^{142}Nd anomalies in the Nuvvuagittuq supracrustal belt revisited

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Coupled ^{147,146}Sm-^{143,142}Nd systematics are a powerful tool to trace the earliest differentiation of the silicate. While early mantle depletion has been well documented as positive ^{142}Nd anomalies in Eoarchean rocks from West Greenland and Western Australia [1-3], first evidence for an enriched-reservoir reported as negative ^{142}Nd anomalies in pre-3750 Ma rocks from the Nuvvuagittuq supracrustal belt (NSB) in Québec [4] is controversial [5].

Here we report new Nd isotopic data for rocks from the NSB. Samples are from five different lithologies and comprise amphibolites, cummingtonite-rich amphibolites, granodiorites, tonalites, and trondhjemites [6]. They cover a range of Sm/Nd ratios from about 0.14 to 0.32. Sm and Nd were separated from bulk rock samples by standard ion-exchange chromatography [2] and Ce was efficiently removed from Nd by liquid-liquid extraction [7]. Nd was measured as Nd^+ using the Thermo Triton (TIMS) at ETH Zurich in dynamic mode. Repeated measurements of the JNdi-1 standard yield an external precision of ±5 ppm (2 SD) for the ^{142}Nd/^{144}Nd ratio over a period of two years (n=82). Over the course of this study the external precision was ±4 ppm (n=35). To further test the accuracy of our method we analyzed samples from the Isua supracrustal belt and Itsaq Gneiss for which positive ^{142}Nd anomalies have previously been reported [2]. Our data are in excellent agreement with those reported earlier.

In contrast to an earlier study [4], our new data show no resolvable ^{142}Nd anomalies in rocks from the NSB. This is consistent with a ca. 3.8 Ga ^{147}Sm-^{143}Nd age of these rocks. To further explore the potential occurrence of ^{142}Nd anomalies in the NBS we are currently analyzing several samples (same sample powders) that were also analyzed by O'Neil *et al*. [4].

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Sorption and wetting properties of pore fluids probed by neutron scattering techniques

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The physical properties of pure and binary fluids confined in nanopores of porous materials play an important role in both geological and technological processes such as carbon dioxide sequestration, the uptake,, storage, and transport of geologic fluids, and chromatography. Detailed studies of pore processes on the molecular to microscopic levels are required to understand the interplay of sorption, wetting, and confinement effects. Neutron scattering experiments probe the pore structure and dynamics of pore fluids and provide detailed information about density and volume of fluid phases, sorption properties, as well as species mobility and self diffusion characteristics [1]. We will discuss Small-Angle Neutron Scattering (SANS) studies of confined pure fluids [2] and mixtures, and present different experimental and analysis techniques to extract physical quantities of pore fluids from these data. Mixtures of iso-butyric acid (iBA) and water (W) serve as model systems for binary pore fluids, including geologic fluids such as CO_2+water or hydrocarbon +water [3]. This particular system was chosen because the critical temperature of the iBA + W system is near room temperature, and both components are liquids with very similar mass densities, diminishing the effects of gravitational demixing. A H/D contrast variation study of the demixing properties of this binary liquid inside the pores of mesoprous Vycor 7930 material with 3 nm average pore size was conducted on the GP SANS instrument at ORNL. Analysis was performed in terms of contrast variation SANS [4] as well as a modified 3-phase model based on the consideration of the scattering invariant [5].

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