Assessment of Uncertainty Propagation from DEM's on Small Scale Typologically-Differentiated Landslide Susceptibility in Romania

Ionut Cosmin Sandric (1,2), Zenaida Chitu (3), Marta Jurchescu (4), Jean-Philippe Malet (5), Mihai Ciprian Margarint (6), and Mihai Micu (4)

(1) University of Bucharest, Faculty of Geography, Romania, (2) Esri Romania, Bucharest, Romania, (3) National Institute of Hydrology and Water Management, Bucharest, Romania, (4) Institute of Geography, Romanian Academy, Bucharest, Romania, (5) nstitut de Physique du Globe de Strasbourg, CNRS UMR 7516, University of Strasbourg, France, (6) Faculty of Geography and Geology, Alexandru Ioan Cuza University, Iasi, Romania

An increasing number of free and open access global digital elevation models has become available in the past 15 years and these DEMs have been widely used for the assessment of landslide susceptibility at medium and small scales. Even though the global vertical and horizontal accuracies of each DEM are known, what it is still unknown is the uncertainty that propagates from the first and second derivatives of DEMs, like slope gradient, into the final landslide susceptibility map

For the present study we focused on the assessment of the uncertainty propagation from the following digital elevation models: SRTM 90m spatial resolution, ASTERDEM 30m spatial resolution, EUDEM 30m spatial resolution and the latest release SRTM 30m spatial resolution. From each DEM dataset the slope gradient was generated and used in the landslide susceptibility analysis. A restricted number of spatial predictors are used for landslide susceptibility assessment, represented by lithology, land-cover and slope, were the slope is the only predictor that changes with each DEM. The study makes use of the first national landslide inventory (Micu et al, 2014) obtained from compiling literature data, personal or institutional landslide inventories. The landslide inventory contains more than 27,900 cases classified in three main categories: slides flows and falls

The results present landslide susceptibility maps obtained from each DEM and from the combinations of DEM datasets. Maps with uncertainty propagation at country level and differentiated by topographic regions from Romania and by landslide typology (slides, flows and falls) are obtained for each DEM dataset and for the combinations of these. An objective evaluation of each DEM dataset and a final map of landslide susceptibility and the associated uncertainty are provided