

New constraints on the West Tahoe-Dollar Point Fault recurrence interval

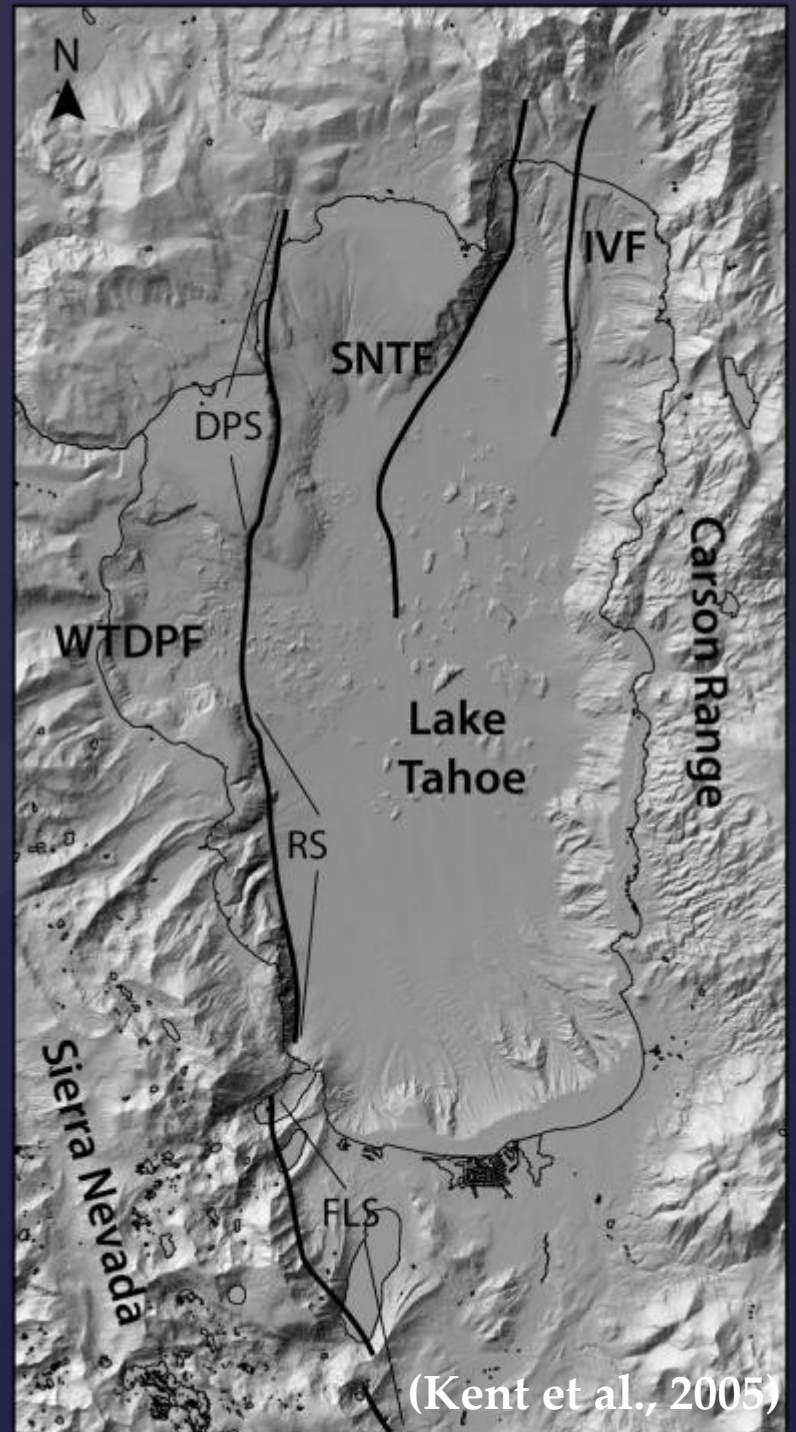
{ Jillian M. Maloney & Paula J. Noble
{ Neal W. Driscoll, Graham M. Kent, Gretchen Schmauder, Daniel S.
Brothers, Robert L. Baskin, Robert Karlin, and Shane B. Smith



Lake Tahoe Basin



(Unruh et al., 2003)



(Kent et al., 2005)

Lake Tahoe Basin

Incline Village Fault (IVF)

-MRE: 660-520 yr. BP

(Seitz et al., 2005)

-Slip rate = 0.18-0.30 mm/yr

(Dingler et al., 2009)

Stateline-N. Tahoe Fault (SNTF)

-MRE: unknown

-Slip rate = 0.35-0.6 mm/yr

(Dingler et al., 2009)

WTDPF-RS

-MRE: 5.3-5.6 k.y. B.P.

(Smith et al., 2012)

-Slip rate = 0.4-0.8 mm/yr

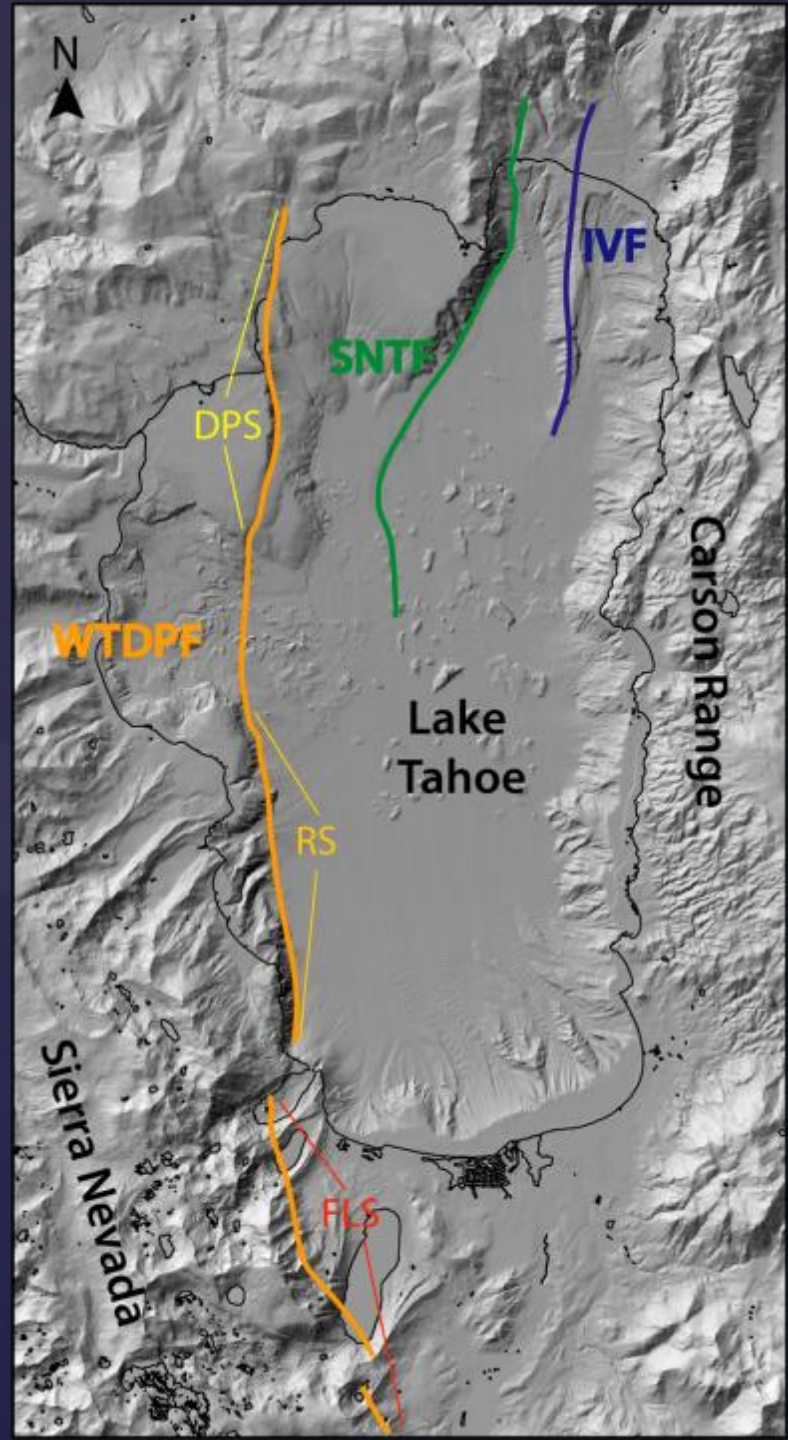
(Brothers et al., 2009)

