



Longitudinal rivers profiles in the Douro basin – Iberia: differences and general trends.

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The Douro river is one of the main rivers in Iberia. It extends across an east–west transect nearly 957 km long from the Iberian ranges to the Atlantic Ocean. The Douro watershed is the result of a complex drainage evolution. The Cenozoic basin represents the infilling of a closed basin from end Cretaceous-early Cenozoic times to late Miocene. After this time the Douro River captured the closed Douro Basin and opened it to the Atlantic, whereas the timing of the process is not constrained. These two stages of the river network evolution are reflected in the longitudinal profiles of the main river and its tributaries, also marked by the differences in the incision degree of the main valley along its course.

This work analyzes the principal characteristics of the longitudinal profiles of the river network in Douro basin using digital terrain models from SRTM and ASTER GDEM elevation data, with 90 and 30m of pixel size. It were used this two digital elevation models in order to compare results and get a better design of the longitudinal shape and to refine the doubts in the knickpoints and knickzones location. The elevation data of the longitudinal profiles were automatically obtained using GIS software. The rivers network used, in vectorial form, was obtained from the official mapping in scales 1.25000 or 1.50000, depending on the data availability for the basin.

Based in this data we obtained the longitudinal profiles of 51 rivers along the entire basin, including Douro and his principal tributaries, to obtain representative river profiles of the whole catchment area in order to identify the differences and the main trends. To compare the shape between all the profiles, beyond the differences in length, we normalize the measures of length and height, which allows differentiating more effectively between different clusters of the longitudinal profiles.

The analysis of the longitudinal profiles revealed significant differences in shape, concavity index, number and position of knickpoints and knickzones. The results obtain allowed the individualization of several sectors of similar longitudinal shape with some local peculiarities, especially in the western part of the basin where the substratum is composed by rocks of weak resistance like schists and in the main fault zones that cross the fluvial network. The different patterns found in longitudinal profiles seem to be associated with the main tectonic compartments distinguished and related with two base levels – the ocean and the high level of the Cenozoic closed basin, representing different stages of evolution on the current river system.