

3-D joint P- and S-wave tomography of a fault zone in Rock Valley, Nevada, the Nevada National Security Site

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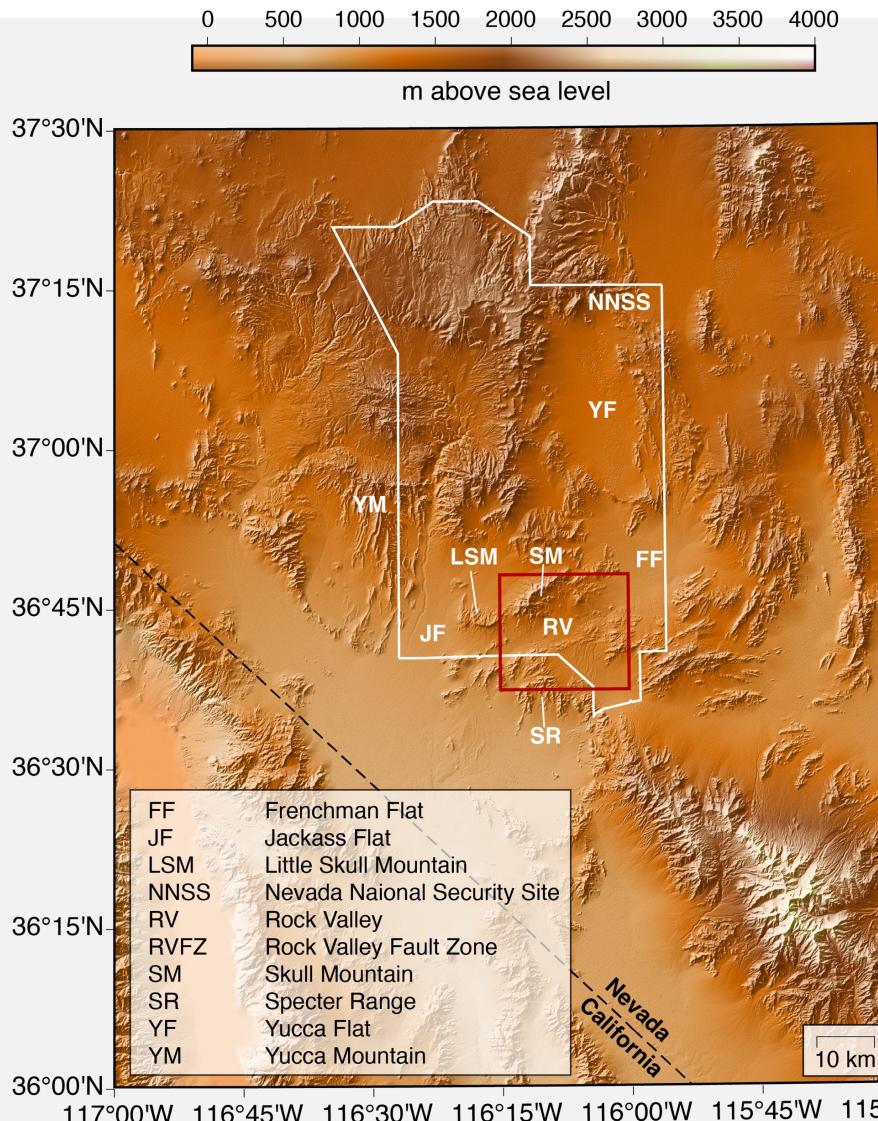
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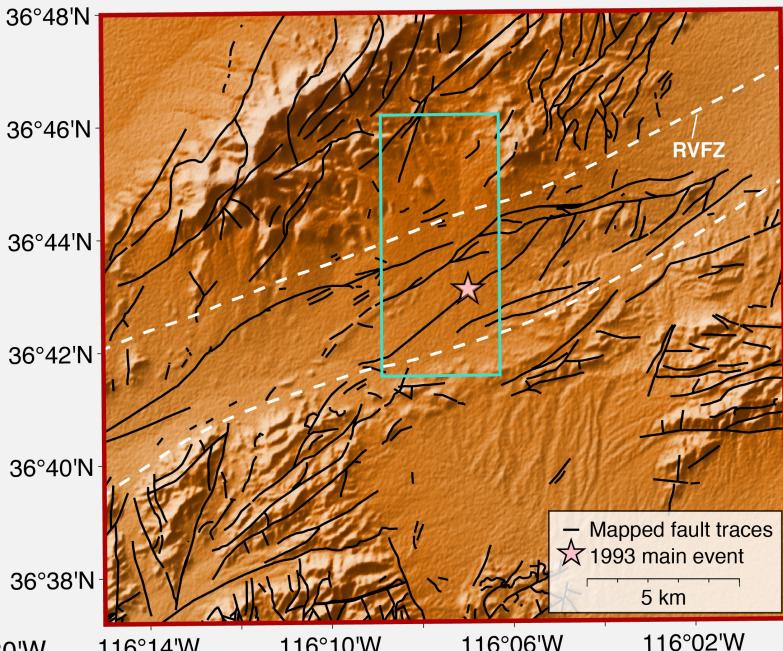
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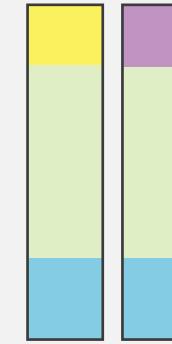
Rock Valley, Nevada



