

## **Two styles of primary gold mineralization in the Atacora Structural Unit from the Natitingou area, Northwestern Bénin (Pan-African Dahomeyides Belt, West Africa)**

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Syn-genetic and epigenetic gold mineralization in Natitingou area occurs in poorly documented metallogenic zone belonging to the Atacora Structural Unit of Pan-African Dahomeyides Belt. The syn-genetic mineralization is disseminated in the quartzites, schists, micaschists and amphibolites, and the epigenetic mineralization is hosted by the small quartz lode and kilometric NW-SE, NE-SW quartz veins (dykes) crosscutting the metasediments. The highest gold contents are obtained in the strongly deformed area along kilometric-scale faults where the metasediments are sheared, folded, brecciated. They contain abundant lentils and dykes of quartz lode bearing calcite  $\pm$  sulphides. This underlines the structural control of the gold mineralization in the study area. In the lodes and quartz dykes, gold is rarely visible macroscopically, but is invisible in the metasediments and amphibolites.

Trace element geochemistry shows that the invisible gold grade in quartz vein samples varies from  $< 5.0$  to 147.4 ppb. Gold content in amphibolites ranges from 49 to 1760.9 ppb whilst it varies from  $< 5.0$  to 9586.8 ppb in metasediments.

Lithophile elements (K, Rb and Ba) show a co-enrichment suggesting that potassium metasomatism have accompanied the gold mineralization, and was probably resulted from hydrothermal ore fluids. The chondrite-normalized REE patterns displays LREE enrichments and HREE depletions with a negative Eu anomaly. Such configurations express an extensive interaction of mineralizing fluids with metasedimentary host rocks and/or ore fluids were likely derived from metamorphic dewatering of host rocks.

Primary gold mineralization origin in the Atacora is inferred to be of (i) remobilization processes of gold contained in the host rocks during the late Pan-African metamorphic and tectonic processes and/or (ii) hydrothermal phenomena related to the Pan-African granitoids setting up in depth under these metasediments. Similar geotectonic setting of the Atacora gold mineralization is described in Ghana, Nigeria gold fields and many areas of Precambrian in the world.

**Keywords:** primary gold mineralization, hydrothermal, structural control, Dahomeyides, Benin