

Massive mobilization of toxic elements from an intact rock glacier in the Central Eastern Alps: insights on ice melt dynamics

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Supplement

10 Hoda Moradi¹, Gerhard Furrer², Michael Margreth³, David Mair¹, Christoph Wanner¹

15 ¹Institute of Geological Sciences, Department of Earth Sciences, University of Bern, Baltzerstrasse 3, CH-3012 Bern, Switzerland

²Institute of Biochemistry and Pollutant Dynamics (IBP), Department of Environmental Systems Science, ETH Zurich, CH-8092 Zurich, Switzerland

20 ³Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Mountain Hydrology and Mass Movements, Zürichstrasse 111, CH-8903 Birmensdorf, Switzerland

Correspondence to: Hoda Moradi (hoda.moradi@unibe.ch)



25 **Figure S1: Photographs of the Aua da Prasüra stream, Val Costainas, Switzerland, with white-colored streambed inherited from basaluminite precipitation.**

Table S1: Chemical analysis of streamwater samples collected between March 2021 and November 2022 at the AP10 location of the Aua Prasūra stream (Fig. 1).

AP10	Method	Unit	22 Mar 2021	09 Apr 2021	23 Apr 2021	07 May 2021	20 May 2021	03 Jun 2021	10 Jun 2021	08 Jul 2021
T	Electrode	°C	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.9	9.5
pH	Electrode	-	7.08	6.59	6.51	6.44	6.44	6.45	7.14	6.43
EC	Electrode	μS cm ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	133.5	434
Na⁺	IC	mg L ⁻¹	1.95	1.79	1.79	1.78	1.81	1.53	1.41	2.84
K⁺	IC	mg L ⁻¹	0.597	0.579	0.558	0.563	0.532	0.446	0.381	0.560
Ca²⁺	IC	mg L ⁻¹	31.4	27.1	27.3	27.0	26.8	21.2	19.2	50.7
Mg²⁺	IC	mg L ⁻¹	15.4	13.2	13.0	14.1	15.3	12.6	11.7	45.7
Al	ICP-OES	mg L ⁻¹	0.021	0.013	0.043	0.026	0.030	0.049	0.057	0.402
Co	ICP-OES	mg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.018
Cu	ICP-OES	mg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	<0.05
Fe	ICP-OES	mg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	<0.005
Mn	ICP-OES	mg L ⁻¹	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.365
Ni	ICP-OES	mg L ⁻¹	0.036	0.021	0.018	0.045	0.042	0.039	0.039	0.245
Sr	ICP-OES	mg L ⁻¹	0.150	0.115	0.123	0.107	0.099	0.073	0.062	0.143
Zn	ICP-OES	mg L ⁻¹	0.052	0.050	0.046	0.068	0.108	0.123	0.130	0.624
As	AAS	μg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
F⁻	IC	mg L ⁻¹	0.610	0.596	0.608	0.623	0.710	0.773	0.772	1.85
Cl⁻	IC	mg L ⁻¹	0.176	0.264	0.170	0.179	0.175	0.147	0.126	0.260
Br⁻	IC	mg L ⁻¹	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	0.540	0.750	0.554	0.553	0.628	0.598	0.619	0.590
SO₄²⁻	IC	mg L ⁻¹	114	95.5	94.6	101	107	86.3	79.6	308
Si	ICP-OES	mg L ⁻¹	3.18	3.01	3.05	3.08	2.97	2.70	2.57	2.88
TOC	C-analyzer	mg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	<1
TIC	C-analyzer	mg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.96
TDS		mg L ⁻¹	168.36	142.98	141.86	149.19	156.26	126.58	116.69	416.66

