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Morphometric analysis of the thrust front of the Lucanian Apennine, southern Italy

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The thrust front of the southern Apennines, Italy, is formed by a north-east verging imbricate fan, transversally cut by several major rivers draining to the Ionian Sea. In the Lucanian segment of this orogen, the tectonic stack is composed by Cretaceous-Oligocene deep-sea water clayey successions and Miocene siliciclastic units, emplaced during Pliocene and Pleistocene times. It is still debated if the contractional deformation of this external part of the south-Italian orogen continues until now, because clear field evidences of recent shortening does not overcome the Middle Pleistocene. On the other hand, geomorphological features clearly indicate that the whole area suffered a significant uplift in more recent times. The present study will try to discriminate the different components of the recent and active tectonic deformation in the light of an accurate morphotectonic analysis, based on both the study of terraced surfaces and morphometric indices. The analysis of fluvial terraces arrangement and their longitudinal profiles revealed that the study area underwent a diffused rising during the Late Pleistocene. In the Holocene, the same area seems to be affected by differential uplift due to tectonic tilting toward south-east, as also supported by the increasing of the sinuosity index of the Bradano River. The tectonic mobility has been adequately proved by other indices such as the asymmetry index and the stream length-gradient index. The mapping of the SLk values has also shown that the anomalies follow NW-SE trends, suggesting a very recent activity of the ridges previously produced by contractional tectonics. Similar results have been obtained by swath profile analysis, showing peaks in coincidence of the main outcropping thrust and of more external buried structures located in the foredeep. In conclusion, all the data and geomorphic parameters led to consider the frontal portion of the Lucanian Apennines as still tectonically active, even if its recent evolution has been not uniform in space and time.