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Tectonic controls of fluvial incision in Cenozoic Duero Basin (N Iberia)

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The Duero basin, located in the north-west of Iberia, covers approximately 50.000 Km2 and is the largest of the tree main intraplate cenozoic Iberian Basins. This basin shows a complex evolution from end Cretaceous-early Cenozoic times as result of faulting and upbuilding of mountain belts associated to the internal deformation affecting Iberian microplate during Alpine orogenic events. The mountain ranges work as active borders supplying sediments to infill the basin and constraining the basin geometry while, western border of the Duero cenozoic basin is a relatively flat but elevated zone (mean high of 800 m a.s.l) where the variscan basement crops out. This area played an important role in the current configuration of Iberia; acting as a passive border for the Duero Basin during its endorreic evolution. Afterwards, it controls the exoreic evolution of the basin acting as a local base level for the Cenozoic Basin. In this area the Duero river and main tributaries form deep gorges, deeply incised mainly in granitic bedrock. Changes in equilibrium conditions are reflected as changes in main trunk direction and variation in the concavity and steepness of longitudinal profiles, resulting in the presence of numerous knickpoints in the fluvial network. Previous work, in the western border of Duero Cenozoic basin, comparing fluvial incision and fracture pattern, showed a strong structural control either in the orientation of drainage network, either in the incision rates distribution.

Analysis of river longitudinal profiles in the whole Basin evidence great differences in profiles shapes; whereas in the Cenozoic Basin profiles are close to equilibrium, in the western Variscan basamen extensive bedrock segments along the active channel include knickzones of steep rapids and short steps, and V-shaped valleys are characteristics of the area.

In the present work we quantify incision from the closed Basin base level by comparison of theoretical and real longitudinal profiles. Geomorphic analyses of the longitudinal profiles of major river systems developed along the Basin, distribution of nickpoints and incision from the closed Basin base level is interpreted together with well constrained geological and tectonic pattern, to analyze the role of tectonics in the evolution of drainage in the area. Further studies in fluvial network evolution and its interplay with tectonics in the Duero Basin are currently under study though tectonic, geomorphology, surfaces dating and modeling approaches.