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Records of near-isothermal decompression and clockwise P–T history from the Paleoproterozoic Mahakoshal Belt, Central Indian Tectonic Zone: Constraints from pseudosection modelling and monazite geochronology

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The Mahakoshal Belt (MB) is regarded as the oldest subunit along the northern collar of the Central Indian Tectonic Zone (CITZ) arguably representing the zone of accretion between the North India Block and the South India Block. The following study focuses on deciphering the structural and metamorphic P–T–t history of the schists/phyllites from the eastern part of the belt, and provides insights into the Paleoproterozoic tectonic development in the CITZ. The schists comprise phengite, quartz, andalusite, biotite, muscovite and margarite, and are associated with veins of rare andalusite + corundum + quartz assemblage. The field relations combined with deformation microtextures in the MB schists suggests three episodes of metamorphism, M_1, M_2 and M_3, corresponding with D_1, D_2 and D_3 deformation events respectively. Inclusion trails (S_1) of phengite + biotite + quartz $\pm$ chlorite in syn/post-S_2 andalusite porphyroblasts constrain the M_1 metamorphic event in pelitic schists. The application of pseudosection modelling estimated peak metamorphic conditions at $\sim$8 kbar and 520 $^{\circ}$C. Near isothermal decompression ($<$4 kbar) resulted in the formation of the andalusite + muscovite bearing retrograde assemblage that stabilized at the expense of phengite-bearing assemblage. Further, andalusite porphyroblasts are replaced by margarite + muscovite + chlorite pseudomorphs (2–3 kbar) during syn/post–S_3 fluid-aided metamorphism. Th–U–total Pb dating of monazite grains yield core populations at 1.8–1.9 Ga, and rim populations at 1.7–1.8 Ga and 1.5–1.6 Ga. Thus, the peak metamorphism in MB schists was Paleoproterozoic in age, 1.8–1.9 Ga, and the clockwise P–T path was recorded at 1.7–1.8 Ga, which overlaps with the emplacement of blastoporphyritic granitoids along southern margin of the MB. The results obtained in this study combined with the existing structural–metamorphic–chronological information demonstrate the CITZ to be a composite of desperately-evolved crustal domains. With some major omissions, the tectono-thermal events identified in the CITZ partly overlap with those observed in the Capricorn Orogen (Western Australia) and the Trans North China Orogen. Therefore, these global correlations possibly corroborate new configurations on the assembly and fragmentation of Columbia Supercontinent, but await further studies and robust age determinations in the various parts of CITZ.