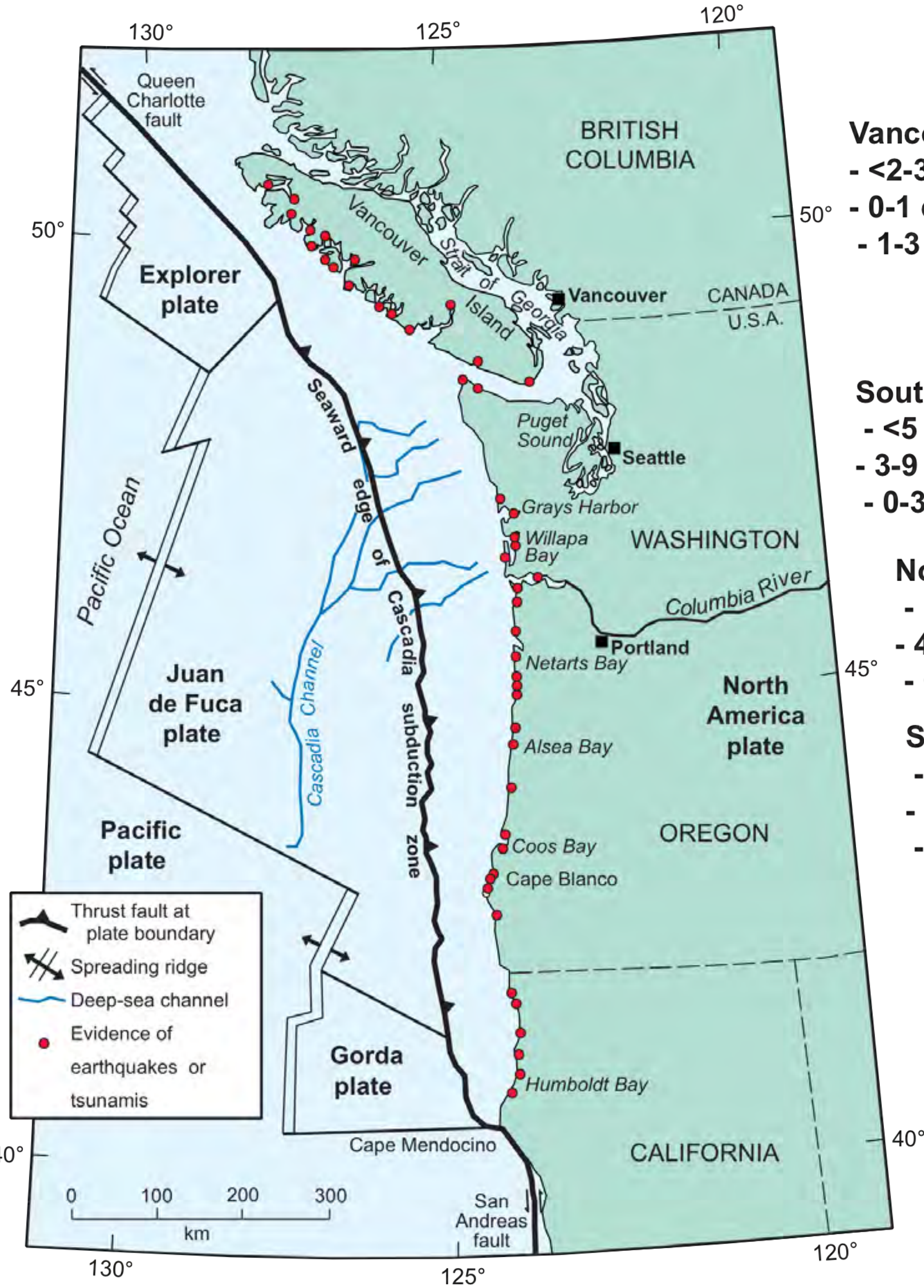


Subduction-zone Paleoseismology at Cascadia

Vancouver Island sites
- **<2-3 ka - 800-900 yr mean recurrence**
- **0-1 earthquake subsidence contact**
- **1-3 tsunami deposits**

