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Estimation of rainfall thresholds for the initiation of landslides in the Ialomita Subcarpathians, Romania

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Landslides are a common feature in the landscape of the Romanian hills and plateaus, affecting around 7% of the national territory (Pusch, 2004). It is general knowledge that landslides represent the combined result of a series of predisposing factors (lithology, faults, slope, land-use, land cover, etc.) with long term impact on slope stability and triggering factors (rainfall, snow melt, earthquakes) that temporarily modify the local hydrogeological conditions (Corominas, 2008). Rainfall represents the most common triggering factor of landslides in the Ialomita Subcarpathians, therefore the determination of rainfall thresholds for landslides initiation would be very useful for landslide hazard assessment and implementation of warning systems.

This paper aims to determine regional rainfall thresholds in the Subcarpathian area between the Prahova and Ialomita Valleys, where the most frequent phenomena are: deep seated rotational slides, earth flows and complex movements (rotational slides combined with mudflow or translational slides).

The methodology used in studies addressing the regional scale is based on empirical or statistical analysis of rainfall, due to the spatial and temporal variation of landslide factors. Given the lack of hourly measurements of rainfall variables for long periods in Romania we were constrained to determine the corresponding rainfall thresholds based on cumulated precipitation during the landslide events. The rainfall variables were chosen based on the typology of landslides: daily rainfall in the case of shallow landslides usually triggered by short and intense rainfall, normalized total precipitation (antecedent and event rainfall) for deep-seated landslides.

After establishing what thresholds correspond to the different types of landslides, we continued by analyzing the spatial and temporal variability of the pluvial regime aiming to understand the over time occurrence of landslides in the Subcarpathian area between the Prahova and Ialomita Valleys, Romania