

Is thallium in peat a good indicator of anthropogenic contamination? Examples from Czech sites with contrasting pollution histories

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The purpose of this study is to investigate the Tl distribution and accumulation rates in Czech peatbogs with contrasting anthropogenic loads. Nine peat cores were sampled in the mountain areas of the Czech Republic (6 cores in the northern part affected by emissions from coal-burning power plants and 3 in the pristine southern part). In addition, 3 cores were collected close to the Pb mining and smelting area of Pribram. Cores were ²¹⁰Pb dated and trace metals/metalloids were measured in the digests by ICP-MS. Maximum Tl concentrations in peat were significantly higher in the polluted northern areas (1.16 mg/kg) and close to the Pb smelter (0.83 mg/kg) than in the pristine area (0.45 mg/kg). Thallium distribution well correlated with other metals (Pb, Hg) and metalloids (As, Sb). Thallium enrichment factors (EFs) calculated against Sc reached the maximum value of 17 indicating significant input of anthropogenic Tl. Thallium accumulation rates in peat varied between 20 and 50 $\mu\text{g}/\text{m}^2/\text{y}$ until 1930s, followed by a significant increase related to industrial activities in the northern part of the Czech Republic (up to 290 $\mu\text{g}/\text{m}^2/\text{y}$ in 1980s). In contrast, maximum Tl accumulation rate at the pristine site was 88 $\mu\text{g}/\text{m}^2/\text{y}$. Data from the vicinity of Pb mines/smelter indicated higher accumulation rates even in the second half of the 19th century (between 50 and 200 $\mu\text{g}/\text{m}^2/\text{y}$) followed by a significant decrease in late 1970s as a result of more efficient flue gas cleaning technology installed in the smelter during this period.