

Figure S1 Extraction profile of calcium as a percentage of the sum of five fractions in S3 and S7

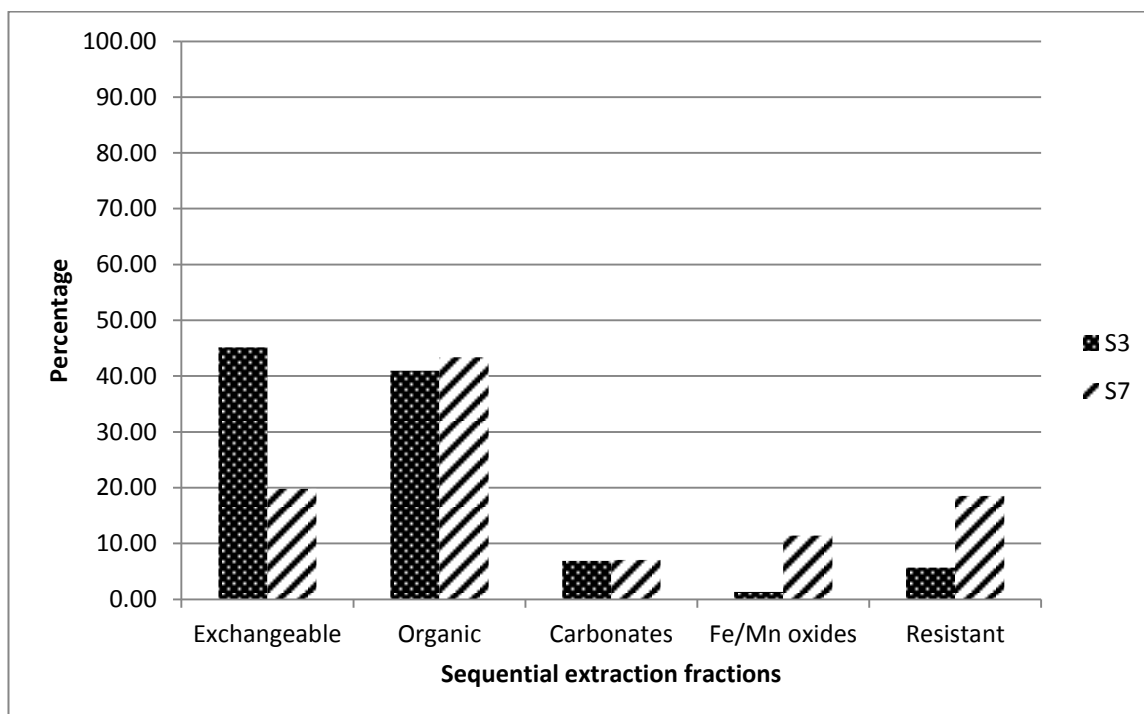


Figure S2 Extraction profile of manganese as a percentage of the sum of five fractions in S3 and S7

