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Detrital mineral thermochronology of Cenozoic deposits of Central Myanmar and implications for the evolution of the eastern Himalayan orogen

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Detrital low temperature thermochronology of single grains of white mica using ^{40}Ar/^{39}Ar methods, and double dating of zircon by fission track and U/Pb combined with Lu-Hf geochemistry methods, have been applied to a suite of Eocene, Oligocene and Miocene samples from the Central Myanmar Basin in order to identify the tectonothermal events and source terranes that are recorded in the sedimentary rocks. By combining multiple provenance tools, it is possible to determine how changes in provenance from Late Eocene to early Miocene time are related to exhumation and landscape evolution in the eastern sector of the Himalayan orogen. To discriminate between source terranes, we compare our ages to published low temperature thermochronology data from Jurassic-Tertiary bedrock of the Lhasa terrane, and the Transhimalayan rocks of the eastern syntaxis, eastern to southeastern Myanmar, and western Thailand.

Detrital white mica ^{40}Ar/^{39}Ar ages for the Eocene and Oligocene deposits reflect a broad range of cooling events that are Jurassic to Oligocene in age and the majority of the ^{40}Ar/^{39}Ar ages are older than 60 Ma. In contrast, the detrital micas from Miocene deposits have a narrow range of ^{40}Ar/^{39}Ar ages with one dominant peak of 30 – 40 Ma, and about 90% of the ages are younger than 60 Ma. Multi-modal detrital zircon fission track ages are evident in all samples and span the last 200 Ma, and the majority are younger than 60 Ma. The combined dataset supports our previous interpretations that the Yarlung Tsangpo of Tibet and the Irrawaddy River of Myanmar were connected in Late Eocene and Oligocene time, and that the timing of river disconnection and capture of the Yarlung Tsangpo by the Brahmaputra is an early Miocene event (between 18 - 19 Ma). The ^{40}Ar/^{39}Ar age distributions of detrital muscovite in Palaeogene samples reflect multiple sources within the Lhasa terrane and represent episodic cooling following intrusion of the Gangdese Batholith from the Jurassic to Tertiary time. The abrupt change in ^{40}Ar/^{39}Ar age spectra observed in the oldest Miocene deposit (and all the younger Miocene deposits sampled) reflects a change in provenance to a single source area which is interpreted to be in southeastern Myanmar and western Thailand. We propose that exhumation and deformation in the syntaxis and along the boundary between the Burma plate and the Asian margin is associated with the disconnection of the Yarlung Tsangpo-Irrawaddy river coincident with increased coupling of the India and Burma plates. The partial resetting of a small proportion of ^{40}Ar/^{39}Ar mica ages in the oldest Eocene samples, and of some fission track ages in all the samples analysed, allows us to constrain the depth of burial and timing of exhumation of the sedimentary sequences within the Central Myanmar Basin, and link that exhumation to the onset of movement on the Sagaing Fault.