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A global database of seismically and non-seismically triggered landslides for 2D/3D numerical modeling

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Landsliding is a worldwide common phenomenon. Every year, and ranging in size from very small to enormous, landslides cause all too often loss of life and disastrous damage to infrastructure, property and the environment. One main reason for more frequent catastrophes is the growth of population on the Earth which entails extending urbanization to areas at risk.
Landslides are triggered by a variety and combination of causes, among which the role of water and seismic activity appear to have the most serious consequences. In this regard, seismic shaking is of particular interest since topographic elevation as well as the landslide mass itself can trap waves and hence amplify incoming surface waves – a phenomenon known as "site effects".
Research on the topic of landsliding due to seismic and non-seismic activity is extensive and a broad spectrum of methods for modeling slope deformation is available. Those methods range from pseudo-static and rigid-block based models to numerical models. The majority is limited to 2D modeling since more sophisticated approaches in 3D are still under development or calibration. However, the effect of lateral confinement as well as the mechanical properties of the adjacent bedrock might be of great importance because they may enhance the focusing of trapped waves in the landslide mass.
A database was created to study 3D landslide geometries. It currently contains 277 distinct seismically and non-seismically triggered landslides spread all around the globe whose rupture bodies were measured in all available details. Therefore a specific methodology was developed to maintain predefined standards, to keep the bias as low as possible and to set up a query tool to explore the database. Besides geometry, additional information such as location, date, triggering factors, material, sliding mechanisms, event chronology, consequences, related literature, among other things are stored for every case.
The aim of the database is to enable statistical analysis on a vast and newly updated set of data and to create numerical models in the future. It is possible to define groups of landslides sharing the same characteristics, or cases belonging to different groups can be used to compare their responses to external loads. Thus, different options exist to create input data for numerical models. This is very promising especially considering the possibility of comparing 2D and 3D models having the same framework conditions (i.e. geometry, material, etc.). Comparison of 2D and 3D approaches might contribute to a better understanding of landsliding phenomena to improve the hazard prevention.