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Geochemical Assessment of Impact of Mine Spoils on the Quality of Stream Sediments within the Obuasi Mines Environment, Ghana

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ABSTRACT

Stream sediment samples were analyzed for the concentrations of some trace metals in the Obuasi gold mining environment, Ghana. The objectives were to determine the possible impacts of mining operations in the area on sediments' trace metal load, and the resulting effects on agriculture and livelihoods. The concentrations of arsenic (As), copper (Cu), lead (Pb), zinc (Zn), iron (Fe), with calcium (Ca) as reference element, were compared to their respective background concentrations to calculate the enrichment and contamination factors, and also geo-accumulation and pollution load indices of each trace metal. These were in turn compared to standard tables to determine the status of contamination. Q-mode hierarchical cluster analysis (HCA) was then applied to the samples for spatial classification. This study suggests probable contribution of mining and associated activities in the Obuasi area to the concentrations of trace metals especially arsenic, in the stream sediments. Three spatial relationships were revealed based on the concentrations of these trace metals from the Q-mode HCA. The samples presented generally high concentrations, which were more profound for samples taken closer to holding pond and tailings dams, and decreased downstream.

KEYWORDS

Enrichment Factor, Contamination Factor, Geo-Accumulation Index, Pollution Load Index, Trace Metals, Obuasi Gold Mine, Ghana

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