

# Quakes can lead to more quakes, scientists suggest

**David Perlman, San Francisco Chronicle, 3-2-10**

The deadly earthquake that struck in Chile on Saturday was probably due to stresses built up deep in the Earth's crust by the largest recorded temblor ever recorded in the same coastal nation 50 years ago, scientists proposed Monday as an explanation for the most recent devastating event.

Similar stress from early historic earthquakes in California could well have helped trigger quakes like the damaging Coalinga (Fresno County) temblor of 1983 that destroyed the small city's downtown, they said.

Ross S. Stein, a research geophysicist at the U.S. Geological Survey in Menlo Park, and Jian Lin, a geologist from the Woods Hole Oceanographic Institution on Cape Cod, are conferring about the latest Chile quake in Stein's office this week, and in interviews Monday they discussed the concept they call "stress triggering."

The monstrous Chile quake in 1960, with a magnitude of 9.5, created strong stress deep in the ground at both ends of the rupture zone, and Saturday's temblor relieved that stress in one lurch, Lin said.

Although unrelated on the far side of the Pacific, the same kind of stress inside a similar giant rupture zone beneath Indonesia built up and led to the great tsunami-generating Sumatra quake of 2004, Lin said. And that stress then helped trigger the next major earthquake that hit the same island on a different fault only three months later, he said.

"But just why it took 60 years for stress to trigger Saturday's quake in Chile, while it took only three months to rupture the ground in Indonesia, we just don't have enough science yet to understand," Lin said.

The January quake in Haiti that has claimed an estimated 230,000 lives so far could also have been triggered, at least in part, by stress built up during three earlier major quakes on that island in 1751, and two others that struck within months of each other in 1770, Stein suggested.

"Haiti right now remains vulnerable to another large quake closer to Port au Prince, although the chance is quite small - a few percent, perhaps," he said.

Earthquake studies in Northern California relate many recent events to a remote part of the San Andreas Fault where the Fort Tejon quake of 1857 struck with a magnitude later calculated at 7.9.

That quake, Stein said, created stress on the Coalinga fault that resulted in the devastating magnitude 6.7 quake there 126 years later.

Stress inside the fault generated by the Fort Tejon quake also helped rupture the White Wolf fault in Kern County and caused the Tehachapi earthquake of 1952 which killed 14 people in that small town, he said.

Still another example of "stress transfer," Stein said, was the powerful Landers quake of 1992 with a magnitude of 7.3 that shook all of Southern California. Only three hours later, stress within that fault caused the Big Bear quake 22 miles away, and seven years later set off the larger Hector Mine quake with a magnitude of 7.1 in the Mojave Desert east of Barstow.

"Whenever an earthquake strikes," Stein said, "the probabilities of another quake are higher. Like aftershocks,

they never disappear. But our hypothesis of stress transfer triggering quakes is still being hotly debated; it will take a lot more science to prove it."

Stein and Lin first published their report in 2004 in the *Journal of Geophysical Research*.