

Growth of new lithosphere during the period 2.3-2.0 Ga in the Birimian Supergroup of the Bui belt of Ghana: Insights from geochemistry

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The Bui belt in Ghana is one of the NE-SW trending volcano-sedimentary belts of the Birimian Supergroup. Volcanic, volcanoclastic and gabbroic rocks, which outcrop along the flanks and in the south-western parts of the belt, have been studied to constrain their source (including potential crustal contaminants) and geodynamic environment. The rocks are low-K tholeiites with low Mg# (volcanics: 36-64; gabbro: 60) which suggests they do not represent primary magmas. When normalised to PM, the rocks display depletion in Th and Y, variable enrichment and depletion in Ti, relatively flat LREE and HFSE, whereas some display strong depletion in HREE. They show affinity to both N-MORB and E-MORB in REE and multi-element plots, suggesting their derivation from variably depleted mantle source. Sm-Nd isotope whole rock data for the volcanics and the gabbro define an isochron with an age of 2140 ± 160 Ma (MSWD: 3.0). The rocks have positive $\epsilon_{Nd_{2140}}$ values between +2.2 and +3.7. Lu-Hf isotope data give a poorly defined isochron with an age of 2022 ± 470 Ma (MSWD: 0.57). Most volcanics have positive $\epsilon_{Hf_{2140}}$ values up to +6.8. The dominantly positive epsilon Nd and Hf values confirm their derivation from a moderately depleted mantle source. These data thus support the idea of formation of new lithosphere at 2.3-2.0 Ga proposed for the Birimian terrane in the West African craton during the Eburnean orogeny.