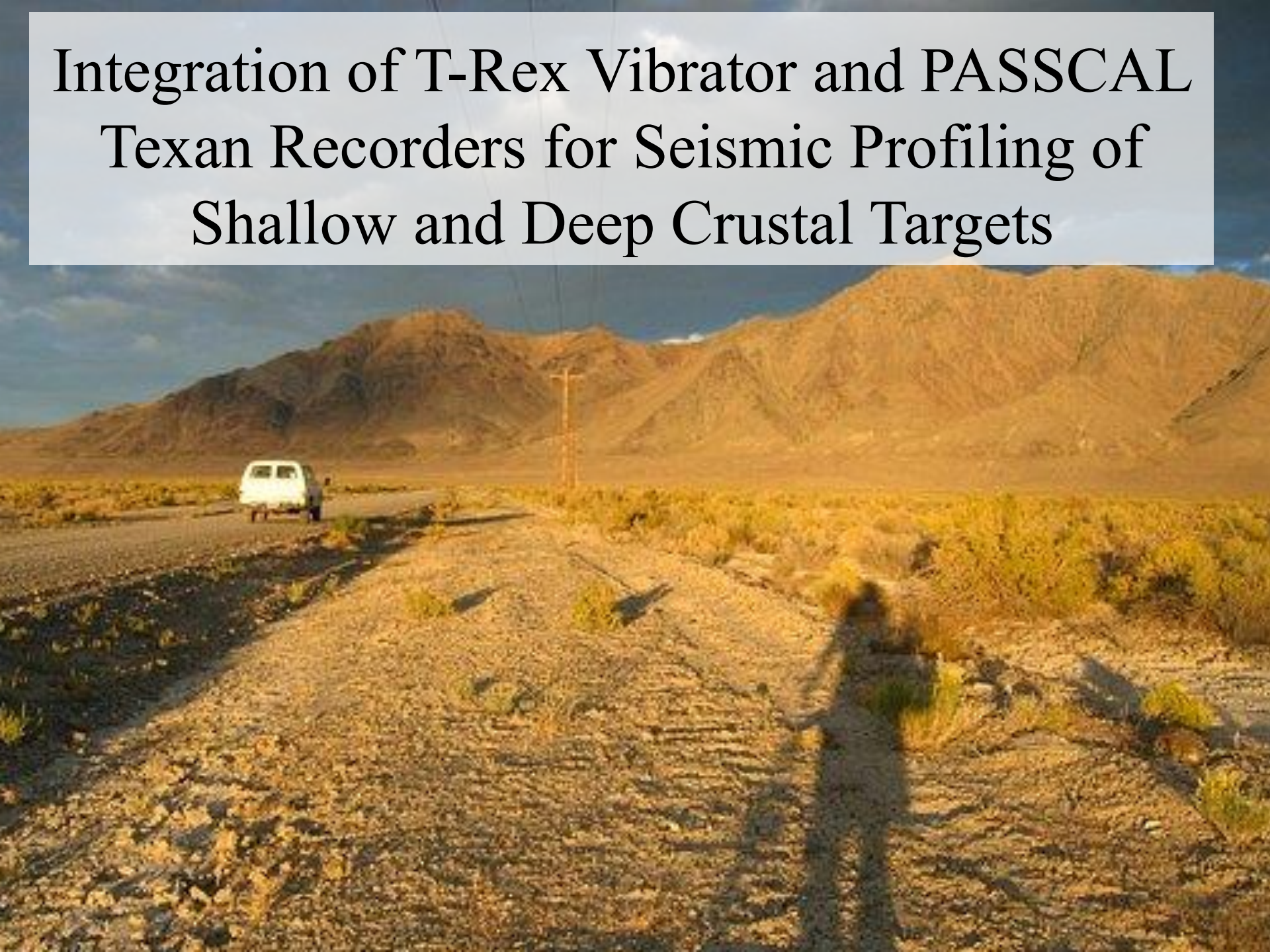
# Integration of T-Rex Vibrator and PASSCAL Texan Recorders for Seismic Profiling of Shallow and Deep Crustal Targets



