Volume XL-1

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-1, 293-300, 2014
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XL-1/293/2014/
doi:10.5194/isprsarchives-XL-1-293-2014

Analyzing the Effects of Spatial Resolution for Small Landslide Susceptibility and Hazard Mapping

O. E. Mora[1], M. G. Lenzano[2], C. K. Toth[1], and D. A. Grejner-Brzezinska[1]

[1]Department of Civil, Environmental and Geodetic Engineering, The Ohio State University, Columbus, OH, USA

[2]International Center for Earth Sciences, National Council of Scientific and Technological Research (CONICET), Mendoza, Argentina

Keywords: LiDAR, landslide, feature, extraction, spatial, resolution, DEM

Abstract. Spatial resolution plays an important role in remote sensing technology as it defines the smallest scale at which surface features may be extracted, identified, and mapped. Remote sensing technology has become a vital component in recent developments for landslide susceptibility mapping. The spatial resolution is essential, especially when landslides are small and the dimensions of slope failures vary. If the spatial resolution is relevant to the surface features found in the landslide morphology, it will help improve the extraction, identification and mapping of landslide surface features. Although, the spatial resolution is a well-known issue, few studies have demonstrated the potential effects it may have on small landslide susceptibility mapping. For these reasons, an evaluation to assess the impact of spatial resolution was performed using data acquired along a transportation corridor in Zanesville, Ohio. Using a landslide susceptibility mapping algorithm, landslide surface features were extracted and identified on a cell-by-cell basis from Digital Elevation Models (DEM) generated at 50, 100, 200 and 400 cm spatial resolution. The performance of the landslide surface feature extraction algorithm was then evaluated using an inventory map and a confusion matrix to assess the effects of spatial resolution. In addition to assessing the performance of the algorithm, we statistically analyzed the surface features and their relevant patterns. The results from this evaluation reveal patterns caused by the varying spatial resolution. From this study we can conclude that the spatial resolution has an effect on the accuracy and surface features extracted for small landslide susceptibility mapping, as the performance is dependent on the scale of the landslide morphology.