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Earthquakes Hazard Assessments Relying on Statistical Approaches

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Introduction

Every year, earthquakes of a large size occur, although the majority strike isolated, unpopulated areas and go unnoticed. Large earthquakes rarely strike populated regions, but when they do, the results are always catastrophic in terms of the loss of lives and property. As more people move into high-risk locations as a result of population growth, they are exposed to more potentially disastrous geologic occurrences, increasing the human and financial consequences of natural hazards.

Description

Large-magnitude earthquakes are complicated phenomena that are known to leave a lasting legacy of post-seismic geologic hazards (such as landsliding, landslide dam collapse, debris flows, and river aggradation) and significantly impact the natural environment. This is especially true in mountainous areas where slopes remain unstable for extended periods of time following the primary seismic triggering event and are more likely to produce secondary hazards. The 2008 Mw-7.9 Wenchuan, China event and the Taiwan event both demonstrate the significant effects that heightened post-seismic landslides and debris flows continue to have on both the physical environment and human lives and livelihoods for many years. Therefore, in mountainous areas affected by large-magnitude earthquakes, post-earthquake investigations and monitoring of induced landslides and possibly unstable slopes are crucial parts of hazard-mitigation management. Research findings were presented at the international symposium honouring the fifth anniversary of the 2008 Wenchuan earthquake, which was held in Chengdu, China in May 2013.

The gathering of a multidisciplinary group of international experts from Asia, Australia, Europe, and North America, including engineering geologists, geomorphologists, geotechnical engineers, and seismologists, allowed for the development of fresh ideas and new research on issues that are crucial to science and society, such as recurrent and protracted slope hazards in regions affected by large earthquakes. somewhat unique because, apart from the earthquake, well-documented examples of slope hazards from large-magnitude earthquakes are very few, which resulted in the world's most extensively investigated database on seismically induced landslides). Within this general theme, several topical issues and current study needs in the field of seismic slope hazard are addressed, including continuing research similar to that recently highlighted in research paper. Reports have some significant advances on the following:

i) Enhanced post-seismic debris-flow hazard analysis (temporally variable rainfall thresholds, initiation processes and run-out mechanisms, sediment delivery volume estimates);

ii) Characterization, mapping, and hazard quantification of co-seismic and post-seismic landslides;

iii) Mechanisms of very large, disastrous co-seismic landslides and formation of landslide dams; and iv) site effects

v) Statistical approaches to modelling co-seismic landslide susceptibility and hazard.

The coseismic and post-seismic landsliding brought on earthquake are the main topics of the papers chosen for this Issue. A particularly useful summary of the co- and post-seismic generation and transport of loose material in the Mianyuan River basin, one of the most severely affected regions during the 2008 event, may be found in the work by Huang and Li. The authors provide evidence of protracted post-earthquake mass migration, particularly in the form of recurring debris flows brought on by torrential downpours. Three additional papers also focus on enhanced debris-flow generation in the area struck by the Wenchuan event. The predominance of this topic in the Special Issue likely reflects the disastrous consequences of debris flows that have occurred in the five-year period after the earthquake and the persistence of this type of hazard. It presents the results of flume tests conducted to study the post-seismic initiation mechanism of huge debris flows. They show that the slope inclination has the major control on the scale of the debris flows, while the influence of discharge on erosion and on the size of the flows appears less clear. Researchers investigate the temporal evolution of By analysing the damaging debris flows that regularly occurred in the five years after the Wenchuan earthquake in a region close to the epicentre, we investigate the physical interactions in debris-flow mixes. They draw significant conclusions concerning the run-out properties and potential mobility of these flows. The study focuses on how the seismic deformation of slopes affects the rainfall triggering thresholds of debris flows.

The results, based on the post-seismic debris-flow generation in the Chi-Chi and Wenchuan earthquake areas, show that large earthquakes not reduced rainfall triggering thresholds not only increase debris-flow activity but also have an impact on its length. Significantly, it was discovered that longer peak ground acceleration was associated with longer post-seismic debris-flow activity duration. The two studies that follow in the special issue are about extremely dangerous landslides brought on by strong earthquakes. Study the Donghekuo landslide as an illustration of the catastrophic slope failures brought on by the Wenchuan earthquake in the first of these. The outcomes of field and laboratory research provided light on the reasons underlying the failure material's reported high mobility and protracted run out. One of the reasons why predicting slope behavior during future strong earthquakes and conducting regional-scale analyses of hazards from large catastrophic landslides remain difficult is the complexity of the amplification phenomena related to a combination of topographic and soil/bedrock stratigraphic effects. ologic studies of seismic landslides in China have already produced a large number of insightful articles. We believe that the articles in this Special Issue will contribute to spreading knowledge on co-seismic and post-seismic slope dangers among the larger scientific community and the decision-makers in charge of disaster preparedness and geologic hazard mitigation [1-6].

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Conflict of Interest

The Author declares there is no conflict of interest associated with this manuscript.

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