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Bioindicators for trace metal inputs in the Harz Mountains (Germany)

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Bioindicators are well-known monitoring tools to assess the environmental pollution by toxic elements and trace metals. Wild berries and peat mosses are common in most European mountain ranges and are widely used in biomonitoring studies for the evaluation of anthropogenic inputs [1-3].

Sphagnum mosses and bilberries (*Vaccinium myrtillus)* of different morphological and geological units in the Western Harz Mountains were analysed for trace metals (As, Cd, Cu, Co, Ni, Pb, U, Zn) und REE. The mosses were sampled from 2017 to 2025. Bilberry samples (leaves and berries) were only taken in 2025. The different regions of the mountain range are characterised by specific ranges of elemental concentrations and associations of the analysed peat mosses. The highest trace metal contents (e.g., Pb, Co, Ni) were found on quartzite at elevations of about 800 m a.s.l. whereas enriched U and La contents are typical for mosses around Mount Brocken (1141 m a.s.l.) on granitic rocks. Due to specific uptake mechanisms for trace metals, bilberries and their leaves generally have lower Pb and Cu contents than the mosses (Figure 1). Compared to other European mountain ranges, relatively high trace metal contents of mosses (especially for Pb) were found in the Harz Mountains.

The environmental conditions (e.g., microtopography, geological background, precipitation amounts, long-range atmospheric transport) and the historical mining activities causing the distribution of trace metals are discussed.

References:

[1] Kandziora-Ciupa, M., Dabioch, M., Nadgórska-Socha, A. (2022), Evaluating the accumulation of antioxidant and macro- and trace elements in *Vaccinium myrtillus*. *Biol. Trace Elem. Res.* 200, 4175–4185.

[2] Shotyk, W., Bicalho, B., Grant-Weaver, I., Stachiw, S. (2019), A geochemical perspective on the natural abundance and predominant sources of trace elements in cranberries (*Vaccinium oxycoccus*) from remote bogs in the Boreal region of northern Alberta, Canada. *Sci. Tot. Environ.* 650, 1652–1663.

[3] Zupančič, N., Bozau, E. (2022), Effect of the coronavirus pandemic lockdown to elemental composition of peat mosses. *Environ. Sci. Pollut. Res.* 29, 25473–25485.

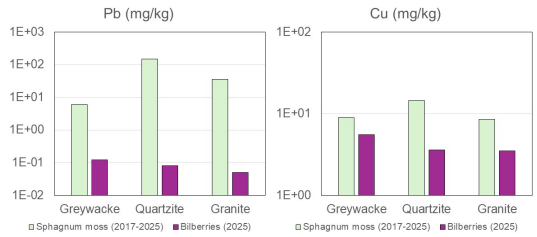


Figure 1: Average Pb and Cu contents of *Sphagnum* mosses and bilberries in the Harz Mountains