

Petrography and Geochemistry of volcanic and plutonic rocks of the southern part of the Toumodi- Fètêkro greenstone belt

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Our study area is the southern part of Toumodi-Fètêkro greenstone belt, located in the center of Côte d'Ivoire. Petrographic data show that the south of the belt is made of mafic to intermediate metavolcanic rocks with composition variation from basaltic to andesitic. Mafic lavas are usually massive, foliated or sheared often reaching amphibolites facies. In Addition, we have some acidic metavolcanic rocks made of dacites, rhyodacite and rhyolites. The plutonic rocks are comprised of gabbros, dolerites, diorites, granodiorites and granites. The presence of lavas, pillow-lavas and volcanoclastics (lapilli tuff, breccia, ash deposit and ignimbrites) reveal that effusive, submarine and explosive volcanism prevailed during the setting of Toumodi-Fètêkro belt, respectively. Major and trace element analyses of volcanites and plutonites indicate that intermediate and acidic facies are more abundant than basalts. Geochemical trends observed denote that olivine, pyroxene, magnetite and plagioclase were the major phases that precipitated during magmatic evolution. The basalts multi-element normalized diagrams show significant enrichments in LILE and a weak Nb-Ta negative anomaly, indicating a backward arc context. The most differentiated facies are derived from the parent magma of basalts by fractional crystallization. The major and trace elements indicate the persistence of archaic processes during the emplacement of these rocks. The REE modeling shows that the basalts come from partial melting at a rate of 10 to 20% from a source composed of spinel lherzolite originated in Depleted MORB Mantle (DDM).

From geodynamical point of view, we sustain a rifting of the Archean continent which could allow in a first stage the contamination of the depleted mantle magmas. In addition, this option explains more the predominance of acid facies compared to mafic facies. The subsequent recycling of magmas in a volcanic arc environment in the active continental margin has completed the geochemical features of the volcanic and plutonic rock in the southern Toumodi-Fetekro belt.

Keywords: Côte d'Ivoire, Toumodi-Fètêkro, Birimian, rifting, active continental margin, back-arc.