

Appendix

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Appendix A – Outcrops

Catavi Formation



Fig. A 1 – Top figure show an overview of the sampled Catavi Formation outcrop. There is a strong inclination in the interbedded sandstones and shales. Bottom pictures show a closer view where the interbedding of sandstone and shale is clearer.

Uncía Formation



Fig. A 2 – Uncia Formation outcrop. Top picture show an overview of Uncía Formation, with strong deformation and chevron folding. Bottom left and right displays a closer view where interbedding of shale and sandstones is present.

Appendix B – Sampled rocks

Catavi Formation



Fig. B 1 - CAT 1, Shale (GC)

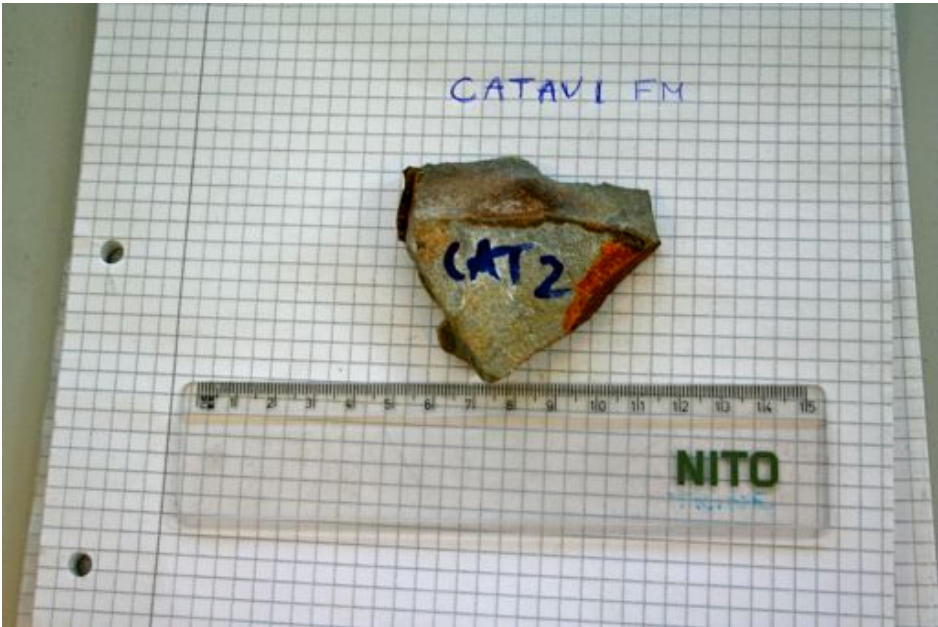


Fig. B 2 – CAT 2, Sandstone (GC)



Fig. B 3 - CAT 3, Shale (GC)



Fig. B 4 - CAT 4, Sandstone (GC)



Fig. B 5 - CAT 5, Shale (GC)



Fig. B 6 - CAT 6, Sandstone (GC)



Fig. B 7 - CAT 7, Shale (GC)



Fig. B 8 - CAT 8, Sandstone (GC)



Fig. B 9 - CAT 9, Shale (GC)



Fig. B 10 - CAT 10, Sandstone (GC)



Fig. B 11 - CAT 11, Shale (GC)



Fig. B 12 - CAT 12, Sandstone (GC)



Fig. B 13 - CAT 13, Shale (GC)



Fig. B 14 - CAT 14, Sandstone (GC)



Fig. B 15 - CAT 15, Shale (GC)



Fig. B 16 - CAT 16, Sandstone (GC)



Fig. B 17 - CAT 17, Shale (GC)



Fig. B 18 - CAT 18, Sandstone (GC)



Fig. B 19 - CAT 19, Shale (GC)



Fig. B 20 - CAT 20, Sandstone (GC)



Fig. B 21 - CAT 21, Shale (GC)



Fig. B 22 - CAT 22, Sandstone (GC)

Uncía Formation



Fig. B 23 – UN 1, Shale (GC)

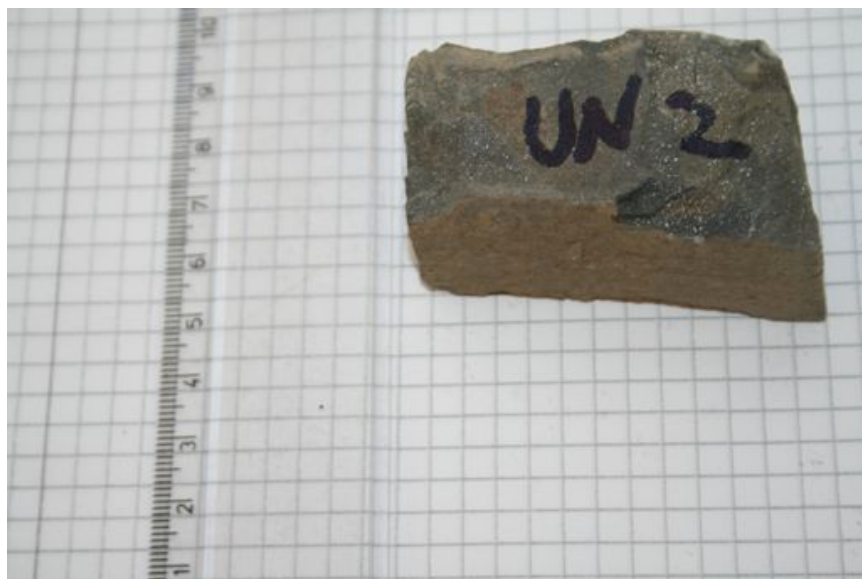


Fig. B 24 – UN 2, Sandstone (GC)



Fig. B 25 – UN 3, Shale (GC)



Fig. B 26 - UN 4, Shale (GC)



Fig. B 27 – Sandstone (TS)



Fig. B 28 - UN 6, Shale (GC)