Table S1 continued

AP10	Method	Unit	18 Aug 2021	18 Jun 2021	02 Jul 2021	16 Jul 2021	06 Aug 2021	22 Sep 2021	03 Sep 2021	30 Sep 2021
T	Electrode	°C	8.7	n.a	n.a	n.a	n.a	4.7	n.a	n.a
pH	Electrode	-	7.47	6.17	6.08	6.00	6.02	7.66	6.53	6.25
EC	Electrode	μS cm ⁻¹	291	n.a	n.a	n.a	n.a	326	n.a	n.a
Na⁺	IC	mg L ⁻¹	2.31	1.67	2.60	2.69	2.42	2.42	2.30	2.58
K⁺	IC	mg L ⁻¹	<1	<1	<1	<1	<1	0.629	<1	<1
Ca²⁺	IC	mg L ⁻¹	35.9	23.1	42.1	45.5	40.0	42.6	39.6	47.9
Mg²⁺	IC	mg L ⁻¹	28.2	16.3	36.2	39.0	33.0	31.5	29.3	36.1
Al	ICP-OES	mg L ⁻¹	0.081	0.098	0.186	0.278	0.116	0.064	0.146	<0.05
Co	ICP-OES	mg L ⁻¹	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.005
Cu	ICP-OES	mg L ⁻¹	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.005
Fe	ICP-OES	mg L ⁻¹	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.005
Mn	ICP-OES	mg L ⁻¹	0.160	0.084	0.286	0.315	0.247	0.079	0.103	0.10
Ni	ICP-OES	mg L ⁻¹	0.138	0.077	0.190	0.206	0.171	0.134	0.136	0.154
Sr	ICP-OES	mg L ⁻¹	0.126	0.079	0.138	0.150	0.132	0.159	0.139	0.163
Zn	ICP-OES	mg L ⁻¹	0.388	0.251	0.526	0.560	0.459	0.333	0.349	0.408
As	AAS	μg L ⁻¹	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
F⁻	IC	mg L ⁻¹	1.260	0.960	1.500	1.560	1.420	1.17	1.21	1.15
Cl⁻	IC	mg L ⁻¹	0.250	0.220	0.280	0.260	0.300	0.239	0.203	0.300
Br⁻	IC	mg L ⁻¹	<0.16	<0.16	<0.16	<0.16	<0.16	<0.016	<0.016	<0.16
NO₃⁻	IC	mg L ⁻¹	0.660	0.910	0.640	0.630	0.600	0.563	0.574	0.690
SO₄²⁻	IC	mg L ⁻¹	195	121	244	262	227	229	211	253
Si	ICP-OES	mg L ⁻¹	3.53	2.67	3.55	3.60	3.47	3.30	3.23	3.80
TOC	C-analyzer	mg L ⁻¹	<0.5	<0.5	0.50	<0.5	<0.5	0.45	n.a	n.a
TIC	C-analyzer	mg L ⁻¹	2.54	1.88	1.41	1.54	2.05	3.05	n.a	n.a
TDS		mg L ⁻¹	271.01	169.40	334.27	357.81	311.40	315.37	288.37	346.40

