Appendix G

Supplementary material of Chapter 12

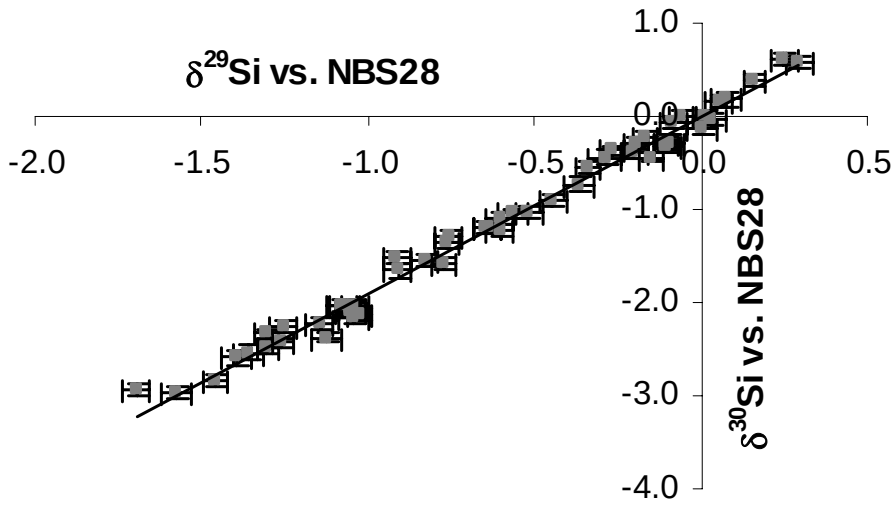


Figure G.1: Isotopic signatures of soil fractions fit onto a mass-dependent fractionation array δ^{30}Si vs. δ^{29}Si following δ^{30}Si = 1.92 δ^{29}Si + 0.0138 (r=0.9901) excluding the last outlier point (left). The slope 1.92±0.03 (1σ) supports an equilibrium mass-dependent fractionation (1.93, Young et al. (2002)).

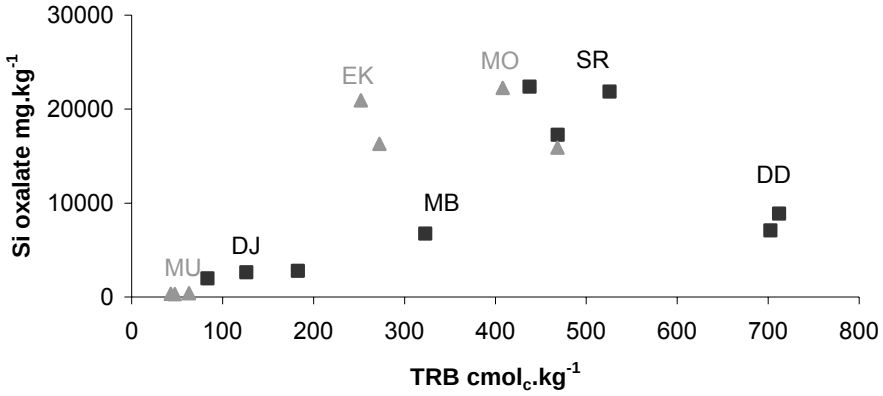


Figure G.2: Plot of Si oxalate vs. Total Reserve in Bases (TRB) in FEF of both sequences. Mungo = Black, Mt Cameroon = Grey.

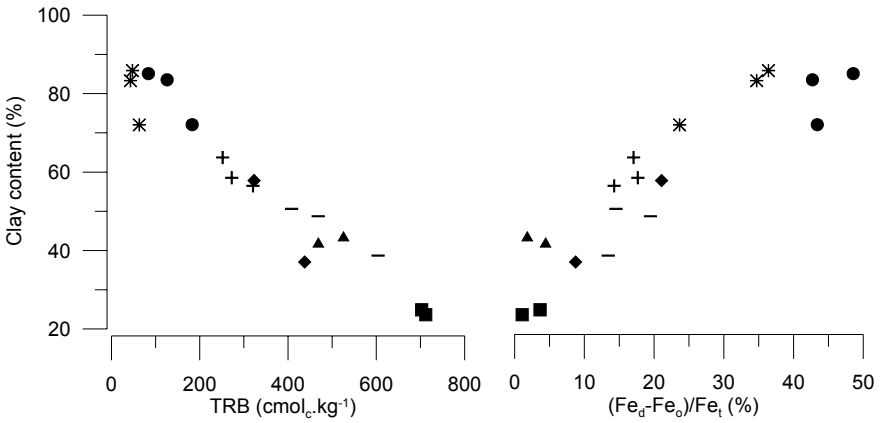


Figure G.3: Weathering indexes in the soil weathering sequences under study: clay content vs. Total Reserve in Bases (TRB) and vs. proportion of crystalline Fe oxides (Fe_d-Fe_o)/Fe_t. DD = square, SR = triangle, MB = diamond, DJ = circle, MO = dash, EK = cross, MU = star.

