

NOW OPEN: The Trail of Time: A Geoscience Exhibition at Grand Canyon National Park

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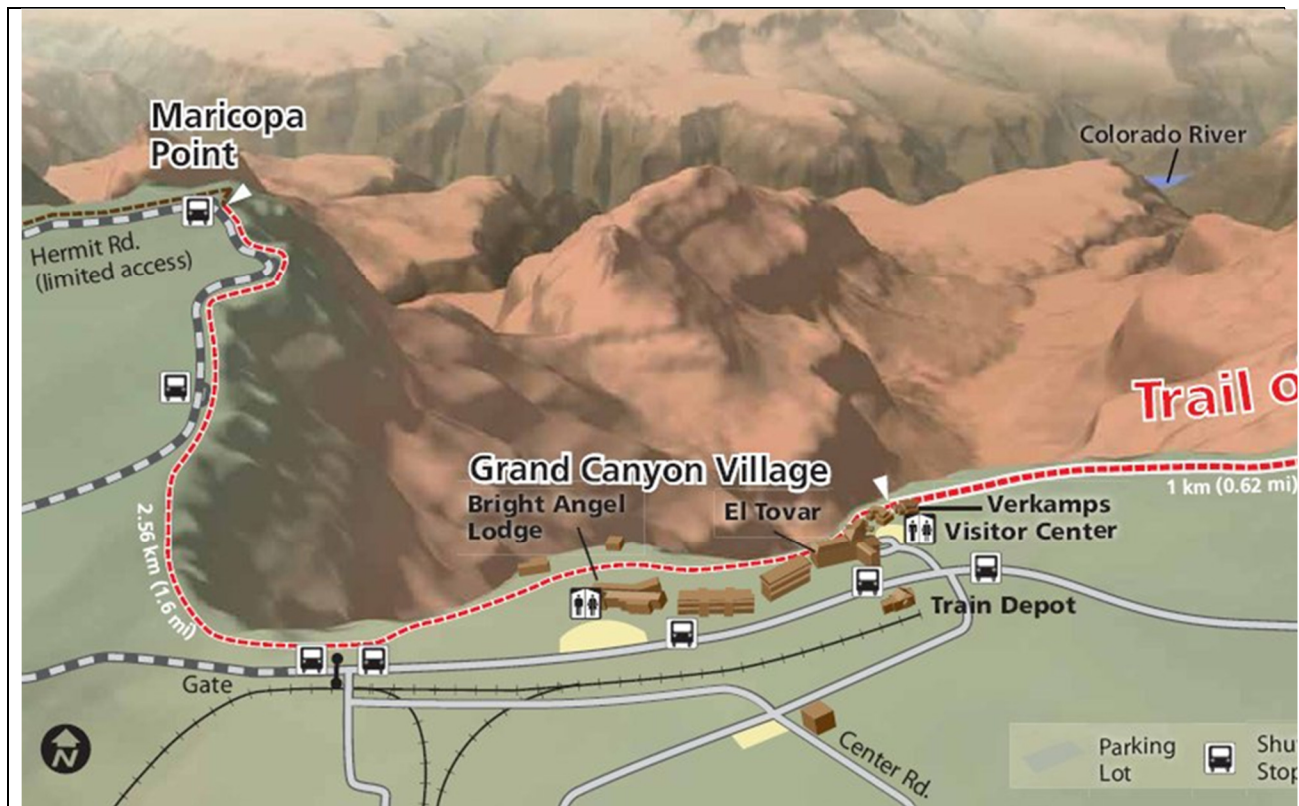
Grand Canyon National Park and the University of New Mexico, with support from the National Science Foundation, hosted a Grand Opening of the Trail of Time Geoscience Exhibition Oct 13-15, 2010, at the south rim of Grand Canyon. Fifteen years in the making, this Exhibition recently won the 2011 First Place Award for Wayside Exhibits from the National Association for Interpretation. The Trail of Time (<http://tot.unm.edu>) is a fully accessible interpretive walking timeline trail located near Grand Canyon Village, on the rim of Grand Canyon. It utilizes the unique vistas and rocks at Grand Canyon to help visitors ponder, explore, and understand the magnitude of geologic time and the stories encoded by Grand Canyon rocks and landscapes.

The Trail of Time Exhibition is a 4,600 km-long (about 3 mile) walking trail on the South Rim of Grand Canyon marked every meter with bronze markers and scaled such that one long step on the trail (1 m) represents one million years of the 4.56 billion year age of the Earth. Park visitors seem to love to touch the rocks that were collected in the Canyon and are now placed at their "birthdays" along the Trail. Trail activities and wayside geologic information can be viewed in the context of great views of one of the world's most spectacular geologic landscapes-- Grand Canyon. Those who walk the entire trail get a visceral feel for the age of mother Earth (really old), and most appreciate getting to know canyon rocks, their ages, and how the human timescales interface with geologic time.

