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Characterization of the natural colloidal TiO_2 background in soil

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1. X-ray fluorescence analysis (XRFA)

Table S1. Concentration in mass percent of the main soil components determined using XRFA.

Soil	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	SO_3
S1	94.39	<LOQ	<LOQ	0.07	<LOQ	0.07	<LOQ	<LOQ	<LOQ	0.02	<LOQ
S2	46.57	9.57	3.72	0.50	0.09	2.62	14.41	0.50	2.04	0.23	0.13
S3	89.06	3.38	0.64	0.15	0.02	0.17	<LOQ	0.24	1.75	0.10	<LOQ
S4	85.09	5.61	1.34	0.39	0.05	0.30	<LOQ	0.39	2.44	0.16	<LOQ
S5	61.26	11.79	4.57	0.60	0.11	2.94	1.50	0.37	3.83	0.24	<LOQ
S6	61.14	11.25	3.24	0.57	0.08	1.09	0.86	0.38	2.80	0.27	0.22
S7*	55.75	6.26	2.52	0.24	0.42	0.76	3.99	0.76	1.92	0.19	1.28
S8	93.10	2.34	1.18	0.37	0.01	0.17	<LOQ	<LOQ	0.43	0.05	<LOQ

*S7 was measured as press tablet (see material and methods for details).

LOQ: limit of quantification

Table S2. Concentration in ppm of selected minor soil components determined using XRFA in $\mu g\ g^{-1}$.

Soil	Ba	Ce	Cr	Ni	Pb	Rb	Sr	V	Zn	Zr
S1	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	15.7	<LOQ	<LOQ	57.3
S2	292.5	53.4	77.1	33.6	40.6	91.9	255.1	66.7	145.3	160.6
S3	277.0	40.3	20.5	<LOQ	27.4	56.7	56.4	12.8	10.5	123.9
S4	401.4	48.2	32.1	<LOQ	26.6	96.5	76.4	28.3	41.3	275.6
S5	477.4	60.8	79.4	29.3	30.7	131.9	116.5	87.5	103.8	210.1
S6	577.8	78.9	69.7	20.1	55.9	122.6	135.2	82.4	115.0	206.7
S7*	654.0	36.3	43.7	17.5	47.0	154.0	97.0	42.0	98.0	101.0
S8	76.9	50.7	<LOQ	<LOQ	<LOQ	10.3	33.4	22.2	<LOQ	614.0

*S7 was measured as press tablet (see material and methods for details).

LOQ: limit of quantification

2. ICP-OES analyses

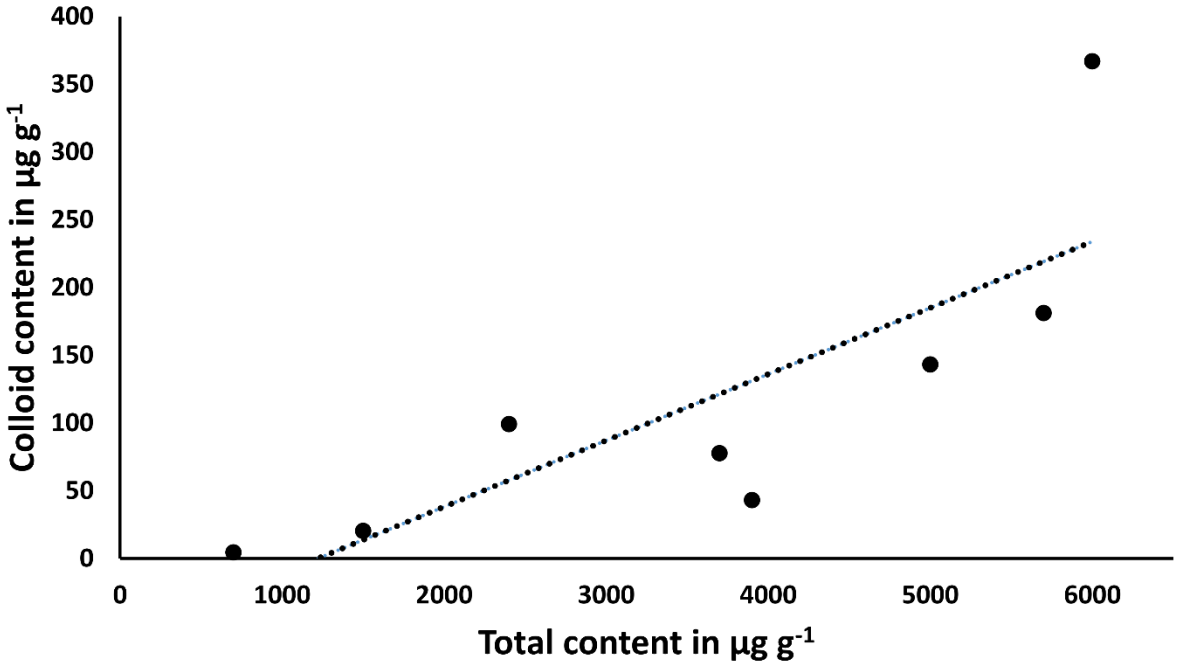

Figure S1. TiO_2 concentrations in µg g^{-1} in the colloidal extracts determined using ICP-OES over the total TiO_2 concentration in µg g^{-1} of the respective soils determined using XRFA. The dashed line represents the least square linear regression model (R^2 = 0.656).

