

Geological evolution and metallogeny through the Birimian
Billa, BGRM
Bonnemaison, BGRM

The Palaeoproterozoic Birimian province of Western Africa is more than 3 million km² and is part of a larger domain including the Guiana Shield that shows similar evolution and similar mineralization.

BRGM had carried out a large amount of prospecting, mapping and scientific work in Western Africa since its foundation in 1959. These works have been synthesized by the "BRGM Birimian team": J. P. Milesi, P. Ledru, J. L. Feybesse et al. in the: *Map of the West african gold deposits in their lithostructural setting (1989)* and *Africa GIS program (2003)*.

The Birimian evolution, more than 150 Ma long, results from the convergence between two Archean cratons: Cupixi-Carajas craton in the Southern Guiana shield and the Kenema-Man craton in Western Africa. Convergence lead to accretion of blocks of different nature such as: archean fragments, flyshoid basin, volcano-plutonic greenstone belts, volcano-plutonic arcs, and TTG domain at the margin of the archean craton. This SE-NW convergence is associated with a widespread magmatism and a multistage tectonic evolution.

Birimian is famous for its extensive gold mineralization (> 8000 t Au production & resources) associated with various geodynamic settings. The gold peak is related to the final stage of evolution (~ 2100 Ma) and characterized by strike-slip shearing. Various types of mineralization may be defined: 1) Orogenic gold mineralization is dominant along regional structures (e.g. belt-basin shear zones in Ghana: Obuasi-Prestea, Akyem, Bibiani, Ahafo); 2) Gold associated with volcanic and shallow plutonic felsic bodies along active strike-slip regional faults related to pull-apart basins (Angovia, Ity); 3) Gold associated with early hydrothermal activity and/or shallow plutonism along normal faults (Siguiri basin); 4) Gold hosted by Tarkwa paleoplacer conglomerates in a possible orogenic foreland basin.

The palaeoproterozoic domain also hosts: 1) World class BIF deposits (Simandou-Nimba) on the passive margin of the Archean; 2) Mn deposits (Ntsuta, Beliata, Tambao, Kiéré) and associated Zn massive sulfides (Perkoa, Nabenia-Tenga) on oceanic to island arc settings (~2160 Ma); 3) Layered mafic complexes with Fe-Ti deposits, Ni sulfides and PGE occurrences; 4) Sn, REE, Nb-Ta associated with orogenic, leucogranitic bodies; 5) Paleoproterozoic diamonds (Borsalogho, Comoe, Akwatia).

There are several Post palaeoproterozoic mineralization concerns including: 1) Uranium hosted by the neoproterozoic cover; 2) Mesozoic diamonds (Guinea, Sierra Leone); 3) Lateritic Ni-Co deposits; 4) Large bauxite deposits (Guinea).

Some deposits are under-represented in Birrimian (IOGC, VMS, SEDEX, Ni-PGE) compared to similar geodynamic settings (Abitibi, Baltic, Etc.). That is probably due to low prospecting and unproductive exploration methods in these morpho-pedogenic conditions.