GSA DATA REPOSITORY 2014121

SUPPLEMENTARY INFORMATION: Liivamägi et al. “Late Neoproterozoic Baltic paleosol: intense weathering at high latitude?”

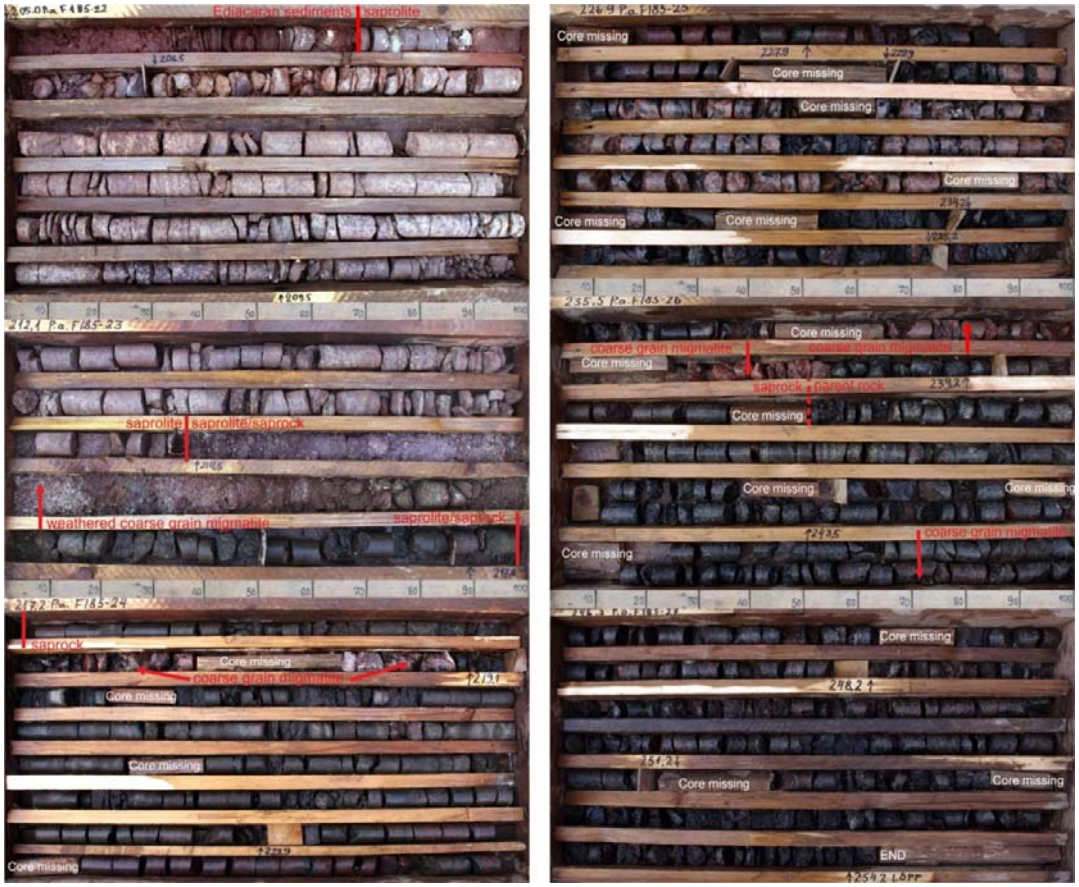

Figure DR1. Photographs of the Pada-Aru core profile of the Baltic paleosol, depth is marked as below ground surface.

