Invited speaker Topic 1

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Geomorphology
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Debris flow
Seismic landslide
Application of remote sensing and GIS
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Abstract

Recent catastrophic debris flows and risk assessment in China

Debris flows in mountainous areas are one of the most dangerous geomorphological events, primarily because of the substantial volumes of material that can be deposited on urbanized alluvial fans. As a consequence of climate change and increase in exposure in many parts of China, the risk associated with debris flows is growing. In recent years, many serious incidents related to debris flows have been reported in China. In areas with high demographic density, protection works often cannot be built because of economic or environmental constraints, and is not always possible to evacuate people because of societal reasons. Debris flow risk assessment (DFRA) is progressively becoming a requirement for the administrations in charge of debris flow risk management.

This paper focuses on the hazard and risk assessment methods developed recently for characterizing the danger caused by the giant debris flows in China. The proposed methodology is composed of four main parts including data collection, hazard assessment consequence analysis and risk assessment. In this study, the methodology on debris flow risk assessment for regional, local, and site-specific scales in practice are explained by the example of the case study of the region of Wenchuan, southwestern China.

The paper proposes a methodology for debris flow risk assessment for regional-scale analysis. The developed debris flow risk assessment methodology is tested in Wenchuan area, in China. Geographic information systems and remote sensing techniques are used to create debris flow factor maps, to obtain hazard maps, elements at risk, and risk maps.

This paper also presents a quantitative risk assessment using run-out models in a specific study sites. In the study, debris flow dynamic characteristics and mitigation plans were considered. Moreover, expected loss values of representative buildings and roads under different debris flow conditions were assessed accurately by combining numerical simulation, elements at risk database and corresponding vulnerability functions.

Keywords: debris flows, major events, run-out modeling, vulnerability curve, risk assessment