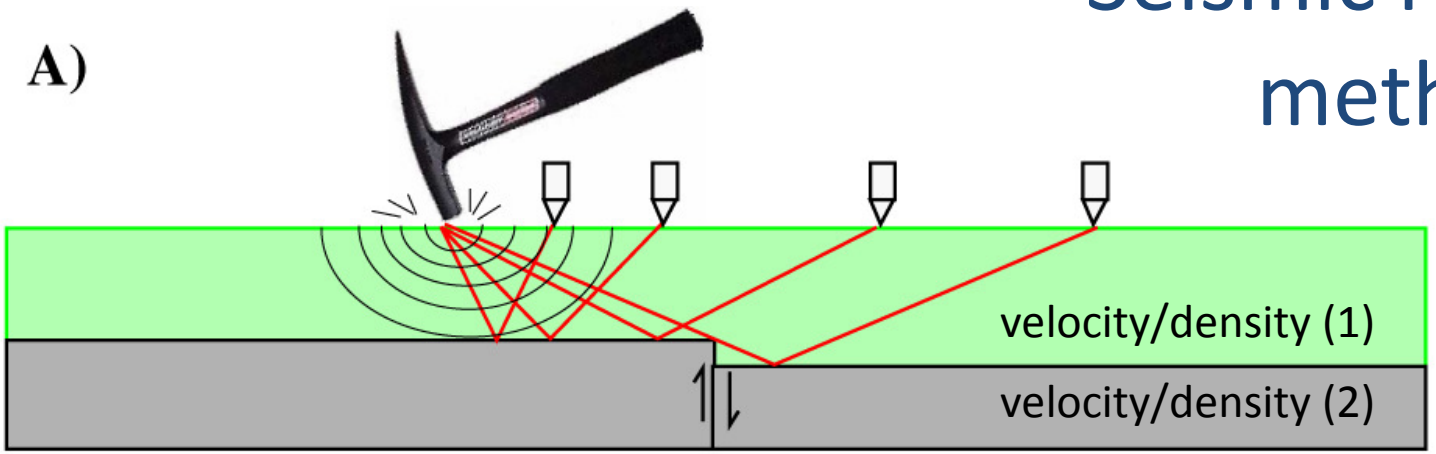
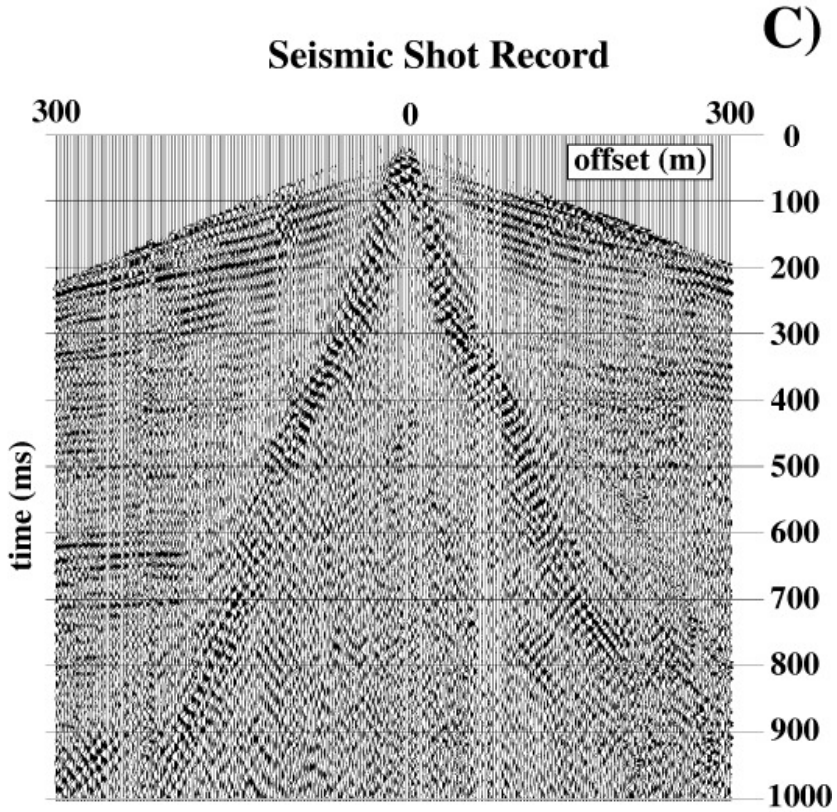
Geophysics of southwest Idaho

- Seismic reflection overview
- Seismic reflection – legacy industry data
- Seismic reflection – new Boise State data - north Ada/east Canyon County
- Potential field (gravity/magnetic) data – north Ada/east Canyon County
- Potential field (magnetic) data – east Ada/west Elmore County
- Seismic reflection - new Boise State data – east Ada/west Elmore County

