

GENERALISED GEOCHEMISTRY OF THE CENTRAL AFRICAN COPPER BELT

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The Central African Copperbelt (CACB) contains the largest and highest grade copper and iron deposits in the world. The region straddles the boundary between Zambia and the Democratic Republic of Congo (DRC), from Kolwezi in the West through Likasi, Lumbubashi to Kitwe in the South East. The orebodies stretches across the CACB from Nkana in the south-east to Kamoto in the north-west. It is hosted in Neoproterozoic metasedimentary rocks of the Katangan Supergroup deposited in the Katangan basin. The climate in the Copperbelt is characterized by three principal seasons: a rainy season from November to April, a dry-cold season from May to June, and a dry-hot season from August to October. The total annual precipitation is more than 1,300 mm, which falls mostly during the rainy season.

Significant geological exploration and mining started during the 1920s when the British South African Company (BSAC) offered prospecting rights to large multinational companies. This resulted in the discovery and development of various mines. Extensive mining and metallurgical activities continue to exploit the ore body to date, all with the potential to impact on the environment. The environmental degradation in the region with respect to the geochemistry of the mine residue deposits, tailings and waste rock, is poorly quantified in spatial terms since the availability of accurate and up to date regional geochemical data is limited.

However, a number of geochemical characterisation studies have been conducted in the region at localised levels primarily focussed on the oxidised ore bodies. This paper will focus on consolidating the available geochemical data on tailings and waste rock material in the region and analysing it to highlight the generalised trends, similarities and differences in the geochemical characterisation of the tailings and waste rock of the region.

The paper will discuss the general geology, mineralogical composition; total elemental composition and acid mine drainage and metal leaching (ARD/ML) characteristics of the tailings and waste rock of the region. A generalised geochemical map showing the key trends, differences and similarities throughout the CACB from Kolwezi to Kitwe will be presented.

The geochemical map will be useful in highlighting regions of significant risk in the region to guide coordinated environmental management where needed. The paper will also contribute to the geochemical pool of knowledge required to generate a generalised environmental geochemical atlas of the CACB region.