# Sedimentary Basin Vibroseis Data

- Surprise Valley/Warner Range
  - east-dipping, high-angle normal fault
  - young (<5 Ma), large offset (~2 km)
  - Holocene slip, geothermal exp., mud volcanoes

- 60,000 lb tri-axial (Trex) vibrator provided by the Network for Earthquake Engineering Simulation (NEES)

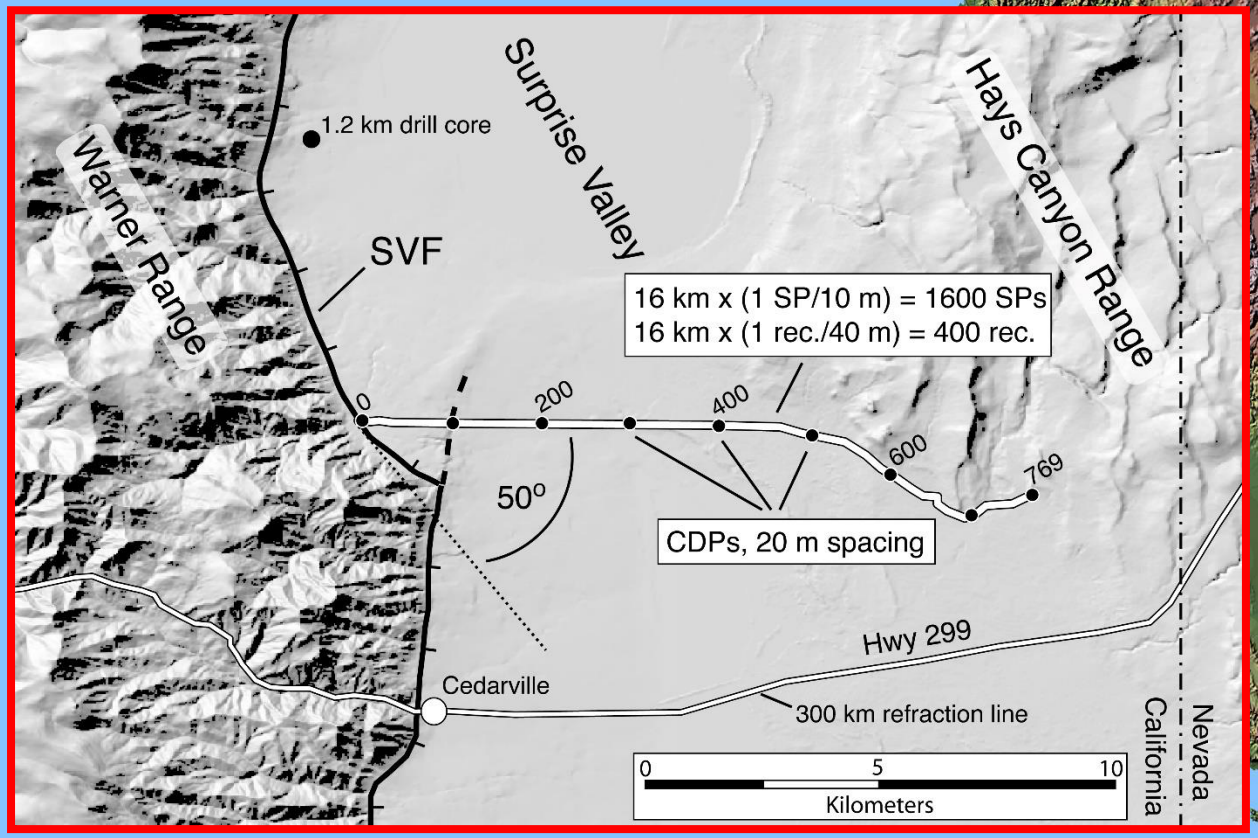
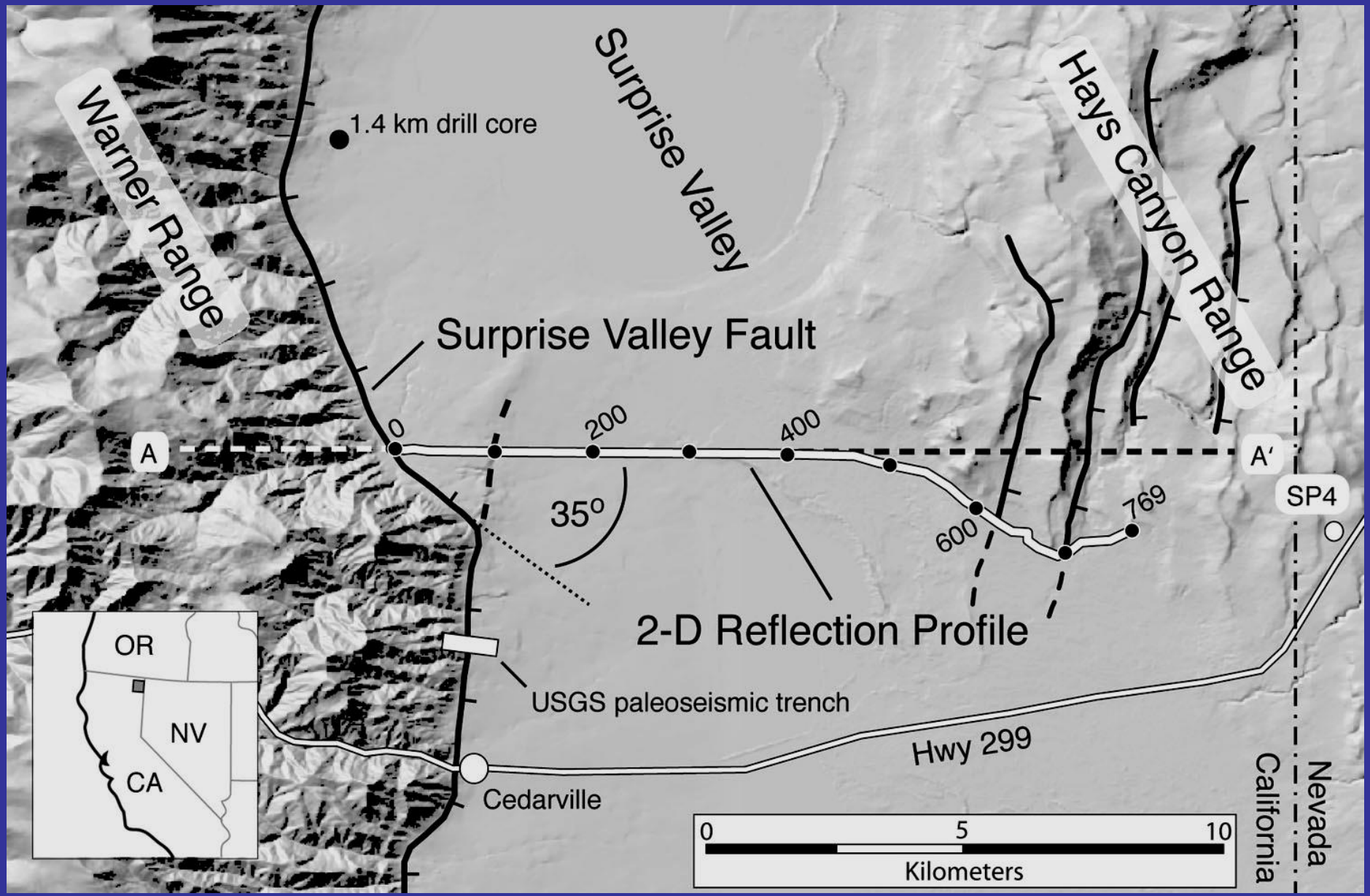