WTDPF-FLS

-MRE: 4.1-4.5 k.y. B.P., $M > 7.0$

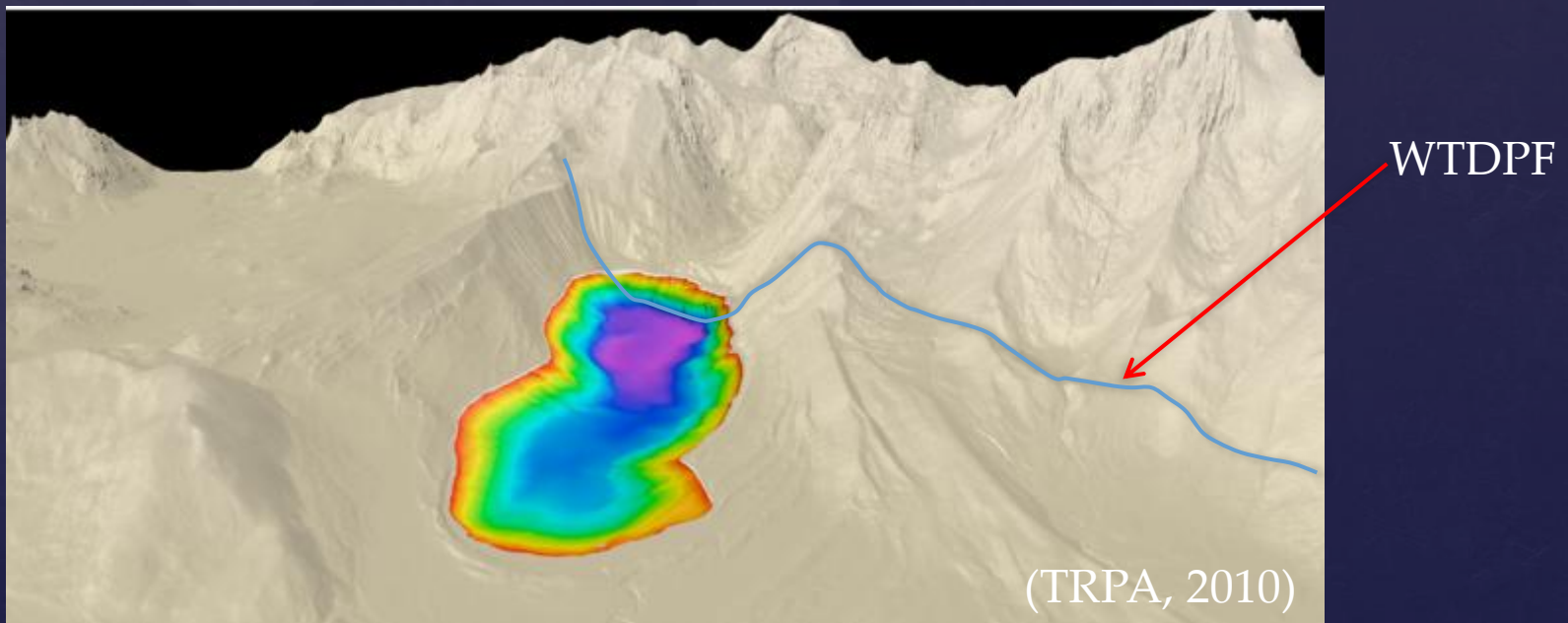
-Slip rate = 0.4-0.8 mm/yr

(Brothers et al., 2009)



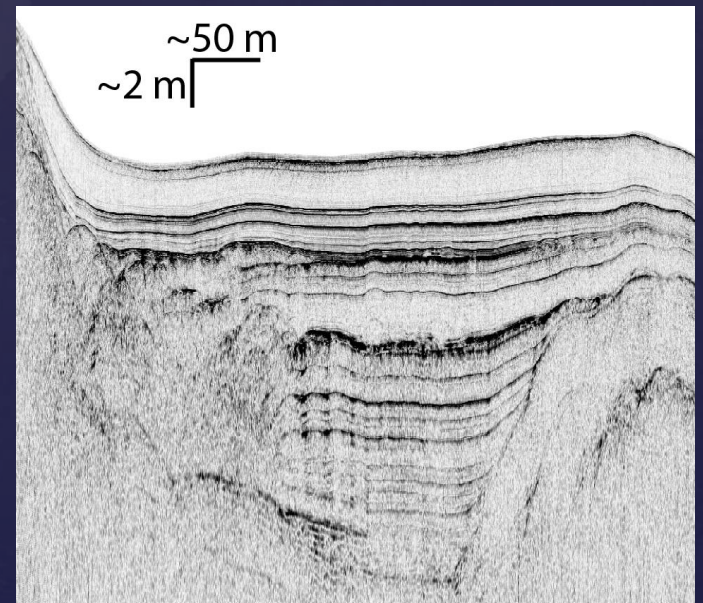
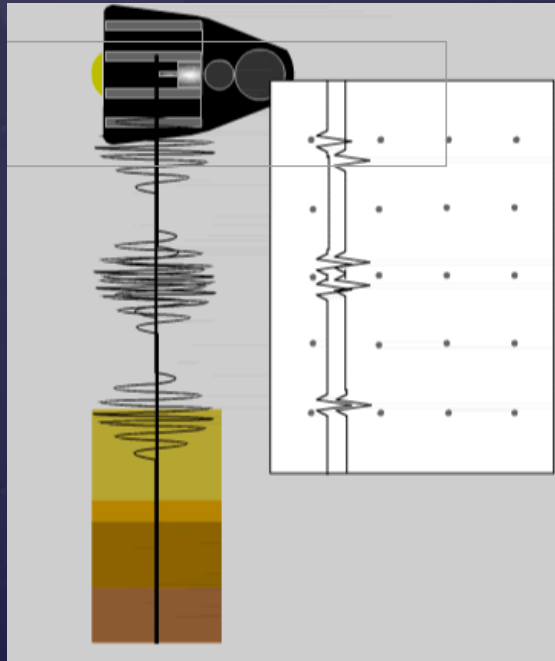
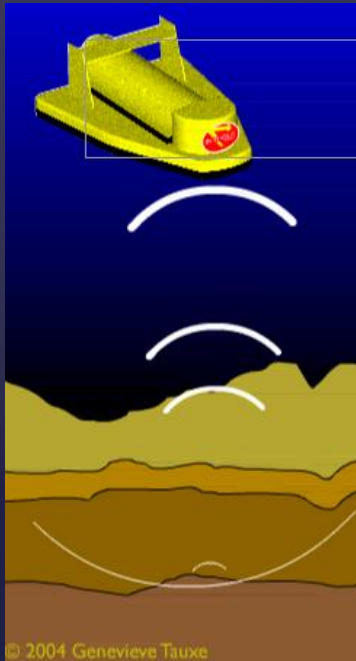
Objectives

- ⌘ What is the recurrence interval on the WTDPF?
 - ⌘ Were slide deposits imaged in Fallen Leaf Lake, Cascade Lake, Emerald Bay, and Lake Tahoe triggered by earthquakes?
- ⌘ What are the rupture patterns between faults of the Lake Tahoe Basin?
 - ⌘ Can timing and extent of slide deposits provide information on the rupture patterns between the three WTDPF sections?



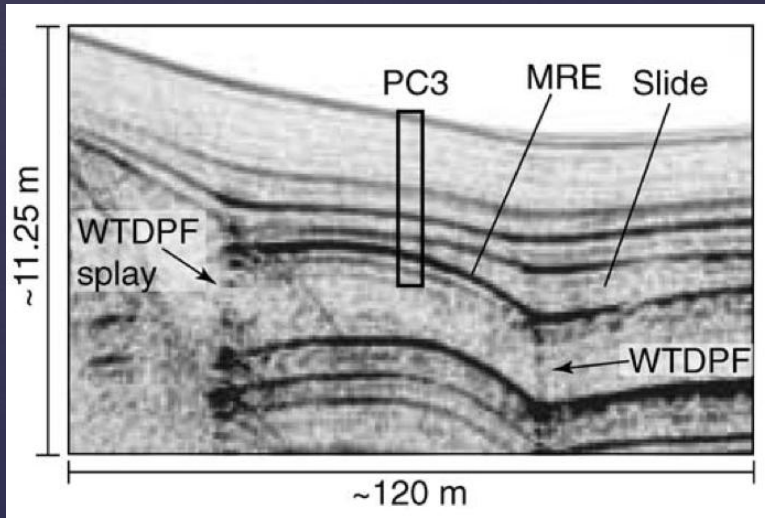
Methods - CHIRP

- Stratigraphy
- Sediment characterization
- Faulting and deformation
- Shallow penetration (~50 m)
- High resolution (~0.1 m)