Table S1 continued

AP10	Method	Unit	11 Oct 2021	21 Oct 2021	29 Oct 2021	02 Apr 2022	20 Apr 2021	29 Apr 2022	14 May 2022	19 May 2022
T	Electrode	°C	n.a.	4	n.a.	0.6	n.a.	n.a.	n.a.	9.5
pH	Electrode	-	6.38	6.67	7.07	6.81	6.85	6.19	6.41	7.73
EC	Electrode	μS cm ⁻¹	n.a.	338	n.a.	183	n.a.	n.a.	n.a.	209
Na⁺	IC	mg L ⁻¹	2.73	2.67	2.54	1.968	1.90	1.94	1.80	1.54
K⁺	IC	mg L ⁻¹	0.644	0.633	<1	0.987	0.641	0.653	0.545	0.441
Ca²⁺	IC	mg L ⁻¹	52.2	51.4	51.1	36.260	33.3	33.7	33.4	27.0
Mg²⁺	IC	mg L ⁻¹	40.2	38.3	37.0	17.589	16.3	17.2	21.8	18.0
Al	ICP-OES	mg L ⁻¹	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	0.08
Co	ICP-OES	mg L ⁻¹	<0.005	<0.005	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Cu	ICP-OES	mg L ⁻¹	<0.005	<0.005	<0.02	<0.5	<0.5	<0.5	<0.5	<0.5
Fe	ICP-OES	mg L ⁻¹	<0.005	<0.005	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
Mn	ICP-OES	mg L ⁻¹	0.109	0.060	0.037	<0.05	<0.005	<0.005	0.007	0.014
Ni	ICP-OES	mg L ⁻¹	0.173	0.156	0.138	0.021	0.019	0.023	0.068	0.063
Sr	ICP-OES	mg L ⁻¹	0.170	0.172	0.167	0.159	0.135	0.137	0.111	0.087
Zn	ICP-OES	mg L ⁻¹	0.434	0.422	0.347	0.057	0.050	0.058	0.212	0.201
As	AAS	μg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
F⁻	IC	mg L ⁻¹	1.10	1.04	0.964	0.531	0.555	0.576	0.818	0.834
Cl⁻	IC	mg L ⁻¹	0.340	2.670	0.229	0.197	0.255	0.240	0.199	0.176
Br⁻	IC	mg L ⁻¹	<0.16	<0.16	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	1.16	0.890	0.702	0.581	0.686	0.624	0.962	0.630
SO₄²⁻	IC	mg L ⁻¹	273	268	265	144	123	137	157	130
Si	ICP-OES	mg L ⁻¹	3.92	3.87	3.326	2.922	n.a.	n.a.	n.a.	n.a.
TOC	C-analyzer	mg L ⁻¹	n.a.	0.54	n.a.	n.a.	n.a.	n.a.	n.a.	1.23
TIC	C-analyzer	mg L ⁻¹	n.a.	1.76	n.a.	n.a.	n.a.	n.a.	n.a.	2.12
TDS		mg L ⁻¹	376.54	372.63	361.63	205.40	176.51	192.01	216.41	181.95

Table S1 continued

AP10	Method	Unit	19 May 2022	20 May 2022	03 Jun 2022	16 Jun 2022	05 Jul 2022	07 Jul 2022	13 Jul 2022	29 Jul 2022
T	Electrode	°C	6.1	5.1	n.a.	n.a.	11.4	9	n.a.	n.a.
pH	Electrode	-	8.10	7.90	6.44	6.18	6.91	6.91	6.49	6.34
EC	Electrode	µS cm ⁻¹	182	181	n.a.	n.a.	440	421	n.a.	n.a.
Na⁺	IC	mg L ⁻¹	1.52	1.63	2.29	2.58	2.88	2.91	2.70	2.74
K⁺	IC	mg L ⁻¹	0.424	0.432	<1	<1	<1	<1	0.676	0.665
Ca²⁺	IC	mg L ⁻¹	25.4	26.2	41.3	48.4	53.3	54.9	49.9	49.8
Mg²⁺	IC	mg L ⁻¹	17.0	17.2	32.9	39.7	43.5	44.9	39.6	39.4
Al	ICP-OES	mg L ⁻¹	0.07	0.057	0.112	0.121	0.131	0.154	0.076	0.07
Co	ICP-OES	mg L ⁻¹	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cu	ICP-OES	mg L ⁻¹	<0.5	<0.5	<0.005	0.0058	<0.005	0.0052	<0.005	<0.005
Fe	ICP-OES	mg L ⁻¹	<0.05	<0.05	0.0228	0.0260	0.0282	0.0275	0.0263	0.0329
Mn	ICP-OES	mg L ⁻¹	0.020	0.013	0.142	0.176	0.199	0.208	0.152	0.128
Ni	ICP-OES	mg L ⁻¹	0.062	0.058	0.138	0.174	0.197	0.200	0.179	0.173
Sr	ICP-OES	mg L ⁻¹	0.080	0.083	0.120	0.143	0.159	0.161	0.162	0.169
Zn	ICP-OES	mg L ⁻¹	0.203	0.192	0.400	0.487	0.529	0.547	0.477	0.460
As	AAS	µg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
F⁻	IC	mg L ⁻¹	0.811	0.815	1.34	1.51	1.59	1.61	1.47	1.40
Cl⁻	IC	mg L ⁻¹	0.163	0.164	0.330	1.17	0.530	0.350	0.270	0.281
Br⁻	IC	mg L ⁻¹	<0.016	<0.016	<0.16	<0.16	<0.16	<0.16	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	0.594	0.664	0.840	1.24	0.720	0.590	0.678	0.640
SO₄²⁻	IC	mg L ⁻¹	117	121	218	254	285	293	273	276
Si	ICP-OES	mg L ⁻¹	n.a.	n.a.	2.879	2.99	3.30	3.21	3.15	3.23
TOC	C-analyzer	mg L ⁻¹	1.10	0.91	n.a.	n.a.	<0.5	<0.5	n.a.	n.a.
TIC	C-analyzer	mg L ⁻¹	1.89	2.38	n.a.	n.a.	1.59	1.66	n.a.	n.a.
TDS		mg L ⁻¹	166.26	171.33	300.45	353.18	393.16	404.11	372.32	375.56

