



## **Landslide detection using object oriented approach and LiDAR-derived DEM.**

Kamila Pawłuszek (1), Sylwia Marczak (2), Andrzej Borkowski (2), and Paolo Tarolli (3)

(1) Institute of Geodesy and Geoinformatics, Wrocław University of Environmental and Life Sciences, Poland (kamila.pawluszek@upwr.edu.pl), (2) Institute of Geodesy and Geoinformatics, Wrocław University of Environmental and Life Sciences, Poland, (3) Department of Land, Environment, Agriculture and Forestry, University of Padova, Italy

Landslide identification is a fundamental step enabling to assess landslide susceptibility and to determine associated risk afterwards. Landslide mapping by conventional methods are time-consuming, therefore alternative techniques including automatic approaches and using remote sensing data are implemented more often. Airborne laser scanning by providing highly detailed digital elevation model (DEM) allows an effective landslide identification, especially in forested areas. In presented study, object based image analysis (OBIA) is implemented for landslide detection from DEM. The presented research was conducted in a study area located in the central part of the Outer Carpathians, in Poland. The investigated landslides consists in rock rotational, clay/silt rotational, planar and compound slides.

Different aspects influencing OBIA accuracy were analyzed: DEM resolution, segmentation scale, feature selection. Based on achieved results, we found that the classification accuracy remains almost stable for DEM resolution between 2 m and 5 m. Furthermore, it was found that optimal scale parameter is within the range of 20 and 40 unit. Moreover, for effective landslide identification, selection of appropriate segmentation scale and DEM resolution should be considered inseparably.

Finally, the results of landslide identification were compared with official landslide database to assess the quality of automatic approach. The achieved overall accuracy of 85% and kappa index equal to 0.60 justify the effectiveness of proposed approach based on OBIA.