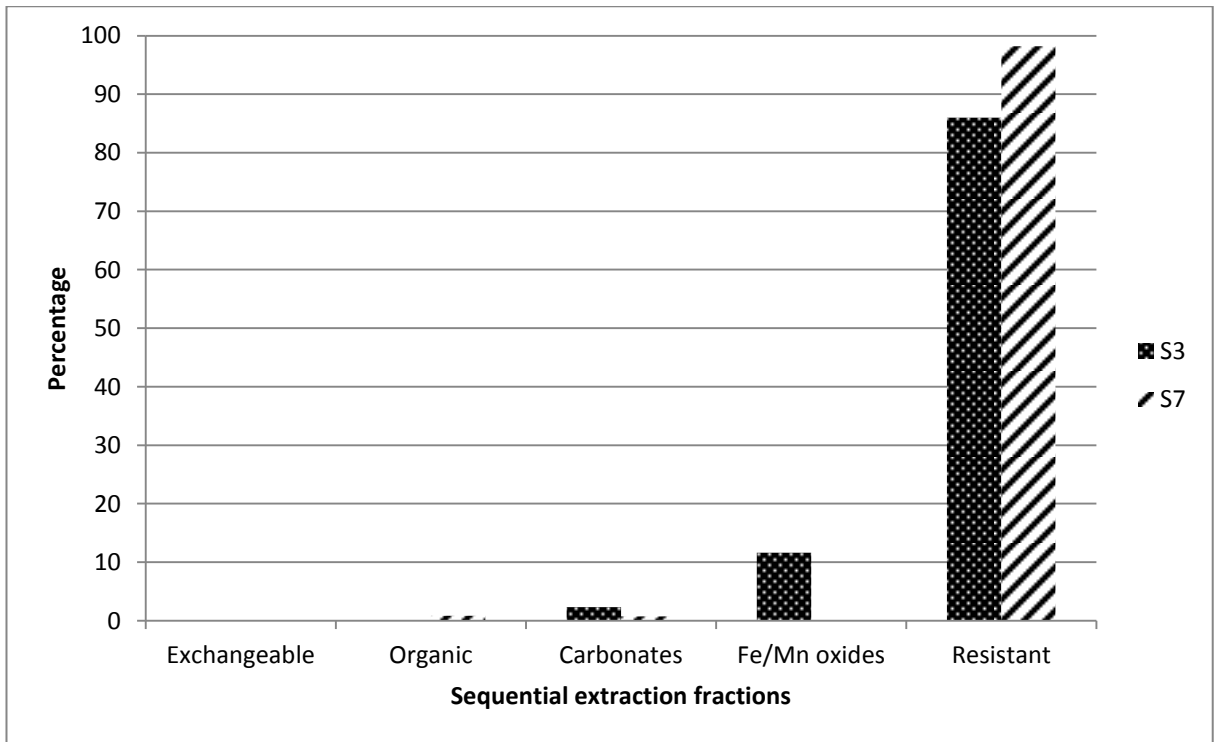


Figure S3 Extraction profile of titanium as a percentage of the sum of five fractions in S3 and S7