45 **Table S1 continued**

AP10	Method	Unit	12 Aug 2022	26 Aug 2022	13 Sep 2022	30 Sep 2022	10 Oct 2022	28 Oct 2022	15 Nov 2022
T	Electrode	°C	10	n.a.	n.a.	n.a.	6.8	n.a.	n.a.
pH	Electrode	-	7.10	6.70	6.12	6.30	7.27	6.43	6.29
EC	Electrode	µS cm ⁻¹	424	n.a.	n.a.	n.a.	371	n.a.	n.a.
Na⁺	IC	mg L ⁻¹	2.83	2.25	2.23	2.02	2.72	2.327	2.182
K⁺	IC	mg L ⁻¹	0.689	0.714	0.630	0.659	0.702	0.595	0.616
Ca²⁺	IC	mg L ⁻¹	53.8	54.5	61.6	51.9	53.1	41.6	37.9
Mg²⁺	IC	mg L ⁻¹	42.8	42.8	47.9	39.6	39.9	30.3	24.9
Al	ICP-OES	mg L ⁻¹	0.08	0.10	0.18	0.094	0.067	0.10	<0.05
Co	ICP-OES	mg L ⁻¹	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cu	ICP-OES	mg L ⁻¹	<0.005	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005
Fe	ICP-OES	mg L ⁻¹	0.0278	<0.05	<0.05	<0.05	<0.05	0.03	0.03
Mn	ICP-OES	mg L ⁻¹	0.155	0.157	0.193	0.122	0.109	0.101	0.023
Ni	ICP-OES	mg L ⁻¹	0.189	0.19	0.21	0.17	0.16	0.12	0.08
Sr	ICP-OES	mg L ⁻¹	0.173	0.19	0.20	0.18	0.18	0.13	0.13
Zn	ICP-OES	mg L ⁻¹	0.516	0.525	0.601	0.489	0.446	0.364	0.252
As	AAS	µg L ⁻¹	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
F⁻	IC	mg L ⁻¹	1.47	1.51	1.62	1.38	1.37	1.270	1.050
Cl⁻	IC	mg L ⁻¹	0.273	0.287	0.340	0.302	0.305	0.326	0.252
Br⁻	IC	mg L ⁻¹	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	0.687	0.677	0.832	0.756	0.758	0.853	0.831
SO₄²⁻	IC	mg L ⁻¹	292	290	327	274	270	211.170	178.450
Si	ICP-OES	mg L ⁻¹	3.39	3.33	3.42	3.55	3.23	3.67	3.65
TOC	C-analyzer	mg L ⁻¹	<0.5	n.a.	n.a.	n.a.	<0.5	n.a.	n.a.
TIC	C-analyzer	mg L ⁻¹	1.92	n.a.	n.a.	n.a.	2.32	n.a.	n.a.
TDS		mg L ⁻¹	400.80	397.44	447.31	375.29	375.63	292.99	250.37

Table S2: Chemical analysis of streamwater samples collected between June 2021 and October 2022 at the AP5 location of the Aua Prasiira stream (Fig. 1).

