

Enriched Hadean reservoir recorded by Archean rocks from NE Brazil: Insights from ^{142}Nd isotopes

VICTOR B. GARCIA¹, JONATHAN O'NEIL¹ AND ELTON
L DANTAS²

¹University of Ottawa

²Universidade de Brasilia

Presenting Author: vgarc091@uottawa.ca

A complex crustal history has been recorded by the north-eastern Brazil Precambrian crust, from the northern end of the São Francisco Archean Craton to the northern domain of the Neoproterozoic Borborema Province. Archean rocks from this region are mostly spanning from 3.5 Ga to 2.5 Ga, but the occurrence of a 4.1 Ga detrital zircon suggests the incorporation of Hadean material in the São Francisco Craton. Despite the lack of Hadean rocks, the short-lived ^{146}Sm - ^{142}Nd isotopic system can provide further evidence of potential Hadean silicate differentiation events because variations in ^{142}Nd isotopic compositions can only be produced by Sm-Nd fractionation within the first ~500 Ma of Earth's history, given the short half-life (103 Ma) of ^{146}Sm . Here we present ^{142}Nd data for Paleo- to Mesoarchean rocks to constrain the timing and extent of the potential involvement of Hadean material in the formation of the NE Brazilian Archean crust. Paleoarchean amphibolites from the São José do Campestre massif show lower $^{142}\text{Nd}/^{144}\text{Nd}$ ratios compared to the Nd standard, with an average $\mu^{142}\text{Nd}$ value of -10.0 ± 4.8 (n = 17, 2SD). The ^{142}Nd isotopic composition of these amphibolites, together with their geochemistry and unusually high concentrations in incompatible trace elements, provide evidence for a Hadean enriched mantle reservoir. Additional six mafic samples from small Paleoarchean basement inliers within the Seridó Neoproterozoic belt, as well as samples from the São Tomé differentiated mafic-ultramafic intrusion (-9.0 ± 6.0 , n = 13, 2SD) are also consistent with a similar early enriched source, with $\mu^{142}\text{Nd}$ values as low as -14.6 ± 4.2 . Although four felsic samples from the São Francisco Craton exhibit $\mu^{142}\text{Nd}$ values closer to zero, additional measurements in felsic and metasedimentary rocks have values as low as $\mu^{142}\text{Nd} = -10.5 \pm 4.0$ and are consistent with large-scale reworking of this mafic crust sourced from an enriched Hadean mantle. The well-resolved negative $\mu^{142}\text{Nd}$ values measured in rocks of distinct nature and covering a regional extent Precambrian crust provide strong evidence for the widespread involvement of an early enriched source in the formation and evolution of the of the NE Brazilian Archean crust.