

VERSAUERUNG DER BIRGTER QUELLE/NÖRDLICHER TEUTOBURGER WALD IN ZEITSCHNITTEN ZWISCHEN DEN JAHREN 1988 UND 2018**ACIDIFICATION OF THE BIRGTER SPRING/NORTHERN TEUTOBURG FOREST IN TIME SLICES BETWEEN THE YEARS 1988 AND 2018**

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SUMMARY

This work analyses the development of water acidification at the Birgter Spring, a silicate spring in the Birgter Mountain, northern Teutoburg Forest, over a measuring interval of three decades (1988-2018). The average grade of acidity varies around pH 4, the concentration of dissolved organic carbon increases from average 6.2 mg to 8.2 mg L⁻¹ DOC. Hydro-chemical characteristics like sulphate, nitrate, aluminium, manganese and lead drop considerably from high initial concentrations (Ø 68.8 mg L⁻¹ SO₄²⁻, 23.5 mg L⁻¹ NO₃⁻, 10.1 mg L⁻¹ Al³⁺, 0.18 mg L⁻¹ Mn²⁺, 481 µg L⁻¹ Pb²⁺) by roughly the factor 1.4 (NO₃⁻), 1.8 (SO₄²⁻), to as few as the factors of 2-, 3- and 4 (Mn²⁺, Al³⁺, Pb²⁺). A statistical analysis of the raw data of the winter periods 1987/88 and 2017/18 resulted in significant differences only for parameters relevant for acidification.

In a further analysis, the following more complex acidification indicators were calculated: $[Ca^{2+}+Mg^{2+}]/[SO_4^{2-}+NO_3^-]$; $\Delta Alk = 0,91 [Ca^{2+}+Mg^{2+}]+Al^{3+}+H^+-HCO_3^-$; $[SO_4^{2-}+NO_3^-]$; Alk acidified water $[HCO_3^-+H^+-Al^{3+}]$; $Alk_{LB} = [Ca^{2+}+Mg^{2+}+Na^++K^+] - [SO_4^{2-}+NO_3^-+Cl]$. The nitrate portion in the acidification was determined on the basis of the nitrogen-sulphur coefficient $KNS = NO_3^-/[SO_4^{2-} + NO_3^-]$. The spring water was typified over the equivalent rank order of its most frequent ions at all measuring times.

The concentration decrease of most of the parameters reflects the intensity of the acidification models and is reason enough to suggest the interpretation of a beginning de-acidification trend. Sulphate concentration – still high in 2018 and combined with the reduced nitrate concentration – proves that the KNS-value and consequently the nitrate portion in acidification have decreased significantly. The typifying of the spring water only confirms the de-acidification effect in the last measuring year on the cation side: aluminium is no longer the primary element unlike throughout all measuring years before; on the anion side is sulphate always the dominating element; hydrogen-carbonate is always missing. The persistent dominance of sulphate, the permanently high, potentially toxic concentration of