

# CyberShake

## Clear with a Chance of Tremors

The CyberShake project at the Southern California Earthquake Center (SCEC) is producing maps that predict how much ground motion can be expected throughout the Los Angeles basin over the next 50 years. In the case of a catastrophic earthquake, these 'seismic hazard maps' will preserve thousands of lives and save billions of dollars.

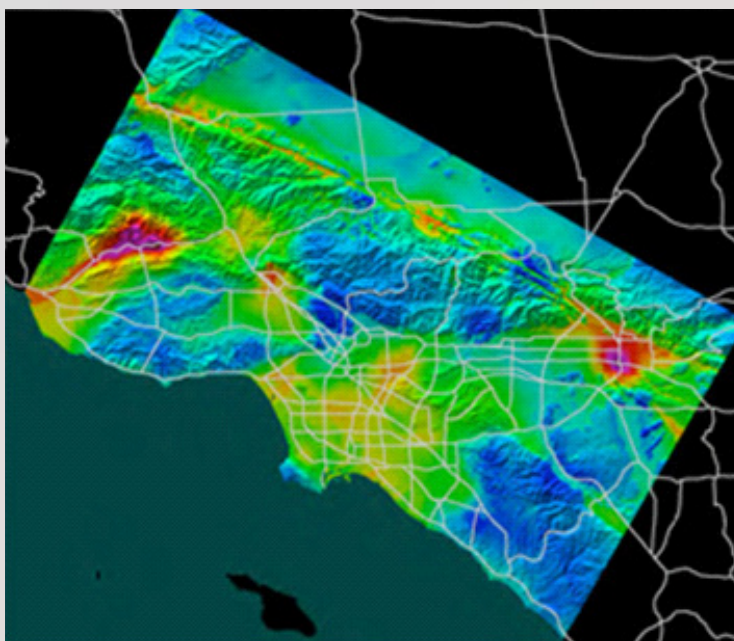
SCEC teamed with the Texas Advanced Computing Center (TACC), whose massive supercomputer, Ranger, enabled the creation of next-generation hazard predictions that are more comprehensive than anything created before.

CyberShake ran 180 million tasks on Ranger making it one of the highest-capacity projects to run on an open HPC system. The developers created new workflows and automation tools to allow many small jobs to be combined into larger jobs, easing the path through the Ranger job queue.

The difficulty in creating these maps lies in the large number of likely earthquakes at a given site.

For example, SCEC had to simulate 415,000 earthquakes across 200 locations to properly characterize southern California. Seismologists studied the geology of the area to determine how earthquakes interact with the soil and substructure of the region, how fast seismic waves travel, and how much shaking the waves would cause. Researchers also had to identify the active faults in the region and determine the probability of each fault rupturing.

The output of the CyberShake simulations will be integrated into a system that incorporates real-world seismic changes as they happen, producing daily ground motion forecasts. "In the next five years, just like weather forecasts, we're going to have ground motion forecasts and a technique that should be applicable anywhere in the world," said Phillip Maechling, information technology architect, SCEC.



*New analyses raise hazard estimates in the Los Angeles and Ventura Basins, and reduce hazard estimates for mountainous regions in Southern California.*

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