

Cenozoic Collision-extrusion Tectonics in Southeast Asia: Constraints from the Ailao Shan-Red River Shear Zone

Speaker

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ABSTRACT

Left-lateral movement of the Ailao Shan-Red River (ASRR) shear zone lends strong support to the hypothesis of continental extrusion resulting from the collision of India with Asia. Recent observations from northwestern Yunnan, China, and northwestern Vietnam on both sides of the shear zone demonstrate that the sinistral offset approximated 600 km according to correlations of Permian-Triassic flood basalt successions and late Paleogene highly potassic mafic magmas. We conclude that the shear belt was propagating on the South China continental margin and does not correspond to a suture between South China and Indochina. The highly potassic magmas were emplaced from about 40 to 30 Ma, before the shear movement which was caused by the late Oligocene to early Miocene (about 27-22 Ma) extrusion activity.

This suggests that a late Eocene to early Oligocene intraplate extension, possibly induced by delamination of thickened continental lithosphere, took place in northwestern Yunnan (or eastern Tibet) as a response to the India-Asia collision.

Whereas extension-related potassic lavas were generated in western Tibet in the last 20 Ma, the widespread highly potassic magmas we identified have similar geochemical features but formed during 40-30 Ma in eastern Tibet. This suggests a¹

diachronous lithospheric thinning and regional extension, and enables us to propose that the Tibetan plateau actually began its rapid uplift in the east from about 40 Ma and in the west from about 20 Ma. Our observation, consistent with sedimentation records from the Ganges-Brahmaputra Delta to the Bengal Fan, can accommodate the tectonically driven models for strontium isotope evolution in the ocean and global cooling over the past 40 Ma. The 40-30 Ma extension from Yunnan (eastern Tibet) to northwestern Vietnam, and sea-floor spreading of the South China Sea that began around 30 Ma, could have accounted for the initiation of the Ailao Shan-Red River shear zone. Therefore, sea-floor spreading of the South China Sea was commenced earlier than the strike-slip movement of the ASRR shear zone and was still in progress after cessation of the latter. These age constraints are in apparent contradiction to those required by the extrusion model. It is more likely that extensional regimes existed in the South China continental margin and eastern Tibet (to Yunnan and northwestern Vietnam) prior to the onset of eastward extrusion of Indochina in the late Oligocene.

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