



Assessment of anthropogenic impact on overbank sediment geochemistry with use of ^{210}Pb : the Warta River, Poland

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The geochemical studies of alluvial sediments allow to reconstruct pollution through time. Concentration of heavy metals in sediments deposited on floodplains is related to their content in sediments transported and accumulated in a river channel immediately before a flood. As a result, changes of heavy metal concentrations in the vertical profiles of overbank sediments reflect concomitant changes of river pollution. This relation is most evident in the areas where river pollution with heavy metals is large. The most heavily polluted layers tend to accumulate during the most intensive production of metals, whereas, in the period prior to industrial activity, concentrations of heavy metals are more similar to geochemical background values. Use of ^{210}Pb method and heavy metal concentration profiles allows to obtain retrospective estimates of recent sedimentation rates (100-150 years for ^{210}Pb method) avoiding many practical difficulties associated with monitoring of contemporary events.

The main purpose of this research was to investigate how the changes in wastewater discharge and atmospheric emission influenced the content of heavy metals in overbank deposits in the gorge of the Warta River (the Cracow Upland, southern Poland). The Warta valley at Jaskrów forms the narrowest part of the gorge. In the upper part of the gorge frequent, annual inundations accelerate sediment accretion on the alluvial plain. Five sediment cores were collected along a cross section perpendicular to the river channel. One subsample representative for each profile was analyzed. The estimated sedimentation rates for the five cores vary from 0.05 to 0.39 g/cm²·year what

corresponds to 0.11 to 0.75 cm/yr, respectively. Sedimentation rates decrease with the distance from the river.

Pronounced peaks of heavy metal concentrations are observed in the investigated profiles. The heavy metal peaks in the profile from the levee occur at larger depth (about 0.5 m) than in profiles from crevasse splays (about 15-18 cm). High pollution of only several centimeter thick sediment layers in each profile suggests abrupt changes in sources of river water pollution during their accumulation. Those pollution sources can be identified as related to functioning of iron smelter and to discharge of municipal effluents from the city of Częstochowa in late 1950s. Loads of pollutants to the river decreased after new wastewater treatment plant started to operate in 1960. This gives an estimation of a relatively high rate of sediment accretion above the polluted layer in the levee (about 1 cm/year) and of a much smaller rate (3-4 mm/year) in crevasse splays.

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