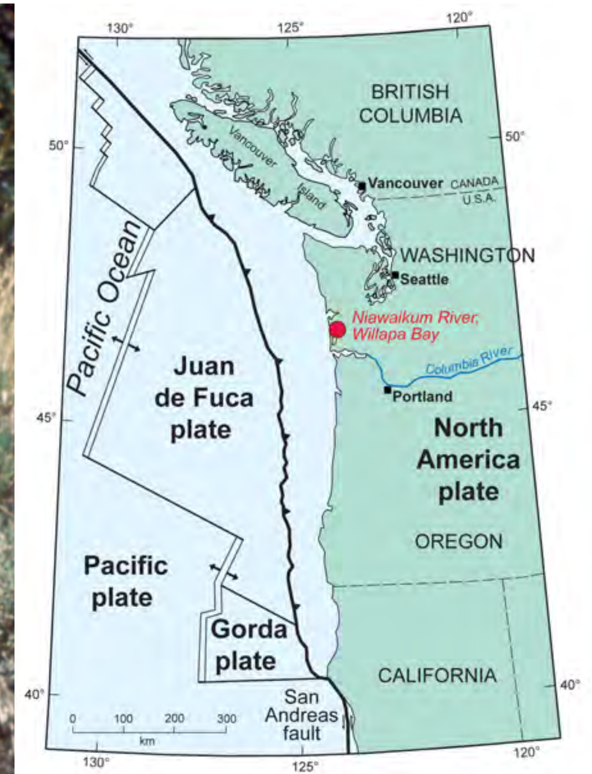
Southwest Washington sites
- **<5 ka - 500-600 yr mean recurrence**
- **3-9 earthquake subsidence contacts**
- **0-3 tsunami deposits**

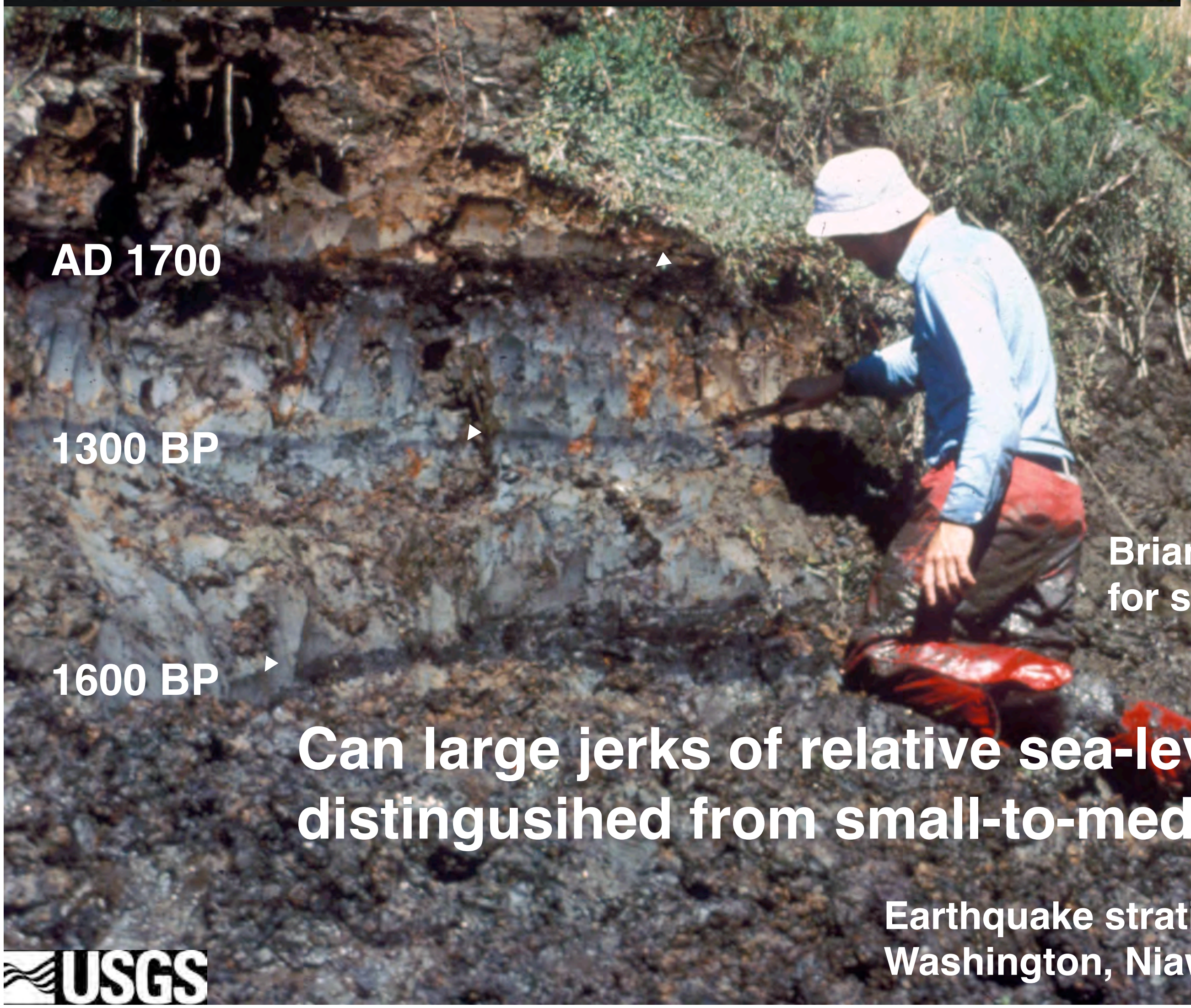
North and central Oregon sites
- **<3.5 ka - 500-600 yr mean recurrence**
- **4-6 earthquake subsidence contacts**
- **0-5 tsunami deposits**

