Interpreting Nd isotope and $^{231}Pa/^{230}Th$ records in the deep Western North Atlantic

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Advances in the our knowledge of past changes in ocean circulation have been made using Nd isotopes, as a proxy for changes in water mass structure [1], and $^{231}Pa/^{230}Th$ ratios as a proxy for the rate of ocean circulation [2]. Despite the potential power of these proxies when applied together, no records have yet been published of both proxies measured at the same location.

Based on previous records of ocean circulation [2, 3], we know the central deep Western North Atlantic is sensitive to changes in water mass structure and advection rates on a glacial-interglacial timescale, making the Bermuda Rise hydrographically one of the best places to test the application of both proxies together.

Here we will present Nd isotopes measured on multiple sediment phases from the core OCE326-GGC6 (33º41.443'N; 57º34.559'W, 4541m), which is a sister core to OCE326-GGC5 on which the McManus *et al.* $^{231}Pa/^{230}Th$ record was measured. Both cores were taken at the same depth and location, allowing accurate comparison of the two proxy records.

[1] Piotrowski *et al.* (2004) *EPSL* **225**, 205-220. [2] McManus *et al.* (2004) *Nature* **428**, 834-837. [3] Curry & Oppo (2005) *Paleoceanography* **20**.

Proterozoic crustal growth in SW Fennoscandia

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Vast belts of juvenile continental crust are preserved on many continents that often include evidence for older crust at depth, i.e. inherited zircons and evolved Hf-in-zircon signatures. An example of this is SW Fennoscandia. In this study it is hypothesised that tectonic-switching, i.e. relative movement of a subduction hinge towards or away from a continental mass, in an extensional accretionary orogen [1] was responsible for crust formation in this region. The proposed model can be applied to other regions such as Yapavai-Mazatzal (SW America), and the Arabian-Nubian Shield.

The 1.8-0.9 Ga crust of SW Fennoscandia is scrutinized with new and published Hf-in-zircon data. Magmatism occurred throughout most of the period, but the largest concentration of juvenile crust formed at 1.7-1.5 Ga. Post-1.5 Ga juvenile magmatism is more sporadic, and in the literature is often related to back-arc settings. The Grenvillian orogeny (1.15-0.9 Ga) comprises few juvenile signatures, and is largely represented by recycling of 1.6-1.2 Ga crust.

The proposed model comprises a 1.8 to 1.1 Ga subduction zone system that was located on the western/southwestern edge of Fennoscandia. The subduction hinge migrated away from the craton over time, but featured tectonic switching episodically. Crust was produced in volcanic arc settings, and was successively accreted onto the craton. Some arc terranes feature older inherited zircons and evolved isotopic signatures, this is attributed to arc formation on stretched continental crust.

Nd model ages from Fennoscandia reveal episodic extraction of crust from the mantle, with major peaks at 2.7, 2.1 and 1.5 Ga. However, during the 1.8-1.1 Ga period crust was continually being produced in a relatively 'steady-state'. The setting of which was a long-lived subduction zone similar to that seen in the western Pacific today, with the rate of growth varying with relative movement of the subduction hinge. From the 1.4 to 1.1 Ga period, preserved magmatism is generally ascribed to back-arc settings.

[1] Collins (2002) *Tectonics* **21**, 1272-1258.