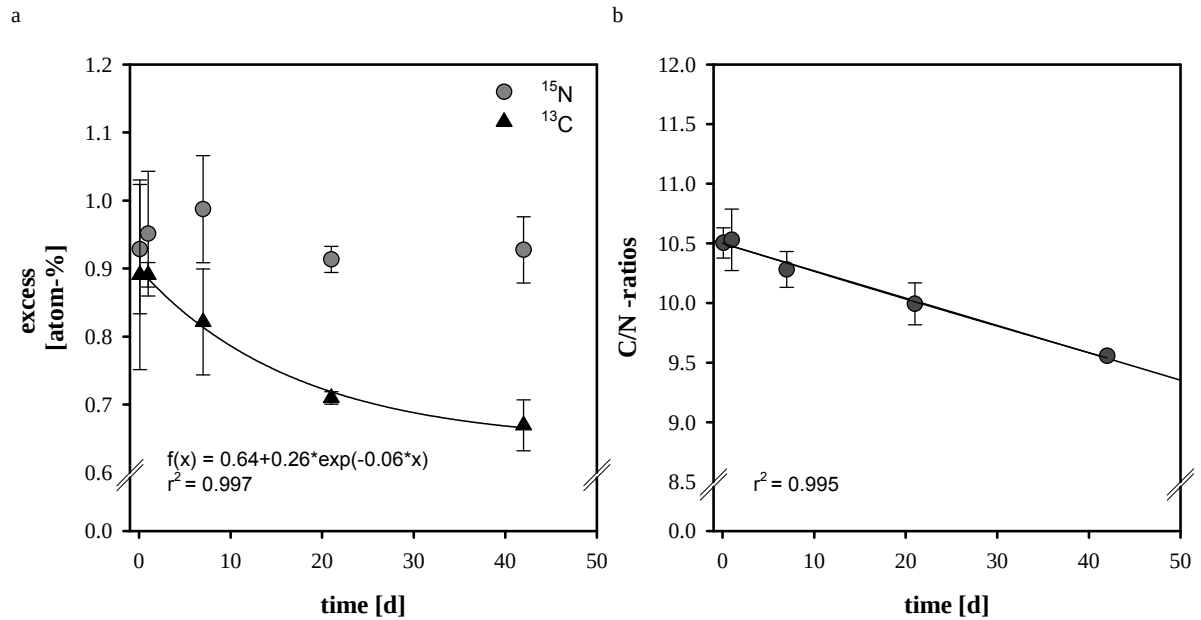
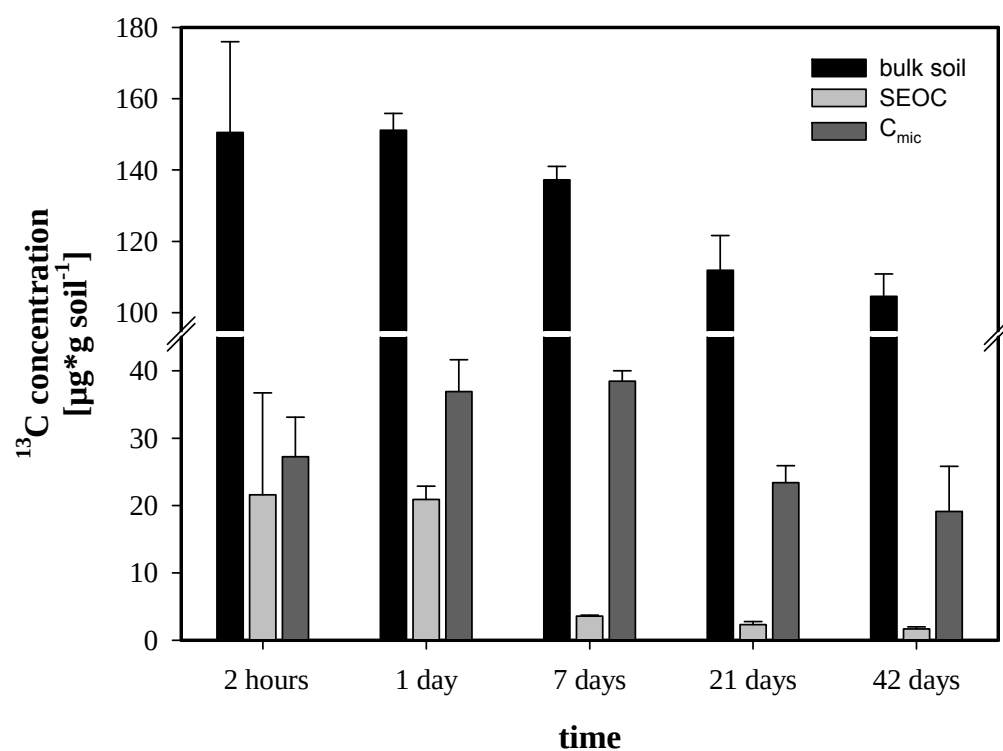


