

# **Tectonothermal evolution of Chilka Granulite Complex, Eastern Ghats Belt, India: Constrained from U-Pb/Hf isotopic studies**

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The Eastern Ghats Belt (EGB) in eastern India is a classical Precambrian deep crustal section that experienced anomalously high temperatures during the Proterozoic orogenesis. The Chilka Lake Granulite Complex (CGC) in the northern part of the EGB is characterized by the occurrence of migmatitic ortho- and paragneisses surrounding an anorthosite massif that is punctuated by multiple phases of deformation and metamorphism.

In the present study, petrological and geochronological data has been used to constrain the tectonothermal evolution of the CGC. Microtextural relations and phase equilibria modeling of metapelites from the area suggest pristine evidence for the record of HT-UHT metamorphism and associated partial melting. Zircon U-Pb dating of the studied CGC granulites identifies two prominent metamorphic imprints recorded in the region during the early and late Tonian. The signature of the prominent late-Tonian metamorphic overprint at ~750 Ma is in good conjunction with the U-total Pb-Th monazite ages, whereas the ~950 Ma metamorphic event is in agreement with the Genevevillian UHT metamorphic event reported in the area. Zircon Hf isotopic studies reveal that the epsilon Hf values for these late-Tonian domains are dominantly negative, with Paleoproterozoic Hf-T<sub>DM</sub> model ages indicative of the involvement of reworked crustal component in their formation. However, the older early-Tonian domains are characterized by near positive epsilon Hf values, and Paleoproterozoic Hf-T<sub>DM</sub> model ages reflect the signatures for juvenile crustal input in their formation. These late-Tonian emplacement ages are in conjunction with the timing of widespread continental rifting event recorded during the final phase of Rodinia dispersal. Similar ages have also been reported from its supercontinent counterparts such as Southern Granulite Terrane, Madagascar, Africa, Sri Lanka, and Antarctica signifying this late-Tonian metamorphism as a pervasive thermal event recorded across East Gondwana.

In addition to these, new U-Pb rutile ages from these rocks that cluster around ~450 Ma, which post-dates the timing of peak metamorphism recorded in the terrane can be considered as their cooling ages during the final phase of the orogeny.