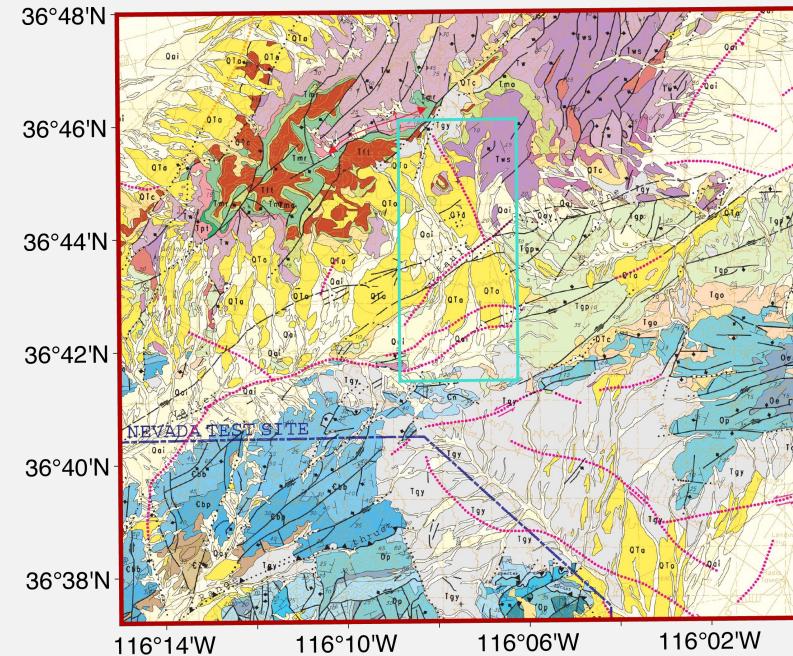
- Rock Valley hosts the left-lateral strike slip Rock Valley Fault Zone (RVFZ)
- Series of shallow (<3 km) earthquakes in 1993