Supplementary Information:

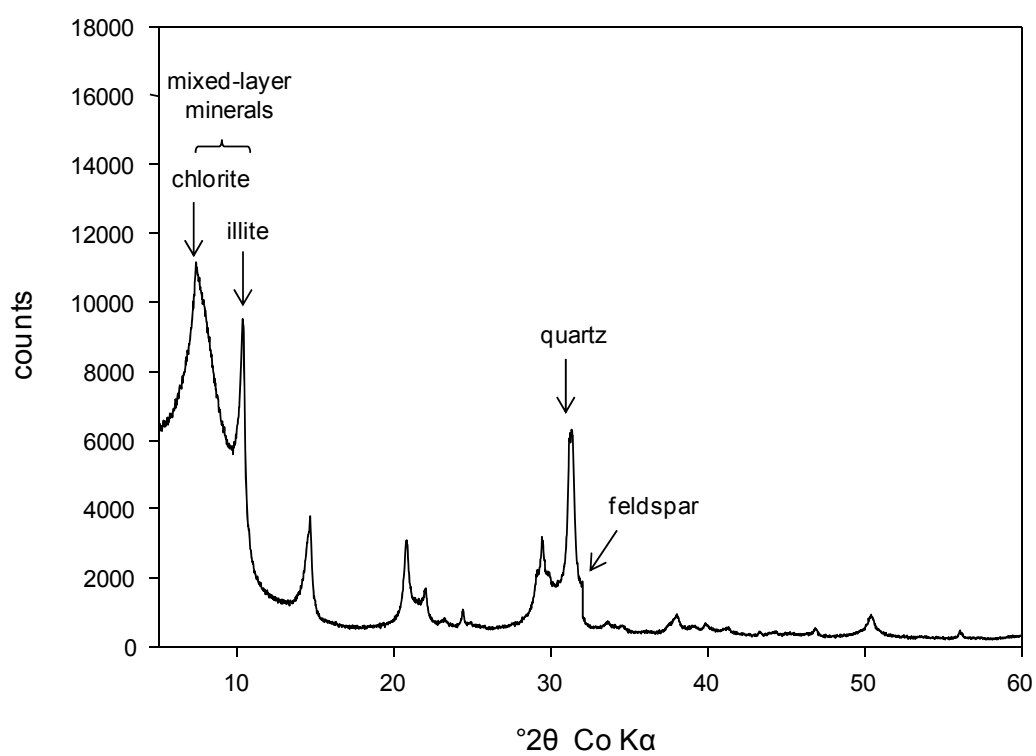
1. Supplementary Figures



Supplementary Figure S1: Quantitative ^{15}N and ^{13}C enrichment as well as the C/N ratio of the bulk soil. a, Dependence of ^{13}C and ^{15}N excess (atom-%) in the bulk soil on incubation time. **b,** Dependence of C/N ratio (means, error bars indicate SDs, $n = 3$) on incubation time.



Supplementary Figure S2: ^{13}C concentration in the bulk soil, salt extractable organic carbon (SEOC) and microbial biomass (C_{mic}). Concentrations of ^{13}C excess in the bulk soil, C_{mic} and SEOC (means, error bars indicate SDs, $n = 3$) at different time points during incubation.



Supplementary Figure S3: Mineral composition of the clay-sized fraction. X-Ray diffraction pattern of an untreated clay-sized fraction, main constituents are marked by arrow with characterisation.

2. Supplementary Tables

Supplementary Table S1: OC, N, ^{13}C and ^{15}N concentrations and C/N ratios of bulk soil samples at the different time points (means, error bars indicate SDs, $n = 3$)

Time point	OC mg g ⁻¹			N mg g ⁻¹			C/N			¹³ C excess atom-%			¹³ C μg g ⁻¹			¹⁵ N excess atom-%			¹⁵ N μg g ⁻¹		
2 h	16.9	±0.2	a	1.6	±0.0	a	10.5	±0.1	a	0.89	±0.1	a	150.5	±25.4	a	0.93	±0.1	a	14.9	±1.5	a
1 d	17.0	±0.2	a	1.6	±0.0	a	10.5	±0.3	a	0.89	±0.0	a	151.2	±4.7	a	0.95	±0.1	a	15.3	±1.6	a
7 d	16.8	±1.2	ab	1.6	±0.1	a	10.3	±0.2	ab	0.82	±0.1	a	137.3	±3.8	ab	0.99	±0.1	a	16.1	±0.3	a
21 d	15.8	±1.2	ab	1.6	±0.1	a	10.0	±0.2	b	0.71	±0.0	b	111.9	±9.7	c	0.91	±0.0	a	14.4	±0.8	ab
42 d	15.6	±0.1	b	1.6	±0.0	a	9.6	±0.0	c	0.67	±0.0	c	104.6	±6.3	c	0.93	±0.0	a	15.2	±0.9	a

Significant differences between time points are indicated by lowercase letters (U test; $p \leq 0.05$).

