

A prolonged Neo-Tethyan arc system with concurrent magmatic flare-ups and lulls

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Major long-lived Phanerozoic arcs commonly show non-steady-state evolution involving low-volume magmatic lulls punctured by high-volume flare-ups, yet the main driver remains highly debated. Here we report detrital zircons from Sumatra that reveal four major age populations at ca. 212, 102-85, 52, and 22-11 Ma. In particular, the mid-Cretaceous to Early Eocene arc-derived zircons yield dominantly high positive $\varepsilon_{\text{Hf}}(t)$ values, matching well with those of typical Neo-Tethyan arc batholiths and testifying to a roughly 6000-km-long Neo-Tethyan arc system from southern Tibet to Sumatra. This prolonged arc system records coherent magmatic lulls (ca. 150-105 and 85-65 Ma) and flare-ups (ca. 105-85 and 65-40 Ma) that lack direct correlation with the India-Eurasia convergence rates. Considering previous modelling and case studies, we propose that the Late Cretaceous magmatic lull, coincident with strong regional shortening/deformation in South Asia and increasingly-fast northward movement of the India plate, might be related to Neo-Tethyan flat subduction, and that periodic behavior of Neo-Tethyan arc magmatism likely resulted from cyclic steepening and shallowing of the slab dip.