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Are Mafic Rocks a Source of Cu, Co, Ni and V in the Central African Copperbelt?

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Sediment-hosted stratiform deposits are significant sources of base metals globally, and with heightened demand in response to the development of low carbon energy production, the need to discover and exploit new deposits for these base metals is imperative.

Red-bed sequences in sedimentary basins are the predominant source of base metals within sediment-hosted deposits, however within the Central African Copperbelt (CAC), red-beds are not sufficiently voluminous to account for the metal endowment. The CAC hosts the majority of the world's Co resources, and a large share of the Cu resource alongside hosting some unusual hydrothermal Ni and V deposits, which leads to the question; what else could be a source of Cu, Co, Ni and V in the CAC? The basement and surrounding strata have been suggested as additional sources, however mafic bodies found throughout the CAC, which are inherently enriched in Cu, Co, V and Ni, have been overlooked and relatively uninvestigated.

Mafic bodies studied have undergone a minimum four stages of alteration, represented by nine different alteration styles, which have been classified through quantitative mineralogy. The textures and mineralogy suggest two different fluids enriched in Na, Ca, K and Cl, have mobilised Cu, Co, V, and the normally immobile Ni, to varying extents.

Through classifying alteration styles, geochemical proxies can be determined which can be applied to drillcore databases to determine the abundance of each alteration style. Through understanding the abundance of alteration, we are able to constrain the amount of Cu, Co, Ni and V leached from altered mafic rocks at a deposit scale. This has broader basin-wide implications to the significance of altered mafic rocks as a source of Cu, Co, Ni and V within the Central African Copperbelt.