

Contrasting patterns of rainfall-induced and earthquake-induced shallow landslides in granitic mountains, northern Ibaraki Prefecture, Japan

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Geomorphological characteristics of shallow landslides induced by strong earthquake and heavy rainfall were surveyed in mountains underlain by granitic rocks (granite and granodiorite) in northern Ibaraki Prefecture, Japan. Interpretation of air photographs and satellite images showed that total 311 landslides occurred due to a heavy rainfall event in 1977. In the same area, 50 landslides occurred due to main shock of the East Japan Earthquake in March 2011, and 189 occurred during a post-earthquake period from March 2011 to March 2014. The rainfall-induced landslides concentrated in concave slopes (valleys). In contrast, the landslides by the earthquake and in the post-earthquake period (2011 –2014) mainly occurred on convex slopes (ridges). Geomorphological characteristics of shallow landslides during the post-earthquake period were similar to those by the main shock. Although more rainfall-induced landslides occurred in granite area rather than granodiorite area, landslide densities in both areas were almost same for the post-earthquake period. These findings imply that impacts earthquake-induced landslides on landform evolution are contrasting to those by rainfall events.

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