Probable depth sequences

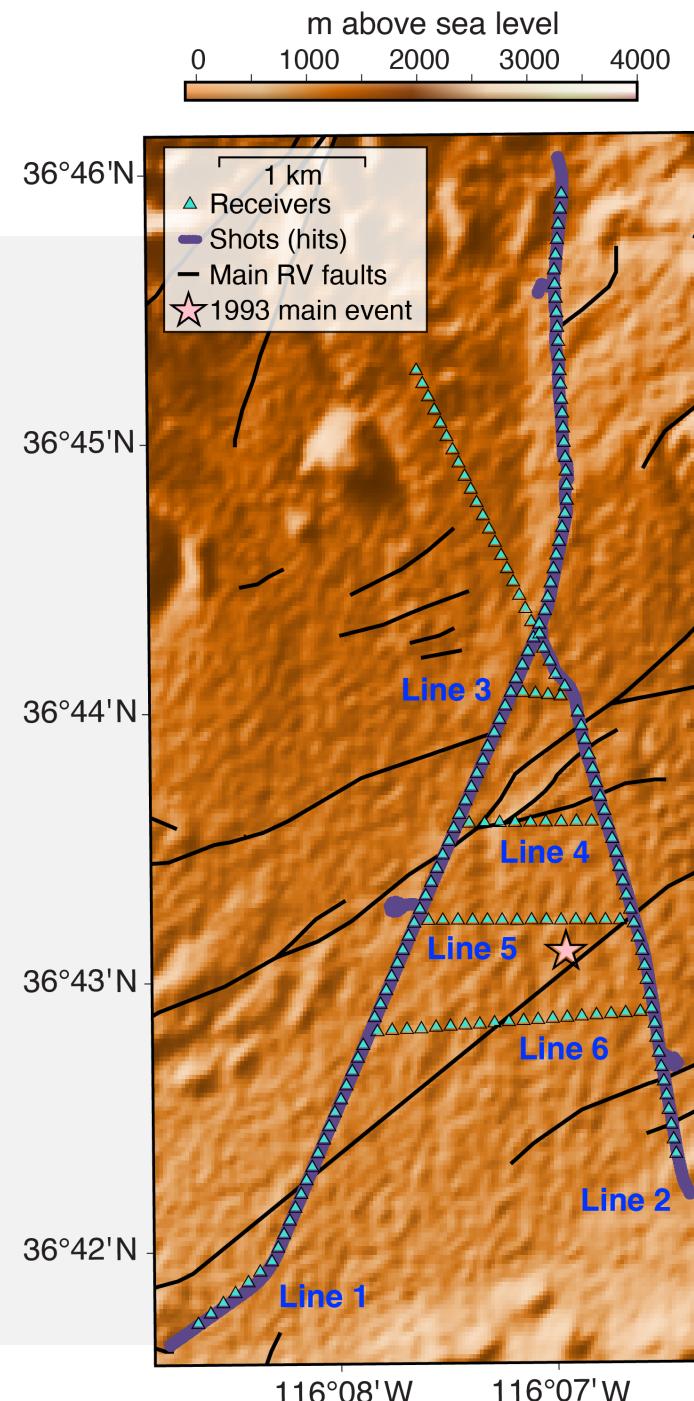


Geologic Units	
Qta	Tertiary-Quaternary alluvium
Qai	
Tgy	Tertiary basin-fill sediments
Tws	Tertiary volcanics
Tgp	Tertiary sedimentary rocks
C	Paleozoic carbonates



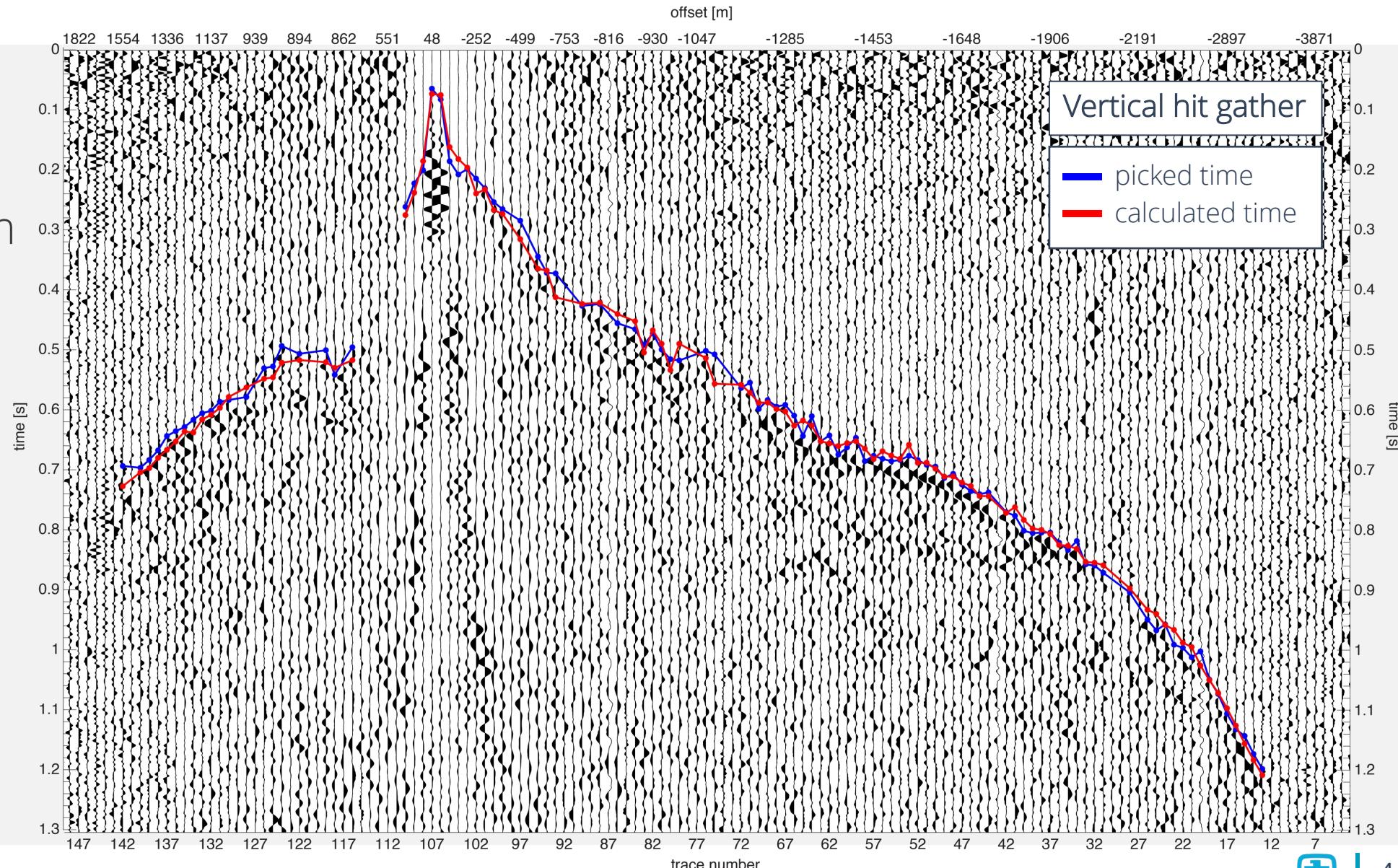
Accelerated Weight Drop Data

- 188 3-C geophones at 100 m spacing
- AWD source every 25 m
 - 5 vertical hits for P waves
 - 10 side hits (5 in each opposing direction) for S waves
- Processed into gathers
 - Vertical hits were stacked, bandpass filtered, automatic gain control (agc)
 - Transverse components stacked, opposing side hits differenced, bandpass filtered, agc



