An OU geologist gains national attention as she searches for clues to a 300-million-year-old mystery. Was it the glacier or the river that pulled off the Colorado canyon caper?

# COLD CASE

By Bill Moakley

Photo provided

## If Gerilyn "Lynn" Soreghan is right,

the 2001 spring break drive she and her family took through Colorado's Unaweep Canyon could have traversed a glacier had they taken it some 300 million years earlier.

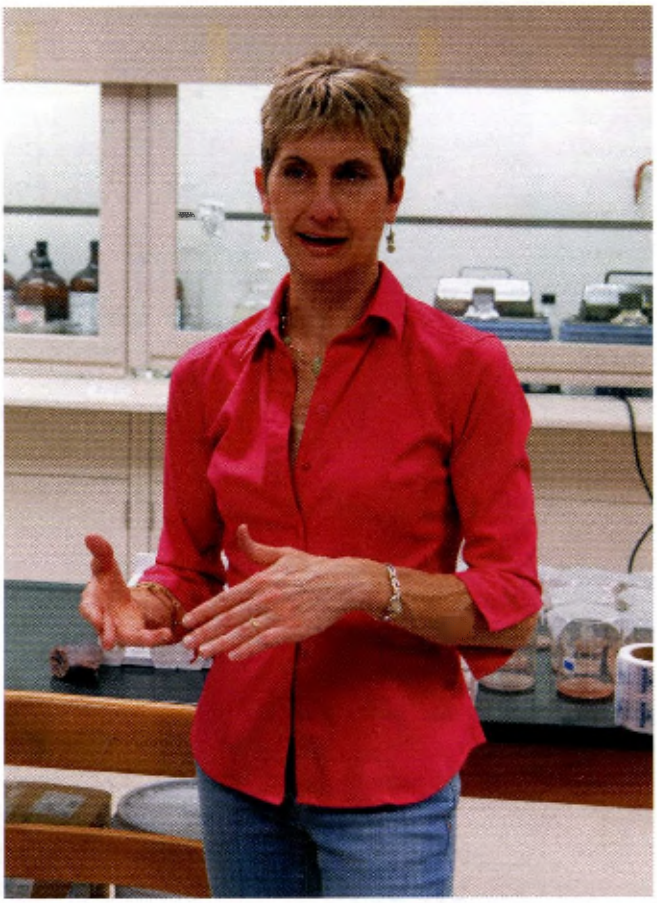
Of course, the issue of automobile travel might have been a stumbling block back then, but Soreghan, associate professor in the OU College of Earth and Energy's School of Geology and Geophysics, believes the ice was definitely there.

That assertion has generated a lot of debate and provided Soreghan and her students ample opportunity for field-based research. Though she has struggled to get her hypothesis published, her work is not going unnoticed.

Soreghan was the 2006 recipient of the prestigious James Lee Wilson Award for Excellence in Sedimentary Geology by a Young Scientist, given by the Society for Sedimentary Geology. Recipients of the award are recognized for having achieved a significant record of research accomplishments in sedimentary geology, including all aspects of modern and ancient sedimentology, stratigraphy and paleontology. The award is named for the renowned paleontologist, stratigrapher and sedimentologist who had a distinguished career in both private industry and academia.

The award is especially meaningful to Soreghan, who as a summer intern during her graduate school days at the University of Arizona, met Wilson at his New Braunfels, Texas, home. That encounter began a friendship that has grown through the years.

Unaweep Canyon in western Colorado is at the center of a geological controversy. The widely held belief that the canyon was formed by rivers is being challenged by OU geologist Lynn Soreghan.



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Lynn Soreghan explains her hypothesis to vistors in her lab.

"It held special meaning for me because he has been such an influence on me," Soreghan says. "He is truly a wonderful man who is such a mentor to young people. Even though he has had this illustrious career, he is absolutely humble. He really listens to students' ideas and treats them like anybody else's ideas."

Soreghan, who holds a doctoral degree in geology from Arizona and came to OU in 1996 after working in the oil and gas industry, hopes her ideas get that type of treatment from journal editors and peer reviewers.

The OU geologist has proposed that some 300 million years ago, during the late Paleozoic, glacial ice extended into what is now western Colorado. The problem is, western Colorado at that time sat directly athwart the equator, in a region that conventional wisdom believes to have enjoyed a warm tropical climate.

Thus the significance of her drive through Unaweep Canyon.

The origins of the canyon have been debated since it was first discovered by the Ute Indians. Located near Grand Junction, Colorado, the canyon is near both the Gunnison and Colorado rivers. Though they do not flow in the canyon today, scholars have hypothesized that the rivers were responsible for cutting the canyon.

Soreghan disagrees.

"[Unaweep] doesn't have the morphology of a river canyon. It has the morphology more of a glacial valley," she explains. "That hasn't escaped anyone, and people have suggested that maybe it was an alpine glacier, and there was some ice up high."

She says the canyon's high point is well below the generally accepted level of ice-age glacial formation in the area. But she hypothesizes the canyon was carved by ice at lower elevations during the late Paleozoic, almost immediately back-filled and was continuously layered with sediment.

As the Rocky Mountains started to rise, the Gunnison and Colorado rivers started to evolve, with at least one of them eventually serving as an agent of exhumation for the canyon, rather than cutting the canyon itself.

The canyon ultimately became blocked, Soreghan believes, forcing one or both of the rivers to follow paths of lesser resistance and allowing it to partially fill once again, leaving partly exposed the landscape we see today, a landscape Soreghan believes is 300 million years old.

