

Frenchman Mountain Dolostone: 500 million-year-old Grand Canyon rock layer finally gets a name

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View of the Grand Canyon from the South Rim. Credit: Josh Hawkins/UNLV

The Grand Canyon is visited by millions of admirers each year. So, naturally, you'd think that all of its rock layers had been studied and

named. But you'd be wrong.

In a new report published this spring in the journal *Geosphere*, a UNLV-led research team outlines how it identified and bestowed a moniker upon a previously unexplored 500 million-year-old Grand Canyon formation: The Frenchman Mountain Dolostone.

The newly named rock layer has lain hidden in [plain sight](#) throughout the Grand Canyon for millennia, but—until now—[geologists](#) had not named it or studied it in detail.

The UNLV research team named it the Frenchman Mountain Dolostone (FMD) —after a similarly named [mountain](#) that lies adjacent to Las Vegas, Nevada. That's where the FMD is thickest, most complete, and most accessible for study. Through scientific detective work, the researchers were able to narrow down the age of this stratigraphic interval and its relationship to strata in the Grand Canyon.

"For decades, geologists were unable to precisely correlate the succession of strata at Frenchman Mountain with those in the Grand Canyon, in part because Frenchman Mountain was tectonically displaced about 40 miles to the west since the rocks were deposited," said lead author Steve Rowland, an emeritus professor of geology at UNLV and paleontologist at the Las Vegas Natural History Museum. "Establishing detailed descriptions and thickness measurements of the strata at Frenchman Mountain and also in the Grand Canyon has finally allowed us to solve this problem."



Quartermaster Canyon (Arizona) exposure, with stratigraphic units labeled. Frenchman Mountain Dolostone here is 117m thick. Credit: Stephen Rowland/UNLV

The FMD is over 1,200 feet thick at Frenchman Mountain, Rowland said, but it thins dramatically toward the east. The portions exposed within the Grand Canyon range in thickness from nearly 400 feet near the "West Rim" Skywalk to less than 100 feet in Marble Canyon, in the eastern part of Grand Canyon National Park.

In 1945, geologist Edwin McKee distinguished—but did not formally name—the cliff-forming interval of rocks that occur just above the well-known Muav Formation. The FMD contains no fossils, so McKee was unsure of its age. Rowland's team used a relatively new technique to determine the FMD's age—subtle differences in the ratio of stable isotopes of carbon. Fluctuations in the ratios of these isotopes occurred at the same time all over the Earth as the layers were deposited.

The researchers compared fluctuations in the Frenchman Mountain strata with those identified in precisely dated [rock layers](#) elsewhere in the world. The results indicate that the newly named formation was deposited over an interval of 7.3 million years, during the Cambrian Period, between 502.8 million and 495.5 million years ago.

The FMD is the first new formation to be named in the [canyon](#) since 1985 when the Surprise Canyon Formation was named. It is also the first rock layer exposed in the Grand Canyon to be named for a location outside the Grand Canyon region.

In addition to Rowland, the research team included former UNLV graduate student Slava Korolev, Denver Museum of Nature and Science geologist James Hagadorn, and UNLV mathematics professor Kaushik Ghosh.

More information: Stephen M. Rowland et al, Frenchman Mountain Dolostone: A new formation of the Cambrian Tonto Group, Grand Canyon and Basin and Range, USA, *Geosphere* (2023). [DOI: 10.1130/GES02514.1](#)

Provided by University of Nevada, Las Vegas

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