Seismic reflection methods

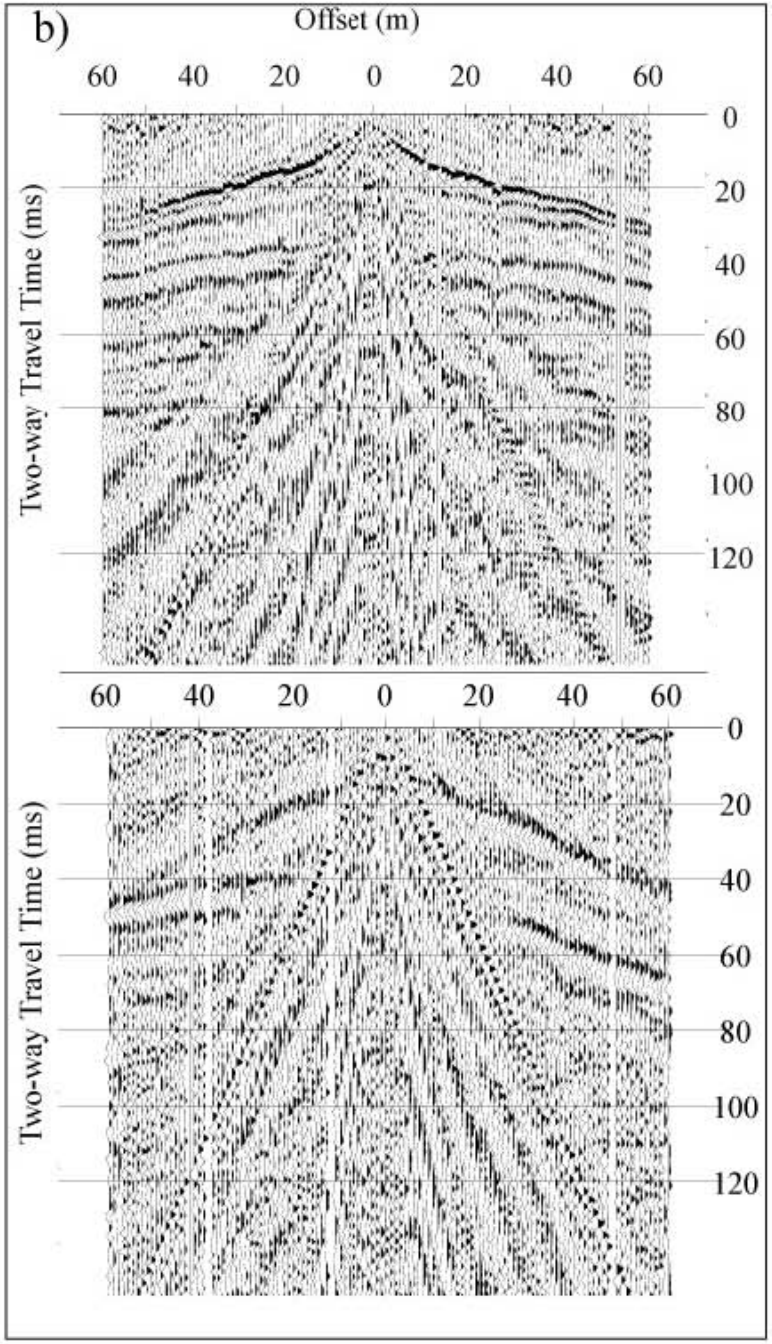


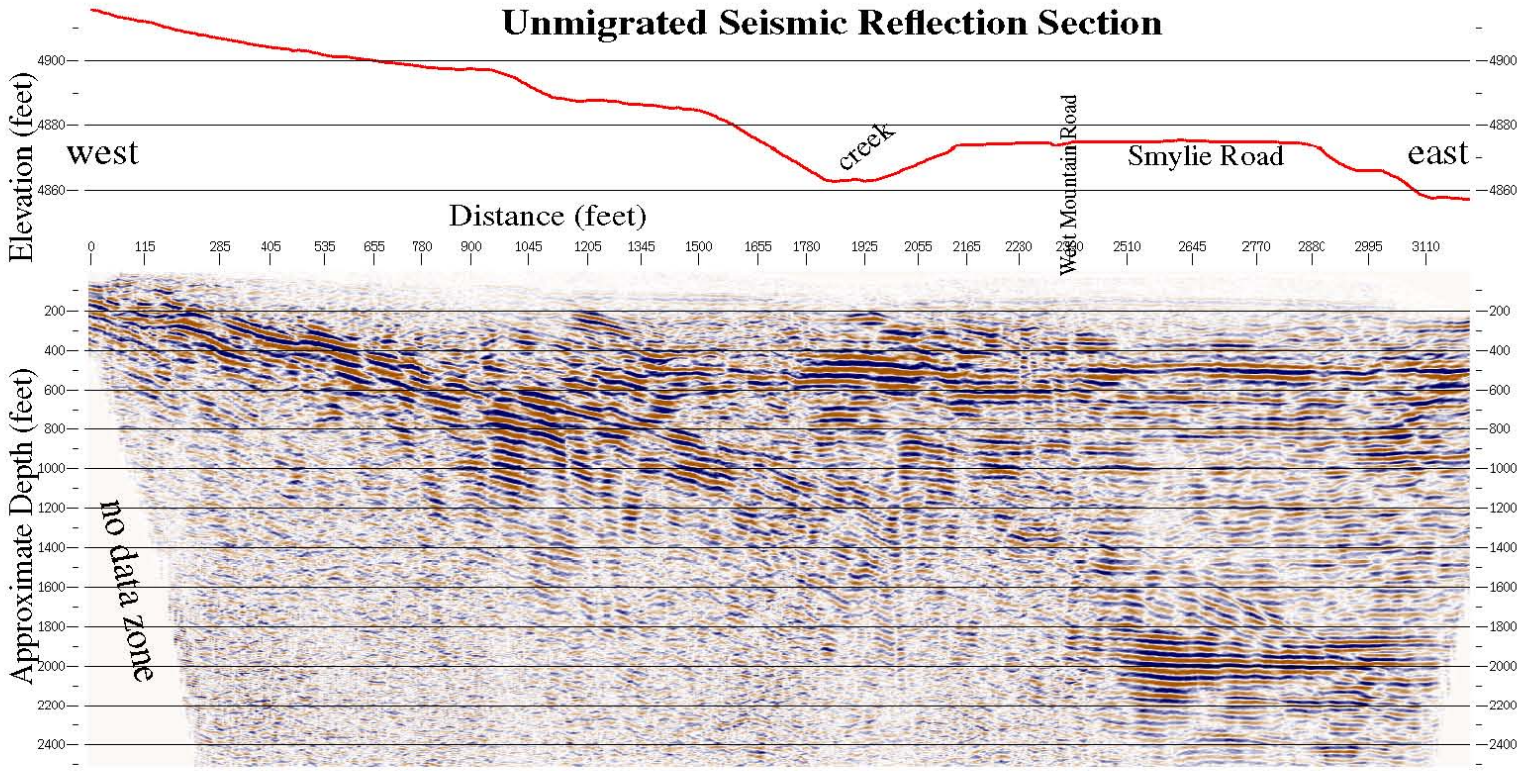


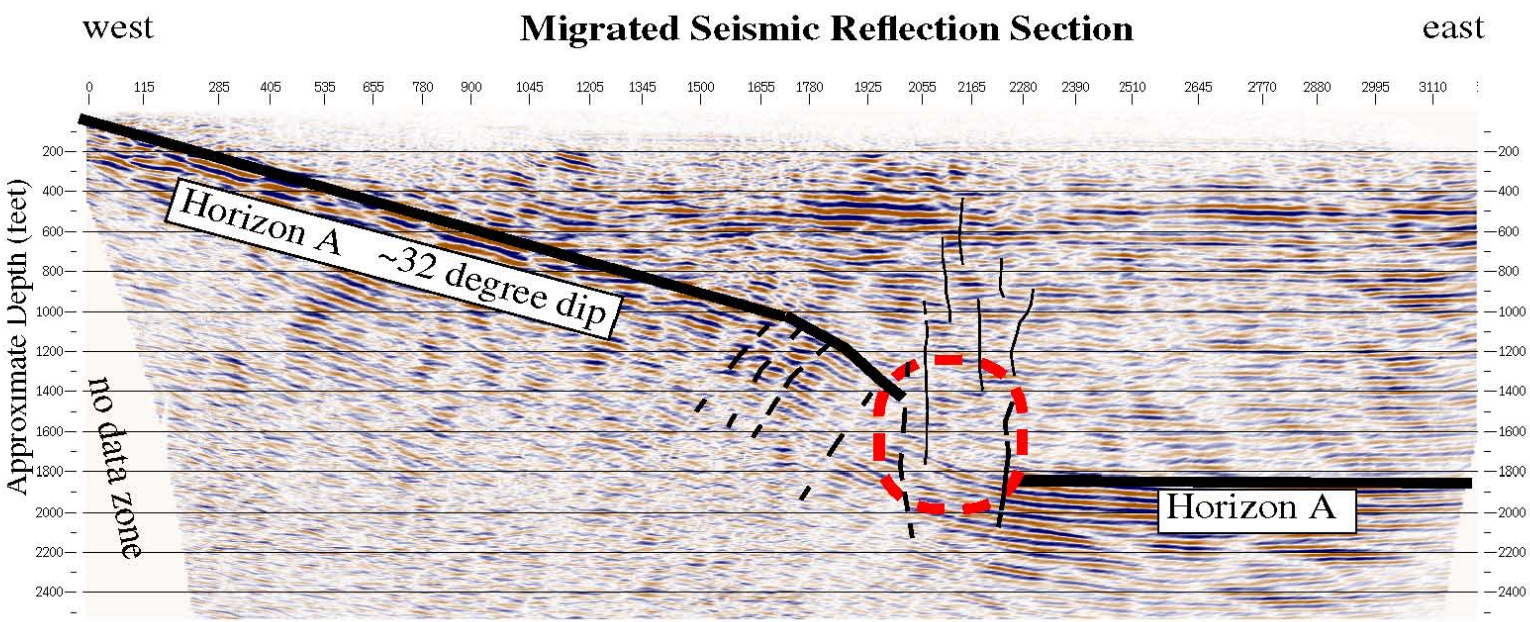
Land seismic sources

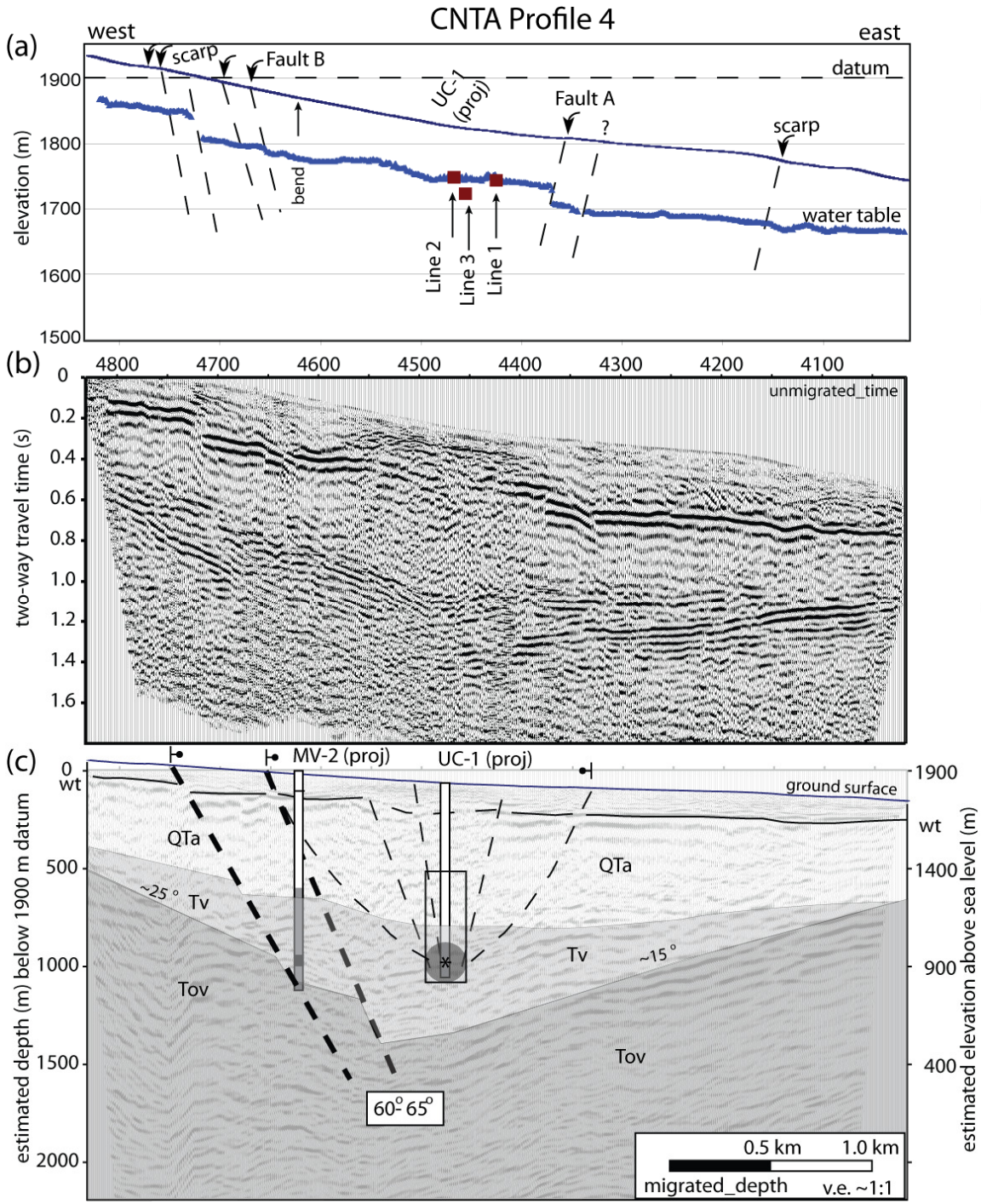
Portland Hills fault
Portland, Oregon

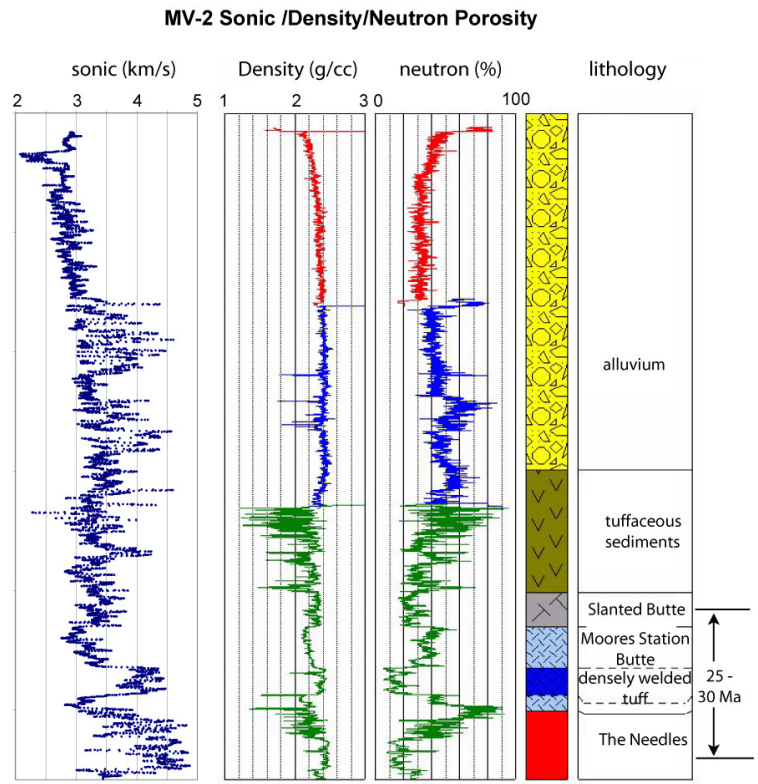
a) **North Clackamas Park**




Unmigrated Seismic Reflection Section
Elevation (feet)
west
creek
West Mountain Road
Smylie Road
east
Distance (feet)
Approximate Depth (feet)
no data zone


west
Migrated Seismic Reflection Section
east
Approximate Depth (feet)
Horizon A ~32 degree dip
no data zone
Horizon A





25-30 Ma Tov ~1.2 km depth

Asymmetric graben bound by ~60° dipping growth faults (~0.05 mm/yr)

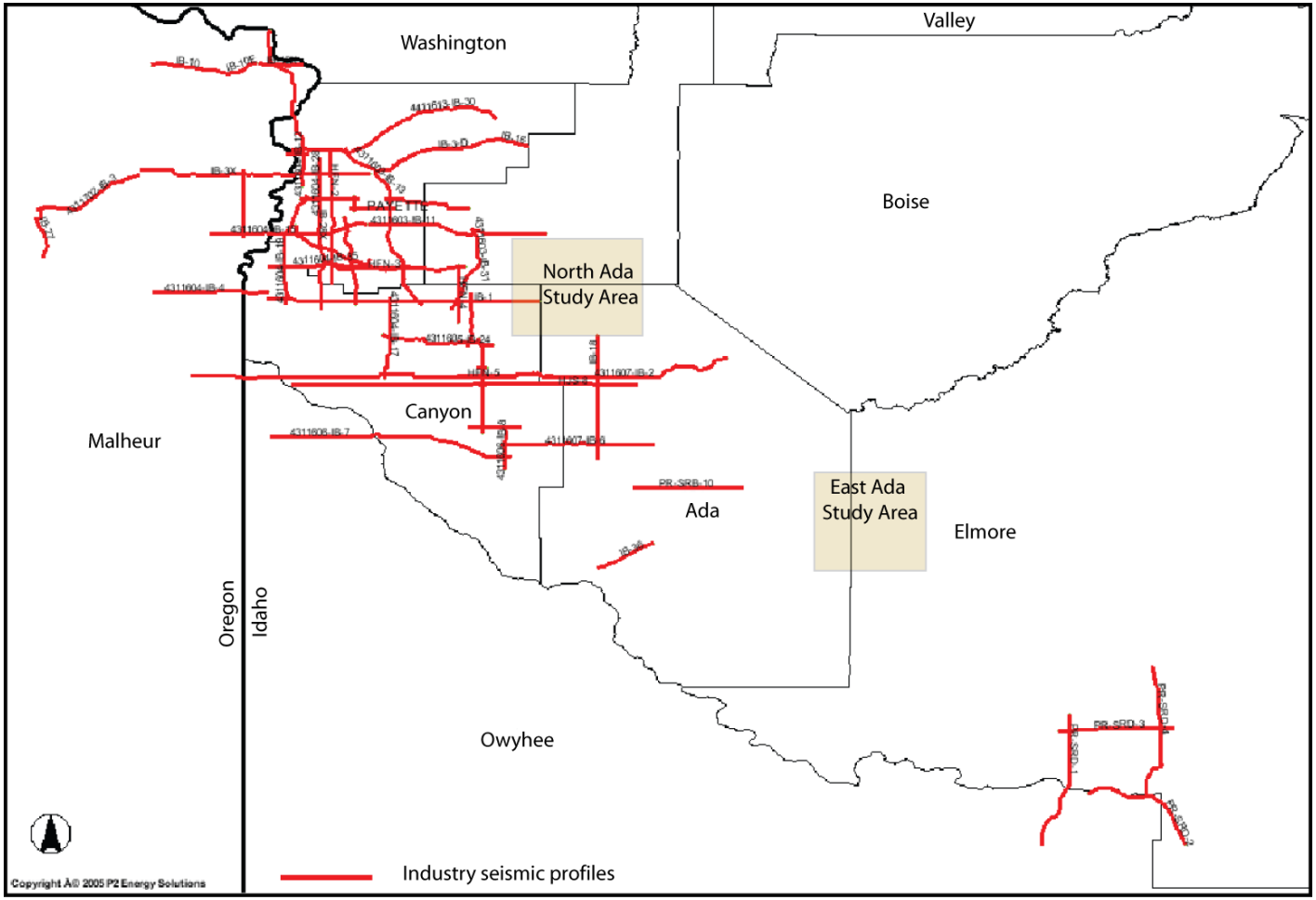
Faults are barriers to lateral fluid flow (pre- and post-blast)

