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Large rockslides and slope deformations in active tectonic areas of Adriatic central Italy

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This work refers to an extended sector of Adriatic Central Italy. It is widely representative of a good part of the remaining peninsular territory, articulated in two fundamental systems: the mountainous system of the Umbria-Marche Apennine, made up prevalently of limestone structured in east verging folds and thrusts, and the second hilly-coastal system made up mainly of marly clays interspersed with sands and conglomerates structured in a monoclinal setting which ends in a narrow anticline along the Adriatic Coast. The structural setting is a consequence of the Pliocene compressive tectonics and its late effects, still active on the coast, and of an extensive tectonic phase which was activated starting in the early Pleistocene, to which a generalized and intense uplifting is associated. The genesis of high fault slopes and thrust fronts and the deep incision of the hydrographic network, to which high relief is connected, are associated to the latter.
Analyzed and interpreted are some mass movements which characterize the fundamental physiographic units that make up the systems, whose action (past and present) assumes a fundamental role in the evolution of the physical landscape of the area since it re-modeled a great part of the valley incisions. Huge rockslides and slope deformations characterize both the tectonic slopes and the transversal valleys of the chain. They affect, besides, the bedrock for a thickness of few decameters up to a hundred meters and more and are frequent also along the coastal cliffs. Large rockslides are less frequent in the hilly unit, but have a great importance there since they often affect villages which originated in the Medieval Ages.
Through the analysis of typical cases, the predisposing, activating and evolutive control factors are identified or hypothesized. These are mainly identified in the lithostratigraphic-structural, tectonic, and seismic factors; in the hydrogeological setting connected to the intrinsic conditions of permeability of the lithotype and to the Pleistocene-Holocene climate oscillations; in the morphological setting induced by the tectonics-climate interaction.
The geomorphological model, has been verified through a numeric code applied to the finite differences (FLAC 3D), aiming at setting the stress/strain correlation within the deformed and/or in motion masses and at establishing their evolution.