South Oregon to Cape Blanco sites
- **<5-7 ka - 400-500 yr mean recurrence**
- **8-12 earthquake subsidence contacts**
- **1-13 tsunami deposits**

South of Cape Blanco sites
- **<3.5 ka - 500-600 yr mean recurrence**
- **0-4 earthquake subsidence contacts**
- **1-6 tsunami deposits**

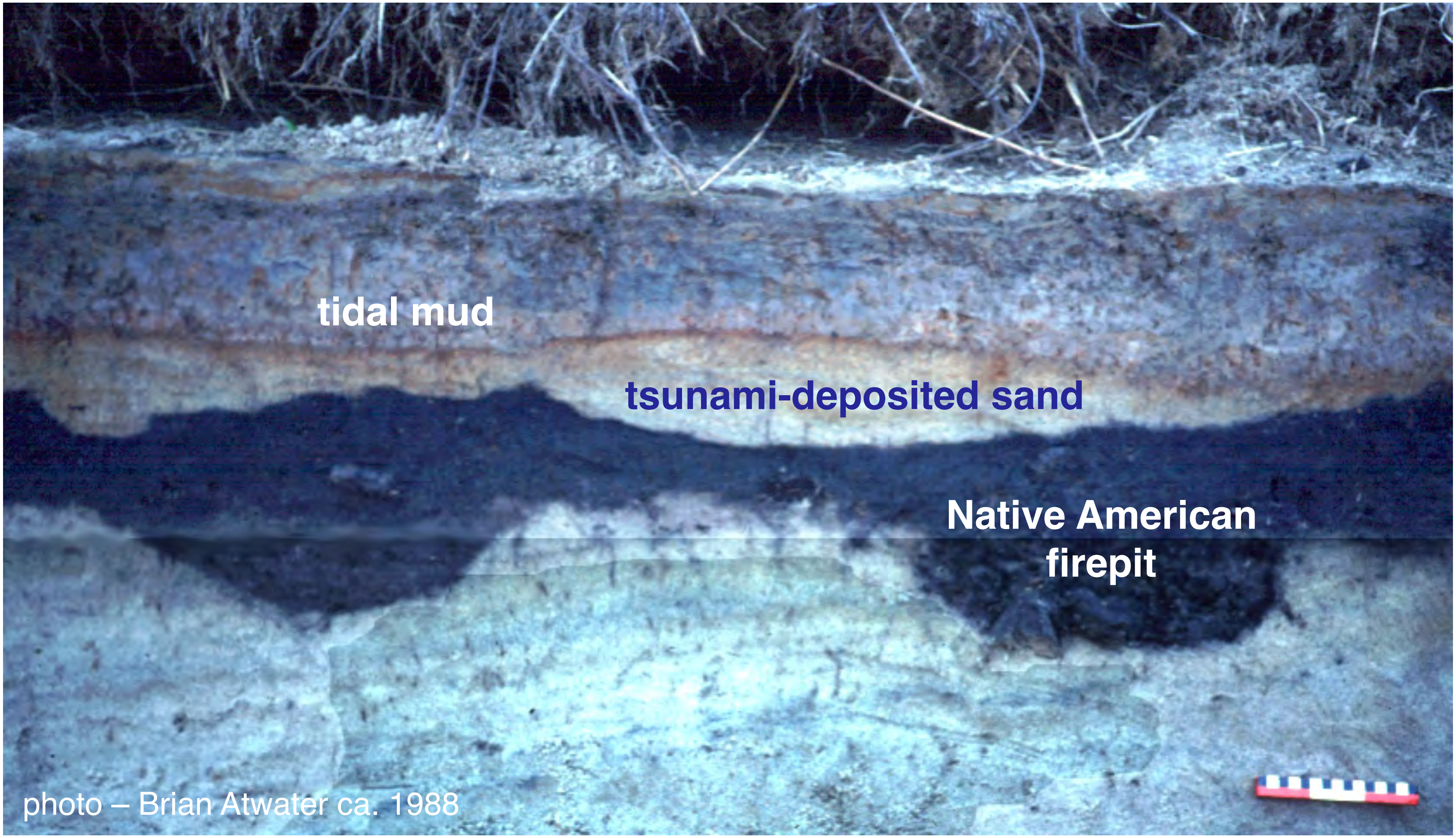
Main point: Need to consider differences in types and quality of evidence, lengths of records, sizes of earthquakes, and recurrence over shorter intervals of time.





