

Base cation hydrogeochemistry at three geochemically contrasting monolithologic catchments

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Three small (27-55 ha) catchments situated 5-7 km apart and covered by Norway spruce (*Picea abies*), each underlain by contrasting bedrocks: granite at Lysina (L), amphibolite at Na Zeleném (N) and serpentinite at Pluhův Bor (P), were studied in the Slavkov Forest Critical Zone Observatory [1] [2]. It is situated close to lignite power plants with large sulfur emissions in 1950s - mid 1990s. Lysina exhibited low resilience to acid deposition and therefore extremely low pH, however Pluhův Bor exhibited very high resilience (Table 1). Only Na Zeleném did not show any major ecosystem problems and exhibited high resilience to acidification. Strong differences in drainage water compositions were generated mainly by differences in chemical weathering rates [1] [3]. High dissolved organic carbon (DOC) resulted from suppressed soil organic matter decomposition due to extreme acidity and Al toxicity at Lysina and due to peculiar chemistry at Pluhův Bor (e.g. high Mg and Ni, and low K).

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Site- water type	pH	Mg	Ca	K	SBC	DOC
		mg L ⁻¹			ueq L ⁻¹	mg L ⁻¹
L- shallow soilw.	3.6	0.2	0.5	2.1	120	39
L- deep soilw.	4.6	0.1	0.3	0.1	80	5
L- groundwater	6.0	1.0	6.9	1.1	710	2
L- streamwater	4.1	0.3	1.1	0.3	160	21
N- shallow soilw.	4.5	0.9	1.5	1.2	220	23
N- deep soilw.	5.9	0.7	3.0	0.3	290	3
N- groundwater	6.9	5.7	13.1	2.5	1440	1
N- streamwater	6.3	2.1	4.3	0.6	530	11
P- shallow soilw.	5.3	8.1	0.9	0.5	770	65
P- deep soilw.	7.7	16	1.1	0.1	1400	16
P- groundwater	8.0	32	10.4	0.2	3230	2
P- streamwater	7.2	13	1.3	0.2	1170	32

Table 1: Mean soilwater chemistry in 2012-2014 (depths 20 and 90 cm), groundwater chemistry in 2014 (borehole depths 26-30 m) and mean discharge-weighted streamwater chemistry in 2010-2014. SBC = sum of base cations.

[1] Krám *et al.* (2012) *Appl. Geoch.* **27**, 1854-1863. [2] Regelink *et al.* (2015) *Geoderma* **247-248**, 24-37. [3] Krám *et al.* (2014) *Procedia Earth Planet. Sci.* **10**, 52-55.