Study on an early-warning model of landslides in Xinjiang, China

Shouding Li (1,2,3), Linan Liu (1,2,3), Yaheng Bai (4), Xiao Li (1,2,3), Jianming He (1,2,3), Yue Jiang (5), Zhanhe Wang (5), and Wenhui Wei (5)

(1) Chinese Academy of Sciences, Institute of Geology and Geophysics, Beijing, China (lsdlyh@mail.iggcas.ac.cn), (2) Institutions of Earth Science, Chinese Academy of Sciences, Beijing 100029, China, (3) University of Chinese Academy of Sciences, Beijing 100046, China, (4) Henan Provincial Communications Planning & Design Institute Co., Ltd., Zhengzhou 450052, China, (5) Xinjiang Institute of Geological Environment Monitoring, Urumchi 830002, China

An early-warning model of landslides refers to the study of space-time relationships between meteorological conditions and risks of geological hazards, which is the core of early-warning. In this paper, an early warning model has been developed to predict rainfall-induced landslides over Xinjiang area, China. The prototyped early warning system integrated three major components: (1) In Kunlun-Alkin area, we develop a two-parameter criterion early warning model, namely temperature and rainfall. Because that vertical zoning of geological disasters in this area is strong, and the main inducing factors of geological disasters are glacial meltwater and rainfall. (2) Ili valley area is a high-prone area for geological disasters, especially the occurrences of loess landslides. The average annual rainfall of the Ili Valley area is relatively large, while the medium and structure of the loess landslide are relatively uniform. The main inducing factors of landslides are rainfall, followed by the spring ice and snow melt. Hence, the early warning unit of this area is the loess slope unit, based on which a slope stability dynamic warning model was established. (3) In the rest region of Xinjiang area, a statistical model with selected optimum indexes is completed based on geographic information system (GIS). In the model the weights of factors are determined according to experts’ experience and the values of geological environment indexes are calculated. Finally, developed models are consistently verified by historical geological hazards.