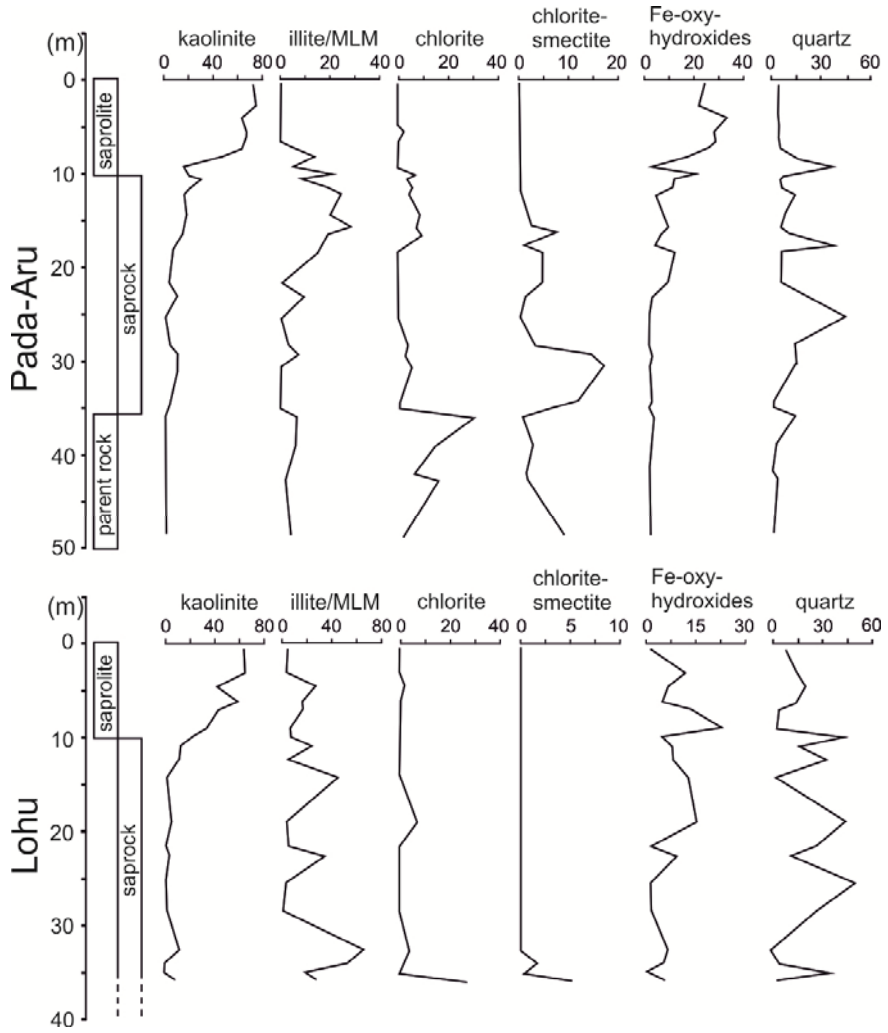

Figure DR2. Mineral composition (wt%) of the Baltic paleosol in the Pada-Aru and Lohu profiles. Depth is given below the paleoweathered surface. MLM – mixed layer illite-smectite mineral. Fe-oxyhydroxides – sum of hematite and goethite.