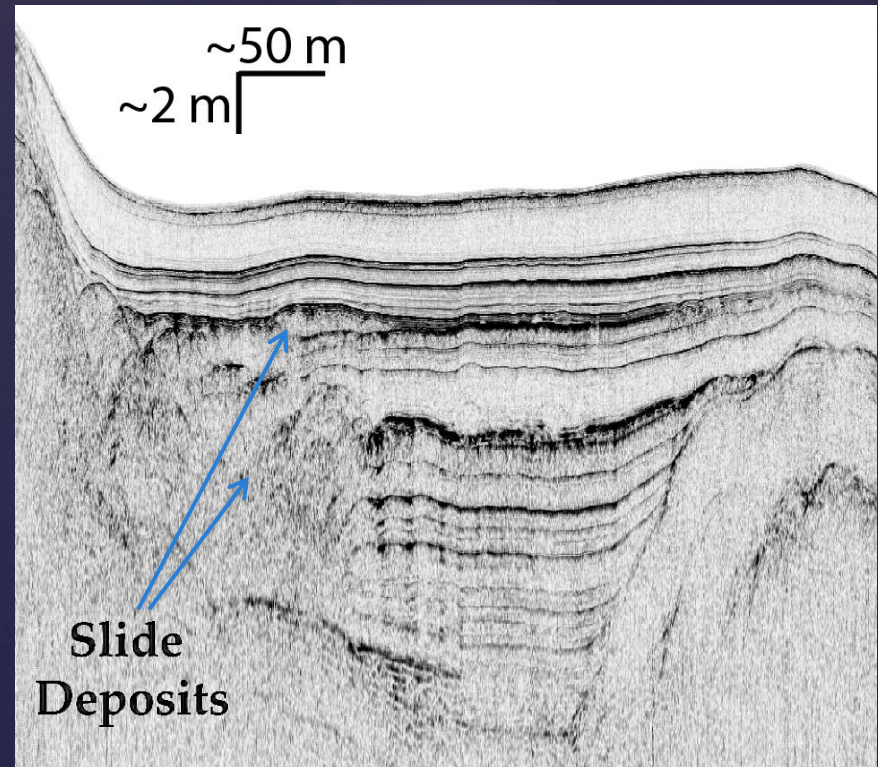
Primary & Secondary Evidence of Earthquakes

Primary:
Offset & Deformation



(Brothers et al., 2009)

Secondary:
Slide Deposits

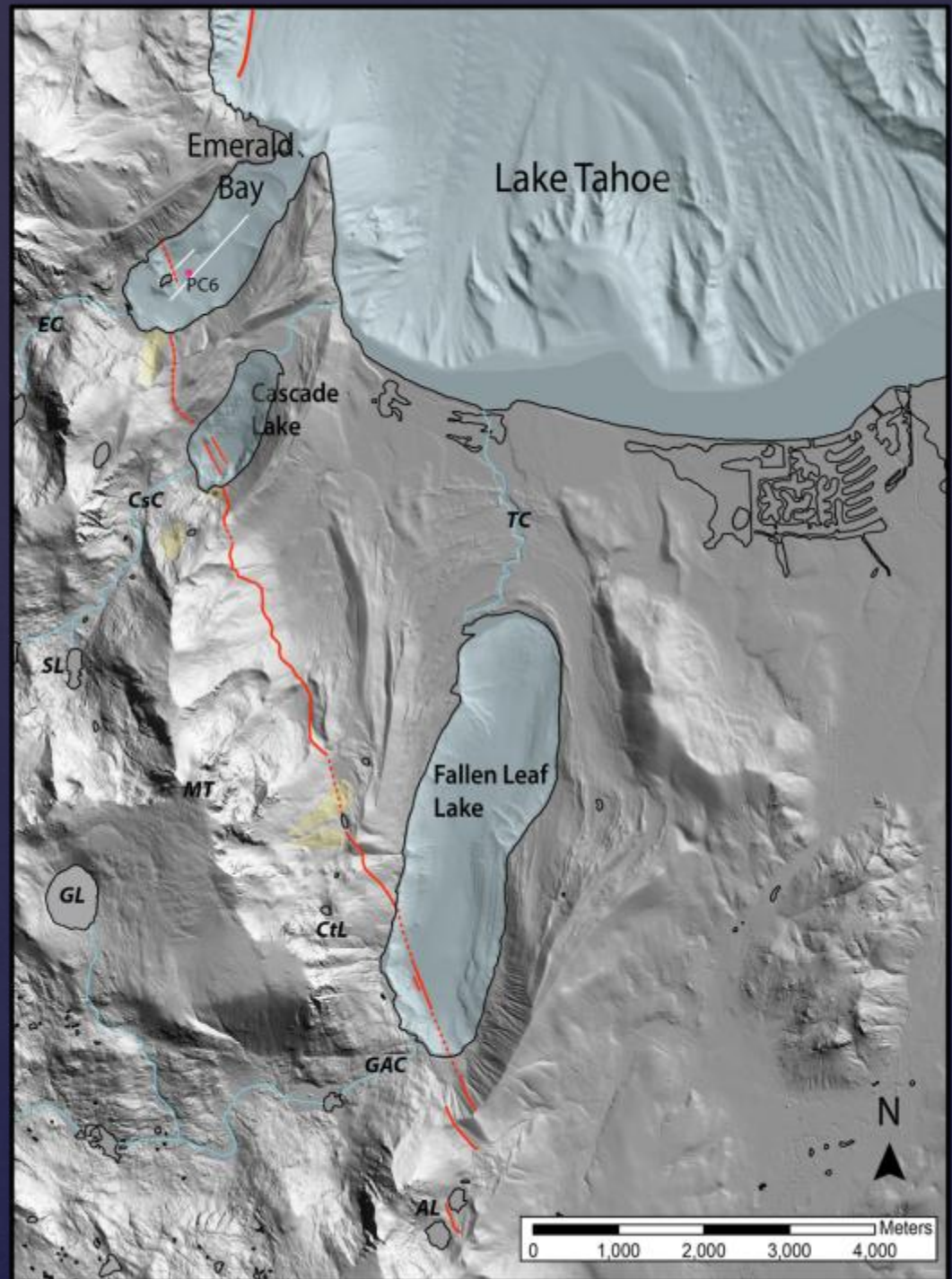


KEY – Synchronous slides across multiple basins.

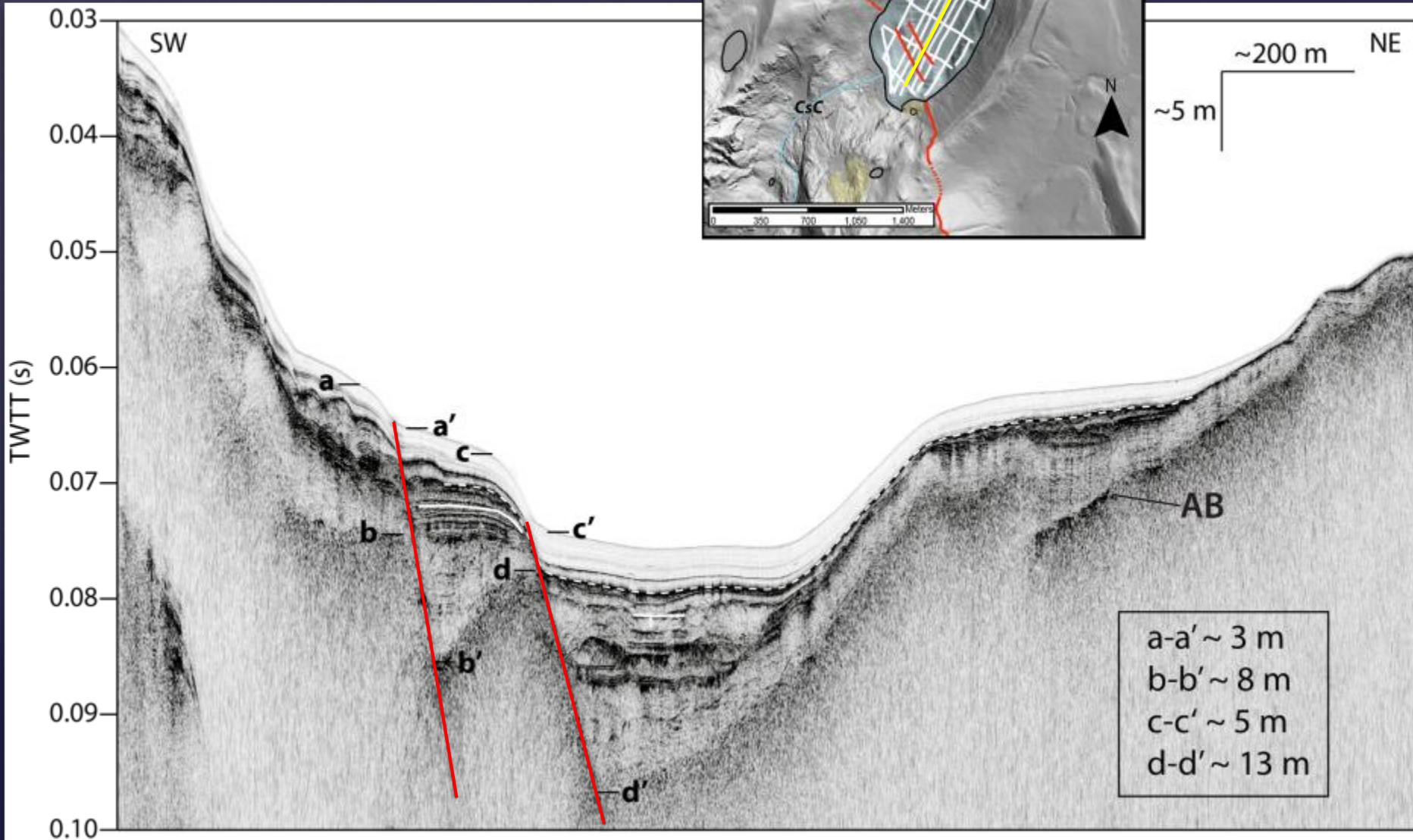
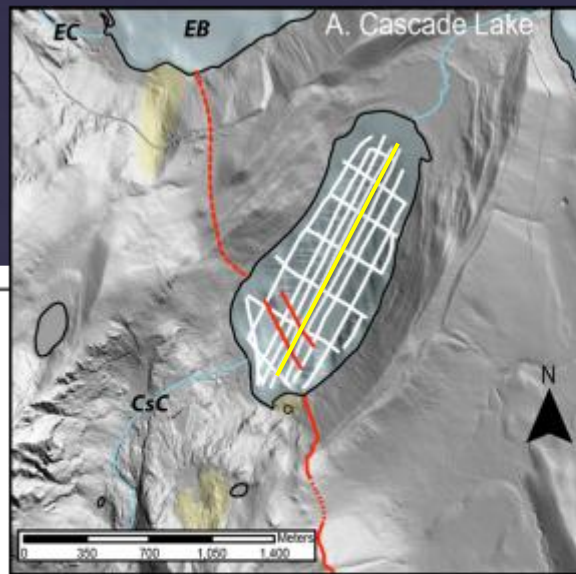
Fault Mapping

