Available online at http://geology.uaic.ro/auig/
Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi
Seria Geologie 58 (2) (2012) 5–22

AUI
GEOLOGIE

Revised petrology and new chronological data on the peralkaline felsic lavas of Ngaoundéré volcanism (Adamawa plateau, Cameroon, Central Africa): evidence of open-system magmatic processes

Aminatou M. Fagny[1], Oumarou F. Nkouandou[2], Bernard Déruelle[3], Ismaila Ngounouno[2]

[1] University of Bamenda, Faculty of Sciences, Department of Earth Sciences, P.O. Box 39, Bamenda, Cameroon
[2] University of Ngaoundéré, Faculty of Sciences, Department of Earth Sciences, P.O. Box 454, Ngaoundéré, Cameroon
[3] Université "Pierre et Marie Curie", Laboratoire de Magmatologie et de Géochimie Inorganique et Expérimentale, Paris 6, 75252 Paris, France

Abstract

The petrology of the peralkaline felsic lavas from the Ngaoundéré region was re-examined, together with new chronological data obtained on them, in order to determine their petrogenesis and investigate their peralkaline features. The results showed that all lavas have a microlitic porphyritic texture. They are composed of more than 70% phenocrysts and microlites of alkali feldspar, with diopside, hedembergite, augite, aegirine-augite for trachytes, and nosean, nepheline, kaersutite, titanite, apatite and oxides, set in a matrix of the same minerals, in phonolite. All lavas, Miocene in age, are the result of the fractional crystallization processes undergone by the surrounding basaltic lavas. The titanite crystallization phase is responsible for the concave downward appearance of the REE pattern of peralkaline phonolite, as well as the slight depletion of Nb and Ta. AFC modeling using Pan-African basement rock as contaminant was also intended. The genesis of peralkaline trachytes from less-evolved lavas requires a Ma/Mc ratio of 0.1, and a fractionation process ($F \approx 0.9$) involving only feldspar so as to comply with the ($^{87}Sr/^{86}Sr$) 9Ma values of ≈ 0.710. Additionally, hydrothermal fluid effects are suspected. The peralkalinity of the lavas is the result of a pronounced fractionation of the Al_2O_3 component by aluminous-enriched phases, in combination with alkali- and volatile-enriched metasomatized fluids, which have acted through the network of Pan-African cracks.

Keywords: petrology, geochronology, peralkaline felsic lavas, crustal contamination, Adamawa-Cameroon, Central Africa.

Corresponding author's e-mail: afagny2002@yahoo.fr