

## UHT metamorphism and tectonic models of Eastern Gondwana: problems and possibilities

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Neoproterozoic Ultrahigh-temperature (UHT) granulite facies metamorphism of the eastern Gondwana lower crust is well established through several reported results in the last two decades. Several localities in the Madurai Block, southern India, central Highland Complex, Sri Lanka, southern Madagascar and East Antarctica, preserves evidences for the peak UHT conditions of crustal metamorphism through mineral assemblages such as sapphirine + quartz, orthopyroxene + sillimanite + quartz and spinel + quartz. It is observed that the typical sapphirine + quartz assemblage is preserved only as inclusions within garnet in all of these terranes. The geochronological studies in these samples show various stages of zircon growth and dissolution, thus implying that the reported ages need not be always indicating the time of peak metamorphism but several stages of evolution within the P-T path.

Apart from the dry orthopyroxene bearing UHT granulites, hydrous-sapphirine granulites (gedrite-staurolite-cordierite bearing) are also reported from some of these terrains. Whether these rare, but important rocks have undergone UHT metamorphism is an area of debate. The timing of metamorphism is very much similar to that of other UHT occurrences though the sense of P-T path and assemblages are completely different. The relation between these sapphirine granulites and the orthopyroxene bearing sapphirine granulites are never discussed. Recent studies suggest the N-S trending UHT belt in Madurai Block as a terrane boundary, which will contradict all the existing concepts and models proposed from eastern Gondwana.

In this presentation, a comprehensive review is made on the UHT rock occurrences, their textural characteristics and variations, mineral chemical characteristics, thermodynamic constraints on P-T evolution and ages. Several models were proposed for the evolution of these terranes though many of them contradict each other. The models include basaltic underplating, slab breakoff, ridge subduction, double subduction and self-heating through radiogenic sources. The presentation intends to evaluate these models along with its problems and other possibilities, and also looks forward to a possibly acceptable model for the pressure-temperature-time evolution of ultra-hot collisional orogeny during the assembly of Gondwana.