

# **$^{40}\text{Ar}/^{39}\text{Ar}$ geochronology and Neoproterozoic tectonics along the northern margin of the Eastern Ghats Belt in north Orissa, India**

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## **Abstract**

The post-1100-950 Ma cooling history of the northern margin of the high-grade Eastern Ghats Belt is determined from  $^{40}\text{Ar}/^{39}\text{Ar}$  data collected from schist and gneiss samples. The data define two groups of dates with distinct cooling histories between ca. 700 Ma and ca. 420 Ma. The oldest group of ages define a slow apparent cooling path, whereas a younger group of  $^{40}\text{Ar}/^{39}\text{Ar}$  dates from the west and north margin of the Eastern Ghats Belt and along the southern margin of the Rengali Province define a more rapid cooling path. The younger  $^{40}\text{Ar}/^{39}\text{Ar}$  dates are interpreted to reflect a variable and locally intense thermal event at ca. 500–550 Ma associated with reactivation of major shear zones. Final exhumation to current exposed levels occurred by ca. 300 Ma as constrained by unconformable Permo-Triassic coal-bearing sediments overlying the northern Eastern Ghats Belt and northwestern Rengali Province. Dextral-reverse reactivation after ca. 950 Ma and possibly prior to ca. 700 Ma along the Kerajang and Barakot Fault Zones, was associated with regional shortening within the Eastern Ghats Belt and Rengali Province. Further reactivation of major shear zones within the same shortening regime at ca. 500–550 Ma is indicated by the  $^{40}\text{Ar}/^{39}\text{Ar}$  data. Resetting of the K/Ar system was locally more intense along the Eastern Ghats Boundary Fault and Kerajang Fault Zones and was associated with ingress of high temperature fluids. The resulting post-Grenvillian tectonic picture for northern Orissa provides insight into the character of intra-cratonic Pan-African tectonism within East Gondwanaland.

*Keywords:* Geochronology; Pan-African; Shear zones; Thermal history