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Kinematic patterns of tectonic displacements in the Blue Clay outcrops along the eastern border of the Bradanic Trough (Southern Italy) from DTM data processing

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The Bradanic Trough (Southern Italy) is the Pliocene-present-day south Apennines foredeep. It is filled by a thick Pliocene to Pleistocene sedimentary succession constituted by hemipelagites (Blue Clay Fm.) in the lower part, and coarse grained deposits (sands and conglomerates) in the upper part, shaped in marine or continental terraced environment.

On the eastern border of the Bradanic Trough along the Murgian Plateau (Apulia, Italy) numerous morphological lineaments are associated with sequential lowering and rotation of the surface, aligned with the carbonate substrate dip direction.

These morphologies have been interpreted so far as erosion products; their association with medium-deep water circulations and surface phenomena, like mud volcanoes, now allows their interpretation as a lumped mass, detached and tilted along shear surfaces.

The surface patterns of such surfaces may be easily detected for the presence, at some distance, of a quite similar twin track, which overlaps with good agreement.

The numerical analysis of the tracks extracted from accurate DTMs allows us to reconstruct the kinematic patterns of the tectonic displacement (distance of the detachment; rotation; angle of the shear plane). This type of analysis might reveal very useful in some fields of engineering geology, such as underground works, and for interpreting many hydrogeological phenomena within the study area. Finally, the correct 3D representation of the detached masses helps to identify the true causes of the direct faulting, which is not always linked to the tectonics, not active in the concerned regions.