U-Pb and Ti in Zircon Constraints on the Timing and Duration of Ultrahigh Temperature Metamorphism in the Eastern Ghats

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Metamorphism from the Anantangiri area within the Eastern Ghats mobile belt has been dated by SHRIMP U-Pb analysis of metamorphic zircons, monazite and rutile. The samples are Mg-Al gneisses containing garnet, sillimanite, cordierite, sapphirine, orthopyroxene, spinel and quartz. The sapphrine + quartz assemblage indicates peak temperatures of >950 $^{\circ}$ C consistent with the attainment of UHT conditions.



Figure 1: Image on right, sapphrine +quatz inclusion in porphyoblastic garnet (fov = 1mm). Left hand image shows orthopyroxene, sillimanite, zircon, rutile, sapphrine and quartz in association with cordierite (fov=5mm).

Soccer ball shaped zircons – characteristic of metamorphic zircon growth - are distributed throughout the sample in association with the porphyroblastic garnet, sapphrine and orthopyroxene and throughout the cordierite. These textural relationships suggest that zircon formed during high-grade metamorphism. In-situ trace element data from accessory minerals (zircon, monazite and rutile) and garnet allow inferences about the conditions of growth to be made. The application of the Zr in rutile and Ti in zircon thermometers enables the linking temperature zircon growth to a specific time, thus providing high-resolution U-Pb age constraints on the timing of UHT metamorphism in the Eastern Ghats to be obtained.