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Geochemical characterisation of Pb-Zn-Cu and Ba mineralisation in the Lower Cretaceous sediments of the Coastal Basin, Gabon, Central Africa

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Over 150 sediment-hosted Pb-Zn-Cu and Ba occurrences are identified in Gabon along the contact between the Mesozoic to recent sedimentary Coastal Basin and the Archaean to Paleoproterozoic Kimezian basement of the West Congo Belt [1]. These occurrences were first described in the 1930s and systematically explored in the 1960s. The Pb-Zn-Cu mineralisation is mostly comprised of disseminated coarse-grained galena and finer-grained sphalerite which is hosted in clastic sediments of the Upper Cocobeach Formation (Lower Cretaceous [2]). The contact of the sediments with the basement follows kilometre-long embayments and is frequently marked by metre-large blocks of barite locally associated with pyrite and galena.

Exploration works in the 1960s and later in the 1970s focused on the high-grade Pb-Zn-Cu Kroussou prospect along the Dikaki embayment. The French *Bureau de Recherches Géologiques et Minières* conducted comprehensive exploration, targeting shallow and high-grade lead deposits. Detailed mapping, rock chip sampling, soil geochemistry, geophysics and Winkie drilling were conducted. The mineralisation style was not fully understood and both Mississippi Valley Type [1] (hosted in coarse-grained arkose i.e. Laisvall sub-type) and red-bed style [3] were proposed.

As part of a renewed interest in the area, two mapping projects were undertaken in 2014-2015 and 60 rock chip samples collected and assayed for major and trace elements, primarily in the Kroussou prospect. A Principal Component Analysis conducted on 39 sediment samples highlighted two distinct metal associations. The first Pb-Cu-Ag-Cr-W association is related to a sandstone-hosted, Pb-dominant mineralisation, more akin to MVT of the Laisvall type. A Zn-Mo-As-Co association represents a carbonate-hosted, Zn-dominant mineralisation. Both mineralisation types occur in close proximity in the field, suggesting a continuum between a Pb-Cu and a Zn end-members with the relative proportion of metals being controlled by the amount of carbonates in the host rocks.

A geochemical characterisation of 12 samples of barite and barite-rich sandstone focused on the Rare Earth Element (REE) content. The samples show a variable content of REE's ranging from 7 – 118 ppm. The chondrite-normalised REE distribution presents a similar pattern across the samples, with an enrichment in light REE's and a slight enrichment to a depletion in heavy REE's. The chondrite-normalised REE patterns of the clastic sediments show a more pronounced enrichment than those of the baritic samples, particularly with respect to LREE's. The REE patterns of barite-bearing rocks were compared to published data on barite from hydrothermal and marine origins and are consistent with a low-temperature hydrothermal source [4].

References:

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