

Timing and distribution of Plio-Quaternary uplift in the NW European Alpine foreland

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Abstract

A way to explore the causes of Plio-Quaternary uplift in NW Europe consists in identifying the distribution of uplifted areas and their respective uplift age. Here we use the composite metric R (Demoulin, 2011) involving different hypsometric integrals calculated for more than 7000 basins and map the derived time-dependent index SR over the NW European alpine foreland. As a complex descriptor of the progress of the fluvial landscape response to tectonic signals, SR is a quantitative proxy of the age of the last uplift phase undergone by every particular area. Here, we discuss various approaches for SR mapping and examine preliminary results of the study. Systematic increase of SR from south to north suggests northward migration of the uplift axis with time, i.e., propagation of an uplift wave that started from ~200 km north of the alpine collision front in Pliocene times and travelled across the Paris Basin and the Rhenish Shield. Other regions, such as the Bohemian Massif or the French Central Massif, show more complex SR patterns that may be linked to interferences between the identified uplift wave and other phenomena (related, e.g., to WNW-oriented compression in front of the Carpathian arc). In any case, this new geomorphometric approach provides a wealth of promising data, whose careful analysis should help get fresh insight into the causes of Plio-Quaternary uplift in NW Europe.