Paper Number: 1822

Geology and geochemistry of the Kanda Kanda tonalite – trondjemite – granite grey gneisses in the Kasaï Archaean craton (D. R. Congo)

Lubala R. T. F., Kabengele M. Z.
Département de Géologie, Université de Lubumbashi, B. P. 1825 Lubumbashi, R.D. Congo

The Kasai craton, which is the Archaean core of the Congo craton, consists of 5 lithological units namely: (i) Haute Luanyi gneisses of Mesoarchaean age (3.4 Ga); (ii) Kasaï – Lomami complex with a Neoarchaean charnockitisation at around 2.87 Ga; (iii) TTG Complex of Kanda Kanda (2.8-3.1 Ga); (iv) Sandoa-Kapanga Complex (2.8-3.1Ga) and (v) Dibaya granite - migmatite Complex (2.7-2.6 Ga) [1].

The Kanda Kanda TTG suite covers an area of about 4800 km^2 and constitutes a transition zone between the Dibaya complex to the north and the charno-enderbites to the south. It consists of tonalite-trondjemite-granite suite; leucogranites; amphibolites; gabbros, alkaline granite and pegmatite veins.

Three main deformation phases affect these rocks [2]: - D1 being the paroxysmal deformation event marked by a NW-SE trending foliation (S1) developed under amphibolite to granulite facies conditions, F1 folds and migmatization. The extreme flattening associated to this event thins out boudinages and disrupts mafic xenoliths and pegmatite veins. - D2 is expressed by foliation (S2) and tight to isoclinal F2 folds developed under P-T conditions of amphibolite facies. - D3 deformation event is expressed by N-S to NNE-SSW fracture cleavage and retrograde greenschist facies. Gabbros, dolerites and alkaline granites dykes are presumably late kinematic to this event.

The Kanda Kanda migmatites were produced from TTG suite rocks during D1 at ~ 2.8 Ga

The Kanda Kanda TTG rocks have typical petrographic and mineral assemblages with secondary minerals, resulting from late hydrothermal activity. Based on their geochemical composition, two types of tonalitic-trondjemitic suites were defined using Al-contents. Their distribution observed in An-Ab-Or diagram towards the Ab apex is typical of Archaean juvenile

crustal rocks.

The petrogenetic model for the Kanda Kanda TTG complex [3], taking into account the isotopic, major, trace and rare earth elements constraints, can be discussed in terms of partial melting (10 - 25 %) of the mantle generating large amounts of tholeiites which have been transformed into garnet-bearing amphibolite which gave rise to the parental magma. This magma underwent fractional crystallization involving hornblende, plagioclase and biotite, with minor amounts of Fe - Ti oxides has operated and produced the differentiated Kanda Kanda TTG suite. The decrease of MgO, $Ti0_2$, CaO and the negative correlation implies that the primary mineralogical assemblage (biotite, amphibole and plagioclase) did not undergo important change during fractionation. The almost constant $A1_20_3$ and K_2O contents of tonalites and trondjemites indicate that the crystallization of these minerals yield no significant influence on their behaviour [4]. However the low-Al contents which characterize the granitoids with SiO_2 > 72 % reflect the influence of fractional crystallization.

References

[1] Delhal et al., 1991. Mus. Roy. Afr. Centr. Tervuren (Belg.) ; Dépt. Géol. Mineral., Rapp. Ann. 1989-1990, 119-125.

[2] Rumvegeri et al., 1991. Mus. Roy. Afr. Centr. Tervuren (Belg.), Dept. Géol. Mineral., Rapp. Ann. 1989-1990, 127-139.

[3] Kabengele et al., 1996. Ann. Fac. Sciences, Univ. Lubumbashi Vol. 6, 98-110.

[4] Wolde B. 1996. Precambrian Res. 76, 3-14.