

STANDARD BIOGEOCHEMICAL REFERENCE MATERIAL FOR Au-REE DEPOSITS

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UPDEEP_JUN_TWIG_ASH

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1. INTRODUCTION

UpDeep standard reference materials (SRM) are intended to be used in vegetation (i.e. biogeochemical) analysis for providing an affordable method of controlling the quality of plant samples for mineral exploration purposes. SRMs are produced less rigorously compared to e.g. certified reference materials. The UpDeep SRM samples do not follow the ISO standardization and are therefore not certified reference materials (CRM). However, the UpDeep standard reference materials are more affordable and can thus be inserted in the analysis sequence more frequently than CRMs. For the user of the UpDeep SRMs, the purpose is to externally quantify laboratory accuracy and precision.

2. SOURCE MATERIALS

UPDEEP_JUN_TWIG_ASH SRM is common juniper (*Juniperus communis*) twigs (foliage) collected on top of a Au-REE bearing quartz-hematite vein in the Mäkärä exploration target in year 2017. UPDEEP_JUN_TWIG_ASH is one of six reference materials (Ah- and B-horizon, common juniper foliage, Scots pine bark, Norway spruce bark and foliage) collected in the UpDeep project on the Mäkärä and Tiira exploration targets in northern Finland.

3. COMMINUTION AND HOMOGENISATION PROCEDURES

The UPDEEP_JUN_TWIG_ASH SRM was prepared as follows:

- sampling of the common juniper foliage samples in the field
- drying at 40°C for 48 h
- separating the needles and the twigs manually
- milling the twigs to < 1 mm with Retsch SM 300 heavy metal free cutting mill
- ashing of the milled material in 475 °C for 48 h at Labtium Oy (Kuopio, Finland)
- homogenizing the ashed material

- 0.5 g aliquots were taken from the split homogenized material to be sent to commercial analytical laboratories

4. ANALYTICAL PROGRAM

UPDEEP_JUN_TWIG_ASH SRM samples were analyzed in three geochemical analytical laboratories:

- Activation Laboratories Ltd. (Actlabs, Ancaster, ON, Canada)
- ALS Minerals/ALS Global (ALS, Vancouver, Canada through, ALS, Sodankylä, Finland)
- Bureau Veritas Minerals Acmelabs (BVAcme labs, Shaughnessy St., Vancouver, BC, Canada)

The analytical methods are presented in table 1.

Table 1. Laboratories, analytical packages and analytical details used to analyse the UPDEEP_JUN_TWIG_ASH.

Laboratory	Analytical package	pretreatment	sample weight (g)	digestion	Instrumentation	# of elements
ALS	ME-VEG41a ME-VEG41a_REE	ashing	0.25	digested in 75% aqua regia using a digestion block operating at 115°C	Agilent 725-ES (ICP-OES) ja Agilent 7900 (ICP-MS) corrected for spectral interferences	53 12
ALS	ME_HALO1a	ashing	0.25	ashed samples leached with hot deionized water, then centrifuged to remove solid	Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Ion Chromatography (IC)	4
BVAcme labs	VG104-EXT-REE	ashing	0.5	modified aqua regia digestion	ICP-MS/ICP-OES	63

				1:1:1 HNO3:HCl:H2O		
Actlabs	2E	ashed	0.25	aqua regia at 95oC for 2 hours	Perkin Elmer Sciex ELAN 6000, 6100 or 9000 ICP/MS	63

Ten UPDEEP_JUN_TWIG_ASH SRM aliquots were sent to each laboratory. Tables 2, 3 and 4 present information values for the laboratory results. The RSD% values < 5 are marked as green, the $5 \leq \text{RSD}\% \leq 15$ are marked with orange and the $\text{RSD}\% > 15$ are marked with red. Elements having less than four observations between the detection limits are coloured grey.

