2.6-2.5 Ga juvenile crust accretion and continental growth in southern India

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One of the today's fundamental problems in geology is understanding the mechanisms of the continental growth in the early history of the Earth that mainly corresponds to juvenile crust accretion. Globally isotopic age data show that a major episode of juvenile continental crust formation during 2.6-2.5 Ga in all the Archaean cratons.

The Archaean domain of southern India clasically termed as 'Dharwar craton' that expose a large section of the continental crust with an exceptional transition from upper to lower crust. The Dharwar craton comprise vast areas of 3.4 -3.0 Ga TTG Peninsular gneisses, two generation supracrustal rocks (3.5 -3.0 Ga older Sargur Group and 2.9-2.55 Ga younger Dharwar Supergroup), 2.6-2.5 Ga syn-kinematic calc-alkaline magmatic rocks and syn-post accretionary granulites.

Isotopic age data show a major outburst of new continental crust in the Dharwar craton during 2.6-2.5 Ga, wherein large amounts of juvenile crustal materials including younger Dharwar volcanics (Chitradurga, Shimoga, Sandur, Kolar, Kadiri and Ramagiri belts), calc-alkaline magmatic rocks (Gundlupet, Closepet, Kolar, Krishnagiri) and granulite grade juvenile massifs (Niligiri-Salem-Madras) accreted. Geochemical (LILE and LREE) together with Nd isotope data show that 2.6-2.5 Ga juvenile crust derived from heterogenous sources (strongly enriched, chondritic to depleted mantle). This major episode of juvenile crust accretion spatially associated with reworking of ancient crust, inverse diapirism and high-T and low-P metamorphism. All these features can be interpreted in terms of vertical accretion and differentiation of juvenile continental crust in the hot spot environments associated with a rising mega plume.