

Field Characterization of Neoproterozoic Volcano-sedimentary Sequence, West Congo Belt, Tshela Region in DRC: Petrography and Implications for VMS Mineralization Potential

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Neoproterozoic volcano-sedimentary sequences of Central Africa, particularly in the Katanga Copperbelt, are renowned for hosting large Cu–Co deposits. In contrast, the Panafrican West Congo Belt (WCB), located along the western margin of the Congo Craton, remains significantly understudied. The Tshela region of northwest Kongo Central in the Democratic Republic of Congo (DRC) represents a promising but largely unexplored segment of the WCB. It is characterized by gold occurrences, extensive anorogenic bimodal volcanism, and sequences of graphitic schists interbedded with volcano-sedimentary rocks, potentially indicative of magmatic and hydrothermal metal fertility.

This study presents new field-based geological data, including six cross-sections that transect the lithostratigraphic units of the region. The aim is to refine the litho-tectono-metamorphic framework and evaluate the fertility of the volcanic sequences, with a focus on their potential to host various types of mineralization (e.g., VMS, Sedex) formed during sedimentary processes and subsequent post-depositional events associated with the Panafrican orogeny.

Preliminary observations do not clearly support the initial hypothesis of geochemical fertility. However, detailed fieldwork reveals features comparable to those in known VMS-bearing terranes such as the Abitibi and Betul belts. The felsic units exhibit massive to flow-banded and porphyritic textures, with local volcanic breccias, suggesting subaqueous lava domes or flows, commonly associated with VMS systems.

Regionally, the bimodal volcanic rocks are interpreted as part of the 920–900 Ma anorogenic magmatism linked to an early Tonian rifting event of the precursor basin to the WCB (Seke-Banza Group, Kongo Central, DRC). Graphitic schists and interbedded tuffaceous units (with subordinate metaquartzite, metaconglomerate, and dolomite) suggest a reducing depositional environment favorable for syn-volcanic metal precipitation. During orogeny, hydrothermal activity likely promoted gold remobilization and precipitation in quartz veins under epi- to mesothermal conditions.

Our field and petrographic results provides a preliminary framework for ongoing geochemical, petrological, and geochronological investigations.