

Paper Number: 4492

Hot orogens and supercontinent amalgamation: a Gondwanan example from southern India

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The Southern Granulite Terrane in southern India preserves evidence for regional-scale high to ultrahigh temperature metamorphism related to the amalgamation of the supercontinent Gondwana. In this talk we will present accessory mineral (zircon and monazite) geochronological and geochemical datasets linked to the petrological evolution of the rocks as determined by phase equilibria modelling. The results constrain the duration of high to ultrahigh temperature (>900 °C) metamorphism in the Madurai Block to be c. 40 Ma with peak conditions achieved c. 60 Ma after the formation of an orogenic plateau related to the collision of the microcontinent Azania with East Africa at c. 610 Ma. A 1D numerical model demonstrates that the attainment of temperatures >900 °C requires that the crust be moderately enriched in heat producing elements and that the duration of the orogenic event is sufficiently long to allow conductive heating through radioactive decay. Both of these conditions are met by the available data for the Madurai Block. Our results constrain the length of time it takes for the crust to evolve from collision to peak P–T (i.e. the prograde heating phase) then back to the solidus during retrogression. This evolution illustrates that not all metamorphic ages date sutures.

