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Tectonics, exhumation, and drainage evolution of the eastern Himalaya since 13 Ma from detrital geochemistry and thermochronology, Kameng River Section, Arunachal Pradesh

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The exhumation history of the central Himalaya is well documented, but the exhumation history of the eastern Himalaya is not well known. In this study, we identify sediment source areas and examine the late Neogene exhumation history of the eastern Himalaya from the synorogenic sedimentary record of its foreland basin. We present Nd and Hf isotopic data as well as apatite and zircon fission-track analyses from the Miocene–Pliocene Siwalik Group along the recently dated Kameng River section in Arunachal Pradesh of northeastern India. Our isotopic data show that Siwalik Group sediments deposited between 13–7 and 3–0 Ma in Arunachal Pradesh were mainly derived from Higher Himalayan source rocks. In contrast, sediments deposited between ca. 7 and 3 Ma have far less negative εNd and εHf values that require involvement of the Gangdese Batholith and Yarlung suture zone source areas via the Brahmaputra River system. Consequently, these sediments should also record incision of the Namche Barwa massif by this river. Source-area exhumation rates of Himalayan-derived sediments, determined from detrital zircon fission-track data, were on the order of 1.8 km/m.y. in the fastest-exhuming areas. These rates are very similar to those calculated for the central Himalaya and have been relatively constant since ca. 13 Ma. Our results do not support the hypothesis of a major change in exhumation rates linked to either local or regional climate change or to Shillong Plateau uplift during the Miocene, as reported elsewhere. The zircon fission-track data further suggest that exhumation of the Namche Barwa massif between 7 and 3 Ma was much slower than the $\sim$10 km/m.y. rate recorded in the recent past. Detrital apatite fission-track data indicate basin inversion at around 1 Ma.