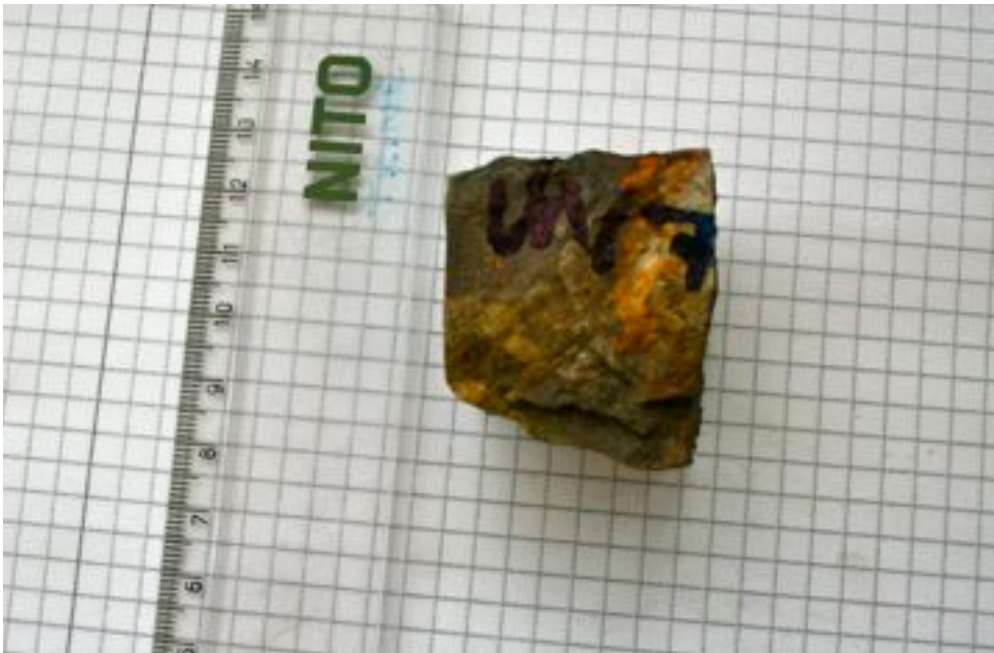


Fig. B 29 - UN 7, Sandstone (GC)



Fig. B 30 - UN 8, Shale (GC)



Fig. B 31 - UN 9, Shale (GC)



Fig. B 32 – UN 10, Sandstone (GC)



Fig. B 33 - UN 11, Shale (GC)



Fig. B 34 - UN 12, Shale (GC)



Fig. B 35 – UN 13, Sandstone (GC)



Fig. B 36 - UN 14, Shale (GC)



Fig. B 37 - UN 15, Shale (GC)



Fig. B 38 - UN 16, Sandstone (GC)

Appendix C – Equipment



Fig. C 1 – Milling process. Right: Retsch RS200 automated milling machine, Upper right: Beakers used during the milling process. Lower left: Milled material bagged and tagged, ready for geochemical and TOC measurements.



Fig. C 2 – Left: Thin sections, prepared for analysis. Right: Zeiss AXIO light microscope with an AxiCam ERc 5s camera connected to a computer.



Fig. C 3 – Upper left: Struers TegraPol-35 automated polishing machine. Right: Leica EM SCD500 high vacuum sputter coater. Lower left: Polished heavy mound containing heavy mineral fractions and coated mound fixed to aluminum peg with carbon tape ready for SEM analysis.



Fig. C 4 - Left: Zeiss Supra 35 VP featuring a Scanning electron microscope (SEM) with a Back scattered electron (BSE) detector, Cathodluminescence (CL) and a Energy dispersive spectrometer (EDS). To the right, three screens used for visualizing the fractions and analysing EDS results.

Appendix D – Geochemical data

		CIA	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MgO	CaO	Na ₂ O	K ₂ O	TiO ₂	P ₂ O ₅	MnO
			%	%	%	%	%	%	%	%	%	%
CAT1	Shale	78	61.75	21.20	3.00	1.18	0.18	0.50	4.58	1.02	0.12	0.02
CAT2	Sandstone	70	88.05	6.34	1.28	0.25	0.13	1.18	0.72	0.40	0.08	<0.01
CAT3	Shale	78	58.11	23.00	3.88	1.31	0.17	0.59	5.26	1.15	0.15	0.03
CAT4	Sandstone	68	88.23	6.64	0.69	0.15	0.11	1.31	0.83	0.41	0.07	0.01
CAT5	Shale	78	59.25	20.33	6.43	1.64	0.17	0.74	4.20	0.94	0.13	0.03
CAT6	Sandstone	76	71.35	14.05	4.92	1.18	0.17	1.03	2.59	0.85	0.11	0.02
CAT7	Shale	76	67.80	15.83	5.73	1.42	0.25	1.05	3.00	0.80	0.13	0.03
CAT8	Sandstone	70	77.76	9.53	4.83	0.89	0.45	1.11	1.62	0.70	0.14	0.06
CAT9	Shale	76	63.96	18.55	5.27	1.55	0.17	0.90	4.04	0.95	0.12	0.03
CAT10	Sandstone	35	74.76	6.99	3.28	0.73	5.57	1.21	0.92	0.38	0.06	0.15
CAT11	Shale	77	48.67	21.45	11.48	1.91	0.42	0.23	5.13	0.91	0.13	0.08
CAT12	Sandstone	84	84.46	8.64	1.13	0.19	0.07	0.05	1.49	0.44	0.05	0.01
CAT13	Shale	76	63.17	18.15	5.12	1.36	0.29	0.73	4.13	0.94	0.15	0.03
CAT14	Sandstone	65	81.72	8.15	2.91	0.53	0.35	1.57	1.26	0.40	0.06	0.03
CAT15	Shale	76	54.22	19.07	10.11	1.43	0.42	0.23	4.73	0.90	0.14	0.19
CAT16	Sandstone	72	82.17	8.74	3.03	0.68	0.22	1.21	1.27	0.55	0.13	0.02
CAT17	Shale	75	68.12	16.85	4.25	1.29	0.16	1.04	3.48	0.86	0.10	0.02
CAT18	Sandstone	73	74.83	12.40	4.40	0.97	0.23	1.41	2.11	0.65	0.16	0.05
CAT19	Shale	77	59.41	20.54	6.40	1.78	0.11	0.78	4.43	0.87	0.09	0.03
CAT20	Sandstone	72	72.76	13.06	4.28	1.20	0.57	0.99	2.51	0.77	0.13	0.06
CAT21	Shale	78	60.01	20.48	5.24	1.02	0.29	0.36	4.70	0.93	0.13	0.07
CAT22	Sandstone	84	87.93	6.55	1.53	0.14	0.03	0.07	1.19	0.35	0.07	0.01
UN1	Shale	81	66.77	15.13	8.41	1.36	0.24	0.58	2.35	0.79	0.16	0.04
UN2	Sandstone	87	76.59	8.44	9.15	1.34	0.18	0.13	0.86	0.54	0.08	0.06
UN3	Shale	79	62.34	18.43	7.61	1.39	0.33	0.77	3.18	0.93	0.23	0.03
UN4	Shale	79	62.72	17.89	7.53	1.36	0.34	0.69	3.17	0.98	0.22	0.04
UN6	Shale	79	61.39	19.80	6.55	1.38	0.34	0.73	3.47	0.98	0.17	0.03
UN7	Sandstone	83	77.11	9.72	6.53	0.95	0.09	0.44	1.34	0.58	0.15	0.03
UN8	Shale	80	63.24	18.38	6.54	1.26	0.23	0.72	3.25	0.93	0.17	0.03
UN9	Shale	79	62.94	19.04	6.14	1.29	0.22	0.78	3.54	0.98	0.13	0.03
UN10	Sandstone	86	71.58	10.39	10.57	1.62	0.28	0.18	1.26	0.70	0.18	0.06
UN11	Shale	81	71.10	13.24	7.38	1.21	0.24	0.59	1.94	0.74	0.13	0.04
UN12	Shale	77	71.16	13.19	6.49	1.22	0.51	0.69	2.06	0.72	0.13	0.05
UN13	Sandstone	79	79.83	8.32	6.06	0.80	0.12	0.74	1.03	0.47	0.14	0.03
UN14	Shale	78	62.39	20.02	5.41	1.27	0.23	0.82	3.81	1.01	0.15	0.03
UN15	Shale	78	69.74	14.35	6.36	1.17	0.21	0.75	2.49	0.88	0.15	0.03
UN16	Sandstone	77	81.94	7.24	5.40	0.81	0.25	0.59	0.95	0.54	0.11	0.06
UCC			65.9	15.2	4.5	2.2	4.2	3.9	3.4	0.5	0.2	0.08