5. STATISTICAL ANALYSIS

Analysed elements, units, lower (LDL) and upper detection limits (UDL), percentage of <LDL, >UDL and discretized values, mean, median, standard deviation (SD), relative standard deviation (RSD%) and median absolute deviation (MAD) are presented in Chapter 6. Original data, quality control monitoring results and statistical measures are available upon request.

6. PARTICIPANT LABORATORIES

6.1. Actlabs, Ancaster, Canada

Table 2. Statistics for UPDEEP_JUN_TWIG_ASH_Actlabs based on 10 aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values, SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the $5 \leq \text{RSD}\% \leq 15$ are marked with orange and the $\text{RSD}\% > 15$ are marked with red. Elements having less than four observations between the detection limits are coloured grey.

element	unit	LDL_ppm	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
Ag	ppm	0.2	100	NA	0	100	0.15	0.15	0	0	0
Al	ppm	2	0	NA	0	0	378.1	376	14.418	3.8133	14.0847
As	ppm	3	100	NA	0	100	2.25	2.25	0	0	0
Au	ppb	5	40	NA	0	80	5.1	5	1.89	37.0595	1.6679
B	ppm	5	0	NA	0	0	178.3	178.5	16.6203	9.3215	22.9803
Ba	ppm	3	0	NA	0	0	863.7	859.5	16.9971	1.9679	13.3434
Be	ppm	0.08	100	NA	0	100	0.06	0.06	0	0	0
Bi	ppm	0.05	100	NA	0	100	0.0375	0.0375	0	0	0
Ca	%	0.1	0	NA	0	0	33.04	32.95	0.645	1.9521	0.7413
Cd	ppm	0.01	0	NA	0	30	0.743	0.755	0.0327	4.398	0.0297
Ce	ppm	0.01	0	NA	0	0	3.594	3.6	0.0595	1.655	0.0741
Co	ppm	0.01	0	NA	0	0	3.759	3.765	0.084	2.2344	0.0741
Cr	ppm	10	100	NA	0	100	7.5	7.5	0	0	0
Cs	ppm	0.001	0	NA	0	0	0.1537	0.1545	0.0087	5.6889	0.0096
Cu	ppm	0.2	0	NA	0	0	91.11	90.95	1.7947	1.9698	1.705
Dy	ppm	0.001	0	NA	0	0	0.1899	0.191	0.0075	3.9442	0.0059
Er	ppm	0.001	0	NA	0	30	0.0883	0.089	0.005	5.6259	0.003
Eu	ppm	0.001	0	NA	0	0	0.1411	0.1415	0.0049	3.4792	0.0074
Fe	%	0.01	0	NA	0	90	0.101	0.1	0.0032	3.131	0
Ga	ppm	0.1	0	NA	0	80	0.22	0.2	0.0422	19.1653	0
Gd	ppm	0.01	0	NA	0	100	0.303	0.3	0.0048	1.5942	0
Ge	ppm	0.1	100	NA	0	100	0.075	0.075	0	0	0
Hf	ppm	0.01	100	NA	0	100	0.0075	0.0075	0	0	0
Ho	ppm	0.001	0	NA	0	30	0.0374	0.038	0.0019	5.0732	0.0015
In	ppb	0.2	0	NA	0	0	3.32	3.35	0.86	25.9028	0.8896
K	%	0.01	0	NA	0	0	4.762	4.725	0.1321	2.775	0.0815
La	ppm	0.002	0	NA	0	0	5.524	5.515	0.0833	1.5078	0.1186
Li	ppm	0.5	0	NA	0	0	9.26	9.25	0.2914	3.1464	0.2224
Lu	ppm	0.001	0	NA	0	100	0.0081	0.008	0.0009	10.8098	0.0015
Mg	%	0.01	0	NA	0	30	1.002	0.995	0.022	2.1966	0.0148
Mn	ppm	0.1	0	NA	0	30	2518	2530	41.8463	1.6619	37.065
Mo	ppm	0.1	0	NA	0	90	0.21	0.2	0.0316	15.0585	0
Na	%	0.01	0	NA	0	100	0.063	0.06	0.0048	7.6674	0
Nb	ppm	0.005	0	NA	0	30	0.0965	0.096	0.0058	6.0474	0.0044
Nd	ppm	0.002	0	NA	0	0	1.641	1.65	0.039	2.3767	0.0519
Ni	ppm	5	0	NA	0	80	43.9	44	0.7379	1.6808	0.7413

