



## **The $^{40}\text{Ar}/^{39}\text{Ar}$ age record and geodynamic significance of Indo-Madagascar and Deccan flood basalt volcanism in the Sarnu-Dandali alkaline complex, Rajasthan, northwestern India**

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The Sarnu-Dandali alkaline complex in Rajasthan, northwestern India, is considered to represent early, pre-tholeiite magmatism in the Deccan Traps continental flood basalt (CFB) province, based on a single  $^{40}\text{Ar}/^{39}\text{Ar}$  age of 68.57 Ma. Rhyolites found in the complex are considered to be 750 Ma Malani basement. Our new  $^{40}\text{Ar}/^{39}\text{Ar}$  ages of 88.9-86.8 Ma (for syenites, nephelinite, phonolite and rhyolite) and  $66.3 \pm 0.4$  Ma ( $2\sigma$ , melanephelinite) provide clear evidence that whereas the Sarnu-Dandali complex has Deccan-age components, it is dominantly an older (by  $\sim 20$  million years) alkaline complex, with rhyolites included. Sarnu-Dandali is thus an alkaline igneous center active at least twice in the Late Cretaceous, and also much before as suggested by a basalt flow underlying the Early Cretaceous Sarnu Sandstone. The 89-86 Ma  $^{40}\text{Ar}/^{39}\text{Ar}$  ages fully overlap with those for the Indo-Madagascar CFB province formed during continental break-up between India (plus Seychelles) and Madagascar. Recent  $^{40}\text{Ar}/^{39}\text{Ar}$  work has shown polychronous emplacement (over  $\geq 45$  million years) of the Mundwara alkaline complex in Rajasthan, 100 km from Sarnu-Dandali, and 84-80 Ma ages obtained from Mundwara also arguably represent late stages of the Indo-Madagascar CFB volcanism. Remnants of the Indo-Madagascar CFB province are known from several localities in southern India but hitherto unknown from northwestern India 2000 km away. Additional equivalents buried under the vast Deccan Traps are highly likely. We relate the Sarnu-Dandali and Mundwara complexes to decompression melting of ancient, subduction-fluxed, enriched mantle lithosphere due to periodic lithospheric extension during much of the Cretaceous, and hundreds of kilometers inland from the India-Madagascar and India-Seychelles rifted margins.