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Landslide database dominated by rainfall triggered events

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A digital landslide database has been created for Nicaragua to provide the scientific community and national authorities with a tool for landslide hazard assessment. Valuable information on landslide events has been obtained from a great variety of sources.
On the basis of the data stored in the database, preliminary analyses performed at national scale aimed to characterize landslides in terms of spatial and temporal distribution, types of slope movements, triggering mechanisms, number of casualties and damage to infrastructure. A total of about 17000 events spatially distributed in mountainous and volcanic terrains have been collected in the database. The events are temporally distributed between 1826 and 2003, but a large number of the records (62% of the total number) occurred during the disastrous Hurricane Mitch in October 1998. The results showed that debris flows are the most common types of landslides recorded in the database (66% of the total amount), but other types, including rockfalls and slides, have also been identified. Rainfall, also associated with tropical cyclones, is the most frequent triggering mechanism of landslides in Nicaragua, but also seismic and volcanic activities are important triggers or, especially, the combination of one of them with rainfall. Rainfall has caused all types of failures, but debris flows and translational shallow slides are more frequent types. Earthquakes have most frequently triggered rockfalls and slides, while volcanic eruptions rockfalls and debris flows. Landslides triggered by rainfall were limited in time to the wet season that lasts from May to October and an increase in the number of events is observed during the months of September and October, which is in accord with the period of the rainy season in the Pacific and Northern and Central regions and when the country has the highest probability of being impacted by hurricanes. Both Atlantic and Pacific tropical cyclones have triggered landslides. At the medium scale, the influence of topographic and lithologic parameters on the occurrence of landslides was also analyzed and the physical characterization of landslides was done to better understand the landslide dynamics and run-out distances in both volcanic and non-volcanic areas. Data from fairly well documented events in Nicaragua were compared with other similar events in Central America and elsewhere and treated statistically to search for possible correlations and empirical relationships to predict run-out distances for different types of landslides, knowing the height of fall or the volume. The empirical relationships showed that debris flows and debris avalanches at volcanoes have the highest mobility and reach longer distances compared to other types of landslides. Because of their characteristics and downstream behaviour (long run-out distances and large volumes) both types of landslides have produced the highest number of victims in the country being the most dangerous to life and property.