The Samapleu mafic-ultramafic dyke: an Eburnean (2.09 Ga) intrusion mineralized in Ni-Cu sulfide in the northern part of the so-called stable Archean domain- western Ivory Coast (Future first Nickel-Copper deposit in West Africa)

Franck Gouédji[1,*],Christian Picard[2], Marc Antoine Audet[3], Yacouba Coulibaly[4]
[1]Université de Man - BPV20 Man - Côte d'Ivoire ; [2]Université de Franche-Comté (UMR 6249) / ISTerre Univ. Grenoble-Alpes (UMR 6245) ; [3]Sama Nickel-CI SARL, 2 plateaux Vallons, 28 BP 1467, Abidjan 28, Côte d'Ivoire ; [4]Université Félix Houphouët Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire
[*]E-mail: gouedjiemmanuel@gmail.com

Samapleu dyke belongs to the Yacouba layered complex which intrudes the Archean Kenema-Man Craton (located about 100 km west of the Sassandra Fault in the so-called stable Archean domain) in the Samapleu-Yorodougou area, western Ivory Coast. This dyke dips at 70°-80°SE with a total thickness of 120 to 200 m, comprising an ultramafic unit (websterites, peridotites) and mafic unit (gabbro-norites, norite and anorthosite) arranged symmetrically with mafic layers at the center and ultramafic layers at both margins. Contacts with the country rock gneiss are characterized by a hybrid zone that is a few meters thick and composed of plagioclase-orthopyroxene.

The ages obtained on zircons in the country rock gneisses granulites, as well as in the hybrid facies, yield Archean ages of ~ 2.78 Ga (Liberian). The ages obtained on rutiles in the hybrid zone give also a U-Pb age of 2.09 Ga (Eburnean), which is interpreted as the age of contact metamorphism and emplacement of the intrusion in the lower crust at a depth of about 25 km.

The dyke age (U-Pb age obtained on rutiles 2.09 Ga, an Eburnean age recently discovered) shows that the northern part of the so-called stable Archean domain (Western Ivory Coast) has been affected by Eburnean geodynamic events.

Thus, the age obtained on the dyke in addition to the basaltic composition of the parent magma shows that this dyke may then be related to the location of the plume-related oceanic flood basalts of the Birimian sequence or the Eburnean tectonic convergence between the Birimian crust (central and eastern Ivory Coast) and the Archean craton between 2.1 and 2.05 Ga.

The Samapleu dyke contain Ni and Cu sulfide deposit which is disseminated mainly in pyroxenite or occurs as subvertical and semi-massive to massive sulfide veins. The sulfide textures range from matrix, net-textured, droplets or breccia textures and composed of pentlandite, chalcopyrite, pyrrhotite and rare pyrite.

The revised Samapleu deposit mineral resource estimate includes an indicated mineral resource of 14.1 million ton (Mt) grading 0.24% nickel and 0.20% copper and, together with an inferred mineral resource of 26.5 Mt grading 0.24% nickel and 0.18% copper (http://samaresources.com, 2017). This dyke whose mineralization will be exploited soon, would become the first in West Africa.

Keywords: Ivory Coast, Man, Archean domain, Eburnean Samapleu mafic-ultramafic dyke, Ni-Cu sulfides