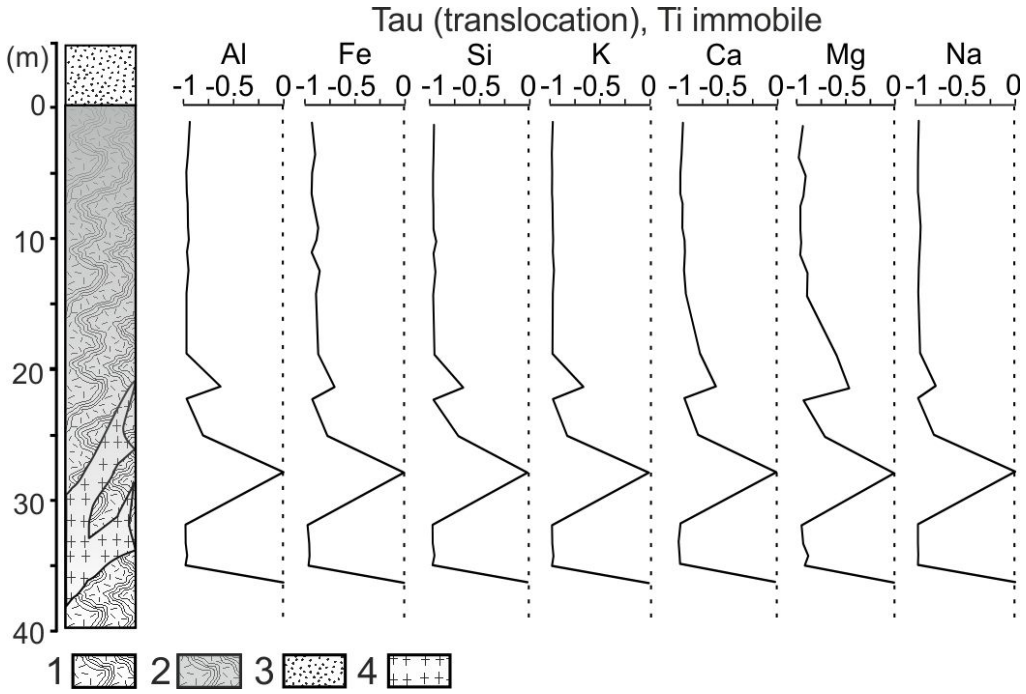

Figure DR3. Mass balance graph with strain (tau; translocation) of Al, Fe, Si, K, Ca, Mg, and Na versus depth of the Lohu profile assuming Ti was immobile during weathering (wt% are used in the calculations). Depth is given below the paleoweathered surface. Legend: 1. migmatized metagabbro, 2. weathered saprock-saprolite, gray shading shows weathering intensity, 3. Ediacaran-Cambrian sediments, 4. coarse grained migmatite veins.

Table DR1. Bulk mineralogical composition of the Baltic paleosol in wt%, tr. - trace amount <0.5 wt%. Determined in unoriented powdered samples using X-ray diffraction analysis on a Bruker D8 Advance diffractometer with Cu*K*α radiation, scanning step size 0.01° in the range 3-70 °2θ. Mineral quantification was performed using Siroquant-3 software (Taylor, 1991). Sample depths are in metres below ground surface (b.g.s.) and below the paleoweathered surface (b.p.s). MLM – illitic mixed layer mineral. Chl-S – chlorite-smectite. Fe-oxyhydroxides – sum of hematite and goethite.

Drillcore - sample no.	Depth, b.g.s. (m)	Depth, b.p.s (m)	Quartz	K-feldspar	Mica/Biotite	Plagioclase	Hornblende	Kaolinite	Illite/MLM	Chlorite	Chl-S	Fe-oxy-hydroxides	Anatase	Apatite	Calcite	Dolomite	Siderite	Garnet
F185-01	205.6	0.1	4.5					70.0				24.1	1.2					
F185-03	208.0	2.4	4.7					72.2				21.4	1.5					
F185-04	209.3	3.7	4.1					60.9				33.8	1.1					
F185-05	210.0	4.4	4.4					62.7				31.2	1.4					
F185-06	210.8	5.2	4.1					64.2		2.2		28.2	1.2					
F185-07	211.8	6.2	4.3	1.9				63.6				28.6	1.4					
F185-08	212.5	6.9	5.5					60.5	4.6			26.9	1.4	1.1				
F185-09	213.5	7.9	16.3					45.0	13.6			16.4	1.1	7.1			tr.	
F185-10	214.6	9.0	42.6	25.8				14.3	5.0			0.8		2.2				9.0
F185-11	215.4	9.8	7.0	19.5	4.4			18.6	20.6	6.6		21.2		1.4				
F185-12	215.9	10.3	5.2	40.5	3.3			27.7	8.2	3.5		10.9					tr.	
F185-13	216.8	11.2	6.3	36.9	2.7			18.6	18.7	5.5		10.1						
F185-14	217.5	11.9	14.2	25.9	12.0			14.3	24.2	4.5		2.5	1.1				0.5	
F185-15	219.7	14.1	7.2	31.2	7.4			16.2	19.4	8.7	1.5	5.7					1.1	
F185-16	221.0	15.4	6.1	25.5	5.1			14.0	29.0	7.1	2.4	8.5	0.7				1.5	
F185-17	221.7	16.1	10.4	24.6	8.0			13.2	18.9	9.7	7.6	4.9	tr.				1.1	
F185-18	223.0	17.4	39.6	26.9	3.6			7.2	16.4	2.9	0.3	2.1						
F185-19	223.7	18.1	6.2	6.4	12.0	24.9	12.5	4.1	14.7	0.0	4.7	11.5	tr.	2.4				
F185-20	227.0	21.4	5.6	2.3	6.5	59.3	9.3	2.2		0.0	4.5	8.1		0.8				
F185-21	228.5	22.9	19.3	15.2	22.0	12.9	8.5	8.9	9.1	0.0	1.0	1.0	0.9	0.9				
F185-22	230.8	25.2	46.1	16.1	27.0	10.8		0.0		0.0	0.0							
F185-23	233.7	28.1	14.1	4.0	15.3		48.8	3.7	3.0	3.8	3.2	1.0			1.1	1.4		
F185-24	234.8	29.2	15.0	6.5	14.2		26.2	9.3	7.0	3.1	14.6	2.1	0.9		0.8	0.5		
F185-25	236.0	30.4	15.2	8.1	23.4		10.6	10.0		5.7	17.2	1.5	1.0		5.4	2.0		
F185-26	239.8	34.2	1.5	3.0	8.5	38.1	29.9	3.2		0.6	12.0	2.1						
F185-27	240.5	34.9	1.3	2.7	6.1	55.5	24.1	2.5		0.7	5.7							
F185-28	241.5	35.9	14.4	11.2	11.6	21.1	1.4		6.4	29.9	0.7	1.8	0.8					
F185-29	244.5	38.9	3.5	20.6	7.4	21.8	21.9		5.8	14.8	2.8	1.2						
F185-30	247.5	41.9	0.9	3.3	8.9	40.8	34.3		2.9	6.6	1.7							
F185-31	248.2	42.6	3.7	5.4	4.3	24.8	41.4		2.1	15.8	1.7							
F185-32	254.2	48.6	1.9	9.1	6.7	28.7	34.8		3.9	2.0	9.2	1.9			1.7			

