New Madrid -- New take on a very old earthquake

Tom Chandler, Scripps Howard News Service, 5-20-10

MEMPHIS, Tenn. -- Sure, the Mississippi River flowed backward and church bells rang on the East Coast, but the 1811-12 New Madrid earthquakes weren't nearly as powerful as generations have been told.

That's the conclusion of a U.S. Geological Survey scientist who has spent years studying the legendary series of quakes that largely defined the perceived risks associated with the New Madrid seismic zone, which stretches from southern Illinois to the Memphis area.

USGS seismologist Susan Hough contends that the three main quakes occurring between Dec. 16, 1811, and Feb. 7, 1812, probably were no more than 7.0 in magnitude. While that's still a large event -- the Jan. 12 quake that killed more than 200,000 people in Haiti was a 7.0 -- it's only about one-twentieth as powerful as the 7.7-plus magnitudes previously estimated.

Hough's findings, presented last month at a meeting of the Seismological Society of America in Portland, Ore., carry significance because the 1811-12 quakes -- generally considered to be the strongest that the New Madrid can generate -- serve as a basis for seismic building-code standards in the region.

Hough bases her conclusions on a new method of interpreting historic accounts of the temblors, which occurred long before the advent of modern instruments capable of measuring their power.

"The magnitudes hinge on how you interpret the accounts of the earthquakes," she said. "The accounts are limited."

Hough compiled the accounts of the shaking -- everything from landslides along the river to falling chimneys -- and submitted them to a team of international experts, none of whom had previous familiarity with the New Madrid zone.

She asked the experts to assign the accounts "intensity values."The consensus values then were plugged into a computer program estimating the magnitudes of the quakes.

"When you do that, across the board the magnitudes are lower," said Hough, who is based in Pasadena, Calif.

However, some other scientists say Hough's conclusions are tenuous at best.

Chris Cramer, a research associate professor with the Center for Earthquake Research and Information at the University of Memphis, said that without instrument-based measurements to calibrate the types of accounts reported in 1811-12 effects, it makes little sense to assign magnitudes based solely on them.

"There is a little bit of a disconnect," Cramer said. "Scientifically, you cannot say what she is stating is true."

Scientists over the years have claimed the 1811-12 temblors were perhaps comparable in power to the 1906 San Francisco earthquake, which is believed to be nearly 8.0 in magnitude, because of the dramatic effects they produced and the strong shaking that was felt across more than 1 million square miles. Waterfalls and a backward current were reported on the Mississippi, for instance, and church bells rang as far away as Charleston, S.C.

But Hough's analysis indicates the 1811-12 events are more similar, strength-wise, to the magnitude-6.6 San Fernando Valley earthquake of 1971 and 6.7-magnitude Northridge temblor of 1994.

Some of the more cataclysmic events reported by witnesses two centuries ago, she said, reflect "site amplification."That's the process in which areas underlain by loose soil shake more violently that those on bedrock. Land along the Mississippi would be especially prone to amplification.

Based on archeological evidence, scientists know that the New Madrid zone has been producing major earthquakes every 500 years or so.

But Hough's report is among the latest in a series of studies suggesting that the seismic hazards of the zone might have been overstated in recent decades.

Seth Stein, a Northwestern University researcher, has published papers concluding that the fault zone is shutting down, although scientists at the U of M and elsewhere strongly dispute that.

While he and Hough differ on whether the zone is shutting down, Stein agrees with her assessment that the power of 1811-12 quakes has been exaggerated based on sometimes-sketchy accounts.

"There's a tendency for these things to grow," Stein said.