

## **Identification of Pb sources in the upper Mežica Valley based on Pb isotope composition**

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Mining in Mežica started in Roman times. Intensive mining of Pb and Zn ore began in the early 19th century. Until the mine closed in 1995, 19.000.000 tons of ore have been mined. Due to long and intensive mining and processing activities, the environmental load especially with Pb has greatly increased. The burden on the population in the upper Mežica valley has been monitored by measuring Pb concentrations in the blood since 1976. Until 1990 the concentrations of Pb decreased from 500 µg/L to 41-284 µg/L. During 2001 to 2002, an increase of Pb concentrations in the blood of children (> 100 µg/L) was determined in one third, and in 2017 in one quarter of blood samples from children aged 3 [1]. The reason for this is the re-release of Pb, since also its concentration in the dust particles started to grow. Following the closure of the Pb mine and ore smelters, potential sources of Pb pollution are discharges mainly from the battery production and recycling plant and building materials producing plant. By monitoring the total concentration of Pb in dust particles or environmental samples only, it is nearly impossible to determine their sources and fate in the environment.

The aim of the present study was to identify sources of Pb based on its isotope composition. Pb isotope composition was determined in dust particles and in the local environmental samples (soil, water and sediments from Meža river and its tributaries, that receive water from the mine, and mine tailings). Pb concentrations were determined by ICP-MS and isotope compositions by MC-ICP-MS. Correlations of different Pb isotope pairs were studied in order to find a characteristic isotopic pattern among samples analysed. From the analysis of soil, mine tailings and sediments we determined the local background Pb isotope composition, since in all samples Pb isotopes had the same fingerprint, while the ones in the dust particles slightly deviate, indicating additional sources may contribute to its isotope composition. They will be further investigated.

[1] Tratnik S. J. et al. (2019), International Journal of Hygiene and Environmental Health 222, 563-582.