A regression analysis framework for the prediction of runout distance of landslides: a case study for Sichuan

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In recent years, the impact of landslides on society has increased due to increasing urbanisation and climate change (as much as up to 30%). In about a decade, around 5000 fatal non-seismic landslides have occurred world-wide resulting in almost 56000 deaths, most of which took place in developing countries, such as China and Philippines. The purpose of studying the characteristics of landslides is to develop a better understanding of their features and to reduce any threat posed by them. Out of these characteristics the runout distance directly determines the impact of the landslide and extend of the affected area which are useful in evaluating risk to infrastructure (such as road pavements or railroad or built structures). Therefore, the study of landslide runout distance prediction has great significance for urban planning and risk assessment, specifically in mountainous areas.

This study focuses on conducting a review of previous literature on landslides reported at the region of Wenchuan in Sichuan (China), aiming to identify any trends connecting the cause and effect relationship between landslides in a phenomenological and empirical manner. Specifically, a dataset of landslides (20 due to rainfall and 50 due to earthquake) is used to statistically link, using multiple regression analysis, the travel distance to five main influencing factors, including landslide volume, height of landslide, landslide plane form, landslide average thickness and relative coefficient of friction. Good results are obtained through error minimisation rendering the developed framework as a useful tool for predictive analysis of the potential extent and impact of landslides using historical regional data.