Midwest Seismic Zone Became Frozen in Time

Kenneth Chang, New York Times, 8-3-10

A ferocious swarm of earthquakes shook the center of the United States two centuries ago, and it remains a mystery how such strong temblors could have occurred there, in the middle of the North American tectonic plate where the ground ought to be stable.

In the current issue of the journal Nature, researchers suggest that the quakes were essentially set off by the end of the last ice age thousands of years earlier.

In a three-month period starting in December 1811, three major earthquakes, estimated at magnitude 7 or greater, and many smaller ones struck the New Madrid (pronounced MAD-rid) seismic zone in southeastern Missouri and northwestern Tennessee, roughly halfway between St. Louis and Memphis. The quakes were far from the usual earthquake-prone tectonic boundaries. Modern GPS measurements have added to the mystery by showing no signs that the ground is deforming and accumulating strain.

The researchers said that the strain actually built up long ago when the Midwest was squeezed by the uplift of the Rocky Mountains and opening of the Atlantic Ocean, and the strain then frozen in the rocks when the movement stopped tens of millions of years ago. New shaking started about 10,000 years ago, not long after the melting of the ice sheets at the end of the ice age, which washed away a swath of sediment from the upper Mississippi River basin. The timing, say the scientists, was no coincidence.

With the sediments removed, the lightened crust bent upward, stretching the upper layers enough to loosen the ancient faults.

“The removal of the sediments is a little trigger, a little push, the last drop in the bucket that you need to get the fault going,” said Eric Calais, a professor of geophysics at Purdue and lead author of the Nature paper, “and then you get the earthquake.”

With no new strain building up, a fault that broke to generate one of the major earthquakes is unlikely to break again. “But,” Dr. Calais said, “the fault next to it may.”