

Petrographic and geochemical characterization of the Archean fine granitoid: Example of the Bakoudou gold deposit in Gabon

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The Bakoudou gold deposit is located in southeastern Gabon in the province of Haut-Ogooué, specifically on the Chaillu Massif about 700 km south-east of Libreville, 40 km south of the village of Bakoumba and 60 km southwest of Franceville. It is hosted in granitoids belonging to the Archean basement of the Chaillu massif, and dated between 2880 Ma and 2550 Ma (Caen-Vachette et al., 1988; Prian et Johan, 1989; Thomas et al., 2001; Chevallier et al., 2002; Bouton et al., 2009; Thiéblemont et al., 2009). These granitoids have a large lithological diversity due to the existence of several plutonic episodes (Prian and Johan, 1989; Thomas et al., 2001; Chevallier et al., 2002; Bouton et al., 2009).

The petrographic study of granitoid Bakoudou allowed us to distinguish three facies of rocks namely the gray granitoids (quartz diorite and granodiorite), with the same mineralogical composition consisting of plagioclase, hornblende, biotite, quartz, low potassium feldspar, accessory minerals (zircons, apatite) and opaque minerals. The leucocratic porphyry pink granitoid (granite) is composed mainly of plagioclase, potassic feldspar, quartz, biotite, accessory minerals (zircons, apatite) and opaque minerals. The evolution of quartz diorites to granites results in a decrease in plagioclase and amphibole levels, and a progressive increase in the quartz and potassium feldspar content.

The geochemical study (major, trace and rare earth elements) of our samples allowed us to show that the granitoids of Bakoudou are magnesian rocks, calc-alkaline to calcic. They have a moderately potassic calc-alkaline affinity, with meta-aluminous to weakly hyper-aluminous character. All these rocks show geochemical signatures of volcanic arc granitoids, which implies their formation under the influence of a subduction zone.

The evolution of the chemical compositions in major, trace and rare earth elements, as well as the petrographic data allows to conclude that the studied rocks come from the same source of mantle magma with a probable crustal contamination, and that the links between the different facies are governed by fractional crystallization processes.

Keywords: Gabon, granitoid, Bakoudou gold deposit, geochemistry, petrography

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