



Longitudinal to transverse drainage network evolution in the High Atlas (Morocco)

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The High Atlas of Morocco is a linear intracontinental mountain chain in the NW African plate. The Atlas mountain system results from weak crustal thickening associated with rift inversion during Cenozoic times and from uplift related to lithospheric-scale thermal doming, approximately parallel to the trend of the chain. A striking morphological feature of the High Atlas is the occurrence of both transverse and longitudinal drainage characterized by deep fluvial incision of more than 1000 m in low-relief topography of the axial zone of the chain. Most of the transverse component of the drainage appears to postdate the longitudinal component as indicated by recent or incipient captures and wind gaps. The longitudinal drainage is inherited from an early stage (Paleogene to Miocene in age) of fluvial organization controlled by the tectonic structures developed during upper crustal folding and thrusting in the post-Paleozoic cover. Post-Miocene, amplification of N-S regional slope in the western High Atlas by crustal shortening and thickening triggered: (i) higher erosion rates in transverse than in longitudinal catchments and (ii) captures of longitudinal streams by transverse ones creating a new organization of the drainage system toward the regional slope. Such evolution from a longitudinal to a transverse-dominated drainage may represent a common mechanism of fluvial network development in mountain belts where the amplification of the regional slope results from long-lived lithospheric convergence.