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Shallow landslides in weathered volcanic terrains in south-western Umbria, central Italy

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In the period from December 2004 to mid January 2005 prolonged rainfall caused several shallow landslides in south-western Umbria, central Italy. Landslides concentrated along a main escarpment that dominates the morphology of the area. The escarpment, more than 40 kilometers long and 20 to 100 meter high, is formed by a thick layer of volcanic deposits, chiefly ignimbrites and other pyroclastic rocks, that overly marine sedimentary rocks, mostly clay with minor beds and lenses of sand and silt. Failures of the hard volcanic cap are well known in the area, and have affected with rock falls, topple, and minor rock slide several towns, threatening people and producing considerable damage. Slope failures in the underlying clay deposits are also known. These failures are represented by shallow slides and flows, deep-seated slide-earth flows and complex movements, which exhibit a seasonal pattern of activity controlled by precipitation. Many of the slope failures that occurred in the period between December 2004 and January 2005 pertained to a different type of landslide. The new failures involved the weathered volcanic hard cap, and were represented by debris slides, debris flows, debris falls, and minor slumps, with areas ranging from a few square meters to 0.2 ha. Landslides detached from very steep, locally sub-vertical slopes, exhibited a considerable mobility and - based on eyewitness accounts - proceed at high speed. We mapped the rainfall induced landslides during a field campaign conducted in January 2005. The new landslides were recognized directly in the field and mapped at 1:10,000 scale, producing a detailed event landslide inventory map. A total of 50 landslides where identified along the volcanic escarpment. Landslides were most abundant near the villages of Sugano, Benano and Porano. In this work,

we report: (a) on the spatial distribution of the slope failures, (b) on the geometrical characteristic of the failures, (c) on some of the mechanical properties of the failed materials, and (d) on the meteorological conditions that triggered the landslides. In view of these new findings, we attempt a preliminary critical evaluation of the performance and reliability of a geomorphologically-based assessment of landslide risk, which we prepared for some of the affected villages in the years 2000-2001.