deformed zone from blast ~60° cone ~1 km radius

10 m wt offsets @ 40 years ~ 2×10^{-8} m/s lateral flow rates

Industry seismic reflection data southwest Idaho

- Cost=$2,200 per mile
- Poorly imaged upper 1,000 ft
- Limited locations

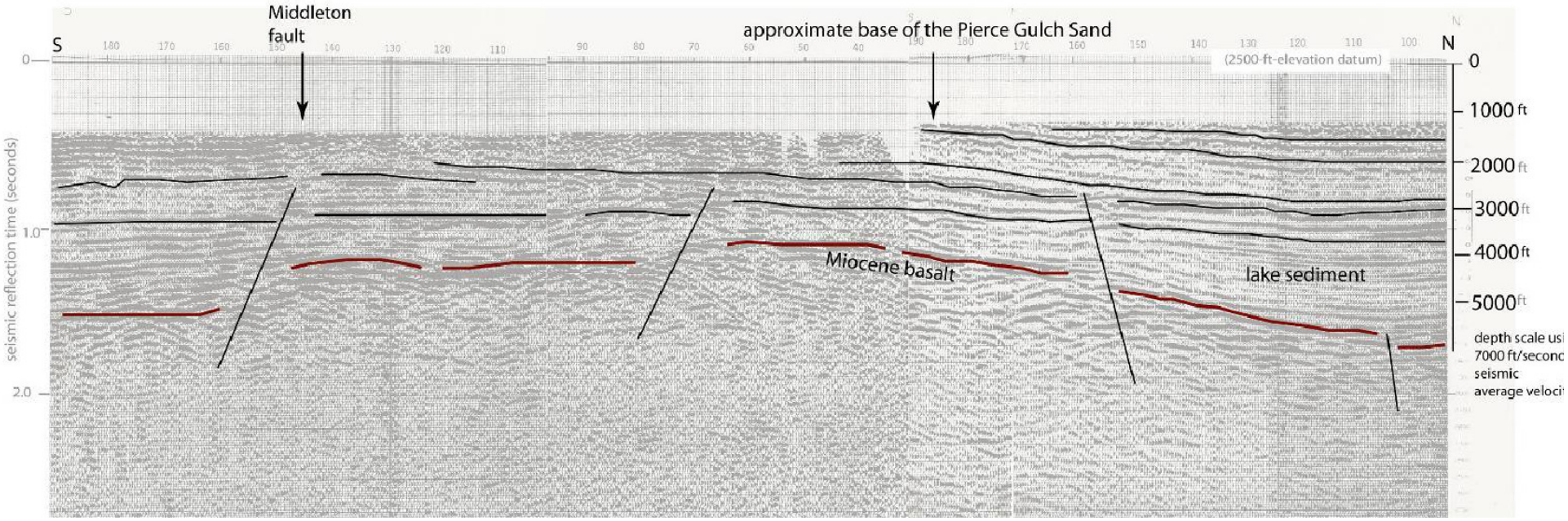


from Seismic Data Exchange (Denver, Co)

