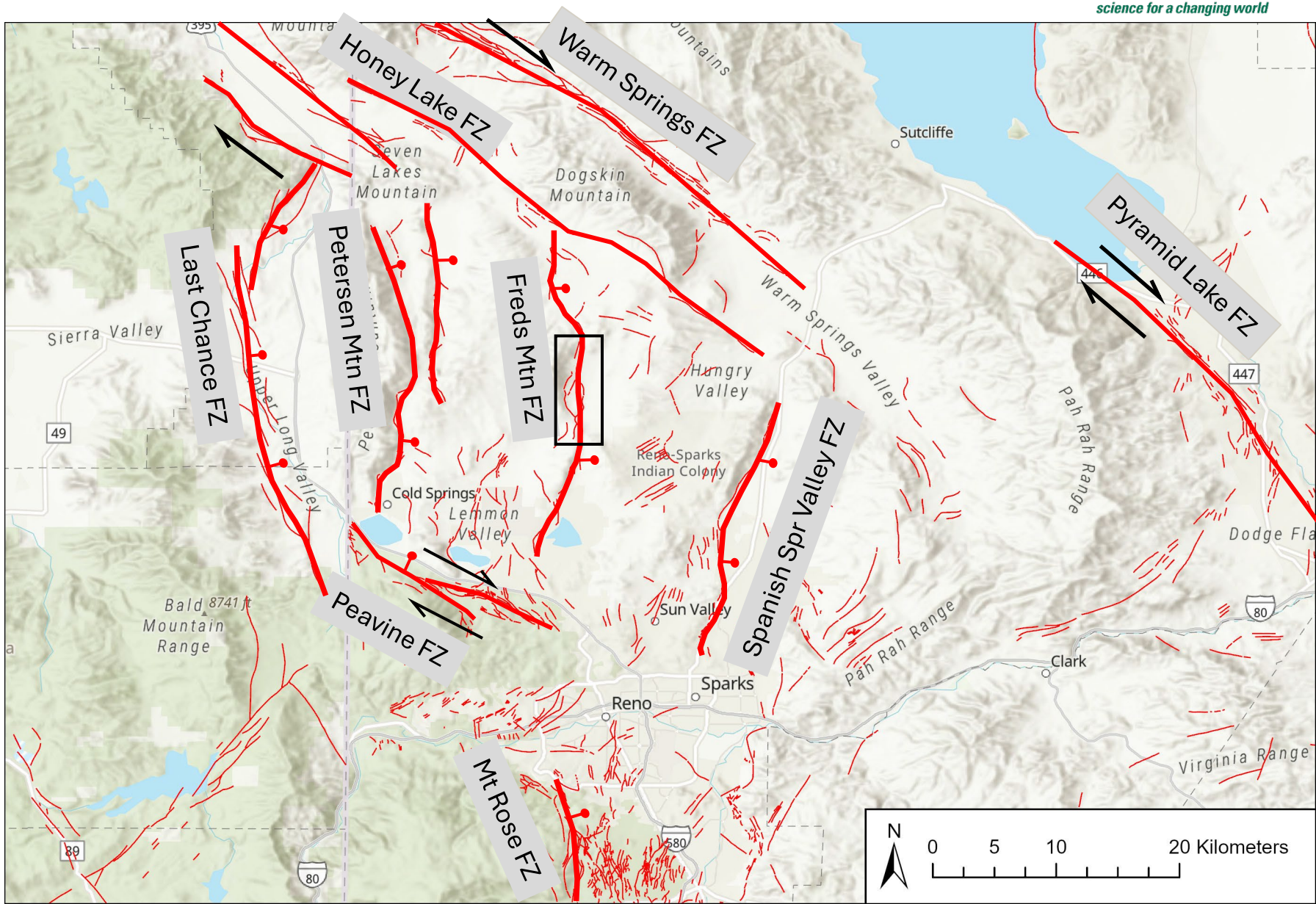
The North Valleys Faults – Freds Mountain Fault Zone

