Geophysical Research Abstracts
Vol. 20, EGU2018-3404, 2018
EGU General Assembly 2018

Probabilistic critical rainfall thresholds for landslide occurrence using the WRF model in China

Qiang Dai (1), Dawei Han (1), Ningsheng Chen (2), and Anna Jacomo (1)

(1) University of Bristol, Department of Civil Engineering, Bristol, United Kingdom (qd_gis@163.com), (2) Chinese Academy of Sciences, Key Laboratory of Mountain Hazards and Surface Processes, Institute of Mountain Hazards and Environment, Chengdu, China

The critical rainfall threshold is widely used for landslide occurrence analysis as the actual slope failure mechanism is complex and various dynamics involved. However, there are two major shortcomings of the current empirical and physical (process-based) critical rainfall thresholds models. Firstly, most models only provide deterministic thresholds with a single possible output (landslide or no-landslide) for a given input (rainfall condition). Moreover, the rainfall input is generally provided from rain gauges (for small spatial scale) or satellite (for large spatial scale), which lack the ability to predict rainfall in the future. The threshold estimated based on these types of rainfall measurements can only be used to reproduce historical landslides or to assess current landslide risk. The Weather Research and Forecasting (WRF) Model can simulate the atmosphere at high spatial resolution and predict the rainfall with a short lead time. For this reason, this study aims to model the relationship between WRF-based rainfall and landslide occurrence using a Bayesian approach. The intensity-duration relationship of rainfall will be established using long-term WRF simulations. The landslide information will be collected using time-variable earth surface displacements from high-resolution synthetic aperture radars. The method used is based on the implementation of the Differential SAR Interferometry (DInSAR) algorithm by exploiting the available huge ERS and ENVISAT SAR data archives. The goal of this study is to establish a relationship between landslide occurrence and rainfall and consequently to improve the predictability of rainfall-triggered landslides. This is part of the RESIST Project funded by NERC of UK and NSFC of China.