Tectonic evolution of the Mahakoshal Belt, Central India: Insights from phase equilibria modelling and monazite geochronology

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The current study demonstrates the application of in situ monazite dating using electron microprobe for providing constraints on the absolute timing of deformation events. U–Th–total Pb monazite ages linked with *P–T* evolution of Garnet-staurolite schists from the Mahakoshal Belt (MB), present new insights into the accretionary evolution along the Central India Tectonic Zone (CITZ) that developed during the collision between North Indian block (NIB) and South Indian block (SIB). Pseusosection analysis reveals *P–T* conditions of 520–530 °C/4.8–5.2 kbar and 590–600 °C/6.0–6.5 kbar for the pre-peak (M_1: $garnet_{Core}$ + biotite + muscovite + ilmenite + quartz ± plagioclase) and peak (M_2: $garnet_{rim}$ + staurolite + biotite + muscovite + ilmenite + quartz) metamorphic assemblages respectively. The post-peak retrograde assemblage defined by the growth of chlorite porphyroblasts in the schists formed at 500–520 °C/4.0–5.0 kbar. U–Th–total Pb monazite ages in combination with microtextural relations suggests that the schists experienced pre-peak (M_1), peak (M_2) and post-peak metamorphic events at 1.90–1.80 Ga, 1.75–1.65 Ga and 1.60–1.55 Ga respectively. The timing of M_2 metamorphism coincides with the emplacement of granitoids along the southern margin of MB. The Late Paleoproterozoic to Early Mesoproterozoic clockwise *P–T–t* path involving prograde heating (M_1) followed successively by moderate loading (M_2) and decompression cooling is overprinted by hitherto uncharacterized Neoproterozoic tectonic event (0.95–0.85 Ga). This event coincides with the time of formation of the Rodinia Supercontinent. Whereas, The Late Paleoproterozoic to Early Mesoproterozoic tectonothermal record (1.9–1.5 Ga) determined in this study provides additional constraints on the tectonic linkage of the CITZ with the Capricorn Orogen of Western Australia in the Columbia Supercontinent assembly.