

## **A review of mechanisms and modelling procedures for landslide tsunamis**

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Landslides, including volcano flank collapses or volcanically induced flows, constitute the second-most important cause of tsunamis after earthquakes. Compared to earthquakes, landslides are more diverse with respect to how they generation tsunamis. Here, we give an overview over the main tsunami generation mechanisms for landslide tsunamis. In the presentation, a mix of results using analytical models, numerical models, laboratory experiments, and case studies are used to illustrate the diversity, but also to point out some common characteristics. Different numerical modelling techniques for the landslide evolution, and the tsunami generation and propagation, as well as the effect of frequency dispersion, are also briefly discussed. Basic tsunami generation mechanisms for different types of landslides, including large submarine translational landslide, to impulsive submarine slumps, and violent subaerial landslides and volcano flank collapses, are reviewed. The importance of the landslide kinematics is given attention, including the interplay between landslide acceleration, landslide velocity to depth ratio (Froude number) and dimensions. Using numerical simulations, we demonstrate how landslide deformation and retrogressive failure development influence tsunamigenesis. Generation mechanisms for subaerial landslides, are reviewed by means of scaling relations from laboratory experiments and numerical modelling. Finally, it is demonstrated how the different degree of complexity in the landslide tsunamigenesis needs to be reflected by increased sophistication in numerical models.