Table D 1 – Geochemical data

Cr	Ni	Sc	LOI	Sum	TOT/C	Ba	Co	Cs	Ga	Hf	Nb
PPM	PPM	PPM	%	%	%	PPM	PPM	PPM	PPM	PPM	PPM
82.2	20.00	17.00	6.30	99.82	0.40	562.00	5.80	28.30	26.00	7.10	19.70
41.1	20.00	4.00	1.50	99.93	0.09	86.00	3.10	2.90	6.80	10.30	8.20
116.5	28.00	20.00	6.10	99.73	0.61	688.00	7.40	39.00	29.10	15.10	23.50
20.6	20.00	4.00	1.50	99.93	0.06	96.00	1.70	3.50	3.50	11.50	6.90
89.1	43.00	17.00	5.60	99.49	0.61	571.00	14.70	31.40	25.30	7.20	20.20
68.5	29.00	13.00	3.20	99.47	0.22	360.00	10.00	20.20	14.50	9.10	16.80
61.7	26.00	14.00	3.80	99.85	0.21	386.00	11.00	18.40	17.80	7.20	15.40
27.4	20.00	9.00	2.80	99.85	0.27	213.00	7.00	11.00	10.60	15.30	12.30
75.4	20.00	16.00	4.30	99.81	0.31	499.00	8.60	32.00	22.60	9.00	18.00
13.7	20.00	6.00	5.80	99.91	1.26	118.00	5.60	6.30	7.30	9.10	7.20
95.9	41.00	18.00	9.30	99.76	1.63	621.00	19.90	37.50	25.30	4.60	19.10
34.3	20.00	6.00	3.40	99.91	0.06	138.00	1.40	7.50	6.80	9.70	7.50
68.5	39.00	16.00	5.70	99.80	0.62	462.00	12.60	29.10	19.80	10.00	16.80
34.3	20.00	6.00	2.90	99.92	0.44	128.00	6.00	6.90	5.80	9.90	8.10
89.1	51.00	17.00	8.30	99.79	1.49	525.00	13.90	30.00	22.20	7.30	19.20
34.3	20.00	8.00	1.80	99.86	0.10	156.00	6.10	8.60	9.00	17.80	10.30
54.8	20.00	15.00	3.70	99.85	0.20	422.00	6.50	23.80	19.70	6.90	16.00
61.7	26.00	11.00	2.60	99.85	0.11	266.00	7.20	12.90	12.60	11.10	12.00
82.2	46.00	16.00	5.20	99.69	0.37	579.00	8.70	32.30	24.50	6.10	18.00
54.8	40.00	16.00	3.50	99.81	0.28	333.00	9.80	19.20	12.30	11.50	16.20
82.2	37.00	17.00	6.60	99.80	0.84	540.00	15.00	36.30	24.90	8.60	17.30
20.6	20.00	5.00	2.00	99.92	0.04	94.00	1.70	6.70	2.80	9.60	6.80
61.7	20.00	13.00	3.90	99.79	0.20	322.00	13.50	8.90	17.10	6.10	14.30
34.3	41.00	8.00	2.50	99.84	0.15	133.00	16.10	3.40	11.30	4.80	10.20
89.1	20.00	16.00	4.60	99.80	0.44	418.00	11.20	14.40	20.10	6.40	16.70
82.2	20.00	17.00	4.80	99.74	0.44	437.00	16.60	15.70	20.60	6.60	18.50
95.9	22.00	17.00	4.90	99.79	0.63	489.00	17.30	18.30	25.00	6.30	20.10
34.3	20.00	9.00	2.90	99.87	0.15	189.00	10.20	6.30	13.70	5.70	12.10
75.4	22.00	16.00	5.00	99.78	0.56	429.00	12.40	12.60	19.90	6.60	16.60
82.2	20.00	16.00	4.70	99.81	0.45	461.00	11.40	15.20	23.60	5.90	18.80
54.8	41.00	10.00	3.00	99.79	0.17	188.00	14.40	4.10	13.10	6.10	14.80
54.8	26.00	11.00	3.30	99.86	0.32	274.00	12.00	9.50	17.60	7.60	13.50
48.0	20.00	12.00	3.60	99.88	0.39	269.00	11.70	9.40	17.60	7.20	14.40
20.6	20.00	7.00	2.30	99.82	0.15	128.00	9.10	5.80	7.10	5.60	7.90
89.1	25.00	17.00	4.70	99.82	0.50	512.00	7.60	18.90	25.60	8.00	19.20
506.9	20.00	13.00	3.60	99.82	0.39	315.00	9.20	10.60	16.90	8.60	15.20
20.6	26.00	7.00	2.00	99.86	0.17	129.00	7.40	2.90	7.40	5.50	8.80
83	44	13.6				550	17	4.6	17	5.8	12