Pb	ppm	0.1	0	NA	0	60	5.88	5.9	0.1476	2.5097	0.1483
Pd	ppb	3	0	NA	0	40	222	221.5	4.1633	1.8754	5.1891
Pr	ppm	0.002	0	NA	0	0	0.5123	0.513	0.0128	2.5015	0.0096
Pt	ppb	2	0	NA	0	60	8.8	9	2.6583	30.2082	2.9652
Rb	ppm	0.01	0	NA	0	0	139.3	139	3.1287	2.246	2.9652
Re	ppb	0.1	10	NA	0	60	0.2275	0.2	0.087	38.2253	0
Ru	ppb	10	100	NA	0	100	7.5	7.5	0	0	0
Sb	ppm	0.02	0	NA	0	60	0.244	0.245	0.0117	4.8106	0.0148
Sc	ppm	0.5	20	NA	0	70	0.485	0.5	0.0658	13.5728	0
Se	ppm	10	100	NA	0	100	7.5	7.5	0	0	0
Si	%	0.2	100	NA	0	100	0.15	0.15	0	0	0
Sm	ppm	0.001	0	NA	0	0	0.2477	0.2455	0.0095	3.8255	0.0067
Sn	ppm	1	100	NA	0	100	0.75	0.75	0	0	0
Sr	ppm	0.1	0	NA	0	0	580.1	580	11.4644	1.9763	13.3434
Ta	ppm	0.001	100	NA	0	100	0.0008	0.0008	0	0	0
Tb	ppm	0.001	0	NA	0	90	0.0357	0.035	0.0009	2.6574	0
Te	ppm	0.01	20	NA	0	0	2.9055	0.57	3.5668	122.7588	0.834
Th	ppm	0.001	0	NA	0	0	0.0734	0.071	0.0144	19.6194	0.0052
Ti	ppm	1	0	NA	0	70	31.1	31	0.9944	3.1975	1.4826
Tl	ppm	0.001	0	NA	0	30	0.0207	0.021	0.0018	8.5361	0.0015
Tm	ppm	0.001	0	NA	0	90	0.0112	0.011	0.0006	5.6469	0
U	ppm	0.001	0	NA	0	40	0.0274	0.027	0.0025	9.2968	0.0015
V	ppm	10	100	NA	0	100	7.5	7.5	0	0	0
W	ppm	0.5	0	NA	0	70	0.75	0.7	0.0972	12.9577	0
Y	ppm	0.001	0	NA	0	30	1.499	1.515	0.0378	2.5247	0.0148
Yb	ppm	0.001	0	NA	0	40	0.0547	0.054	0.0043	7.8063	0.003
Zn	ppm	1	0	NA	0	0	400	399.5	7.9022	1.9755	8.8956
Zr	ppm	0.5	100	NA	0	100	0.375	0.375	0	0	0

6.2. ALS, Vancouver, Canada

Table 3. Statistics for UPDEEP_JUN_TWIG_ASH_ALS based on 10 aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values,

SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the 5 ≤ RSD% ≤ 15 are marked with orange and the RSD% > 15 are marked with red. Elements having less than four observations between the detection limits are coloured grey.

