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A Pan African greenschist facies shear zone in central India and its tectonic implications

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Pan African aged orogenic belts are well reported from peninsular India. These belts occur along the northern and north-west margins of the Eastern Ghats Mobile Belt, the South India Granulite Belt along with the tectonic domains of Marwar craton in north west India. These belts record high temperature granulite facies metamorphism at mid-to lower crustal levels and felsic magmatism between ~650-550 Ma.

In this communication we report for the first time a greenschist facies shear zone from the central part of the Bundelkhand craton. The strongly sheared felsic intrusive rocks like tonalite trondhjemite granodiorites (TTGs) and potassic granites within the shear zone record a E-W trending shear fabric with near vertical dips. The shear fabric is often mylonitic and is defined by very fine-grained quartz and feldspar. Chlorite and muscovite are also a very common within the shear fabric. The zircons within the TTGs yield U-Pb concordant upper intercept ages ranging from 3.6 Ga, 3.4 Ga, 2.8 Ga and 2.6 Ga, while that recorded from the potassic granite ranges from ~2.6-2.5 Ga. Nevertheless, all these strongly sheared felsic units from yield an unequivocal lower intercept age ~550-540 Ma, implying a lead-loss event in the late Neoproterozoic. Since similar lower intercept ages are recorded from each of these different felsic units the Pan-African aged Pb-loss event is correlated with formation of the E-W trending shear zone.

The deformation microstructures of quartz and feldspar from the mylonites broadly indicate that the crystal plastic deformation has been a dominant mechanism with feldspar showing evidences of brittle deformation as well. The ductile deformation of quartz indicates a minimum deformation temperature of 300º C whereas that of feldspar (brittle to ductile transition) suggests temperature in the range of 400-500ºC. Chloritization and Albitization reactions which are evident from the mineral chemical analysis, further supports a low temperature process of mylonitization.

The shear zone is thus an intra-crustal greenschist facies belt.