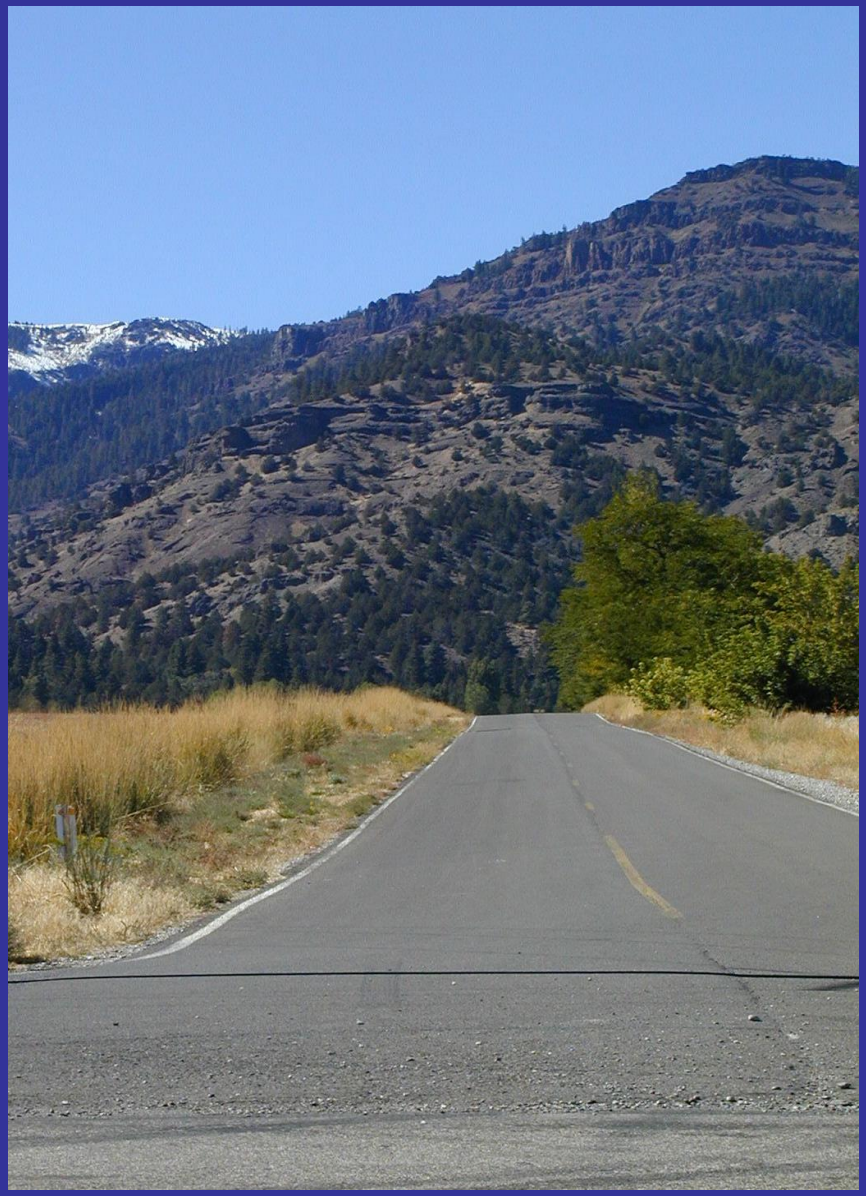

Figure: USGS EROS Data Center

# Surprise Valley reflection profiling (cont.)




Shaded relief map of Surprise Valley

# Surprise Valley reflection profiling (cont.)



Views along “High-Resolution” phase of experiment: Fortynine Lane

Photo: S.L. Klemperer

# Surprise Valley reflection profiling (cont.)


T-Rex baseplate and mass

