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# Identifying Pathfinder Elements for Gold in Multi-Element Soil Geochemical Data from the Wa-Lawra Belt, Northwest Ghana: A Multivariate Statistical Approach

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## ABSTRACT
A multivariate statistical analysis was performed on multi-element soil geochemical data from the Koda Hill-Bulenga gold prospects in the Wa-Lawra gold belt, northwest Ghana. The objectives of the study were to define gold relationships with other trace elements to determine possible pathfinder elements for gold from the soil geochemical data. The study focused on seven elements, namely, Au, Fe, Pb, Mn, Ag, As and Cu. Factor analysis and hierarchical cluster analysis were performed on the analyzed samples. Factor analysis explained 79.093% of the total variance of the data through three factors. This had the gold factor being factor 3, having associations of copper, iron, lead and manganese and accounting for 20.903% of the total variance. From hierarchical clustering, gold was also observed to be clustering with lead, copper, arsenic and silver. There was further indication that, gold concentrations were lower than that of its associations. It can be inferred from the results that, the occurrence of gold and its associated elements can be linked to both primary dispersion from underlying rocks and secondary processes such as lateritization. This data shows that Fe and Mn strongly associated with gold, and alongside Pb, Ag, As and Cu, these elements can be used as pathfinders for gold in the area, with ferruginous zones as targets.

## KEYWORDS
Multivariate Analyses; Multi-Elements; Soil Geochemical Data; Pathfinder Elements; Gold; Northwest Ghana

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