3. Scanning electron microscopy (SEM)

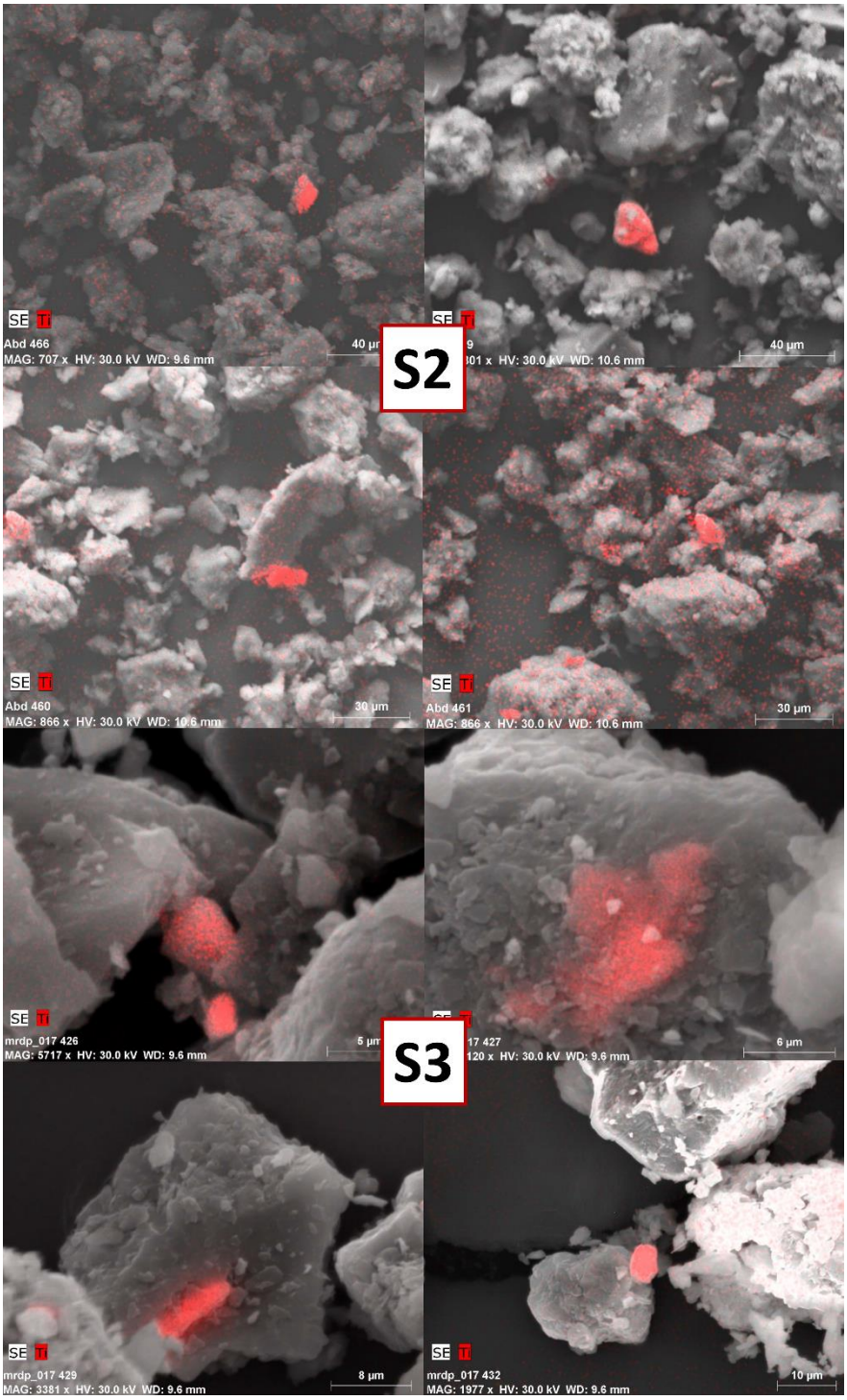

Figure S2. Image obtained using SEM of soil born natural particles in the untreated soils S2 and S3. The red dots mark the places where Ti was detected using EDX.