Photo: S.L. Klemperer

# Surprise Valley reflection profiling (cont.)

Teeth marks from baseplate

Photo: S.L. Klemperer

# Surprise Valley reflection profiling (cont.)


T-Rex with plywood pad on baseplate to protect asphalt

Photo: S.L. Klemperer

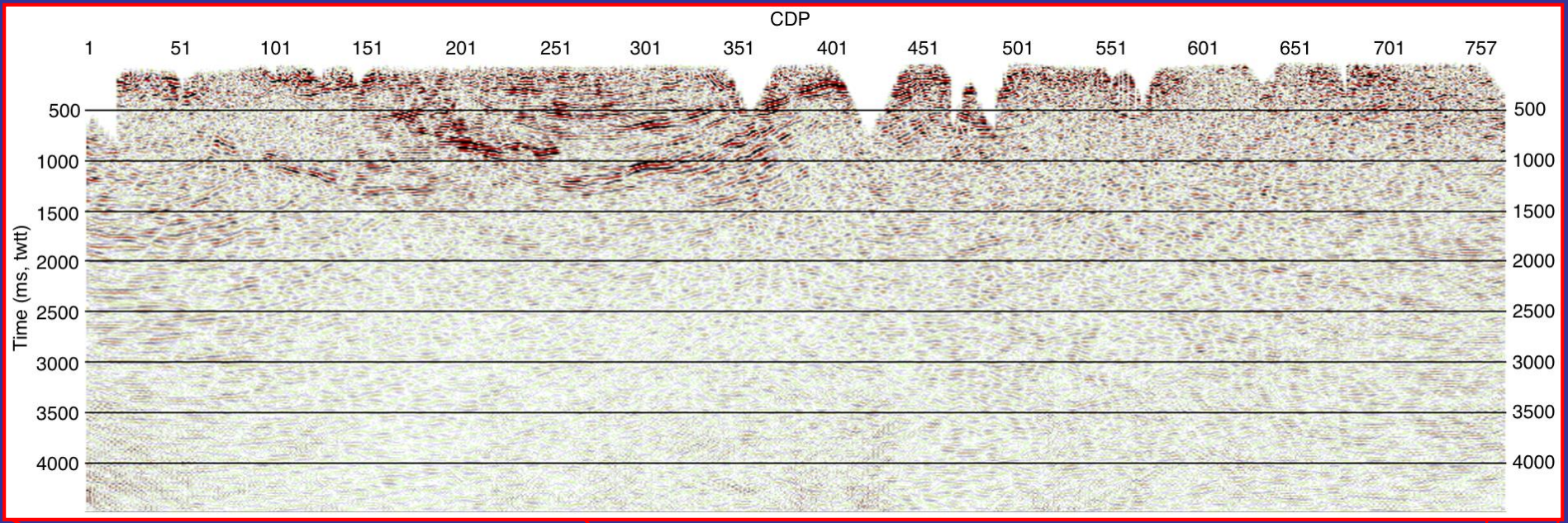
# Surprise Valley reflection profiling (cont.)

