Why the discovery of a new fault near the Salton Sea earthquake swarm could be important

Mark Muckenfuss, Riverside Press-Enterprise, 10-7-16

A newly discovered fault beneath the Salton Sea may change the way scientists look at the southern San Andreas fault and the growing potential for a major earthquake centered in that region.

Valerie Sahakian, a postdoctoral fellow at the U.S. Geological Survey Earthquake Science Center, is lead author of a report on the discovery of the new fault. Sahakian did the research while at Scripps Research Institute in La Jolla, where she was until just recently.

The Salton Trough Fault, according to the report, runs parallel to the San Andreas Fault, California's major earthquake fault, which terminates at Bombay Beach on the eastern shore of the Salton Sea. Most other known faults in the sea bed nearby run perpendicular to the San Andreas. Those other faults were responsible for a recent swarm of quake activity.

The southern section of the San Andreas Fault is long overdue for a major earthquake. Such temblors usually erupt every 175 to 200 years. Scientists say the fault's southern section hasn't moved significantly since the 1600s. They estimate a 19 percent chance of one or more quakes of a 6.7 magnitude or greater will take place there within the next 30 years.

Sahakian's paper appeared online in the Bulletin of the Seismological Society of America last month, but has drawn attention because of the earthquake swarm in the same area of the Salton Sea over the past week and a half. More than 200 quakes were recorded, the largest registered at 4.3, leading earthquake experts to temporarily raise the risk for the anticipated Big One on the San Andreas Fault just a few miles away.

The new fault is not one of those that moved during the swarm. In fact, it had been undiscovered until now because no activity had been recorded on it in the past.

"It's hard to say what the significance is," Sahakian said, at least not until scientists have more data on the fault.

She said she's intrigued how it might influence the San Andreas Fault.

"It looks like it's fairly old," she said. "It would be really interesting to see if there is any relationship."

The new fault was found during a survey of the region using seismic reflection equipment and lidar, a radar type system that uses lasers instead of sound. The data revealed a "deformation" in the surface of the ground that the researchers said had a "thickness up to at least 2 kilometers (about 1.2 miles). The San Andreas Fault is believed to be 10-12 kilometers (6.2 to 7.5 miles) deep in that area.

Neal Driscoll, a professor of geology and geophysics at Scripps, is one of the other scientists who worked on the project. He said he and his team members are being cautious about their findings. In fact, they're seeking further evidence that they've actually found a new fault.

"There are places where we directly imaged the fault," Driscoll said. "There are parts that are less well-resolved and they're dashed. We're being guarded. In places, it's hard to get very close to the fault. We're planning to do land surveys where it extents to the north (and leaves the sea bed).

Driscoll said the team believes the fault is 35 kilometers to 40 kilometers long. They have no idea of what kind of power it might be able to generate, since they haven't yet found any seismic evidence tied directly to it. But there are indications of past movement.

"The layers in the Salton Sea, right up to the sea floor, are deformed by this fault," Driscoll said, "So it appears to be active.

The southern Salton Sea has a web of faults, mostly running in an east/west orientation. The Salton Trough Fault would be different since it runs mainly north/south.

"It's a very complex area tectonically," Sahakian said. "It's a pull-apart basin between the San Andreas and the Imperial fault."

The Imperial fault, also a north/south fault, is about 10 miles from the southern tip of the San Andreas fault. The cluster of smaller transverse faults is in between the two.

"We can learn a lot about the basin and tectonics and that evolution," Sahakian said, "that was a big part of the intent behind the study."

Then, she and others noticed the new fault.

Now that they've found it, the researchers hope to excavate a portion of the new fault to learn the history of its movement and to see if that correlates with action on the San Andreas.

"Future research is to try to understand how this fault might interact with San Andreas in depth and time," Driscoll said.

Whether that will provide insight into when we can expect the Big One is anyone's guess, he said.