

SDSU 'fault finder' reveals the hidden history of quakes

Gary Robbins, San Diego Union Tribune, 3-28-11

Can a guy get a break? Tom Rockwell wonders as he roams the desert outside Borrego Springs, scanning a pale expanse of sand and rock. He takes it in and says, "C'mon, where's the fault?"

Rockwell is egging himself on. The San Diego State University seismologist believes the Earth will surrender its secrets if you're persistent. And on this day, like so many others, it does.

He notices a rise in the ground about the height of a wine bottle and tears into it with a shovel. An hour later, Rockwell kneels in a trench, runs his finger over a thin line of sediment, and says, "There's the fault. It had to be here someplace."

It's not a victory. This isn't about winning. It's about history. Rockwell searches for the path of faults. Their stratigraphy can tell you roughly when earthquakes occurred, how big they were, and when the fault might snap again.

It's the kind of research that can lead to changes in building codes and emergency planning and simply the way scientists think about Earth.

Today, Rockwell has unearthed a sliver of the San Jacinto fault. It could just as easily be the San Andreas or the Elsinore or Rose Canyon. Rockwell studies the entire seismic fabric of Southern California, as well as faults from Turkey to Israel.

Other scientists also are in the hunt. But researchers say Rockwell is among the most intuitive, skillful and tireless seismologists in the country.

"Tom can read the story of geology in a way that most people can't," says Ken Hudnut, a geophysicist at the U.S. Geological Survey in Pasadena. "He has this Jedi-like ability to see and sense things."

Hudnut flashes back to a moment last year when scientists gathered to watch video of smoke rising from the mountains where the magnitude-7.2 El Mayor-Cucapah quake occurred in Baja California in April.

"Tom looked at the smoke and realized that a few seconds passed between breaks in the fault," Hudnut says. "It told us something about the quake. No one else picked up on that."

The 56-year-old Rockwell has been digging trenches and revealing potential seismic threats for 30 years. He was largely responsible for determining that the Rose Canyon fault, which snakes through San Diego County, is active. He also helped spot seismic hazards in the region where the Panama Canal is being expanded.

More recently, Rockwell has been exploring the San Jacinto system while also working a research trench near El Centro, along a strand of the southern San Andreas fault. Tiny plastic strips mark interesting spots at both sites, and Rockwell is happy to explain what they mean. Or what they might mean. Like most seismologists, he's loathe to talk in absolutes. No one can predict quakes.

He gets antsy when you ask about his skill at finding buried faults. He'd rather talk about his love of Jimmy Buffett music or piloting airplanes or what he has stocked in the wine cellar of his home in La Mesa. Pressed for

an answer, Rockwell says, “When I was a kid and someone hit a baseball over the fence, I was the one who found it. I just have a knack for finding things.”

There’s far more to it than that. When the conversation drifts to the broad nature of seismology, he talks about the importance of noticing subtle but distinct patterns in the landscape. Look closely, he says, and things like erosion and lift and slumping will point you to where a fault might exist.

Then you have to dig and search for clues that could be the size of a frizzy strand of hair. And you often have to dig in many places to get a sense of one small section of fault.

“You’re not looking for a needle in a haystack,” says Rockwell, who has dug more than 1,000 trenches. “You are looking for dozens of needles in dozens of haystacks.”

He lives for the hunt.

“Tom is a what’s-around-the-next-bend kind of guy,” says Scott Lindvall, a Valencia geologist who earned his master’s degree under Rockwell. “He’s full of enthusiasm. He wants to get out there.

“I remember going with him to look for the surface rupture of the Superstition Hills earthquake in 1987. We took maps and drove off-road, negotiating canyons and washes without knowing if there was a way out. Everything’s an adventure with Tom, and fun.”

Rockwell came to know the natural world early in life. He grew up in El Cerrito, near Berkeley, in a house about a block from the Hayward fault. Back then, scientists didn’t fully grasp the destructive power of the Hayward. They were just getting their heads around the idea that the Earth has tectonic plates.

Rockwell’s father, an engineer, knew enough to reinforce the basement against shaking when he was building the family home.

Family outings were even more illuminating. His parents regularly took him hiking in the Sierra Nevada, where the shape and texture of the Earth stands in stark relief.

“My interest in geology came from my mother, who collected rocks and fossils,” Rockwell says. “By the time I was a teenager, I had more rocks in my dresser drawers than clothing.”

His interest in seismology emerged in college. One of his professors frequently showed compelling slides of faults from different parts of the world. Rockwell liked the idea of a job that involved travel.

In 1983, Rockwell joined the faculty of San Diego State, where he could teach and make quick trips to remote research sites. Emphasis on the word quick. He drives like he’s fleeing a mob.

The trips offer time for reflection. On a recent morning, as he shot east on Interstate 8, Rockwell gestured through the window of his Ford Explorer and said, “Just once, I’d like to be out in the middle of nowhere and feel an 8.0 quake — providing it didn’t hurt anyone. I’d like to know if you can see the fault slipping. It’d let me identify more strongly with what I study.”

He’s truly hungry for such action; Rockwell has never been close to the epicenter of a big quake. When last year’s El Mayor shaker hit, he was driving to an Easter party. He didn’t know there had been a big quake until after he got there.

Rockwell doesn't dwell on it. Like the Earth he studies, he is a restless guy, forever thinking about what he might find the next time he steps into a research trench.

In places like Borrego Springs and the site near El Centro, Rockwell searches the walls of trenches for black smudges that are usually no larger than the pupils of his eyes. There's always a chance that the smudge is a trace of charcoal left over from the burning of wood hundreds of years earlier.

He can perform Carbon-14 dating on the charcoal, precisely determining the age of the wood. That helps him to determine the approximate date of past earthquakes. The quakes appear as fissures in the soil, just above the spot where charcoal is found. It's history by association.

Scientists use this technique to establish the recurrence rates of earthquakes. The job requires patience and perspective. Trenching faults is the equivalent of trying to find and assemble the pieces of a massive puzzle that will never be finished or fully understood because the Earth is too large, complex and dynamic to grasp.

But there are dividends for guys like Rockwell. Rebecca Tsang, one of his graduate students, watched him move around a trench near El Centro on a recent morning and said, "He loves what he sees. He uses words like gorgeous, beautiful, pretty and fabulous to describe the fault."

Ever the teacher, Rockwell says, "I'm not sure I'd call this beautiful. But it certainly contains a beautiful story. Look at the stratigraphy. It doesn't get this good at many sites. It's telling us a story."

The thought lingers into evening, when Rockwell is back in his Ford Explorer, gunning for home as the lights of Salton City twinkle in the distance.

"I hope I'm around in 30, 40 years to see what all of this means."