

Huge tsunami in popular area for Alaskan cruises provides lessons in steep, mountainous terrain

May 6 2026



Oblique aerial photo of the August 10, 2025 landslide, terminus of South Sawyer Glacier, and Tracy Arm taken from across the fjord during a U.S. Geological Survey field reconnaissance overflight on August 13, 2025. Note the trimline along the far side of the fjord, caused by the tsunami stripping the walls of vegetation. View direction is approximately north. Credit: Cyrus Read / U.S. Geological Survey

When part of a mountain in southeast Alaska slid into the ocean last summer, it triggered the second highest tsunami ever recorded. That tsunami ran 481 meters—one-and-a-half times the height of the Eiffel Tower—up the wall of the Tracy Arm fjord more than a kilometer away and generated a seismic signal equivalent to a magnitude 5.4 earthquake.

Despite its massive size, no one was caught in the wave because it hit around 5:30 a.m. Hours later, some of the 20 or so cruise ships, boaters and kayakers that use the general area daily could have been in the narrow fjord, which is a popular sightseeing area for glaciers in the Tongass National Forest about 80 kilometers south of Juneau, Alaska.

The "near miss" has now been studied by a team of international researchers, and their findings are published in *Science*. The team determined that the event provided valuable lessons for those who spend time in steep, mountainous terrain.

"We reconstructed the event from a suite of perspectives, including eyewitness accounts from a variety of ship passengers and kayakers," says geomorphologist Dr. Dan Shugar, Ph.D., lead author of the study and an associate professor with the Department of Earth, Energy, and Environment in the Faculty of Science at the University of Calgary.



Field photos from reconnaissance trip for 2025 Tracy Arm landslide on August 13, 2025. Credit: U.S. Geological Survey

Witness reports from fjord visitors

The paper notes that a group of kayakers reported waking around 5:45 a.m. to see water flowing past their tent, carrying away one of their kayaks and much of their gear. Another observer described a two-meter wave coming along the beach while those on a cruise ship anchored near the mouth of the fjord saw currents and white water, but no obvious wave.

The team of researchers also studied satellite data before and after the event, seismic data and did numerical modeling to understand exactly what happened.

Satellites shed light on hidden waves

Study co-author Dr. Thomas Monahan, of the Department of Engineering Science at the University of Oxford, says satellite observations of remote ocean dynamics are becoming essential as Arctic hazards intensify.

"Until now, we simply didn't have a way to observe [these waves](#) directly, but our study has demonstrated that using data from the new [Surface Water Ocean Topography](#) satellite can reveal the full sea-surface structure of these events, even if no one witnesses them directly."

A landslide that gave no warning

Shugar adds there wasn't much warning before the landslide hit.

"Normally, with these gigantic rock avalanches, they often give some sort of warning signs in the weeks, months, years prior when the slope is slowly moving down the mountain. It's sagging and then it catastrophically gives way in a rock avalanche," he explains. "In this case, that didn't happen."

Instead, he says there was some minor seismic noise that was so slight it wouldn't have caught anyone's attention.

"This one was truly a surprise," adds Shugar, noting that it presents some challenges when it comes to disaster reduction in high-risk areas.

Glacial retreat raises new risks

The research concludes that the [glacial retreat](#) in the [Alaska fjord](#) led to the near disaster.

There are lessons to be learned from the event—particularly that glacier retreat as cold regions warm is increasing the risk of other hazards and that improved monitoring could mitigate some of those impacts.

Shugar says it's important to pay close attention, particularly in areas on the west coast and in polar regions where glaciers are thinning due to a changing climate.

"Ultimately, what we hope is that coastal municipalities, the cruise ship industry and other stakeholders take these threats seriously," he says, noting similar events could result in future disasters.

Media reports show that at least six cruise lines have altered their itineraries in Alaska this year due to the hazards that still exist in the Tracy Arm fjord.

The U.S. Geological Survey has warned on its website that [steep, mountainous landslide areas](#) are "[inherently unstable](#) and will continue to change for years following an initial landslide."

More information: A 481-meter-high landslide-tsunami in a cruise ship frequented Alaska fjord, *Science* (2026). [DOI: 10.1126/science.aec3187](#)

Provided by University of Calgary

Citation: Huge tsunami in popular area for Alaskan cruises provides lessons in steep, mountainous terrain (2026, May 6) retrieved 6 May 2026 from <https://sciencex.com/news/2026-05-huge-tsunami-popular-area-alaskan.html>

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