Introduction to UTD Seismic Imaging Laboratory

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UTD Seismic Imaging Laboratory

Mission: developing advanced seismic imaging technologies to investigate tectonic/environmental processes, physical properties of Earth’s materials, and earthquake rupture processes

Structure seismology

\[ \rho \frac{\partial^2 u}{\partial t^2} = \nabla \cdot T + f \]

- Continental-scale tomography (Europe, North America, and Australia)
- Crustal-scale tomography (central Oklahoma and the Delaware Basin)
- Reservoir-scale imaging
- Azimuthal anisotropy and attenuation

Environmental seismology

Earthquake seismology
Rivera slab

500 km

Cocos slab

Atlantic slab

Return flow

Escape flow

Trench-perpendicular flow

Trench-parallel flow

Farallon slab

Caribbean slab

(Zhu et al, Nature Communications, 2020)
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- Structure seismology
- Environmental seismology
- Earthquake seismology

Monitoring crustal response to:
- Ice sheet melting
- Injection/withdrawal of water
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Structure seismology

Environmental seismology

Earthquake seismology

\[ \rho \frac{\partial^2 u}{\partial t^2} = \nabla \cdot T + f \]

• Earthquake location
• Moment tensor inversion
• Finite fault rupture imaging

IN 3D EARTH!
Rupture processes for the fore and mainshocks

2019 Mw6.4 Ridgecrest, California earthquake

2020 Mw 6.5 Stanley, Idaho earthquake

(Yang et al, GRL, 2020, 2021)