Part III

Seismically Induced Landslides and Seismic Landslide Hazard Analysis

Introduction by Ed Harp[1], Hideaki Marui[2], and Luca Guerrieri[3]

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With 46 presentations, both oral and poster, session L25 included a broad spectrum of studies ranging from finite-element and other displacement modeling to case studies of earthquake-triggered landslides. Presentations included the latest developments in seismic landslide hazard and risk analysis and mapping as well as novel theories of the mechanisms of landslide triggering. In addition to the variety of topical papers with a focus on seismically triggered landslides, an equally wide range of settings were featured from pre Himalaya slopes in Pakistan to the Denali Range in Alaska. Similarly, a large range of triggering events were covered, from small to moderate earthquakes in Greece and Spain to large magnitude events in Japan and China.

New seismic monitoring techniques have resulted in the discovery of directional amplification of ambient seismicity suggesting that triggering ground motions may have been directionally enhanced in the direction of landslide movement in past earthquakes. Studies using both finite-element and Newmark (both single and multi-block) methods of modeling landslide displacement have allowed comparisons and evaluations of the relative merits of these methods. The use of GIS (Geographic Information Systems) tools in modeling seismic landslide susceptibility, hazard, and risk was featured in numerous presentations of the session. Also, GIS analyses were employed to visualize the relationship between the earthquake-triggered landslide distribution and fault-slip modeling based on teleseismic records and coseismic GPS (Global Positioning Satellite) displacements. These and many other new methods of monitoring, recording, and displaying landslide data have made it clear that we are now able to analyze and interpret seismically triggered landslides in new ways and understand their occurrence in the context of a greater quantity and variety of data than ever before. An important message arising from the presentations in this session is that the completeness and precision of landslide inventories is paramount in allowing scientists to analyze the landslides and other spatial parameters in order to reach greater understanding of landslide processes and the hazard and risk created by them.