

Perspectives on crustal evolution from zircon geochemistry throughout Earth history

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Crustal processes exert first-order influences on numerous biogeochemical cycles. Here we will present a global compilation of detrital zircon isotopic and trace elemental data that spans over 4 billion years of Earth history to better understand the evolutionary history of the continental crust. Our data show marked changes in crustal thickness, composition, and average crystallization temperature in association with the proposed onset of lateral plate tectonics during the Archean. Zircon-producing melts become more evolved throughout the Proterozoic, while a general overall decrease in thickness of crust through which magmatism occurs is observed into the Phanerozoic, corresponding with changes in mantle temperature and subduction processes. These data, when integrated with existing datasets on global magmatism and paleotectonics, provide important insights into the oxygenation of atmosphere and Earth's evolving climate system.