Primary Evidence

- Fault Scarps
- Offset Horizons
- Divergence

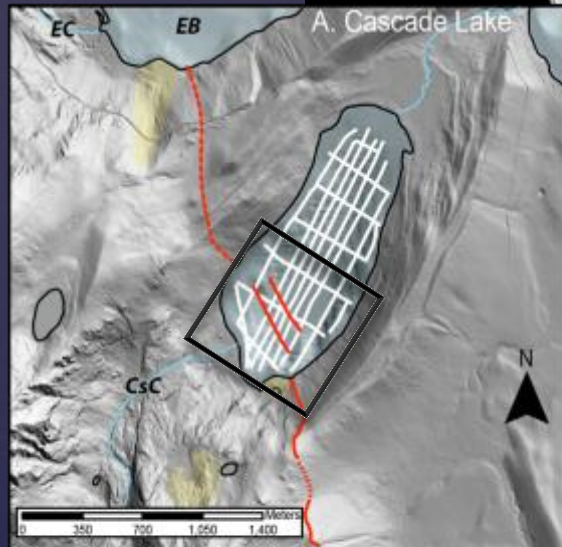


Fault Mapping



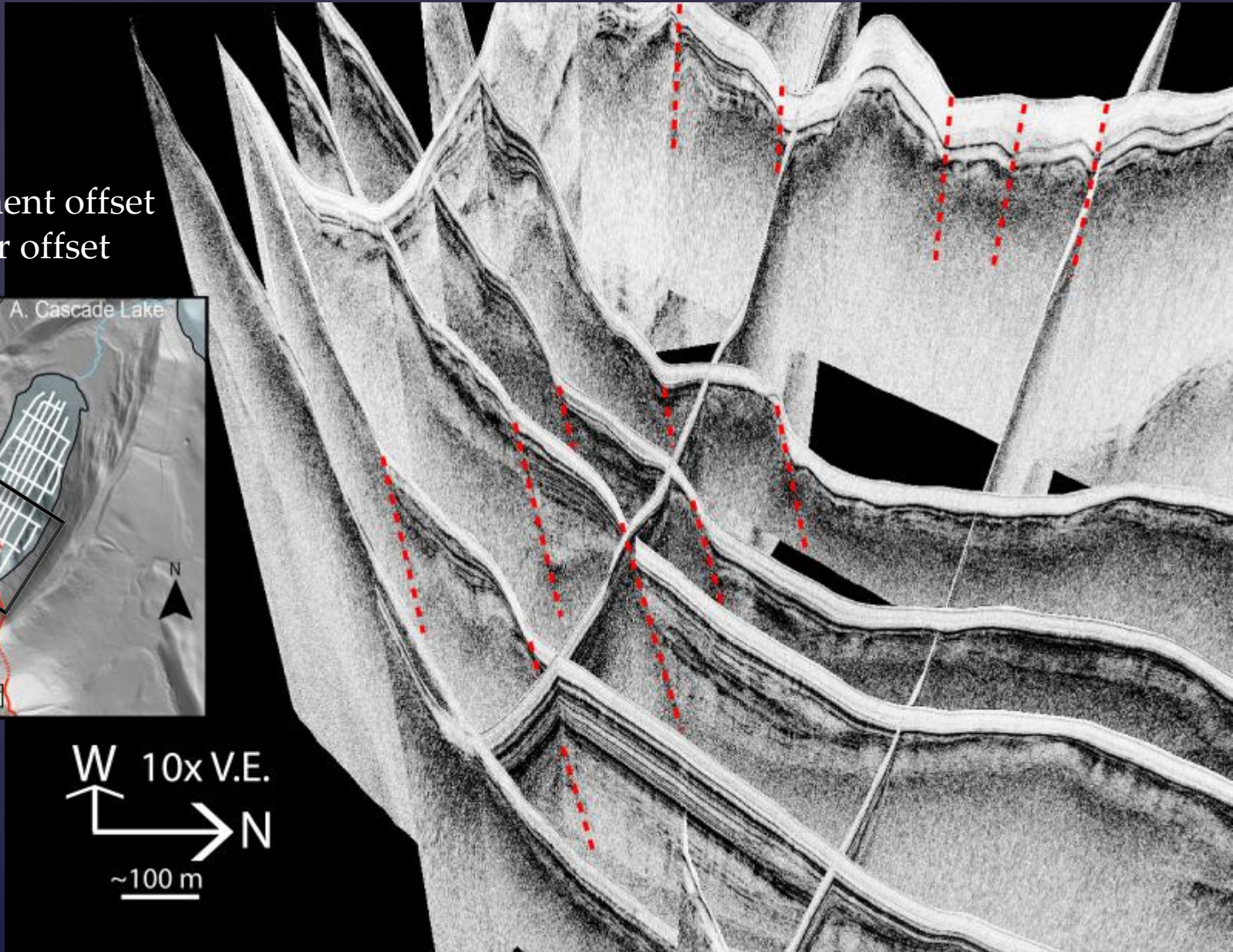
Fault Mapping

~21 m basement offset
~8 m seafloor offset

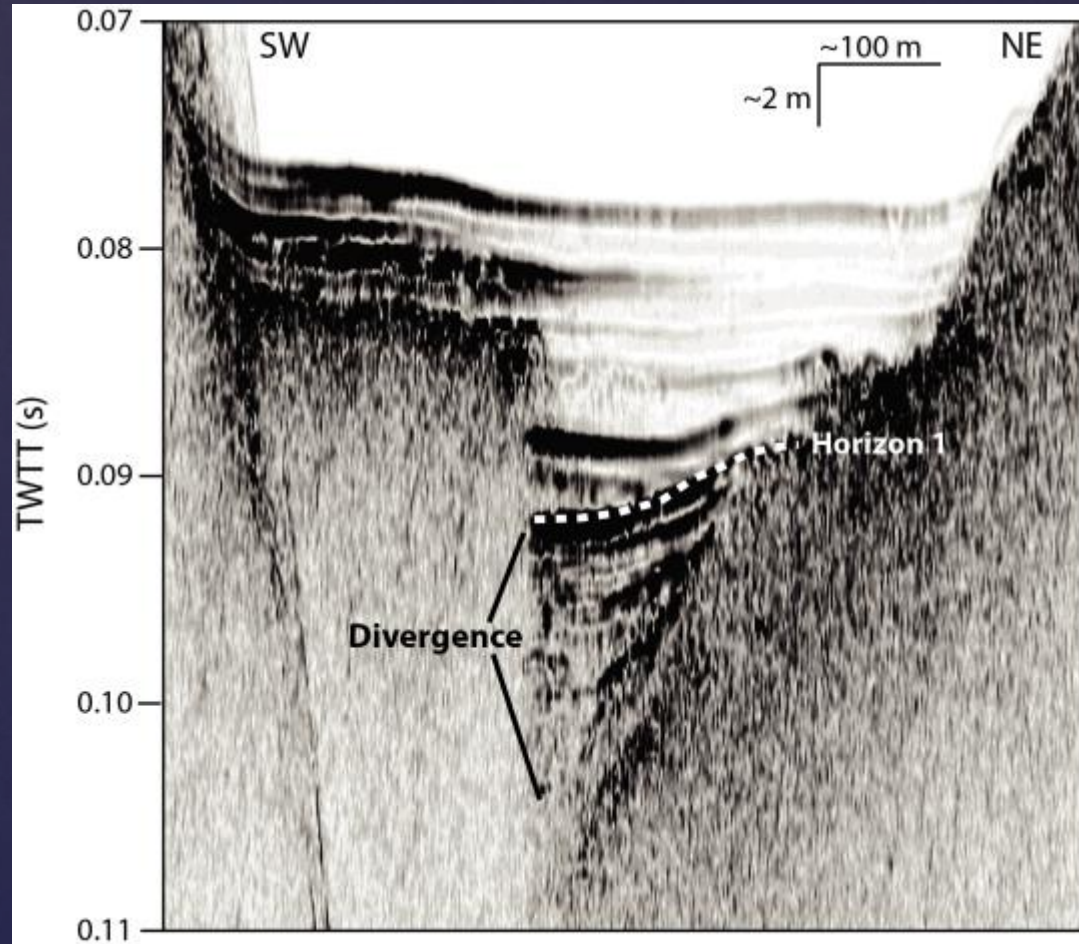
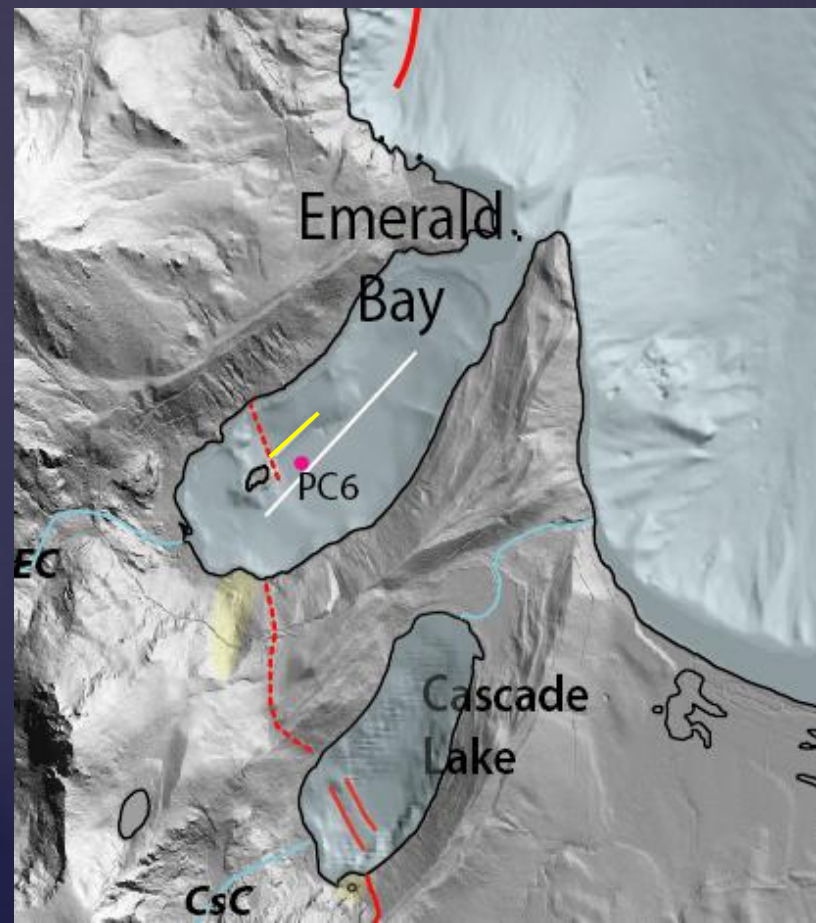


