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Land-use changes as uncertainties in landslide hazard assessment. An application in Vrancea Seismic Region

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Vrancea Seismic Region, covering a surface of 8 000 km2 in the Romanian Curvature Carpathians, represents one of Europe's most intensely affected by slope and channel processes area. Due to its geographical framework (a diverse relief, of mountains, hills and depressions) and socio-political situation (several changes of property due to historical circumstances), it shows also an increased predisposition for land-use changes. The purpose of this paper is to highlight the uncertainties that land-use (considered an independent variable within a landslide susceptibility assessment) changes may trigger within the assessment of landslide hazard, potentially amplifying the uncertainties already induced by climate change. Besides historical maps and CORINE-derived land use distributions, statistical data were used to run two modeling applications (CLUE-S model and Idrisi Taiga Land Change Modeler, who predicts new land-use covers using Markov Chain or Multiple Layer Perception). Based on certain driving forces, like bio-physical drivers (elevation, slope, geology, soil, climatic conditions etc.) but also on socio-economic drivers (population density, distance to towns, distance to roads, people employed in different economical sectors, livestock density, land-property type, farms type, etc.) predicted land-use changes pattern is studied through statistical analysis (logistic regression) backed-up by continuous expert-opinion analysis. The results, represented by land-use simulated maps (2010-2050), once validated (using land-use maps derived from 2007 to 2011 Landsat images, according to CORINE methodology), will give important information on both the suitable methodology for such simulation and on the landslide hazard assessment, a vital stage in the elaboration of landslide risk management strategies.