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Triple dating Plio-Pleistocene sediments from the Coastal Range, Taiwan - the erosion record deconvolved

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The Coastal Range in eastern Taiwan contains the remnants of the Pliocene-Pleistocene retro-foredeep basin of the ongoing collision between the Luzon volcanic arc and Eurasian continental margin (Penglai orogeny). We dated detrital apatite and zircon from Plio-Pleistocene sediments in the Coastal Range using multiple thermochronometers to document changes in source and exhumation rate through time. Zircon fission-track grain ages in 2 – 4 million year old sediments from the Coastal Range between 23.78° and 23.14° N were not reset by the Penglai orogeny and reflect the early-stage removal of the sedimentary cover. Sediments younger than 2 million years old in this region yield Pliocene zircon fission-track grain ages and suggest that exhumation, transport and deposition occurred within 0.4 to 1.5 million years. In the Southern Coastal Range south of $\sim$23 °N this relationship between depositional age and resetting of the zircon fission tracks ceases. Instead reset grains are only found in samples deposited < 1 million years ago. Deconvolution of apatite fission-track grain ages from the same samples indicate Miocene and Pliocene peak age components reflecting sediment sources from the Luzon arc as well as the continental margin. The recorded onset of rapid exhumation in the Pliocene in the northern Coastal Ranges is contemporaneous with major tectonic changes in the region. These data along with previously published palaeo-magnetic studies (e.g. Lee et al., 1991) suggest that collision propagation along the Taiwan margin may not be a simple and continuous process but is potentially a series of discontinuous steps.

Lee et al., 1991. Earth and Planetary Science Letters, 104, 245-257