Drillcore - sample no.	Depth, b.g.s. (m)	Depth, b.p.s (m)	Quartz	K-feldspar	Mica/Biotite	Plagioclase	Hornblende	Kaolinite	Illite/MLM	Chlorite	Chl-S	Fe-oxy-hydroxides	Anatase	Apatite	Calcite	Dolomite	Siderite	Garnet
F280-39	282.4	0.2	9.4	20.9				59.0	9.5	tr.		0.9						
F280-40	285.0	2.6	16.5					59.9	8.5			12.8	1.5					
F280-41	286.5	4.1	21.5					38.4	30.6	1.7		7.1	0.7					
F280-42	288.2	5.8	15.3	3.4				54.5	20.5			4.9	1.1					
F280-43	289.0	6.6	4.7	18.4				40.1	21.6	tr.		14.3	0.9					
F280-44	291.0	8.6	3.7	27.1				31.5	11.5			25.4	0.8					
F280-45	292.0	9.6	47.8	14.9				20.0	12.7			4.7						
F280-46	293.0	10.6	16.2	33.8				12.5	29.0			8.5						
F280-47	294.5	12.1	35.5	35.5				11.4	9.1			8.3						
F280-48	296.4	14.0	2.0	33.2				1.9	48.9			13.8						
F280-49	301.3	18.9	46.0	11.4				5.2	9.3	6.8		18.5			0.7			
F280-50	304.0	21.6	28.2	60.1				1.1	10.1			0.6						
F280-51	305.0	22.6	11.2	35.7				3.6	39.0			9.9	0.5					
F280-52	308.0	25.6	52.8	36.3				1.3	8.8			0.8						
F280-53	311.0	28.6	28.1	62.5				2.3	6.0			1.1						
F280-54	315.3	32.9		7.1				11.1	67.1	3.5		6.5	1.8	1.8				
F280-55	316.8	34.4	5.3	30.1					54.9	1.7	1.6	5.6		0.8				
F280-56	317.8	35.4	36.5	41.5					23.0	tr.								
F280-57	318.6	36.2	3.5	5.7	9.6			8.1	31.5	27.5	5.2	6.0	1.8	1.1				

Table DR2. Geochemical composition of the bulk Baltic paleosol samples in wt%. Determined using ICP-OES analysis at Acme Analytical Laboratory, Canada. Average percent relative standard deviation (average RSD%) was <5% for all elements. Chemical Index of Alteration (CIA) and Chemical Index of Alteration minus Potassium (CIA-K) are dimensionless numbers between 0-100. L.O.I. – loss on ignition (950 °C).

