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Alkaline and Tholeiitic magmatism in the Buem Structural unit of the Pan-Africa Dahomeyide orogenic belt, Southeastern Ghana.



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The volcanic and associated mafic plutonic rocks of the Buem Structural Unit have been studied for their petrography and geochemistry to infer their mode of emplacement, petrogenesis and geodynamic setting. The volcanic rocks are petrographically spherulitic, amygdaloidal, vesicular, phyric and aphyric [1]. The mafic plutonic rocks on the other hand are massive, weakly altered, phaneritic, and often jointed [2]. Whole-rock major and trace element geochemistry have revealed that the volcanic and the mafic plutonic rocks show both alkaline and tholeiitic characteristics [1][2]. The alkaline volcanic rocks are alkali basalt and basanite tephrite which, define REE and incompatible trace elements patterns similar to OIB. However, the tholeiitic volcanic rocks can be classified as basalts and basaltic andesite with REE and incompatible trace element patterns comparable to that of typical E-MORB. The volcanic rocks show no significant effect of crustal contamination and plot consistently in the E-MORB and WPA fields in the tectonic setting discrimination diagrams. Hence, the OIB-E-MORB character of the volcanic rocks coupled with no significant effect of crustal contamination may connote mantle derived magmatism in a rifted lithospheric setting probably prior to the peak Pan-Africa collision [1]. The geochemical characteristics of the alkaline mafic plutonic rocks appear similar to that of the alkaline volcanic rocks, hence similar source character and tectonic setting can be inferred. The tholeiitic mafic plutonic rocks show REE and incompatible trace element patterns akin to typical N-MORB with pronounced positive Ba and Th anomalies and negative Nb and Ti anomalies. These geochemical features give the tholeiitic mafic plutonic rocks an arc character, hence, subduction related magmatism [2].

Keywords: Buem Structural Unit, Pan-African collision, Tectonic setting, Volcanic rocks, Mafic plutonic rocks

References:

- [1] Nude P.M et al. (2015) J. Afr. Earth Sci. 112: 314-327
- [2] Kwayisi D et al. (in-prep)