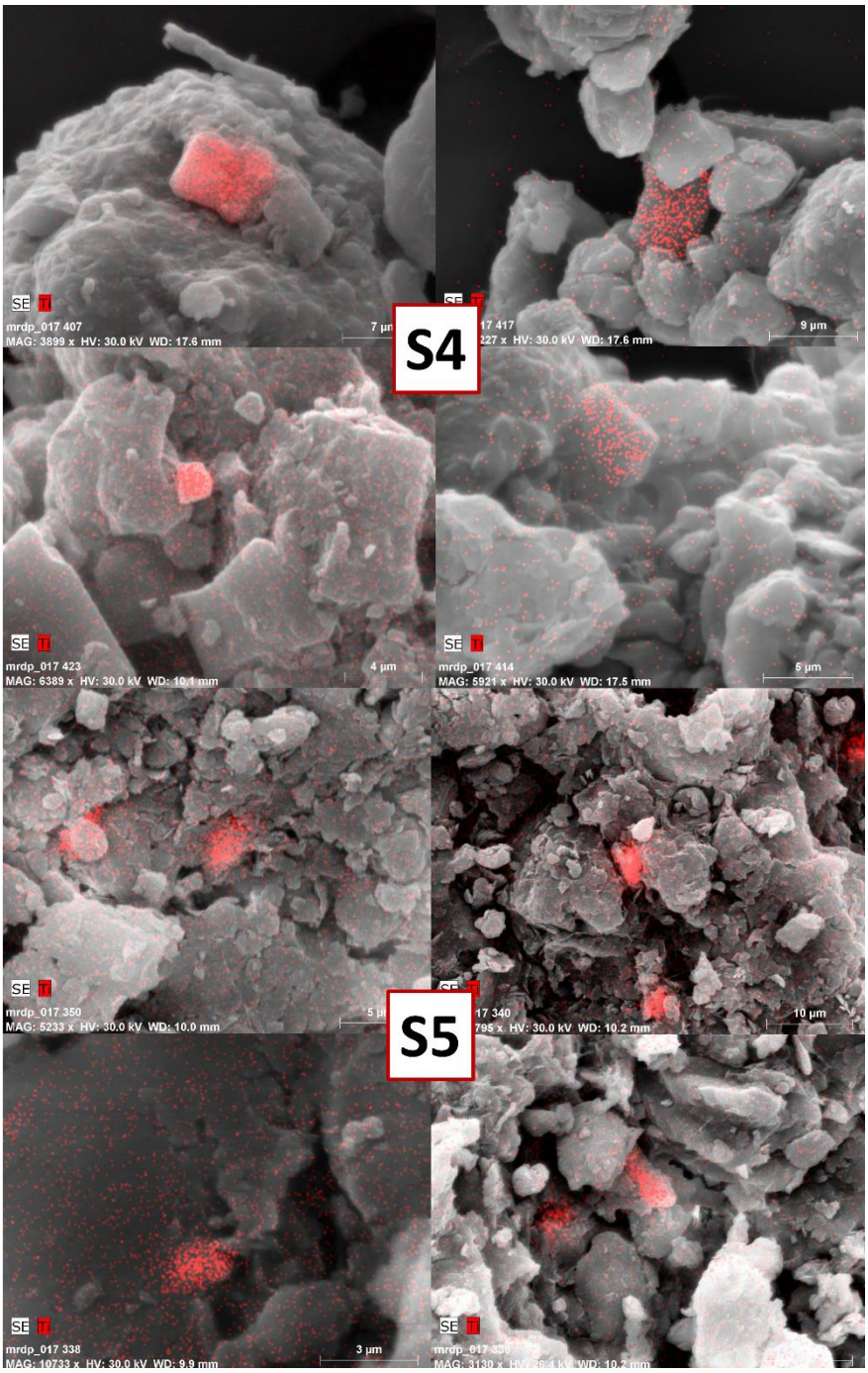

Figure S3. Image obtained using SEM of soil born natural particles in the untreated soils S4 and S5. The red dots mark the places where Ti was detected using EDX.

