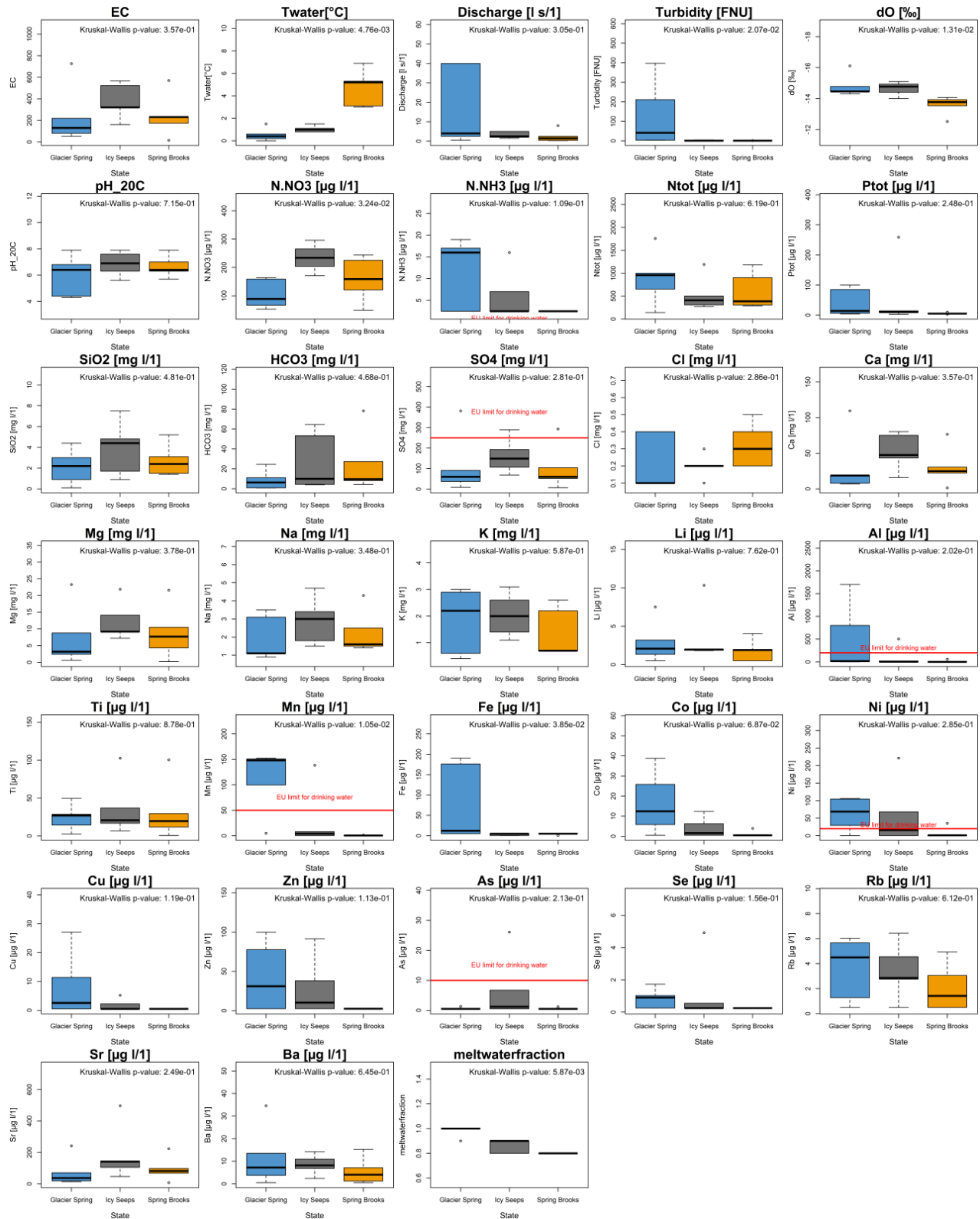
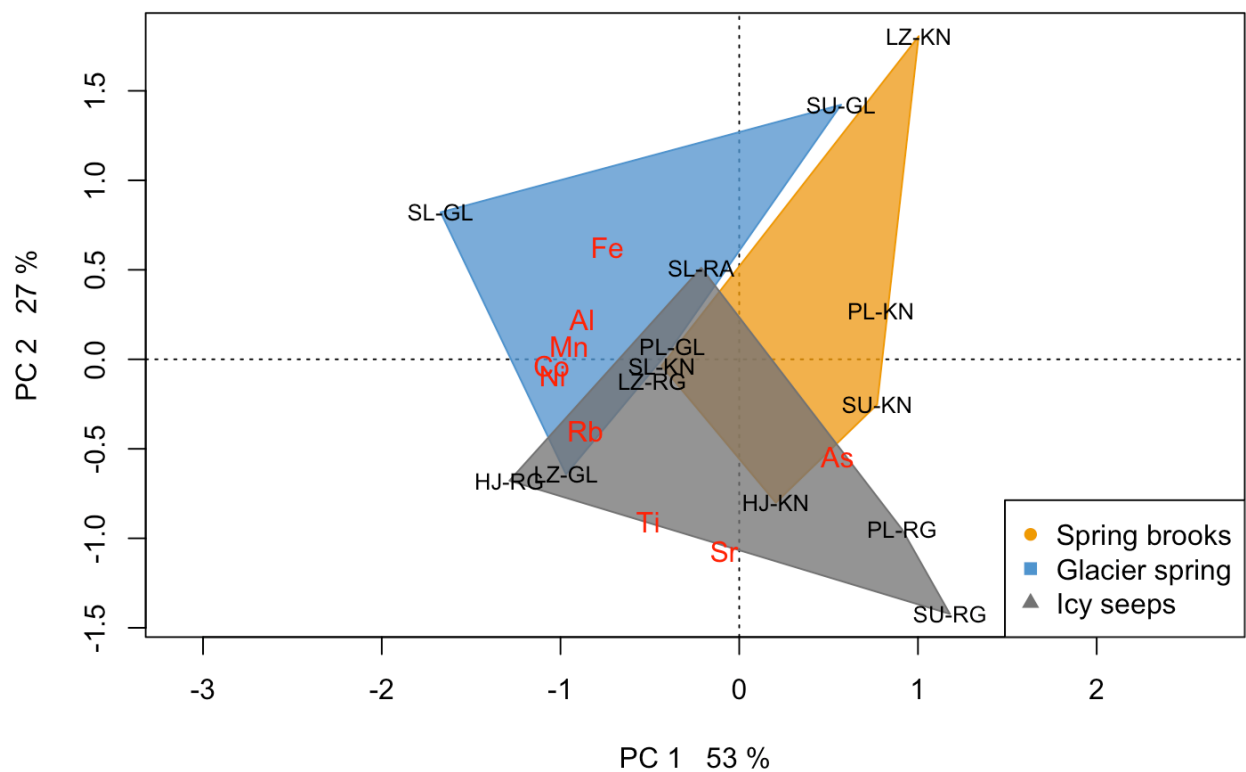
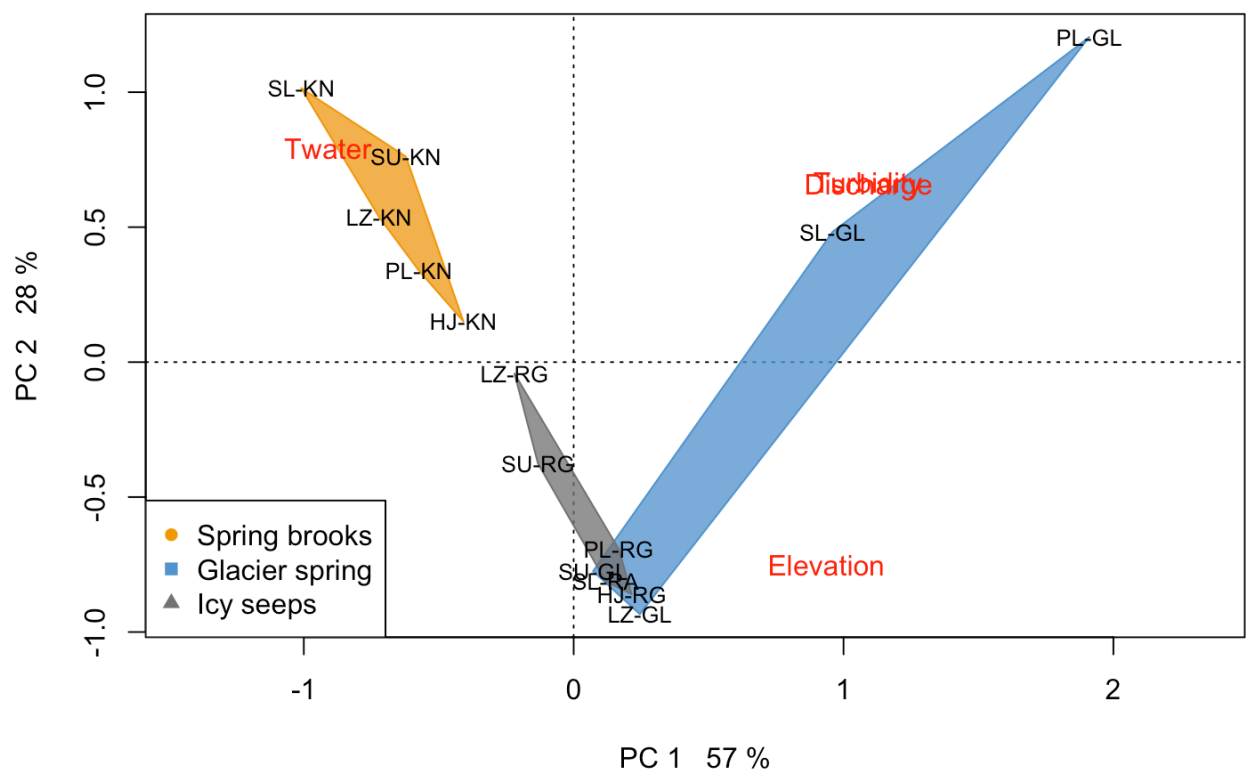