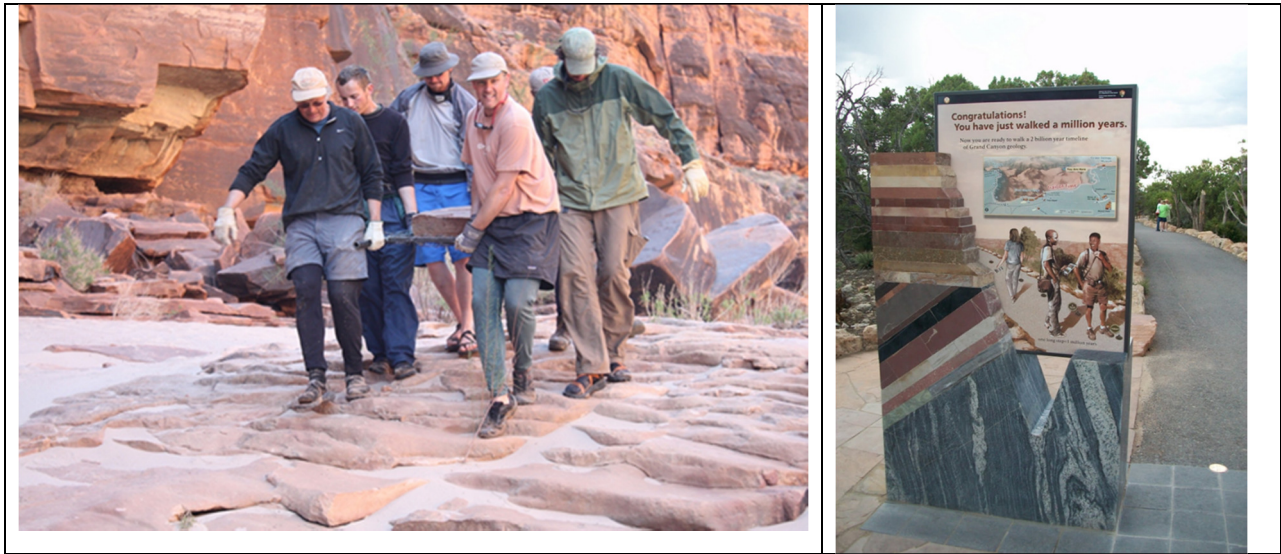


Although not the world's deepest, widest, or longest canyon, there is something about the grandeur of Grand Canyon that strikes awe into those that view it and makes them more open to new connections with the Earth and its landscapes. Many of the five million annual visitors, some who don't think they are interested in science or geology, experience a "teachable moment" as they are confronted with Grand Canyon and the Trail of Time and start to ponder questions about Earth's history. They wonder: "How did something the size of the Colorado River (way down at the canyon's bottom) carve a 10-mile-wide and 1-mile-deep canyon?" and "How long did it take Grand Canyon to form and how old are the rocks in the Canyon's walls?" 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 - Grand Canyon, as catalyzed by the Trail of Time Exhibition.

The recently opened Trail of Time geoscience exhibition aims to help visitors frame some of their questions. We wanted to try 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. We hope that, through the Trail of Time, one of Grand Canyon National Park's most significant resources, its geology, is now more sharply focused towards informal geoscience education. From the "TODAY" marker near Yavapai Museum, to Grand Canyon's oldest rock, at the east end of the village is a 1,840 m (1.1 mile) long walk along the timeline trail that covers 1.84 billion years. Amazingly, it's another 2,720 m (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 are heard 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 one point eight billion years!"



Leveraging the Grand Opening event in October, 2010, we held a NSF-funded workshop involving 120 participants who discussed and developed plans for "*Innovations in Geoscience Education in the National Park System*". Numerous ideas were formulated that build on The Trail of Time Exhibition's interpretation themes of Geologic Time and Earth Processes. Additional formal and informal science education efforts across the National Park System are needed, and GTS and the boatmen community can play an important role. As we all have seen, the Grand Canyon and the Colorado Plateau are premier venues for natural science interpretation and informal science education and can have an important impact on visitors of all ages. The Trail of Time effort also involved research and evaluation in informal science education aimed at understanding and helping improve public cognition of geologic time—the vital, and difficult- to- comprehend, connection between human time scales and the million year heartbeat of the Earth.



We first proposed the ToT concept to the Park in 1995, and eventually received about \$2 million funding from the National Science Foundation in 2005 to install it. It has been an excellent collaborative team effort between Grand Canyon National Park, National Science Foundation, University of New Mexico and Arizona State University, and professional design and evaluation teams. We hope to generate similar efforts at other Colorado Plateau Parks as we feel that understanding the science of geology is assuming increasing importance as human populations exceed 7 billion on one small planet. The National Park Service is filling an essential role and needs to continue to provide improved informal geoscience education to the public.

Trail of Time team (*= Principal Investigators)

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Publications about the Trail of Time:

1. Karlstrom, K., Semken, S., Crossey, L., Perry, D., Gyllenhaal, E. D., Dodick, J., Williams, M., Hellmich-Bryan, J., Crow, R., Bueno Watts, N., & Ault, C., 2008, Informal geoscience education on a grand scale: the Trail of Time exhibition at Grand Canyon. *Journal of Geoscience Education*, v. 56, no. 4, p. 354-361.
2. Crow, R., Karlstrom, K.E., Crossey, L.J., Semken, S., Perry, D., Williams, M., and Bryan, J., 2011, It's about time: Innovations in geoscience education at Grand Canyon: *Legacy*, v. 22, p. 26-27.
3. Semken, S., Dodick, J., Ben-David, O., Pineda, M., Bueno Watts, N., & Karlstrom, K., 2009, Timeline and time scale cognition experiments for a geological interpretative exhibit at Grand Canyon. *Proceedings of the National Association for Research in Science Teaching*, Garden Grove, California, 8 p.
4. Semken, S., Dodick, J., Frus, R., Perry, D., Wells, M., Bryan, J., Williams, M., Crow, R., Crossey, L., and Karlstrom, K., 2010, Studies of Informal Geologic Time Learning at the "Trail of Time" in Grand Canyon National Park: *Informal Learning Review*,