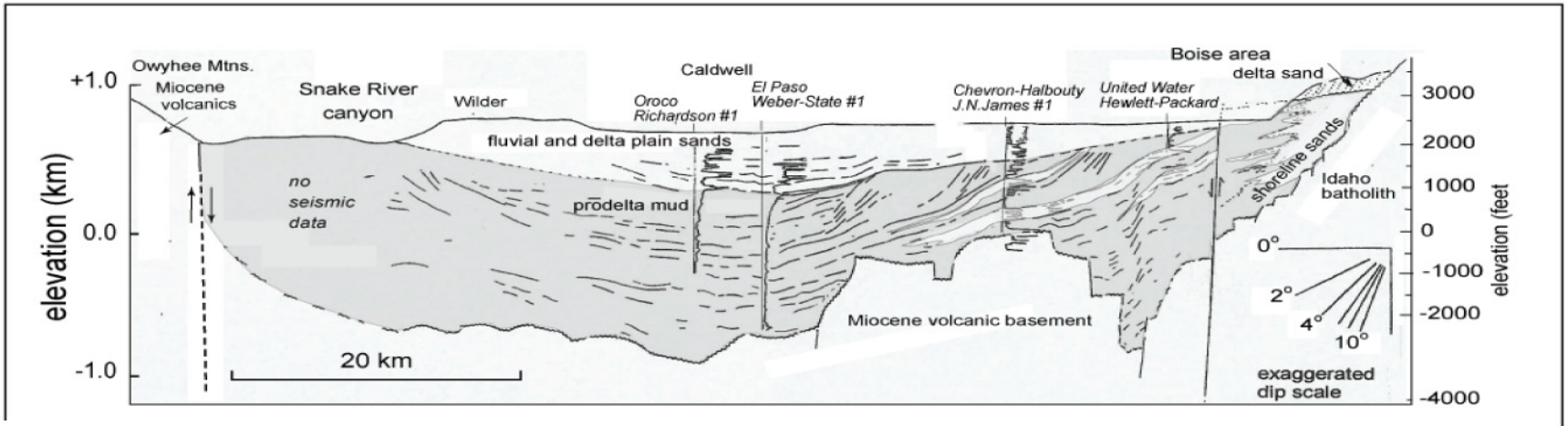
Industry seismic example

- Cost=$2,200 per mile
- Poorly imaged upper 1,000 ft
- Limited locations

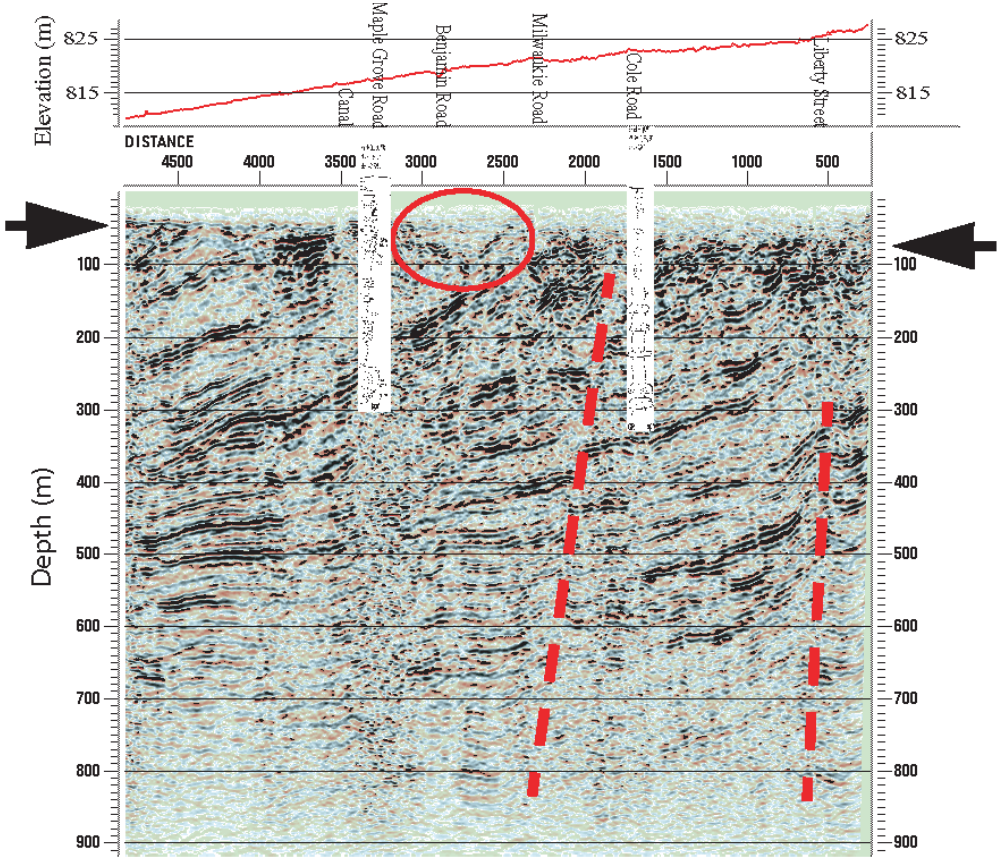
Middleton seismic profile

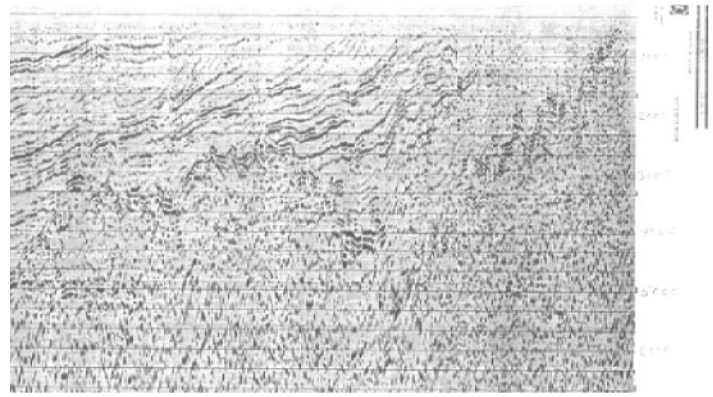


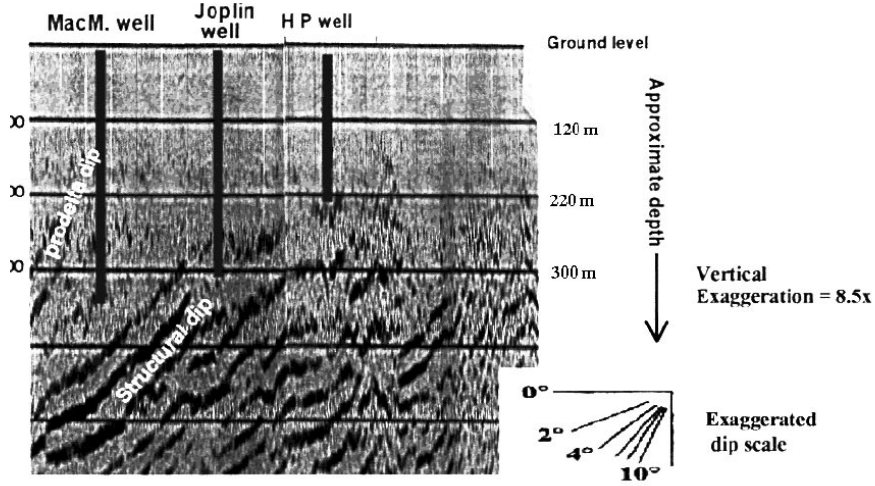
from S. Wood



BSU hammer seismic

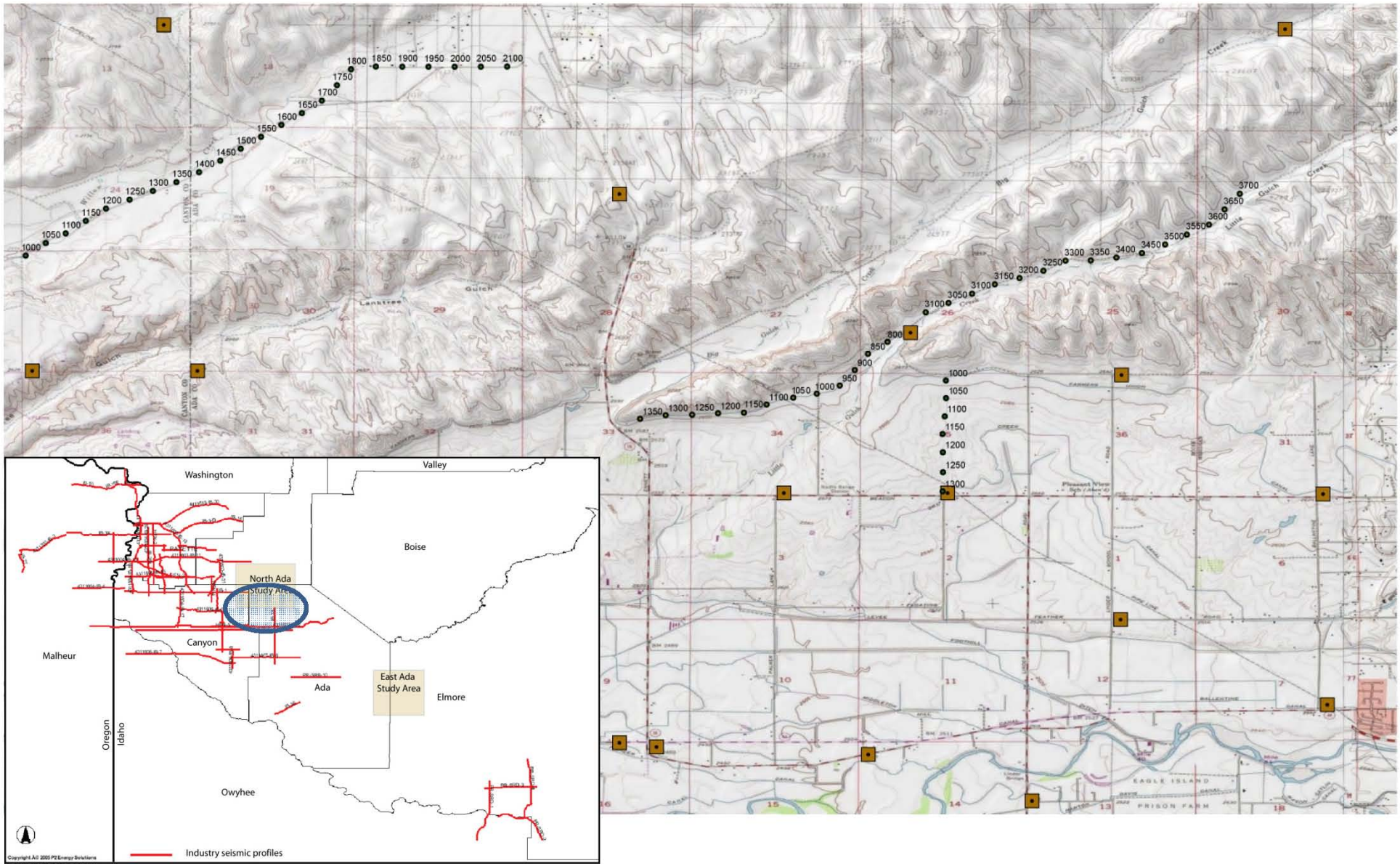






from Wood, 1994

North Ada seismic profiles and gravity stations



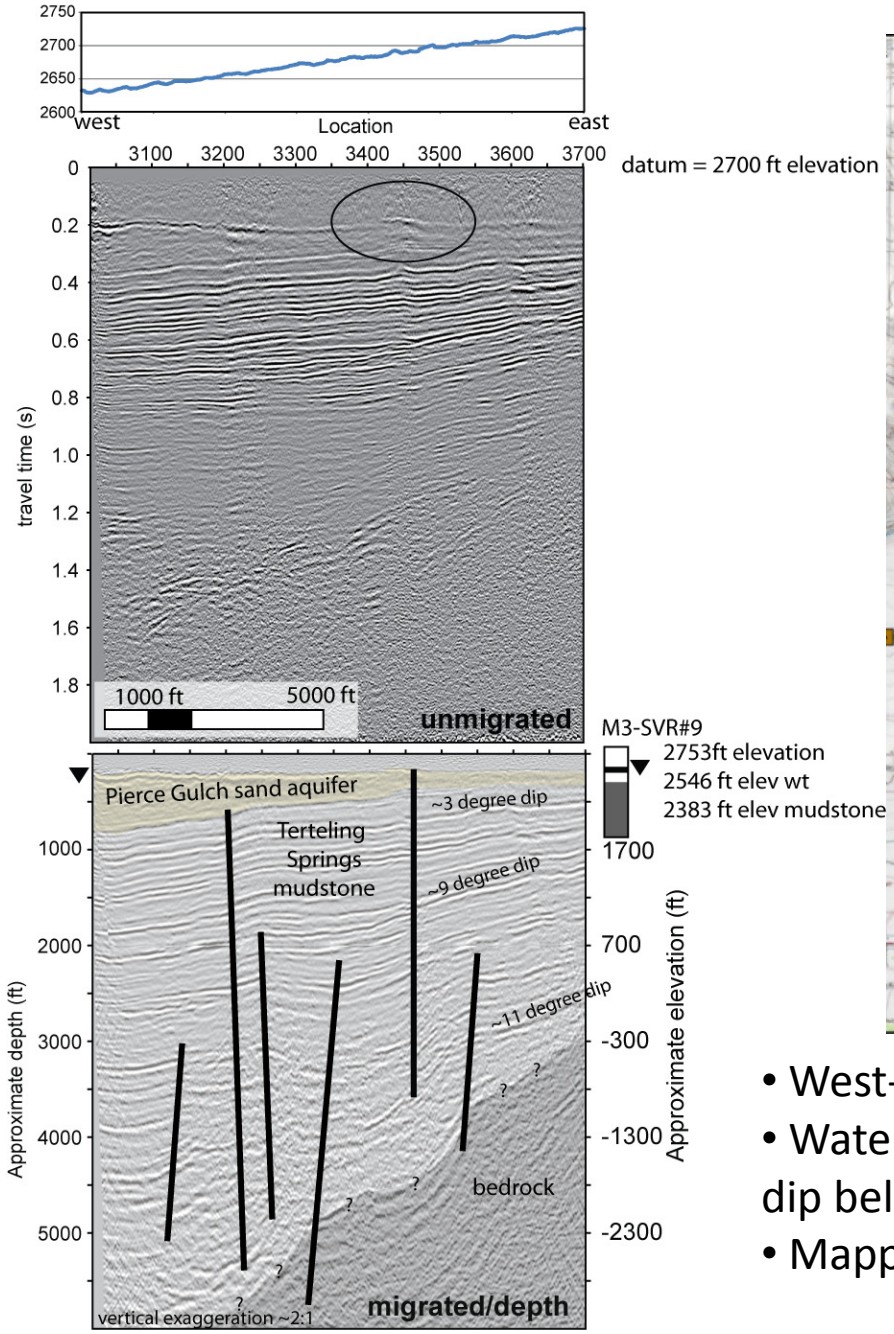
Boise State
weight drop

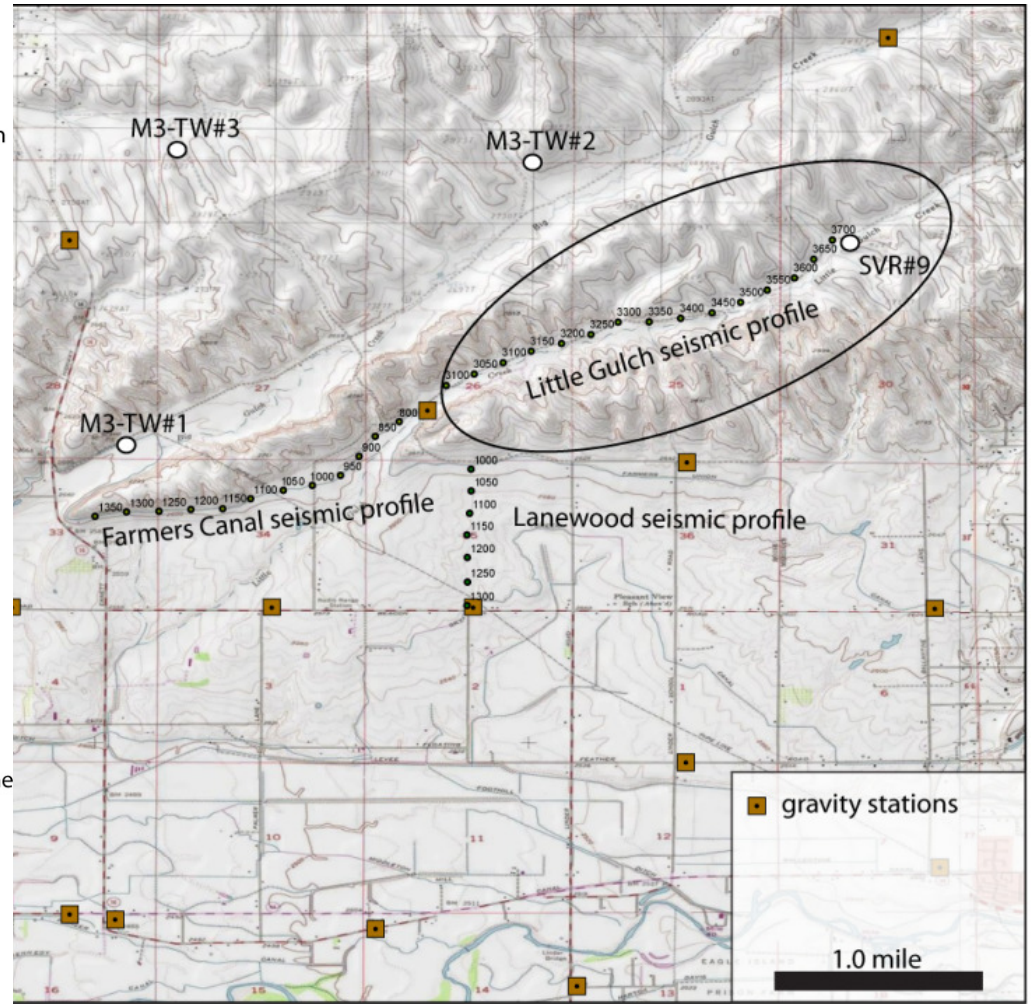
Univ Texas
Nees Minivib

Ford F650 Truck
Total weight: 22,000 lbs

(9,990 kg)

