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Petrology and geochemistry of granitoids of the northern part of Adamawa Massif, N.E Nigeria

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The granitoids of the northern part of Adamawa Massif in northeastern Nigeria have been differentiated based of field and petrochemical data into granodiorite and granites. Although there are slight mineralogical and geochemical differences between the granodiorite and the granites (e.g Rb/Sr ratios lower in granodiorite than the granites), the two rock units have similar geochemical characteristics. The rocks are characterized by a wide range in SiO₂, Calc-alkaline affinity, syn- to within-plate granite signatures, metaluminous to peraluminouss composition and more K₂O-rich and hypersthene-poor comparable to fractionated I-type granitoids. The rocks display slightly fractionated to fractionated LREE, almost flat HREE patterns, with significant negative EU and Ba anomalies, Linear major element trends and progressive rise in SiO₂, K₂O, Rb and Rb/Sr ratios with depleting MgO, Fe₂O₃, CaO, TiO₂, Sr and Ba consistent with removal of plagioclase during fractionation of basic melts to yield silicic magma. This linear trend is reflected in the normative mineralogy where orthoclase and quartz increase from granodiorite to the granites whereas other minerals behave in a reverse manner.

Based on field and petrochemical features, the granodiorites and the granites of south Adamawa Massif are I-type, generated in a syn- to within-plate collision-related tectonic setting and genetically related to a common source by fractional crystallization dominated by the removal from the melt hornblende, plagioclase, biotite, K-feldspar and accessory phases such as apatite, epidote and zircon.

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