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Engineering geological units for the assessment of shallow landslide susceptibility in weathered clayey soils

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Shallow earth translational slides and earth flows, affecting colluvial soils derived by the weathering of the clayey bedrock, are a recurrent problem causing damage to buildings and roads in many areas of Apennines. The susceptibility assessment, e.g. slope stability models, requires the preliminary characterization of these superficial covers (lithology, geotechnical and hydraulic parameters). The aim of the work is to develop and test a methodology for the identification and mapping of weathered clayey soils responsible for shallow landslides. A test site in Northern Apennines (Province of Pavia) was selected. Calcareous marls with interbedded clays characterize the area. Shallow landslides occurred in October-November 2000 due to high intensity rainfalls. Trench pits were used for the soil profile description (lithology, structure, grade of weathering, thickness) and sampling. The main geological, topographic and geomorphologic parameters of shallow landslide were analysed. Field surveys were integrated with some geotechnical laboratory tests (index properties, suction and volumetric characteristic determination, methylene blue adsorption test, linear shrinkage, swelling pressure and percentage of volume change tests, shear tests). Engineering geological zoning was carried out by grouping the superficial soils on the basis of six attributes: structure of the bedrock, topographic conditions (slope angle and drainage), lithology, thickness, hydrogeological (active zone depth) and geotechnical characteristics. The resulted engineering geological units (areas that may be regarded as homogeneous from the geomorphologic and engineering geological point of view) were analysed in terms of shallow slope instability.