### Introduction to Fault Mapping Course

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# Outline

- Introduction
- Fault mapping example
- Research

## Pacific Gas & Electric

- Utility company serving 16 million people in California
- Service territory extends from Bakersfield to Oregon border
- Electric and gas transmission and distribution; gas storage.
- Hydro power and nuclear generation

### **Geosciences Department Overview**

- In-house group of 20 Integrated Geoscience Experts
  - Geologists
  - Geotechnical Engineers
  - Geophysicists/Seismologists
  - Civil/Structural Engineers

•Formed to Manage Long Term Seismic Program for Diablo Canyon Power Plant; an Operating License Commitment

•Broadened Role Over Time to Support All Company Lines of Business for Range of Geosciences Issues



2016-2017 Storm Response

#### Fault Mapping Exercise



Little Lake Fault – USGS Fault and Fold Database



LiDAR source: Hudnut et al., (2020) Airborne Lidar and Electro-Optical Imagery along Surface Ruptures of the 2019 Ridgecrest Earthquake Sequence, Southern California. Seismological Research Letters, 91 (4). pp. 2096-2107. ISSN 0895-0695.



Pre-rupture mapping source: Philibosian et al., Evidence of Previous Faulting along the 2019 Ridgecrest, California, Earthquake Ruptures. Bulletin of the Seismological Society of America (2020) 110 (4): 1427–1456



UAV photo courtesy of University of Nevada Reno

PrincipalTrace

ace

Secondary









### **Research Questions**

- What is the rupture location uncertainty for faults mapped with different levels of confidence
- How does this uncertainty change with climate, geology, slip rate, etc.
- What is the variability in rupture location from one earthquake to the next?

![](_page_13_Figure_4.jpeg)

Table 2 Mapping Accuracy Summary: Distance Measured from Mapped Fault Trace to Observed Surface Rupture Mapping One-Sided Standard Two-Sided Standard Mean A

Accuracy	(m)	Deviation (m)	Deviation On Fault (m)
All	30.64	43.14	52.92
Accurate	18.47	19.54	26.89
Approximate	25.15	35.89	43.82
Concealed	39.35	52.39	65.52
Inferred	45.12	56.99	72.69