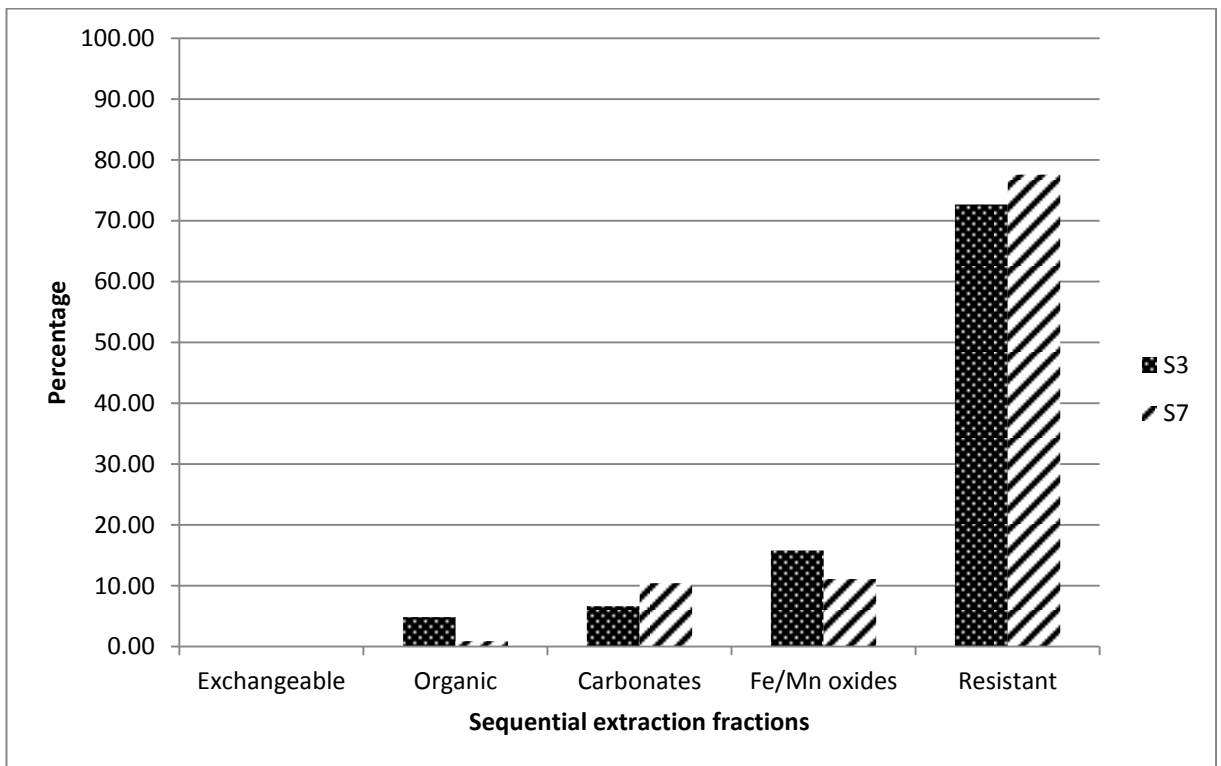


Figure S4 Extraction profile of iron as a percentage of the sum of five fractions in S3 and S7

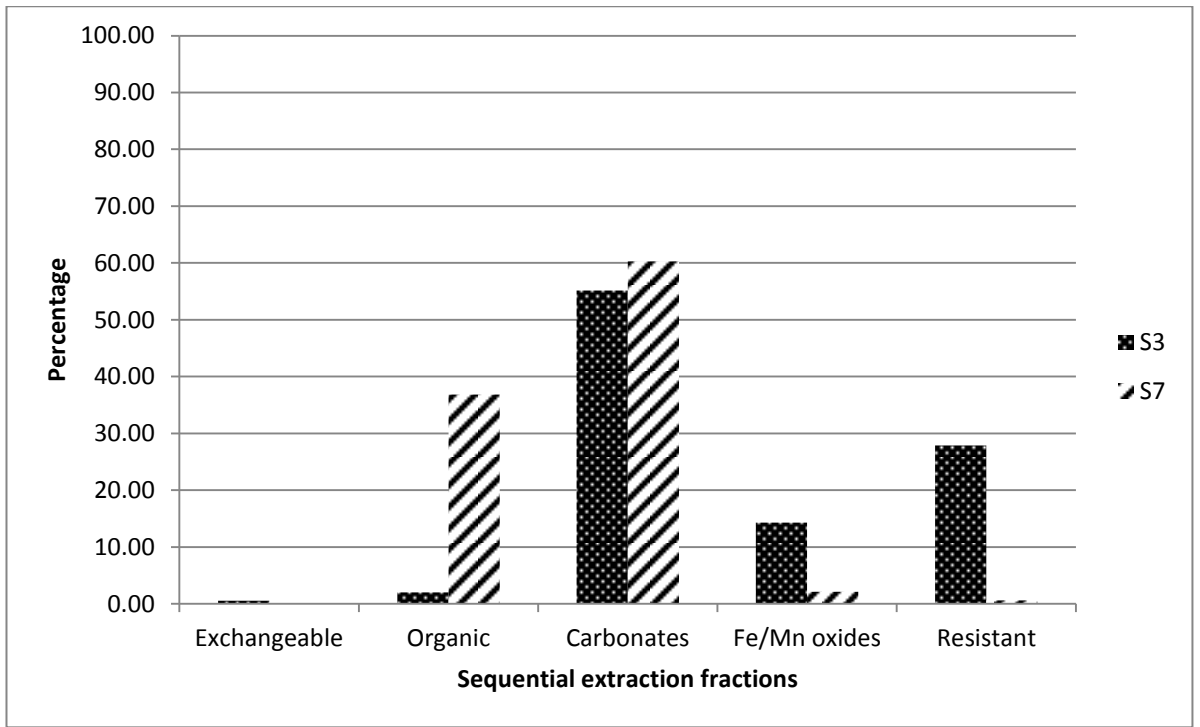


Figure S5 Extraction profile of arsenic as a percentage of the sum of five fractions in S3 and S7