W 10x V.E.
N
~100 m

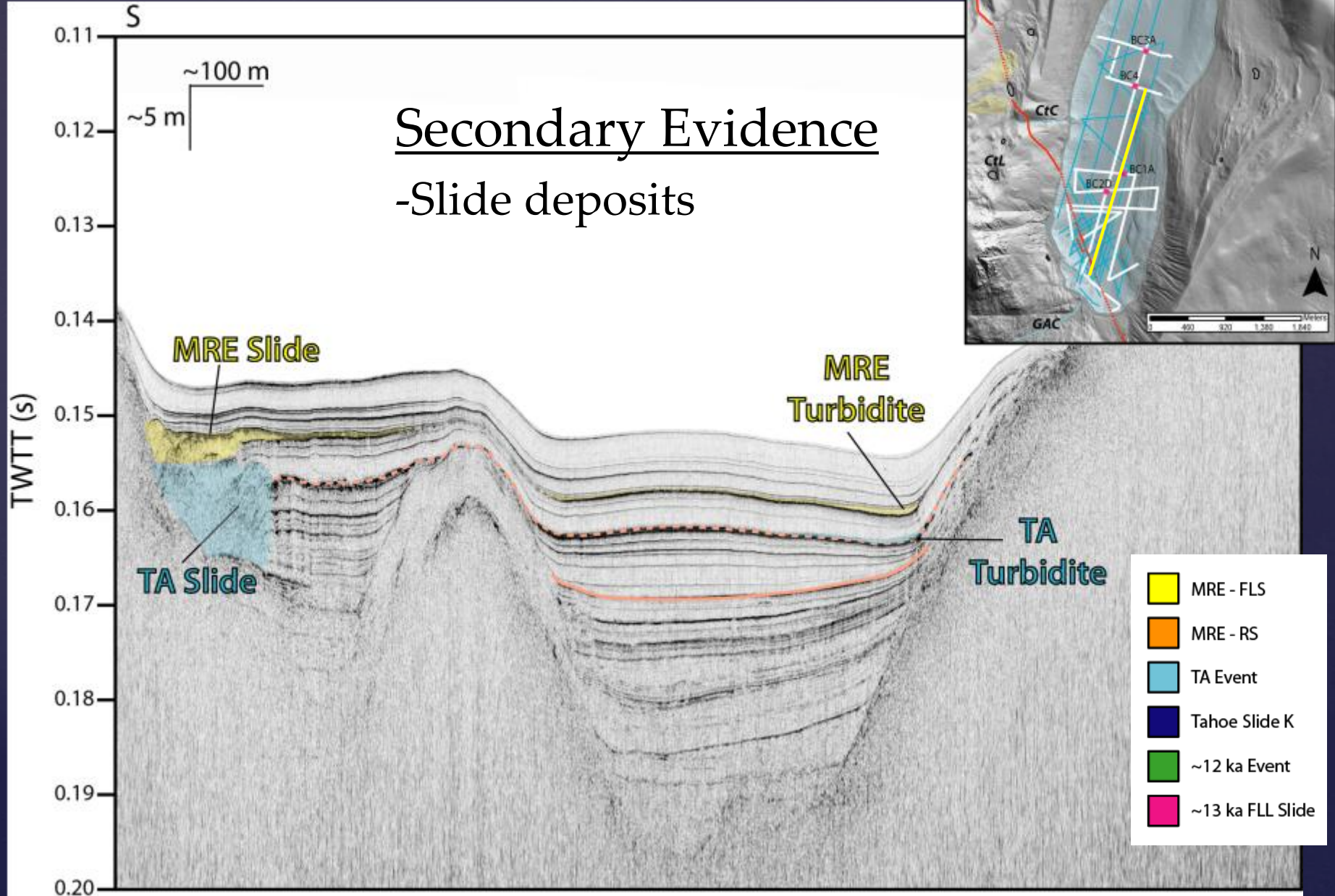
A compass rose indicating West (W) and North (N) directions. The text '10x V.E.' likely refers to a 10x vertical exaggeration. A scale bar below the rose indicates a length of approximately 100 meters.



