

Biomonitoring of trace element uptake by trees in a former uranium mining area in Germany

CAROLINE PUKALLUS, SARAH NETTEMANN, MARKUS
RIEFENSTAHL, DIETRICH BERGER, MARCUS BÖHM,
LEVKE PETERSEN, ERIKA KOTHE AND THORSTEN
SCHÄFER

Friedrich Schiller University Jena

In the federal states of Thuringia and Saxony, Germany, about 230,000 tons of uranium were produced by the Wismut company between 1947 and 1990 [1]. From 1991 onwards, the former uranium mining areas were remediated by Wismut GmbH to reduce the environmental impact of potentially released radionuclides. Nowadays, climate change poses additional and increasing challenges especially for through surface coverage remediated sites due to more extreme hydrological conditions.

In the framework of the BMBF-funded project MykoBEst, we are working at the study site Beerwalde, a waste rock pile in the former uranium mining area near Ronneburg (Thuringia, Germany). After deposition, the waste rock material was covered with uncontaminated substrate and the site was afforested until 2002 [2]. Our project includes a detailed characterization of this site and an assessment of heavy metal uptake by the tree population. It is hypothesized that changing climatic conditions, such as extended drought periods, could lead to deeper rooting and deepening of oxidation fronts. Tree roots may subsequently grow into the waste rock and take up heavy metals. This could create new preferential pathways for contaminant translocation such as heavy metal transport to the surface via tree compartments. In this study we link data on trace element concentrations in seepage water, soil, tree stems and tree leaves to monitor potential uptake mechanisms. We perform dendrochemical analysis of tree cores using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). This method enables temporal tracking of contamination pathways at selected sites and provides insights into the effectiveness of the protective barriers and potential leaching.

[1] Märten, Berger, Köhler & Merten (2015), Environ. Sci. Pollut. Res. 22, 19417-19425.

[2] Schramm & Roscher (2013), Proc. Eighth Int. Seminar on Mine Closure, 207-222.