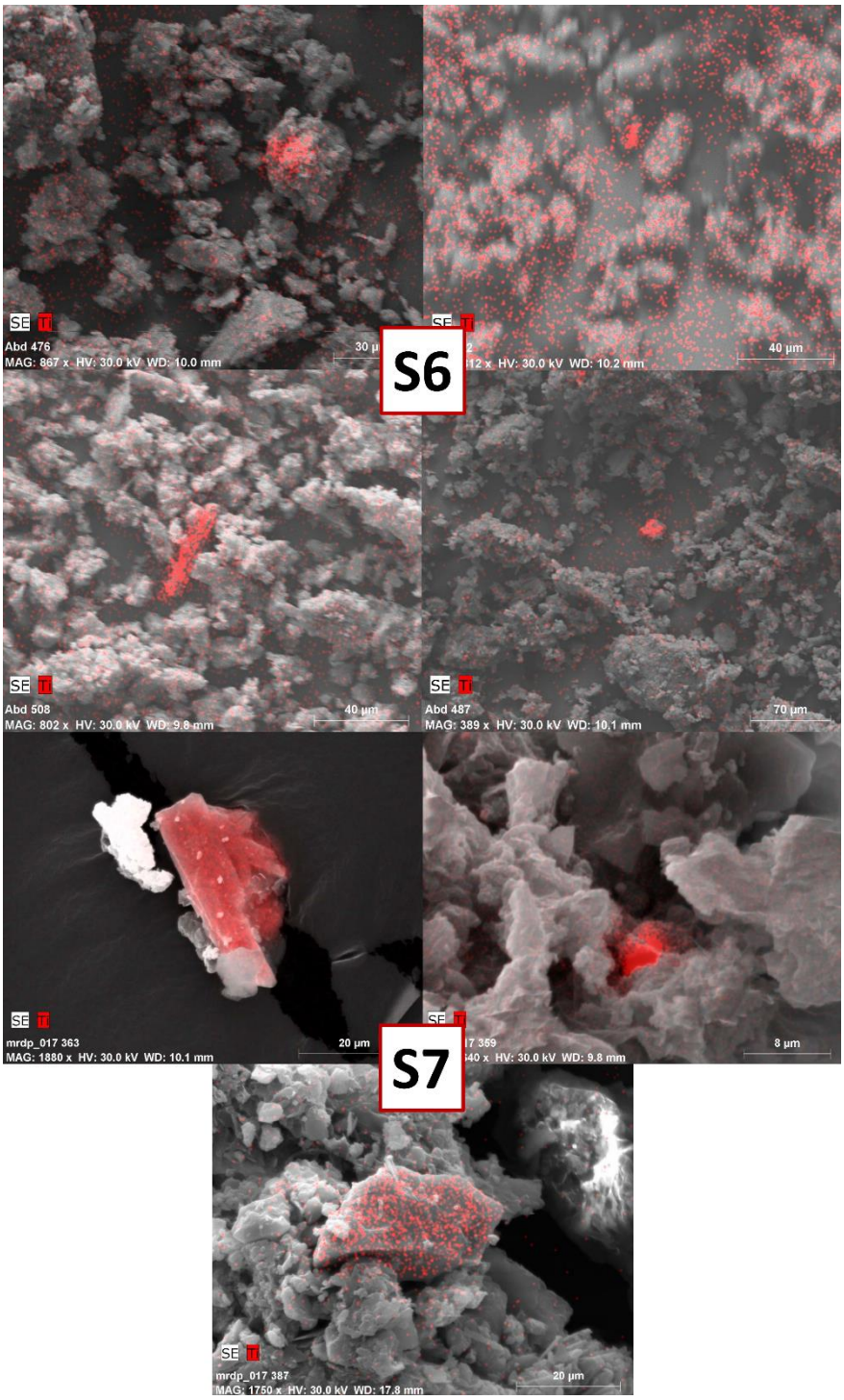

Figure S4. Image obtained using SEM of soil born natural particles in the untreated soils S6 and S7. The red dots mark the places where Ti was detected using EDX.

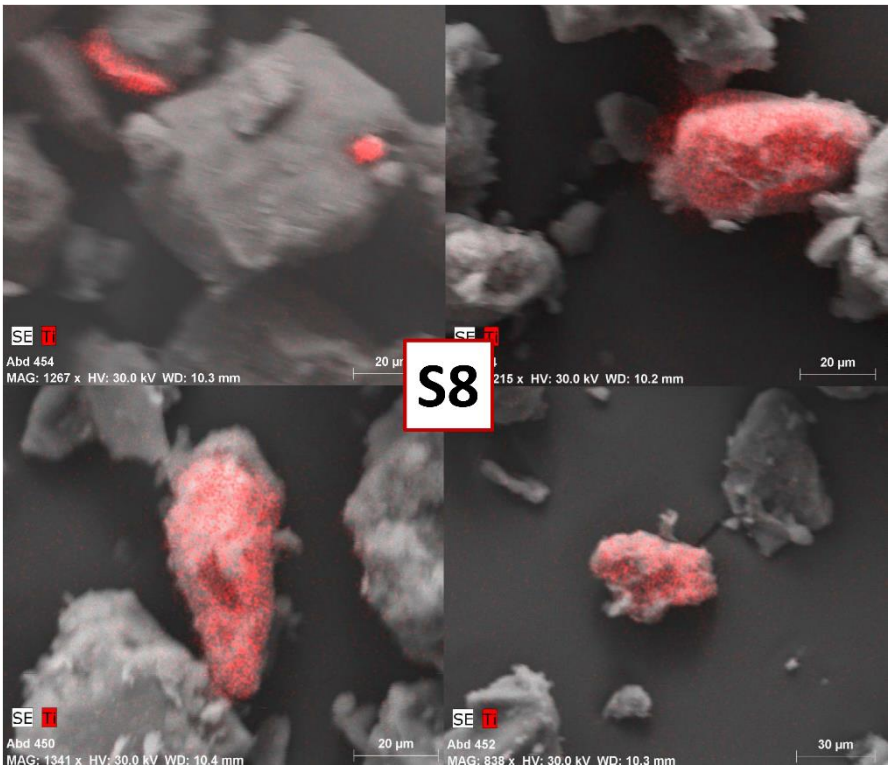

Figure S5. Image obtained using SEM of soil born natural particles in the untreated soils S8. The red dots mark the places where Ti was detected using EDX.