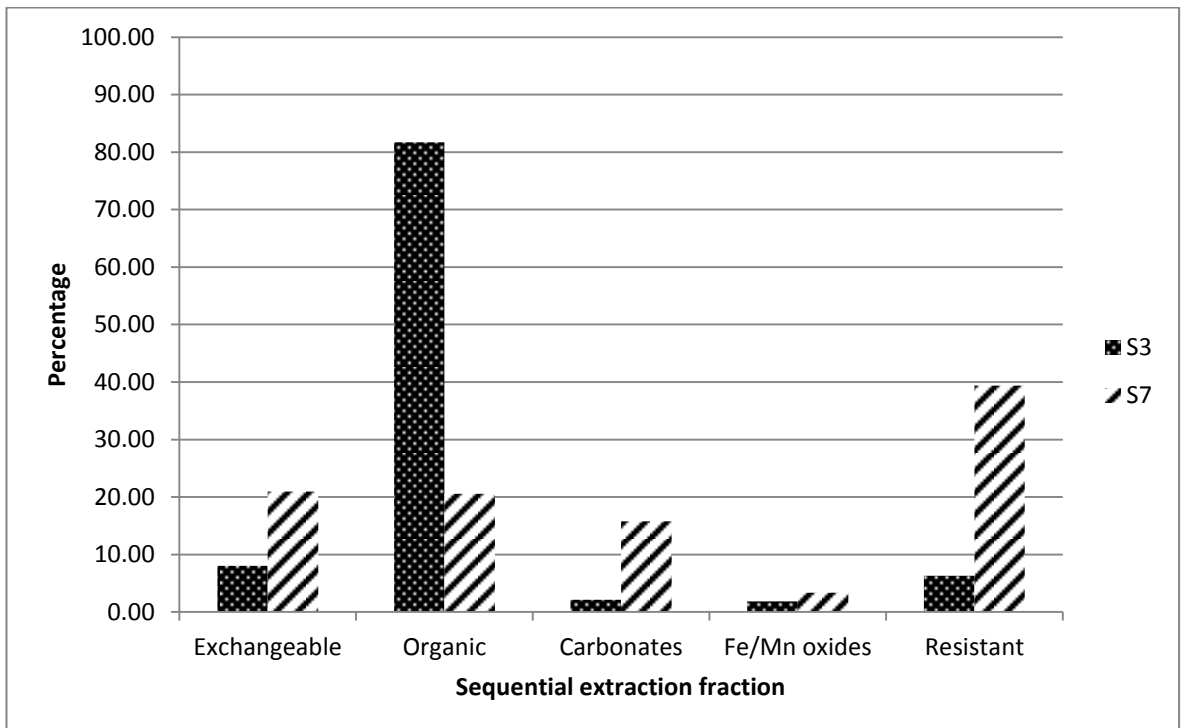


Figure S6 Extraction profile of barium as a percentage of the sum of five fractions in S3 and S7

Table S1 Summary of the sequential extraction method applied for radionuclides and stable elements from Cornwall sediments (sample/reagent ratio is 1.0 g/ 15 .0 mL)

Fraction	Extractive reagents	Temp. °C	Shaking time (h)
Exchangeable	0.4 M MgCl ₂	R. T.	1
Organic matter	5-6% NaOCl (pH7.5)	96	0.5 x 2
Carbonates	1 M NaOAc in 25% HOAc (pH 4)	R. T.	2 x 2
Oxides (Fe/Mn)	0.04 M NH ₂ OH.HCl (pH 2)	R. T.	5
Residual	HCl/HNO ₃ (3:1)	96	2

Table S2 Mineralogical composition from XRD and loss on ignition of sediments collected from the River Fal and side streams in Cornwall

ID	L.O.I.	Quartz%	^a Total phy.%	TiO ₂ %	Dolomite%	Chlorite%	Jarosite%
S1	5.2	88	6	5	-	-	-
S2	22.3	77	18	1	-	4	-
S3	37.0	77	11	7	-	2	-
S4	1.0	84	12	2	-	2	-
S5	1.0	50	11	6	1	1	-
S6	5.8	76	15	8	1	-	-
S7	21.0	66	20	9	2	3	-
S8	24.8	79	7	6	1	7	-
S9	2.1	80	10	7	1	2	-
S10	0.7	79	11	6	1	2	-
S11	1.0	73	10	7	1	2	-
S12	28.6	82	7	6	1	2	-
S13	20.0	80	12	6	-	2	-
S14	1.5	80	12	6	2	-	-
S15	0.7	78	11	9	1	1	-
S16	0.8	73	16	9	2	-	-
S17	5.8	77	5	8	-	3	5
S18	0.8	74	15	9	2	-	-
S19	1.1	79	10	8	1	1	-
S20	1.0	87	10	5	1	2	-

^aTotal phy. Represents Total phyllosilicates (muscovite and kaolinite)