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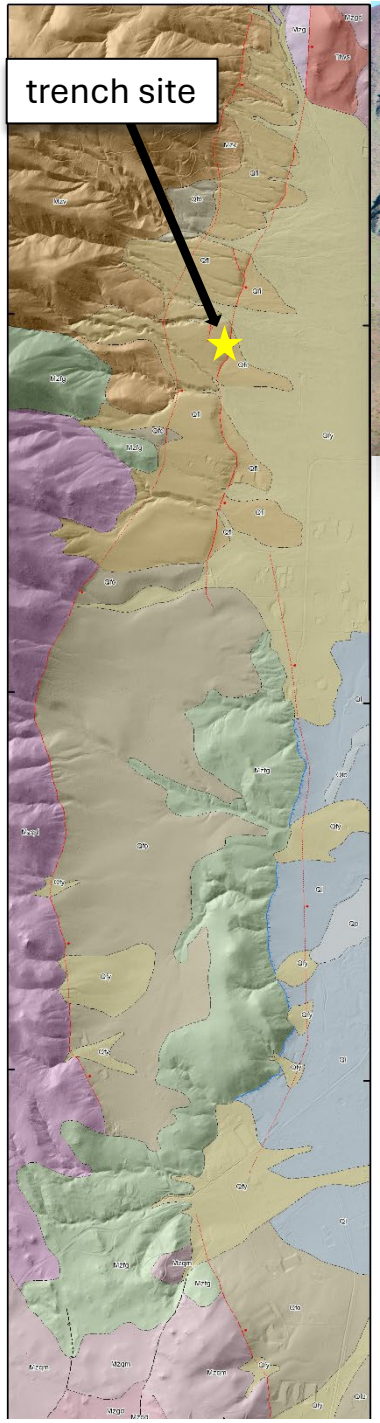
Nevada Bureau of Mines and Geology
University of Nevada, Reno

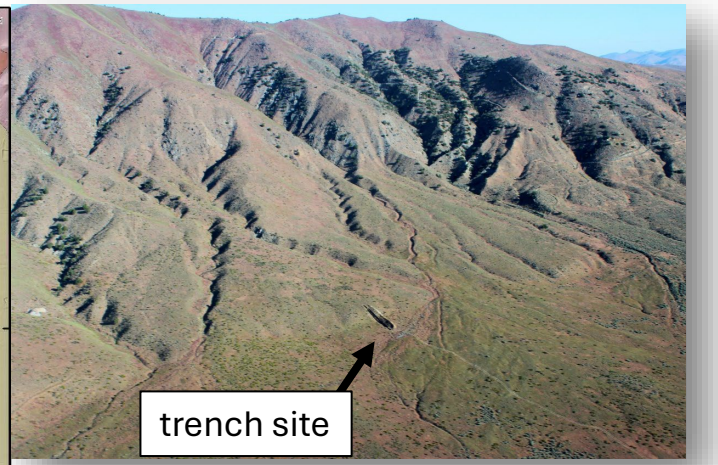
USGS science for a changing world

- The North Valleys faults are normal faults in the northern Walker Lane series situated in the northern Walker Lane.
- Fast growing area of Washoe County, 5-10 km from Downtown Reno.
- Four principal fault zones, all east-dipping normal faults. Possible right-lateral oblique slip.
- Fault investigation on Petersen Mtn Fault Zone found evidence for dextral oblique slip and one earthquake (post-32Ka) on the eastern strand (DeMasi et al., 2021).
- No paleoseismic studies of Last Chance or Spanish Springs Valley fault zones

