



Re-organisation of the foreland basin and regional exhumation of the Himalaya as a result of a break-off of the Indian slab

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The Tertiary continental series of the Himalayan foreland basin are classically subdivided in Siwalik and pre-Siwalik groups with a boundary dated at ~ 15.5 Ma. From the analysis of 24 drills-holes of the foreland basin, we find that the southward migration rate of the pinch-out of the Siwalik sediment is 20 ± 6 mm/yr and equals the Himalayan shortening rate estimated by others tectonic methods. This equality confirms that the foreland basin development is linked to the flexure of the lithosphere ahead of the southward moving Himalayan thrust belt. For the Tertiary pre-Siwalik sediments, the pinch-out migration rate was smaller whereas the Himalayan shortening rate remained nearly constant. Furthermore erosion surfaces at ~ 15 -17 Ma develop locally above Indian shield lineaments that were reactivated beneath the Tertiary basin.

A detrital study of three Siwalik sections of the Central Himalaya has been performed by using fission track and Ur/Pb dating on the same Zircons. It is found that a major cooling event occurred at 15-19 Ma and affected both Lesser Himalaya and Higher Himalaya.

We suggest that this regional exhumation and change in the development of the basin before 15 Ma is linked to the detachment of a subducted continental mantle at the trailing edge of the Indian lithosphere, because: A) a detached mantle body is presently imaged beneath India by tomographic studies; B) the detachment decreased the slab

pull induced by the subducted lithospheric mantle; C) an increase of the compressive stress within the plate was needed to maintain the constant convergence of the Indian plate and D) this increase favoured fault reactivation within the Indian crust; E) detachment of the heavy roots of the Himalayan belt changed the forces at the trailing edge of the flexed lithosphere and decreases its curvature; F) this isostatic lithospheric rebound reduced the regional southward migration of the foreland basin and induced a regional increase of the Himalayan topography.