Sr	Ta	Th	U	V	Zr	Y	La	Ce	Pr	Nd	Sm
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
35.20	1.60	19.00	4.30	131.00	228.00	41.30	63.30	128.10	14.39	54.20	10.27
15.40	0.60	11.20	2.30	29.00	392.10	27.40	28.90	63.70	6.95	27.70	4.89
39.90	1.80	24.70	5.10	157.00	507.30	53.20	65.10	129.70	15.44	59.20	11.56
15.60	0.80	10.60	2.30	31.00	359.70	21.00	29.00	58.90	6.84	26.00	4.72
43.40	1.30	19.00	3.90	139.00	221.80	39.60	55.70	108.90	12.73	47.60	9.49
36.40	1.40	15.70	3.70	86.00	341.30	40.60	44.80	96.20	10.95	42.90	7.80
38.30	1.40	14.80	3.50	95.00	248.80	38.10	37.10	78.60	8.69	34.10	6.85
34.90	1.20	16.30	4.30	51.00	527.80	43.60	39.60	82.00	9.26	36.50	7.15
39.80	1.50	18.60	4.20	114.00	291.40	44.10	57.70	116.10	12.98	47.60	9.41
115.00	0.60	10.30	2.30	35.00	333.10	26.10	27.00	56.70	6.26	25.00	4.57
33.50	1.30	18.10	4.00	152.00	146.70	40.90	53.50	105.70	12.70	57.20	9.58
9.20	0.80	11.20	2.40	38.00	334.80	27.10	29.70	63.30	7.35	28.20	5.01
31.50	1.60	18.50	4.00	118.00	314.60	44.80	52.10	103.10	12.49	43.70	9.06
21.90	0.70	11.70	2.50	33.00	342.00	26.50	29.80	62.00	7.16	28.20	5.06
25.90	1.30	18.60	4.30	132.00	265.80	42.30	53.10	107.50	12.24	50.90	9.41
26.70	1.00	16.00	3.90	39.00	627.50	39.00	28.60	62.80	6.67	24.50	5.60
41.20	1.40	15.60	3.90	98.00	244.20	38.00	47.50	96.60	10.89	42.20	8.11
36.40	1.00	15.00	3.80	60.00	390.70	42.30	40.70	85.60	9.91	39.10	7.99
53.20	1.50	17.70	3.70	136.00	177.70	36.70	53.00	102.90	12.25	45.80	8.57
46.30	1.10	16.10	4.00	72.00	380.80	50.70	42.50	91.60	10.64	39.80	8.44
34.70	1.30	18.90	4.50	138.00	265.50	43.50	53.10	108.90	12.70	48.90	9.42
8.10	0.70	10.90	2.10	28.00	340.20	24.80	24.50	55.50	6.21	25.30	4.18
54.50	1.10	12.10	2.70	97.00	211.50	31.10	38.10	79.30	9.21	37.30	6.91
19.10	0.70	8.50	1.50	74.00	153.40	21.70	21.80	45.50	5.46	20.70	4.36
70.40	1.20	15.30	3.20	115.00	203.40	36.20	45.10	90.10	10.66	42.90	7.99
67.10	1.30	15.90	3.10	123.00	215.70	36.90	52.10	105.00	12.49	44.20	9.86
67.90	1.60	18.10	3.50	131.00	233.90	39.20	47.80	98.80	11.73	43.70	8.84
31.70	1.10	9.20	2.20	64.00	214.20	25.60	25.50	53.90	6.22	21.60	4.55
56.00	1.10	15.10	3.30	110.00	212.50	34.30	45.60	88.50	10.49	40.40	8.04
67.30	1.40	16.60	3.40	131.00	228.00	33.50	47.40	97.30	11.23	45.80	8.55
17.30	1.30	10.00	1.90	71.00	192.60	25.80	29.90	68.90	7.79	33.60	6.47
46.00	1.10	13.10	2.90	86.00	260.30	32.10	36.30	78.20	8.89	32.90	6.50
45.20	1.00	12.60	3.00	84.00	266.00	32.00	38.10	77.00	8.60	30.90	6.46
23.90	0.70	6.90	1.50	46.00	195.70	19.90	19.60	40.40	4.84	23.40	3.79
62.70	1.40	18.90	3.90	132.00	277.00	40.20	58.70	119.20	13.57	55.00	9.94
49.00	1.20	14.80	3.20	94.00	341.40	38.00	45.90	93.40	10.80	39.30	7.77
19.00	0.90	7.70	1.90	35.00	213.80	23.20	21.30	44.30	5.07	19.50	3.94
350	1	10.8	2.8	107	190	22	30	64	7.1	26	4.5

Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	ΣREE	Eu/Eu*	Ce/Ce*	LaN/YbN
PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM				
1.81	9.25	1.30	8.02	1.49	4.29	0.63	4.29	0.63	301.97	0.54	0.40	9.97
0.83	4.89	0.73	4.44	0.93	2.66	0.41	2.39	0.43	149.85	0.50	0.43	8.17
2.18	11.16	1.66	10.17	1.90	5.14	0.85	5.21	0.79	320.06	0.56	0.39	8.44
0.68	3.93	0.67	3.88	0.72	2.22	0.33	2.73	0.36	140.98	0.46	0.40	7.18
1.77	8.55	1.30	7.74	1.60	4.25	0.66	4.41	0.64	265.34	0.57	0.39	8.53
1.56	7.14	1.23	6.84	1.45	4.33	0.63	4.14	0.63	230.60	0.61	0.42	7.31
1.31	7.25	1.06	6.77	1.36	3.66	0.57	3.84	0.56	191.72	0.55	0.42	6.53
1.69	7.25	1.10	7.73	1.54	4.57	0.65	4.93	0.74	204.71	0.69	0.41	5.43
1.75	8.78	1.31	8.40	1.60	4.62	0.63	4.30	0.64	275.82	0.56	0.40	9.07
1.27	4.70	0.73	4.38	0.92	2.46	0.37	2.49	0.42	137.27	0.81	0.41	7.33
1.86	8.57	1.29	6.81	1.33	3.94	0.63	3.78	0.58	267.47	0.60	0.38	9.56
0.65	4.63	0.82	4.87	0.95	2.86	0.50	3.51	0.44	152.79	0.39	0.42	5.72
1.77	8.73	1.37	7.77	1.49	4.49	0.67	4.69	0.61	252.04	0.58	0.39	7.51
0.73	4.53	0.72	4.44	0.86	2.55	0.41	2.73	0.42	149.61	0.44	0.41	7.38
1.71	8.53	1.30	7.07	1.45	4.12	0.62	4.18	0.63	262.76	0.56	0.40	8.58
1.25	6.64	1.03	6.95	1.36	4.19	0.59	3.99	0.67	154.84	0.61	0.44	4.84
1.37	7.13	1.04	6.73	1.37	3.65	0.55	3.86	0.58	231.58	0.52	0.40	8.31
1.45	8.22	1.18	7.39	1.41	4.32	0.65	4.17	0.65	212.74	0.53	0.41	6.59
1.52	7.17	1.17	6.39	1.36	3.81	0.61	3.79	0.54	248.88	0.56	0.38	9.45
1.78	9.80	1.55	8.29	1.70	4.85	0.79	5.06	0.76	227.56	0.58	0.42	5.68
1.91	8.50	1.34	7.01	1.47	4.11	0.66	4.51	0.63	263.16	0.62	0.40	7.96
0.62	4.15	0.71	4.64	0.98	2.97	0.42	2.70	0.39	133.27	0.44	0.44	6.13
1.40	6.28	0.99	5.38	1.03	3.32	0.44	3.56	0.48	193.70	0.62	0.41	7.23
0.97	4.38	0.96	4.09	0.78	2.20	0.31	1.88	0.28	113.67	0.65	0.41	7.83
1.69	7.62	1.12	6.51	1.17	3.63	0.57	3.56	0.50	223.12	0.63	0.39	8.56
1.82	8.73	1.29	7.51	1.30	3.97	0.57	3.60	0.50	252.94	0.57	0.40	9.78
1.71	7.93	1.25	6.72	1.45	4.30	0.64	3.84	0.59	239.30	0.59	0.41	8.41
0.91	4.23	0.73	4.39	0.94	2.80	0.39	2.47	0.38	129.01	0.60	0.42	6.98
1.63	7.16	1.11	6.64	1.27	3.66	0.55	3.76	0.49	219.30	0.62	0.38	8.19
1.55	6.91	1.08	6.25	1.28	4.06	0.57	4.00	0.57	236.55	0.58	0.40	8.01
1.24	5.74	0.87	4.76	1.07	2.88	0.39	2.68	0.38	166.67	0.59	0.44	7.54
1.37	6.62	0.96	5.66	1.16	3.33	0.53	3.12	0.46	186.00	0.61	0.42	7.86
1.32	6.49	0.98	5.90	1.18	3.16	0.49	3.26	0.48	184.32	0.60	0.40	7.90
0.85	4.41	0.64	3.66	0.77	1.95	0.28	1.93	0.28	106.80	0.62	0.39	6.86
1.90	9.19	1.27	7.78	1.56	4.59	0.63	4.09	0.70	288.12	0.58	0.40	9.70
1.55	7.18	1.14	6.62	1.27	3.82	0.57	3.70	0.54	223.56	0.60	0.40	8.38
0.78	4.03	0.70	4.09	0.78	2.34	0.36	2.69	0.32	110.20	0.58	0.41	5.35
0.88	3.8	0.64	3.5	0.8	2.3	0.33	2.2	0.32	146.37	0.61	1	9.21

K/Cs	Th/U	La/Sc	Ti/Zr	Zr/Sc	Th/Sc	Y/Ni	Cr/V	Sc/Th	Cr/Th	Nb/Y	Zr/Ti
2193.42	4.42	0.33	26.82	13.41	1.12	2.07	0.63	0.89	4.33	0.48	0.04
2101.18	4.87	0.10	6.12	98.03	2.80	1.37	1.42	0.36	3.67	0.30	0.16
1834.46	4.84	0.37	13.59	25.37	1.24	1.90	0.74	0.81	4.71	0.44	0.07
1677.27	4.61	0.05	6.83	89.93	2.65	1.05	0.66	0.38	1.94	0.33	0.15
1575.15	4.87	0.32	25.41	13.05	1.12	0.92	0.64	0.89	4.69	0.51	0.04
1766.89	4.24	0.19	14.93	26.25	1.21	1.40	0.80	0.83	4.36	0.41	0.07
2142.68	4.23	0.24	19.28	17.77	1.06	1.47	0.65	0.95	4.17	0.40	0.05
1934.66	3.79	0.15	7.95	58.64	1.81	2.18	0.54	0.55	1.68	0.28	0.13
2552.88	4.43	0.30	19.54	18.21	1.16	2.21	0.66	0.86	4.05	0.41	0.05
1696.38	4.48	0.21	6.84	55.52	1.72	1.31	0.39	0.58	1.33	0.28	0.15
1820.47	4.53	0.33	37.19	8.15	1.01	1.00	0.63	0.99	5.30	0.47	0.03
1475.21	4.67	0.08	7.88	55.80	1.87	1.36	0.90	0.54	3.06	0.28	0.13
1674.59	4.63	0.26	17.91	19.66	1.16	1.15	0.58	0.86	3.70	0.38	0.06
1951.36	4.68	0.09	7.01	57.00	1.95	1.33	1.04	0.51	2.93	0.31	0.14
2721.26	4.33	0.29	20.30	15.64	1.09	0.83	0.67	0.91	4.79	0.45	0.05
1344.38	4.10	0.13	5.25	78.44	2.00	1.95	0.88	0.50	2.14	0.26	0.19
2062.43	4.00	0.26	21.11	16.28	1.04	1.90	0.56	0.96	3.51	0.42	0.05
1120.38	3.95	0.17	9.97	35.52	1.36	1.63	1.03	0.73	4.11	0.28	0.10
1969.95	4.78	0.32	29.35	11.11	1.11	0.80	0.60	0.90	4.64	0.49	0.03
1111.13	4.03	0.17	12.12	23.80	1.01	1.27	0.76	0.99	3.40	0.32	0.08
1065.11	4.20	0.32	21.00	15.62	1.11	1.18	0.60	0.90	4.35	0.40	0.05
1354.40	5.19	0.03	6.17	68.04	2.18	1.24	0.73	0.46	1.89	0.27	0.16
1223.39	4.48	0.21	22.39	16.27	0.93	1.56	0.64	1.07	5.10	0.46	0.04
1048.76	5.67	0.13	21.10	19.18	1.06	0.53	0.46	0.94	4.03	0.47	0.05
1213.09	4.78	0.25	27.41	12.71	0.96	1.81	0.77	1.05	5.82	0.46	0.04
1136.40	5.13	0.26	27.24	12.69	0.94	1.85	0.67	1.07	5.17	0.50	0.04
1650.32	5.17	0.32	25.12	13.76	1.06	1.78	0.73	0.94	5.30	0.51	0.04
1178.97	4.18	0.16	16.23	23.80	1.02	1.28	0.54	0.98	3.72	0.47	0.06
1516.93	4.58	0.25	26.24	13.28	0.94	1.56	0.69	1.06	4.99	0.48	0.04
1309.74	4.88	0.30	25.77	14.25	1.04	1.68	0.63	0.96	4.95	0.56	0.04
1226.73	5.26	0.15	21.79	19.26	1.00	0.63	0.77	1.00	5.48	0.57	0.05
1214.64	4.52	0.22	17.04	23.66	1.19	1.23	0.64	0.84	4.18	0.42	0.06
1358.74	4.20	0.23	16.23	22.17	1.05	1.60	0.57	0.95	3.81	0.45	0.06
1139.32	4.60	0.09	14.40	27.96	0.99	1.00	0.45	1.01	2.98	0.40	0.07
1085.97	4.85	0.33	21.86	16.29	1.11	1.61	0.67	0.90	4.71	0.48	0.05
1075.56	4.63	0.22	15.45	26.26	1.14	1.90	5.39	0.88	34.25	0.40	0.06
1475.42	4.05	0.10	15.14	30.54	1.10	0.89	0.59	0.91	2.67	0.38	0.07
6117.48	3.86	2.21	18.3	13.97	0.79	0.5	0.78	1.26	7.67	0.55	0.05