element	unit	LDL_ppm	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
Ag	ppm	NA	0	NA	0	30	0.0412	0.04	0.0044	10.5984	0.003
Al	%	NA	0	NA	0	100	0.05	0.05	0	0	0
As	ppm	NA	0	NA	0	0	0.472	0.445	0.1463	30.9899	0.1186
Au	ppm	NA	0	NA	0	30	0.0027	0.0026	0.0007	25.4213	0.001
B	ppm	NA	0	NA	0	30	203	203.5	3.4641	1.7065	3.7065
Ba	ppm	NA	0	NA	0	0	766.6	766	10.5325	1.3739	8.8956
Be	ppm	NA	0	NA	0	80	0.061	0.06	0.0074	12.0961	0.0074
Bi	ppm	NA	0	NA	0	0	0.036	0.036	0.0024	6.5473	0.0022
Br	ppm	NA	0	NA	0	0	6.86	6.98	0.4368	6.3671	0.5782
Ca	%	NA	0	NA	0	0	33.68	33.6	0.4826	1.4329	0.5189
Cd	ppm	NA	0	NA	0	30	0.6814	0.6815	0.0122	1.7923	0.017
Ce	ppm	NA	0	NA	0	0	3.317	3.32	0.0483	1.4566	0.0593
Cl	ppm	NA	0	NA	0	0	1246	1285	103.2473	8.2863	59.304
Co	ppm	NA	0	NA	0	0	3.631	3.58	0.1582	4.3574	0.1631
Cr	ppm	NA	0	NA	0	0	4.634	4.59	0.4452	9.6078	0.3188
Cs	ppm	NA	0	NA	0	0	0.1527	0.1515	0.0119	7.7674	0.0074
Cu	ppm	NA	0	NA	0	0	89.84	90	2.0073	2.2343	2.3722
Dy	ppm	NA	0	NA	0	0	0.1821	0.18	0.0136	7.478	0.0052
Er	ppm	NA	0	NA	0	30	0.0867	0.085	0.0081	9.3395	0.0052
Eu	ppm	NA	0	NA	0	0	0.0405	0.04	0.0053	13.1816	0.0067
F	ppm	0.05	100	NA	0	100	0.0375	0.0375	0	0	0
Fe	ppm	NA	0	NA	0	30	928	923.5	27.3252	2.9445	34.8411
Ga	ppm	NA	0	NA	0	0	0.142	0.142	0.0048	3.3692	0.0037
Gd	ppm	NA	0	NA	0	0	0.2329	0.2335	0.0097	4.1749	0.0133
Ge	ppm	NA	0	NA	0	60	0.0085	0.008	0.0016	18.6016	0.0015
Hf	ppm	NA	0	NA	0	100	0.0095	0.009	0.0014	14.2527	0.0015
Hg	ppm	0.001	70	NA	0	70	0.001	0.0008	0.0005	50.7072	0
Ho	ppm	NA	0	NA	0	30	0.0336	0.0345	0.0025	7.3171	0.0022
I	ppm	NA	0	NA	0	0	0.2442	0.247	0.0235	9.6188	0.023
In	ppm	0.005	70	NA	0	70	0.0048	0.0038	0.0018	36.3146	0
K	%	NA	0	NA	0	0	4.54	4.53	0.0672	1.4794	0.0741
La	ppm	NA	0	NA	0	0	4.965	4.98	0.0643	1.2958	0.0371
Li	ppm	NA	0	NA	0	0	8.92	8.8	0.478	5.3583	0.2965
Lu	ppm	NA	0	NA	0	90	0.0072	0.007	0.0006	8.7841	0
Mg	%	NA	0	NA	0	30	1.042	1.04	0.0155	1.4867	0.0148
Mn	ppm	NA	0	NA	0	30	2299	2285	33.8132	1.4708	37.065
Mo	ppm	NA	0	NA	0	50	0.229	0.23	0.011	4.8057	0.0074
Na	%	NA	0	NA	0	40	0.0804	0.0815	0.0023	2.8241	0.0015
Nb	ppm	NA	0	NA	0	0	0.1134	0.113	0.0068	6.0126	0.0059
Nd	ppm	NA	0	NA	0	0	1.591	1.595	0.0455	2.8604	0.0482
Ni	ppm	NA	0	NA	0	0	40.29	40.3	1.4761	3.6636	1.7791