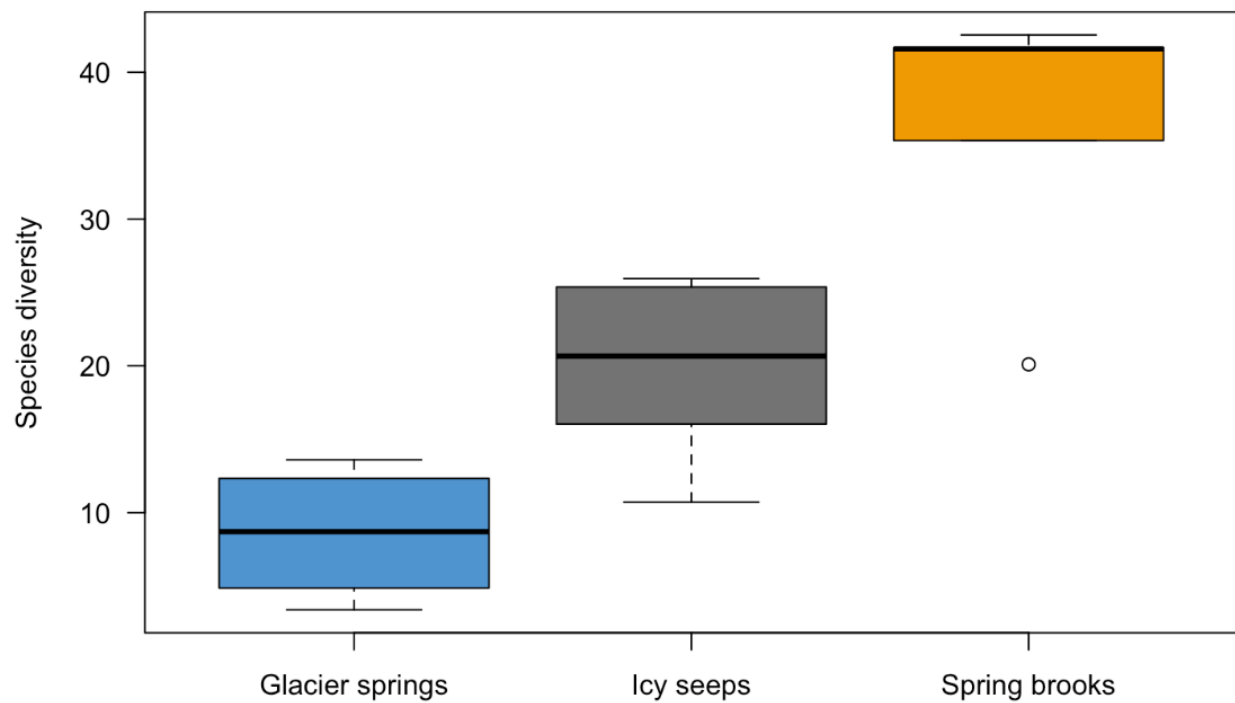
Supplementary Materials



Supplementary Information I: Boxplots of environmental variables (median, interquartile range). In blue glacier springs, in grey icy seeps, and in orange spring brooks. Red line indicates EU limits for drinking water quality.