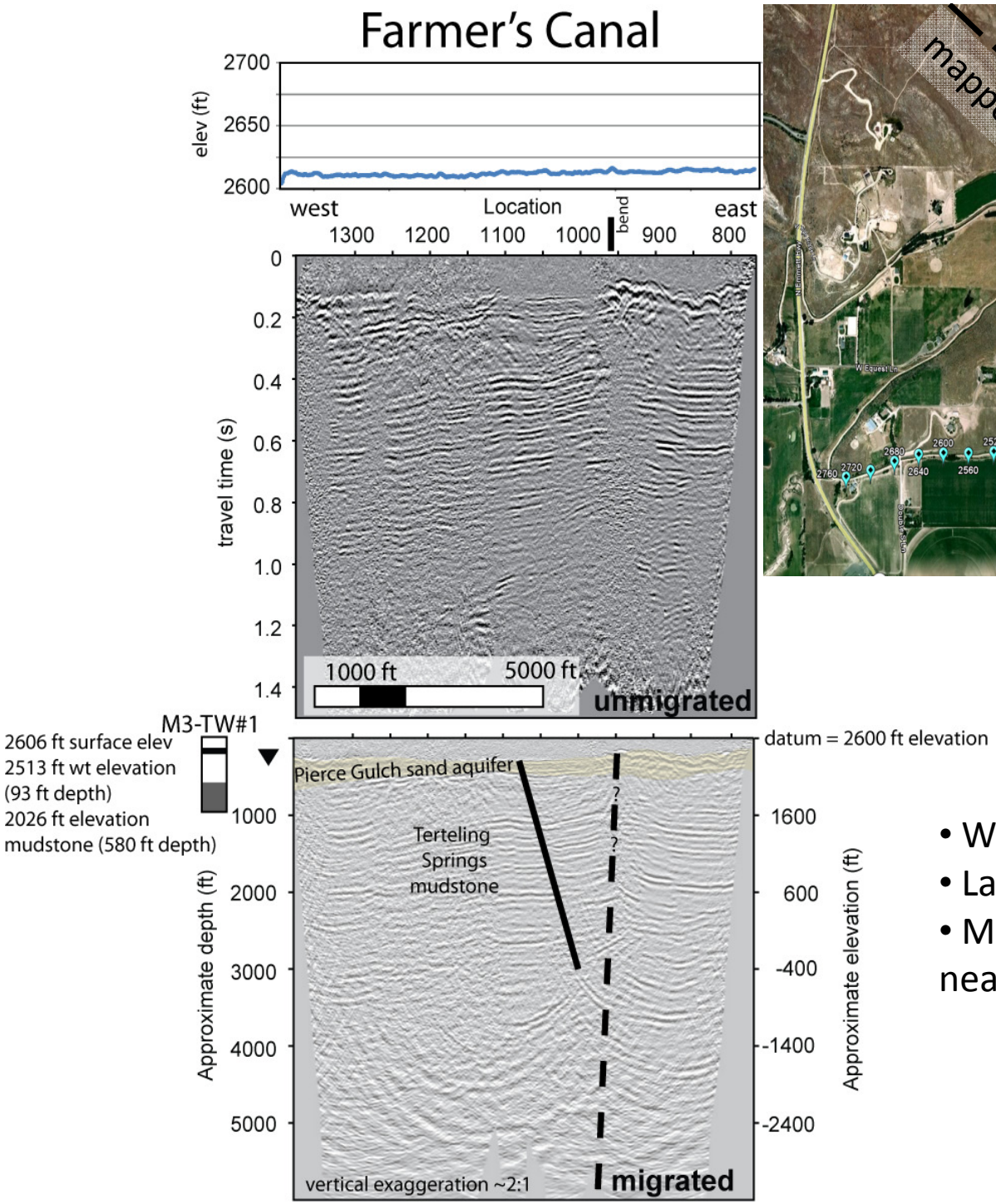
Little Gulch seismic profile

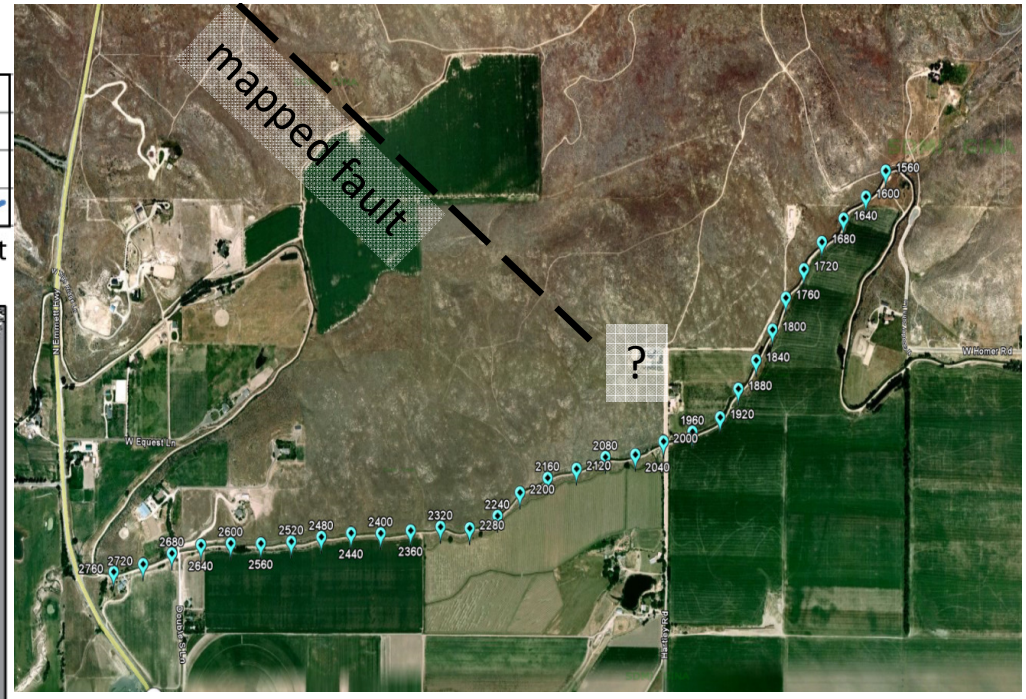




- West-dipping strata, increasing dip w/depth
- Water table step at position 3450 @ change in reflector dip below
- Mapped fault projects across profile near position 1000

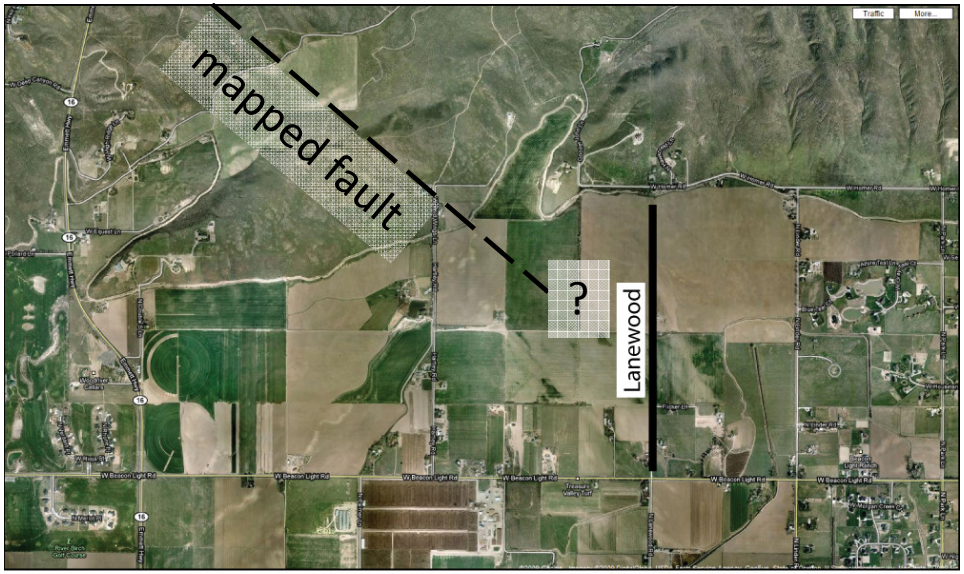
well log from E. Squires





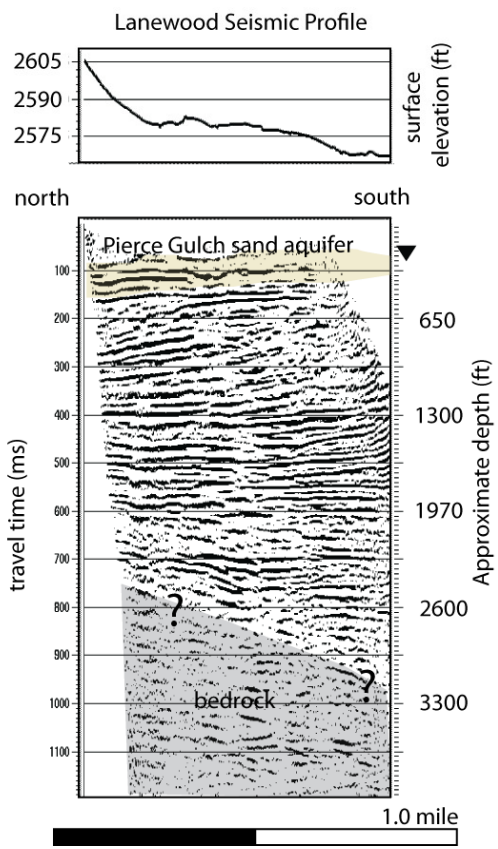
- West-dipping strata
- Large water table step at canal bend
- Mapped fault projects across profile near position 1000