Drillcore - sample no.	Depth, b.g.s. (m)	Depth, b.p.s (m)	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Cr_2O_3	L.O.I.	Sum	CIA	CIA-K
F185-01	205.6	0.1	41.42	28.68	15.49	0.09	0.20	0.03	0.21	2.12	0.15	0.05	0.006	11.3	99.7	97.3	98.5
F185-03	208.0	2.4	42.70	29.54	11.09	0.11	0.52	0.03	0.08	2.64	0.36	0.07	0.006	12.6	99.7	96.2	96.7
F185-04	209.3	3.7	38.71	27.24	18.34	0.12	0.25	0.02	0.06	2.59	0.20	0.08	0.011	12.2	99.8	97.8	98.2
F185-05	210.0	4.4	38.28	26.23	19.59	0.11	0.40	0.02	0.07	2.54	0.27	0.08	0.008	12.2	99.8	96.7	97.1
F185-06	210.8	5.2	38.31	26.93	18.82	0.15	0.21	0.02	0.07	2.58	0.23	0.09	0.007	12.4	99.8	98.0	98.5
F185-07	211.8	6.2	37.36	25.93	20.72	0.26	0.34	0.02	0.10	2.42	0.27	0.08	0.006	12.2	99.7	96.8	97.5
F185-08	212.5	6.9	39.39	25.12	18.59	0.40	0.38	0.03	0.28	2.62	0.34	0.09	0.006	12.4	99.6	97.8	99.8
F185-09	213.5	7.9	46.45	19.99	12.72	0.96	5.09	0.05	1.41	0.95	3.45	0.03	0.003	8.6	99.7	80.7	90.1
F185-10	214.6	9.0	67.92	13.15	7.08	1.57	1.42	0.20	4.40	0.31	0.88	0.08	0.010	2.7	99.7	59.8	94.7
F185-11	215.4	9.8	44.12	17.70	16.87	2.84	1.25	0.04	4.96	1.98	0.64	0.10	0.012	9.0	99.5	63.8	95.0
F185-12	215.9	10.3	48.97	19.75	11.47	1.55	0.97	0.04	7.17	1.83	0.54	0.05	0.012	7.3	99.7	56.8	91.4
F185-13	216.8	11.2	48.73	16.87	12.82	2.74	1.32	0.04	7.27	1.63	0.49	0.10	0.010	7.7	99.7	51.5	87.1
F185-14	217.5	11.9	52.53	16.48	10.89	3.95	0.92	0.05	6.39	1.57	0.44	0.08	0.009	6.4	99.7	54.9	90.2
F185-15	219.7	14.1	46.50	16.51	14.25	5.19	1.13	0.05	6.04	1.82	0.51	0.10	0.014	7.5	99.6	55.4	88.4
F185-16	221.0	15.4	48.04	16.16	13.44	4.17	1.07	0.04	5.84	1.57	0.49	0.11	0.010	8.7	99.6	55.8	88.8
F185-17	221.7	16.1	48.97	15.21	13.79	5.92	0.99	0.05	6.13	1.44	0.47	0.07	0.018	6.6	99.7	53.6	88.8
F185-18	223.0	17.4	68.26	11.58	5.06	2.02	0.54	0.05	5.62	0.22	0.10	0.03	0.000	6.3	99.8	50.3	91.4
F185-19	223.7	18.1	46.54	16.92	13.92	4.78	2.35	0.96	5.74	1.61	0.48	0.11	0.011	6.2	99.6	54.4	82.3
F185-20	227.0	21.4	48.66	18.18	13.22	2.71	7.29	3.40	0.80	1.81	0.52	0.06	0.015	3.0	99.7	47.2	49.1
F185-21	228.5	22.9	49.03	16.39	13.14	3.98	4.06	1.84	3.10	1.53	0.48	0.13	0.009	6.0	99.7	51.2	62.3
F185-22	230.8	25.2	65.49	10.82	10.85	3.60	0.34	0.75	5.30	1.25	0.04	0.06	0.004	1.3	99.8	47.9	84.4
F185-23	233.7	28.1	50.50	8.19	12.24	12.91	6.66	0.31	2.40	0.76	0.19	0.23	0.174	4.9	99.5	34.8	42.9
F185-24	234.8	29.2	51.48	11.42	11.17	11.47	3.21	0.24	3.21	0.58	0.08	0.09	0.136	6.5	99.6	50.6	68.5
F185-25	236.0	30.4	45.20	12.54	10.03	11.60	4.80	0.16	4.26	1.03	0.33	0.23	0.193	9.2	99.6	55.0	83.7
F185-26	239.8	34.2	47.72	14.75	11.75	9.01	7.64	2.34	1.57	1.17	0.36	0.13	0.035	3.2	99.7	41.0	44.6
F185-27	240.5	34.9	52.15	18.41	7.61	5.98	7.99	3.37	1.33	0.62	0.17	0.14	0.016	1.9	99.7	44.1	46.8
F185-28	241.5	35.9	50.94	15.97	9.89	7.76	0.66	1.52	3.76	0.69	0.17	0.09	0.018	8.2	99.7	59.4	79.9
F185-29	244.5	38.9	49.61	15.34	9.73	8.47	3.94	1.29	4.60	0.96	0.31	0.11	0.028	5.3	99.7	45.9	61.5
F185-30	247.5	41.9	49.83	16.92	8.42	7.53	7.48	2.45	2.18	0.96	0.20	0.12	0.026	3.5	99.6	43.2	48.1
F185-31	248.2	42.6	49.16	14.97	10.24	8.58	6.36	2.26	1.89	1.11	0.44	0.17	0.029	4.4	99.6	43.6	48.6
F185-32	254.2	48.6	47.55	14.81	10.00	9.45	7.67	1.89	2.46	0.87	0.29	0.15	0.039	4.5	99.7	42.1	48.3

