



## **The effect of lithology in shaping the post-orogenic relief of the Central Pyrenees**

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The topography of active, young mountain ranges is dominated by the competition between tectonics and climate that drive crustal thickening, erosion and sedimentation. Numerous studies have investigated these important interactions on mountain ranges such as Southern Alps, New Zealand and Taiwan. However, the role of these processes during post-orogenesis has not received so much attention although most of the mountain ranges in the world are in various stages of post-orogenic decay (European Alps, Urals, Caledonides, Appalachians, Rocky Mountains and Pyrenees). Here, we consider post-orogenesis to represent the onset of the reduction in the mean topographic elevation of the mountain range. Consequently, the processes underpinning the transition is the competition between erosion and crustal thickening; the balance of these processes determines the timing and magnitude of isostatic rebound and hence subsidence versus uplift of the foreland basin. The post-orogenic evolution of these systems, which is associated with a reduction in plate convergence and crustal thickening, results in other geomorphologic process dominating the landscape such as lithology, climate or base level change. In this study we focus on the Central Pyrenees using: i) Inverse modelling using QTQt of low-temperature thermochronological data (ZFT, AFT and AHe) in order to quantify the timing and rate of decelerated exhumation linked to the transition to post-orogenesis and ii) Topographic analyses of river profiles coupling with a world georeferenced lithological database (GLiM) in order to show the effect of different lithologies in the channel steepness as a proxy for erosion. Results show that the transition to post-orogenesis is complex with a diachronous timing and different rate through the Central Pyrenees. Comparison of channel steepness versus lithologies during post-orogenesis time display an important relation. In coupling channel steepness versus lithology and the result of Schmidt hammer test on different lithologies, we demonstrate that lithology plays an important role in shaping the topography and determining the drainage divide, and the highest peaks. This study is part of the Orogen project, an academic-industrial collaboration (CNRS-BRGM-TOTAL).