediment	Clay0	0.2 ± 0.2 *	-0.2	0.7	1.3 ± 0.3 *	0.4	2.2	0.34	0.80
7.5	Se + 1 % Clay [b]	Clay1	0.6 ± 0.2 *	0.1	1.1	4.5 ± 0.3 ***	3.6	5.3	0.74	0.98
7.5	Se + 2 % Clay [b]	Clay2	4.8 ± 0.4 ***	3.7	5.9	15.3 ± 1.0 ***	12.5	18.2	0.97	0.98

[a] Determined by linear regression
[b] Addition of 1 % or 2 % of the clay mineral montmorillonite.
significance levels: (***) p < 0.001; (**) p < 0.01; (*) p < 0.05

Table 2. Texture, pH-values, OC-, and metal oxide-contents (mean of three measurements), DOC concentrations (median of two measurements) and specific surface area (median of two measurements) of top- and subsoil and the sediment in dependence of the respective treatment (high or low OC). The treatment "high OC" are the untreated samples and "low OC" the H_2O_2-treated samples. Me_o is the summed content of all oxalate extractable metal oxides ($Fe_o + Al_o + Mn_o$) and Me_d is the summed content of all dithionite extractable metal oxides ($Fe_d + Al_d + Mn_d$).

Substrate	Treatment	OC (%)	Sand : Silt : Clay (%)	pH[g] (-)	Me_o [d] ($mmol \cdot kg^{-1}$)	Me_d [d] ($mmol \cdot kg^{-1}$)	Me_o / Me_d -	DOC [e] ($mg \cdot L^{-1}$)	SSA [e] ($m^2 \cdot g^{-1}$)
Topsoil	low OC	0.7	25.4 : 50.6 : 24.0	4.8 / 4.8	137 ± 4.0	206 ± 4.1	0.67	45 ± 0.3	12 ± 0.02
Topsoil	high OC	2.7						29 ± 0.03	10 ± 0.12
Subsoil	low OC	0.1	26.3 : 51.3 : 22.4	4.3 / 4.3	92 ± 2.6	243 ± 12	0.38	42 ± 0.9	24 ± 0.03
Subsoil	high OC	0.6						10 ± 1.4	24 ± 0.31
Clay (pure)[a]	-	-	0 : 0 : 100	-	-	-	-	-	249 ± 0.28 [f]
Sediment	Clay0	0.8	97.6 : 2.3 : 0.1	9.1 / 8.1	2 ± 0.04	18 ± 2.4	0.10	4 ± 0.1	1.1 ± 0.04
Se+Clay[b]	Clay1	-	96.6 : 2.3 : 1.1 [c]	-	-	-	-	-	3.6 [c]
Se+Clay[b]	Clay2	-	95.6 : 2.3 : 2.1 [c]	-	-	-	-	-	6.1 [c]

[a] Montmorillonite.
[b] Addition of 1 % or 2 % of the clay mineral montmorillonite.
[c] Values are calculated from Clay content and SSA for sediment and the pure clay mineral.
[d] Mean and standard deviation of three measurements.
[e] Range of two measurements.
[f] Standard deviation of four measurements.
[g] pH in H_2O / pH in 0.01 M $CaCl_2$-solution.
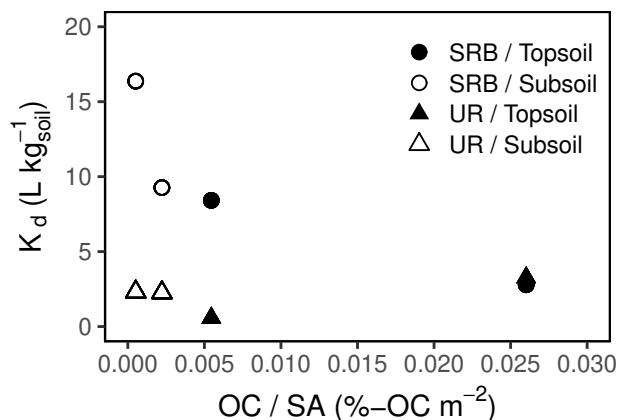
Additional/Improved figures