AP5	Method	Unit	11 Jun 2021	09 Jul 2021	20 Aug 2021	23 Sep 2021	20 Oct 2021	06 Jul 2022	13 Aug 2022	11 Oct 2022
T	Electrode	°C	1.4	4.9	5.7	4.9	2.5	8.9	6	5.4
pH	Electrode	-	5.71	5.60	5.54	5.32	5.56	5.57	5.63	5.68
EC	Electrode	µS cm ⁻¹	317	749	995	1208	1077	991	1039	1114
Na⁺	IC	mg L ⁻¹	2.55	4.97	6.14	7.64	8.07	4.56	6.72	6.97
K⁺	IC	mg L ⁻¹	0.434	0.850	1.03	1.07	1.05	1.12	1.07	1.06
Ca²⁺	IC	mg L ⁻¹	49.6	94.8	123	168	162	126	138.9	157
Mg²⁺	IC	mg L ⁻¹	42.4	109	154	206	194	139	161.1	179
Al	ICP-OES	mg L ⁻¹	1.42	5.35	7.761	8.30	7.32	6.62	7.84	7.60
Co	ICP-OES	mg L ⁻¹	0.013	0.058	<0.05	0.029	<0.05	0.031	0.028	0.024
Cu	ICP-OES	mg L ⁻¹	<0.5	<0.5	<0.5	0.067	0.072	0.0625	0.0682	0.06
Fe	ICP-OES	mg L ⁻¹	0.006	<0.05	<0.05	0.012	<0.05	<0.005	<0.005	<0.05
Mn	ICP-OES	mg L ⁻¹	0.079	1.415	1.73	1.60	1.47	1.381	1.56	1.41
Ni	ICP-OES	mg L ⁻¹	0.185	0.733	1.001	1.225	1.155	0.847	1.01	1.06
Sr	ICP-OES	mg L ⁻¹	n.a.	n.a.	0.355	0.460	0.434	0.326	0.387	0.43
Zn	ICP-OES	mg L ⁻¹	0.560	1.764	2.61	3.007	2.871	2.22	2.69	2.851
As	AAS	µg L ⁻¹	n.a.	n.a.	n.a.	n.a.	<4	<4	<4	<4
F⁻	IC	mg L ⁻¹	1.877	5.65	3.200	2.89	2.46	6.47	0.468	1.55
Cl⁻	IC	mg L ⁻¹	0.250	0.500	0.680	0.944	2.71	0.780	0.829	0.831
Br⁻	IC	mg L ⁻¹	<0.016	<0.016	<0.16	<0.016	<0.16	<0.16	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	0.656	0.860	0.930	0.840	1.21	0.920	0.925	1.042
SO₄²⁻	IC	mg L ⁻¹	285	679	965	1287	1212	822	1033	1141
Si	ICP-OES	mg L ⁻¹	2.74	3.68	6.47	5.20	7.03	4.81	5.54	5.58
TOC	C-analyzer	mg L ⁻¹	0.51	<1	0.63	0.57	0.63	<0.5	0.55	0.87
TIC	C-analyzer	mg L ⁻¹	<0.5	<0.5	<0.5	0.50	0.59	<0.5	0.53	0.52
TDS		mg L ⁻¹	387.98	909.05	1274.47	1695.86	1604.66	1117.13	1363.17	1509.12

Table S3: Chemical analysis of streamwater samples collected between July 2021 and October 2022 at the AP3 location of the Aua Prasiira stream (Fig. 1).