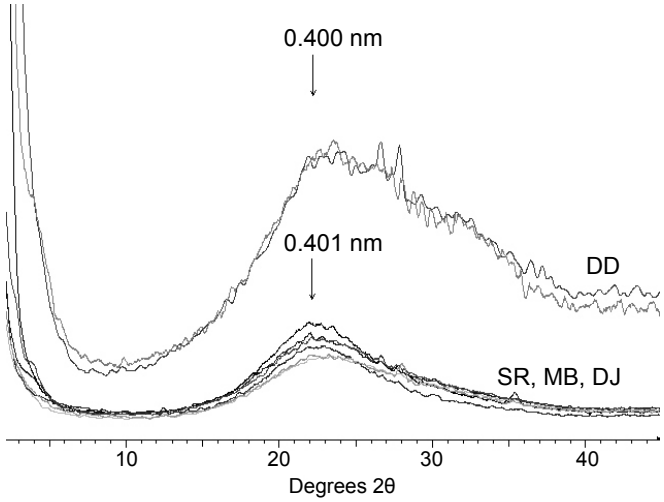


Figure G.4: X-ray diffraction (XRD) spectrum of the amorphous Si (ASi) fractions in the Mungo profiles showing the typical 0.4nm characteristic of opal-A.

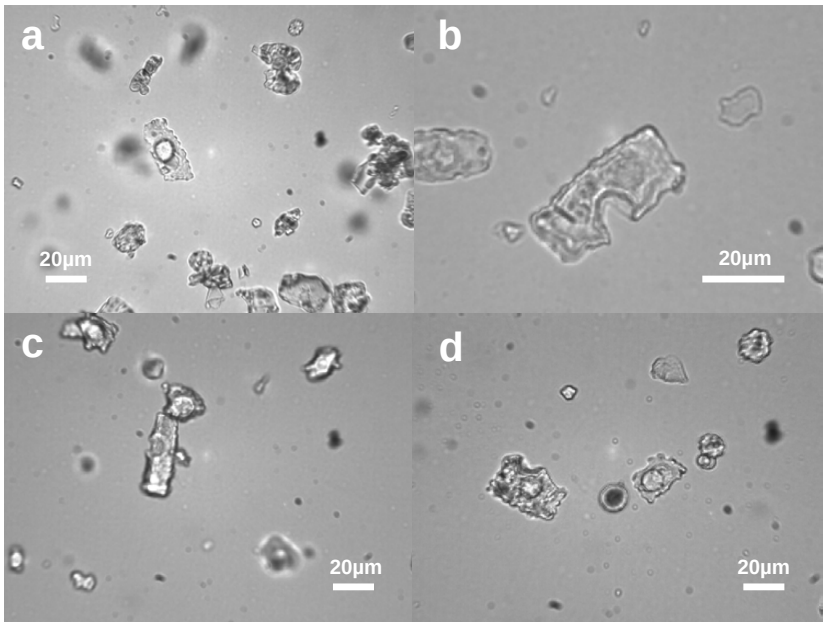


Figure G.5: Evidence of banana phytoliths in the amorphous silica fraction (ASi) extracted by heavy liquid from surface horizon of Mungo soils: (a) DD Ap - (b) SR Ap - (c) MB Ap - (d) DJ Ap (optical).

Table G.1: Total elemental analyses in FEF and clay fractions. LOI = loss on ignition.

Fine earth fractions (<2mm)