well log from E. Squires

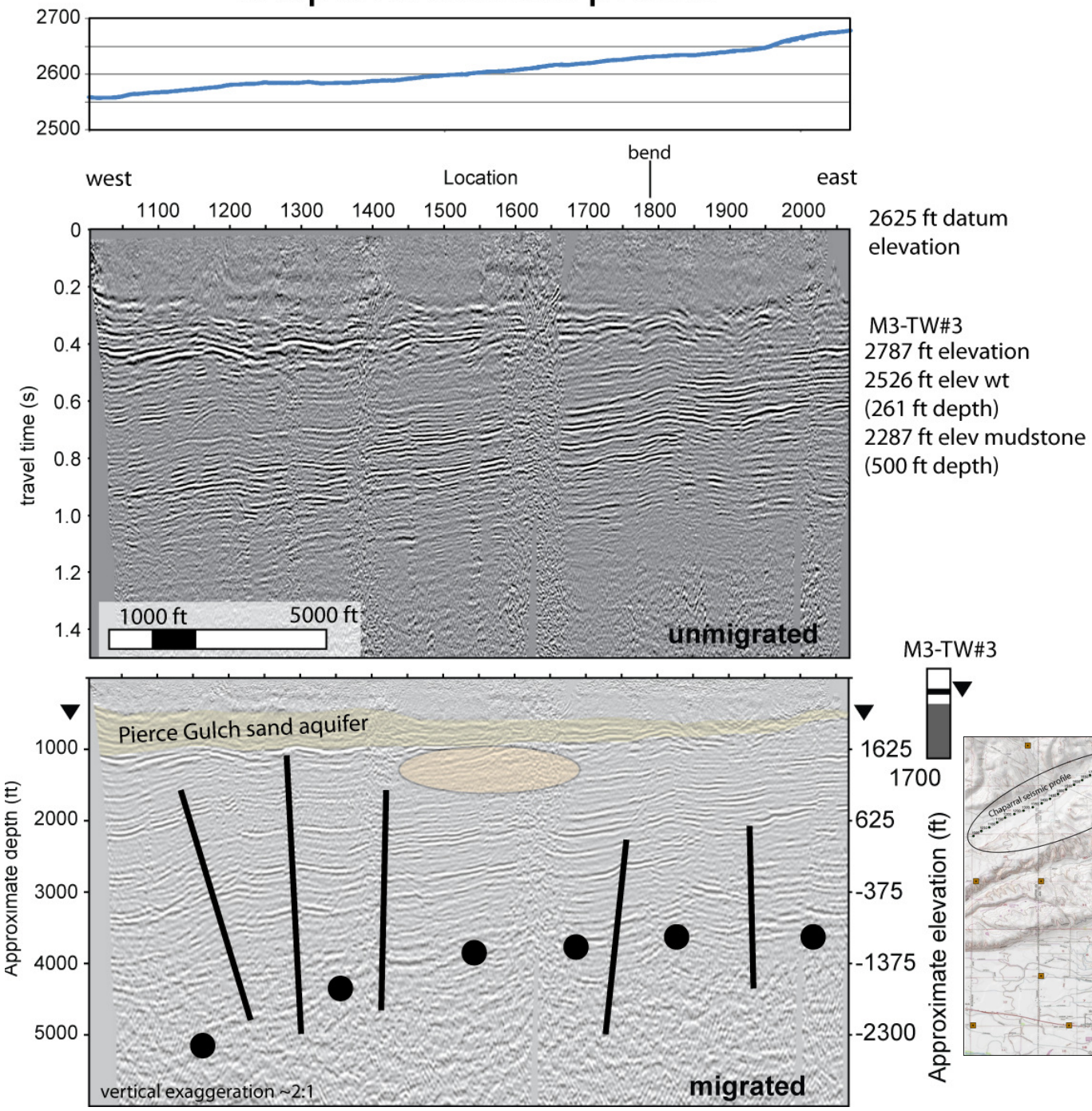


Lanewood seismic profile

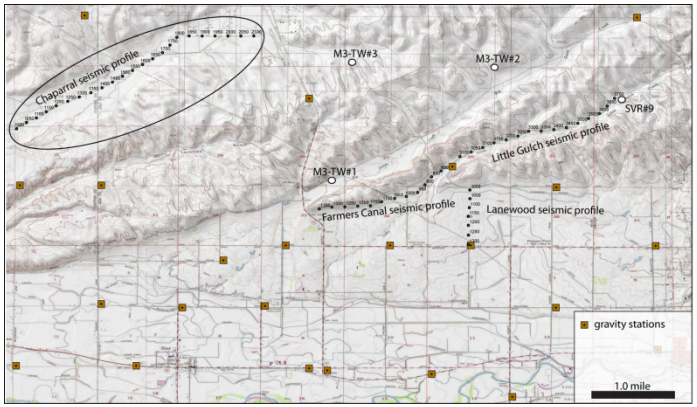
- mapped SE-striking fault (Wood)
- No faults observed on Lanewood seismic profile
- Propose to continue profile to the south



Chaparral seismic profile



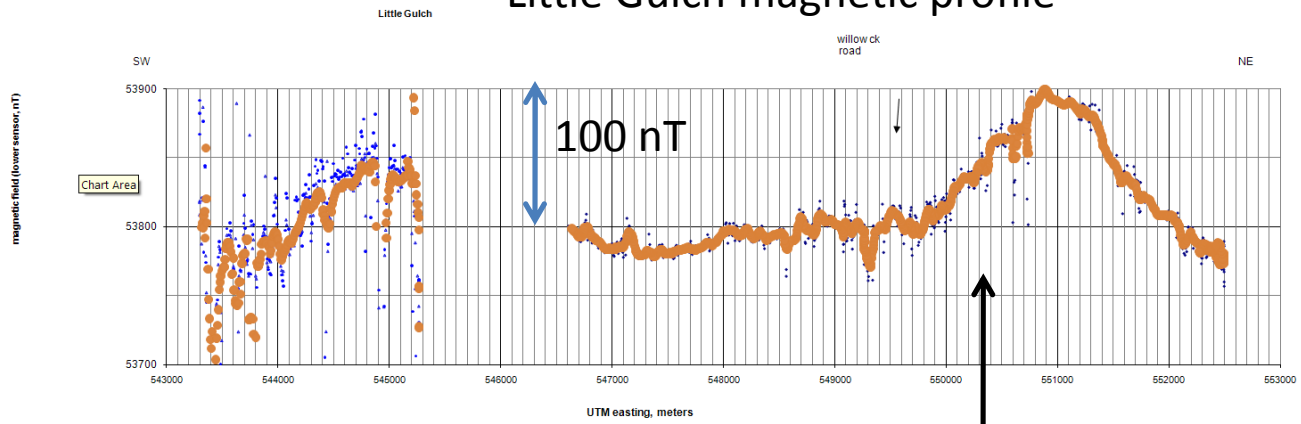
- West-dipping strata
- reflector topography @ ~1,000 ft depth → unconformity
- Interpreted thickness of Pierce Gulch aquifer increases to the west