Figure 1. K_d-values as function of OC related to the surface area SA (%-OC / m^{-2}) for UR (triangles) and SRB (circles) in topsoil (filled symbols) and subsoil (open symbols). For each tracer and type of substrate (top- or subsoil) the K_d-value at lower OC-value result from the H_2O_2-treatment and the K_d at higher OC from the untreated samples. Each K_d-value was derived as the slope from linear regression of the sorption isotherms (six concentrations times three replications).
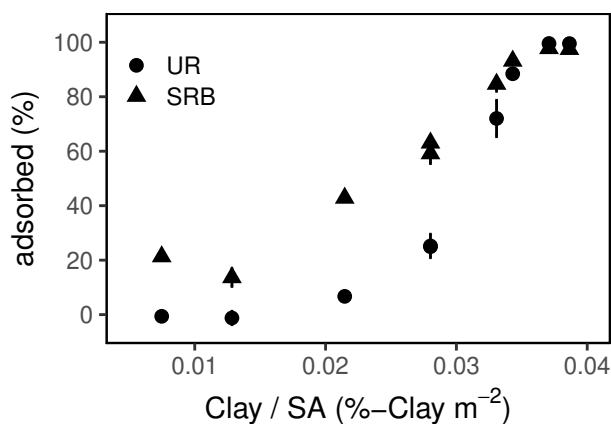
Figure 2. Adsorbed percentage as a function of the clay content related to the surface area SA (%-Clay / m^{-2}) for UR (triangles) and SRB (circles) in the sediment. The data points at 0.14, 1 and 2 % clay- addition contain 18 single measurements consisting of the six tracer concentrations and each in triplicate preparation. The errorbars represent the standard deviation. The other data-points (without errorbars) are single measurements of tracer adsorption at 0.1, 0.5, 2.5, 5.0 and 10.0 % clay- addition.
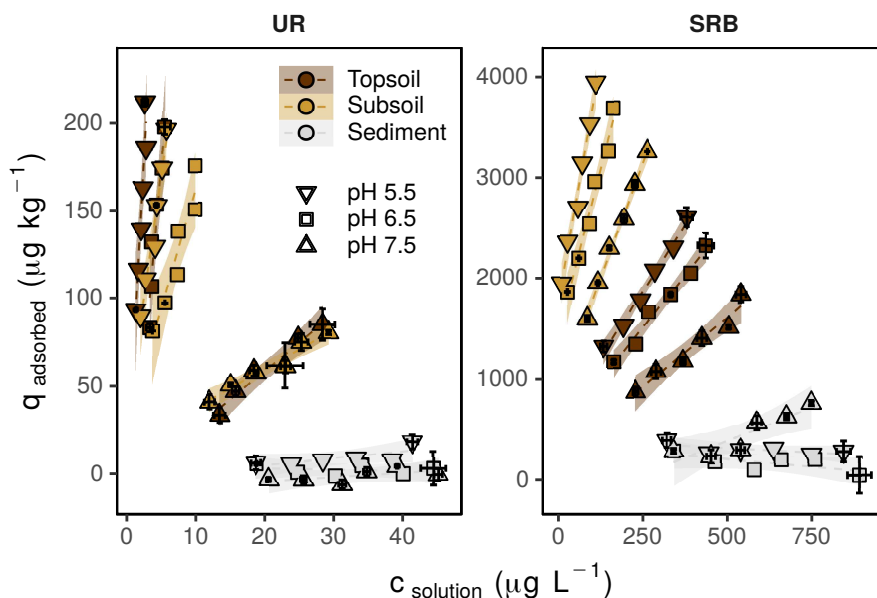
Figure 3. Sorption-isotherms for UR and SRB determined at pH 5.5 (down-pointing triangle), 6.5 (square) and 7.5 (up-pointing triangle) in topsoil (brown), subsoil (yellow) and sediment (grey). At pH 5.5 and 6.5 the highest and the lowest concentration of the sorption isotherms was prepared in triplicate, the other concentrations were only prepared once. At pH 7.5 all concentrations were prepared in triplicate. The errorbars in x- and y-direction represent the standard deviation of the tracer concentration measured in solution ($c_{solution}$) and the calculated content of adsorbed tracer ($q_{adsorbed}$) of three replicates each. The transparent areas around the regression lines represent the 95%-confidence intervals.
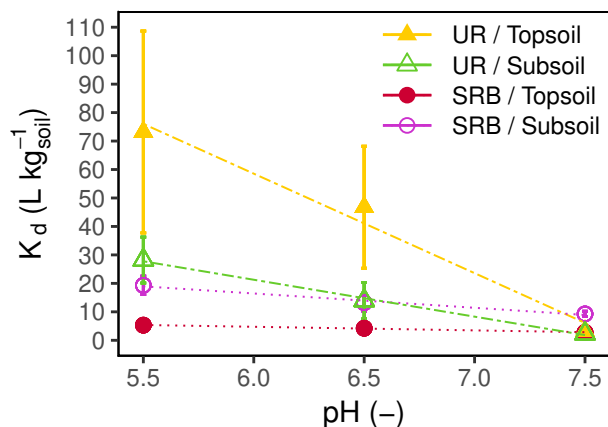

