

# Compositional signature of trace elements in stream sediments along the Babahoyo/Daule riverbeds (Ecuador): A geostatistical and Bayesian approach

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**Abstract.** The high concentrations of Potentially Toxic Elements (PTEs) in stream sediments may pose a significant threat since the pollutants may travel long distances to the sea, affecting aquatic environments and public health. When rivers cross large cities, mining, or cultivated areas, it is usually observed an increasing concentration of PTEs downstream, reaching hazardous levels due to the ability and persistence of heavy metals by bioaccumulation in the environment.

This research comprises a comprehensive sampling campaign composed of 75 samples of stream sediments from the Babahoyo and Daule riverbeds (Ecuador, South America), downstream and upstream of Guayaquil. 63 chemical major and trace elements were analyzed in each sample. The research aims to define a preliminary expert-based geochemical signature for the area to ascertain the degree of anthropization in two riverbeds exposed to intense industry and agriculture.

In the first step, the selected attributes underwent a compositional transform (CoDa) by means of a clr-transformation of geochemical data, followed by an unsupervised Bayesian approach. From the exploratory analysis of the unsupervised network, the potential relationships between geochemical data can be explored in reality, transferring them to the model. This great potential allows us to carry out a global analysis of the problem, detect which PTEs have the greatest influence and identify data redundancy. The definition of spatial hot spots of pollution downstream of the Babahoyo and Daule rivers was computed through Sequential Gaussian Simulation and further interpreted on the PTEs' geochemical fate framework, facing the lithological and land use patterns. The preliminary results point to a division between those trace elements that are linked to geogenic enrichment (Co, Cr, V), the ones related to anthropogenic nature, such as the related to industrial or agricultural origin (Ba, Cd, Mo), and the ones linked to both processes (As, Cu, Mn).