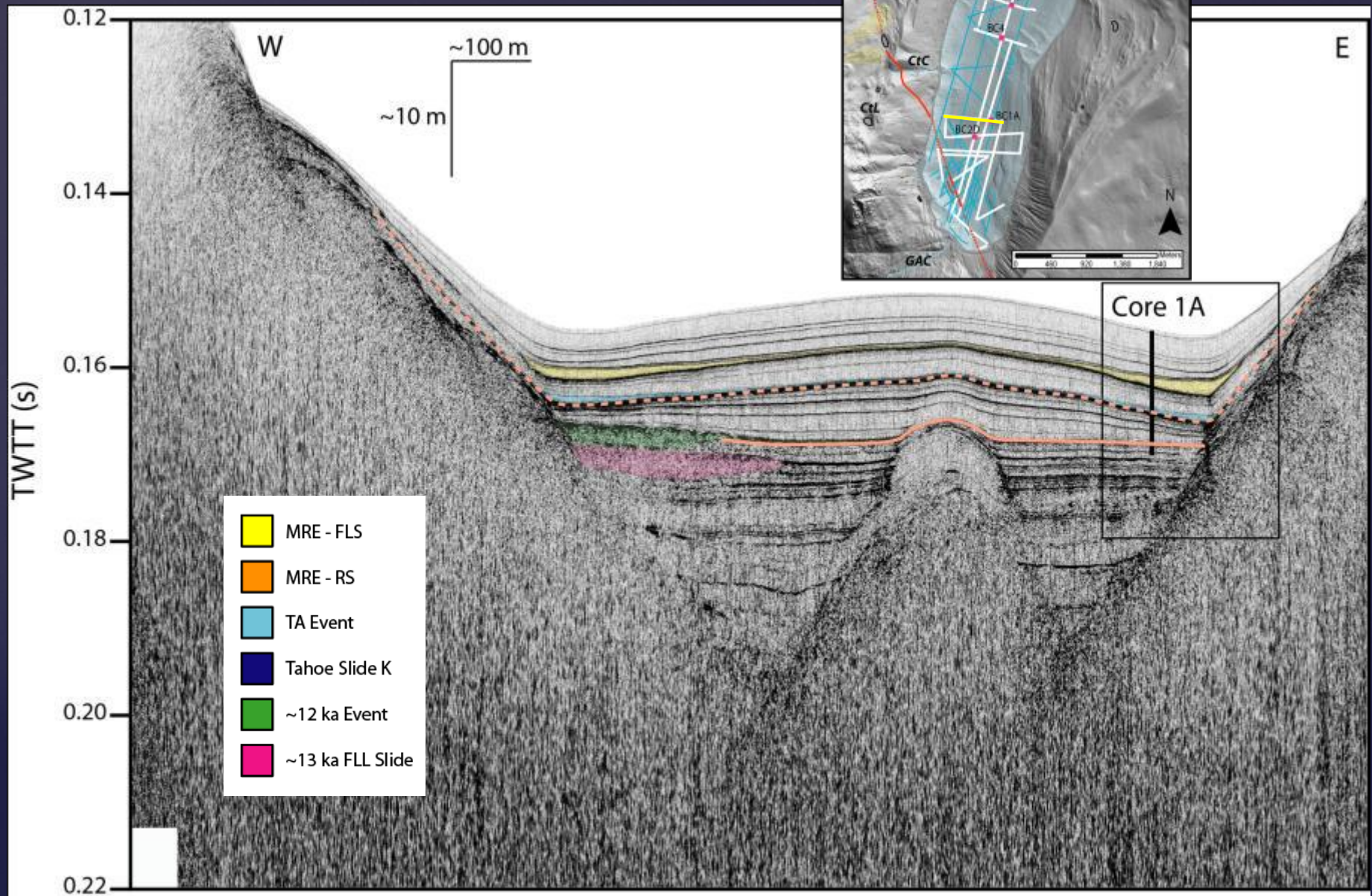
Fault Mapping



Fallen Leaf Lake



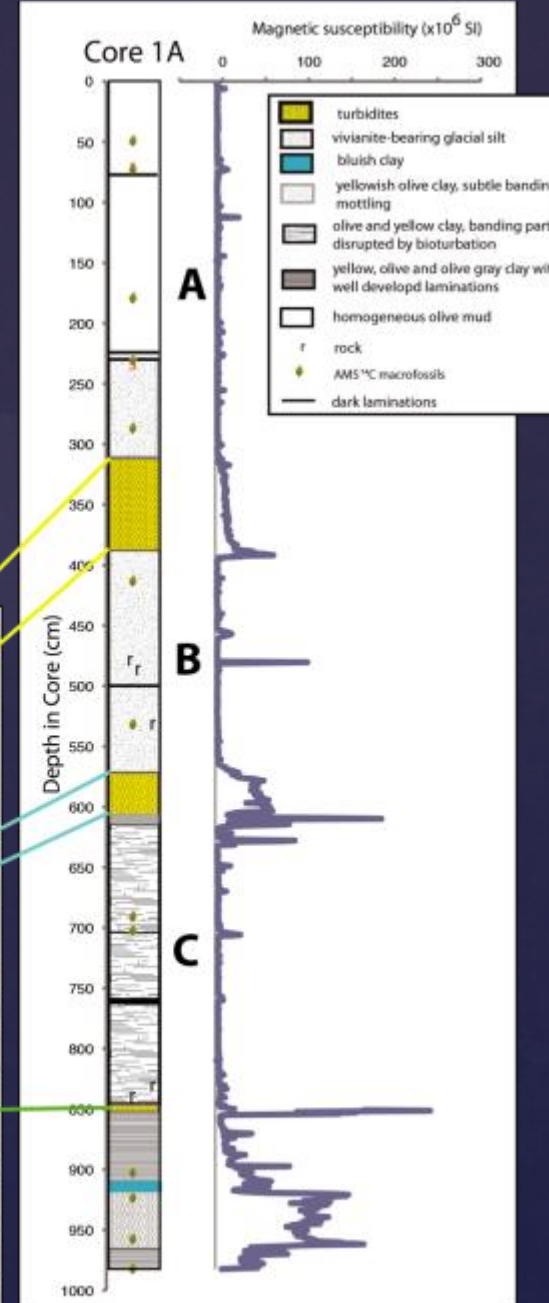
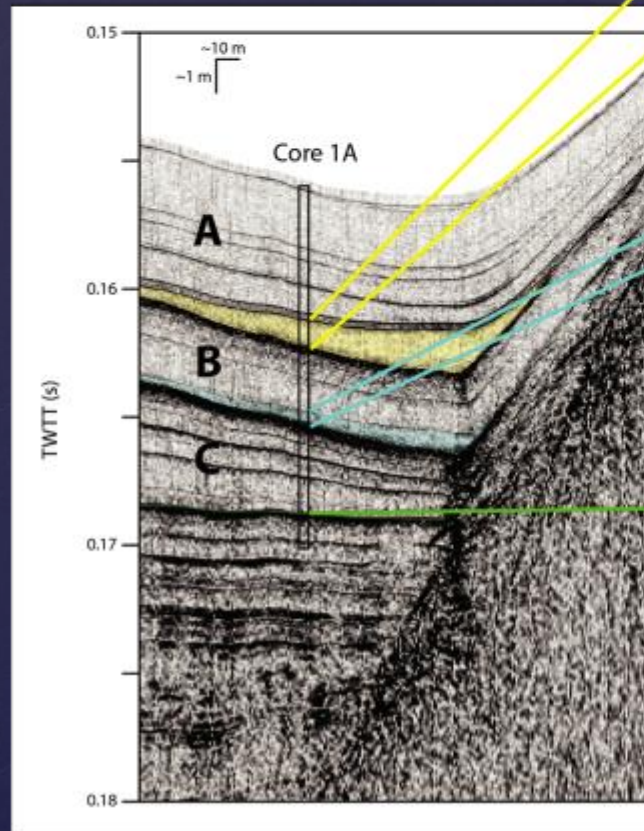
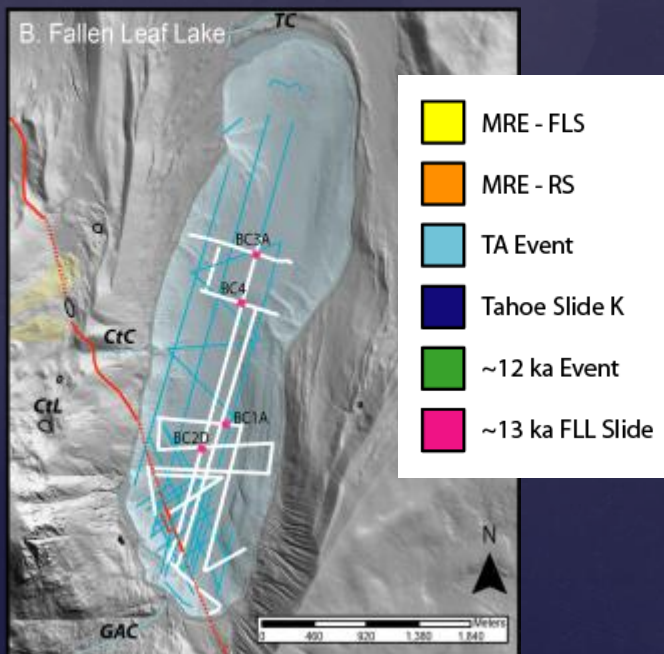
Fallen Leaf Lake



