

3-D CONTRIBUTION FROM THE LARSE  
PHASE Q DATA TO THE SCEC 3-D  
VELOCITY MODEL

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## ABSTRACT

During 1994, the Southern California Earthquake Center and the United States Geological Survey conducted phase 1 of the Los Angeles Region Seismic Experiment. This experiment was designed to collect data for three separate 2-D profiles. On-shore stations were collecting data while the R.V. Ewing generated data for the three profiles. This in-line plus fan geometry allows us to create a 3-D velocity model for the region. Unfortunately, signal-to-noise is low in much of this urban area and it was only possible to correlate phases on 45% of the data. First arrival times were used in a tomographic inversion to create a 3-D velocity model.

This paper presents the preliminary 3-D velocity model which shows velocity structure throughout the Los Angeles region. Slices were made through the model and profiles were used to make a lithological interpretation. From this, it is inferred that Catalina schist may underlie the offshore region to depths of about 12 km and Orocochia/Pelona schist may continue to about 8 km depth beneath the San Gabriel Mountains.

## THE SCEC VELOCITY MODEL

In 1997, the Southern California Earthquake Center (SCEC) formalized a unified 3-D reference model for Southern California. In the 1997 annual workshop in November of the same year SCEC scientists put together various models. This version included models of the Los Angeles, San Fernando, San Gabriel Basins based on lithological boundaries. The background velocities for the smoothed version of the standard model used for locating Southern California earthquakes. The Moho was laterally uniform at a depth of 32 km.

Since 1997, SCEC scientists have used seismic studies to modify an D model. In particular, they need more accurate information on the mid well as a more defined look at the shape and depth of the Moho. To this Nicola Godfrey, David Okaya, and Thomas Henyey of the University of Southern California forth a proposal to use data collected from the Los Angeles Region Seismic Experiment to create a 3-D model of the Los Angeles Region. In June 1999, a SCEC internship Kathryn van Rosendaal based on this proposal.

#### LOS ANGELES REGION SEISMIC EXPERIMENT

From November 1993 to October 1994, SCEC and the United States Geological Survey (USGS) conducted phase 1 of the Los Angeles Region Seismic Experiment (LARSE) which originally consisted of two lines (Lines 1 and 3) of recorders across the Gabriel Mountains and the Mojave Desert. After the Northridge earthquake a third line was added through the San Fernando Valley (Line 2) (Figure 1).

The first LARSE study consisted of 88 stations along Line 1 that passively recorded teleseismic earthquakes. This was followed by a marine survey conducted by Maurice Ewing. This study used an active source in the form of a 20 element airgun attached to the Ewing. The data was collected using a 160 channel digital recording system. Ewing as well as 2 sonobuoys and 9 ocean bottom seismometers (OBSs). A land-based study was conducted at the same time as the marine study. While airgun was being fired from the Ewing, 170 land stations were in place along Lines 1, 2, and 3. Line 1 had 630 seismographs along line 1 collecting data from 63 explosions.