Supplementary Information II: Principal component analysis summarizing physical (upper) and chemical harshness (lower).



Supplementary Information III: Boxplots showing species diversity in the three spring types. Shannon-Diversity Index was significantly different between spring brooks and glacier springs (Kruskal-Wallis test, $p < 0.05$, $df = 2$; Dunn's test, $p < 0.05$, $df = 2$, $n = 3$) with highest diversity observed in spring brooks in decreasing order in Sulden/Solda, Plima, Lazaun and Hochjoch/Giogo alto.

Supplementary Information IV: Stream type preferences according to the CLAMTEST results. Glacier spring taxa in blue, icy seeps in grey, generalists in green, spring brooks in orange and too rare in red.

Taxa	Spring brooks [ind. m ⁻²]	Spring brooks [%]	Icy seeps [ind. m ⁻²]	Icy seeps [%]	Glacier springs [ind. m ⁻²]	Glacier springs [%]	Habitat preference
<i>Diamesa goetghebuerti modesta</i>	196	0.32	880	4.98	72	18.95	Glacier spring
<i>Diamesa steinboeckii</i>			4	0.02	196	51.58	Glacier spring
<i>Diamesa zernyi bohemani</i>	248	0.41	844	4.78	28	7.37	Glacier spring/ Icy seep
<i>Rhypholophus</i> sp.	84	0.14	728	4.12	8	2.11	Glacier spring/ Icy seep
<i>Diamesa tonsa</i>	156	0.26	1248	7.07	4	1.05	Icy seep
<i>Pseudokiefferiella parva</i>	436	0.72	2472	14.00	8	2.11	Icy seep
<i>Eukiefferiella claripennis</i>	28	0.05	96	0.54			Icy seep
<i>Heleniella ornatocollis</i>	68	0.11	600	3.40			Icy seep
<i>Orthocladius</i> spp.			60	0.34			Icy seep
<i>Orthocladius/ Eudactylocadius</i> sp.			600	3.40			Icy seep
<i>Paratrachocladius rufiventris</i>	124	0.21	1384	7.84			Icy seep
<i>Thienemaniella majuscula</i>			356	2.02			Icy seep
<i>Leuctra</i> sp.	1044	1.73	1520	8.61			Icy seep
<i>Dictyogenus</i> sp.	216	0.36	228	1.29			Icy seep
<i>Brachyptera</i> sp.	40	0.07	632	3.58			Icy seep
Limnephilidae	1208	2.00	2596	14.70			Icy seep
<i>Diamesa latitarsis</i>	236	0.39	128	0.72			Generalist
<i>Pseudodiamesa branickii</i>	164	0.27	12	0.07			Generalist
<i>Eukiefferiella breviculcar</i>	740	1.22	248	1.40	4	1.05	Generalist
<i>Limnophyes</i> sp.	28	0.05	4	0.02			Generalist
<i>Paratrachocladius nudipennis</i>	200	0.33	48	0.27			Generalist
<i>Tvetenia calvescens bavarica</i>	4556	7.54	1092	6.18			Generalist
<i>Micropsectra</i> spp.	156	0.26	16	0.09			Generalist
Empididae	992	1.64	404	2.29			Generalist
Muscidae	76	0.13	8	0.05			Generalist
Helophoridae	72	0.12	8	0.05			Generalist
<i>Crenobia</i> sp.	2016	3.33	672	3.81			Generalist
