

^{182}W and $^{142, 143}\text{Nd}$ of Neoproterozoic ferropicrites from the Wawa subprovince (Ontario, Canada)

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Variations in ^{182}W and ^{142}Nd can only be produced within the first 50 to 500 million years of Earth's history respectively, making these ideal tracers to study the early differentiation history of the mantle. Some terrestrial rocks have anomalies in these isotopes suggesting the formation of heterogeneities in the Earth's early mantle, perhaps as a result of crystal-liquid fractionation during a magma ocean stage. Based on their geochemical compositions, it has been suggested that Archean Fe-rich primitive magmas known as ferropicrites may derive from mantle domains that differentiated in a Hadean magma ocean. To investigate the potential involvement of a mantle source formed in the Hadean, here we present an isotopic study of ferropicritic rocks from the Pulpwood-Playter Harbour in the Wawa subprovince of the Western Superior Province. This includes the long-lived (^{147}Sm - ^{143}Nd) and short-lived (^{146}Sm - ^{142}Nd , ^{182}Hf - ^{182}W) systems. The studied ferropicritic sequence consists of a differentiated intrusion with peridotites, pyroxenites and gabbros, bound by Fe-rich pillowed lavas at the top. The bottom of the sequence is bounded by tholeiitic basalts. Results from the ^{147}Sm - ^{143}Nd system yield an isochron with age of 2830 ± 190 Ma (MSWD=5.1) and an initial ϵNd of +3.6. This initial ϵNd value is consistent with derivation from a depleted mantle source, which contrasts with the highly enriched incompatible rare earth elements compositions of all ferropicritic samples. On-going work into short-lived isotope systems (^{146}Sm - ^{142}Nd and ^{182}Hf - ^{182}W) will help constrain the early evolution of the ferropicrite mantle source and highlight differentiation processes possibly occurring in the Hadean.