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World-wide analysis of rainfall conditions that have resulted in landslides

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Rainfall is a recognized trigger of landslides, and investigators have long attempted to determine the amount of precipitation needed to trigger slope failures, a problem of scientific and societal interest. We review the literature on rainfall thresholds for the initiation of landslides, and we present a catalogue of 125 empirical rainfall thresholds for the possible occurrence of landslides proposed in the literature in the period from 1970 to 2006. Next, we present a world-wide database of rainfall conditions that resulted or did not result in slope failures, and we exploit this information to establish minimum global intensity-duration and normalized intensity-duration thresholds for the occurrence of landslides. We compare the new thresholds with the existing thresholds, including global, regional and local thresholds. We conclude discussing the results obtained, with emphasis on the possible application of the new thresholds in a world-wide operational landslide warning system.