Can large jerks of relative sea-level rise be distingusihed from small-to-medium jerks?

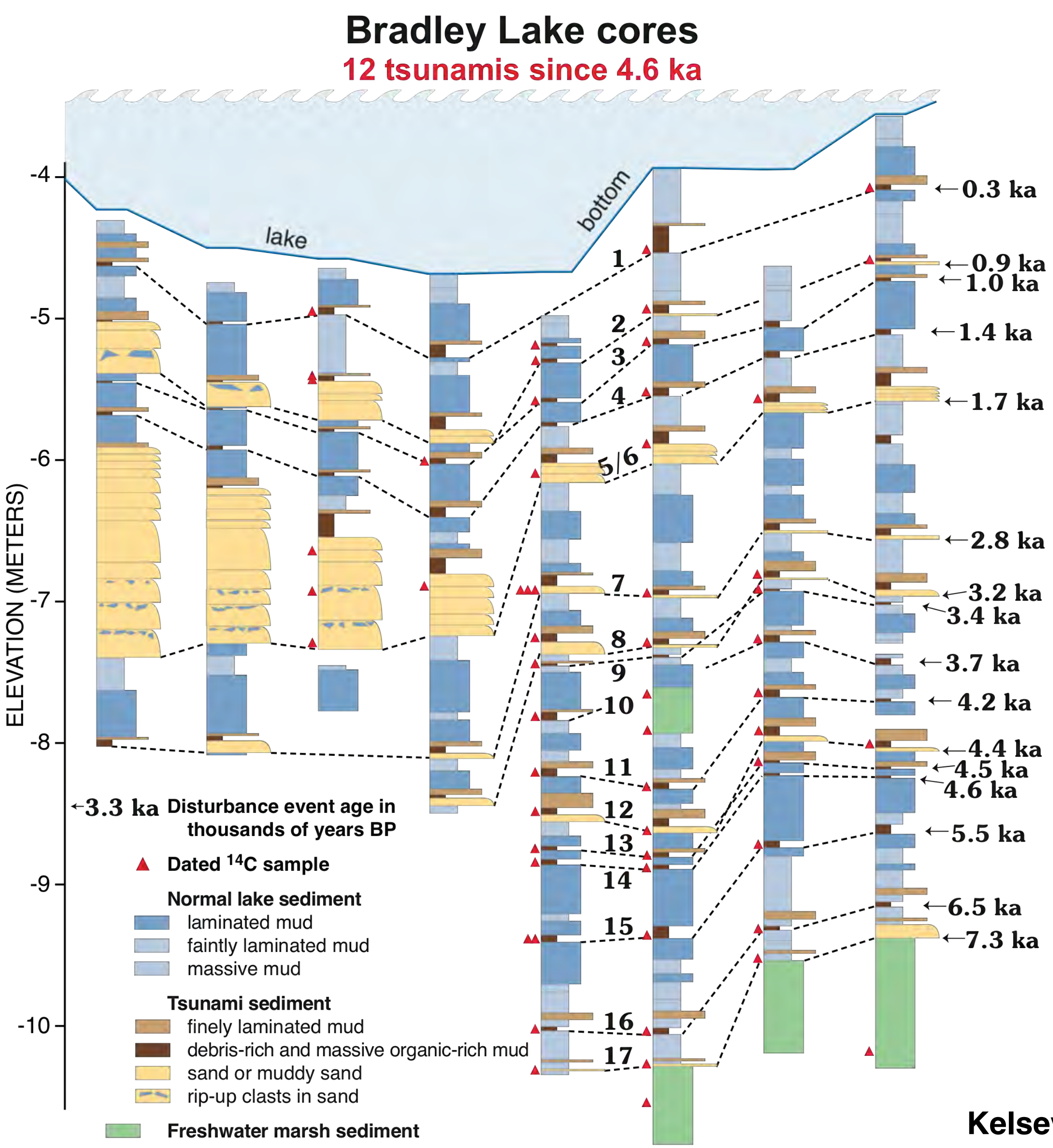
Earthquake stratigraphy exposed in southern Washington, Niawiakum River estuary



