



On the climatic origin of relict landscape uplift in active orogens

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Elevated, low relief fluvial landscapes in mountain belts are classically interpreted as paleolandscapes, or relict landscapes, formed at lower elevation and subsequently uplifted. In active mountain belts, their uplift is usually considered as the signature of a change in the tectonic setting, typically by acceleration of rock uplift. Based on experimental modeling of erosion and landscape dynamics under controlled tectonic (uplift rate) and climatic (rainfall rate) conditions, we demonstrate here that the uplift of low-relief relict landscapes may represent the transient response of the landscape to climate change (decrease of the mean rainfall rate) with constant rock uplift. Such a climatically-induced surface uplift of topography doesn't require any initial change in the tectonic forcing conditions (even if by feedback the topographic load may influence the subsequent tectonic evolution) and is only driven by the fall in erosion rate consecutive to the decrease in rainfall. From geological, geomorphological and thermochronological data, we argue that relict landscapes in the Kingdom of Bhutan (eastern Himalayan), formed by such a climatic effect during Plio-Quaternary times.