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Susceptibility mapping and estimation of rainfall threshold using space based input for assessment of landslide hazard in Guwahati city in North East India

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Keywords: Landslide, Guwahati, Satellite image, Susceptibility map, Intensity-Duration plot

Abstract. Slopes are the most common landforms in North Eastern Region (NER) of India and because of its relatively immature topography, active tectonics, and intense rainfall activities; the region is susceptible to landslide incidences. The scenario is further aggravated due to unscientific human activities leading to destabilization of slopes. Guwahati, the capital city of Assam also experiences similar hazardous situation especially during monsoon season thus demanding a systematic study towards landslide risk reduction. A systematic assessment of landslide hazard requires understanding of two components, "where" and "when" that landslides may occur. Presently no such system exists for Guwahati city due to lack of landslide inventory data, high resolution thematic maps, DEM, sparse rain gauge network, etc. The present study elucidates the potential of space-based inputs in addressing the problem in absence of field-based observing networks. First, Landslide susceptibility map in 1 : 10,000 scale was derived by integrating geospatial datasets interpreted from high resolution satellite data. Secondly, the rainfall threshold for dynamic triggering of landslide was estimated using rainfall estimates from Tropical Rainfall Measuring Mission Multi-satellite Precipitation Analysis. The 3B41RT data for 1 hourly rainfall estimates were used to make Intensity-Duration plot. Critical rainfall was estimated for every incidence by analysing cumulative rainfall leading to a landslide for total of 19 incidences and an empirical rainfall intensity-duration threshold for triggering shallow debris slides was developed (Intensity = 5.9 Duration-0.479).

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