The Tethys Himalaya in the Cretaceous/Paleocene: anorogenic evolution driven by Deccan-related uplift

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The Cretaceous to Lower Paleocene succession of the Tethys Himalaya records an entirely anorogenic evolution that both began and ended with flood-basaltic eruptions. Uplift associated with emplacement of the Rajmahal Traps was followed by thermal subsidence and quasi-synchronous shelf drowning at the end of the Early Cretaceous (Garzanti, 1993; Hu et al., 2010). Widespread deposition of upper-bathyal foraminiferal oozes ensued. A similar cycle was repeated at the end of the Late Cretaceous. The widespread Campanian hiatus associated with re-suspension and faunal reworking was followed by a major pulse of terrigenous supply and drastic increase in accumulation rates. This major erosional event recorded across the Indian subcontinent is ascribed to magmatic upwelling at the base of the Indian lithosphere, begun around 80-75 Ma or even some Ma earlier. The shallowing-upward Maastrichtian succession of the Tethys Himalaya is capped by Lower Paleocene coastal quartzarenites testifying to rejuvenation of the Indian subcontinent in the south. Volcanic rock fragments and Cr-spinels virtually identical geochemically to Deccan spinels resisted the coupled effect of strong weathering at subequatorial latitudes and subsequent diagenetic dissolution, and are preserved throughout the Maastrichtian to Danian succession (Garzanti and Hu, 2014). This is "smoking-gun" evidence that detritus from Deccan lavas reached the passive margin of northern India. At the close of the Danian (~62 Ma), transgression of marine carbonates documents a synchronous drowning event all along the Tethys Himalaya. Thermal subsidence took place at the same time as India moved away from the magma source and Deccan volcanism eventually ceased. The sedimentary record of the northern Indian margin excludes any postulated orogenic event associated with ophiolite obduction, arc-continent or continent-continent collision in the Late Cretaceous, and indicates that Neotethys remained open until the Late Paleocene (Fig. 1).

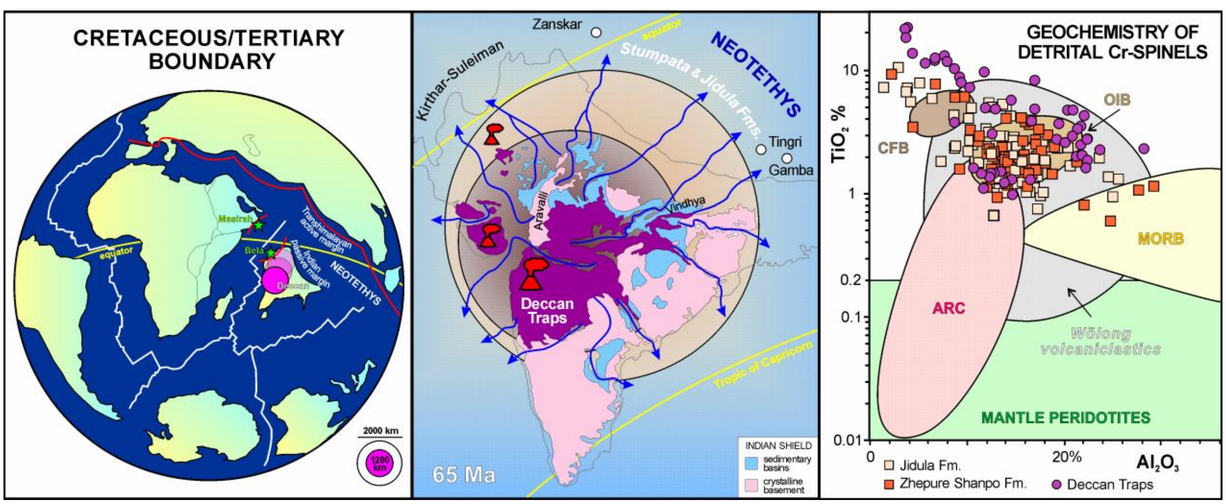

Figure 1. The simple anorogenic scenario for the Tethys Himalaya in the latest Cretaceous/earliest Paleocene (Cande and Stegman, 2011). Passive-margin evolution of northern India is indicated by stratigraphic and mineralogical data, while ophiolite obduction was taking place along the western transpressive boundary of the Indian plate (Gnos et al., 1997). Detrital Cr-spinels in Maastrichtian to Danian sandstones of the Tethys Himalaya are both derived first-cycle from Deccan basalts and recycled from Lower Cretaceous lavas and volcaniclastics (data for comparison from Kamenetsky et al., 2001, Melluso et al., 2010, and Hu et al., 2014).

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