

2010 SCEC FINAL REPORT

SURVEY FOR NEW PRECARIOUS ROCKS IMPORTANT FOR TESTING CYBERSHAKE, NGA, AND HAZARD MAPS

James Brune

PBRS AND SEISMIC HAZARD

It has become clear that precariously balanced rocks (PBRs) provide important constraints on ground motion attenuation curves and seismic hazard. Because obtaining a statistically sufficient number of near-source instrumental recordings from very large earthquakes in a variety of tectonic environments may take many decades, precariously balanced rocks which have been in place thousands of years provide important constraints on ground motion attenuation curves and seismic hazard. Support for the old age of the rocks has been provided by cosmogenic age dating (Rood et al., SCEC Annual Meeting Abstracts, 2008). Previous results from SCEC funding are strong evidence that PBRs provide important constraints for all of the new tools for estimating earthquake hazard. The PI and assistant carried out surveys to locate and document new PBRs in areas critical for constraining results of the new seismic hazard tools.

ADVANCED DOCUMENTATION OF PBR SHAPES

In previous surveys we have documented shapes by taking 4 photographs from different angles, assuming that we would revisit the sites if more accurate shapes were required. We have realized that if finding the rock requires an hour of strenuous hiking, we are reluctant to repeat the hike with heavy equipment. We now use a Photomodeler computer program to document rock shapes. We take about 15 pictures at different angles and use the computer program to digitize the shape of the rock. This methodology is now employed to document important rocks and the results have been excellent. The most important rocks for comparison with Cybershake waveforms will be collected in a special table

Surveyed Areas:

North Frontal Fault--Pinnacles near Lake Arrowhead—

Pinyon Flat west of Palm Desert

Deep Canyon southwest of Palm Desert

Ridgecrest area near the Garlock Fault

Pinnacles Area near Trona and the Garlock Fault

Black Mountain Road, San Jacinto Mountain

Jacumba area near Elsinore fault

Joshua Tree National Monument

La Contenta-Eureka Peak area west of Joshua Tree Park

Rocks Photographed for Photomodeler:

Santa Ynez Mountains-Santa Barbara

Wilson Canyon near Anza. CA

Jacumba rock near southern Elsinore fault

Tiana Rock near southern Elsinore fault

McCainValley Rock near Elsinore fault

Enchanted Canyon, Motte Rimrock Reserve, near Perris

Lake Perris North, near San Jacinto Fault

Perris toppled rock

Pioneertown near the Pinto Mountain fault

Yucca Valley near the Pinto Mountain fault

Pacifico Mountain

Grass Valley rocks

Lovejoy Buttes rocks

Beaumont South near San Jacinto fault

Lake Isabella

Round Top rock near Vail Lake

CONCLUSION

We continued surveys for precarious rocks in areas important for constraining earthquake hazard. We documented these with a computer modeling program called Photomodeler. We presented some of the results in the SSA annual Meeting in Portland, OR, the GSA Cordilleran Section meeting in Anaheim, CA, and the 2010 SCEC annual meeting. We will present further results at the 2011 SCEC annual meeting.

