Quantifying the dynamic topography through a combination of basin-averaged erosion rates and geomorphic analysis from the Anti Atlas and Western Meseta (Morocco) transient landscape

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The topography of the Atlas-Meseta system (Morocco) is the result of Late Cenozoic rejuvenation related to mantle-driven uplift. This recent, large-scale dynamic uplift is testified by the occurrence of uplifted shallow-water marine deposits in the Middle Atlas Mountains and in the Western Meseta, indicating that surface uplift must have started after the Late Miocene (Messinian) at rates of 0.1 to 0.2 mm yr⁻¹. This recent pulse is still recorded by transient river networks and by the presence of uplifted relict landscape. In particular, in the Anti Atlas and Western Moroccan Meseta, the lack of significant Cenozoic crustal shortening and the occurrence of several hundred of meters of mantle-driven uplift, offers the possibility to investigate magnitude, timing and rates of deep-seated uplift. In this study we have combined geomorphic analysis of stream profiles with in situ-produced cosmogenic concentrations (¹⁰Be, ²⁶Al) in river sediments and bedrock surfaces (corresponding to relict landscape upstream of knickpoints), in order to decipher the uplift history. Our catchment-mean erosion rates allow us to quantitatively constrain the transient state of landscape and hence to unravel the contribution of regional surface uplift on mountain building processes in Morocco during the Plio-Quaternary.