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Preface to the Special Issue on Earthquake-Induced Landslides

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Earthquake-induced landslides are the most destructive secondary geological hazards following large earthquakes that can destroy infrastructures and cause loss of lives and properties (Marano K. D. et al., 2010; Xu Chong et al., 2018). In the past few decades, earthquake-induced landslides have captured growing interests of both scientific communities and the public; more and more studies have been carried out (Xu Chong et al., 2010; Xu Chong, 2018; Fan Xuanmei et al., 2019). To demonstrate the state-of-the-art on related research, we presented a special issue on earthquake-induced landslides. This special issue includes six columns, including inventory and spatial distribution, hazard assessment, numerical calculation and simulation, shaking table test, early warning, and evolution of earthquake-induced landslides, as well as a few studies about nonseismic landslides.

Inventory mapping is the basis of related study, and spatial distribution is a common result derived. Xu Jixiang et al. (2020) delineated 936 landslides in the seismic intensity VIII and XI zones, with a total landslide area of 58.6 km^2 based on Google Earth, and further analyze the correlations between of the landslides and associate impact factors. This inventory is the most detailed and comprehensive result about the landslide induced by the 1927 Gulang earthquake. Du Peng et al. (2020) recognized and mapped 52 194 coseismic landslides related to the 2008 Wenchuan earthquake, with a total area of 1 021 km^2. Based on the inventory map, they correlated the landslides with several parameters including landslide area, length, and width, elevation of the scarp top and foot edge, and the top and bottom elevations of each located slope. Gao Yuxin et al. (2020) mapped 2 427 landslides in Baoshan City, Yunnan Province, China, including 2 144 new landslides and 283 old landslides with a total area of about 104.8 km^2. The relationship between the two types of landslides and eight impact factors, including elevation, slope angle, slope aspect, slope position, lithology, fault, regional peak ground acceleration, and average annual rainfall,

were analyzed.

The aim of regional landslide hazard assessment is to classify the regional hazard of landslides under certain conditions, which can provide support for reduction of landslide risks. Wen Boyu et al. (2020) carried out hazard assessment of co-seismic landslides based on information value method, 9 293 co-seismic landslides and seven influencing factors related to the 2018 M_W6.6 Hokkaido Earthquake, Japan. Result shows that both the success rate and prediction rate are about 78.5%.

Numerical calculation and simulation can be used to reveal the mechanisms, calculate the stability of slopes, and repeat the instability, movement, and accumulation process of individual landslides, which has been widely used in individual landslides in recent years. Cao Yanbo et al. (2020) simulated the deformation, failure and movement process of a catastrophic two-branch Tangjiagou rock avalanche triggered by the April 20, 2013 Lushan earthquake in Sichuan Province, China. The result shows that the movement of the rock avalanche includes several stages, such as begins and forms two branches, high-speed sliding, transforms into debris flows, moving and collision, accumulation, and finally merging and reaches a steady state. Zhu Yao et al. (2020) established a two dimensional slope model which includes 0.2 million elements to simulate the development of high speed and long-runout landslides using the discrete element software MatDEM, which is an independently secondary developed open source software based on the Matlab language. The result shows that the logarithms of the total calorific value and the highest value in the heat zone during the sliding process are linearly related to the logarithm of the landslide height, which reveals the frictional heating effect of high-speed and long-runout landslides. Zhao Binbin and Jiang Yuanjun (2020a) carried out a series of dry granular impact experiments on one rigid barrier model in order to support the potential design requirement of structure used to resist the impact force on retaining structure caused by granular flow comprised of dry particles originated from shallow landslides.

In order to reveal the dynamic response and instability failure process of the loess slope, Pu Xiaowu et al. (Pu Xiaowu et al., 2020) designed and constructed a large-scale shaking table model test. The result shows that different parts of the slope have different vibration characteristics and the first natural frequency in the model increases with the increase of the slope height. The response acceleration of different parts may change due to the coupling relationship between the spectral characteristics of input wave and the natural frequencies of different parts of slope, suggesting the characteristics of regional differential dynamic response.

Landslide early warning is an important method for landslide disaster prevention and mitigation. Zhao Binbin et al. (2020b) proposed a comprehensive landslide warning level method that provides four early warning levels to reflect the safety factor reductions during and post rainfalls. This study is a new method for performing multi-index and multi-level landslide early warnings.

Landslide evolution has received much attention in recent decades, especial after the 2008 Wenchuan earthquake. He Jing et al. (2020) conducted an interesting study on this issue from the viewpoint of vegetation restoration monitoring. They extract the vegetation coverage information in the study area from the satellite images collected in 2005, 2011 and 2013, respectively. The vegetation recovery rate of the study area is calculated and result shows that the speed of vegetation restoration is slow before 2011 while increases

significantly from 2011 to 2013, which would lead to the probability of geological disasters in the area significantly reduced.

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