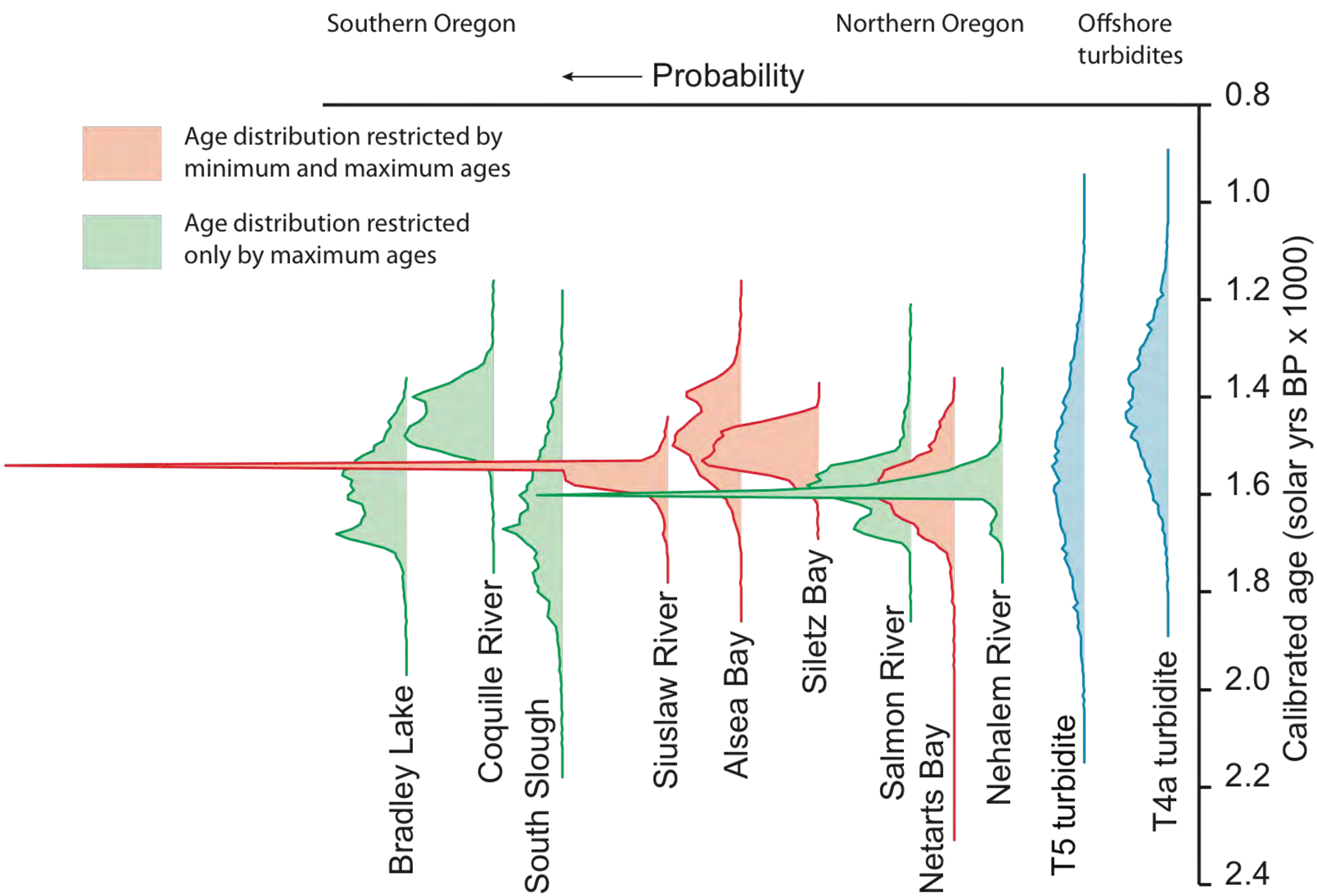
AD 1700 tsunami deposit near mouth of Salmon River, central Oregon coast