AP3	Method	Unit	09 Jul 2021	20 Aug 2021	23 Sep 2021	06 Jul 2022	13 Aug 2022	11 Oct 2022
T	Electrode	°C	2.9	3.5	4.1	4.7	5	3.5
pH	Electrode	-	6.37	6.04	5.77	6.35	6.21	5.98
EC	Electrode	µS cm ⁻¹	403	686	854	642	832	797
Na⁺	IC	mg L ⁻¹	3.16	4.87	8.91	3.50	5.89	5.38
K⁺	IC	mg L ⁻¹	0.620	<1	<1	<1	0.975	0.878
Ca²⁺	IC	mg L ⁻¹	88.0	152	190	138	171.9	165
Mg²⁺	IC	mg L ⁻¹	40.1	67.9	94.3	66.9	86.0	80.7
Al	ICP-OES	mg L ⁻¹	0.466	1.254	1.47	0.55	0.69	0.96
Co	ICP-OES	mg L ⁻¹	<0.005	<0.05	<0.005	<0.005	<0.005	<0.005
Cu	ICP-OES	mg L ⁻¹	<0.05	<0.5	<0.01	<0.005	<0.005	<0.01
Fe	ICP-OES	mg L ⁻¹	<0.005	<0.05	<0.005	0.0374	0.0426	<0.05
Mn	ICP-OES	mg L ⁻¹	0.063	<0.05	0.009	0.014	0.015	0.017
Ni	ICP-OES	mg L ⁻¹	0.096	0.078	0.118	0.051	0.064	0.08
Sr	ICP-OES	mg L ⁻¹	n.a.	0.329	0.327	0.229	0.289	0.32
Zn	ICP-OES	mg L ⁻¹	0.180	0.149	0.202	0.122	0.131	0.182
As	AAS	µg L ⁻¹	n.a.	<4	0.748	<4	<4	<4
F⁻	IC	mg L ⁻¹	1.38	4.280	2.26	1.59	1.71	1.52
Cl⁻	IC	mg L ⁻¹	0.550	0.320	0.514	0.460	0.749	0.350
Br⁻	IC	mg L ⁻¹	<0.016	<0.16	<0.016	<0.16	<0.016	<0.016
NO₃⁻	IC	mg L ⁻¹	0.730	0.870	0.689	1.25	1.075	0.960
SO₄²⁻	IC	mg L ⁻¹	369	666	870	546	735	685
Si	ICP-OES	mg L ⁻¹	3.00	7.11	4.16	3.66	4.17	4.32
TOC	C-analyzer	mg L ⁻¹	<1	<0.5	0.00	<0.5	<0.5	<0.5
TIC	C-analyzer	mg L ⁻¹	1.82	2.97	4.31	4.12	4.79	6.39
TDS		mg L ⁻¹	509.35	908.06	1177.59	766.47	1013.72	952.44

Table S4: Chemical analysis of streamwater samples collected between July 2021 and October 2022 at the AP2 location of the Aua Prasiira stream (Fig. 1).

AP2	Method	Unit	09 Jul 2021	20 Aug 2021	06 Jul 2022	13 Aug 2022	11 Oct 2022
T	Electrode	°C	0.3	3.1	0.4	0	1
pH	Electrode	-	5.25	5.23	5.14	5.23	5.1
EC	Electrode	μS cm ⁻¹	403	711	700	1064	160
Na⁺	IC	mg L ⁻¹	2.95	4.44	3.82	7.49	12.05
K⁺	IC	mg L ⁻¹	0.66	<1	1.13	2.82	1.93
Ca²⁺	IC	mg L ⁻¹	72.4	119	152	242.0	375
Mg²⁺	IC	mg L ⁻¹	51.2	76.8	111	165.4	276
Al	ICP-OES	mg L ⁻¹	2.68	2.728	6.06	9.151	10.83
Co	ICP-OES	mg L ⁻¹	0.052	<0.05	0.087	0.152	0.250
Cu	ICP-OES	mg L ⁻¹	<0.05	<0.5	0.0991	0.1354	0.16
Fe	ICP-OES	mg L ⁻¹	<0.005	<0.05	<0.005	<0.005	<0.05
Mn	ICP-OES	mg L ⁻¹	0.547	0.268	1.196	2.02	3.39
Ni	ICP-OES	mg L ⁻¹	0.350	0.361	0.707	1.05	1.63
Sr	ICP-OES	mg L ⁻¹	n.a.	0.252	0.287	0.443	0.69
Zn	ICP-OES	mg L ⁻¹	0.737	0.961	1.31	1.80	2.489
As	AAS	μg L ⁻¹	n.a.	<4	<4	<4	<4
F⁻	IC	mg L ⁻¹	2.92	4.780	5.63	0.376	0.632
Cl⁻	IC	mg L ⁻¹	0.290	0.460	0.580	4.59	1.199
Br⁻	IC	mg L ⁻¹	<0.016	<0.16	<0.16	<0.016	0.021
NO₃⁻	IC	mg L ⁻¹	1.74	1.120	1.64	1.921	0.097
SO₄²⁻	IC	mg L ⁻¹	415	654	777	1297	1986
Si	ICP-OES	mg L ⁻¹	2.26	5.16	3.76	4.78	5.71
TOC	C-analyzer	mg L ⁻¹	<1	<0.5	<0.5	<0.5	<0.5
TIC	C-analyzer	mg L ⁻¹	0.72	1.13	2.27	5.00	5.47
TDS		mg L ⁻¹	554.83	871.57	1068.66	1745.73	2682.63

