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Preserved Sm-Nd Isotopic Composition as Useful Provenance Indicators in Neoproterozoic Sandstones in the Voltaian Basin, Ghana

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Author(s)

Chris Anani, Daniel Asiedu, Johnson Manu, Prosper Nude, Jacob Kutu, Patrick Asamoah Sakyi

ABSTRACT

The provenance of sandstones derived from theLower Voltaian Kwahu-Morago Group and the Middle Voltaian Oti-Pendjari Group of the Neoproterozoic Voltaian basin are discriminated by their Sm-Nd Isotopic compositions. Plots from the Sm-Nd data suggested provenance of the Kwahu-Morago Group to be from the Birimian metasediments and associated "basin type" granitoids. The Sm-Nd studies have further revealed an average T_{DM} model age of whole rock samples in the Kwahu-Morago Group to be 2.2 Ga which shows that this portion of the Voltaian Supergroup represents eroded remnants of "basin type" granitoids. Sm-Nd data from the Oti-Pendjari Group suggested provenance from the Birimian volcanic rocks and probably with contribution from the Pan African rocks. Its average T_{DM} model age of whole rock samples was 2.0 Ga, which generally falls in the range of the model ages for the basement Birimian volcanic rocks as well as the model ages for the granitoid rocks and thus suggests the major source rock of the Oti-Pendjari Group as coming from the volcanic belts. The model ages for both groups seem to indicate clastic supply from an early Proterozoic crustal provenance. This study shows that whole rock isotopic analyses can also be complementary in providing an insight into the origin and development of sedimentary successions.

KEYWORDS

Isotope; Model Age; Provenance; Sandstone; Voltaian Basin

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