Figure 4. K_d-values as function of pH for UR (triangles, dash-dotted lines) and SRB (circles, dotted lines) in topsoil (filled symbols) and subsoil (open symbols). Each K_d-value was derived as the slope from linear regression of the sorption isotherms (six concentrations times three replications). The error bars represent the 95%-confidence intervals of K_d-values.
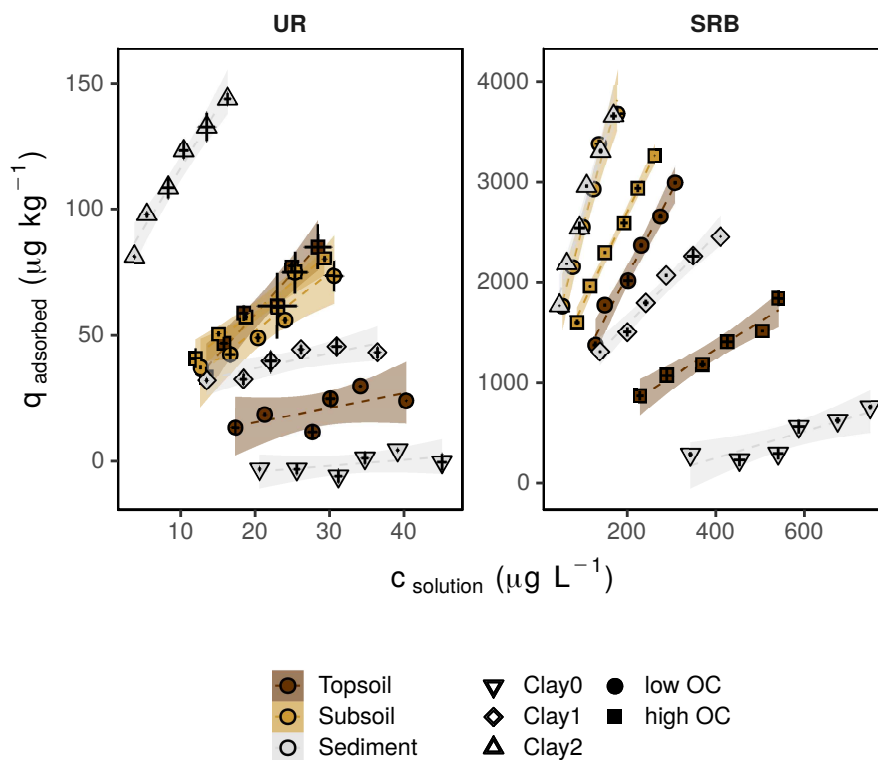
Figure 5. Sorption-isotherms for UR and SRB in topsoil (brown), subsoil (yellow) and sediment (grey) at different OC (filled symbols) and clay (open symbols) conditions. The high OC treatments (square) represent the untreated samples, low OC (circle) the H_2O_2-treated samples. Clay0 (down-pointed triangle) represents the sediment without clay addition, Clay1 (diamond) and Clay2 (up-pointed triangle) are sediment plus 1 % and 2 % clay addition. All samples were prepared in triplicate. The errorbars in x- and y-direction represent the standard deviation of the tracer concentration measured in solution ($c_{solution}$) and the calculated content of adsorbed tracer ($q_{adsorbed}$) of three replicates each. The transparent areas around the regression lines represent the 95%-confidence intervals.
