



## **Geomorphometric mapping of spatio-temporal changes in Plio-Quaternary uplift in the NW European Alpine foreland**

Alain Demoulin (1,2) and Hadrien Bourdon (1)

(1) Université de Liege, Dept of Physical Geography and Quaternary, Liege, Belgium (ademoulin@ulg.ac.be), (2) FRS-FNRS, Brussels, Belgium

A way to explore the causes of Plio-Quaternary uplift in NW Europe consists in identifying the distribution of uplifted areas and evaluating relative uplift ages. Here we use the composite metric  $R$  of fluvial landscapes, which involves three different hypsometric integrals (catchment, drainage network, and trunk stream), in order to get time information (Demoulin, 2011). Main controls on  $R$  are catchment size  $A$  and uplift age. To isolate the latter information, we use the derived  $SR$  index, which is the slope of the linear fit between  $R$  and  $\ln(A)$ . We calculate  $R$  for more than 7000 basins larger than 15 km<sup>2</sup> and determine  $SR$  values for 60-km-wide regions in five N- to NW-trending zones of alternating Paleozoic massifs (Massif central-Brittany; Rhenish shield; Bohemian massif) and Meso-Cenozoic basins (Paris basin; Franconian basin) covering the whole NW European platform in front of the alpine arc. The resulting 350- to 750-km-long  $SR$  profiles seem to provide the most meaningful time information, better than that obtained with noisier higher-resolution  $SR$  maps. Preliminary results of the study especially evidence a systematic increase in  $SR$  from south to north across the Paris basin and Rhenish shield zones that suggests northward propagation of an uplift wave that started from ~200 km north of the alpine collision front in Pliocene times and travelled across this part of the European platform. The Bohemian Massif and the Massif central-Brittany zone show more complex  $SR$  patterns that might be linked to interferences between the uplift wave and more local phenomena (related, e.g., to WNW-oriented compression in front of the Carpathian arc). Surprisingly, the Franconian basin displays fairly uniform low to moderate  $SR$  values suggesting that no tectonic perturbation occurred there since at least the late Early Pleistocene. In conclusion, this new geomorphometric approach of uplift chronology provides a wealth of data, whose careful analysis will help get fresh insight into the timing and the causes of Plio-Quaternary uplift in NW Europe.

- Demoulin A., 2011. Basin and river profile morphometry: A new index with a high potential for relative dating of tectonic uplift. *Geomorphology* 126, 97-107.