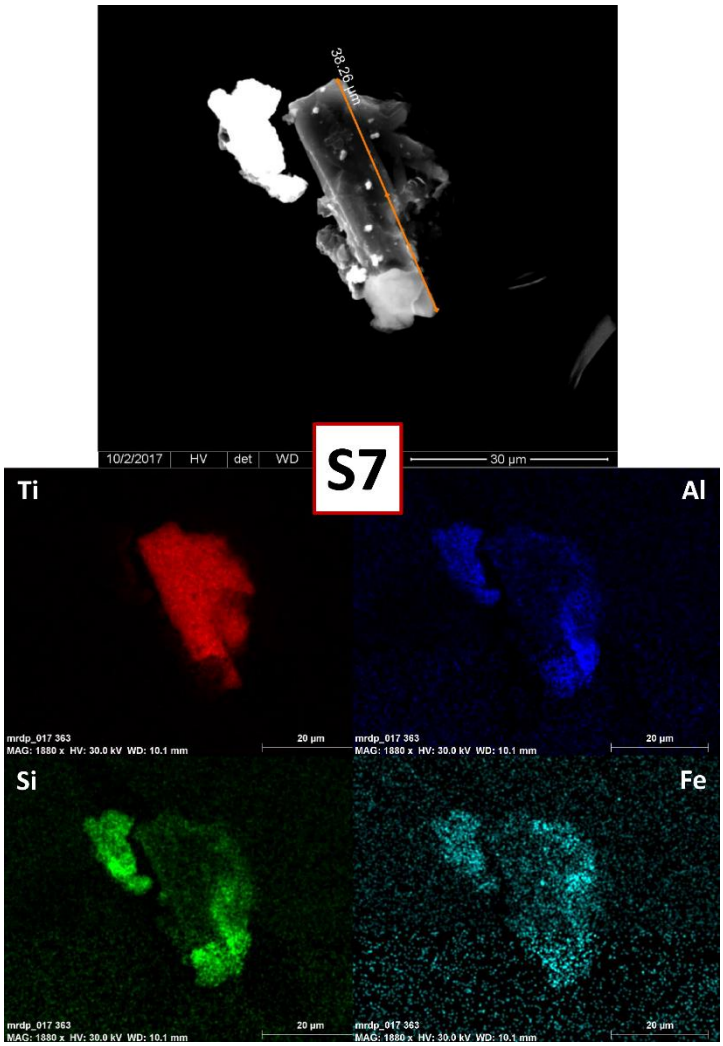

Figure S6. Image obtained using SEM of soil born natural particles in the untreated soils S7 and the corresponding EDX maps. Ti: red; Fe: cyan; Si: green; Al: blue.

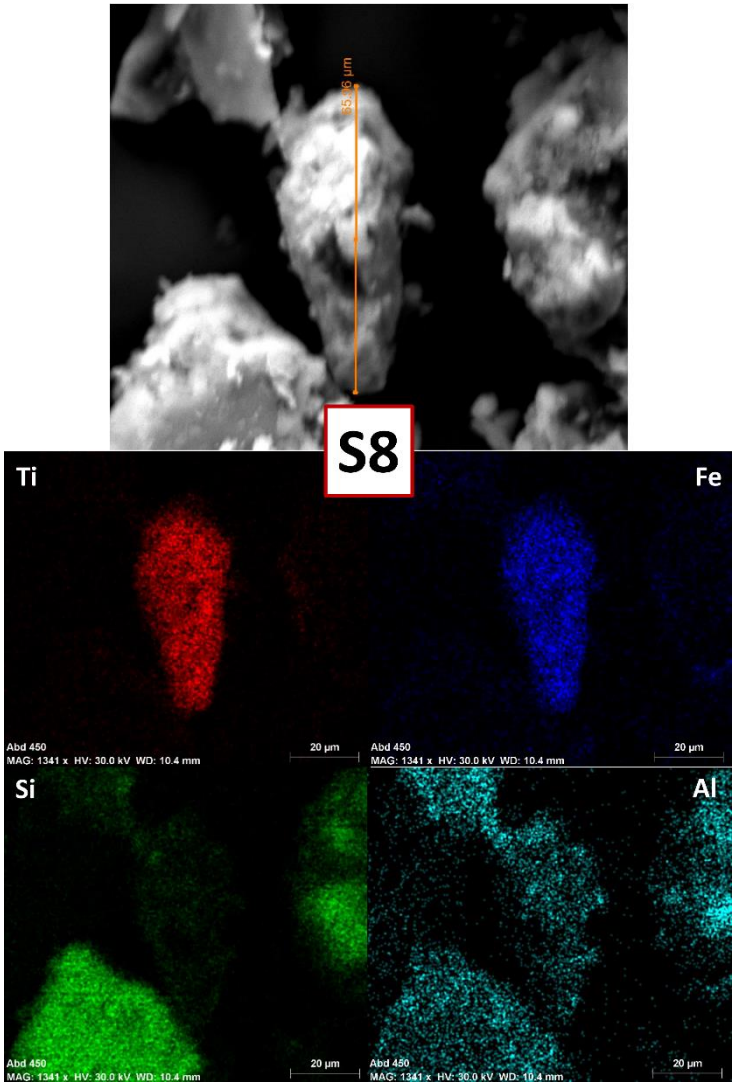

Figure S7. Image obtained using SEM of soil born natural particles in the untreated soils S8 and the corresponding EDX maps. Ti: red; Fe: blue; Si: green; Al: cyan.

