The Northern Walker Lane Seismic Refraction Experiment


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A New Transect

Location map of the western Great Basin
White line: Northern Walker Lane seismic refraction experiment
Green dots: Seismic sources used for refraction survey

Large Mining Blasts = Low Cost

C: >80,000 lb
B: 40,000 lb
A: 20,000 lb

On May 23, 2002, Barrick set off 3 blasts about 10 seconds apart at their 1500-ft-deep Goldstrike pit in northeastern Nevada. Each blast used ~20,000 lb of ANFO, with the third approaching 100,000 lb. The three blasts can be seen clearly above, with the third causing a landslide, at left. A quarry blast 200-600 km away in Watsonville, California had also been recorded the previous day. This blast was noted by the N. Calif. Seismic Network with a Richter magnitude of 2.2. 200 “Texas” recorders loaned by the PASSCAL Instrument Center were deployed along the white line seen in the map above. Each instrument recorded continuously for two working days.

Tomography Results: N. Sierra Root, Thin B&R Crust

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 6 sec delay across the northern Sierra Nevada and Walker Lane.
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.

Blast C Pick Detail

May 23, 2002 Barrick Goldstrike 80,000-lb blast record, 100 seconds long, filtered at 8-30 Hz. Time picks are small red rectangles.

No. Walker Lane 2-D Optimization Fits

Watsonville 2-d Times
Barrick 2-d Times
Watsonville Fits
Barrick Fits

Distance West of Barrick, km

Travel Time, sec

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