Appendix E – Additional data: SEM – BSE – CL – EDS

Catavi Formation

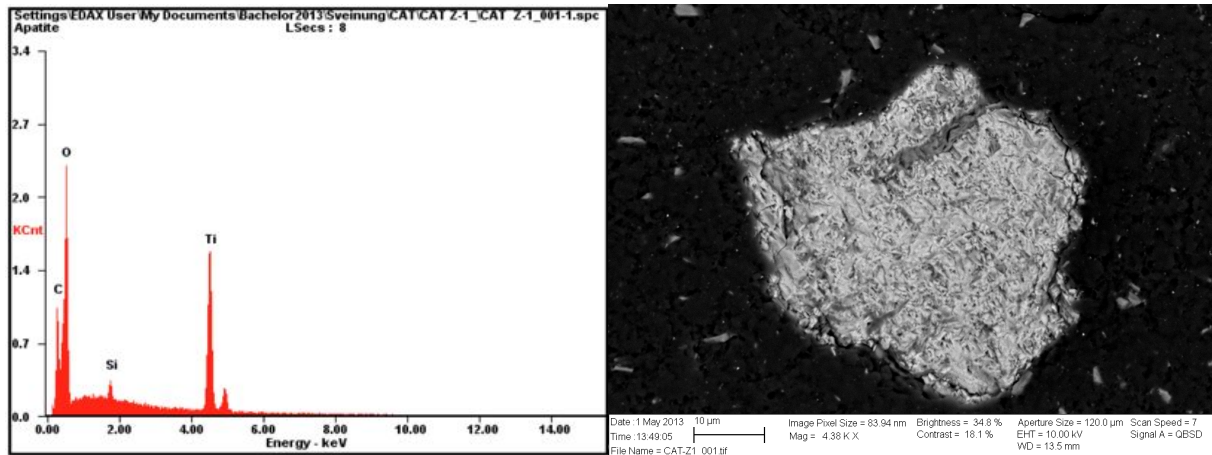


Fig.E 1 – Left: Geochemical signature for titanite. Right: Sub-angular titanite grain.

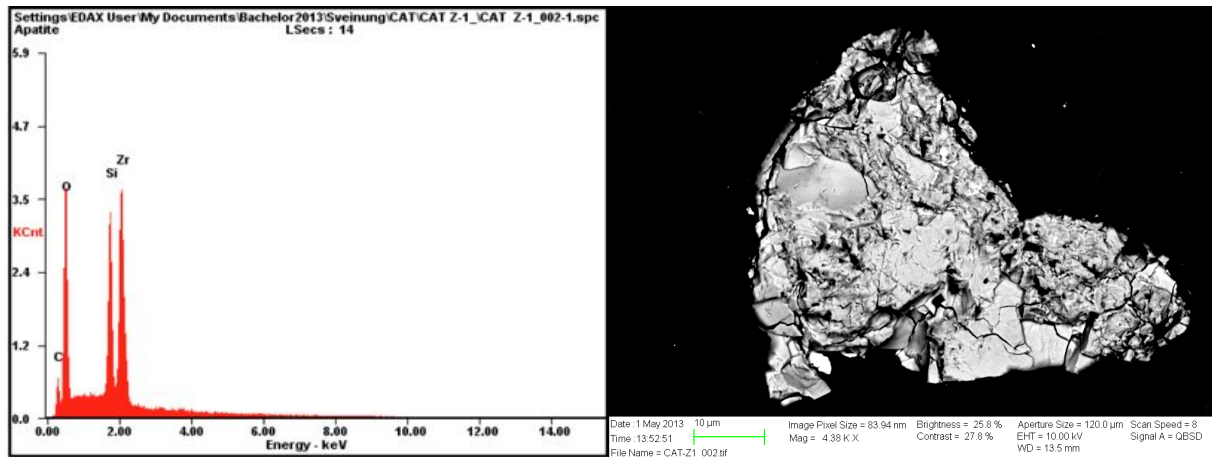


Fig.E 2 – Left: Geochemical signature for zircon. Right: Fragmented zircon grain.

