GSA Connects 2024 Meeting in Anaheim, California

Paper No. 117-3
Presentation Time: 8:00 AM-5:30 PM

NUMERICAL MODELING ON SLAB BREAKOFF RELATED TOPOGRAPHY AND CRUSTAL EVOLUTION: A CASE STUDY OF THE GANGDESE MAGMATIC OROGENY, SOUTHERN TIBET

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Gangdese magmatic orogen, now exhumed as the Gangdese Batholith, was built along the southern margin of the Lhasa terrane during the Mesozoic-Cenozoic convergence between the Indian and Eurasian plates. Despite many studies having been done on the composition and geochronology of the batholith, the crustal thickness and paleo-elevation of the Gangdese are still under debate. A major discrepancy between different proxies exists at 60-50 Ma during the subduction-collision transition. In particular, isostatic elevation from crustal thickness using zircon europium anomaly data suggests a ~3-3.5 km elevation (Tang et al., 2021), while the isostatic elevation from paired whole rock Sr/Y-La/Yb data shows a ~1.5 km elevation (Sundell et al., 2021). Independent from the crustal thickness-convertedelevation, paleo-altimetry using oxygen and hydrogen isotopes suggests a 4-4.5 km elevation during 60-50 Ma (e.g., Ibarra et al., 2023). Such an isotope-based elevation is ~1-3 km higher than the crustal thickness-converted elevations. Interestingly, the breakoff of the Neo-Tethyan slab has been proposed to start at ~53 Ma, and the breakoff is likely to occur at a shallow depth based on the depleted zircon εHf(t) and high Ba/Th ratio in coeval igneous rocks.

Here, we explore the possibility that the slab breakoff can explain some, if not all, discrepancy between the crustal thickness-converted elevation and the isotope-based elevation. This research will use a state-of-the-artnumerical code LaMEM.jl to evaluate the time scale and magnitude of elevation change caused by slab breakoff. Eventually, the results from the numerical modeling will be compared with elevations from existing studies to better understand the crustal evolution of the Gangdese orogeny.

Session No. 117--Booth# 217

T162. Innovative Ideas in Tectonics of Earth and Other Planetary Bodies: a Session in Memory of An Yin (Posters)
Monday, 23 September 2024: 8:00 AM-5:30 PM

Hall D (Anaheim Convention Center)

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