Geophysical Research Abstracts
Vol. 14, EGU2012-8663, 2012
EGU General Assembly 2012

Combining TerraSAR-X and SPOT-5 data for object-based landslide detection

B. Friedl, D. Hölbling, and P. Füreder
Centre for Geoinformatics (Z_GIS), University of Salzburg, Austria (barbara.friedl@stud.sbg.ac.at)

Landslide detection and classification is an essential requirement in pre- and post-disaster hazard analysis. In earlier studies landslide detection often was achieved through time-consuming and cost-intensive field surveys and visual orthophoto interpretation. Recent studies show that Earth Observation (EO) data offer new opportunities for fast, reliable and accurate landslide detection and classification, which may conduce to an effective landslide monitoring and landslide hazard management. To ensure the fast recognition and classification of landslides at a regional scale, a (semi-)automated object-based landslide detection approach is established for a study site situated in the Huaguoshan catchment, Southern Taiwan. The study site exhibits a high vulnerability to landslides and debris flows, which are predominantly typhoon-induced.

Through the integration of optical satellite data (SPOT-5 with 2.5 m GSD), SAR (Synthetic Aperture Radar) data (TerraSAR-X Spotlight with 2.95 m GSD) and digital elevation information (DEM with 5 m GSD) including its derived products (e.g. slope, curvature, flow accumulation) landslides may be examined in a more efficient way as if relying on single data sources only. The combination of optical and SAR data in an object-based image analysis (OBIA) domain for landslide detection and classification has not been investigated so far, even if SAR imagery show valuable properties for landslide detection, which differ from optical data (e.g. high sensitivity to surface roughness and soil moisture). The main purpose of this study is to recognize and analyze existing landslides by applying object-based image analysis making use of eCognition software. OBIA provides a framework for examining features defined by spectral, spatial, textural, contextual as well as hierarchical properties. Objects are derived through image segmentation and serve as input for the classification process, which relies on transparent rulesets, representing knowledge. Through class modeling, an iterative process of segmentation and classification, objects can be addressed individually in a region-specific manner. The presented approach is marked by the comprehensive use of available data sets from various sources. This full integration of optical, SAR and DEM data conduces to the development of a robust method, which makes use of the most appropriate characteristics (e.g. spectral, textural, contextual) of each data set.

The proposed method contributes to a more rapid and accurate landslide mapping in order to assist disaster and crisis management. Especially SAR data proves to be useful in the aftermath of an event, as radar sensors are mostly independent of illumination and weather conditions and therefore data is more likely to be available. The full data integration allows coming up with a robust approach for the detection and classification of landslides. However, more research is needed to make the best of the integration of SAR data in an object-based environment and for making the approach easier adaptable to different study sites and data.