EGU23-6247
EGU General Assembly 2023

Structural analysis by anisotropy of magnetic susceptibility and U-Pb geochronology of the Gamaye pluton (Kédougou-Kéniéba Inlier, West Africa)

Aliou Dembele[1,2,4], Olivier Bolle[1], Marc Poujol[3], Moussa Dabo[4], and Mamadou Lamine Bouaré[5]

[1]Département de géologie, Université de Liège, Belgique (aliou.dembele@doct.uliege.be)
[2]Département de géologie, Université des Sciences, des Techniques et des Technologies de Bamako, Mali
[3]Université de Rennes, CNRS, Géosciences Rennes UMR6118, France
[4]Département de Géologie, Université Cheikh Anta Diop de Dakar, BP 5005, Dakar-Fann, Senegal
[5]Département de géologie, Ecole Nationale d'Ingénieurs - Abderhamane Baba Touré, Mali

The Gamaye pluton (Kedougou-Kenieba Inlier, West African Craton) is elongated along a N-S direction, over about 20 km, to the east of the sinistral, transcurrent Senegal-Mali Shear Zone (SMSZ). It is assumed to have been emplaced at around 2045±27 Ma (Rb-Sr whole-rock and feldspar age; Bassot & Caen-Vachette, 1984) and, as other granitoids from the Kedougou-Kenieba Inlier, it displays a spatio-temporal relationship with world-class gold mineralization (Lawrence et al., 2013a, b). The pluton is made of a leucocratic, coarse-grained, locally porphyritic granite, associated with a subordinate, mesocratic, fine-grained facies, mostly found in a small (1.5 x 4 km) body along the western border of the pluton. Preliminary apatite LA-ICP-MS U-Pb dating yield ages with quite large uncertainties, which highlight, however, magmatic pulses with distinct emplacement ages: 2294.6±68.3 Ma (western mesocratic body), 2160±34.8Ma (main leucocratic facies) and 1922.7±53.1 Ma (a tiny mesocratic body in the east of the pluton). The western part, particularly the democratic body, and the southern part of the pluton, close to the SMSZ, are mylonitized, displaying a S-C fabric, whereas the northern, central and eastern parts are almost isotropic. However, a study of the microstructures shows that these parts of the Gamaye pluton have also undergone solid-state deformation and dynamic recrystallization. Measurements of the anisotropy of magnetic susceptibility, conducted on about 50 samples, reveal paramagnetic signatures, with bulk susceptibilities lower than 0.5×10^{-3} SI. The shape of the magnetic fabric ranges from oblate to prolate, and the degree of anisotropy increases towards the western limit of the pluton and the SMSZ, together with the rock strain intensity. There is also a deflection of the magnetic foliation and lineation in that direction: in particular, when approaching the western border, the magnetic fabric is dominated by NNW-SSE-trending, steeply-dipping foliations (parallel to the C plane of the S-C fabrics) and gently-plunging lineations (concordant with the strike-slip movement of the SMSZ). It is concluded that the Gamaye pluton has been emplaced along the SMSZ and/or has been deformed by this transcurrent regional discontinuity.

Reference

Bassot, J.P., Caen-Vachette, M., 1984. Données géochronologiques et géochimiques nouvelles sur

les granitoïdes de l'Est du Sénégal: implications sur l'histoire géologique du Birimien de cette région. In: Klerkx, J., Michot, J. (Eds.), African Geology, Belgium, Tervuren, pp. 196–209.

Lawrence, D.M., Treloar, P.J., Rankin, A.H., Harbidge, P., Holliday, J., 2013a. The geology and mineralogy of the Loulo mining District, Mali, West Africa: evidence for two distinct styles of orogenic gold mineralization. Econ. Geol. 108, 199–227.

Lawrence, D.M., Treloar, P.J., Rankin, A.H., Boyce, A., Harbidge, P., 2013b. A fluid inclusion and stable isotope study at the Loulo mining District, Mali, West Africa: implications for multifluid sources in the generation of orogenic gold deposits. Econ. Geol. 108, 229–257.