EARTHQUAKE-INDUCED LANDSLIDES IN THE JAMAICAN NEOGENE PLATE BOUNDARY ZONE

Ahmad, R.
Department of Geology, University of the West Indies, Mona, Kingston 7, Jamaica

ABSTRACT

The evolution of landforms in the seismically active, Neogene plate boundary zones in the tropics is strongly influenced by landslide processes. The triggering mechanisms for landslides are (i) high annual precipitation punctuated with high-magnitude rainfall associated with tropical storms which may reach hurricane force; (ii) earthquakes; and (iii) a combination of (i) and (ii). However, due to lack of historical records it is not always possible to relate landslides to earthquakes, especially if they occur in unpopulated areas or offshore environments. The information on earthquake-induced landslides is vital for seismic hazard zonation as in Jamaica, where human settlements are located in proximity to major landslide landforms.

This study deals with an analysis of landslides triggered by recent earthquakes in Jamaica with a view to refining our understanding of landslides in plate boundary zones. An attempt has been made to determine palaeoseismicity from landslides. The island of Jamaica is located within a seismically active plate boundary zone of Neogene strike-slip deformation. Tertiary faults define the geological structure and the neotectonic landforms are dominated by mass movements.

Historical records and scientific reports between 1667 and 1993 reveal only 13 earthquake triggered landslide forming events in Jamaica. However, it is not a true picture and is urban biased. The predominantly mountainous terrain of the island is dotted with prehistoric and recent landslide landforms. It appears that >M 5.5 earthquakes have produced large and spectacular landslides, whereas <M 5.5 events have generally resulted in localized rock falls and debris flows. The earthquake of January 13, 1993, M 5.4, triggered more than 40 landslides in eastern Jamaica including submarine landslides. The distribution pattern of 1993 landslides is strikingly similar to that described for the M 6.5, Great Kingston Earthquake of 1907.