



The Pattern, Geological Parameters and Distribution of Mass Movements triggered by Kashmir Earthquake 2005 in Northern Pakistan

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The Kashmir earthquake 2005 of magnitude 7.6 in Northern Pakistan triggered thousands of mass movements. These mass movements are primarily rock fall, debris fall and rock slide. The size of mass movements varies from few cubic meters to > 85 million cubic meters rock avalanches. The relationship between the active Muzaffarabad fault and mass movements shows that the concentration of mass movement is higher in hanging wall block than the footwall block. The mostly the mass movements are shallow. However the few mass movements are deep in nature. The general mass movement direction is related to southwest Himalayan thrust direction in the northeast Himalayas of Pakistan. The patterns of mass movements are concentrated close to epicenter, Main Boundary Thrust (MBT) and along the hanging wall block of the reactivated Muzaffarabad fault. The mass movements are concentrated within 14 Km wide zone of 40 Km long Muzaffarabad fault from Muzaffarabad to Chikar fault segment and 10 Km wide zone of MBT close to the epicentre. It was observed that mass movement failure generally followed 20°-60° slope. The distribution of mass movements are greater in Murree Formation as compared to other formations such as Precambrian Hazara Formation, Muzaffarabad Formation, Paleocene, Eocene rock units, Panjal Formation, Tanwal Formation and granite gneisses exposed in the earthquake affected areas. The mass movements' distribution and field investigation show that these are the result of ground shaking, structural failure, hanging wall collapse, slope failure and lithological control. These parameters played the vital role during the triggering of these mass movements.