The Northern Walker Lane Seismic Refraction Experiment


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Tomography Results: New Model vs. Prior Model

Picks to 600 km Distance

Tomography Results: New Model vs. Prior Model

The new model (top) shown against the prior model (bottom). The most striking difference is a much thinner crust under Battle Mountain. The models agree on the existence of a crustal root under the Sierra Nevada.

Results of Recording and Velocity Optimization

1. Large mine and quarry blasts allow effective crustal tomography. Direct field costs < $10,000.
2. Reversed first-arrival picks could be made despite distances exceeding 600 km. Picks were made in ignorance of model times.
3. Pick data show up to 3 sec advance in central Great Basin, near the Battle Mountain heat-flow high.
4. Picks also show up to 3 sec advance in central Great Basin, near the Battle Mountain heat-flow high.
5. Delays may result from low (5.5 km/s) velocities in a deep root below the northern Sierra, as well as from large basins.
6. Advances suggest Moho as shallow as 25 km below the Battle Mountain heat-flow high.

Large Mining Blasts = Low Cost

On May 23, 2002, Barrick Goldstrike set off approximately 140,000 lbs of ANFO in 3 blasts at their northeastern Nevada pit. A quarry blast registering a Richter magnitude of 2.2 was also recorded from Watsonville, California (see figure above). All blasts were recorded using 200 "Texan" recorders on loan from the PASSCAL Instrument Center laid out on the red line above. The instruments recorded during daylight hours for two working days.

Acoustic synthetic model of the Watsonville blast (left), from the "prior model", compiled from 9 other studies in the vicinity of our survey. First picks are marked in red. Note that in the beginning of the record the picks are acceptable. Picks in the Pn region are obviously late. The pick detail (right) from the Watsonville source shows the possibility of late picks in our data. The bottom set of picks are the picks used in our interpretation while the top picks approximately 10s advanced. The Barrick record (above) shows no recognizable advance.