# Understanding global geodynamics over the last 3 billion years using Hf isotope arrays

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Global compilations of U-Pb zircon ages show a number of crystallization peaks throughout Earth history, which are hypothesized as evidence for episodic crustal growth associated with supercontinent amalgamation. However, this interpretation is problematic, because different compilations from different continents have slightly different peaks, and Cenozoic proxies of supercontinent formation have produced meagre zircon populations. Indeed, other workers have suggested that the tenures of Precambrian supercontinents coincided with zircon minima, at least for three of the five putative supercontinents: Superia/Sclavia, Nuna and Rodinia.

Using the εHf moving average and geological constraints, we suggest that formation of the supercontinents Nuna and Gondwana can be better identified by a marked change in the global εHf array, reflecting a change from long-term reworking to one involving increased mantle contributions to the global budget of silicic magmatism. The amalgamations of Rodinia and Pangea do not conform to this pattern, indicating they formed in different ways.

Based on the global geodynamic patterns during the Phanerozoic era, we favorably compare the peripheral orogens of Nuna to the long-lived circumPacific orogens, which forms part of an external orogenic system defining the boundary of two contrasting, global-scale Phanerozoic supercells. Using this Phanerozoic analogy, we consider that a similar binary mantle convection system existed on Earth throughout the Late Paleoproterozoic, as part of a billion-year global cycle that began approximately 3 billion years ago.