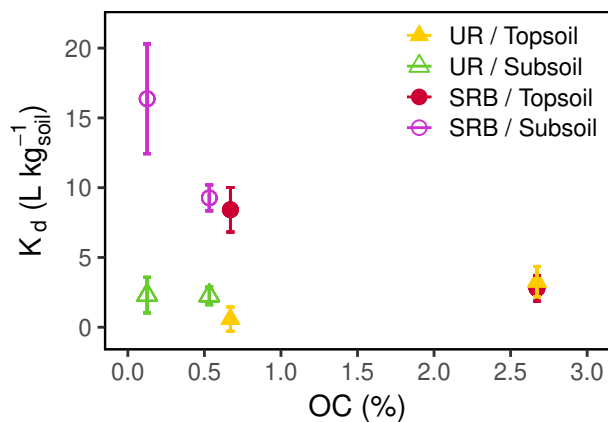
Figure 6. K_d-values as function of OC (%) for UR (triangles) and SRB (circles) in topsoil (filled symbols) and subsoil (open symbols). For each tracer and type of substrate (top- or subsoil) the K_d-value at lower OC-value result from the H_2O_2-treatment and the K_d at higher OC from the untreated samples. Each K_d-value was derived as the slope from linear regression of the sorption isotherms (six concentrations times three replications). The error bars represent the 95%-confidence intervals of K_d-values.
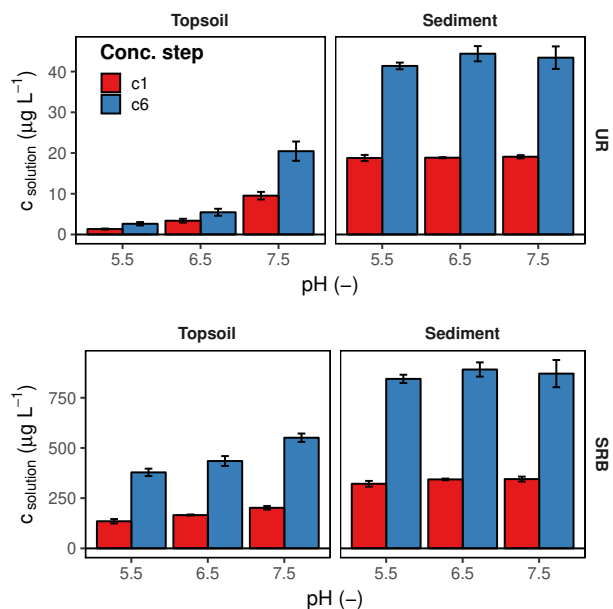

Figure 7. Measured concentrations in solution after separation of solid and liquid phase in dependence of pH for the concentration steps 1 and 6 (20 and 50 $\mu g/L$ for UR and 400 and 1000 $\mu g/L$ for SRB) for topsoil and sediment and the tracers UR and SRB. The error bars represent the standard deviation of three repeated measurements.