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Conditioned duality of the Earth System: Geochemical tracing of the supercontinent cycle through Earth history

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Abstract

The balance between constructive versus destructive processes in the formation and recycling of continental crust over Earth history - or crustal growth - remains contentious; whereas some advocate continuous continental growth, others suggest episodic growth predominantly during periods of supercontinent assembly. In this paper, we review the geological record and present an analysis of time constrained hafnium and oxygen isotopes in dated zircon crystals, and of incompatible elements (Zr, Th) in dated magmatic rocks, to explore the operation of Earth's supercontinent cycle. This analysis reveals the importance of the supercontinent cycle to continental growth by demonstrating a link between periods of enhanced crustal recycling and elevated geochemical proxies of subduction flux.

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