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Tsunamis generated from long, thin, gravitationally accelerated landslides

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Landslide generated tsunamis are major hazards for developed areas on lakes and reservoirs. Over the past twenty years, enormous advances have been made in both the physical and numerical modeling of the wave generation, wave propagation, and run-up components of this problem by the geoscience community. However, nearly all of the experiments capturing the mechanics of wave generation have been conducted using flume tests of either zero-porosity blocks, or granular material pneumatically accelerated to achieve different impact velocities. Therefore, wave generation has been investigated primarily for physical model landslides that tend to be short, thick, and have a packing that is not entirely dissimilar from the static packing of the material in the release box. In this study we a large-scale landslide flume consisting of an 8.2 m long 30° landslide slope to gravitationally accelerate granular landslides into a 2.1 m wide and 33.0 m long wave flume that terminates with a 27° runup slope, with still water depths of 0.05 to 0.5 m in the reservoir. Granular material is released at the top of the inclined portion of the flume, and is then accelerated under gravity to produce a long, thin, high porosity granular flow prior to impact with the water reservoir. The characteristics of the waves generated under the these conditions are then compared to the results from previous studies on shorter and thicker landslides, before drawing conclusions regarding the applicability of existing empirical models describing the maximum amplitude of landslide generated waves for this class of landslide.