Constraints on continental growth models from isotope geochemistry

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The Earth is unique among all known planets in that it possesses oceans of liquid water and continents of buoyant crust. The continental crust has an andesitic bulk composition and is vertically stratified from lower parts composed of relatively mafic rocks to upper parts dominated by quartzo-feldspathic rocks. The quartzo-feldspathic rocks are highly enriched in incompatible elements, making the continental crust an important reservoir for major heat-producing elements such as K, Th and U and also for several *in vivo* essential elements such as K and P. Furthermore, the presence of continental crust has modified the composition of the oceans and the atmosphere through sedimentary processes. Thus, understanding when and how the continental crust has evolved to its present form is a fundamental goal in Earth and planetary sciences.
Previously proposed models of continental growth are quite diverse, ranging from early establishment with little subsequent growth (e.g., Armstrong, 1981; Fyfe, 1978) to progressive growth with a nearsteady rate (e.g., Hurley and Rand, 1969; Moorbath, 1978; O'Nions et al., 1979) or with pulses at a high rate (e.g., Condie, 1998; McCulloch and Bennett, 1994; McLennan and Taylor, 1982; Patchett and Arndt, 1986).
Here I use the compiled detrital zircon U-Pb age and Hf isotope data to set constraints on the timing of continental crust generation and the mode of continental crust evolution in relation to supercontinent cycle. Further, by taking into account the crustal residence times of continental crust recycled back into the mantle, I propose a model of net continental growth that stable continental crust was firstly established in the Paleo- and Mesoarchean and significantly grew in the Paleoproterozoic.

Keywords: continental crust, supercontinent cycle, crustal recycling