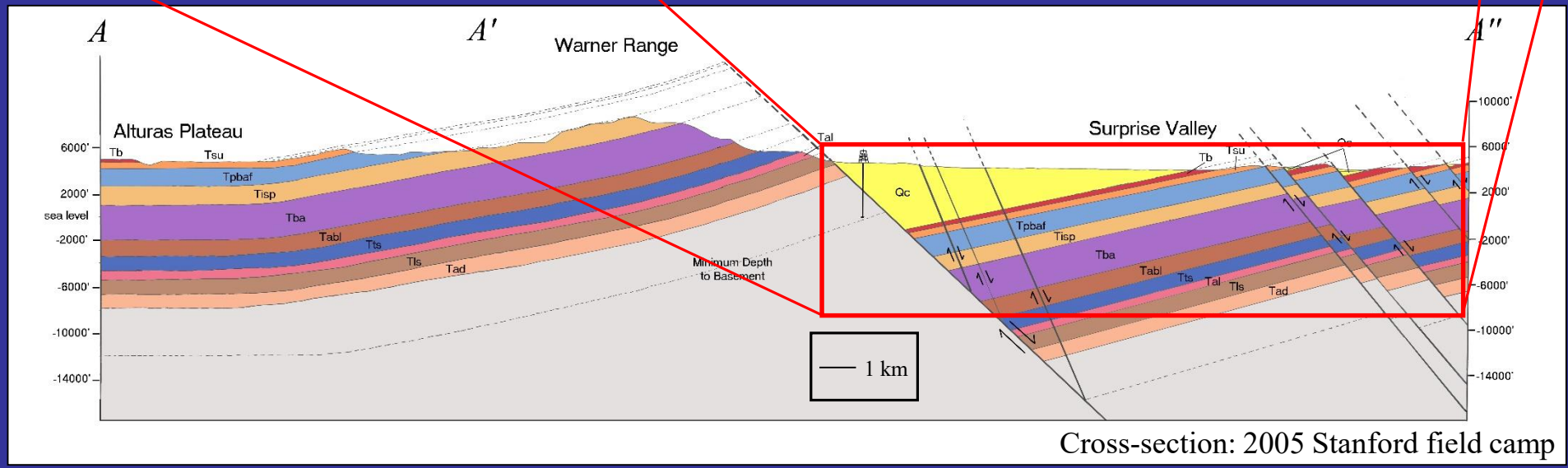
1 60,000 lb vibrator
8 hours/day

= 90 gallons of diesel/day


Photo: S.L. Klemperer

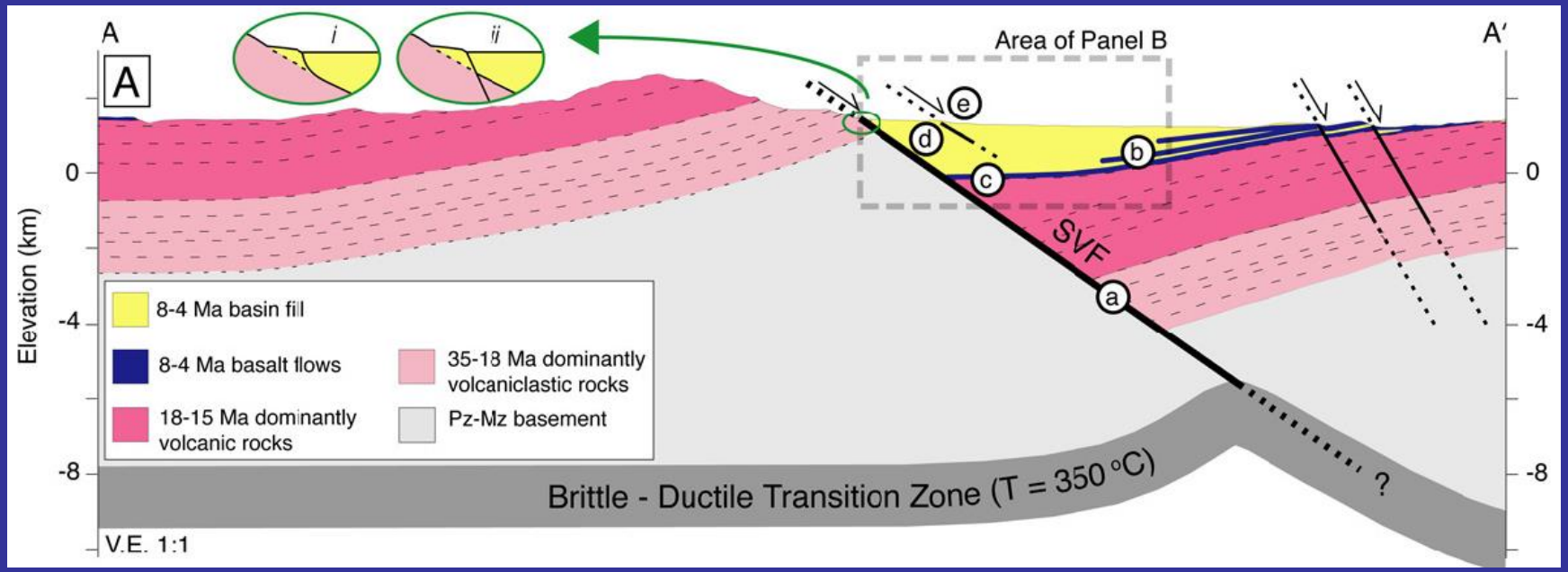
# Surprise Valley reflection profiling results




