

Mesozoic juvenile crustal growth in the easternmost Tethys: New evidence from zircon Hf isotopes in Sumatran granitoids, Indonesia

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In the now-disrupted easternmost Tethys, the formation of juvenile arcs and crustal growth that occurred in the Mesozoic prior to the collision of India and Asia are poorly constrained. Mesozoic granitoids exposed in Sumatra, Indonesia, have the potential to record Mesozoic crustal formation in the easternmost Tethys. Although some geochronological data exists for Sumatran granitoids, there is still a lack of precise geochronological and isotope data. Our finding of a drastic change in zircon $\varepsilon_{\text{Hf}}(t)$ values from negative to positive in the Late Triassic (around 210-200 Ma) reveals a fundamental restructuring of the arc system in Sumatra. The magma source no longer just trapped ancient continental crust, but also records the onset of juvenile arc input. Early Jurassic to Late Cretaceous granitoids (ca. 200-100 Ma) also have positive zircon $\varepsilon_{\text{Hf}}(t)$ values (+17.7 to +11.2), consistent with ongoing eastward subduction of the easternmost Tethyan lithosphere beneath Sumatra. Mesozoic zircon $\varepsilon_{\text{Hf}}(t)$ values from Sumatran granitoids are higher than those (-14.7 to +13.7) of contemporaneous Cordilleran arcs related to subduction of the Paleo-Pacific Ocean in the Americas and Zealandia, implying greater juvenile input and lesser crustal contamination occurred in the easternmost Tethys. Mesozoic juvenile crustal growth in the easternmost Tethys provides a new understanding of tectono-magmatic evolution of eastern Tethys and its role in global juvenile crustal formation.