



The story

“Is San Francisco Next?”

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by Judith Lewis Mernit

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The pitch

Dear James --

[stuff cut]

Jian Lin has devoted his life and career to trying to determine when earthquakes will happen and where -- not predicting, but forecasting; understanding how one shift triggers another, what constitutes a foreshock and whether the lithosphere is vulnerable to chain reactions. This is of urgent interest now in California, Oregon and Washington State, where some people worry that a fourth point in the Pacific plate, on the Cascadia or San Andreas faults, is due to rip open soon. (Simon Winchester wrote a short piece about that in Newsweek.)

Lin grew up in China working on Mao's team of young scientists dispatched around the country to predict earthquakes. Earthquake prediction is generally something only dictators and the unhinged ever try to do, but Mao's experiment yielded some useful results. The kids monitored groundwater levels, observed animals, strung wires between trees to detect motion. They did this for a couple of years before late January of 1975, when one team of young observers reported to Beijing that they had enough data to raise an alarm. Snakes were emerging from hibernation, livestock had run off, unusual swarms of rats were invading the city. Chinese officials consulted with geologists who had noticed a foreshock sequence, and heeded the teenagers' warnings. They predicted that an earthquake would hit near the city of Haicheng, Liaoning Province, within the next 24 hours.

The police and local authorities in Haicheng figured the best way to protect people was to lure them outside, which wasn't easy. It was chilly in Haicheng that time of year, and the last thing people wanted to be doing was standing around in the cold waiting for an earthquake that might not happen. So they built bonfires and set up movie screens outdoors, turning the city into a massive outdoor festival. Their timing was good: At 19:36 Chinese Standard Time on February 4, a 100 mile-long segment slipped apart on the Haicheng fault in a 7.3 magnitude earthquake. The shaking was felt over more than 650 square miles, and the city of Haicheng was close to destroyed. But only 3,000 of its 1.2 million residents were killed.

Without the warning, it's likely that the death toll would have climbed above 150,000.

Haicheng bolstered a lot of people's confidence among the earthquake predictors, including among the young crews whom the government had engaged as monitors. But then, just a year and a half later, a 7.6 struck near the city of Tangshen, 300 miles southwest of the 1975 quake. Despite the teenagers still measuring ground motion, the geophysicists counting foreshocks, the detailed observations of groundwater levels and animal behavior, Tangshen came as a surprise. More than 250,000 people died, according to official Chinese records. Lin thinks the real death toll is closer to 400,000.

Lin decided in that moment that he wanted to better understand the science of the lithosphere, but he wasn't allowed to go to college. Instead, he was sent down for re-education in a rural village, where he'd learn to be a rice farmer, as his older siblings did. He was saved in 1976 by Mao's death and Deng Xiaoping's decision to reopen the country's shuttered universities. Lin took the national entrance exam and became part of the first class of students to attend university in China after Mao.

Now 52, Lin has built up a body of research into the movements of the earth's crust, known as "Coulomb stress interactions." He asks the kind of questions ordinary people in earthquake zones want to know (and mistakenly think they can answer). Why do slips on some faults take stress of other nearby faults, and others trigger future quakes? Which kinds of faults and quakes trigger chain reactions, as Lin and his colleague Ross Stein at the U.S. Geological Survey believe happened before the 2004 Sumatra earthquake? Can earthquakes be plotted in any kind of pattern around the globe, and can physicists put a time frame on them? What do clusters mean?

In other words, does the pattern of earthquakes in Chile, New Zealand and now Japan -- all shifts of the Pacific tectonic plate -- mean anything for the long quiescent Cascadia or San Andreas faults on the U.S. West Coast? Is this sequence even a pattern at all?

As I live 40 miles from the southern segment of the San Andreas and have written about it often and with dread, these are questions I think about myself. I download quake maps from USGS and plot dots on maps in Google Earth to see if anything looks odd. And to me, it looks like the whole Pacific plate is on the move more than usual. But seismologists hate it when journalists say things like that -- seismology is the most humbling and least predictive of sciences -- and so I don't. But I'd like to know what Jian Lin says, and I think his moving personal story is a good way in to this potentially arcane topic.

I've interviewed Lin a few times since I met him in person at Woods Hole in 2008. He's a storyteller and a lucid explainer, and the only reason he's not on the radio more (like Ross Stein is) is because of his thick accent. I've also interviewed other seismologists, like Lucy Jones at USGS and Ken Hudnut at CalTech, who have varying opinions about his work. It's important to be honest about the controversial nature of this research, but it's fascinating, and, I think, instructive, all the same.

And I've written quite a bit about earthquakes, and moderated panels on the topic, so I have lots of sources. Most recently, I worked on this book: <http://www.artcenter.edu/getready/book.php> (I wrote for it, edited some of it, and in the

end basically put it together into a coherent narrative); and I wrote this for High Country News: <http://www.hcn.org/issues/40.19/the-coming-quake>

Thanks for considering this, if, in fact, you do.

Really enjoyed your "My Own Personal Wikileaks" story by the way.

All best,

Judith Lewis Mernit