4. High resolution transmission electron microscopy (HR-TEM)

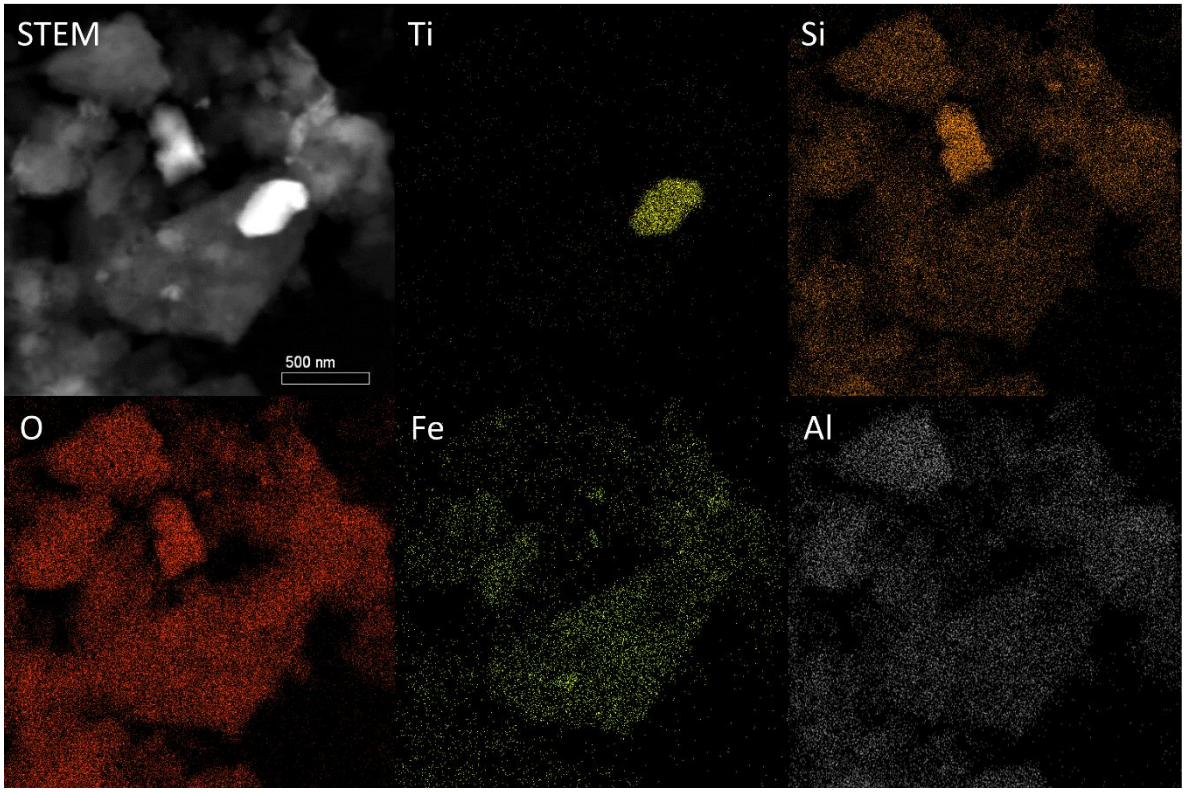

Figure S8. Image obtained using HR-TEM in HAADF scanning mode of soil born natural particles, which were extracted from the soil S2, and the corresponding EDX-maps. Ti: yellow; Si: orange; O: red; Fe: green; Al: grey.