Supplementary Table S2: SEOC, SEOC-¹³C, C_{mic} and ¹³C_{mic} concentrations of bulk soil samples at the different time points (means, error bars indicate SDs, n = 3), along with the concentrations of the control sample (without litter, n = 5)

Time point	SEOC μg g ⁻¹ soil			SEOC- ¹³ C excess atom-%			SEOC- ¹³ C μg g ⁻¹ soil			C _{mic} μg g ⁻¹ soil			¹³ C _{mic} excess atom-%			¹³ C _{mic} μg g ⁻¹ soil		
Control	12.1	±5.2								278.6	±29.4							
2 h	411.7	±235.3	a	4.67	±1.5	a	21.6	±15.1	a	636.2	±152.2	a	4.30	±0.1	a	27.2	±5.9	a
1 d	420.8	±32.6	a	4.96	±0.1	a	20.9	±2.0	a	724.4	±103.8	a	5.11	±0.2	b	36.9	±4.7	ab
7 d	126.6	±4.6	b	2.83	±0.1	b	3.6	±0.1	b	937.9	±33.8	b	4.10	±0.1	a	38.5	±1.5	bc
21 d	89.3	±12.8	c	2.60	±0.1	c	2.3	±0.4	c	679.9	±67.0	ac	3.44	±0.1	c	23.4	±2.5	ad
42 d	82.3	±9.8	c	2.02	±0.1	d	1.7	±0.3	c	546.7	±136.1	ac	3.45	±0.3	c	19.1	±6.7	ad

Significant differences between time points are indicated by lowercase letters (*U* test; *p* ≤ 0.05).

Supplementary Table S3: OC, N, ^{13}C , and ^{15}N concentrations and C/N and $^{13}\text{C}/^{15}\text{N}$ ratios of the soil fractions at the different time points (means, error bars indicate SDs, n = 3)

