Geophysical Research Abstracts
Vol. 20, EGU2018-19546, 2018
EGU General Assembly 2018

Automatic mapping of event landslides at basin scale using a Montecarlo approach and synthetic land cover fingerprints

Alessandro Mondini (1), Kang-Tsung Chang (2), Shou-Hao Chiang (3), Romy Schlögel (4), Claudia Notarnicola (5), and Hitoshi Saito (6)

(1) Istituto di Ricerca per la Protezione Idrogeologica, Consiglio Nazionale delle Ricerche, Perugia, Italy (alessandro.mondini@irpi.cnr.it), (2) Department of Geography, National Taiwan University, Taiwan, (3) Centre for Space and Remote Sensing Research, National Central University, Taiwan, (4) ESA Climate Office - ECSAT, Oxfordshire, United Kingdom., (5) EURAC Research, Institute for Applied Remote Sensing, Bolzano, Italy, (6) College of Economics, Kanto Gakuin University, Yokohama, Japan

Landslides occur when slopes are disturbed by earthquakes, storms, human activities, or a combination of these factors. Landslides, which are frequent and widespread in the world, can cause fatalities and social environmental damages.
Mapping landslides is a difficult task. Conventional methods rely on the visual interpretation of stereoscopic aerial photographs or satellite images, aided by field surveys. They are time consuming and resource intensive. Quantitative image analysis of remotely sensed data has facilitated the task in recent years.
We propose a framework to systematically generate event landslide inventory maps from satellite images. The spectral information captured by optical satellite images is used to assess a pixel land cover class membership probability through a Maximum Likelihood classifier trained with randomly generated synthetic land cover spectral fingerprints, which are obtained from an independent training images dataset. Pixels are classified as landslides when the calculated landslide class membership probability, weighted by a susceptibility model, is higher than membership probabilities of other classes.
We applied the proposed approach to mapping landslides triggered by typhoons in southern Taiwan. We prepared training samples from two satellite images post-Typhoon Morakot, and we classified landslides on two other images, one pre-Morakot and the other post-Morakot. We compared our final maps with inventories prepared through manual Interpretation. The agreement between the two sets of inventories is given by the Cohen's k coefficients of 0.62 and 0.64, respectively.
This procedure promises to facilitate the automatic production of landslide inventory maps in areas where landslides are frequent and abundant.