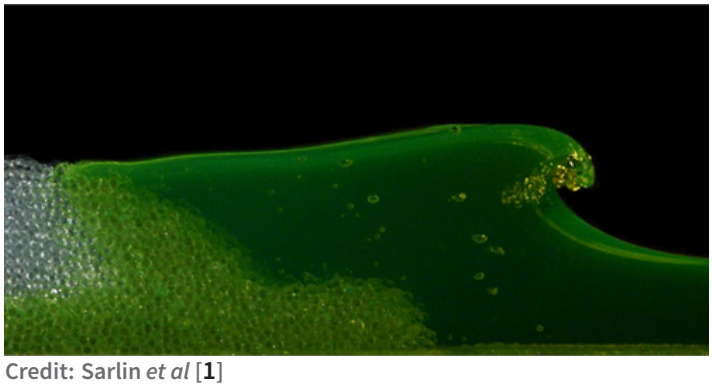
Modeling Landslide-Induced Tsunamis

A new model can accurately predict the height of waves created when a cliff collapses into water, allowing for a better evaluation of the threat the incident may pose to local people.

By **Allison Gasparini**

Tsunamis are a hazardous and potentially destructive phenomena, consisting of a series of towering water waves that can reach over 30 m in height. Although often caused by earthquakes or by underwater explosions, such as the eruption of an underwater volcano, they can also be triggered by landslides down coastline cliffs. Landslide-induced tsunamis however are poorly understood. Wladimir Sarlin of the University of Paris-Saclay and his colleagues have now created a model that can accurately predict the amplitudes of the waves created when a landslide collapses into a body of water [**1**]. The finding could help to improve methods for evaluating how a local population would be affected by a coastal landslide.

The setup used by Sarlin and colleagues consisted of a glass tank containing a makeshift water reservoir and a hill of glass beads that were a few millimeters in diameter. Initially the bottom of the hill was flush with the surface of the water. The researchers lifted a plastic wall separating the water and the beads, and the hill collapsed and slid in a manner resembling a landslide. They then studied the resulting waves. The team also developed a model to predict the amplitude of the resulting tsunami that accounts for both the motion of the beads and the hydrodynamics of the waves.



Credit: Sarlin *et al* [**1**]

The team found that the beads pushed the water around in a manner akin to that of a pushed brush displacing water as someone sweeps. Sarlin and colleagues' model predictions matched their experimental results and correctly predicted the tsunami-wave amplitudes.

While the team's setup was highly idealized, the researchers say that they plan to perform experiments with more realistic systems, such as irregularly shaped bead columns and bead "islands." Their next step is to study a more complex configuration, such as how a cylinder of grains falling into the middle of a water source affects wave amplitude.

Correction (13 Sept. 2022): *The original story misstated the relative positions of the bead hill and the water's surface*

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REFERENCES

1. W. Sarlin *et al.*, "From granular collapses to shallow water waves: A predictive model for tsunami generation," **Phys. Rev. Fluids 7, 094801 (2022).**