Geophysical Research Abstracts
Vol. 16, EGU2014-3133, 2014
EGU General Assembly 2014

Development of Tools for the Rapid Assessment of Landslide Potential in Areas Exposed to Intense Storms, Earthquakes, and Other Triggering Mechanisms

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Landslides frequently occur in connection with other types of hazardous phenomena such as earthquake or volcanic activity and intense rainstorms. Strong shaking, for example, often triggers extensive landslides in mountainous areas, which can then complicate response and compound socio-economic impacts over shaking losses alone. The U.S. Geological Survey (USGS) is exploring different ways to add secondary hazards to its Prompt Assessment of Global Earthquakes for Response (PAGER) system, which has been developed to deliver rapid earthquake impact and loss assessments following significant global earthquakes. The PAGER team found that about 22 percent of earthquakes with fatalities have deaths due to secondary causes, and the percentage of economic losses they incur has not been widely studied, but is probably significant. The current approach for rapid assessment and reporting of the potential and distribution of secondary earthquake-induced landslides involves empirical models that consider ground acceleration, slope, and rock-strength. A complementary situational awareness tool being developed is a region-specific landslide database for the U.S. The latter will be able to define, in a narrative form, the landslide types (debris flows, rock avalanches, shallow versus deep) that generally occur in each area, along with the type of soils, geology and meteorological effects that could have a bearing on soil saturation, and thus susceptibility. When a seismic event occurs in the U.S. and the PAGER system generates web-based earthquake information, these landslide narratives will simultaneously be made available, which will help in the assessment of the nature of landslides in that particular region. This landslide profile database could also be applied to landslide events that are not triggered by earthquake shaking, in conjunction with National Weather Service Alerts and other landslide/debris-flow alerting systems. Currently, prototypes are being developed for both the slope-based and the narrative assessment of landslide susceptibility and hazard.