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# Late Paleoproterozoic granite magmatism in the south-central Sandmata Complex, Aravalli Craton (NW India): structures, geochronology and tectonic implications

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The Sandmata Complex in the Aravalli Craton (NW India) is regarded as a reworked crustal terrane, which recorded Paleoproterozoic (1.8–1.7 Ga) granulite facies metamorphism and extensive granitoid magmatism, temporally associated with the Aravalli Basin closure and therefore critical for understanding its tectono-magmatic evolution. The present study emphasizes on the 1.8–1.7 Ga granite magmatism, represented by the Amet pluton. These granitoids recorded three stages of deformation ($D_1$, $D_2$ and $D_3$). Early foliation ($S_1$) is indicated by gently dipping mylonitic fabric (10°–50°). The steeply dipping (>65°) mylonitic fabric with strike values of N35°–N75° defines the $S_2$ mylonitic foliation, whereas the N350°–N20° striking and steep dipping (>70°) ultramylonitic fabric characterizes the $S_3$ foliation in the granitoids. The folds on $S_1$ are upright folds, gently plunging towards NE or SW due to the $F_1$–$F_2$ event and NNE or SSW due to the $F_1$–$F_3$ event. The reclined folds developed on $S_2$ layers are steeply plunging towards N or S due to $F_2$–$F_3$ event. Kinematic vorticity analysis suggests that $S_1$ has (60.5–71.5)% pure shear component and $S_2$ has (43.5–49.5)% pure shear component. The quartz CPO results suggest a SW movement direction during $S_1$ and NW during $S_2$ and $S_3$ with low-T basal slip in c-plane along a-direction. The new in-situ zircon-monazite ages show distinct age populations at 2.4 Ga, 1.95–1.90 Ga, 1.85–1.70 Ga and 1.0–0.9 Ga. The 2.4 Ga and 1.95–1.90 Ga ages indicate the inherited protolith ages. The 1.85–1.75 Ga age characterizes the crystallization age and the timing of garnet growth and early mylonitization event ($D_1$). The 1.0–0.9 Ga age population is attributed to the onset of Delhi Orogeny and associated mylonitization ($D_2$ and $D_3$) events. This study suggest that the south-central part of the Sandmata Complex witnessed felsic magmatism over a span of ~150 Ma, likely driven by the partial melting of thickened continental crust, the fractionation of mantle-derived mafic magmas, or a combination of both processes. Therefore, the Sandmata Complex records prolonged amalgamation history by preserving Late Paleoproterozoic (Aravalli Orogeny) and Mid-Neoproterozic (South Delhi Orogeny) orogenic episodes.