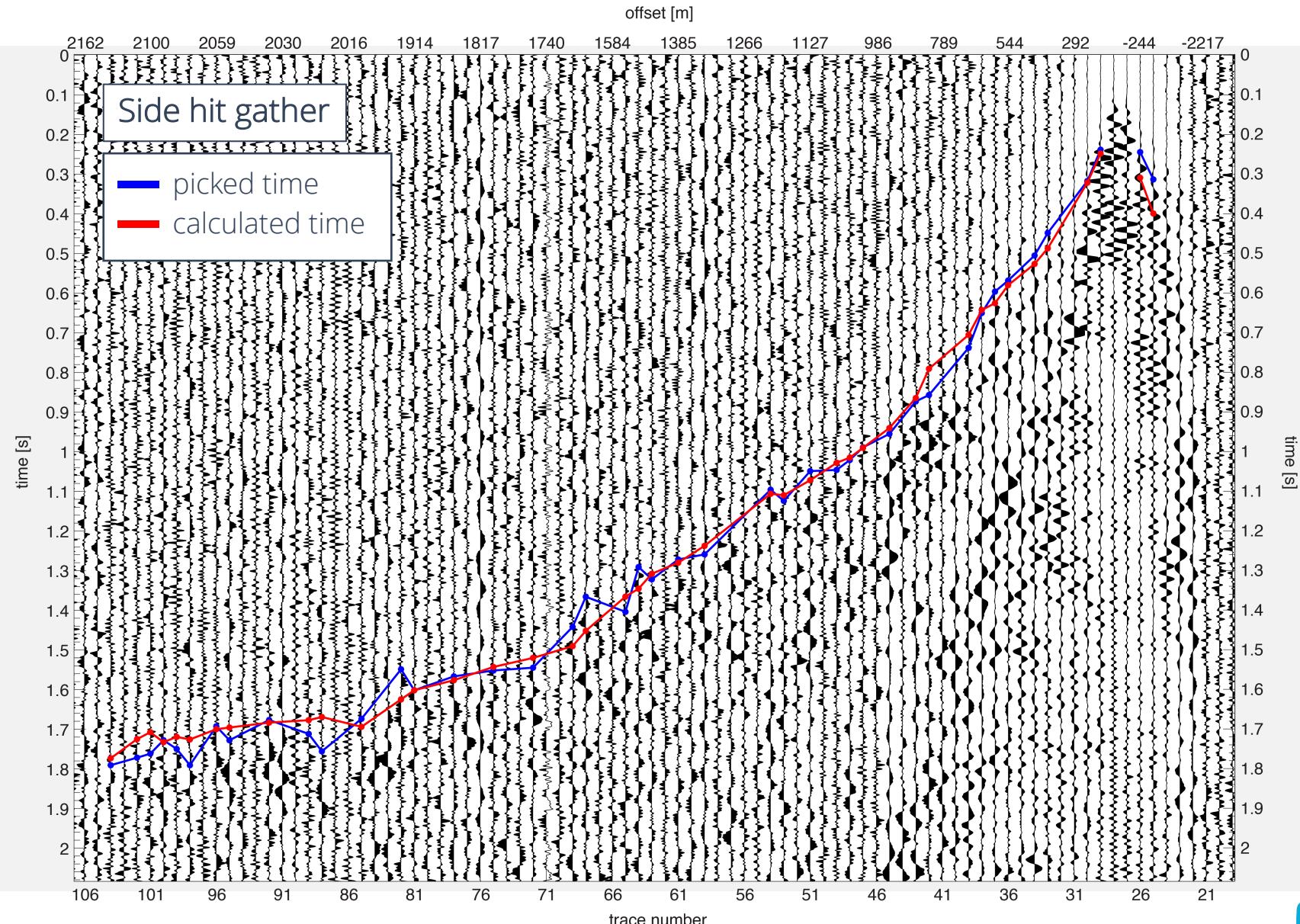
P- and S-wave travel time tomography

- ~17k P picks with maximum offset of ~3.5 km
- P pick root mean squared (RMS) misfit of 20 ms



