



Reconstruction of Post-Deccan topographies from mapping of relict lateritic paleosurfaces: Implications for long-term denudation of Peninsular India

Amandine Jean (1), Anicet Beauvais (1), Dominique Chardon (2), Nicolas Bonnet (3), Jayananda Mudlappa (4), Shazia Janwari (4), and Pierre-Etienne Mathé (1)

(1) Aix Marseille Univ, CNRS, IRD, Coll France, CEREGE, Aix en Provence, France (jean@cerege.fr; beauvais@cerege.fr), (2) GET (CNRS/IRD/UPS), Université de Toulouse, Toulouse, France, (3) Université de Rennes 1, Géosciences Rennes, UMR CNRS 6118, 35042 Rennes Cedex, France, (4) Centre for Earth and Space Sciences, University of Hyderabad, Hyderabad, India

Cenozoic topographic rejuvenation of divergent continental margins and their cratonic hinterland is a matter of debate. For instance, continental scale tilt has been advocated as a cause of Late Cenozoic relief growth of the Indian Peninsula. Our work aims at providing independent geomorphological constraints to test such assertions.

The western margin of the Peninsula bears the Western Ghats Escarpment (WGE), which carves both Precambrian rocks and 65 Ma old Deccan Traps. The escarpment separates a narrow coastal lowland plain drained to the Arabian Sea from a highland plateau drained towards the Bengal Sea. Alternating and coupled chemical weathering and erosion led to formation and dissection of lateritic paleolandscapes preserved both sides of the WGE. In the highland, the relicts of three distinctive lateritic surfaces are recognized. They formed successively from ~ 53 Ma to ~ 23 Ma on the basis of ages obtained by Ar-Ar dating of K-rich manganese oxides [1]. The first surface is topped by a duricrust rich in Al (bauxite) forming mesas at altitudes of 960 to 1400 m. The second surface called "Intermediate" is mantled by a ferricrete, whose relicts remain ~ 100 m below the bauxite at altitudes of ~ 850 to 1250 m. The third surface corresponds to the relicts of a lateritic pediment, which may be capped by a ferricrete at altitudes of 600 to 900 m. Three lateritic surfaces have been documented in the lowland. The Ar-Ar ages obtained indicate common lateritic weathering in both the highland and the lowland between at 53-45 Ma, then a divergence later on [1]. The oldest remnants of lateritic surface in the lowland are preserved at maximum elevation of 400-500 m close to the WGE and correspond to a pediment. This ancient landform was re-altered at 24-19 Ma to form residual hills of the "Intermediate" relief (ca. 350-200 m). A younger pediment formed around the residual hills and is preserved at ca. 150-50 m elevation.

Relicts' elevations of the three surfaces have been retrieved in both the lowland and the highland to reconstruct successive topographies across the WGE and estimate relief evolution and erosion budgets for major time steps. The results suggest that the denudation did not exceed 10 m/my in the Highland since 45 Ma, and is less than 11 m/my since mitigation of chemical weathering ca. 23 Ma ago. In the lowland, denudation was limited to 5 m/my since 45 Ma and less than 6 m/my since ~ 19 Ma, implying negligible reworking of the WGE, which stabilized at least 50 Ma ago [2]. These results have major implications for relief evolution of South India. They imply very low relief growth since the Eocene and do not require a tilt of the Peninsula. They further put constraints on sedimentary supplies to both margins of the Peninsula over the last 50 Ma.

[1] Bonnet et al., 2016, *Chemical Geology* 446, 33-53.

[2] Beauvais et al., 2016, *Geology* 44, 299-302.