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Morphological expressions of active tectonics at the transition from the Southern Alps to the foreland basin

ROBL, J.C., HEBERER, B., NEUBAUER, F.

University of Salzburg, Department of Geography and Geology, Hellbrunnerstraße 34, 5020 Salzburg, Austria

Evolving drainage patterns and longitudinal channel profiles have shown to be sensitive indicators for tectonic or climatic events punctuating the evolution of mountain belts and their associated foreland basins.

The Southern Alps are one of the most seismically active zones of the Central Mediterranean region. However, the linkage between crustal deformation and topographic evolution of this highly active Alpine segment remains to be examined.

In this study we focus on the transition from the eastern Southern Alps to the Po Basin beyond the extent of the last glacial maximum. We use a high-resolution digital elevation model and a novel numerical approach to morphometrically analyze large-scale drainage patterns. We link the results to published structural information in order to investigate the Plio-Quaternary landscape- and drainage evolution.

Morphometric analyses (e.g. normalized steepness indices) allow us to assess the state of (dis-)equilibrium and fingerprint actively uplifting segments at the transition zone from the Alps to the foreland, where erosion is mainly controlled by river incision and mass wasting at the hillslopes.

First results from hydrographic network analyses yield ample evidence for landscape response to active tectonics, such as the occurrence of numerous wind gaps, most prominently in the Sava / Paleosava valley. This is well in line with strong spatial variations of recent uplift indicating the still ongoing reorganization of the drainage system at the Alpine-Dinaric junction. Locations of these knickpoints, stream captures and drainage divide migration will be discussed in relation with lithology, rock uplift and fault patterns.