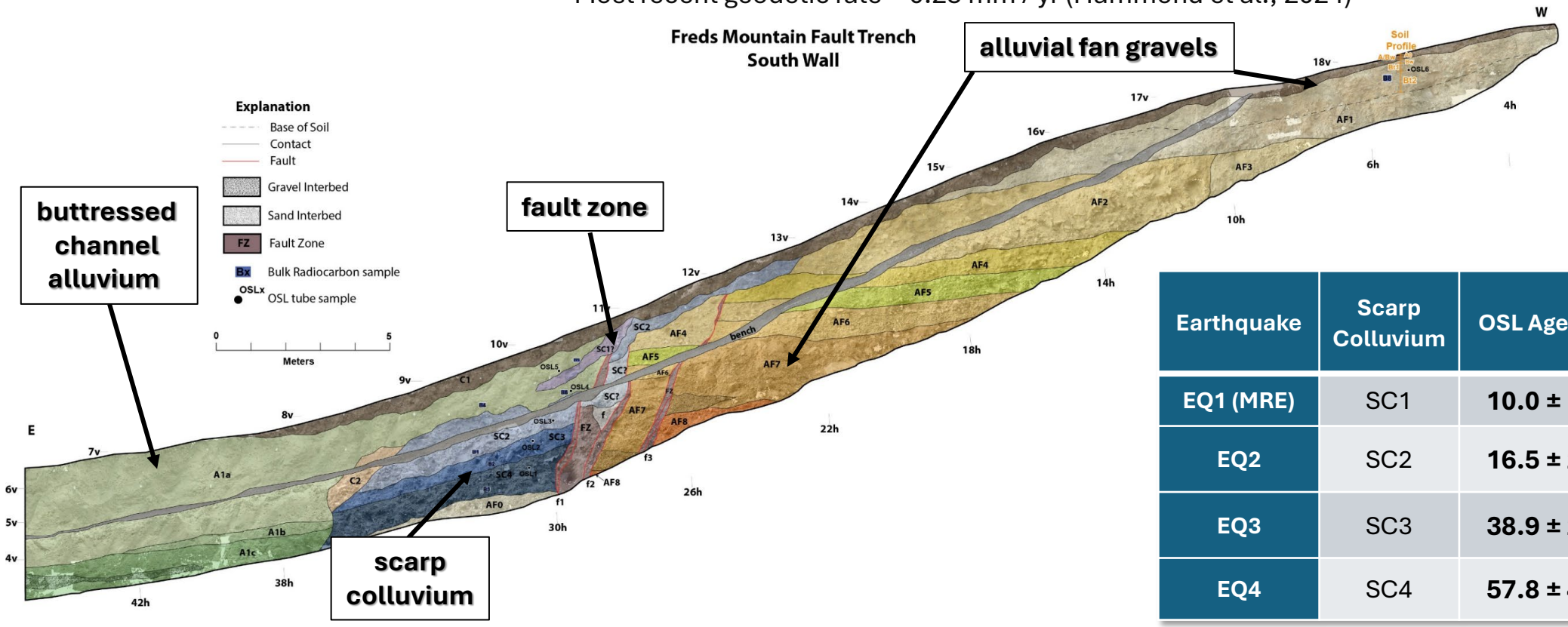


Freds Mountain Fault Trench

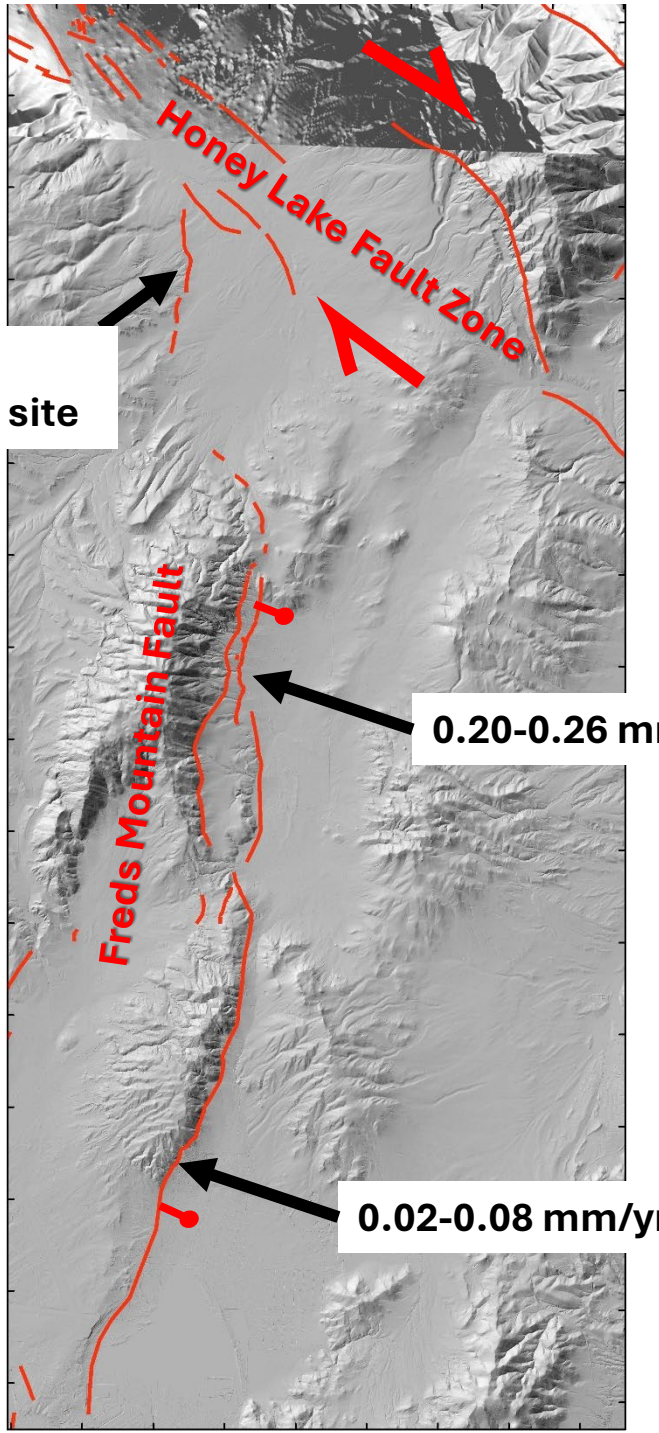


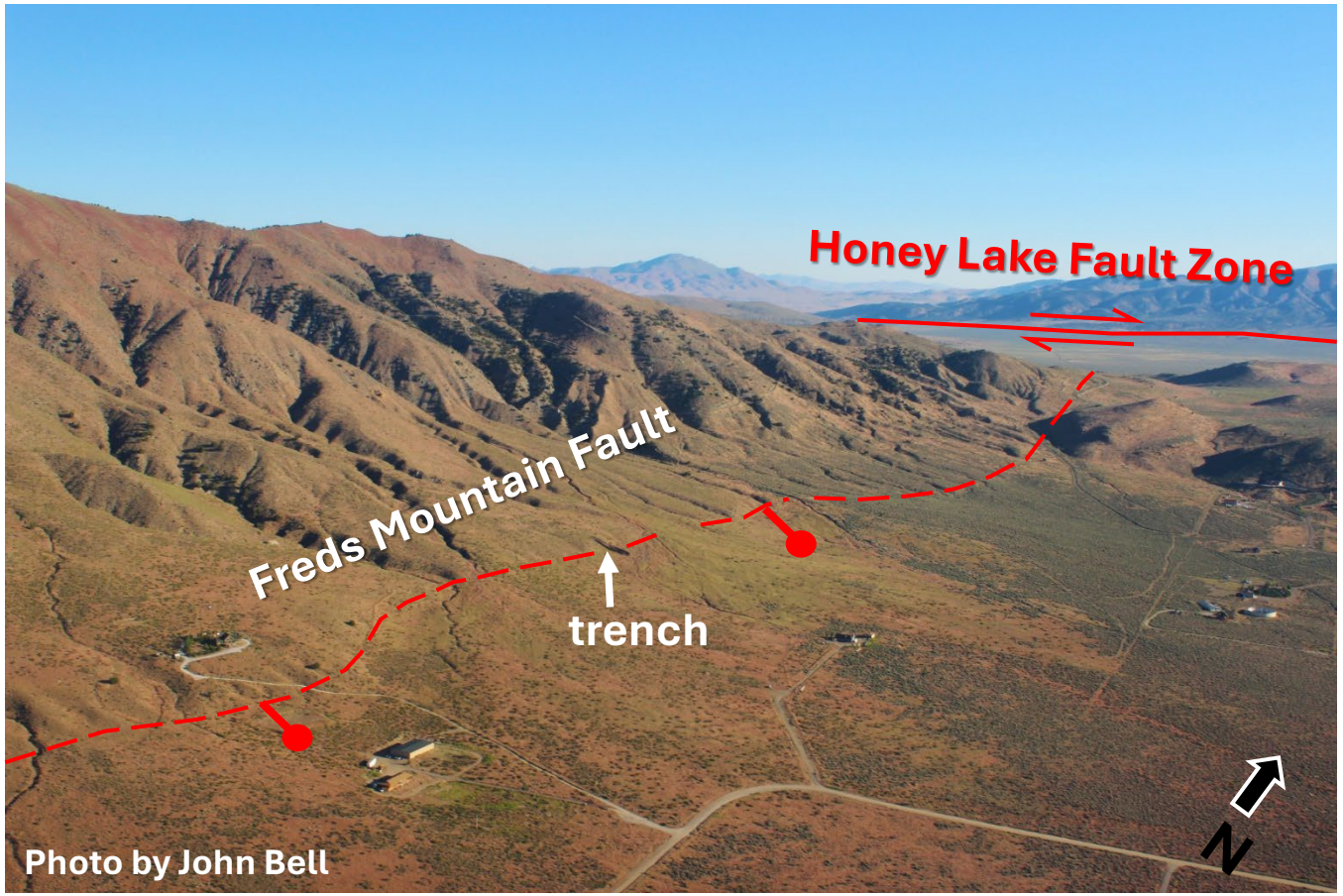


- Trench across 9 m tall scarp in late Pleistocene alluvial fan deposits
- Colluvial wedge history of four earthquakes, dated with OSL.
- Recurrence intervals from 6.5-22.4 ka, **mean recurrence = 15.9 ka (n=3)**
- Age of youngest footwall deposit
  - Charcoal C14 = 22.9 ± 0.3 ka (2-sigma cal.)
  - Feldspar IRSL = 34.7 ± 3.3 ka
  - Combined age range = **22.6-38.0 ka (post-EQ3)**
- ~ 8.3 m vertical surface displacement since 36.4 - 41.4 ka (EQ3); late Pleistocene vertical slip rate = 0.20-0.26 mm/yr
- Most recent geodetic rate = 0.28 mm / yr (Hammond et al., 2024)



Earthquake	Scarp Colluvium	OSL Age (ka)
EQ1 (MRE)	SC1	**10.0 ± 1.2**
EQ2	SC2	**16.5 ± 2.3**
EQ3	SC3	**38.9 ± 2.5**
EQ4	SC4	**57.8 ± 4.1**





- Freds Mountain fault slip rate is highest near the high slip rate Honey Lake Fault (~1.6 mm/yr) and diminishes southward
- Suggests linkage between the North Valleys normal faults and Walker Lane dextral faults