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Geochemical characterization of lavas from the Oku Volcanic Group, Cameroon Volcanic Line, West Africa
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Understanding the origin and evolution of magma along the Cameroon Volcanic Line (CVL) has been a fundamental issue within the last 4 decades. The CVL is broadly divided into the oceanic, ocean continent boundary (OCB), and continental sectors, based on its lead and helium isotopic compositions. Mantle geochemistry using isotopes has been intensively studied in the oceanic islands and the OCB zones. On the contrary, very few isotopic data exist on the other volcanic centres of the continental CVL. As a result, most conclusions on this sector are drawn based on major and trace element data. In order to complement the understanding of the entire CVL, we are carrying out a detailed geochemical study of rocks from the Oku Volcanic Group (OKVG) located in the north eastern part of the CVL. As the first stage of the investigation, we here report preliminary geochemical data for eight volcanic rocks, alongside high quality literature data for rocks from the same area. Oku Volcanic Group lavas range from primitive mafic to highly differentiated felsic lavas. Major element compositions (wt. %) are; SiO2 = 35-78.7; Al2O3 =10.1-27.2; MgO = 0.005-11.9; CaO = 0.09-11.15; Fe2O3t= 1.8-13.85. This compositional variation favours a fractional crystallisation model for the continuous evolution from a parent mafic magma to the more evolved felsic lavas. The high (La/Yb)N ratio (mean of 14.1) in most samples is an indication of melting in the presence of residual garnet.. The low ($<$ 66.5) Mg # of most mafic lavas of the OKVG confirms that they solidified from fractionated melts. Based on K2O/Na2O ratios, mafic rocks with Mg# = 47.7-66.3 in this area are further classified as sodic alkali basalts (K2O/Na2O $<$1, dominant species), with one sample from the Lake Nyos area as potassic alkali basalt (K2O/Na2O = 1.30). The latter class is very rare and is reported for the first time along the CVL. Some three sodic alkali lavas in this range (Ba, Rb, K relative to Th) are classified as tholeiites (K2O/Na2O = 0.11-0.15; La/Yb = 3-4.6). These properties coupled with the high Ba/Th ratio could result from modification of the melts by processes such as meteoric alteration, metasomatism and/or crust contamination. Isotopic ratios of Sr, Nd and Pb of these samples will throw more constrains on the petrogenesis of these lavas. Existing data for radiogenic isotopes in the OKVG ranges for 87Sr/86Sr = 0.70334-0.70382 and 143Nd/144Nd = 0.5128460-0.512983. This is higher compared to the average ratio (0.7034 and 0.512867 respectively) of CVL lavas and thus in agreement with crustal contamination by the granitic basement rocks.

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