Retrospective biomonitoring using spatially resolved X-ray microanalysis of Salix nigra L. in a Ni and U contaminated depositional system (A05-punshon115001-Oral)

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Abstract:

A hard X-ray microprobe was used to determine the concentration and distribution of metals within the annual rings of black willow (Salix nigra L.) from Steed Pond; a former de facto settling basin at the Savannah River Site, near Aiken, South Carolina, and Tims Branch - a depositional system downstream that is periodically inundated with contaminated sediments. Incremet core samples were aged using dendrochronological image analysis, and bulk elemental composition was determined on replicate cores using ICP-OES. Cores taken from S. nigra at Tims Branch were significantly enriched with Ni in years corresponding with spillway breach incidents, with the highest localized Ni concentrations within tissues of approximately 792 ppm. Cores from Steed Pond showed much higher concentrations of Ni within annual rings. The technique revealed spatial variation in metal concentrations between and within annual rings, revealing anomalous regions of almost pure Ni * thought to reside within vessel elements. Synchrotron based X-ray fluorescence (XRF) is a repeatable and non-destructive technique for multielement analysis of woody tissue, requiring a minimal degree of sample preparation.

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