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Geochemical and isotopic evolution of the Mineiro Belt, Brazil: implications for continental crust growth

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An important change in Earth's continental crust is manifest in the transition from TTG to sanukitoid-type magmatism (high Ba-Sr), which is inferred to represent the onset of subduction-driven plate tectonics due to the opening of the mantle wedge angle. Globally, this transition started at 3 Ga and "concluded" at around 2.5 Ga. Plutonic rocks from the Mineiro Belt, Brazil record the onset of this transition much later, starting during the magmatic lull when few juvenile magmas were added to the continental crust. Rocks mostly belong to the calc-alkaline series, meta- to peraluminous and originally "I-type", meaning that oxidized magmas were formed by partial melting of subducted material. The temporal distribution and apparent secular changes of the magmas are consistent with TTG-sanukitoid transition, and shed light on the evolution of the sub-continental lithospheric mantle. The isotopic analyses (Sm-Nd whole rock and Lu-Hf in zircon) corroborate the restricted juvenile nature of the Mineiro Belt and confirm the genetic link between the Lagoa Dourada Suite, a rare ca. 2350 Ma high-Al tonalite-trondhjemite magmatic event, and the sanukitoid-type ca. 2130 Ma Alto Maranhão Suite. U-Pb dating of zircon and titanite constrain the crystallisation history of plutonic bodies; coupled with major and trace element analyses of the host rocks, they distinguish evolutionary trends in the Mineiro Belt. Several plutons in the region have ages close to 2130 Ma but are distinguished by the lower concentration of compatible elements in the juvenile high Ba-Sr suite. New oxygen isotope analyses in zircons potentially describe episodes of continental crust growth in the Palaeoproterozoic.

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