T21A-07 THE PRE-COLLISION CONFIGURATION OF NORTHERN GREATER INDIA AND POST-COLLISION CONTROLS ON HIMALAYAN DEFORMATION

Tuesday, 16 December 2025

09:30 - 09:40

352 (New Orleans Convention Center)

Author will be Presenting:

In-person

Abstract

Determining the composition and configuration of northern Greater India prior to the India-Asia collision is a controversial topic. We add to the models by conducting a mass-balance analysis and combining that with previously published work to determine the width of northern Greater India. We determine that the evidence yields 2 possible configurations. One of these configurations is a ≥1815±630 km wide and ~10-23 km thick Zealandia-type northern Greater India indicating a ≥ 2550±640 km wide pre-collisional Greater India without or with a limited ~500-1000 km Xigaze back-arc oceanic basin. This hyperextended margin is our preferred solution. It predicts a single-stage collision at ~60 Ma with significant shortening on post-collisional northern Greater India.

Post-collisional shortening began as India collided with Asia. The shortening between 60-25 Ma is not well known; however, the minimum shortening since ~25 Ma is well known in the Himalayan thrust belt. We do not understand why some thrust sheets in Greater and Lesser Himalayan parts of the thrust belt are >100 km long and others <35 km. We determine that early-stage broad leucogranite melting from ~30-20 Ma weakened the mid-lower crustal strength, which produced a supercritical wedge. This promoted across-strike lengthening of the low-elevation Himalayan taper accommodated by detachment faulting on the South Tibetan

Detachment system and the far-traveled long basal thrust sheets from ~30–25 Ma to 20-15 Ma, the Main Central and Ramgarh-Munsiari thrust sheets. Melt-removal and extraction coeval with widespread leucogranite intrusion during ~20-10 Ma substantially strengthened the mid-lower crust, which transitioned the wedge from supercritical to subcritical states. This maintained the growing high-elevation taper and shifted the deformation mode from long thrust sheets to foreland-propagated short imbrication/duplex thrust sheets. Beginning at ~20-15 Ma, the Lesser Himalayan duplex began to form and continued until ~5 Ma when the thrust belt propagated southward into the Subhimalayan rocks. Thus, the transition from melt-presence to melt-removal caused the transition from long thrust sheets to shorter thrust sheets in the Himalayan thrust belt.

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