

## Tracing Proterozoic mantle Hf-isotope depletion through coupled zircon U–Pb and Lu–Hf isotopes

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In calculating mantle extraction ages, and when constructing crustal growth models, a linear evolution of incompatible trace elements in a depleted mantle since >4 Ga is routinely used. Mantle depletion may however vary regionally and over time, and >100 Myr residence times for crustal precursors are common in the literature. Subduction of sediments and crust leads to a mantle-wedge that is enriched relative to normally depleted mantle.

Here we propose that use of coupled zircon U–Pb and Lu–Hf isotopes from primitive syn-orogenic intrusions can provide better constraints of the temporal shifts in mantle depletion in a convergent orogen. Interpolation of Paleoproterozoic gabbro suites from Fennoscandia enables the construction of a regional mantle evolution curve, providing improved constraints on model ages, crustal residence times and the fraction of juvenile versus reworked continental crust. Convergent margins are assumed to be one of the main sites of continental crust growth, and using an overly depleted mantle source yield model ages that are too old and hence cumulative crustal growth models show too much crust generation early in the Earth's history.