2nd International
Earth Science & Global Geology Conference

December 3-4, 2018   Dubai, UAE

Rapid Segmentation of Change Detection Maps Derived from Satellite Backscatter Imagery to Extract Landslides Information

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Segmentation represents a common process for the extraction of land cover information from satellite imagery. This is a valid support to realize thematic maps and detecting land cover variations when applied to change detection products.

By means of multispectral or radar sensors mounted on satellite platforms, it is possible to get information referred to wide territories. However, depending on the extension and resolution of the analyzed data, processing can be resource demanding and time consuming. When a proper calibration of the parameters required by the used algorithms is needed, the processing time may also increase, becoming not acceptable with respect to the research aims.

In this study we describe a rapid procedure for reducing the time required for the segmentation of large raster layers. In particular, we focus on the analysis of maps representing land cover changes derived from satellite backscatter imagery. We implemented the procedure in a set of Bash scripts running on a GNU/Linux operating system and exploiting the GRASS GIS Open Source modules. First of all, the backscatter changes are calculated by comparing radar signals of multi-temporal Sentinel-1 satellite images, and are converted into a common GIS raster layer. Afterward, the layer is segmented using a Mean Shift algorithm. The computational time required for the segmentation of the raster layer is reduced by splitting it into a series of smaller subsets (tiles), which are segmented in parallel and then reunified. The segmentation process is automatically repeated for different sets of values of the Mean Shift controlling parameters. The values that maximize, at the same time, the number of segments and their average size are thus selected as the best ones.

The described procedure was successfully applied for the detection of landslides triggered by massive earthquakes that struck the central Papua New Guinea in February and March 2018.

Biography:

Giuseppe Esposito works as Research Associate at the Research Institute for Geo-Hydrological Protection of the National Research Council (CNR-IRPI), Italy. He earned a PhD in Gemorphology at the University of Pisa (Italy) in 2018, and his current activity focuses on the combined use of Remote Sensing and GIS techniques for the detection and monitoring of slope instability processes. During his scientific career, Giuseppe had also experiences in Coastal Geomorphology, Paleoseismology, Geotechnics, and Disaster Management. He published most of his researches in international peer-reviewed journals and conferences.

Int J Earth Sci Geol. 2018
IJEG an open access journal

Earth Science-2018
December 3-4, 2018

Conference Proceedings

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