

# Tsunami Earthquake Location Included in Forecast

30 December 2004

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The location of the Dec. 26 earthquake that unleashed a devastating tsunami across the Indian Ocean was identified in a 10-year forecast of likely earthquake sites worldwide made recently by researchers at the University of California, Davis, Center for Computational Science and Engineering.

The researchers used records of past earthquakes of magnitude 5 and greater and computer models to produce a map that shows "hotspots," where earthquakes of magnitude 7 or greater are likely to occur between 2000 and 2010.

Of 38 large earthquakes worldwide since 2000, 30 have occurred directly on or within the margin of error of hotspots identified by the forecast. The Dec. 26 magnitude 9 event struck on a hotspot off the coast of Indonesia.

"These results indicate that the technique developed by our group can successfully identify the locations for 80 to 90 percent of future large earthquakes over time periods of up to a decade or so," said John Rundle, director of the UC Davis center. The information could allow governments and agencies to make informed decisions about where to locate critical infrastructure and supplies, and to set priorities for allocating resources for emergencies or carrying out seismic strengthening and retrofits, he said.

The 10-year forecasts could aid disaster preparation but are not yet focused enough in time to give actual earthquake warnings. Future work on computational methods, together with the use of specialized radar satellites that can make very precise measurements of ground movements, could be used to enhance future forecasts, Rundle said.

"We can't prevent these devastating events, but we can provide tools so that people can take steps to reduce the potential damage and loss of life," Rundle said.

Starting from identified hotspots, scientists could also use computer models to predict how earthquake-generated shaking would move through the ground, or how and where tsunamis might travel over the ocean, he said.

The UC Davis Center's map uses the same technique as a more detailed forecast for California created by Rundle and colleagues as part of the Quakesim project in collaboration with NASA's Jet Propulsion Laboratory. Quakesim is funded primarily by NASA and the U.S. Department of Energy.

The worldwide map was prepared by UC Davis graduate student James Holliday and presented by Donald Turcotte, professor of geology at UC Davis, on Dec. 14, 2004, at the meeting of the American Geophysical Union in San Francisco, California.

Earlier this year, the team reported that the California forecast, which runs from 2000-2010, had successfully predicted the locations of 12 of 14 large earthquakes (magnitudes greater than 5.0) since January 1, 2000. The California forecast was published on February 19, 2002, in the Proceedings of the National Academy of Sciences. Eleven of the 14 large earthquakes occurred after the publication date.

The researchers have made a similar forecast for Japan that successfully identified the location of the Oct. 23 earthquake in Niigata province on a previously unknown earthquake fault. That forecast, which was prepared by UC Davis postdoctoral researcher Kazuyoshi Nanjo, was presented during lectures by Rundle in Japan on Oct. 13 (Kyoto University) and Oct. 14 (Tokyo University), prior to the occurrence of the Niigata earthquake.

Source: University of California, Davis

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