Acari	992	1.64	16	0.09	24	6.32	Glacier spring/ Spring brook
<i>Macropelopia</i> spp.	376	0.62					Spring brook
<i>Diamesa dampfi</i>	68	0.11					Spring brook
<i>Chaetocladius dentiforceps</i> gr.	116	0.19					Spring brook
<i>Eukiefferiella devonica</i>	380	0.63					Spring brook
<i>Eukiefferiella minor</i>	20092	33.23	344	1.95	8	2.11	Spring brook
<i>Eukiefferiella similis</i>	68	0.11					Spring brook
<i>Heleniella</i> spp.	48	0.08					Spring brook
<i>Heterotrissocladius marcidus</i>	840	1.39					Spring brook
<i>Heleniella serratosioi drieri</i>	356	0.59					Spring brook
<i>Krenosmittia boreoalpina</i>	292	0.48					Spring brook
<i>Euorthocladius rivicola</i> gr.	472	0.78	12	0.07	4	1.05	Spring brook
<i>Euorthocladius saxosus</i>	868	1.44					Spring brook
<i>Euorthocladius frigidus</i>	160	0.26			8	2.11	Spring brook
<i>Paratrachocladius skirwitensis</i>	3544	5.86					Spring brook
<i>Psectrocladius Allopsectrocladius</i> sp.	88	0.15					Spring brook
<i>Rheocricotopus effusus</i>	88	0.15					Spring brook
<i>Thienemaniella partita</i>	100	0.17	4	0.02			Spring brook
<i>Thienemaniella vittata</i>	56	0.09					Spring brook
Simuliidae	800	1.32					Spring brook
Ceratopogonidae	132	0.22					Spring brook
<i>Dicranota</i> sp.	812	1.34	40	0.23			Spring brook
<i>Pedicia</i> sp.	40	0.07					Spring brook
<i>Baetis</i> sp.	680	1.12	48	0.27			Spring brook
<i>Rhithrogena</i> sp.	240	0.40	16	0.09	4	1.05	Spring brook
<i>Nemoura</i> sp.	860	1.42			4	1.05	Spring brook
<i>Nemoura mortoni</i>	64	0.11					Spring brook
<i>Protonemura</i> sp.	1652	2.73	20	0.11			Spring brook
<i>Isoperla</i> sp.	212	0.35			4	1.05	Spring brook
Phylopotamidae	40	0.07					Spring brook
Nematoda	992	1.64	64	0.36			Spring brook
Enchytraeidae	5700	9.43	200	1.13	4	1.05	Spring brook
Naididae	5792	9.58					Spring brook
Lumbriculidae	156	0.26					Spring brook
<i>Procladius</i> sp.	8	0.01					Too rare
<i>Zavrelimyia</i> sp.	16	0.03					Too rare
<i>Diamesa bertrami</i>	8	0.01					Too rare
<i>Brillia bifida</i>	8	0.01					Too rare
<i>Corynoneura lobata</i>	28	0.05					Too rare
<i>Metriocnemus eurynotus</i> gr.	20	0.03					Too rare
<i>Parametriocnemus stylatus</i>	28	0.05					Too rare
Thaumaleidae	28	0.05					Too rare
Dixidae	24	0.04					Too rare
<i>Perlodes</i> sp.	8	0.01					Too rare
<i>Rhyacophila</i> sp.	16	0.03	4	0.02			Too rare
Dytiscidae	8	0.01					Too rare
Total	60460		17656		380		

Supplementary Information V: Excluded taxa were not considered for the analysis.

