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Setup of 3-D Velocity Model Version 1

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SCEC recognized the need for a single southern California seismic velocity model that will: (1) match geological and geophysical observations, (2) contain information at length scales appropriate for different uses (for example, fine scaled for strong ground motion simulations, more coarsely scaled for earthquake location), and (3) be parameterized in a manner that is convenient to store and update as new information (e.g., oil well sonic logs) and verification results (e.g., waveform modeling and tomographic studies) become available. In a series of workshops, participants agreed that Version 1 of the model will consist of the major southern California populated basins (Los Angeles basin, Ventura basin, San Gabriel Valley, San Fernando Valley, Chino basin, and San Bernardino valley; Figure 1) embedded in a 1D crustal model that varies smoothly with depth (Figure 2) over a constant depth Moho. The basin model, developed with previous SCEC support, is based on a compilation of geological data (Figure 3). See the annual report of the project "3D Seismic Velocity Models of Populated Southern California Basins" for a description of the basin model. The model is parameterized as a set of objects and rules that are used in a computer code to generate any 3D mesh of seismic velocities and density values at length scales appropriate for different uses. Version 1 will be the starting model for a variety of waveform modeling, tomographic studies, and new data releases that will provide geophysical constraints to be incorporated into Version 2.

The tasks of this project were: (1) Tune the basin model to fit recently released oil well sonic logs. This was accomplished (Figure 4) by adjusting the constant for each basin in the velocity-age-depth relation that governs the basin sediment seismic velocities. (2) Add the background crustal velocity-depth function to represent crustal bedrock, Moho, and upper mantle velocities (Figure 2). (3) Install the model generating code in the SCEC Data Center. We are currently modifying the code run faster and occupy less memory. Model depth slices and cross sections are shown in Figures 5 and 6.

The Version 1 model was presented at the 1998 annual meeting of the Southern California Earthquake Center in Palm Springs, the 1998 annual meeting of the American Geophysical Union in San Francisco, and the 1998 Project ROSRINE Data Dissemination Workshop in Los Angeles.

1998 Publications and Products:

Magistrale, H., R. Graves, and R. Clayton, 1998, A standard three-dimensional seismic velocity model for southern California: Version 1, *EOS Trans. AGU* **79**, p. F605.

The model generating code and associated model files are available on the SCEC Data Center at <http://www.scecdc.scec.org>.