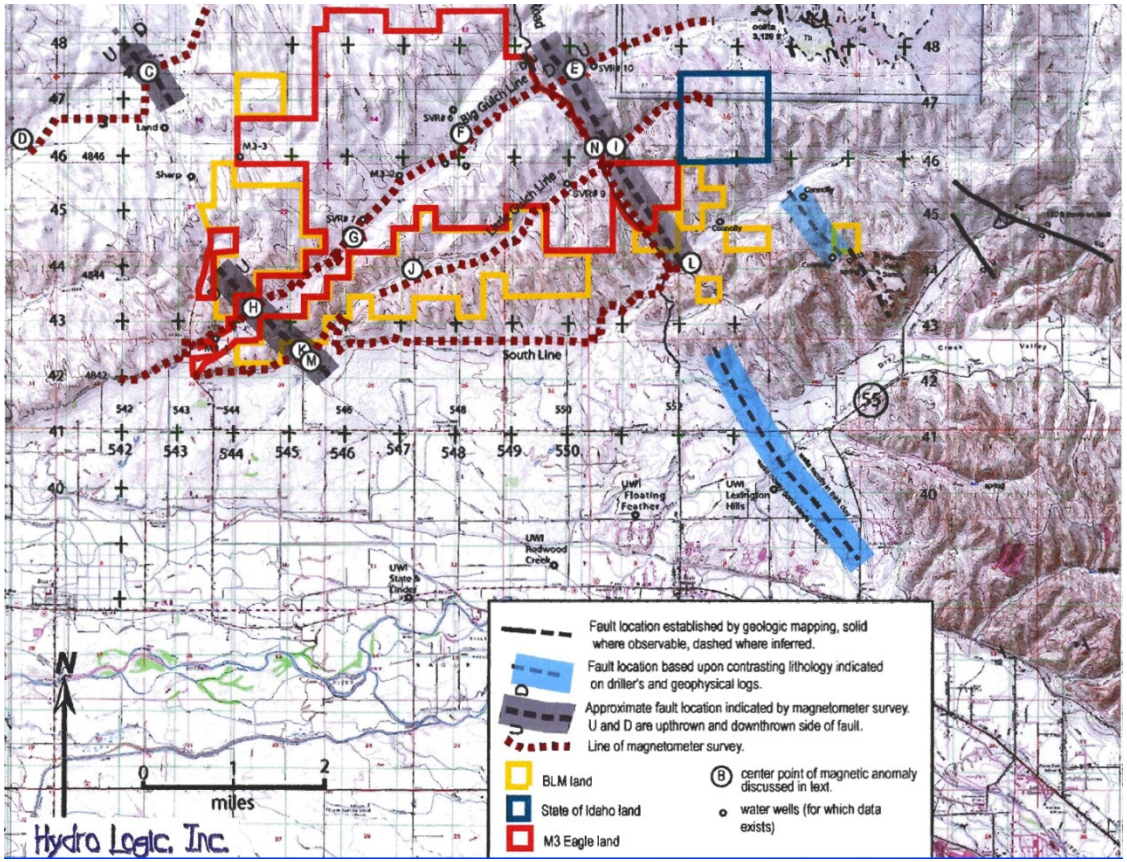
well log from E. Squires

North Ada magnetic data

Little Gulch magnetic profile



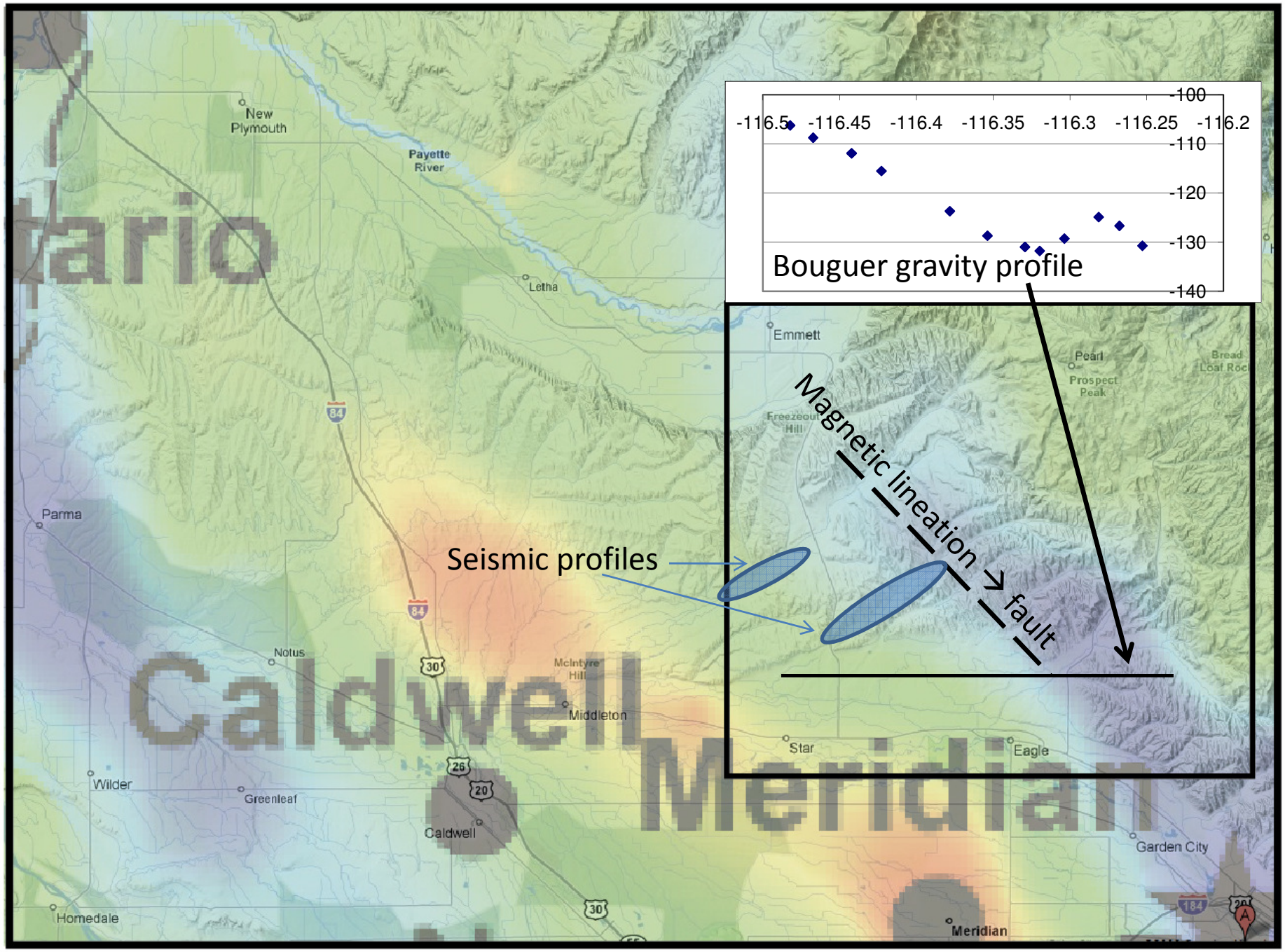
~4,600 ft depth, ~600 ft down to the SW



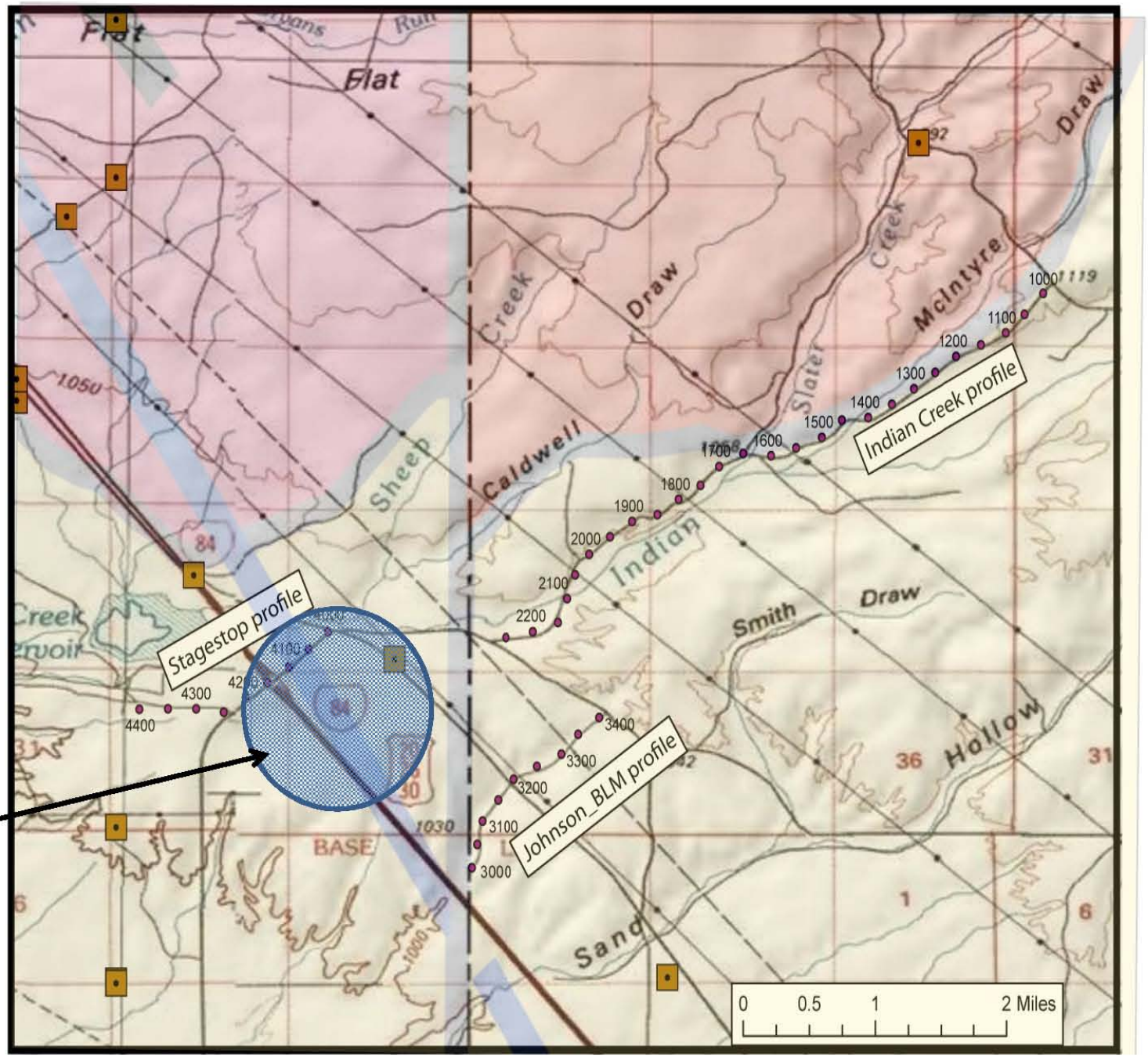
- Model magnetic data with new seismic/gravity constraints
- Acquire new profile(s) to the south

