

## Circum-Indian ca. 800 Ma tectonothermal activities: A review of imprints of Rodinia growth and dispersal at Indian Archean cratonic margin

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Indian continent preserves rock records of small- to large-scale magmatic and metamorphic events related to plate tectonics from early Archean till recent geological past. Records of such events on the global level are quite plenty in the Phanerozoic era, but scarce in the Precambrian era. However, a recent surge in geochronological data, particularly of Proterozoic time in other old continental blocks helps to have a better understanding of global tectonism related to assembly, growth, and dispersal of several Proterozoic supercontinents, particularly Rodinia. Data from Indian continents are also coming up in recent years related to this supercontinent. The present study is mainly based on our data on rock records of tectonothermal events and their geochronological data (U-Pb zircon and U-total Pb-Th monazite age data) on orogenic belts in and around the present-day Indian landmass highlighting the events occurring at ca. 800 Ma.

The northern part of the Eastern Ghats Granulite belt (EGB), i.e. Chilka Lake province south of the Archean Singbhum craton shows major zircon growth in aluminous granulite at ~800 Ma ( $777 \pm 5$  Ma,  $785 \pm 14$  Ma,  $780 \pm 9$  Ma,  $786 \pm 21$  Ma depending on the rock types). This rock also preserves the textural evidence of strong isothermal decompression  $M_3$ - $D_3$  event from peak conditions of 9 Kbar, ~900 °C to 5-6 Kbar (cordierite-bearing assemblages), possibly during ca. 800 Ma. The matrix monazite grains yield a slightly lower age value of  $760 \pm 21$  Ma. Carbonic fluid ingression possibly occurred syn- to post ITD event affecting both zircon and monazite grains. Large-scale shear zone in the orogenic interior of the EGB, called Nagavalli Shear Zone contains the evidence of decompression and shear zone formation in orthopyroxene-bearing granitoids ranges between ca. 840 Ma to 780 Ma. Our ongoing study in this shear zone-bound megacrystic granitic-granodioritic gneiss yields a possible syn-tectonic granitic magmatism ~ 800 Ma (zircon U-Pb SHRIMP ages at  $780 \pm 11$  Ma;  $816 \pm 17$  Ma, lowest spot age;  $823 \pm 42$  Ma with inherited EGP orogenic event ages in between 1000 Ma and 900 Ma). Whereas, orogenic upheaval at the southern part of the Western Dharwad craton-margin occurred at the same time, where Paleo- to Mesoarchean sedimentary protolith (~3.0 Ga to ~3.6 Ga) suffered deep crustal metamorphism in between ~ 2.4-2.2 Ga. Thereafter, this deep crustal section was cratonized for nearly 1200 m.y. before it was reactivated and upheaved to shallow crustal depth in between  $817 \pm 23$  Ma (from granulite assemblage) and  $814 \pm 18$  Ma (from associated amphibolites). This reactivation has been petrologically imprinted in the metapelitic granulite through the reaction textures caused by isothermal decompression from peak conditions of ~10 Kbar and 850-800 °C. On the north-west side of the Indian continent, Aravalli-Delhi orogenic belt occurs in between two Archean cratonic blocks, namely Marwar Craton and Bundelkhand Craton. The Soth Delhi Fold belt, dominated by calc-silicate gneiss and some siliciclastic metasediments, is sandwiched between these two. This belt is dominantly showing the structural imprint of a transpressive orogeny and pre- to syn-to-post-tectonic granitoids which fix the age of transpression between 850 Ma and 820 Ma.

Hence, it seems that there was a possible orogenic pulse affecting the Archean craton-margin granulites from east India (south of the Archean Singbhum craton and northern part of EGB) to south India (south-western margin of the Dharwad craton) up to north-west India (South Delhi Fold Belt in

Aravalli-Delhi Orogenic belt) at ca. 800 Ma. All these imply the presence of a tectonothermally active belt surrounding the preexisting Indian cratons ca. 800 Ma (similar to Knoydartian orogeny in Laurentia) along which the deep continental crustal materials were exhumed and grown, while the shallow crust was tectonically activated along narrow zones in the cratonic parts.

Keywords: Indian continent, 800 Ma, Circum-Indian peripheral tectonothermal events