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四川大地震により発生した大規模地すべりと天然ダムについて

On the catastrophic landslides and landslide dams triggered by the 2008 Wenchuan (M8.0) earthquake

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On May 12, 2008, an 8.0M earthquake struck Sichuan province of China, causing a huge number of death and injuries, and great loss of properties, becoming the most damaging earthquake since the 1976 Tangshan earthquake, in China. The collapse of buildings during the earthquake is the main reason for the casualties. There were a huge number of landslides triggered by this earthquake. Almost all the roads to the mountainous areas had been blocked and many dams were formed by the displaced landslide materials, resulting in great difficulties for the aftershock rescue activities and further damage. Also a big portion of the casualties was directly caused by the landslides. We performed field investigation of the landslides on the wide area along the quake faults and conducted detailed studies on some catastrophic landslides and landslide dams. In this report, three landslides, Xiejiadian landslide in Pengzhou city, Donghekou landslide in Qingchuan County, Xiaojiaqiao landslide in An County, and Tangjiashan landslide in Beichuan County, are introduced. The characteristics of deposited landslide masses in Xiaojiaqiao, Tangjiashan, and Donghekou landslides were investigated by means of a multichannel surface wave technique. Two earthquake recorders were installed at the upper part and deposit area of Donghekou landslide. The seismic responses of different parts of the landslides were monitored. The main conclusions are summarized as: (1)The strong seismic excitation and precipitous mountains as well as the fragmented rocks enabled the occurrence of vast of landslides with high mobility; (2) The rich groundwater in some gentle slopes might have favored the generation of high pore-water pressure during the earthquake and then resulted in the rapid movement and long runout of the displaced landslide mass; (3) Many landslide dams had been formed, causing great threaten to the downstream residents. However, due to the different geological background and movement of each landslide, the debris forming the dam is nonuniform and poses differing properties. These differences should be taken into account in the stability analysis of landslide dam; (4) The response of different slope parts to an earthquake may be greatly different. Better understanding the responses will be helpful for the slope stability analysis with high reliability. (5) Weathered dolomite showed strong resistance to cyclic shearing, while the sample from Donghekou and Xiejiadian landslide areas suffered remarked reduction in shear strength when subject to undrained cyclic shearing. These characteristics may be the reason why flow-type long traveled landslides were less triggered on the soil layers originated from dolomite rocks.

キーワード:四川大地震,斜面災害,天然ダム,地震動,せん断強度

Keywords: Wenchuan earthquake, landslide, landslide dam, seismic movement, shear resistance