P	%	NA	0	NA	0	30	1.325	1.325	0.0186	1.4007	0.0148
Pb	ppm	NA	0	NA	0	0	5.406	5.365	0.1241	2.2959	0.1038
Pd	ppm	0.001	100	NA	0	100	0.0008	0.0008	0	0	0
Pr	ppm	NA	0	NA	0	0	0.4938	0.492	0.0131	2.659	0.0089
Pt	ppm	NA	0	NA	0	30	0.0104	0.01	0.0028	26.8925	0.003
Rb	ppm	NA	0	NA	0	0	132.95	132.75	4.3998	3.3094	4.0771
Re	ppm	0.001	90	NA	0	90	0.0008	0.0008	0.0001	10.2009	0
S	%	NA	0	NA	0	80	0.36	0.36	0.0125	3.4645	0.0148
Sb	ppm	NA	0	NA	0	70	0.222	0.22	0.014	6.2992	0.0148
Sc	ppm	NA	0	NA	0	30	0.582	0.585	0.0181	3.116	0.0148
Se	ppm	NA	0	NA	0	0	0.2161	0.223	0.0134	6.2216	0.0096
Sm	ppm	NA	0	NA	0	0	0.2272	0.226	0.0187	8.2442	0.0252
Sn	ppm	NA	0	NA	0	60	0.213	0.21	0.0231	10.8535	0.0297
Sr	ppm	NA	0	NA	0	0	637.9	638.5	9.4921	1.488	6.6717
Ta	ppm	0.001	100	NA	0	100	0.0008	0.0008	0	0	0
Tb	ppm	NA	0	NA	0	60	0.0302	0.03	0.002	6.7681	0.0015
Te	ppm	0.02	80	NA	0	80	0.018	0.015	0.0063	35.1364	0
Th	ppm	NA	0	NA	0	30	0.0756	0.076	0.0044	5.7556	0.0059
Ti	%	NA	0	NA	0	100	0.002	0.002	0	0	0
Tl	ppm	NA	0	NA	0	60	0.0249	0.025	0.0012	4.8081	0.0015
Tm	ppm	NA	0	NA	0	100	0.0097	0.01	0.0005	4.9799	0
U	ppm	NA	0	NA	0	40	0.0259	0.026	0.0016	6.1588	0.0015
V	ppm	NA	0	NA	0	0	2.722	2.71	0.1225	4.5021	0.1186
W	ppm	NA	0	NA	0	0	0.758	0.765	0.0333	4.3887	0.0297
Y	ppm	NA	0	NA	0	0	1.631	1.6425	0.0601	3.6867	0.0556
Yb	ppm	NA	0	NA	0	30	0.0522	0.0535	0.005	9.6337	0.0037
Zn	ppm	NA	0	NA	0	0	403.8	403	5.9404	1.4711	4.4478
Zr	ppm	NA	0	NA	0	40	0.42	0.42	0.0176	4.1996	0.0148

6.3. Bureau Veritas Acmelabs, Vancouver, Canada

Table 4. Statistics for UPDEEP_JUN_TWIG_ASH_BVAcmelabs based on 10 aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values, SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the 5 ≤ RSD% ≤ 15 are marked with orange and the RSD% > 15 are marked with red. Elements having less than four observations between the detection limits are coloured grey.

