



## **Implementation of the Geological Hazard Monitoring and Early Warning System Based on Multi - source Data –A Case Study of Deqin Tibetan County, Yunnan Province**

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The new technologies, such as 3D laser scanning, InSAR, GNSS, unmanned aerial vehicle and Internet of things, will provide much more data resources for the surveying and monitoring, as well as the development of Early Warning System (EWS). This paper provides the solutions of the design and implementation of a geological disaster monitoring and early warning system (GDMEWS), which includes landslides and debris flows hazard, based on the multi-sources of the data by use of technologies above mentioned. The complex and changeable characteristics of the GDMEWS are described. The architecture of the system, composition of the multi-source database, development mode and service logic, the methods and key technologies of system development are also analyzed. To elaborate the process of the implementation of the GDMEWS, Deqin Tibetan County is selected as a case study area, which has the unique terrain and diverse types of typical landslides and debris flows. Firstly, the system functional requirements, monitoring and forecasting models of the system are discussed. Secondly, the logic relationships of the whole process of disaster including pre-disaster, disaster rescue and post-disaster reconstruction are studied, and the support tool for disaster prevention, disaster reduction and geological disaster management are developed. Thirdly, the methods of the multi - source monitoring data integration and the generation of the mechanism model of Geological hazards and simulation are expressed. Finally, the construction of the GDMEWS is issued, which will be applied to management, monitoring and forecasting of whole disaster process in real-time and dynamically in Deqin Tibetan County.

Keywords: multi-source spatial data; geological disaster; monitoring and warning system; Deqin Tibetan County