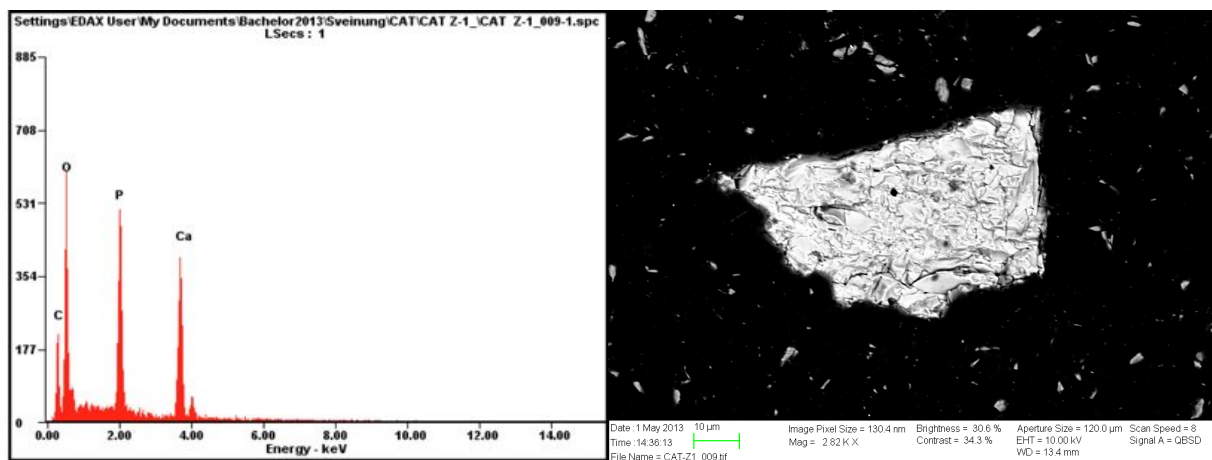


Fig.E 3 – Left: Geochemical signature for apatite. Right: Angular to sub-angular apatite grain.

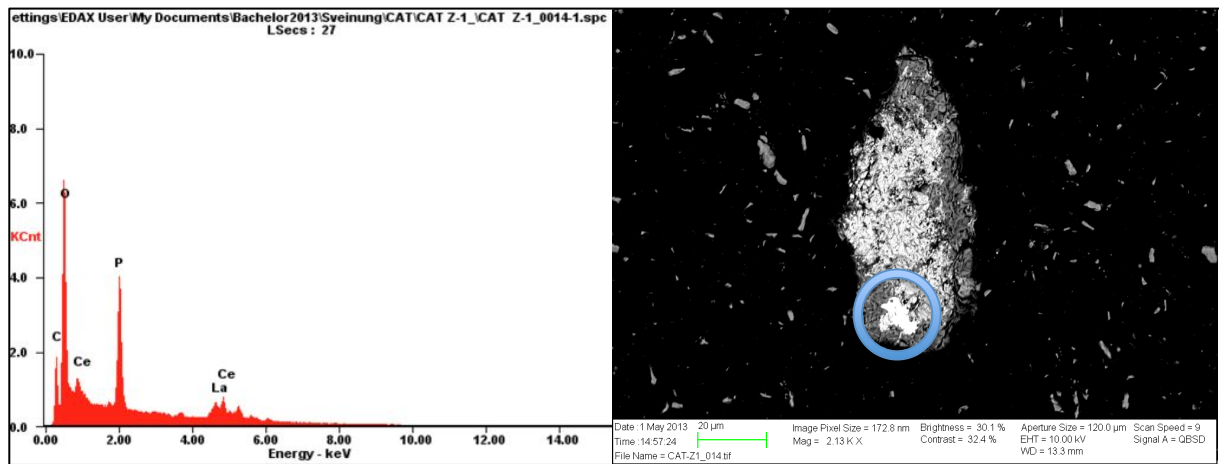


Fig.E 4 – Left: Geochemical signature for monazite. Right: White monazite fragment inside apatite and muscovite.

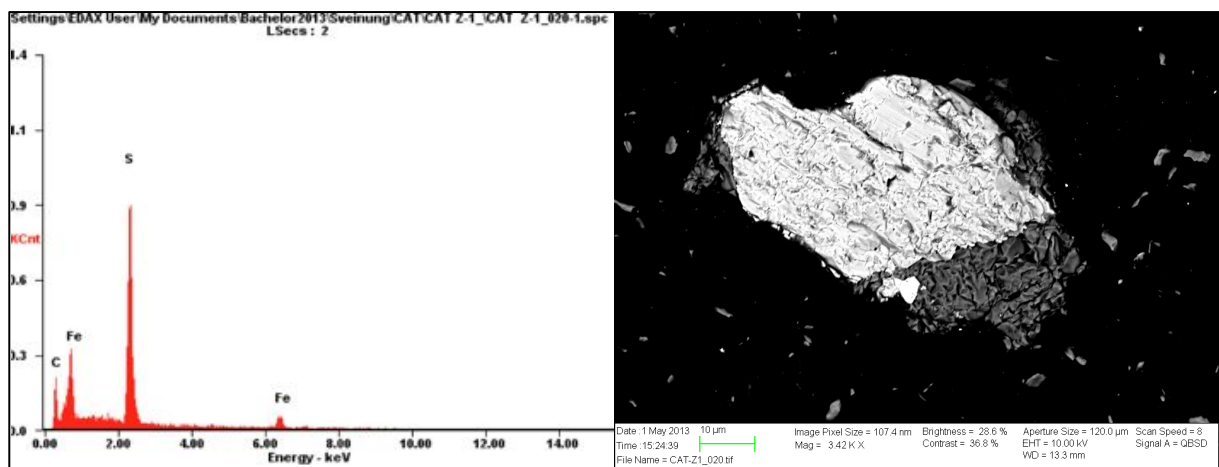


Fig.E 5 – Left: Geochemical signature for pyrite. Right: Bright white pyrite accompanied by darker muscovite.

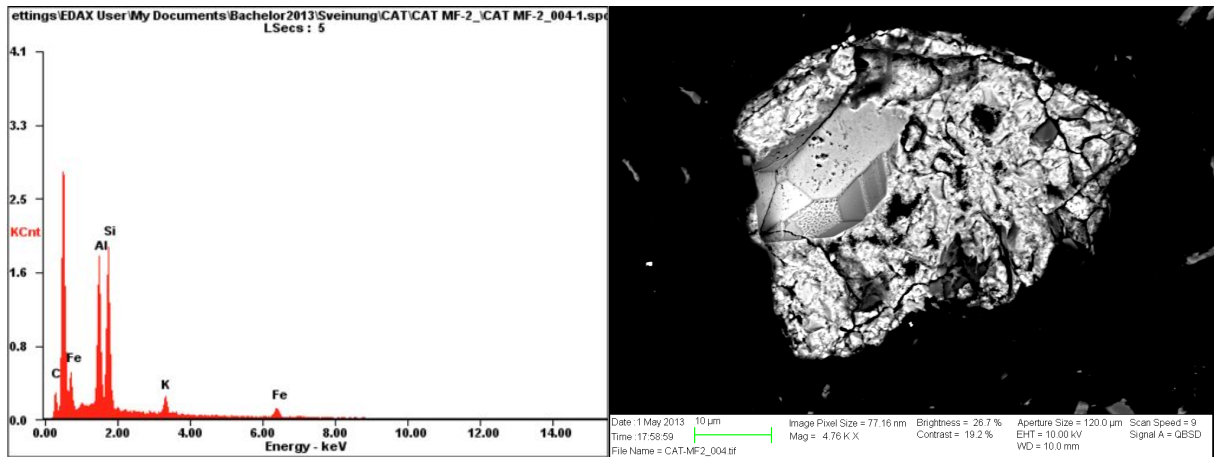


Fig.E 6 – Left: Geochemical signature for muscovite. Right: Muscovite surrounding an octahedral magnetite crystal.