element	unit	LDL_ppm	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
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Ag	PPB	2	0	NA	0	0	44	45	3.9441	8.9638	3.7065
Al	%	0.01	0	NA	0	90	0.051	0.05	0.0032	6.2005	0
As	PPM	0.1	0	NA	0	0	0.65	0.6	0.2635	40.542	0.2224
Au	PPB	0.2	0	NA	0	30	2.33	2.5	0.4715	20.237	0.4448
B	PPM	20	0	NA	0	0	168.5	169	10.168	6.0344	11.1195
Ba	PPM	0.5	0	NA	0	0	785.74	786.9	17.2578	2.1964	22.832
Be	PPM	0.1	100	NA	0	100	0.075	0.075	0	0	0
Bi	PPM	0.02	50	NA	0	100	0.0175	0.0175	0.0026	15.0585	0.0037
Ca	%	0.01	0	NA	0	0	34.132	34.135	0.8227	2.4104	0.8377
Cd	PPM	0.01	0	NA	0	0	0.763	0.76	0.0353	4.6255	0.0371
Ce	PPM	0.1	0	NA	0	40	3.38	3.4	0.1229	3.6369	0.1483
Co	PPM	0.1	0	NA	0	40	4.22	4.2	0.1874	4.4403	0.1483
Cr	PPM	0.5	0	NA	0	0	4.28	4.3	0.2348	5.485	0.2224
Cs	PPM	0.02	0	NA	0	90	0.135	0.13	0.0071	5.2378	0
Cu	PPM	0.01	0	NA	0	0	87.47	87.255	1.9488	2.2279	1.8755
Dy	PPM	0.02	0	NA	0	60	0.17	0.17	0.017	9.9981	0.0297
Er	PPM	0.02	0	NA	0	80	0.075	0.075	0.0085	11.3312	0.0074
Eu	PPM	0.02	0	NA	0	30	0.191	0.195	0.03	15.6971	0.0297
Fe	%	0.01	0	NA	0	100	0.09	0.09	0	0	0
Ga	PPM	0.1	0	NA	0	80	0.22	0.2	0.0422	19.1653	0
Gd	PPM	0.02	0	NA	0	30	0.228	0.23	0.0322	14.1443	0.0297
Ge	PPM	0.1	100	NA	0	100	0.075	0.075	0	0	0
Hf	PPM	0.02	100	NA	0	100	0.015	0.015	0	0	0
Ho	PPM	0.02	30	NA	0	100	0.0185	0.02	0.0024	13.0553	0
In	PPM	0.02	100	NA	0	100	0.015	0.015	0	0	0
K	%	0.01	0	NA	0	30	4.715	4.705	0.0862	1.8279	0.126
La	PPM	0.5	0	NA	0	80	5.17	5.1	0.1889	3.6529	0.1483
Li	PPM	0.1	0	NA	0	0	8.42	8.4	0.5712	6.7834	0.7413
Lu	PPM	0.02	100	NA	0	100	0.015	0.015	0	0	0
Mg	%	0.01	0	NA	0	0	1.081	1.08	0.0281	2.5964	0.0371
Mn	PPM	1	0	NA	0	0	2434.9	2439	56.7988	2.3327	66.717
Mo	PPM	0.01	0	NA	0	60	0.352	0.35	0.0169	4.7913	0.0148
Na	%	0.001	0	NA	0	40	0.0849	0.084	0.0022	2.5716	0.0015
Nb	PPM	0.02	0	NA	0	80	0.102	0.1	0.0042	4.1337	0
Nd	PPM	0.02	0	NA	0	0	1.455	1.445	0.1	6.8748	0.0964
Ni	PPM	0.1	0	NA	0	0	39.68	40.15	1.7319	4.3647	1.5567
P	%	0.001	0	NA	0	0	1.2903	1.2995	0.0469	3.6384	0.0378

