

Geology Happenings

Gravity's Role: How Mass Wasting Carves Cliffs

by Allyson Mathis

The landscape of southeastern Utah with its long vistas, majestic rock spires and cliffs, secluded deep canyons, and peaceful overlooks seems timeless and unchanging. But it's not. As an erosional landscape, canyon country is a product of the active Earth where geologic processes, both large and small, have sculpted the scenery. These erosional events include ones that occur gradually across spans of deep time and those that occur suddenly and dramatically.



Rock fall debris at the base of a cliff.

Canyon country has been carved during the last few million years by flowing water and by the relentless pull of gravity. The Green and Colorado Rivers flow across the uplifted Colorado Plateau (where elevations average more than a mile above sea level) meaning that they can *incise* into the land, making deep canyons. Networks of tributary drainages reach up from the rivers, carving intricate networks of canyons. Once canyon walls and cliffs have formed, they too erode, sometimes by water flowing downhill in rare flash floods, but also due to the pull of gravity working on its own.



Small rock fall temporarily blocking the Long Canyon Road in March 2026. Photo courtesy of Gabrielle Lyle.

Mass wasting is the term that geologists use to describe movement of rock material downslope under the force of gravity but without transport by water. Mass wasting can occur slowly such as when soil *creeps* down a steep slope or rapidly when sections of a cliff give a way in *rock falls* or *rock slides*. *Rock avalanches* take place when rock fall or slide debris moves chaotically down steep slopes while breaking into ever smaller chunks that make thin deposits that extend well out from the cliff face. *Landslides* are another type of mass wasting phenomena, and these can move slowly or rapidly depending on the dynamics of an individual slide itself.

Rock falls, slides, and avalanches all play a major role in shaping canyon country. They can happen at any time,

but are most frequent in the late winter or early spring when the ground is saturated, weakening the bedrock. *Frost wedging* in natural rock fractures caused by freeze-thaw cycles is also at work then.

Rock falls are also more likely during large rain events, again because of water saturation. They are even triggered by small earthquakes that shake the ground just enough to send a loose section of rock tumbling downhill.

Most of us who spend time in canyon country do not get to actually witness a rock falling from a cliff, much less see an entire cliff face give way. However, the evidence of past rock falls is seemingly everywhere. Boulders and broken-up rock fragments are found beneath virtually every cliff and cover nearly every slope in the desert surrounding Moab.

From time to time, a recent rock fall may alter someone's travel plans such as what recently happened to me. In mid-March, a small rock fall blocked the Long Canyon Jeep Road on a day that I planned to drive back to Moab that way. The county road crew had it cleared the next morning, but the detour was an excellent reminder

A self-described "rock nerd," **Allyson Mathis** is a geologist, informal geoscience educator and science writer living in Moab. To learn more about Moab's geology, visit the *Geology Happenings* archive online at www.moabhappenings.com/Geology.htm.



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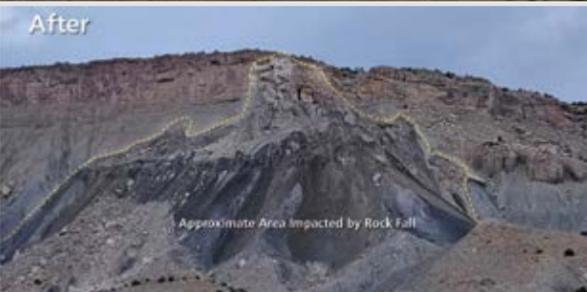
that the canyon landscape is ever changing, even if most of us don't get to see the change as it happens. Only very rarely are major rock falls in southeastern Utah witnessed, such as happened in 2025 near Thompson Springs.

Long-Lasting Rock Fall Near Thompson Springs Doubled as Social Event



Pulverized rock kicked up by the May 2025 rock fall near Thompson Springs. Photo courtesy of AJ Rogers

On May 28 of last year, the residents of Thompson Springs, a small community tucked up below to the Book Cliffs north of I-70 and about 37 miles from Moab, witnessed a mass wasting event that brought the whole town out to watch it. Instead of a single instance of a section of cliff giving way, it was a sequence of rock falls and slides that transitioned downslope into rock avalanches. These events



Before and after images, with annotation showing the approximate outline of the area impacted by the rock fall. Images courtesy of Orion Rogers.

occurred over a span of more than 8 hours across an area about 800 feet wide, impacting the cliffs and upper parts of the gray slopes north of town and sending house-sized boulders bouncing down the hillslope. The great clouds of pulverized rock and dust that were kicked up were visible twenty miles away.

Residents became aware of the rock fall when they began hearing it. Rock falls generally produce clapping noises and loud pops. Folks who witnessed this event said it sounded like thunder.

Long-time Thompson Springs resident AJ Rogers described the reaction of locals, "Most of our little town set up camp chairs on the road up the canyon adjacent to the rock fall and watched all day. We even had Ray's burgers delivered from Green River. It was a dandy way to catch up and visit with all the neighbors." The rock fall lasted so long that residents were even able to invite their out-of-town relatives to come see it. For example, AJ called his son Orion in Moab who brought his young daughters along to watch the once-in-a-lifetime event.

A lifelong resident of Thompson Springs, AJ had never seen anything like the 2025 rock fall. He said, "I've looked at pictures of his hillside from 1900 and I couldn't see much difference, if any difference. But now I can."

Special thanks to AJ Rogers, Orion Rogers, and Gabrielle Lyle.

Deep gratitude to you, the readers of *Geology Happenings*, and especially to Theresa King and the Moab Happenings staff, for the opportunity to share the wonders of canyon country geology with you all. This column is number 100. Allyson Mathis

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