# Testing the combined use of LIDAR and High-Resolution Multispectral data for automatic detection of landslides in the Marecchia valley,

Geophysical Research Abstracts
Vol. 14, EGU2012-7375, 2012
EGU General Assembly 2012


# Testing the combined use of LIDAR and High-Resolution Multispectral data for Automatic detection of Landslides in the Marecchia valley, Italy.

D. Lagomarsino, L. Tanteri, G. Forzieri, A. Battistini, and F. Catani
University of Firenze, Department of Earth Sciences, Italy (daniela.lagomarsino@unifi.it)

The purpose of this work is to test a method to automatically detect landslides using change detection techniques on airborne sensor data.
High spatial resolution multispectral and digital surface model data acquired in two different times are used to identify landslides on a 80 km transect of the Marecchia valley, Italy.
Multispectral ADS40 and Light Detection and Ranging (LiDAR) data, acquired in October 2009 and November 2010, were used in this study. High spatial resolution color-infrared digital aerial image data from ADS40 sensor has 4 spectral bands: Red, Green, Blue and NIR. The imagery data has a 12-bit radiometric depth, with 0.2 meter pixel size. Airborne laser scanning data collected by LiDAR sensors were provided in Digital Terrain Model (DTM) and Digital Surface Model (DSM) form with 1-meter spatial resolution and 0.2 meters vertical accuracy.
An expert system for change detection and classification of landscapes has been developed; a pixel-oriented approach based on multi-temporal tree classification algorithm was implemented. The tool is driven by a priori knowledge related to the expected temporal variations of remote sensing multispectral and digital surface model data.
Detection of land use/cover changes focuses on temporal variations of remote sensing data by discriminating: devegetation, rivegetation, urbanization, demolition, landslide and river bed transitions. In order to better identify the landslide class, further analyses on morphological factors was performed. For this purpose several geo-morphological factors, for which a change can be related to landslide occurrence, were analyzed.
A database of the landslides occurred between the two acquisition was built and then statistical analyses were performed to correlate the presence of a landslide with the variations of selected morphological features between the two acquisitions.
In order to establish wether or not a parameter variation is an exclusive characteristic of a landslide some statistic tests, such as t-test and frequency ratio analysis, were performed on parameter data derived from airborne sensors. Considering the results of such analysis, a landslide classification scheme was developed taking into account increasing degrees of membership probability.
Subsequently, post-processing refinements have been used to reduce misclassification errors and mapping inconsistencies, which conducted to a lower number of membership classes and a decrease in uncertainty accounting for the range in probability values of neighboring pixels.