

Her students consider her one tough teacher; her civil engineering colleagues wonder at her work ethic and commitment; and now she has entered a rarified group among her national peers.



“Ninety percent of a person’s success rate is who you work with,” Amy Cerato says, crediting the national recognition her research has received to the quality of the team of which she is a part—from left, K. K. Muraleetharan, Gerald Miller, Cerato, Kinoosh Hatami, and (not pictured) Musharraf Zanan.

# A Year in the Life of Amy Cerato

By Anne Barajas Harp  
photos by Robert Taylor

**S**aying that Amy Cerato has had a busy year might be a bit of an understatement. After all, earning two major professional awards, meeting the president of the United States, giving birth for the first time and having a tornado rip through your front yard is enough to fill anyone’s calendar.

Cerato, the Rapp Foundation Presidential Professor in the University of Oklahoma’s School of Civil Engineering and Environmental Science, is still spinning from a January visit to the White House, where she and 99 other scientists received the Presidential Early Career Award for Scientists and Engineers. The designation is the nation’s highest honor for young researchers.

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Cerato, here with daughter Mia, takes very seriously the responsibility to be successful for other young women in engineering and to demonstrate to her women students that they can have both a career and a family.



The award recognized Cerato's National Science Foundation-funded work on expansive soils, a topic that sounds benign yet costs U.S. taxpayers billions of dollars each year and impacts a full quarter of the nation. Cerato was the only civil engineer to receive the PECASE award. A month later, her research earned Cerato a top award from the American Society of Civil Engineers.

"It has been a big year," Cerato says with a smile as she holds six-week-old daughter, Mia. Two weeks earlier, she and Mia had huddled in a bathroom while an F-3 tornado broke trees into matchsticks a stone's throw from the front porch of their east Norman home.

Cerato's work deals with equally large forces of nature. Much of the Southwest, including Oklahoma, is built on expansive soil, land that contracts in extreme heat and swells after heavy rains. This instability creates damages to the tune of \$13 billion each year—more than what is spent on earthquakes, floods, tornadoes and landslides combined.

Cerato, who is one of only 100 scientists worldwide actively researching expansive soil, believes she can help bring that number down. "My goal is to help society immediately in building better foundations and long-term predictions of soil behavior."

She explains that this complex-sounding issue is fairly cut and dried. "If you put a house or a foundation on shifting soils, you're going to have cracking. Once you have foundation cracks, they're impossible to fix—repairs are only temporary." Even expensive "pier-jack" systems will not keep future damage from occurring, she says.

The problem and the solution are the same for our nation's homes and roads: soil testing. "Building contractors don't do testing now," says Cerato, whose husband, Michael Leary, is a contractor and whose own home sits on expansive soil.

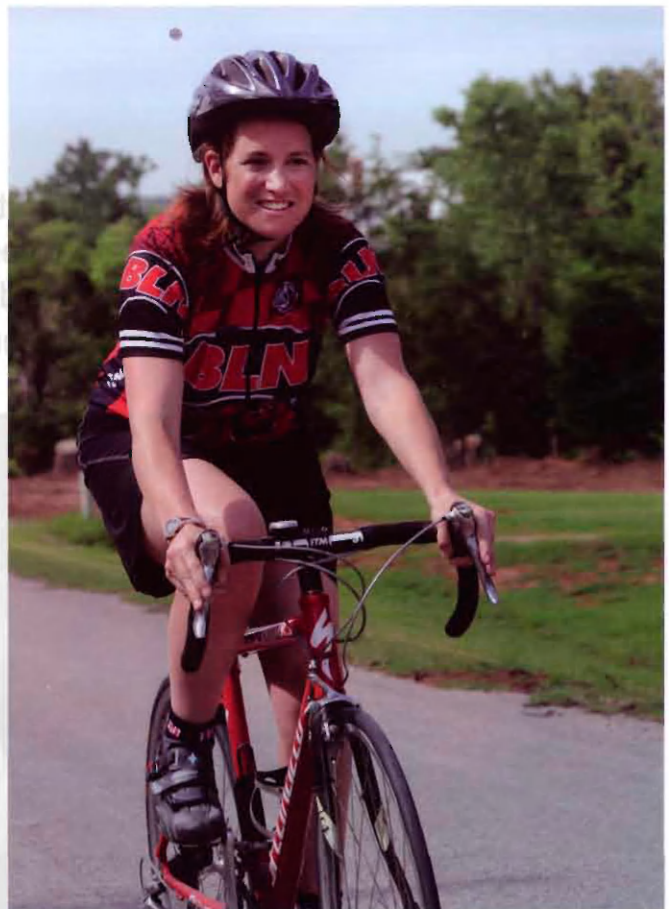
Cerato feels homeowners should start the building process by contacting a soil-testing laboratory, like those at OU or Oklahoma State University. Free information on soil types also is available online from the National Resources Conservation Service at <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>, she says.

If the property is on expansive soil, a more serious step may be necessary.

