

Did dinosaurs enjoy Grand Canyon views? Definitely not, say researchers

June 11 2015, by Nikki Cassis



Did dinosaurs roam the Grand Canyon? ASU researchers say that the canyon is much too young to have been the stomping ground of prehistoric lizards. Credit: Rich Rudow

Did dinosaurs roam the Grand Canyon? Well, the answer depends on whom you talk to. And how old they believe the majestic canyon to be.

Although it might be fun to imagine scientists and researchers arguing about whether giant reptiles were hanging around Arizona's most famous landmark 65 million years ago, this isn't a debate about dinosaur territories. It's a question of when the deep walls of the Grand Canyon were eroded by the snaking Colorado River.

Recently two different groups published papers that suggested the Grand Canyon started forming more than 6 million years ago. One group said the canyon had eroded to nearly its current form by 70 million years ago, and another said it started eroding 17 million years ago. These papers have caused several groups to take a closer look at both old and new data sets – including researchers from Arizona State University.

"We are confident the western canyon is younger than 6 million years and is certainly younger than 18 million years," said Andrew Darling, a graduate student in ASU's School of Earth and Space Exploration. The research is published online June 10 in the journal *Geosphere*.

The problem with the assertion is that studying the age of the Grand Canyon isn't easy.

Measuring time can be tricky when everything you're studying is eroding away. And the whole region has been eroding for a long time, so not much is left of the landscape that was there when the Grand Canyon started forming. Yet, most people think the Grand Canyon is young – around 6 million years old based on what is preserved.

While many different detective methods exist to gauge the canyon's age, Darling and his adviser, Kelin Whipple, a professor in ASU's School of Earth and Space Exploration, decided to see whether the shape of the landscape could be used to infer the timing of canyon incision in a different way.

They analyzed the shape of the land and an understanding about how landforms change, plus comparisons to other thoroughly dated features in the region – like the Grand Wash Fault and the cliff-band along it.

As Darling put together computer analyses of the landscape, he and Whipple noticed the cliffs that make the edge of the Colorado Plateau

(the Grand Wash Cliffs) look different than the cliffs that make the Grand Canyon. The Grand Canyon cliffs are steeper. Looking more closely, the tributary streams that pour into the Colorado River are also steeper than those in the Grand Wash Cliffs.

Many other researchers have shown the fault that formed the Grand Wash Cliffs experienced most of its movement in a long period of fault slip between 18 million and 12 million years ago. The west side of the fault has slipped downward a few kilometers, making a hole for sediment eroding from the Grand Wash Cliffs to pile into. As erosion occurs, steep cliffs become more gradual slopes and rivers flatten out over time. But the western Grand Canyon has steeper cliffs and steeper tributary rivers than those along the Grand Wash Cliffs.

"We think this means that the western Grand Canyon is younger and started eroding more recently and at a higher rate than the area of the Grand Wash Cliffs," Darling explained.

In both landscapes, the amount of erosion measured vertically is about the same: but the time taken to do that erosion is different and hence the erosion rates are different.

Using this inference, they evaluated the three previous hypotheses for the age of incision of Western Grand Canyon: 70 million years ago, 17 million years ago or about 6 million years ago.

"Since the canyon seems to be younger than the fault slip, only the most recent 6-million-year-old incision idea is supported by the topographic and erosion rate data," Darling said.

Which, if Darling is correct, means we have an answer to our question: "There's no way dinosaurs overlapped with what we call the Grand Canyon."

Provided by Arizona State University

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