Pb	PPM	0.01	0	NA	0	0	5.861	5.86	0.2074	3.5394	0.2669
Pd	PPB	10	100	NA	0	100	7.5	7.5	0	0	0
Pr	PPM	0.02	0	NA	0	60	0.477	0.475	0.0221	4.6407	0.0222
Pt	PPB	2	0	NA	0	40	9.8	9	3.084	31.4695	1.4826
Rb	PPM	0.1	0	NA	0	0	125.15	125.3	4.6306	3.7001	3.1135
Re	PPB	1	100	NA	0	100	0.75	0.75	0	0	0
S	%	0.02	0	NA	0	70	0.283	0.285	0.0106	3.7433	0.0074
Sb	PPM	0.02	0	NA	0	90	0.208	0.21	0.0063	3.0407	0
Sc	PPM	0.1	0	NA	0	100	0.25	0.25	0.0527	21.0819	0.0741
Se	PPM	0.1	100	NA	0	100	0.075	0.075	0	0	0
Sm	PPM	0.02	0	NA	0	0	0.2	0.205	0.0271	13.5401	0.0222
Sn	PPM	0.1	0	NA	0	100	0.2	0.2	0	0	0
Sr	PPM	0.5	0	NA	0	0	564.88	563.05	22.065	3.9061	23.0544
Ta	PPM	0.05	100	NA	0	100	0.0375	0.0375	0	0	0
Tb	PPM	0.02	0	NA	0	100	0.036	0.04	0.0052	14.3444	0
Te	PPM	0.02	0	NA	0	80	0.029	0.03	0.0074	25.4436	0.0074
Th	PPM	0.1	100	NA	0	100	0.075	0.075	0	0	0
Ti	PPM	10	0	NA	0	70	77.4	78	3.3066	4.272	2.2239
Tl	PPM	0.02	0	NA	0	100	0.02	0.02	0	0	0
Tm	PPM	0.02	100	NA	0	100	0.015	0.015	0	0	0
U	PPM	0.1	100	NA	0	100	0.075	0.075	0	0	0
V	PPM	2	0	NA	0	100	3	3	0	0	0
W	PPM	0.1	0	NA	0	90	0.67	0.7	0.0675	10.0739	0.0741
Y	PPM	0.01	0	NA	0	0	1.539	1.53	0.0703	4.5685	0.0667
Yb	PPM	0.02	0	NA	0	80	0.056	0.06	0.0084	15.0585	0.0074
Zn	PPM	0.1	0	NA	0	0	320.61	325.85	11.8776	3.7047	8.1543
Zr	PPM	0.1	70	NA	0	70	0.0925	0.075	0.0392	42.3519	0

7. PREPARER AND SUPPLIER

UPDEEP_JUN_TWIG_ASH SRMs are prepared by the Geological Survey of Finland (GTK) in a project Upscaling deep buried geochemical exploration techniques into European business (UpDeep) and supplied by GTK and Scandinavian Geopool.

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8. INTENDED USE

UPDEEP_JUN_TWIG_ASH SRM is intended to quantify laboratory accuracy and to monitor laboratory precision, drift, periodic concentration shifts, unusual breaks and outliers in analytical results of vegetation samples for mineral exploration.

9. STABILITY AND STORAGE INSTRUCTIONS

UPDEEP_JUN_TWIG_ASH SRM should be stored in a room temperature unopened in their own plastic containers. Stability of the materials is not tested.

10. INSTRUCTIONS FOR CORRECT USE

UPDEEP_JUN_TWIG_ASH SRM should be only be used to monitor the quality of ashed biogeochemical samples of the similar matrix and concentration ranges.

11. HANDLING INSTRUCTIONS

Keep dry and do not touch with bare hands to avoid SRM contamination.

12. TRACEABILITY

The analyzed SRM samples represent the entire batch of prepared SRM. All the analyzed samples have individual names and can be traced back into the original analytical results. The laboratories were chosen on the basis of the availability of the analytical services specific to plants and offered range of elements usable for mineral exploration. The laboratories have ISO/IEC 17025:2005 accreditation (ALS Minerals/ALS Global), Quality ISO9001:2008, Environmental Management: ISO14001, Safety Management OH SAS 18001 and AS4801 certificates (Bureau Veritas Minerals Acmelabs) and ISO/IEC 17025 (Activation Laboratories Ltd).

13. LEGAL NOTICE

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14. REFERENCES

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