Sm-Nd garnet metamorphic ages in the Bole-Nangodi belt, Ghana

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The Bole-Nangodi belt (Ghana) forming part of the Paleoproterozoic West African Craton (WAC) contains high-grade metasediments, which are rare in the craton. Only a few metamorphic ages have been determined for the WAC (~2.15-2.00 Ga), and little is known about the ages of regional metamorphic events. The Sm-Nd system in garnet-bearing samples is an effective chronometer in metamorphic rocks [1]. >10 ages with a precision of 0<1 million years can be obtained from concentric growth zones in >1cm garnet crystals [2]. This technique is pushed to new limits with an attempt to derive ages from smaller zoned garnets (about 1-2 mm and 5-6 mm in size, respectively) from two samples (BN436, BN928) of the Bole-Nangodi belt The rim-to-core garnet compositions range from $Alm_{77}Prp_{19}Grs_{3}Sps_{2}$ to $Alm_{65}Prp_{28}Grs_{8}Sps_{1}$ for BN436 and from $Alm_{62}Prp_{4}Grs_{21}Sps_{13}$ to $Alm_{74}Prp_{13}Grs_{9}Sps_{1}$ for BN928. The chemical zoning is associated with a color change and variable concentration of mineral inclusions suggesting at least two prograde episodes of crystal growth. Garnet rims and cores were extracted using a NewWave MicroMill drilling apparatus. Thin slabs (1–1.5 mm) were prepared at a microsaw and garnet sections were placed on a sample plate for drilling. Drilling patterns were defined on the MicroMill using the advantage of the visible zoning. Core and rim material were processed in the clean lab for partial dissolution (inclusions removal) and Sm-Nd extraction. Sm-Nd isotopes were analyze using ID-TIMS .At the time of writing, a preliminary bulk garnet age of 2101 ± 26 Ma (n=4, MSWD=105) is obtained for the sample BN436 and 2104.7 ± 4.7 Ma (n=4, MSWD=3.9) for the sample BN928. The high MSWD, especially for BN436, likely indicates the presence of significant age zonation in these garnets that will be tested by the microsampled core and rim chronology.

[1] Baxter and Scherer, 2013, *Elements*, doi:10.2113/gselements.9.6.433. [2] Pollington and Baxter, *Chem Geol*., doi: 10.1016/j.chemgeo.2010.12.014.