Cross-section: 2005 Stanford field camp

# Surprise Valley reflection profiling results



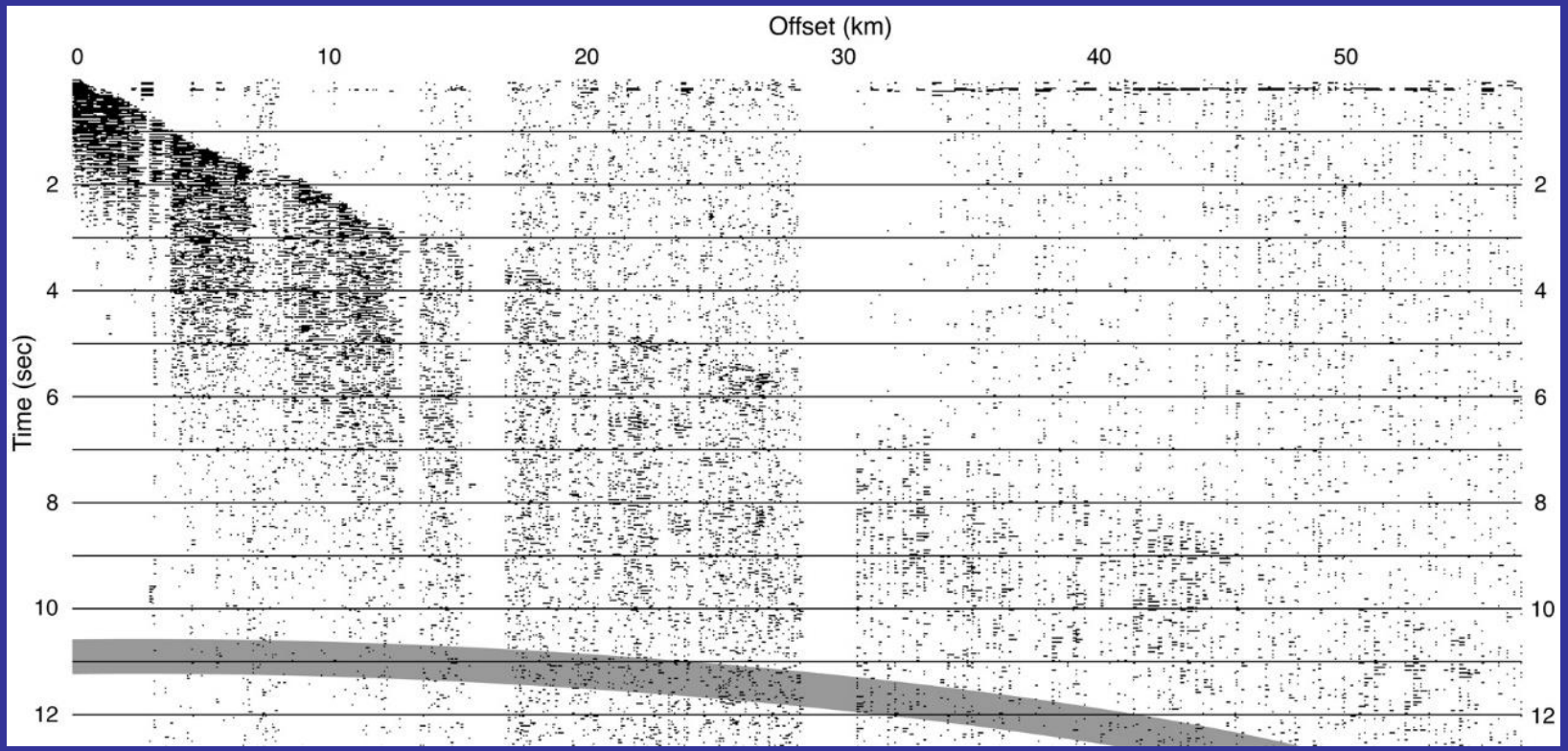

Processing software: ProMAX

# Deep crustal refraction/reflection profiling

NEES “T-Rex” vibrator in the northern Black Rock Range


Photo: S.L. Klemperer

# Deep crustal refraction/reflection profiling




Best source gather from crustal profile. Coherent arrivals visible to offsets of ~ 20 km, with discontinuous energy visible to ~50 km. Wide gray line represents Moho travel time calculated from the Lerch et al. (2007) wide-angle velocity model. Gather produced by stacking ten coincident sweeps, applying a bandpass filter (4-6-36-42 Hz), and performing a predictive deconvolution.

# Conclusions

- T-Rex offers a viable source for upper crustal imaging and velocity modeling
- Mid-to-lower-crustal targets may be out of reach for T-Rex in single-vibrator work
- In addition to standard P-wave velocity modeling, the S-wave capability of the T-Rex vibrator may have applications for those interested in shallow targets such as constraining the Vs structure of basins for earthquake hazard assessment

END