Drillcore - sample no.	Depth, b.g.s. (m)	Depth, b.p.s (m)	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Cr_2O_3	L.O.I.	Sum	CIA	CIA-K
F280-39	282.4	0.2	51.30	25.94	5.67	1.21	0.13	0.08	4.51	0.40	0.13	0.05	<0.002	10.4	99.8	83.0	98.6
F280-40	285.0	2.6	51.05	24.39	11.73	0.66	0.12	0.03	0.35	0.59	0.05	0.03	0.006	10.9	99.9	97.4	98.9
F280-41	286.5	4.1	48.60	18.93	14.95	4.55	0.08	0.03	3.13	1.04	0.05	0.22	0.013	8.2	99.8	83.9	99.0
F280-42	288.2	5.8	47.27	22.99	12.87	3.10	0.09	0.04	2.66	0.95	0.08	0.17	0.013	9.6	99.8	88.0	99.0
F280-43	289.0	6.6	48.23	23.96	10.98	1.27	0.26	0.15	4.65	0.66	0.05	0.13	0.009	9.4	99.7	80.4	97.1
F280-44	291.0	8.6	46.55	22.27	14.18	1.06	0.22	0.29	5.76	0.55	0.03	0.05	0.013	8.7	99.7	75.6	96.2
F280-45	292.0	9.6	72.06	12.50	5.44	0.55	0.17	0.11	3.38	0.24	0.05	0.02	0.010	5.2	99.7	74.9	96.2
F280-46	293.0	10.6	58.06	16.95	8.82	1.19	0.50	0.21	7.30	0.64	0.18	0.03	0.014	5.8	99.7	64.7	93.0
F280-47	294.5	12.1	65.87	13.51	7.93	1.45	0.19	0.05	6.25	0.28	0.09	0.03	0.004	4.1	99.8	65.0	96.9
F280-48	296.4	14.0	48.98	15.40	15.49	3.60	0.68	0.07	8.20	0.72	0.26	0.02	0.079	6.3	99.8	59.8	91.8
F280-49	301.3	18.9	62.88	8.11	10.25	7.46	1.16	0.17	2.79	0.40	0.19	0.10	0.079	6.0	99.6	63.1	82.7
F280-50	304.0	21.6	70.05	14.30	1.68	0.73	0.15	0.10	9.93	0.03	0.03	<0.01	<0.002	2.8	99.8	55.8	97.0
F280-51	305.0	22.6	57.26	14.82	9.81	2.27	0.62	0.05	8.37	0.67	0.13	0.01	0.147	5.7	99.9	58.8	92.4
F280-52	308.0	25.6	79.24	9.69	1.71	0.53	0.11	0.12	6.51	0.04	0.02	<0.01	0.005	1.8	99.8	56.3	96.0
F280-53	311.0	28.6	72.14	13.16	1.84	0.45	0.13	0.18	10.18	0.01	0.03	<0.01	0.002	1.7	99.8	53.0	96.1
F280-54	315.3	32.9	43.55	17.65	13.64	5.63	1.36	0.06	5.84	2.27	0.67	0.09	<0.002	9.0	99.8	71.1	95.8
F280-55	316.8	34.4	44.50	15.33	16.94	6.03	0.73	0.08	8.66	1.89	0.44	0.23	0.003	4.8	99.6	60.2	95.8
F280-56	317.8	35.4	68.33	12.57	4.25	2.47	0.22	0.04	7.81	0.44	0.09	0.05	<0.002	3.5	99.8	58.2	96.4
F280-57	318.6	36.2	40.21	15.61	17.22	8.61	1.28	0.06	4.51	2.18	0.64	0.15	<0.002	9.3	99.8	71.3	92.1

Taylor, J. C., 1991, Computer programs for standarless quantitative analysis of minerals using full powder diffraction profile: Powder Diffraction, v. 6, p. 2-9.