Deep foundations are the only real solution for building homes on expansive soil, Cerato says. Drilling companies drill piers into the soil past the active zone, where water no longer infiltrates the soil, about eight to 11 feet below the surface. The house's foundation is designed to "float" on top of the piers, which allows movement without cracking. Deep foundations are not cheap—they may cost as much as \$30,000—but the expense can be rolled into a home mortgage, as opposed to the cost of foundation repairs, which can be as much as \$200,000, not covered by homeowners insurance or building contractor's warranties.

Bridges can be constructed in the same fashion, using either driven piles or drilled piers. Expansive soil under roads can be chemically stabilized or even dug out and replaced with stable soil, she adds.

This combination of cutting-edge research and practical application attracted the attention of the NSF and the White House, which has pledged \$5.5 billion to infrastructure repair



No casual bicyclist, Amy Cerato thinks nothing of pedaling from her far east Norman home to the Carson Engineering Center on OU's main campus where her classes and laboratory are located.

through the American Recovery and Reinvestment Act. The attention is well deserved, says Robert Knox, who serves as the Ted A. Kritikos Chair, Presidential Professor and director of the School of Civil Engineering and Environmental Science.

"Amy is incredibly talented. We knew that when we recruited her," Knox says. "But talent only takes you so far. She is the most energetic person I've ever come across; her work ethic is second to none. She is 100 percent committed to what she is doing."

"To get where she is going, she set some goals for herself," he says with something like amused awe. "And she will not be denied."

Cerato began setting goals as early as high school, when she spent six weeks deep in Kentucky's Cumberland Gap National Historic Park with the Student Conservation Association summer program. Food was delivered by helicopter. The campers were on their own when it came to finding clean drinking water, and the closest stream was infected with bacteria.

Cerato was given the job of designing a gravitation water filtration system using a tree, buckets, a charcoal filter and paper coffee filters. It worked so well that her supervisor suggested Cerato might have a future career in engineering.

"I didn't even know what that was," admits Cerato, who grew up in the Pennsylvania backcountry 25 miles from the nearest grocery store. "My family had always done engineering projects—we were always helping local farmers or building conservation projects in the woods—but we never called it that."

While at Lafayette College, Cerato joined a class of engineer-

ing students that was equally split between men and women. “That’s not reality,” she says wryly, adding that she encountered very few female engineering professors during her undergraduate career and absolutely none in her graduate program at the University of Massachusetts Amherst.

At OU, Cerato is one of three women civil engineering professors and is acknowledged as one of the toughest professors in the program. She has won both the Alumni Teaching Award for the top 10 percent of student course evaluations and is the five-time recipient of the “Golden Cheeks Award,” which students drolly bestow upon the hardest professor in the school.

“I can relate to students, but I’m also very strict,” Cerato says. “While they think I’m the toughest teacher they ever had, they also know what I expect of them. People rarely rise above expectations, so it is very important to set the bar high and challenge students.”

Cerato holds herself to this same high standard.

“Success is hard. It’s easy to be mediocre. I feel a lot of responsibility to be successful for other young women in the field;

I feel like I’ve got to keep going, and I can’t stop.” Paradoxically, she feels part of her responsibility is to demonstrate that women engineers can have both a career and a family. “If you can’t show that, who wants to be a civil engineer?” Cerato asks.

The question is especially pertinent today, when half of the engineers currently in practice will retire by 2020. There are not enough engineering students in the pipeline to stem the looming shortage, a problem Cerato credits partly to our culture’s perception of engineers as men sitting in cubicles wearing pocket protectors.

“It’s not ‘Dilbert,’ ” she protests with a laugh, adding that she is careful to let prospective students know she is an outdoors enthusiast who enjoys hiking, boating and biking.

“We do very important work, but it’s not very flashy,” she says, pointing out that there is no glamorous “CSI” or “Grey’s Anatomy” for engineers on television.

“I think we need to change the message. We have to stress that we can help people. As an engineer, you can change society. Instead of helping people one at a time, you can help

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Growing healthy food for herself and her family is just one of Cerato’s many passions. She has dedicated a substantial portion of her front yard to a bountiful vegetable garden. The rest of the acreage she shares with her dogs, who come in a variety of shapes and sizes.

thousands at a time.”

Cerato has done her part to spread the word. On the heels of the PECASE award, she made a short tour of local media and talked about everything from meeting the President (“We were lined up in the East Room, and all of a sudden Barack Obama walks around the corner”) to the misconception that prospective engineers must be math and science whizzes, to the need for engineers to become involved in policymaking on the local and federal levels.

She expands on the last thought by pointing out that politicians usually have a background in government, law or business. Few have the hard science to back up decisions made about the environment or our nation’s infrastructure.

“They can implement policy changes, but they’re not always aware of the ramifications of their decisions. Why not take our knowledge into the public arena to make policy? While engineers typically don’t want to be in the public eye, I think they have to.

“We can’t just sit at our desks and do great designs,” Cerato says with conviction. “We have to be the ones to follow through.”

*Anne Barajas Harp is a freelance writer living in Norman.*