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The Colle Lapponi - Piano Ovetta landslide (Agnone, Molise, Italy), an example of rainfall-induced reactivation in weathered structurally complex materials

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Several mass movements were triggered or re-activated in Molise, the smallest region of southern Italy, as a consequence of the intense pluviometric event that occurred on January 23-27, 2003 in southern Italy: the event was characterized by a maximum rainfall height of about 200 mm over 72 hours, with less than 50 mm registered at Agnone. One of the largest re-activations was registered in the territory of Agnone, a town situated in the Isernia province. The landslide took place in the catchment of Vallone S. Antonio, a tributary to the Verrino torrent, and caused serious damage to rural buildings and the local road network. The main social consequence was the cautional evacuation of 15 families from their houses, located in the Colle Lapponi - Piano Ovetta areas. The landslide displayed geomorphological features which allowed to define it as a complex movement, being an initial roto-translational slide evolving in an earth flow. It underwent further secondary phases of re-activations in the time span 2003-2005, evidencing a discontinuous rate of movement strictly related to the rainfall and snow conditions. Due to the main reactivation on January 2003, and the later movements as well, the main body of the landslide travelled for more than 1500 m from its crown, and, being at the present only a few hundreds metres apart from the Verrino torrent, the possibility of formation of a landslide dam cannot be excluded. Based on first inclinometer data, the presence of multiple shear surfaces, located between 5 and 30 m from the ground surface, has been detected. The involved materials represent

the weathered portion of a structurally complex formation, the Agnone flysch, constituted by alternating beds of clays, marls and sandstones with intercalated limestones. Interpretation of multi-temporal air-photos and archival research have been used to identify the landslide history: accordingly, some additional information on the mass movement have been collected, the oldest of which dates back to March 1905. Following the geotechnical characterization of the materials involved in the landslide, a back analysis was performed to verify the parameters governing the equilibrium of the unstable mass and to analyze the evolution of the stress state up to rupture. Some final comments are dedicated to the preliminary remedial measures adopted to slow down the movement and to mitigate the landslide risk.