Annual Report to the National Earthquake Hazards Reduction Program

1999/2000 Funding Period

Grant: 99HQGR0011

Title: **3-D VELOCITY MODEL BUILDING AND NUMERICAL SIMULATIONS OF BASIN RESONANCE: THE LOS ANGELES BASIN**

PI's:
John H. Shaw & Jeroen Tromp*
Harvard University
Department of Earth and Planetary Sciences
20 Oxford Street
Cambridge, MA 02138
Tel. (617) 495-2351; Fax (617) 496-0434
shaw@eps.harvard.edu

**now at:*
California Institute of Technology
Seismological Laboratory
MC 252-21
1200 E. California Blvd.
Pasadena, CA 91125
jtromp@gps.caltech.edu

Abstract
In this first year of our project, we constructed a 3-D velocity model of the Los Angeles basin and refined our spectral element method (SEM) code, which will be used to simulate 3-D earthquake wave propagation. The velocity modeling included the analysis of more than 150 sonic logs and 7000 stacking velocities provided by petroleum industry sponsors. The model includes a top basement layer mapped in seismic reflection data, and sediment interval velocities interpolated from the stacking and borehole data using a kriging method. The SEM code has been thoroughly tested to ensure that it accurately incorporates effects due to free surface topography, attenuation, anisotropy, and fluid-solid boundaries. The code has also been implemented on parallel computers, which will improve the efficiency of our simulations in the Los Angeles basin model. Our efforts will develop powerful new methods to predict strong ground motions caused by large earthquakes, thereby helping to assess and mitigate these natural hazards.