Sol	Hor	Prof	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2	LOI
								%					-
DD	Ap	0-5	12.94	7.47	12.40	1.95	6.79	0.19	1.79	1.11	38.53	2.82	13.80
DD	AC	5-40	14.02	7.43	13.49	0.97	7.34	0.19	1.93	1.10	40.25	3.08	9.80
DD	C	40-100	13.96	8.82	13.58	1.42	7.61	0.17	2.77	0.60	47.47	3.07	0.00
SR	Ap1	0-5	13.41	6.01	12.25	0.76	4.08	0.24	1.12	1.25	32.17	2.82	25.50
SR	Ap2	5-21	17.04	5.43	16.12	0.83	5.08	0.24	1.24	1.16	35.12	3.64	14.00
SR	Bw	21-33	17.26	6.02	16.23	0.91	4.99	0.24	1.37	1.12	36.44	3.64	11.20
SR	BC	33-80	18.23	5.51	17.08	0.83	5.38	0.25	1.35	0.86	37.86	3.80	8.50
MB	Ap	0-5	8.85	4.75	7.68	1.02	2.42	0.30	0.38	0.85	26.04	1.83	45.60
MB	AC	5-32	18.06	4.67	16.34	0.79	4.42	0.26	1.09	1.07	38.72	3.93	10.40
MB	C	32-60	15.05	7.94	13.75	1.79	5.30	0.19	2.83	0.85	48.36	3.22	0.30
MB	IICi	60-74	14.88	7.76	13.24	1.95	5.10	0.18	2.79	0.81	49.80	3.10	0.00
MB	IIIA	74-78	17.13	5.41	14.67	1.34	4.43	0.21	1.60	0.40	47.22	3.49	3.80
MB	IIIC	78-95	14.82	7.53	13.58	1.85	4.97	0.19	2.52	0.79	49.51	3.00	0.70
MB	IVAC	95-115	15.03	7.15	13.78	1.80	4.83	0.19	2.39	0.80	49.28	3.03	1.20
DJ	Ap1	0-5	15.89	1.85	16.38	0.55	2.02	0.38	0.16	0.93	34.88	3.90	22.70
DJ	Ap2	5-15	18.68	0.89	19.44	0.51	2.17	0.31	0.18	0.94	38.23	4.56	13.70
DJ	Bt	15-66	21.74	0.41	20.11	0.41	2.01	0.26	0.10	0.74	37.56	4.72	11.60
DJ	Bw	66-115	21.87	0.27	18.21	0.64	1.17	0.25	0.08	0.56	41.35	4.40	10.80
MO	Ap2	5-20	16.67	5.74	13.11	0.56	4.75	0.26	0.52	2.03	36.32	3.34	16.32
MO	Bw1	20-60	19.26	4.58	14.89	0.54	4.36	0.29	0.52	2.10	34.54	4.06	14.62
MO	Bw2	60-92	19.61	6.03	16.95	0.61	7.19	0.27	0.60	1.28	32.26	4.45	10.64
EK	Ap2	5-32	20.75	2.65	16.60	1.09	2.82	0.34	0.47	1.89	33.90	4.32	14.77
EK	Bt	32-60	22.94	2.60	15.94	0.94	2.53	0.30	0.42	1.90	33.95	4.09	14.11
EK	Bw1	60-100	24.38	2.89	17.12	0.87	3.63	0.30	0.60	1.63	30.95	4.73	12.38
MU	Ap2	5-25	21.99	0.14	25.84	0.32	1.03	0.75	0.00	1.25	27.91	7.74	12.55
MU	Bt1	25-65	28.15	0.09	18.84	0.25	0.67	0.49	0.04	1.23	31.67	5.33	13.00
MU	Bt2	65-110	28.03	0.11	18.72	0.23	0.70	0.51	0.13	1.26	31.52	5.51	12.82

End of table at the following page

Clay fractions (<2μm)

