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Geochemistry (geochronology)

Geochemistry and geochronology of mafic rocks from Bamenda Mountains (Cameroon): Source composition and crustal contamination along the Cameroon Volcanic Line

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Abstract

Mafic rocks from the Bamenda volcanic province along the Cameroon Volcanic Line have been dated from 17 to 0 Ma. Associated with some trachytes and rhyolites, this volcanism covers a period of more than 25 Ma. The studied rocks are basalts to mugearites. Most of them have been contaminated by continental crust during their transit to the surface. The oldest rocks are the most contaminated. One group of samples shows high Eu, Sr and Ba contents. This characteristic is not due to crustal contamination process, but has a mantle source origin. We argue that these characteristics have been acquired by mixing of melts formed by partial melting of mantle pyroxenites with melts formed in mantle peridotites. Such pyroxenites have been observed as mantle xenoliths in the Adamaoua province, and their chemical and isotopic compositions are consistent with such a model. ***To cite this article: P. Kamgang et al., C. R. Geoscience 340 (2008).***

Résumé

Géochimie et géochronologie des roches basiques des monts Bamenda (Cameroun) : composition de la source et contamination crustale le long de la ligne volcanique du Cameroun. Les roches basiques de la province volcanique de Bamenda, appartenant à la Ligne Volcanique du Cameroun, ont été datées entre 0 et 17 Ma. Associées aux roches acides (trachytes et rhyolites), le volcanisme de cette province s'étale sur plus de 25 Ma. Les roches étudiées vont des basaltes à des mugéarites. La plupart ont été contaminées par la croûte continentale pendant leur remontée vers la surface, les roches les plus vieilles étant les plus contaminées. Certaines roches présentent de fortes teneurs en Eu, Sr et Ba, qui ne sont pas en relation avec les phénomènes de contamination crustale, mais trouvent leur origine dans la source des magmas. Les données géochimiques présentées sont en accord

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avec une origine des magmas dans cette région, par mélange entre des magmas issus de la fusion partielle de pyroxénites et des magmas issus de la fusion de péridotites. ***Pour citer cet article : P. Kamgang et al., C. R. Geoscience 340 (2008).***

Keywords: Bamenda Mountains; Cameroon Volcanic Line; Basaltic lavas; K/Ar ages; Geochemistry

Mots clés : Monts Bamenda ; Ligne volcanique du Cameroun ; Laves basaltiques ; Âges K/Ar ; Géochimie

1. Introduction and geological setting

The Bamenda mountains, located between the Santa and Sabga localities, represent one of the most important volcanic province of the continental part of the Cameroon Volcanic Line (CVL). They lie between the Bambouto mountains to the south-west and the Oku massif to the north-east (Fig. 1) and have been poorly studied [4,5,12]. This volcanic province is made of mafic and felsic rocks emplaced on a Panafrican or older basement. An earlier study of the felsic rocks [8] has shown that the volcanism covers a large period of time, at least from 10 to 22 Ma, and that the felsic magmas have been largely contaminated during their evolution in crustal magma chambers.

We present new geochronological and geochemical data on the mafic rocks from the Bamenda volcanic province in order to discuss the relationship between

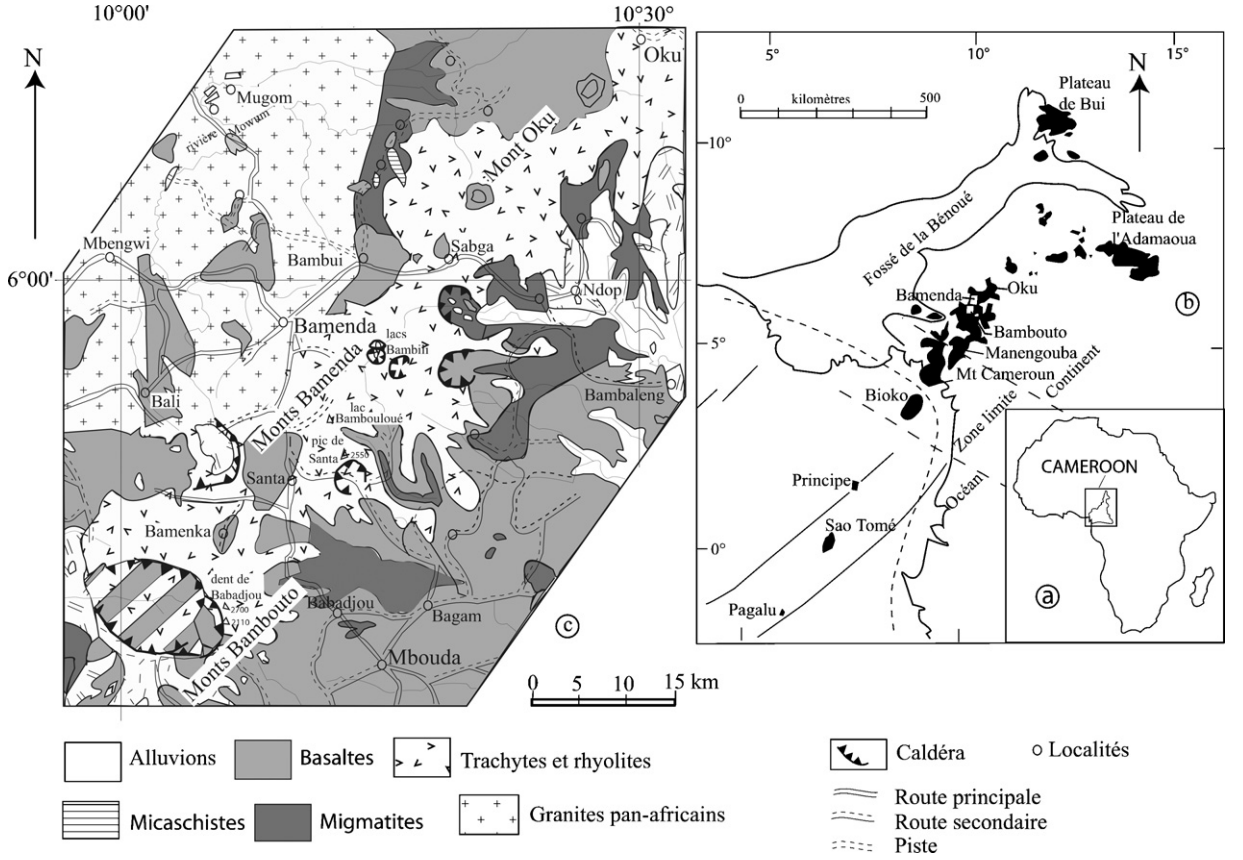

Fig. 1. Map of the studied area showing: ⓐ the location of Cameroon in Africa; ⓑ the location of the Bamenda mountains along the CVL; and ⓒ a simplified geological map of the studied area. Modified from [8].

Fig. 1. Carte montrant : ⓐ la position du Cameroun en Afrique ; ⓑ la position des monts Bamenda le long de la Ligne Volcanique du Cameroun; ⓒ une carte géologique simplifiée de la zone étudiée. Modifié d'après [8].