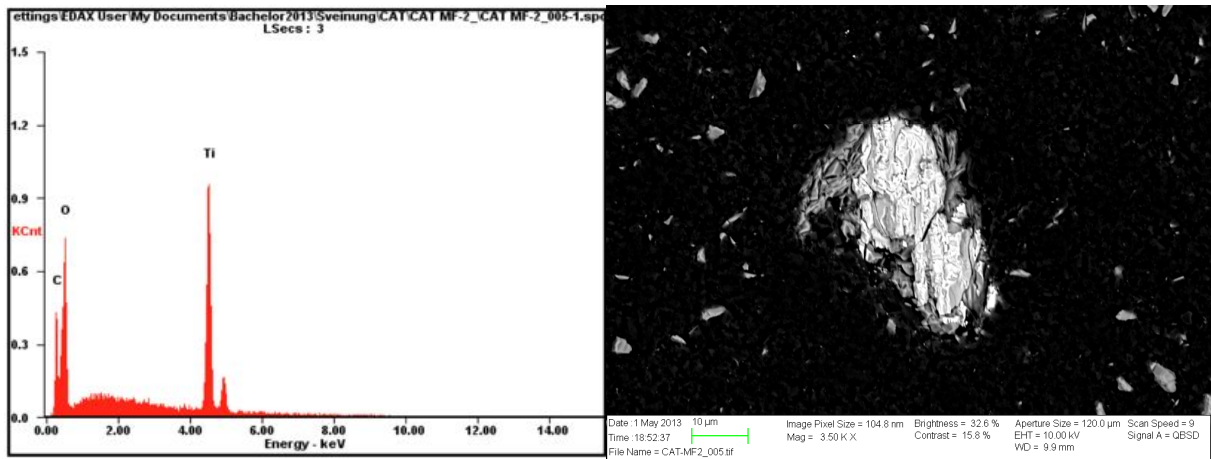


Fig.E 7 – Left: Geochemical signature for rutile. Right:

Uncía Formation

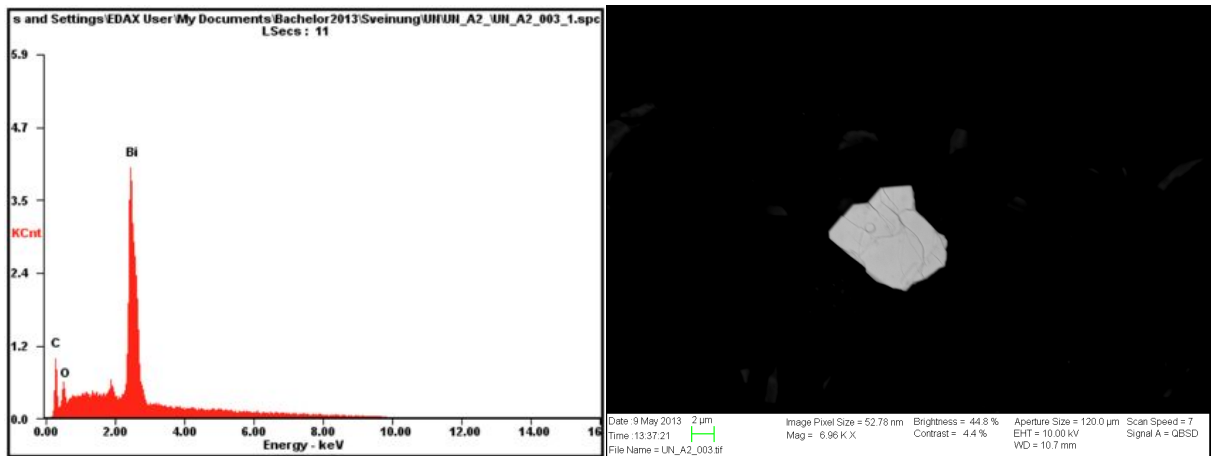


Fig.E 8 – Left: Geochemical signature for bismite. Right: Bismite grain.

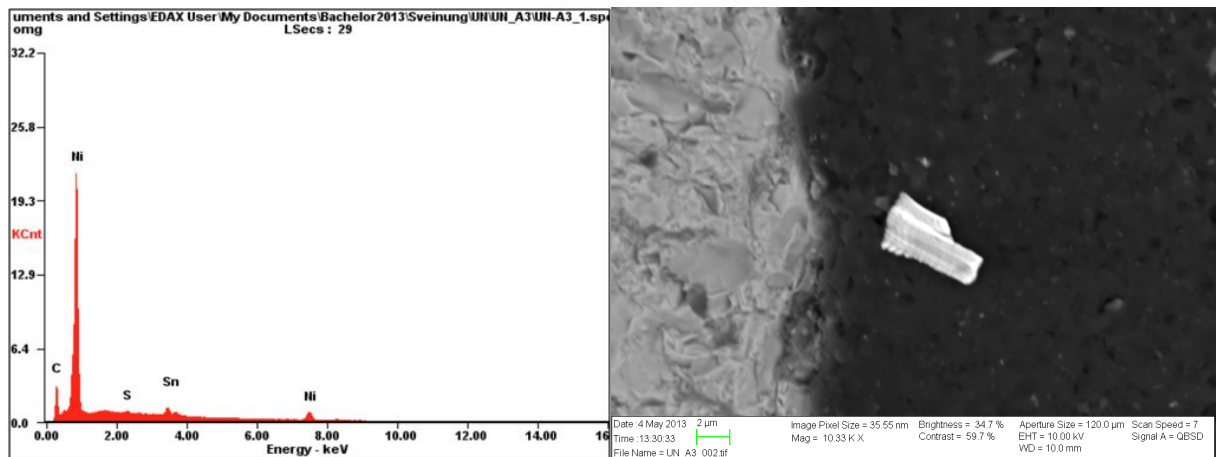


Fig.E 9 – Left: Geochemical signature for nisnite. Right: Nisnite grain.