Sol	Hor	Prof	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2	LOI	SrO
								%						-
DD	Ap	0-5	12.03	0.62	11.04	0.12	0.39	0.24	0.17	2.45	15.76	2.64	49.19	5.09
DD	AC	5-40	14.20	0.62	14.86	0.14	0.43	0.33	0.17	2.96	15.99	3.46	42.51	4.12
SR	Ap1	0-5	16.52	1.25	10.26	0.15	0.90	0.23	0.32	2.01	22.25	2.47	39.99	3.59
SR	Bw	21-33	21.63	1.94	14.57	0.15	1.15	0.24	0.48	2.05	23.20	3.62	28.80	1.98
MB	Ap	0-5	10.76	0.20	6.51	0.16	0.21	0.05	0.11	1.07	21.24	1.37	53.94	4.22
MB	AC	5-32	24.55	0.56	14.46	0.22	0.45	0.41	0.40	1.88	27.57	3.26	24.56	1.56
DJ	Ap1	0-5	20.14	0.06	17.59	0.20	0.33	0.32	0.05	1.11	30.06	3.85	23.51	2.53
DJ	Bt	15-66	25.58	0.04	18.91	0.17	0.37	0.24	0.04	0.87	33.90	4.28	14.25	1.16
DJ	Bw	66-115	25.54	0.02	18.17	0.20	0.32	0.17	0.04	0.67	35.77	3.94	14.12	0.93
MO	Ap2	5-20	22.38	0.91	8.85	0.35	0.51	0.25	0.25	3.52	27.97	2.39	29.41	3.09
MO	Bw1	20-60	25.18	0.95	10.08	0.37	0.55	0.24	0.24	3.45	27.08	2.72	27.01	1.89
MO	Bw2	60-92	28.37	1.03	11.42	0.54	0.84	0.23	0.41	2.30	27.71	3.51	21.65	1.52
EK	Ap2	5-32	23.68	1.00	11.45	0.44	0.48	0.25	0.23	2.57	32.24	2.94	22.08	2.05
EK	Bt	32-60	25.36	0.97	11.61	0.44	0.48	0.25	0.27	2.75	31.31	3.04	21.25	1.94
EK	Bw1	60-100	26.81	1.09	12.65	0.50	0.67	0.24	0.39	2.30	30.21	3.52	19.60	1.47
MU	Ap2	5-25	26.68	1.06	13.82	0.26	0.38	0.33	0.38	1.47	34.17	3.41	16.73	0.97
MU	Bt1	25-65	28.72	1.01	12.28	0.21	0.31	0.24	0.21	1.39	36.06	2.90	15.36	0.79
MU	Bt2	65-110	28.69	1.18	12.23	0.18	0.30	0.23	0.31	1.20	36.05	2.84	15.37	0.83

Table G.2: Total Reserve in Bases (TRB) in the FEF.

Sol	Hor	Prof	Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}	TRB
				$cmol_c.kg^{-1}$			
DD	Ap	0-5	266	337	41	58	703
DD	AC	5-40	265	364	21	62	712
DD	C	40-100	314	378	30	89	811
SR	Ap1	0-5	214	202	16	36	469
SR	Ap2	5-21	193	252	18	40	503
SR	Bw	21-33	214	248	19	44	526
SR	BC	33-80	196	267	18	44	525
MB	Ap	0-5	169	120	22	12	323
MB	AC	5-32	167	219	17	35	438
MB	C	32-60	283	263	38	91	675
MB	IICi	60-74	277	253	41	90	661
MB	IIIA	74-78	193	220	28	52	493
MB	IIIC	78-95	268	246	39	81	635
MB	IVAC	95-115	255	240	38	77	610
DJ	Ap1	0-5	66	100	12	5	183
DJ	Ap2	5-15	32	108	11	6	156
DJ	Bt	15-66	15	100	9	3	126
DJ	Bw	66-115	10	58	14	3	84
MO	Ap2	5-20	204	236	12	17	468
MO	Bw1	20-60	163	216	12	17	408
MO	Bw2	60-92	215	357	13	19	604
EK	Ap2	5-32	94	140	23	15	273
EK	Bt	32-60	93	126	20	14	252
EK	Bw1	60-100	103	180	19	19	321
MU	Ap2	5-25	5	51	7	0	63
MU	Bt1	25-65	3	33	5	1	43
MU	Bt2	65-110	4	35	5	4	48

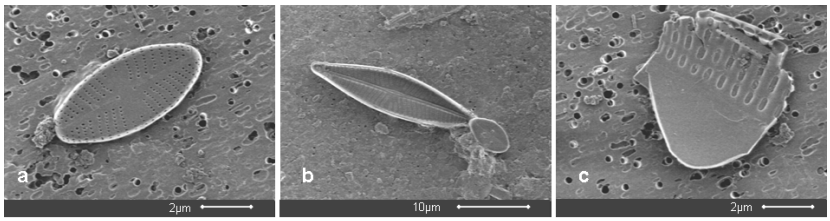


Figure G.6: Diatoms observed in suspended load from Cameroon stream waters used for crop irrigation (SEM): (a) Mbomé, (b) Koumbé, (c) Mbomé.

Table G.3: Oxalate et DCB extractions in FEF and clay fractions.