Fallen Leaf Lake

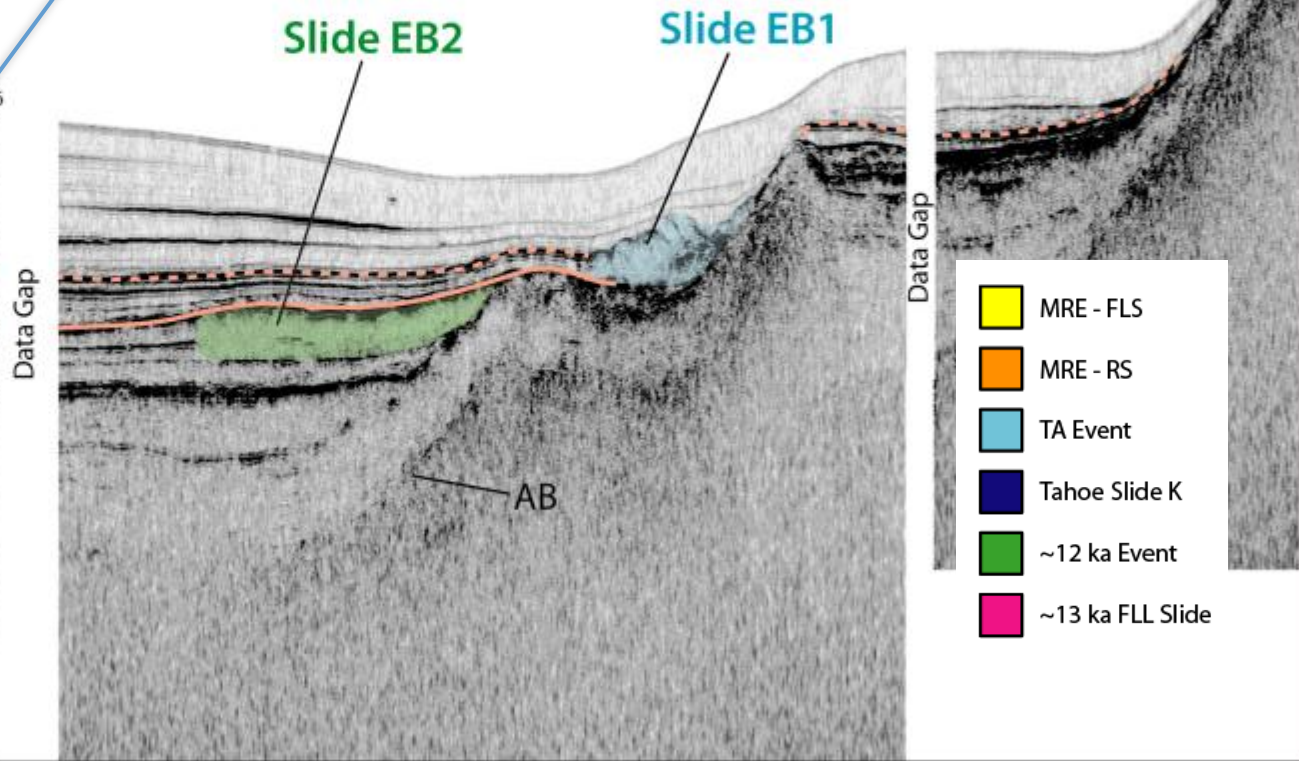
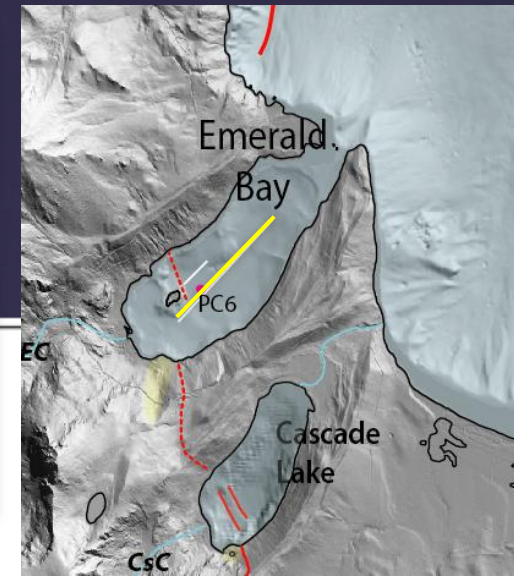
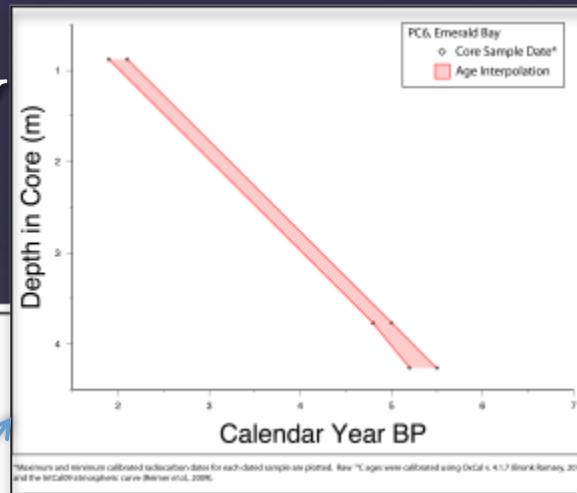
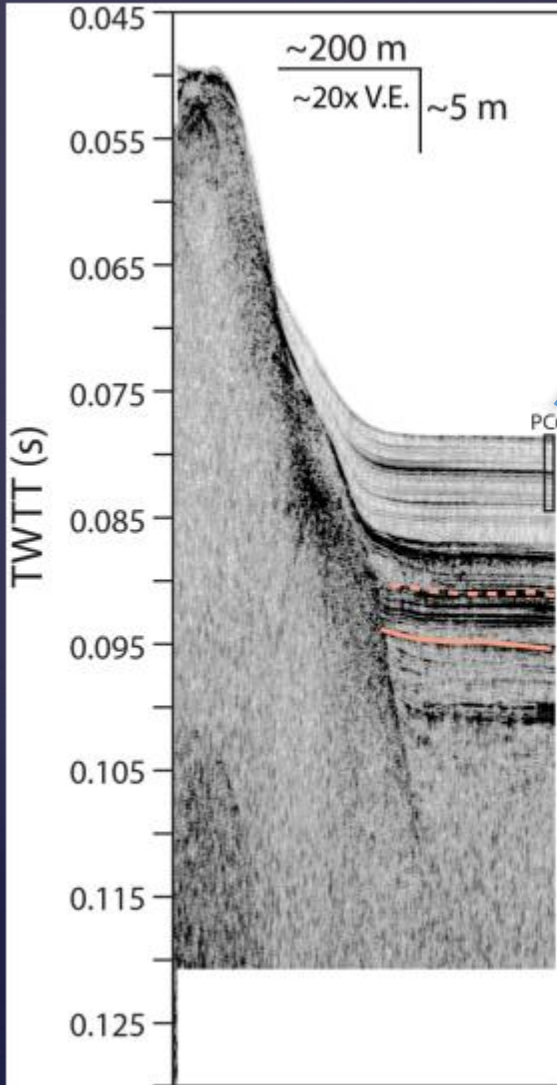
Long Sediment Cores

