

Advancing Planetary Health Monitoring: An Experimental Approach to Soil Contamination Assessment using Electrical Resistivity Tomography

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Heavy metal contamination in soils, particularly by mercury and arsenic, poses a significant environmental challenge with far-reaching impacts on human health and natural ecosystems (Singh & Steinnes, 2020). This study introduces an innovative approach to address this issue, employing Electrical Resistivity Tomography (ERT) as a potent tool for the investigation of mercury and arsenic distribution and concentration in soils. ERT, a non-invasive geophysical technique, generates two-dimensional images of subsurface electrical resistivity distribution. This technique has proven effective in monitoring spatial distribution and concentration of heavy metals in soils, offering high-resolution coverage of large areas at a relatively low cost (e.g. Gabarrón et al., 2020). Our methodology involves conducting tomographies in a laboratory setting using commercial soil samples. These samples will be treated with varying concentrations of mercury and arsenic diluted in water, and their ERT values subsequently determined. This experimental setup will provide clear baselines for detecting and analyzing heavy metal contamination in the field in different soil types impacted by heavy metal contamination. The findings from this study will enhance our understanding of the dynamics of mercury and arsenic contamination in soils. More importantly, they will contribute to the development of effective environmental management and remediation strategies. This research thus represents a significant stride towards improving our capacity to monitor and safeguard planetary health using geochemical tools.

References:

Gabarrón, M., Martínez-Pagán, P., Martínez-Segura, M. A., Bueso, M. C., Martínez-Martínez, S., Faz, Á., & Acosta, J. A. (2020). Electrical resistivity tomography as a support tool for physicochemical properties assessment of near-surface waste materials in a mining tailing pond (El Gorguel, SE Spain). *Minerals*, 10(6), 559.

Singh, B. R., & Steinnes, E. (2020). Soil and water contamination by heavy metals. In *Soil processes and water quality* (pp. 233-271). CRC Press.