P- and S-wave travel time tomography

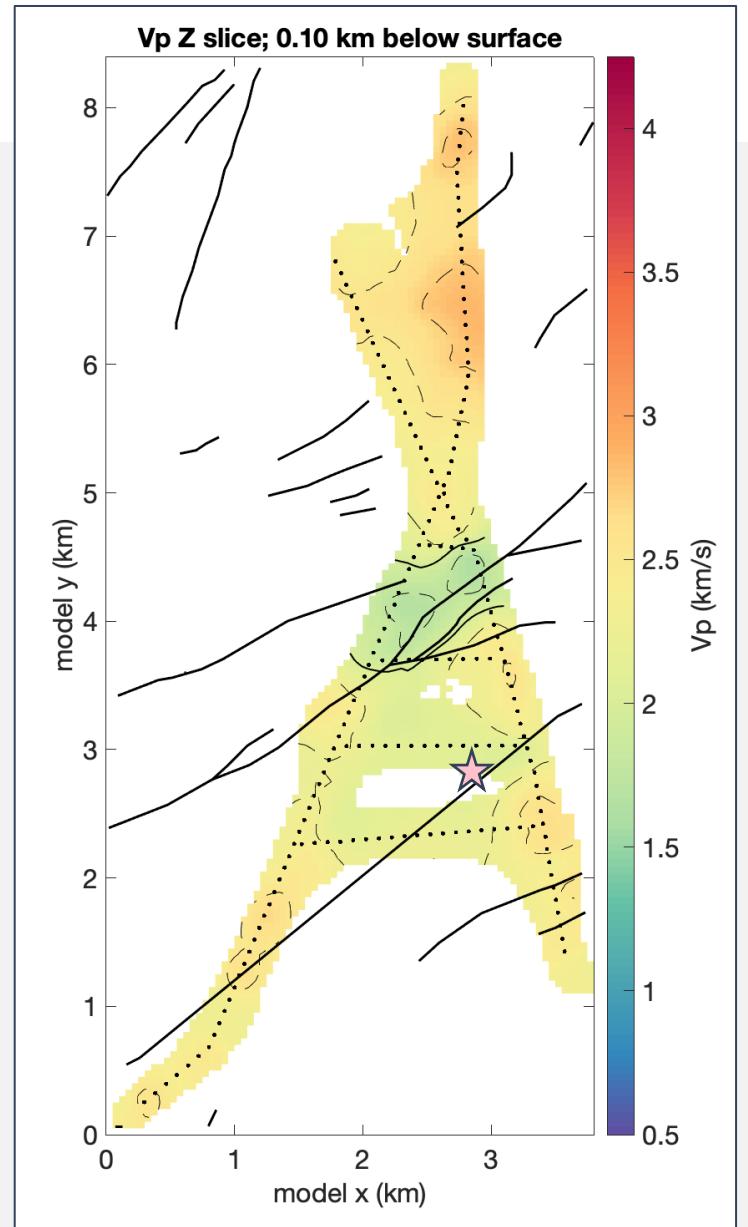
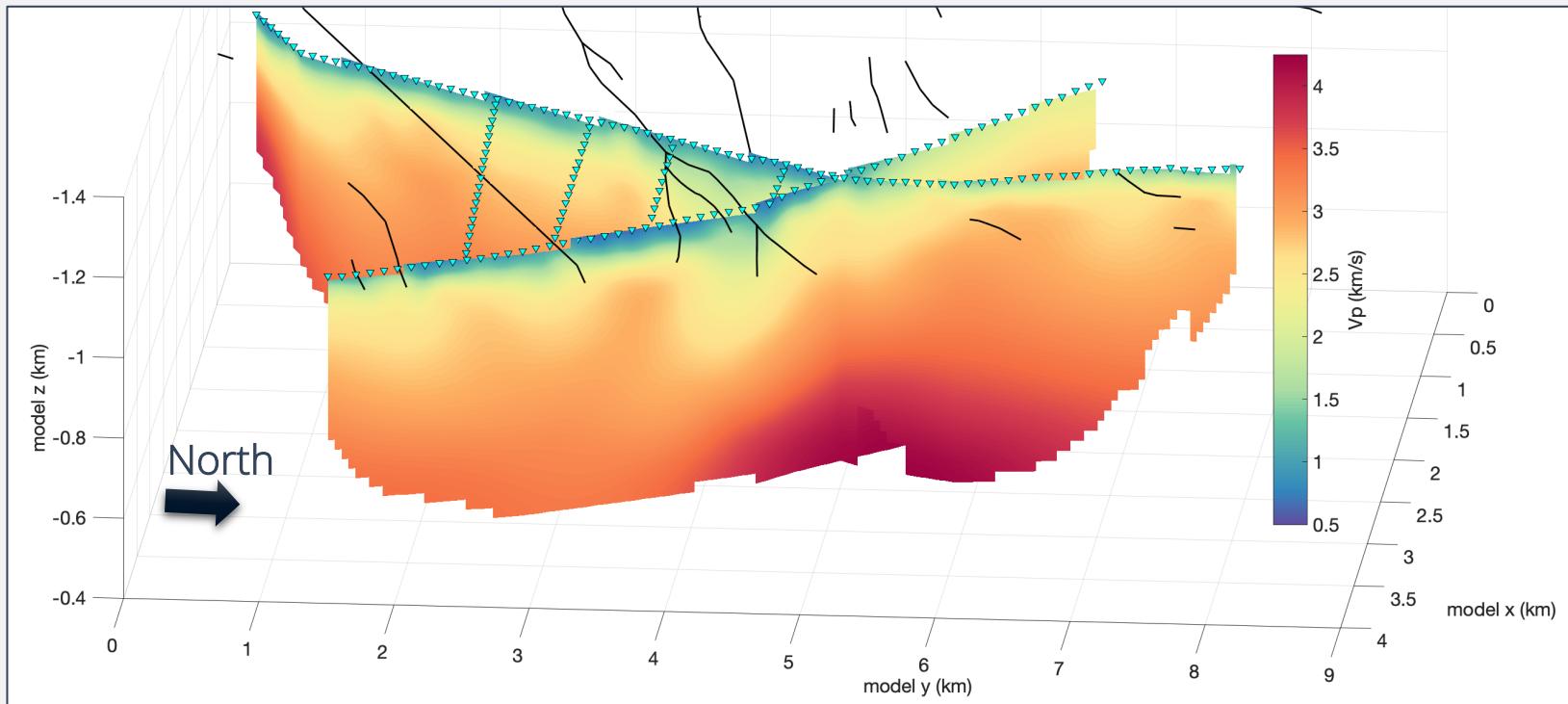
- ~15k S picks with maximum offset of ~3.5 km
- S pick RMS misfit of 60 ms