from Wood, 2007

Filtered Gravity Data

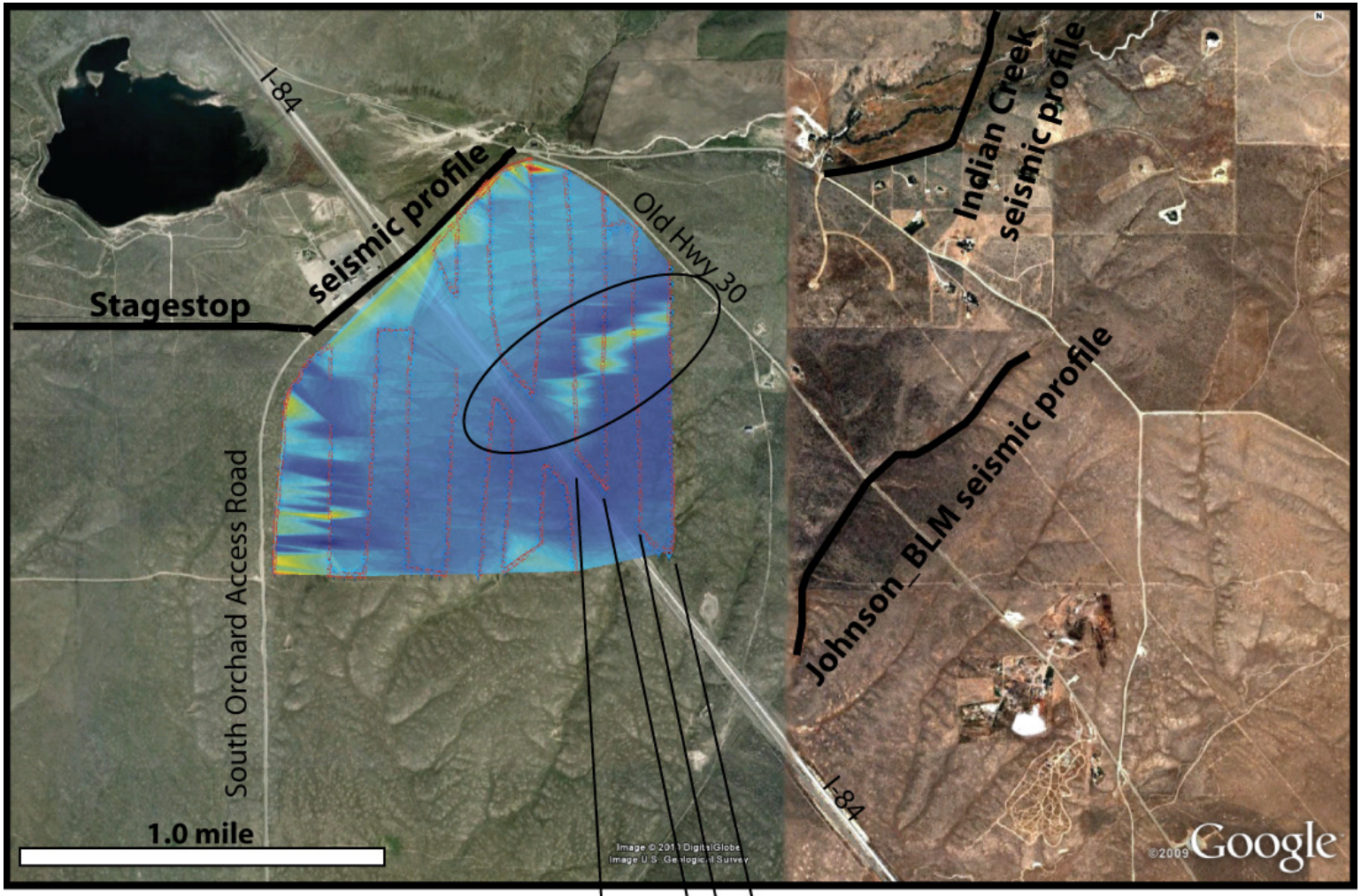


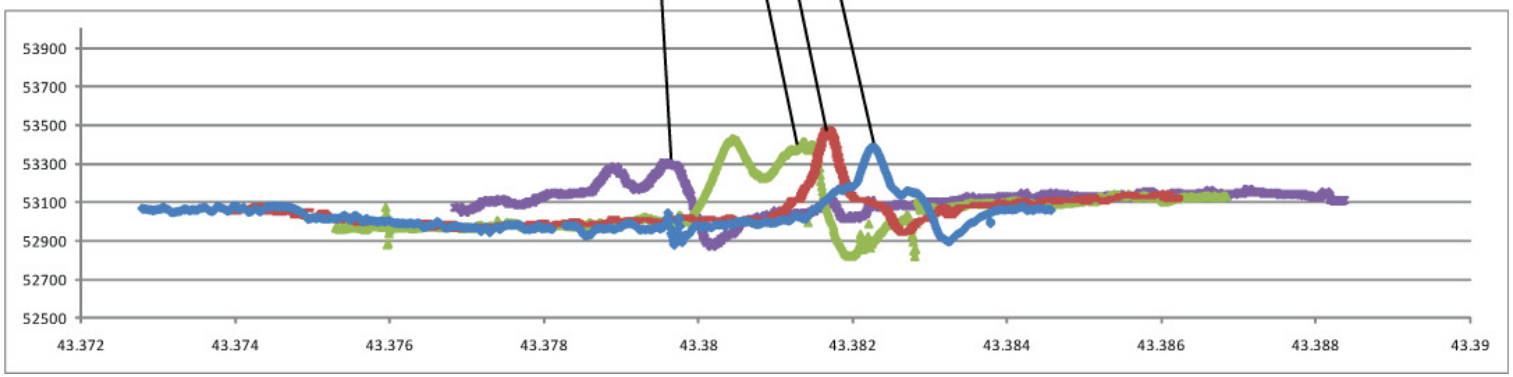
East Ada/West Elmore geophysics



Magnetic survey

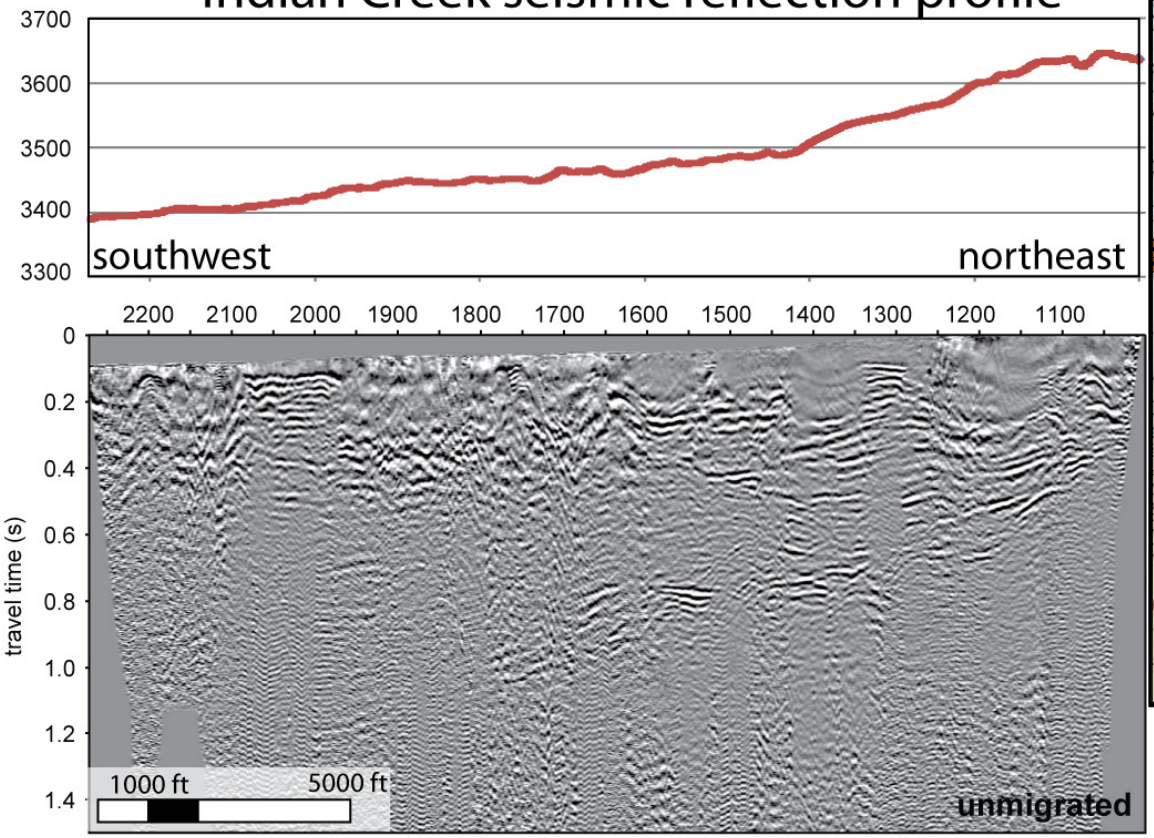
East Ada magnetic survey

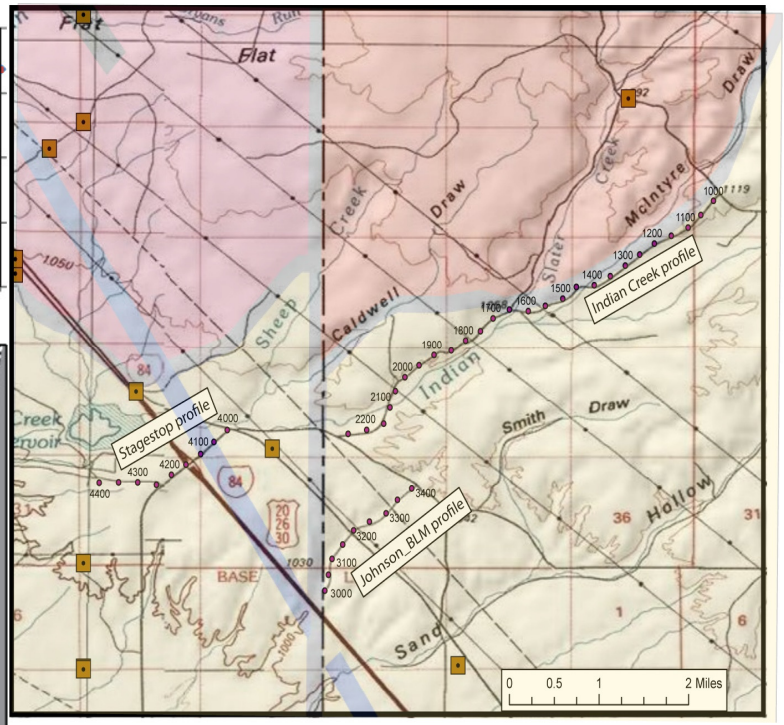


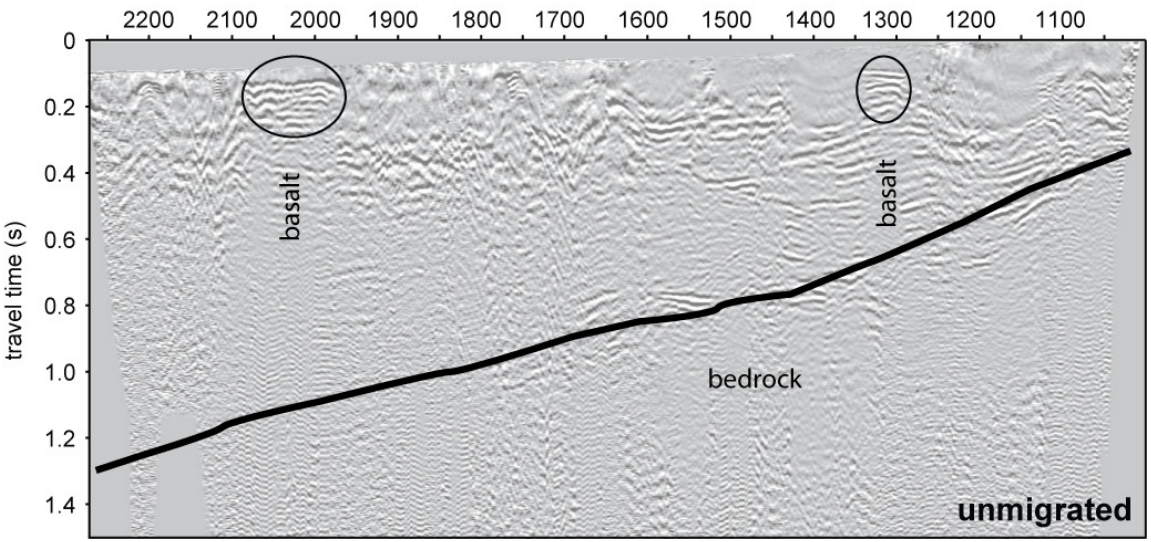


- ~ 500 nT anomaly
- ~500 ft width
- basalt flow edge @ few hundred ft depth

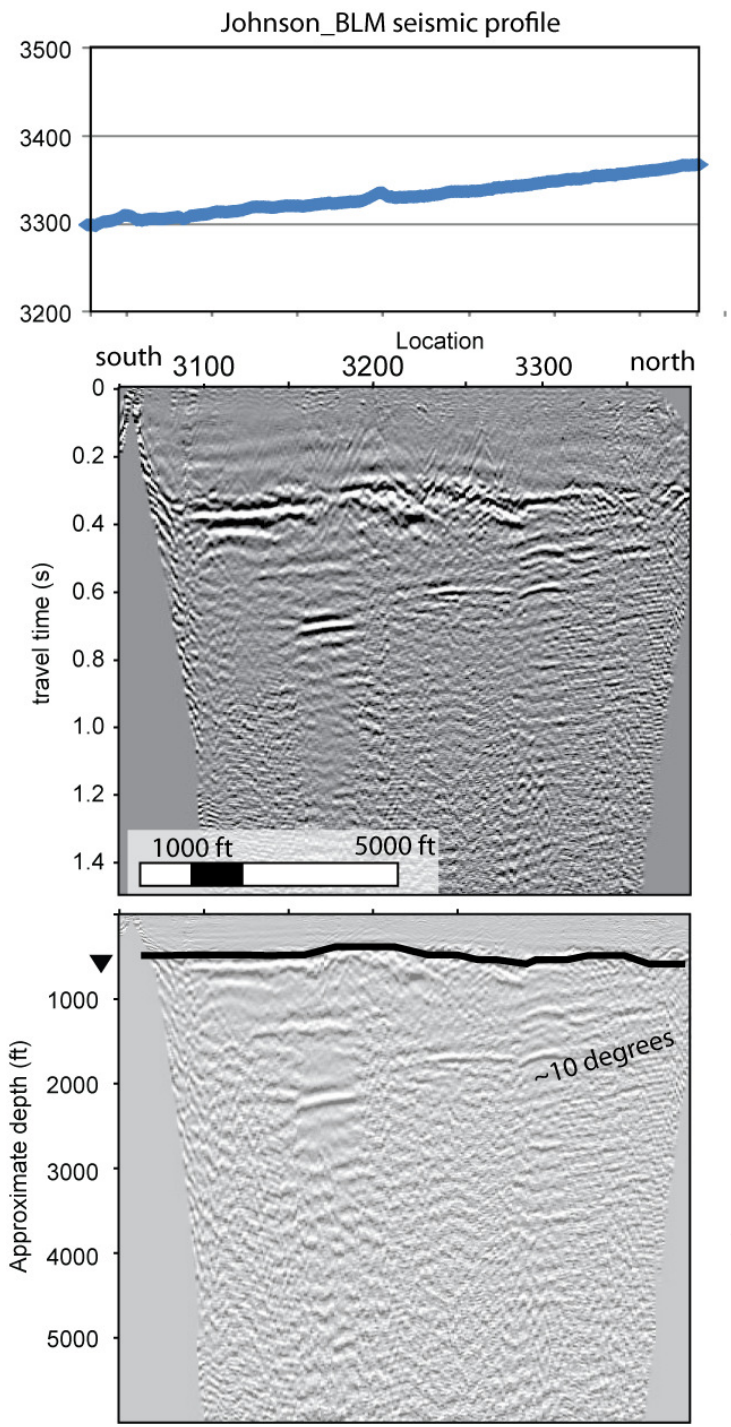
Indian Creek seismic reflection profile

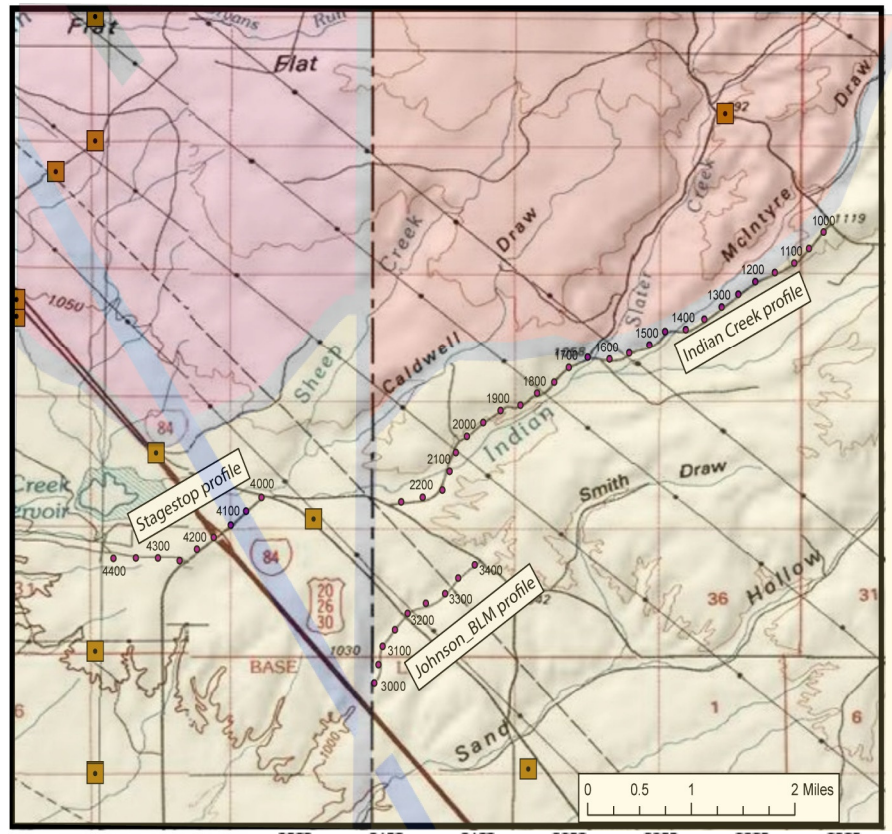


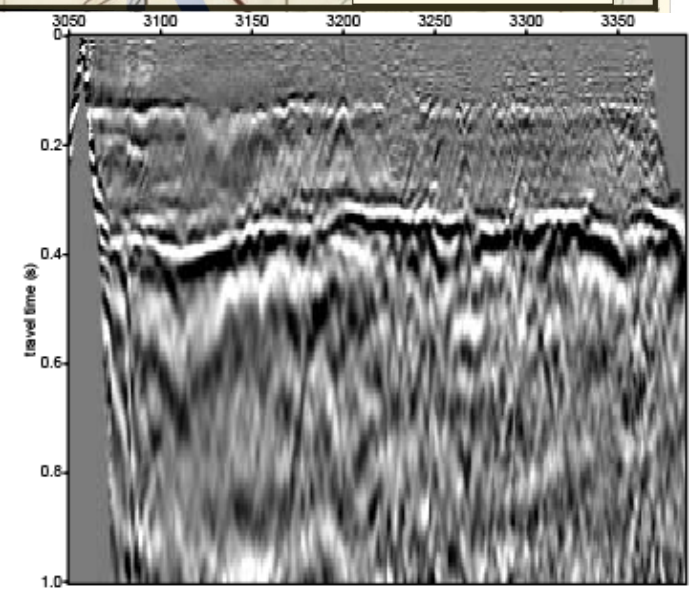




- south-dipping bedrock reflector
- discontinuous reflectors within basin sediments
- large-amplitude near-surface anomalies → near-surface basalt flows





- south-dipping discontinuous reflectors (~10 degrees)

- Large variation in water table reflector depth and character