

Geologists study China earthquake for glimpse into future

July 6 2008

The May 12 earthquake that rocked Sichuan Province in China was the first there in recorded history and unexpected in its magnitude. Now a team of geoscientists is looking at the potential for future earthquakes due to earthquake-induced changes in stress.

Around the world, earthquakes like the one in China are associated with triggered aftershocks that are very large. In 1999, a 7.1 earthquake in Duzce, Turkey, followed a 7.4 magnitude earthquake in Izmit, Turkey. In 2004, an 8.7 magnitude earthquake struck three months after the Sumatra Andaman earthquake of magnitude 9.2. While analysis of the Turkish earthquakes was not timely enough to shed light on the second earthquake there, the researchers believe that information on the Sumatra Andaman earthquake did illuminate the situation.

For the May 12 earthquake, the researchers performed analysis of co-seismic stress transfer onto Sichuan basin faults using broad ranges because at this time, exact values for all the various factors are unknown. The researchers report in today's (July 6) advanced online edition of Nature that "this approach enables rapid mapping of faults with heightened rupture likelihood."

"We knew that the fault was there and we knew it was active," says Eric Kirby, associate professor of geosciences at Penn State. "I had done some previous work in the area, but I do not think anyone would have anticipated the size of this earthquake." The May earthquake in Sichuan Province was 7.9 in magnitude and collapsed buildings, destroyed

villages and killed thousands of people. The earthquake occurred in the area where the Sichuan basin and the Longmen Mountains meet. This is on the eastern edge of the Tibetan Plateau in an area deformed by the collision of the Indian and Asian tectonic plates. The area is crisscrossed with fault lines.

The researchers, who include Tom Parsons, research geophysicist, U.S. Geological Survey, Chen Ji, assistant professor of Earth sciences, University of California-Santa Barbara, and Kirby, used a model to see how the Sichuan earthquake, which took place on the Beichuan fault, affected other portions of that fault and others in the area. They looked at physical characteristics of the faults including the directions and amounts of movement of the faults – whether and how much they moved up and down and side to side, and the estimates of the frictional resistance to motion along the fault.

"The Sichuan earthquake seemed to rupture on the northern portion of the Beichuan fault," says Kirby. "It does not seem to have involved the southwestern branch."

According to the model, after the May 12 earthquake, stress increased on faults running parallel to the Wenchuan-Maowen fault and the two major faults that are perpendicular and to the north of the fault. Some smaller faults south of the earthquake zone show a decrease in stress. However, according to the model, the majority of the faults in the area are still stressed.

"The occurrence of triggered earthquakes after a major earthquake can be months, years or decades," says Kirby. "Sumatra seems to be a really nice example. Also, the historic record in Turkey shows a series of earthquakes that progress from east to west over 60 years."

The data used in the model consists of ranges rather than actual

measurements because of the difficulty of obtaining information from that area of China at the moment. The models always use a range of friction because the movement of the faults changes the friction sometimes in unknown or unexpected ways.

"The model takes what we think we know about the faults in the region and asks what was the change to stress associated with the earthquake," says Kirby. "The model shows where an increase in the potential for failure may occur, but we do not know the trigger point for these faults. The analysis does not say there is going to be an earthquake, just that the potential exists on some of the faults."

Source: Penn State

Citation: Geologists study China earthquake for glimpse into future (2008, July 6) retrieved 9 April 2024 from <https://phys.org/news/2008-07-geologists-china-earthquake-glimpse-future.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--