Velocity Models

P-wave velocity (Vp)

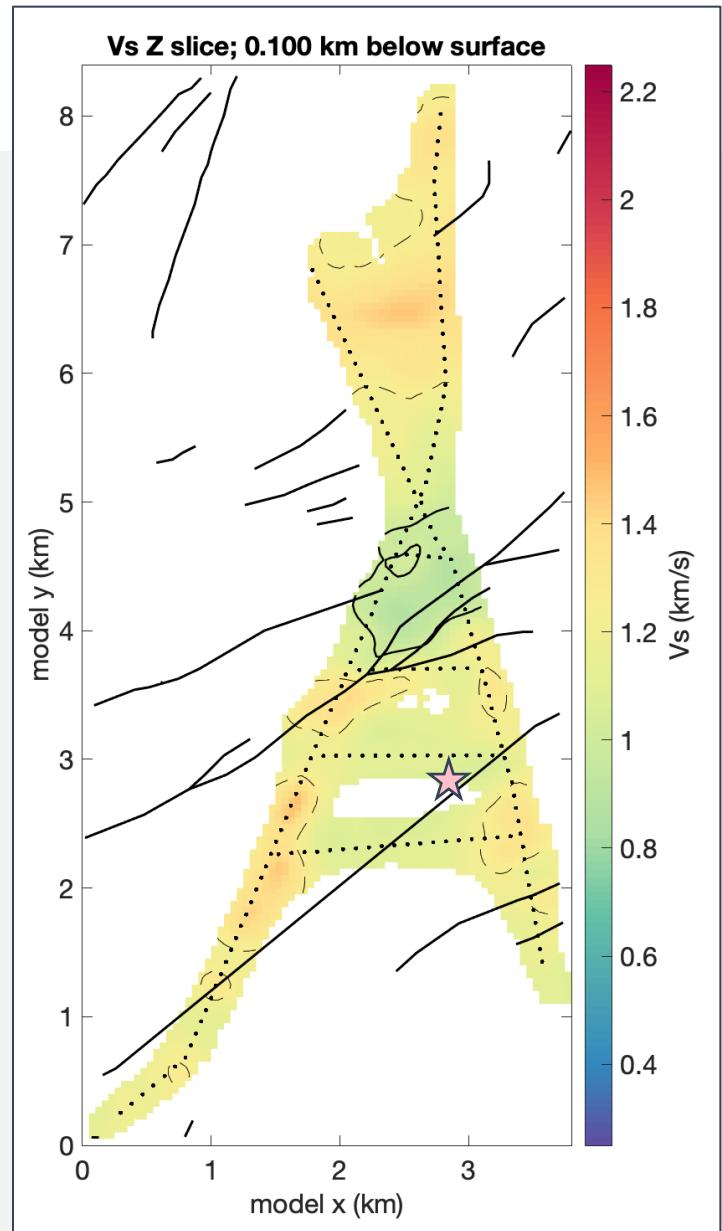
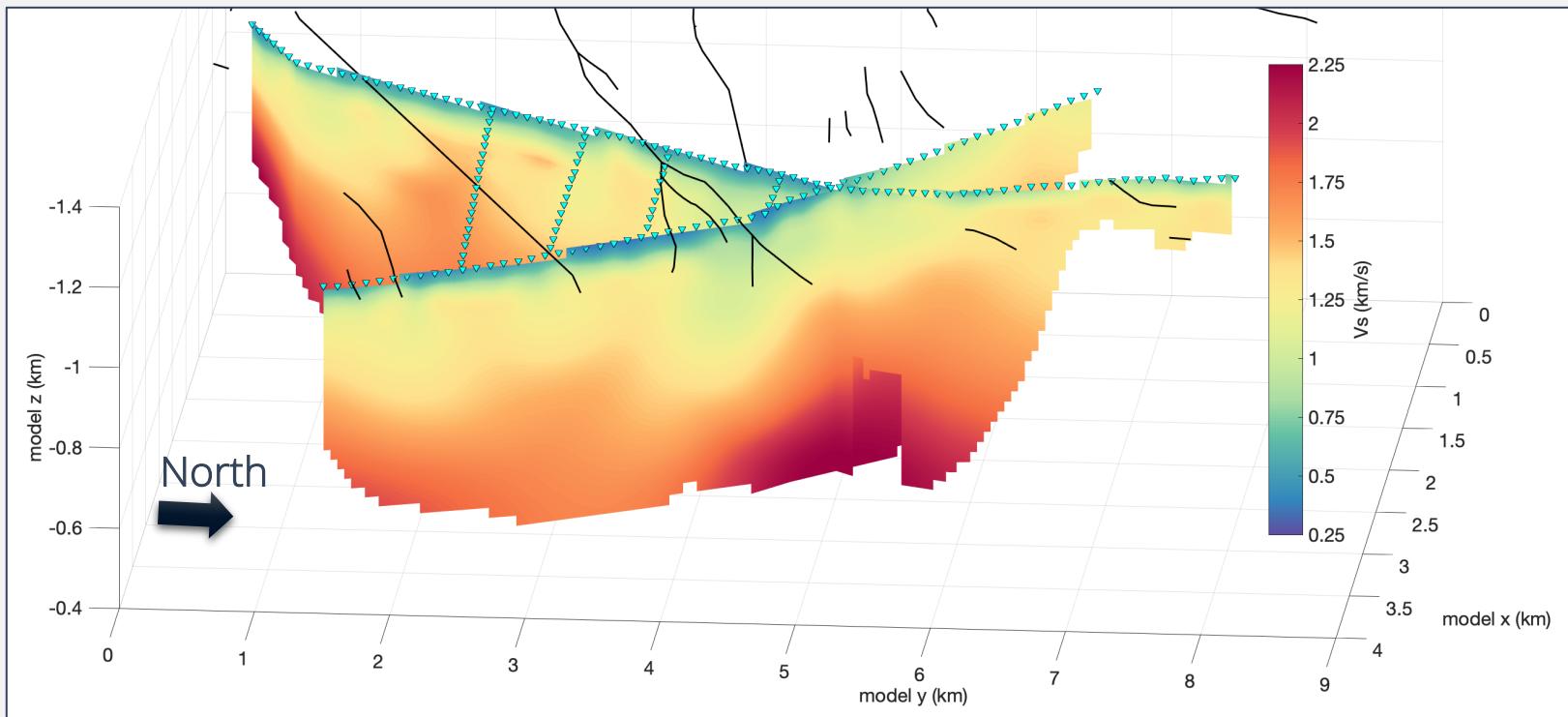
- Prominent low Vp area beneath central faults and lower Vp beneath fault traces
- Consistent with shallow volcanic rocks in northern model area and ~20 m of alluvium central and southern model area



