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# Legacy



Interpreting  
Geology



# It's About Time

## Innovations in Geoscience Education at the Grand Canyon

Although it's not the world's deepest, widest, or longest canyon, there is something about the grandeur of Grand Canyon that strikes awe into those who view it and makes them more open to new connections with the Earth and its landscapes. Five million annual visitors, many of whom don't think they are interested in science or geology, start to ponder questions about Earth's history when they are confronted with Grand Canyon. They wonder, "How did something the size of the Colorado River (way down at the canyon's bottom) carve a 10-mile-wide and one-mile-deep canyon?" and "How long did it take Grand Canyon to form?" Innate curiosity about the dynamic processes and history of Earth seems to be rekindled for people of all ages and backgrounds by the place itself.

Fifteen years in the making, the recently opened Trail of Time geoscience exhibition helps visitors frame some of their questions. The exhibition tries to convey and foster a sense of passion for Grand Canyon geology, and a sense that the future of our species will likely hinge on how well humans understand, coexist with, and utilize Earth systems. One of Grand Canyon National Park's most significant resources, its geology, is now sharply focused towards informal geoscience education.

The theme of the exhibition is time. The Trail of Time (pictured on the cover of this magazine) is a giant



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Wayside exhibits along the trail explain key events in the canyon's geologic past.

geologic timeline, where every meter along the trail, each of which is identified by a bronze marker, represents one million years of Earth's history. The timeline is situated on the highly visited south rim, between the newly renovated geology museum at Yavapai Point and the historic lodges of Grand Canyon Village. It follows the paved, wheelchair-accessible Rim Trail, offering all manner of opportunities for multi-generational family exploration. The walk from the "Today" marker near Yavapai Museum to Grand Canyon's oldest rock at the east end of

the village is a 1,840-meter (1.1 mile) timeline trail that covers 1.84 billion years. Amazingly, it's another 2,720 meters (1.7 miles) along the timeline to the 4.56-billion-year-old age of the Earth, near Maricopa Point. After walking these distances visitors express a visceral understanding of geologic time saying, "It's a long time, the Earth is really old!" or "I knew the number, that [the oldest rock] was 1.8 billion years old, but you don't really get a grasp of how much that is until you've walked 1.8 billion years!"

Interpreted along the timeline



RYAN CROW

Samples of the canyon's rock layers are placed at their "birthday" on the timeline.



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Viewing tubes link the timeline to specific features in the canyon.

are Grand Canyon rocks, wayside exhibits, and viewing tubes that relate Grand Canyon's history and landscape to geologic time. Boulder-sized examples of each of Grand Canyon's rock layers, many collected by raft from the canyon's bottom, have been placed along the trail at their "birthdays." People talk about and touch these beautiful examples of 1.7-billion-year-old folds, 1.2 billion-year-old mud cracks, 800-million-year old algal reefs, and 270-million-year-old fossils. Viewing tubes connect time along the horizontal timeline trail to the specific rock layers down in the canyon. Wayside exhibits explain key events that helped produce the landscape visitors see today at Grand Canyon. One key exhibit, just six meters from the start of the main trail, explains that the Colorado River has carved Grand Canyon in the last 6 million years or six long steps on the timeline. The main trail also has an introductory trail segment or "on ramp" where the first million years is stretched out



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Bronze medallions mark the timeline. Every 10th marker is labeled like this.

to link human timescales (e.g. visitors' birthdays and key events in early Grand Canyon explorations) with geologic timescales (e.g. climate change and Grand Canyon's recent volcanic eruptions).

The project has incorporated extensive evaluation throughout the development process by assessing what works best to enhance visitor experiences. The trail is also being used as an instrument to research how people from all walks of life comprehend

geologic time and geologic processes. This research is helping identify what conceptions and misconceptions people start with. Onsite evaluation shows that 90 percent of respondents used one or more elements of the exhibition and that many were inspired to think about geology and engage in meaningful geology-related conversations. Many also came away with increased geologic reasoning skill, increased geologic vocabulary, and a visceral understanding of geologic time. The Trail of Time has been called the largest geoscience education exhibition at the world's grandest landscape. As such, it is uniquely poised to make a difference for informal geoscience education and interpretation. For more information, and to see the evaluation results: <http://tot.unm.edu>.

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