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Multi-spatiotemporal landslide mapping for landslide evolutionary investigation

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Multi-temporal landslide inventories are crucial for understanding the changing dynamics and states of activity of landslide masses. However, mapping landslides over space and time is challenging as it requires lots of time and resources to delineate landslide bodies for affected areas. With the current advances in artificial intelligence models and acquisition of very high-resolution satellite imageries, the need to map landslides not just spatially, but also temporally, has become evident. Generating multi-spatiotemporal landslide inventories can allow to improve our understanding of evolving landslides and landslide re-activations, addressing the changing susceptibilities, and the associated risks to elements-at-risk. Furthermore, as a result of having multi-temporal inventories, the temporal probability of occurrence of landslides can also be investigated with the help of envelop curves based on variables like rainfall duration, intensity, cumulative rainfall, antecedent rainfall. Therefore, in this endeavour, we have developed a model that generates multi-temporal landslide inventories for some of the most affected landslide regions by using several inventories around the world, for example, in Nepal (Gorkha earthquake of 2015). This study is the first attempt to map landslides over space and time using the state-of-the-art artificial intelligence models and gives a new perspective at mapping landslides through a temporal lens. Subsequently, the modelled outputs are utilised to assess and understand the changing dynamic behaviour of past landslides.