Geophysical Research Abstracts
Vol. 17, EGU2015-774, 2015
EGU General Assembly 2015

Object-based landslide detection in different geographic regions

Barbara Friedl (1), Daniel Hölbling (1), Clemens Eisank (2), and Thomas Blaschke (1)

(1) Department of Geoinformatics - Z_GIS, University of Salzburg, Austria (barbara.friedl@sbg.ac.at), (2) GRID-IT - Gesellschaft für angewandte Geoinformatik mbH, Innsbruck, Austria

Landslides occur in almost all mountainous regions of the world and rank among the most severe natural hazards. In the last decade - according to the world disaster report 2014 published by the International Federation of Red Cross and Red Crescent Societies (IRFC) - more than 9.000 people were killed by mass movements, more than 3.2 million people were affected and the total amount of disaster estimated damage accounts to more than 1.700 million US dollars. The application of remote sensing data for mapping landslides can contribute to post-disaster reconstruction or hazard mitigation, either by providing rapid information about the spatial distribution and location of landslides in the aftermath of triggering events or by creating and updating landslide inventories. This is especially valid for remote and inaccessible areas, where information on landslides is often lacking. However, reliable methods are needed for extracting timely and relevant information about landslides from remote sensing data.

In recent years, novel methods such as object-based image analysis (OBIA) have been successfully employed for semi-automated landslide mapping. Several studies revealed that OBIA frequently outperforms pixel-based approaches, as a range of image object properties (spectral, spatial, morphometric, contextual) can be exploited during the analysis. However, object-based methods are often tailored to specific study areas, and thus, the transferability to regions with different geological settings, is often limited. The present case study evaluates the transferability and applicability of an OBIA approach for landslide detection in two distinct regions, i.e. the island of Taiwan and Austria. In Taiwan, sub-areas in the Baichi catchment in the North and in the Huaguoshan catchment in the southern-central part of the island are selected; in Austria, landslide-affected sites in the Upper Salzach catchment in the federal state of Salzburg are investigated. For both regions, SPOT-5 images are combined with digital elevation models (DEM) for developing a consistent semi-automated landslide detection approach using eCognition (Trimble) software. Suitable image objects are generated by means of multiresolution segmentation. Expert knowledge, i.e. reported facts on features (e.g. mean object slope, mean NDVI) and thresholds that are commonly chosen by professionals for digital landslide mapping, is considered during classification. The applicability of a range of features is tested and the most promising parameters, i.e. features that produce appropriate results for both regions, are selected for landslide detection. However, minor adaptations of particular thresholds are necessary due to the distinct environmental conditions of the test sites. In order to reduce the number of required adjustments to a minimum, relational features and spectral indices are primarily used for classification.

The obtained results are finally compared to manually digitized reference polygons and existing landslide inventories in order to quantify the applicability of the developed object-based landslide detection approach in different geographic regions.