Excluded Taxa	Glacier spring [ind. m ⁻²]	Glacier spring [%]	Icy seep [ind. m ⁻²]	Icy seep [%]	Spring brook [ind. m ⁻²]	Spring books [%]
<i>Diamesa zernyi cinerella</i> gr. juv.			44	0.18	260	0.28
<i>Chaetocladius piger</i> gr.			4	0.02		
<i>Pseudosmittia</i> sp.			4	0.02		
Psychodidae					4	0.004
Otherimoniidae			4	0.02	16	0.02
Baetidae juv.			2580	10.72	2020	2.20
Heptageniidae juv.			28	0.12	748	0.82
Plecoptera juv.			24	0.10	1604	1.75
Leuctridae juv.			1396	5.80	388	0.42
Perlodidae juv.	4	0.3	96	0.40		
Limnephilidae empty cases			1312	5.45	452	0.49
Haplotaenidae					8	0.01
Harpacticoida	12	1.0	524	2.18	24092	26.28
Copepoda	36	3.1			16	0.02
Collembola	96	8.4	396	1.65	1616	1.76
Tardigrada	620	54.0				
<i>Stilocladius montanus</i>						
<i>Total excluded</i>	<i>768</i>		<i>6412</i>		<i>31224</i>	

Supplementary Information VI: Mean and standard deviation of environmental variables.

	Glacier	Icy Seeps	Spring Brooks
Alkalinity [mg CaCO ₃ /l]	7.14 ± 8.02	22.34 ± 24	20.94 ± 25.25
Hardness [°F]	11.28 ± 14.65	18.26 ± 8.64	11.5 ± 10.21
Base chemistry			
N.NH ₃ [µg l/l]	11.4 ± 8.2	6.1 ± 5.87	2.5 ± 0
N.NO ₃ [µg l/l]	106.4 ± 51.94	234 ± 49.18	159.6 ± 79.25
P.PO ₄ [µg l/l]	1.58 ± 2.41	51.5 ± 107.2	3.2 ± 4.05
P _{tot} [µg l/l]	41.8 ± 46.74	59 ± 111.87	5.8 ± 2.59
HCO ₃ [mg l/l]	8.7 ± 9.8	27.24 ± 29.27	25.54 ± 30.79
SO ₄ [mg l/l]	115.66 ± 151.5	161.3 ± 85.44	103.26 ± 111.83
SiO ₂ [mg l/l]	2.12 ± 1.7	3.86 ± 2.64	2.72 ± 1.55
Cl [mg l/l]	0.22 ± 0.16	0.2 ± 0.07	0.32 ± 0.13
Mg [mg l/l]	7.66 ± 9.26	12.32 ± 5.93	8.86 ± 8.1
Na [mg l/l]	1.94 ± 1.25	2.88 ± 1.29	2.26 ± 1.22
K [mg l/l]	1.82 ± 1.25	2.04 ± 0.83	1.38 ± 0.94
Major Elements			
B [µg l/l]	1.04 ± 0.64	0.75 ± 0	1.38 ± 1.4
Ca [mg l/l]	32.32 ± 43.47	52.34 ± 26.13	31.1 ± 27.73
Minor Elements			
Al [µg l/l]	505.32 ± 751.81	105.96 ± 222.31	12.41 ± 26.07
Cr [µg l/l]	0.5 ± 0	0.69 ± 0.43	0.5 ± 0
Mn [µg l/l]	111.16 ± 63.41	30.32 ± 60.58	0.66 ± 0.35
Fe [µg l/l]	77.76 ± 96.55	3.25 ± 2.4	4.15 ± 1.9
Co [µg l/l]	16.68 ± 15.58	4.24 ± 5.12	1.19 ± 1.54
Trace Elements			
Ni [µg l/l]	61.77 ± 46.37	61.21 ± 93.63	7.83 ± 15.35
Cu [µg l/l]	8.41 ± 11.37	1.79 ± 2.05	0.5 ± 0
Rb [µg l/l]	3.59 ± 2.55	3.42 ± 2.21	2.08 ± 1.9
Se [µg l/l]	0.83 ± 0.62	1.24 ± 2.06	0.25 ± 0
Zn [µg l/l]	42.71 ± 44.29	28.97 ± 37.89	2.5 ± 0
Mo [µg l/l]	0.5 ± 0	0.73 ± 0.51	0.76 ± 0.58
As [µg l/l]	0.66 ± 0.36	7 ± 10.98	0.64 ± 0.31