Isotopically juvenile, yet chemically evolved granites: A Neoproterozoic example from the Anti-Atlas Mountains, Morocco

S.D. SAMSON [1]

[1] Department of Earth Sciences, Syracuse University, Syracuse, NY 13244 USA; sdsamson@syr.edu

Most chemically and mineralogically evolved granites have commensurately evolved isotopic compositions. That is, the 'crustal' or 'recycled' chemical nature of the granites is usually equally well reflected in the radiogenic isotopic compositions of the granites. Granitoids with 'mantle-like' isotopic compositions are frequently associated with chemically less evolved rocks, such as gabbros and diorites, which often are volumetrically much more important than the granitic suite. In the Anti-Atlas Mountains of Morocco, there are several major Neoproterozoic inliers surrounded by 2 Ga Eburnian 'basement' granitic gneisses. The Tazigzaout region of the Neoproterozoic Bou Azzer inlier has long been thought to contain a tectonic sliver of Eburnian crust based on chemical, mineralogical, and structural similarities to known 2 Ga granitic gneisses. However, despite the similarities to basement gneisses these rocks have recently been shown to be 750 – 700 Ma based on U-Pb zircon geochronology. The lithology of these rocks range from diorite to muscovite granite, but the main lithology is granite gneiss. Initial ε_{Nd} values for the granites range from +5 to +5.8, even in muscovite-bearing units, and Nd depleted mantle model ages are similar, albeit slightly higher, than crystallization ages. The very radiogenic nature of these granites suggests that their immediate source material, and the precursor material to those sources, must have had a significant depleted mantle component. Mechanisms to produce extremely evolved granitic magmas with very mantle-like isotopic compositions are not well understood. The Tazigzaout region of the Anti-Atlas Mountains may thus be an excellent natural laboratory to study this intriguing petrological process.