Insights into the structural framework of Paleoproterozoic Au-(Cu-Mo) mineralizations at the Odienné project, southern West African Craton

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Résumé

The Odienné Au-(Cu-Mo) district, northwestern Côte d'Ivoire, lies west to the lithospheric-scale Sassandra shear zone, within the transition zone between the Archean and Paleoproterozoic domains of the West African Craton. This zone represents a tectonic suture framed around the main, N-S- to SE-NW-striking Sassandra Shear Zone and multiple EW-striking subsidiary structures. With varied structurally-controlled mineralizations, the Odienné district represents a case in point to unravel influence of a complex, protracted deformation record on metal endowment of such a lithospheric boundary area. Besides, understanding the structural framework and its influence on metal enrichment or remobilization remains crucial for refining the genetic model of the Odienné district.
This study focuses on the deposit-scale characterization of the Lando, BBM and Charger prospects as part of the Odienné district, through integrated fieldwork, structural geology, petrography, and whole-rock and in situ mineral geochemistry with the aim to unravel the nature and timing of ore and barren magmato-hydrothermal events expressed in Odienné.

The diversity of mineralization styles, host rocks, deformation patterns and metallic signatures at Odienné suggest different ore processes for the formation, evolution and preservation of the deposits. If brittle-ductile deformation is ubiquitous in the Charger deposit, then those located near the Sassandra Shear Zone (e.g., BBM and Lando) exhibit genetic affinities with more ductile shearing due to their localization.

At Charger, sub-vertical E-W- to NW-SE-striking discrete shear zones and sub-horizontal second-order shears within diorite and/or felsic dikes appear spatially disconnected with the sub-vertical N-E striking mineralization. Various styles of mineralization are observed, but

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most of the gold is hosted in a zoned quartz-carbonate-amphibole-sulfide breccia suggesting different episodes of brecciation and veining. At BBM, mineralization is mainly hosted within a sheared granodiorite pluton with an oblate, NW-elongated shape consistent with the local shear zone strike direction. Quartz sulfides veins are boudinaged and folded with sulfides that appear transposed along the shear planes.
Mineralization across the district exhibits various structural controls at the district scale in favor of a protracted tectonic evolution. Our results highlight mineralizing and barren fluid circulation during various tectonic events and suggest different crustal structural levels of formation of these mineralizations.

Mots-Clés: West African Craton, Archean, Paleoproterozoic transition, Odienné, Au, (Cu, Mo) district, structural control on mineralization, Gold