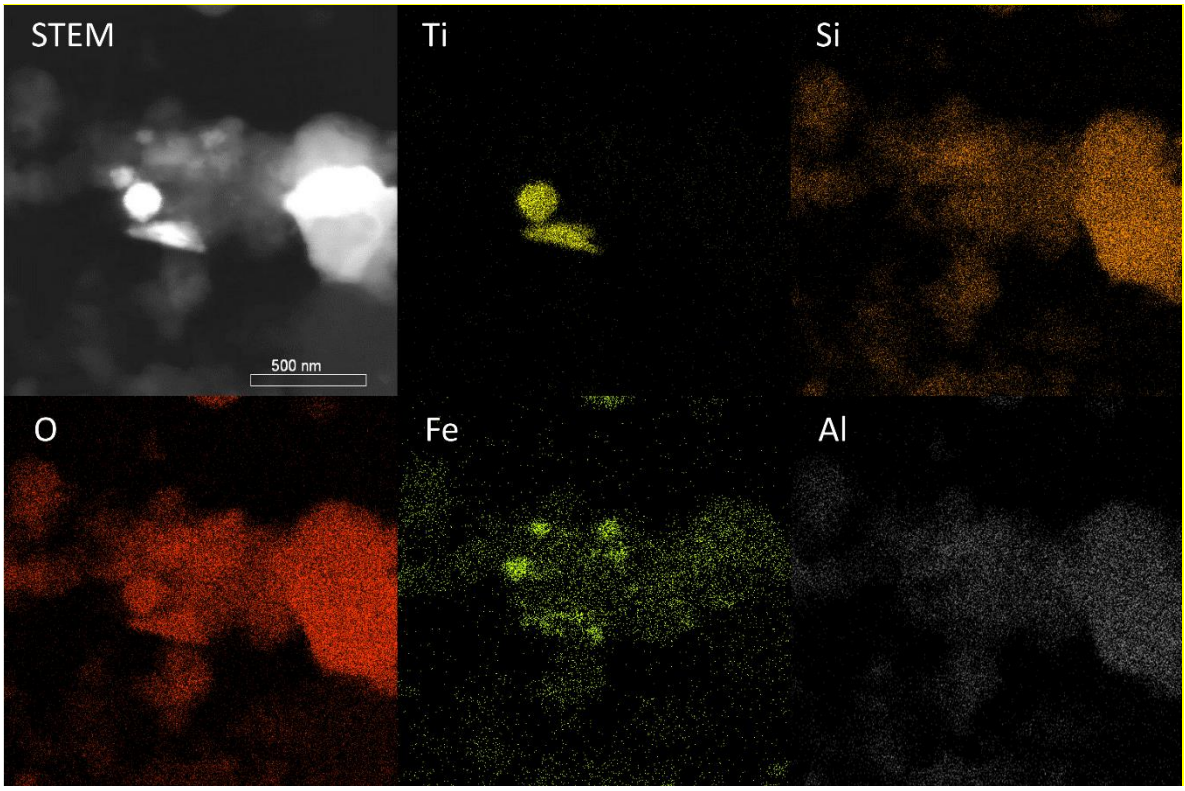

Figure S9. Image obtained using HR-TEM in HAADF scanning mode of soil born natural particles, which were extracted from the soil S2, and the corresponding EDX-maps. Ti: yellow; Si: orange; O: red; Fe: green; Al: grey.