During a drilling expedition, Soreghan and a research team that included her husband, Mike, an assistant professor and research associate in the School of Geology and Geophysics, found an interesting piece of evidence that seems to bolster her late Paleozoic formation hypothesis: The bottom level of fill material contains spores that date to the late Paleozoic.

"If there is Paleozoic material in the canyon, the canyon is at least of that age," Soreghan points out. "We think the canyon

was filled, and the Gunnison River found and erased most of the Paleozoic fill, leaving a little bit."

Soreghan's hypothesis has not gone unchallenged. That, says Larry Grillot, dean of the College of Earth and Energy, is not necessarily a bad thing.

"The history of science is like that," he explains. "There are a lot of stories of ideas that early on were initially rejected and eventually proved to be revolutionary. Whether or not Dr. Soreghan's are we do not know yet. Time will tell. But there is no doubt she doesn't shy away from that challenge."

Doug Elmore, interim director of the School of Geology and Geophysics, agrees.

"It's a natural process for an initial idea to be met with skepticism. If you can make a strong case, people will come around to your point of view," he says. "Sometimes when you start off in a new area you have to keep plugging away, and it takes a while for the pendulum to swing. It may not swing because you may not be right. But [Dr. Soreghan] has a hypothesis and is trying to test it. That is entirely legitimate."

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Graduate student Kristen Marra holds a piece of granite clast from the base of the core drilled in Unaweep Canyon. The sample has been dated to the Late Paleozoic period, which means the canyon was part of an ancient landscape.

Grillot says despite the struggles Soreghan has faced in getting published, the fact she received the Wilson award serves as testimony to the standard of research she conducts.

"It does give recognition to the fact the scientific quality is there," he says. "That in itself demonstrates the level of her achievement."

If Soreghan's hypothesis about the formation of Unaweep is correct, it could lead to re-examining how scientists look at what are called icehouses—periods during which large, continental-based ice sheets are present. Earth today is in an icehouse, with the presence of continental glaciers at high latitudes of both the northern and southern hemispheres. The last icehouse period? The late Paleozoic.

"The state of being in an icehouse is very rare," Soreghan explains. "Ninety percent of Earth's history doesn't include times of large, continental ice sheets."

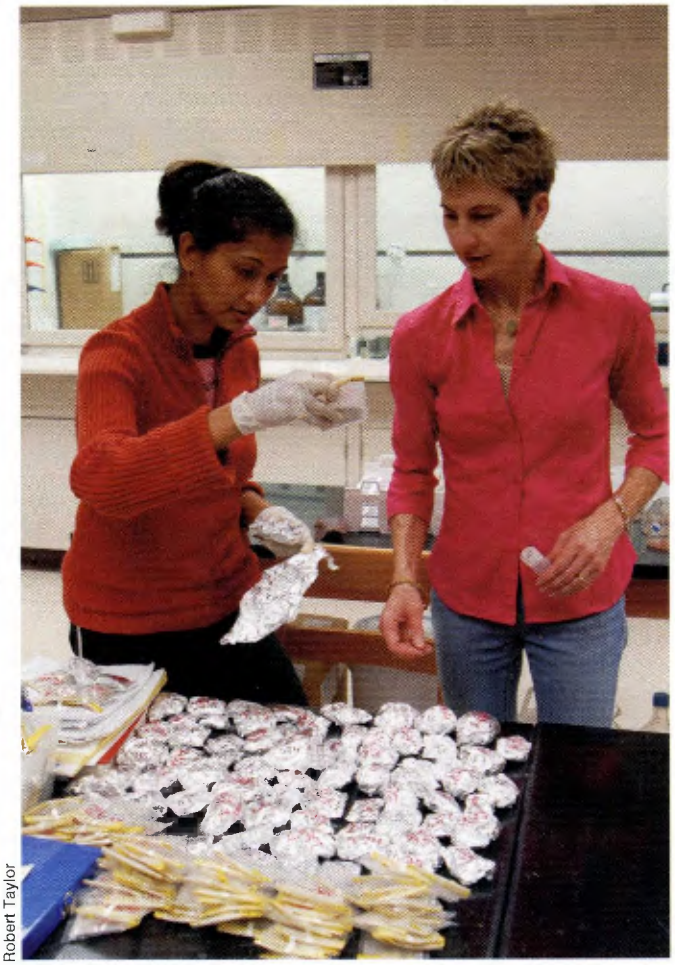
Digging deeper into the planet's rock record may ultimately reveal clues about Earth's current climate and where it is headed. One of Soreghan's research areas is identifying types of major events that affect the move from icehouses to greenhouses—periods of warmer, tropical climates not marked with large, continental ice formations—and what happens during the transition from one state to another.

Soreghan also is an advocate of the interdisciplinary study of Earth.

"It used to be we'd talk about the atmosphere, and that was meteorology. We'd talk about the hydrosphere, and that was oceanography. We'd talk about the geosphere, or the solid rock part, and that was geology. Rarely would scientists studying the different parts talk to each other," she notes. "Increasingly, we're talking about Earth as a system."

A quote by naturalist John Muir on the wall outside of Soreghan's eighth floor office in Sarkeys Energy Center underscores her commitment to the idea of a unified approach to looking at this planet: "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

Soreghan believes the sentiment is particularly applicable to more interdisciplinary study of geosystems. "More and more, there is this idea that we really can't separate one from another."



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Doctoral candidate Sohini Sur and Soreghan look over powder samples as part of their project examining atmospheric dustiness of the Late Paleozoic period.

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