



## Na-Metasomatism and Uranium Mineralization during a Two-Stage Albitization at Kitongo, Northern Cameroon: Structural and Geochemical Evidence

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### ABSTRACT

Mapping and documentation of lithological varieties and their corresponding geochemistry at the Kitongo uranium mineralization were concerned. The Kitongo U occurrence is hosted by granitic rocks that include interleaved sequences of metasedimentary and metavolcanic rocks of the collectively termed Poli Group. U-mineralization and Na-metasomatism are related and structurally controlled. The most promising uraniferous bodies are intimately related to intersections between the ductile ENE-trending faults and the brittle conjugate R' faults postdating the shearing event. The concentration of uranium at fault intersections rather than along individual faults suggests that these zones that are dilatational in nature were also highly permeable and therefore the hydrothermal fluids ponded there could readily precipitate U therein. A two-stage albitization has altered the foliated granitic host rock and the second albitization that has overprinted the first one is more effective at fault intersections. Whole rock geochemistry was performed by using ICP-MS and ICP-AES respectively for major oxides, trace and REE. The U-bearing rock suite exhibits restricted range in SiO<sub>2</sub> concentration (62.89% - 70.91%) and Al<sub>2</sub>O<sub>3</sub> (13.16% - 18.59%) and it is poor in MgO (0.02% - 1.03%), CaO (0.24% - 1.88%) and K<sub>2</sub>O (0.08% - 5.32%). The mineralized rocks are however comparatively richer in Na<sub>2</sub>O (4.33% - 10.92%) compared to their barren counterparts. The host granite and associated granodioritic rocks in the area are weakly metaluminous, peralkaline, and are calc-alkaline. They are moderately to strongly fractionated and have tholeiitic and shoshonitic affinities with moderate to high HFSE (high field strength elements) and LILE (large ion lithophile elements) enrichment. The Rb/Sr, Rb/Ba and Sr/Ba ratios are 0.31, 0.14 and 1.48, respectively. U content in the mineralized granite is up to 651 ppm while the non-mineralized rock has only 2.4 ppm U. The REE patterns of the granite show LREE enrichment and strong Eu negative anomalies (Eu/Eu\* = 0.03 to 0.48). The main mineralization stage characterized by local U, Na, Pb, Zn, Ga, Hf, Sr, Fe, Al, P and Zr enrichments is related to the second albitization event and could probably be associated in time with the calcite-uranium stage. The identification of fault segments favorable for uranium mineralization in northern Cameroon (Poli area) is important for understanding the genesis of hydrothermal ore deposits within continental strike-slip faults and therefore has great implications for exploration strategies.

### KEYWORDS

Uranium; Kitongo; Granite; Albitization; Strike Slip Fault; Cameroon

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