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Landslide hazard in Northern Israel; A 1:200,000 scale map and a GIS based hazard evaluation computer-code

O. Katz and E. Almog

Geological Survey of Israel, 30 Malkhe Israel, Jerusalem 95501, Israel (odedk@gsi.gov.il)

Down-slope mass movements (i.e. landslides) occur worldwide as a consequence of earthquakes or extreme rain-storms. Currently in Israel, there is no national scale landslide hazard map, though landslides have occurred in historical earthquakes and extreme rain-storms. The objectives of the current work are to (1) evaluate earthquake and rain-storm induced landslide hazard of entire Israel; (2) to locate and map sites of relative high hazard and risk; (3) to create an interfaces that will enable easy-access for authorities and engineers to the hazard maps, this in turn will enhance hazard reduction for the Israeli-society. We currently present a 1:200,000 scale earthquake-induced landslide hazard map of Northern-Israel and a GIS based computer-code that enables the calculation of slope-performance scenario in a given area resulted from selected earthquake. The landslide hazard is presented in two formats: a HAZUS like susceptibility map (relative-hazard, grades I to X with increasing of susceptibility) and a map of the critical-acceleration for slope-instability. The process of producing the maps follows five steps: (1) mapping (creating GIS layers) the amount and direction of slope steepness and the geological-structure; (2) grouping the geological mapping units to five geotechnical units consisting of formations with decreasing rock strength; (3) determining the most probable slope failure-types according to the exposed geotechnical-units and the relation between the topography and structure along each slope (25mŒ25m GIS grid-cell); (4) hazard mapping; assigning susceptibility-grades, where the grade increases with decreasing rock strength and increasing slope steepness (for slumps or rock-falls) or structural slopes (for rock-slides); (5) assigning a value of critical-acceleration to each of the ten susceptibility-grades; calibration is performed using field-observations slope instability and results of previous critical-acceleration evaluation, done in a detailed scale. Results draw attention to few areas of high hazard. For creating landslides scenario of selected earthquakes we wrote a GIS

based computer-code that performs empirical regional Newmark analysis (following Jibson et al., 2000) using the critical acceleration map. This code enables the user to define a target area and a few theoretical earthquakes (defined by moment-magnitude and epicenter site) in order to analyze which earthquakes will induce landslides in the target area.