- Lithology
- Radiocarbon dates
- Magnetic Susceptibility

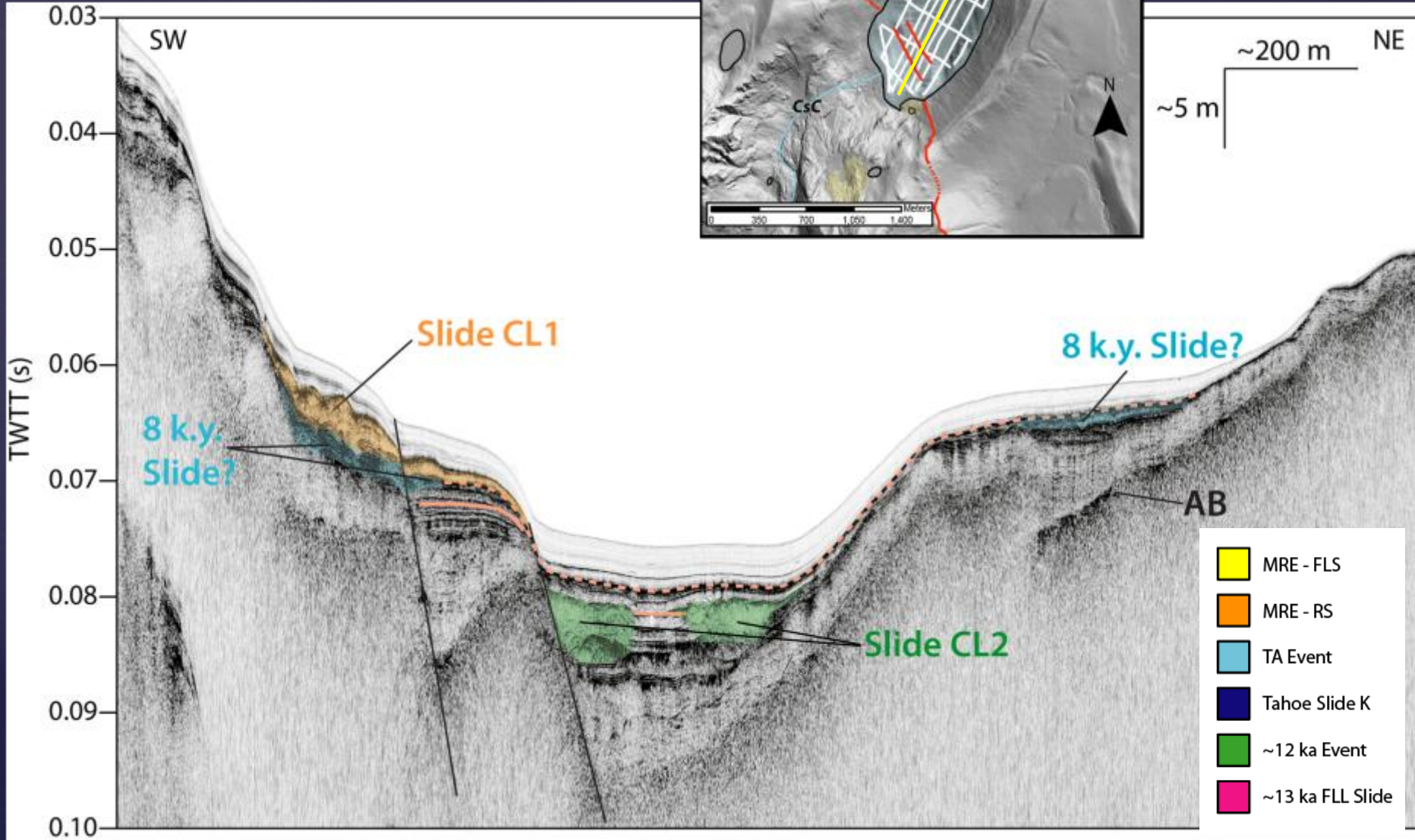


(Karlin & Noble et al., 2011)

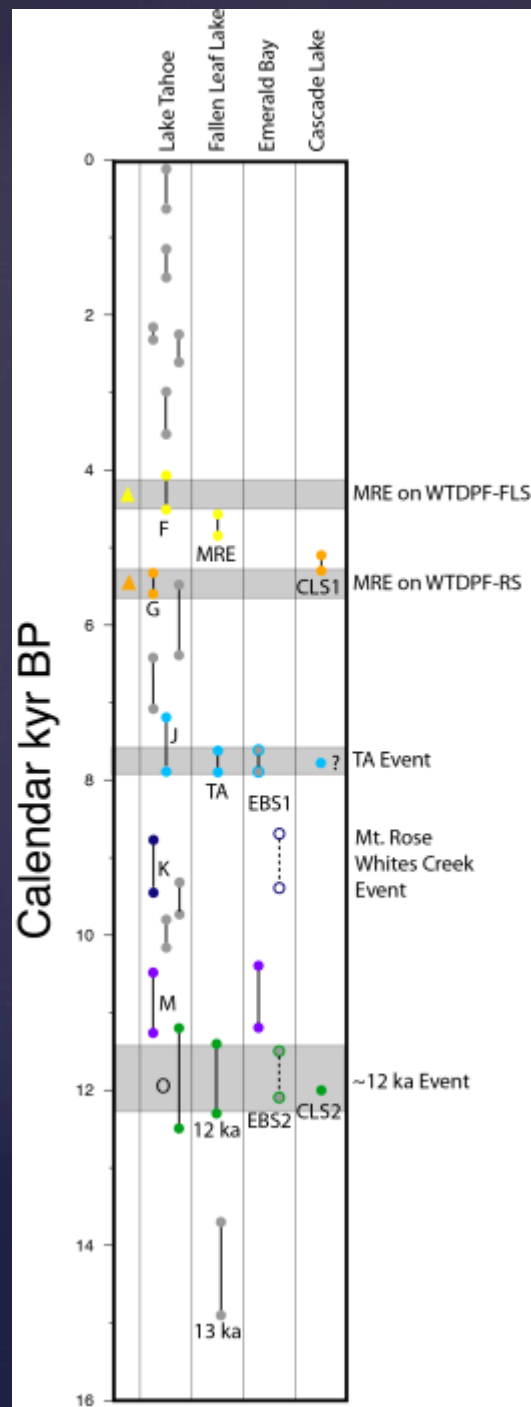
Emerald Bay



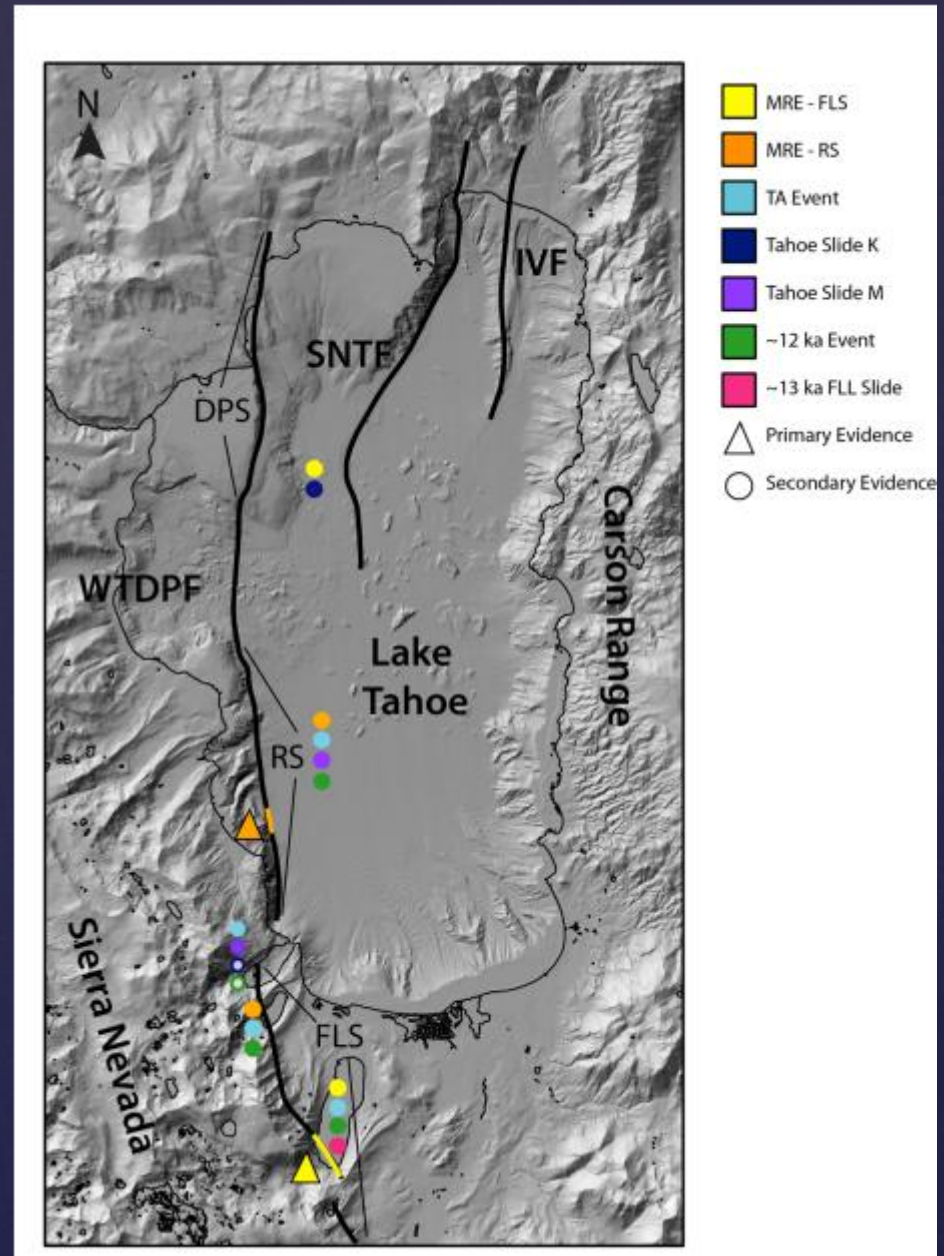
Cascade Lake



Slide Dates & Locations



(Lake Tahoe Dates
Smith et al. 2012)



Conclusions

- Recurrence interval WTDPF - Fallen Leaf Section: 3.4 -3.7 k.y.
- Recurrence interval WTDPF - Rubicon Section: 3.1-3.3 k.y.
- Recurrence interval all WTDPF: 2.3-2.5 k.y.

MRE FLS – 4.1-4.5 k.y. BP

MRE RS – 5.3-5.6 k.y. BP