5. Hydrodynamic chromatography coupled with ICP-MS (HDC-ICP-MS)

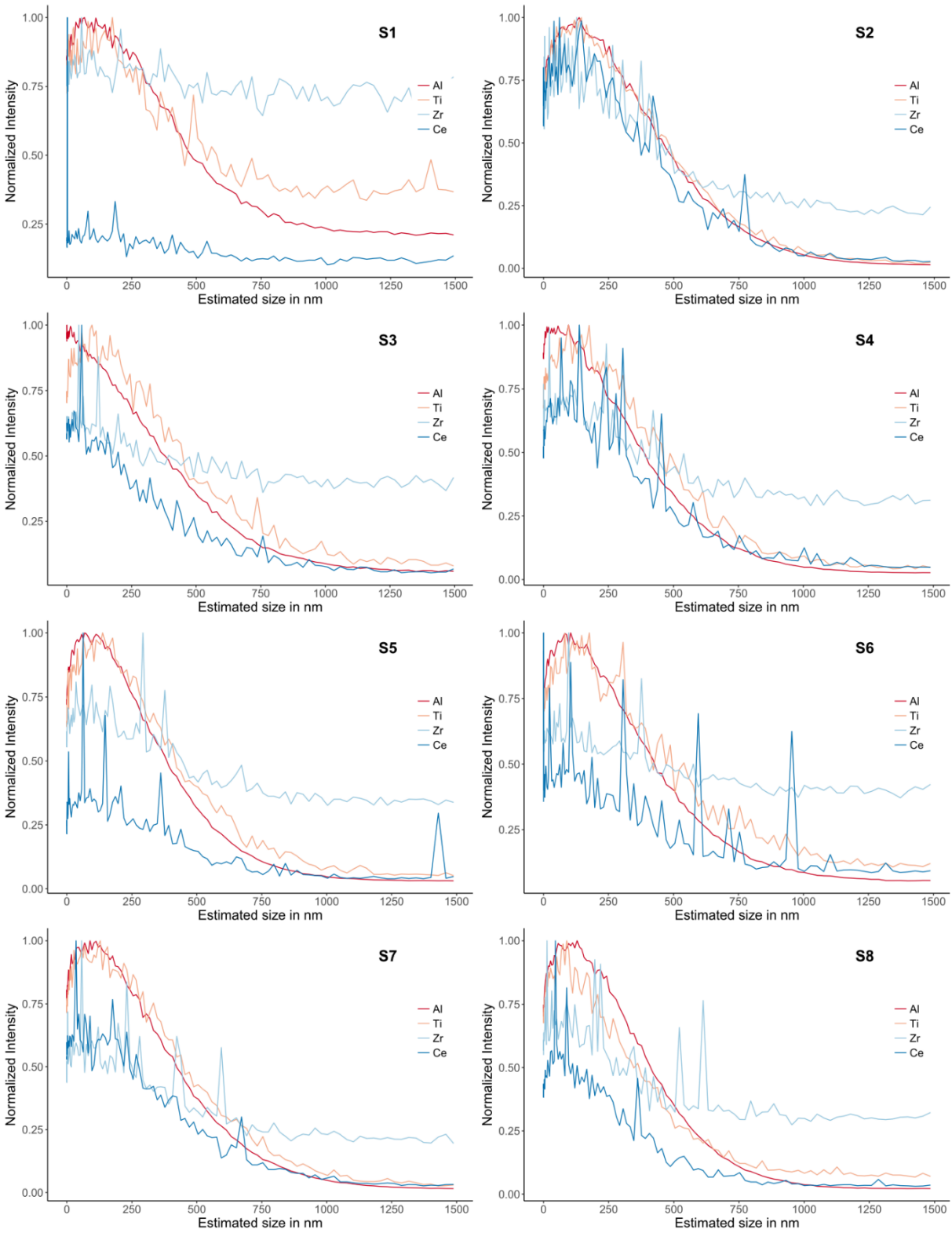

Figure S10. Size distributions estimated from the chromatograms obtained using HDC-ICP-MS for the soils investigated in this study. The signals used for determining the size are: red: ^{27}Al, orange: ^{47}Ti, light blue: ^{90}Zr, and dark blue: ^{140}Ce.

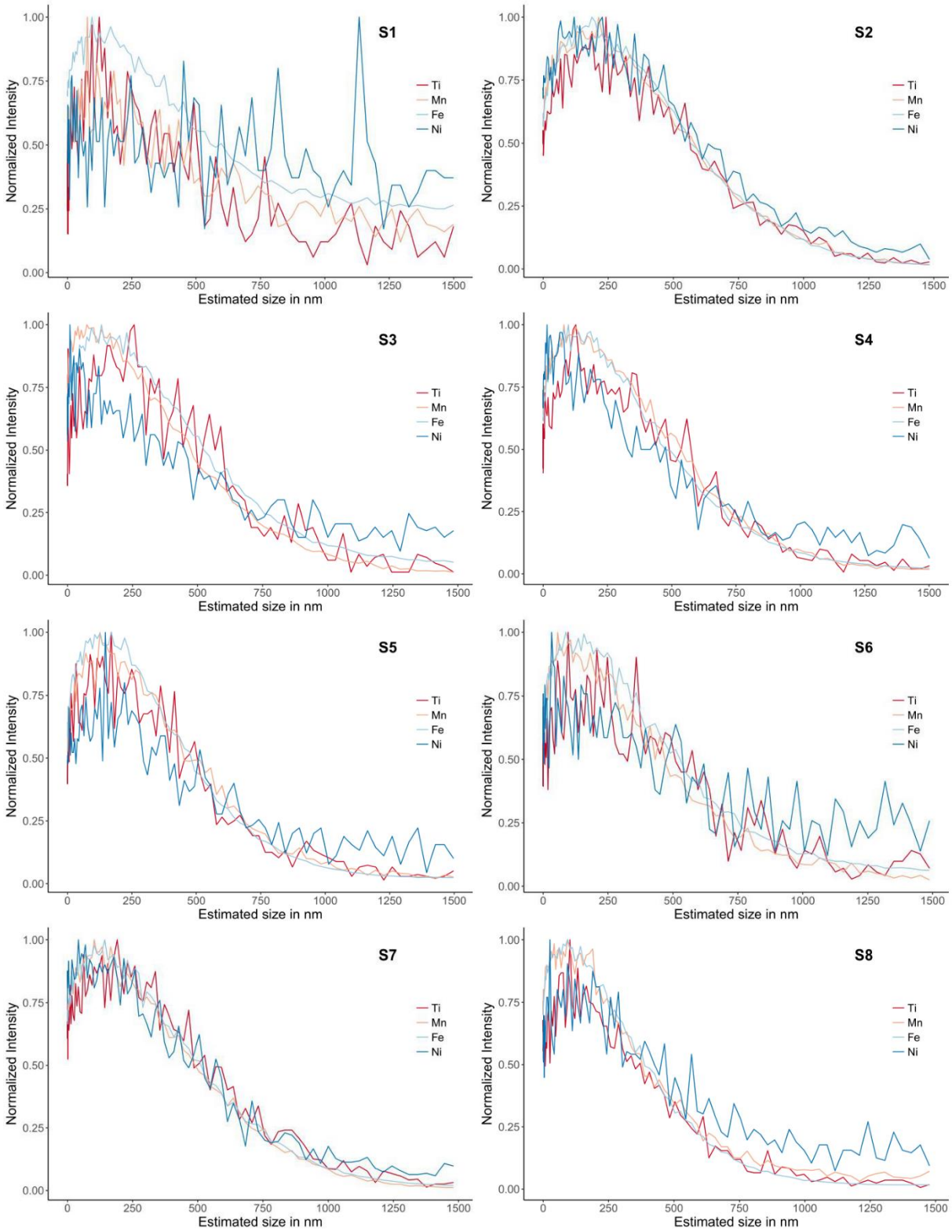

Figure S11. Size distributions estimated from the chromatograms obtained using HDC-ICP-MS for the soils investigated in this study. The signals used for determining the size are: red: ^{47}Ti, orange: ^{55}Mn, light blue: ^{56}Fe, and dark blue: ^{60}Ni.