



## A novel method to estimate the magnitude of bedrock landslide volumes with the index of rock resistance to weathering and erosion

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Landslide volume, as a principal factor in assessing the disaster-causing capacity of potential landslides, needs to be estimated accurately and quickly. At present, volume estimation of landslides is still dominated by traditional field surveys, and the method of using power-law correlations between landslide area and volume to estimate landslide volume is also imperfect. Scholars often ignored the crucial factor of the index of rock resistance to weathering and erosion (IRWE) of landslide bedrocks, leading to the uncertainty in index coefficients ( $\gamma$ ), the applicable range of this method also needs to be further researched. In this paper, firstly, the Qinghai-Tibet Plateau Transportation Corridor (QTPTC) was divided into five sections based on IRWE of stratigraphic lithology, 183 landslides were selected from the landslide inventory along five sections. The power-law correlation between landslide area and volume in each section was fitted based on robust estimation. Secondly, power-law correlations were validated using cross validation and typical landslides in each section, and compared with  $\gamma$  values fitted in other literature. Through analyzing IRWE in the area where 183 landslides are located,  $\gamma$  values were found to be proportional to IRWE. Thirdly, the volume of 1928 landslides along QTPTC were estimated and River Blocking Coefficient (RBC)  $I_b$  was introduced to quickly screen out 88 active major disaster bodies along great rivers. Finally, we proposed a universal framework for volume estimation of landslides. The study will greatly save time in screening potential landslides, laying a solid foundation for early warning and achieving the purpose of landslide prevention and mitigation.