$^{142}Nd/^{144}Nd$ variation in Acasta Gneiss Complex (Slave Craton, Canada)

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The evolution of the early silicate Earth is still poorly understood because of the sparse geological records from Hadean-Eoarchean times. The ^{146}Sm-^{142}Nd short-lived chronometer has been extensively applied in two areas: the Itsaq Complex (SW Greenland) [1, 2] and the Nuvvuagittuq greenstone belt (NE Canada) [3]. Reported ^{142}Nd deviations in these samples indicate that the differention of the Earth's mantle started in the Hadean eon. Here we present new ^{142}Nd measurements on samples from the Acasta Gneiss Complex (Northwest Territories, Canada). We measured a large set of samples including different types of gneiss, granite, tonalite, metadiorite, and metagabbro collected in 7 distinct locations around the Acasta river and having ages from 4.0 to 3.6 Ga. The studied samples display deficits in ^{142}Nd down to -15 part per million (ppm) compared to modern samples and terrestrial Nd standards. The $^{142}Nd/^{144}Nd$ values do not correlate with Sm/Nd. The oldest (3.75 to 4 Ga) whole rock samples show minor deficits in ^{142}Nd (-3 to -5 ppm), whereas the younger (3.73 to 3.6 Ga) ones have significantly more negative anomalies (-13 to -15 ppm). Furthermore, a diorite gneiss sample belonging to a unit in which Sm-Nd and Lu-Hf systematics have probably remained closed (isochrons give an age of 4.0 Ga) [4] displays a ^{142}Nd deficit of -3 ppm, whereas initial εHf and $\varepsilon^{143}Nd$ are both strongly positive. This may call into question the initial $^{142}Nd/^{144}Nd$ value of the Bulk Silicate Earth. In addition to rocks from Nuvvuagittuq greenstone belt (Canada) [3] and Isua supracrustal belt (Greenland) [1, 2], the Acasta Gneiss Complex also documents the existence of very early-formed resevoirs that were preserved until the Eoarchean.

[1] Rizo *et al* (2012) *Nature* **491**, 96-100 [2] Rizo *et al* (2013) *EPSL* **377-378**, 324-335 [3] O'Neil *et al* (2008) *Science* **321**, 1828-1831 [4] Scherer *et al* (2010) *AGU Fall Meeting*, Abstract V44B-01.