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Drainage reorganization and divide migration induced by the excavation of the Ebro basin (NE Spain)

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S1. Specific stream power calculation

We consider the specific stream power, ω, defined as follows:

$$\omega = \frac{\rho g Q S}{W} \quad \text{(S1)}$$

where ρ is water density (1000 kg.m^{-3}), g is gravitational acceleration (9.81 m.s^{-2}), Q is discharge, S is local river gradient, and W is river width.

We estimated discharge from upstream integration of precipitation patterns (Q = A * P), where A is the upstream drainage area (m^2) and P is precipitation (m/yr), using the data of Hijmans et al. (2005), available on the European Soil Data Center (ESDAC) website (Fig. 6). A and S are calculated using the TopoToolbox software (Schwanghart and Scherler, 2014).

The river width is traditionally deduced from satellite imagery as the maximum height of river flood level is indicated by the absence of vegetation. However, our study area is characterized by arid climatic conditions and rivers surroundings are highly anthropomorphized due to intense farming activity. We then use its scaling $\omega \propto Q^{0.5}$ (Leopold and Maddock, 1953; Dadson et al., 2003; Rice et al., 2008) to rewrite (S1) as follows:

$$\omega = \rho g Q^{0.5} S \quad \text{(S2)}$$

References:

Dadson, S. J., Hovius, N., Chen, H., Dade, W. B., Hsleh, M. L., Willett, S. D., Hu, J. C., Horng, M. J., Chen, M. C., Stark, C. P., Lague, D., and Lin, J. C.: Links between erosion, runoff variability and seismicity in the Taiwan orogen, Nature, 426, 648-651, 2003.

Leopold, L. B. and Maddock, T.: The hydraulic geometry of stream channels and some physiographic implications, US Geological Survey, Professional Paper, 252, 57, 1953.

Rice, S. P., Roy, A. G., and Rhoads, B. L. (Eds.): River Confluences, Tributaries and the Fluvial Network, John Wiley and Sons Ltd, The Atrium, Southern Gate, Chichester, England, pp. 484, 2008.

S2. River long profiles along the Ebro / Duero drainage divide

Figure caption:

Figure S1: Four zooms in Figure 9, showing topographic maps with details on streams and knickpoints location, as described in the text. The corresponding river long profiles are shown to the right of each map.