Velocity Models

S-wave velocity (Vs)

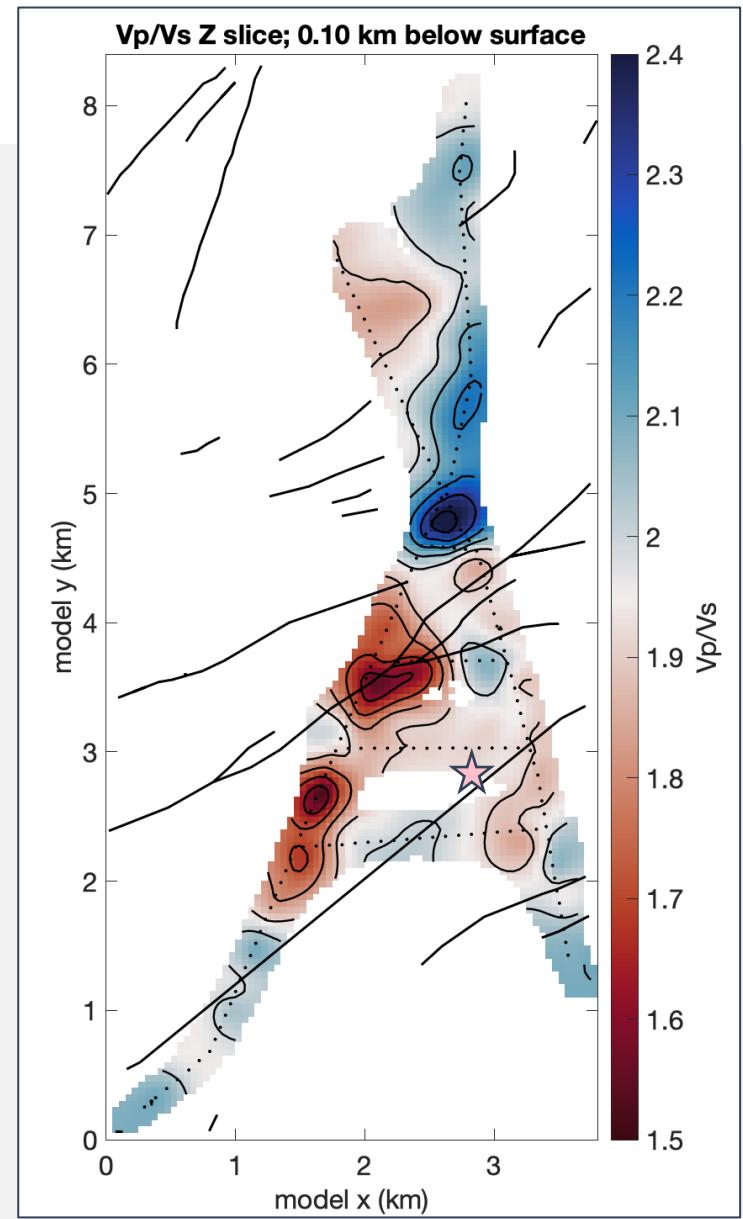
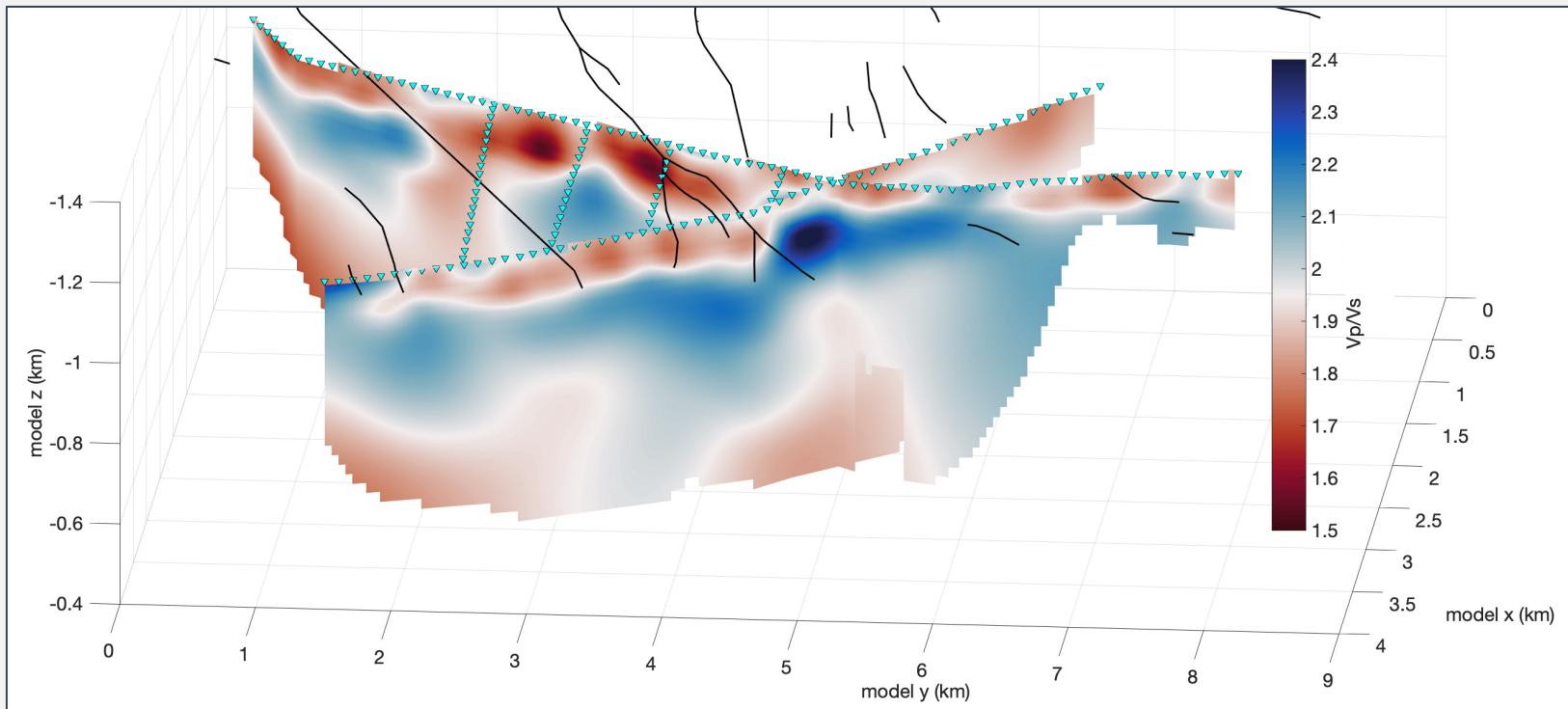
- Similar prominent low Vs area beneath central faults and lower Vs beneath fault traces
- May have imaged the top of the Paleozoic carbonate



Velocity Models

V_p/V_s ratio

- Low V_p/V_s to the south of & high V_p/V_s to the north of central faults at 100 m depth
- High V_p/V_s area – fault damage or fluids?



Summary and Next Steps

V_p , V_s , and V_p/V_s ratio images fault damage, likely from 1993 earthquake swarm and potential fluid-filled faults facilitating groundwater flow

Next Steps

- Still working on V_p/V_s interpretations
- Complete error analysis
- Compare with gravity data
- Use to refine shallow earthquake locations
- Use to inform future source physics modeling