Fraction	Time point	OC mg g ⁻¹			N mg g ⁻¹			C/N			¹³ C excess atom-%			¹³ C μg g ⁻¹ soil			¹⁵ N excess atom-%			¹⁵ N μg g ⁻¹ soil		
fPOM	2 h	145.6	±44.6	a	7.3	±2.0	a	19.9	±0.9	a	1.62	±0.9	a	11.5	±7.3	a	2.59	±0.9	a	0.9	±0.5	a
	1 d	146.9	±19.3	a	7.9	±0.8	a	18.6	±0.6	b	2.28	±0.5	a	21.3	±2.7	b	2.53	±0.4	a	1.3	±0.3	a
	7 d	100.7	±64.5	a	5.7	±2.9	a	16.5	±3.9	ab	1.67	±0.9	a	19.9	±16.8	ab	2.82	±1.1	a	1.8	±1.1	a
	21 d	46.3	±15.9	ab	3.0	±0.3	ab	15.2	±3.7	ab	1.57	±0.6	a	12.5	±6.3	a	2.07	±0.2	a	1.6	±1.2	a
	42 d	21.1	±2.6	c	2.0	±0.2	c	10.8	±0.7	c	1.19	±0.7	a	9.9	±6.2	a	1.47	±0.0	b	1.1	±0.1	a
Coarse silt	2 h	9.3	±0.3	a	0.5	±0.0	a	18.7	±1.5	a	0.51	±0.0	a	5.6	±0.1	a	1.69	±0.1	a	1.0	±0.1	a
	1 d	11.2	±2.0	b	0.7	±0.1	b	17.1	±0.5	b	0.51	±0.0	a	6.7	±1.4	ab	1.73	±0.1	a	1.3	±0.3	b
	7 d	8.2	±1.7	a	0.4	±0.1	a	18.9	±0.3	a	0.38	±0.0	b	3.5	±0.7	c	1.16	±0.3	b	0.6	±0.2	c
	21 d	9.1	±1.5	ab	0.5	±0.1	a	18.5	±1.4	a	0.34	±0.0	b	3.7	±1.6	ac	1.02	±0.4	b	0.6	±0.3	cd
	42 d	8.3	±0.8	a	0.5	±0.1	ab	16.4	±0.1	c	0.27	±0.0	c	2.2	±0.6	c	0.68	±0.0	bc	0.3	±0.1	d
Medium and fine silt	2 h	21.8	±1.8	a	2.2	±0.2	a	9.9	±0.3	a	0.87	±0.0	a	25.4	±1.8	a	0.61	±0.0	a	1.8	±0.2	a
	1 d	21.0	±2.0	a	2.2	±0.2	ab	9.7	±0.1	ab	0.85	±0.0	a	24.5	±3.3	ab	0.64	±0.0	a	1.9	±0.4	ab
	7 d	19.6	±0.8	ab	1.9	±0.1	b	10.1	±0.1	ac	0.75	±0.0	b	21.7	±0.3	b	0.65	±0.0	a	1.9	±0.0	a
	21 d	21.0	±4.0	a	2.1	±0.4	ab	10.0	±0.3	a	0.72	±0.1	ab	19.9	±1.0	c	0.65	±0.0	a	1.8	±0.4	ab
	42 d	20.8	±0.7	ac	2.1	±0.0	a	9.9	±0.0	a	0.66	±0.0	c	21.3	±1.8	bc	0.75	±0.0	b	2.5	±0.4	b
Clay	2 h	61.7	±0.7	a	7.2	±0.1	a	8.5	±0.0	a	0.56	±0.0	a	44.5	±2.1	a	0.62	±0.0	a	5.7	±0.6	a
	1 d	59.0	±0.6	b	7.1	±0.0	b	8.4	±0.0	b	0.50	±0.0	b	41.0	±2.3	a	0.50	±0.0	b	4.9	±0.4	b
	7 d	61.9	±3.9	abc	7.4	±0.3	ac	8.4	±0.2	ab	0.50	±0.0	b	40.3	±5.9	ab	0.57	±0.0	a	5.5	±0.4	ab
	21 d	61.2	±1.5	ac	7.4	±0.3	ac	8.2	±0.1	c	0.53	±0.0	ab	41.6	±7.9	ab	0.64	±0.0	a	6.1	±0.9	ab
	42 d	60.0	±0.5	c	7.4	±0.1	c	8.1	±0.1	c	0.46	±0.0	bc	35.8	±1.7	b	0.65	±0.0	c	6.3	±0.2	a

Significant differences between time points are indicated by lowercase letters (*U* test; $p \leq 0.05$).

Supplementary Table S4: Specific surface area (SSA) of the clay-sized fraction before and after OM removal by a 10% H₂O₂ solution, along with calculated OM loading and coverage (means, error bars indicate SDs, n = 2)

Time point	SSA before OM removal m ² g ⁻¹	SSA after OM removal m ² g ⁻¹	OC loading mg m ⁻²	OC coverage %
2 h	14.3 ±2.1	56.3 ±5.6	1.1 ±0.1	74.7 ±1.3
1 d	10.3 ±0.4	57.2 ±0.4	1.0 ±0.0	81.9 ±0.9
7 d	11.9 ±1.4	53.9 ±7.9	1.2 ±0.3	77.9 ±0.8
21 d	15.1 ±1.7	56.6 ±4.9	1.1 ±0.1	73.3 ±2.6
42 d	11.4 ±0.7	56.7 ±1.0	1.1 ±0.0	79.9 ±0.9

Supplementary Table S5: Mass distribution of specific fractions after textural analysis and density fractionation as well as the OC and N content in the fractions relating to the bulk soil

		f POM	o POM	2000-63 μm	63-20 μm	20-2 μm	< 2 μm
texture	mass-%	-	-	63.0 $\pm$ 2.6	7.1 $\pm$ 0.7	11.3 $\pm$ 0.6	18.5 $\pm$ 0.2
density fractionation	mass-%	1.7 $\pm$ 1.4	0.3 $\pm$ 0.0	59.8 $\pm$ 1.5	11.3 $\pm$ 0.9	14.2 $\pm$ 1.0	12.7 $\pm$ 1.0
OC content	mg OC / g soil	1.0 $\pm$ 0.2	n.d.	1.3 $\pm$ 0.0	1.3 $\pm$ 0.2	3.4 $\pm$ 0.2	9.3 $\pm$ 0.5
N content	mg N /g soil	0.1 $\pm$ 0.0	n.d.	0.0 $\pm$ 0.0	0.1 $\pm$ 0.0	0.3 $\pm$ 0.0	1.1 $\pm$ 0.0

n.d. – not detected