Fine earth fractions (<2mm)

Sol	Hor	Prof	Al_o	Fe_o	Si_o	Al_d	Fe_d	Si_d
					$g.kg^{-1}$			
DD	Ap	0-5	11.9	16.1	7.1	7.9	19.2	3.2
DD	AC	5-40	15.5	22.1	8.9	9.5	23.1	3.7
SR	Ap1	0-5	29.6	26.7	17.3	11.1	30.5	4.0
SR	Bw	21-33	37.7	38.2	21.9	14.5	40.3	4.1
MB	Ap	0-5	12.0	10.4	6.8	6.6	21.7	4.3
MB	AC	5-32	35.5	34.2	22.4	14.3	44.2	4.3
DJ	Ap1	0-5	4.2	19.4	2.8	5.7	69.1	3.9
DJ	Bt	15-66	4.0	25.0	2.6	7.0	85.1	3.8
DJ	Bw	66-115	3.1	20.1	2.0	6.9	81.9	3.8
MO	Ap2	5-20	36.7	15.7	15.9	19.5	33.5	3.8
MO	Bw1	20-60	49.7	20.9	22.3	22.3	36.0	5.0
MO	Bw2	60-92	61.5	18.8	33.6	17.8	34.7	3.9
EK	Ap2	5-32	32.4	26.7	16.3	16.9	47.2	4.9
EK	Bt	32-60	40.1	29.4	21.0	18.5	48.4	5.3
EK	Bw1	60-100	61.9	29.1	36.1	19.5	46.2	5.4
MU	Ap2	5-25	6.0	15.7	0.4	9.9	58.4	0.8
MU	Bt1	25-65	6.8	11.7	0.3	11.6	57.4	0.7
MU	Bt2	65-110	6.7	10.4	0.3	12.0	58.0	0.7

Clay fractions (<2μm)

Sol	Hor	Prof	Al_o	Fe_o	Si_o	Al_d	Fe_d	Si_d
					$g.kg^{-1}$			
DD	Ap	0-5	27.3	39.0	10.1	18.0	56.4	8.6
DD	AC	5-40	35.5	63.8	15.0	19.8	78.0	10.2
SR	Ap1	0-5	23.7	12.1	10.0	18.8	51.4	9.5
SR	Bw	21-33	77.6	49.8	38.8	26.2	78.2	11.8
MB	Ap	0-5	3.5	3.2	1.5	7.3	29.6	4.6
MB	AC	5-32	56.3	50.5	29.7	23.4	78.4	11.8
DJ	Ap1	0-5	5.4	25.7	2.2	8.1	98.5	5.4
DJ	Bt	15-66	4.7	31.0	1.9	7.1	101.1	6.1
DJ	Bw	66-115	3.8	24.2	1.8	6.9	96.4	5.5
MO	Ap2	5-20	51.4	22.9	0.5	25.2	40.0	7.6
MO	Bw1	20-60	53.0	21.1	0.5	25.3	40.1	7.6
MO	Bw2	60-92	81.4	24.2	0.7	24.1	45.8	8.0
EK	Ap2	5-32	36.4	31.8	0.6	22.4	55.3	9.0
EK	Bt	32-60	37.6	32.2	0.6	22.5	53.9	9.0
EK	Bw1	60-100	62.1	31.0	0.7	24.0	52.4	10.4
MU	Ap2	5-25	5.9	16.9	0.1	8.1	52.2	1.1
MU	Bt1	25-65	6.0	14.4	0.1	8.7	50.5	0.9
MU	Bt2	65-110	6.6	14.0	0.1	8.8	52.0	1.1

Table G.4: Characteristics of banana plants sampled in each station: diameter of the pseudostem at 130cm high (C_{130}), number of hands, mean Si content of bulk plant, detailed Si content of each plant parts. R = roots ; Psi, PSe = internal and external pseudostem; P = petiole; M = midrib ; IL, EL = internal and external lamina ; Pe = peduncle; F = fruit.

	Mungo				Mt Cameroon		
	DD	SR	MB	DJ	MO	EK	MU
C_{130} (cm)	55	85	70	83	63	96	59.5
Hands	7	13	11	12	9	14	12
Mean Si ($g.kg^{-1}$)*	5.7	4.4	5.0	5.0	5.0	2.8	2.7
Si content ($g.kg^{-1}$)							
R	5.3	3.1	2.7	3.7	2.2	4.1	2.9
Psi	4.8	4.3	4.1	5.8	3.1	1.4	3.3
Pse	9.4	5.4	6.5	7.9	0.9	3.6	2.7
P	1.6	1.8	1.7	1.4	1.5	1.3	2.2
M	1.3	2.1	1.7	1.4	3.4	1.4	1.9
IL	5.1	5.9	6.6	4.0	2.5	4.1	4.4
EL	6.5	7.0	7.5	5.3	0.9	4.4	5.5
Pe	4.7	3.2	4.7	4.3	2.4	1.3	2.1
F	1.2	1.6	2.2	1.3	17.3	1.5	0.7

* Si content of each plant parts balanced by biomass (Martin-Prével and Montagut, 1966)