

# **New global rainfall intensity - rainfall duration thresholds for the initiation of shallow landslides and debris flows**

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New minimum thresholds of rainfall duration and intensity likely to result in shallow landslides and debris flows are obtained from a global catalogue of 2626 rainfall events that have resulted in shallow hill slope failures. Rainfall intensity - rainfall duration (ID) values are plotted in logarithmic coordinates to establish that with increasing rainfall duration the minimum average intensity likely to trigger landslides decreases linearly. Based on this observation, minimum intensity - duration conditions for the possible initiation of shallow landslides and debris flows are established. The new global thresholds are significantly lower than the global threshold proposed by Caine in 1980, and lower than other global thresholds proposed in the literature. To cope with differences in the intensity and duration of rainfall likely to result in landslides in different climatic regions, the rainfall information is normalized to the mean annual precipitation and the rainy-day-normal. To further investigate the role of climate in the initiation of shallow failures, the available rainfall data are subdivided in climate subsets, and the minimum ID thresholds for the likely occurrence of shallow landslides and debris flows in six different climates are established.