70 1). **Table S5: Chemical analysis of streamwater samples collected between July 2021 and October 2022 at the AP1 location of the Aua Prasiira stream (Fig.**

AP1	Method	Unit	09 Jul 2021	20 Aug 2021	06 Jul 2022	13 Aug 2022	11 Oct 2022
T	Electrode	°C	0.8	1.4	1	1.9	1
pH	Electrode	-	4.90	4.90	5.02	4.9	4.70
EC	Electrode	µS cm ⁻¹	1197	1730	1548	1734	2040
Na⁺	IC	mg L ⁻¹	8.06	11.3	8.95	11.47	14.52
K⁺	IC	mg L ⁻¹	1.61	2.07	2.16	2.03	1.95
Ca²⁺	IC	mg L ⁻¹	162	230	205	216.6	272
Mg²⁺	IC	mg L ⁻¹	234	389	353	387.7	493
Al	ICP-OES	mg L ⁻¹	15.44	23.447	26.7	27.50	28.74
Co	ICP-OES	mg L ⁻¹	0.280	0.325	0.396	0.336	0.433
Cu	ICP-OES	mg L ⁻¹	<0.5	<0.5	0.3190	0.3207	0.32
Fe	ICP-OES	mg L ⁻¹	<0.05	<0.05	<0.005	<0.005	<0.05
Mn	ICP-OES	mg L ⁻¹	4.761	7.67	8.174	8.62	11.27
Ni	ICP-OES	mg L ⁻¹	1.689	2.520	2.536	2.78	3.31
Sr	ICP-OES	mg L ⁻¹	n.a.	0.595	0.502	0.569	0.74
Zn	ICP-OES	mg L ⁻¹	4.214	5.95	6.96	7.23	7.812
As	AAS	µg L ⁻¹	n.a.	<4	4.06	<4	<4
F⁻	IC	mg L ⁻¹	15.7	8.770	23.0	2.13	6.17
Cl⁻	IC	mg L ⁻¹	1.07	1.470	1.40	1.50	1.49
Br⁻	IC	mg L ⁻¹	<0.016	<0.16	<0.16	0.021	0.018
NO₃⁻	IC	mg L ⁻¹	1.06	1.240	1.31	0.044	0.043
SO₄²⁻	IC	mg L ⁻¹	1354	2318	2020	2246	2803
Si	ICP-OES	mg L ⁻¹	5.89	8.86	7.38	7.61	8.10
TOC	C-analyzer	mg L ⁻¹	<1	<0.5	<0.5	<0.5	<0.5
TIC	C-analyzer	mg L ⁻¹	1.69	2.76	1.80	5.40	3.29
TDS		mg L ⁻¹	1810.24	3014.10	2674.23	2928.22	3656.77