Grant et al., 1988; Nelson et al., 2004

Tsunami sand beds in coastal lakes

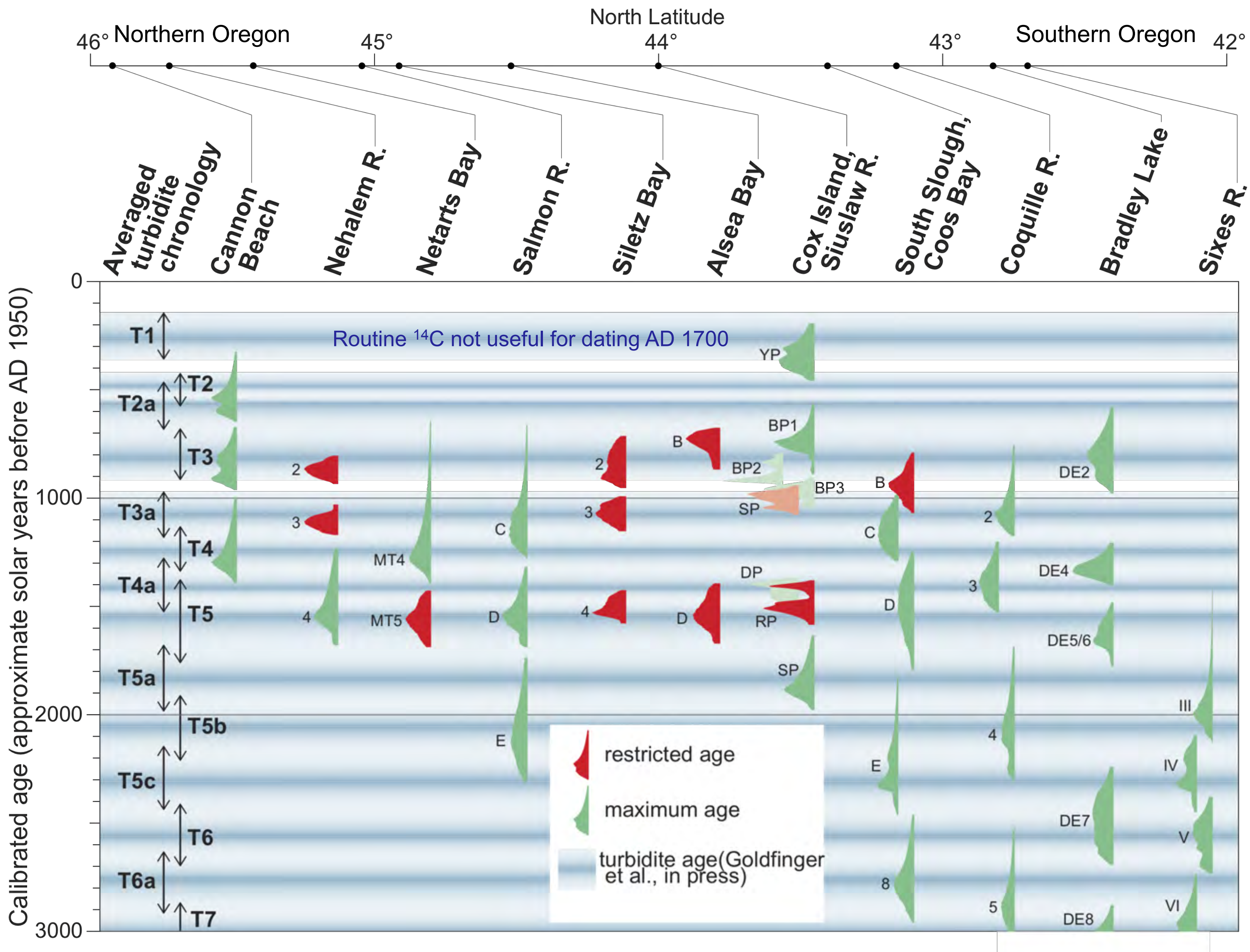


Kelsey et al., 2005; Nelson et al., 2006



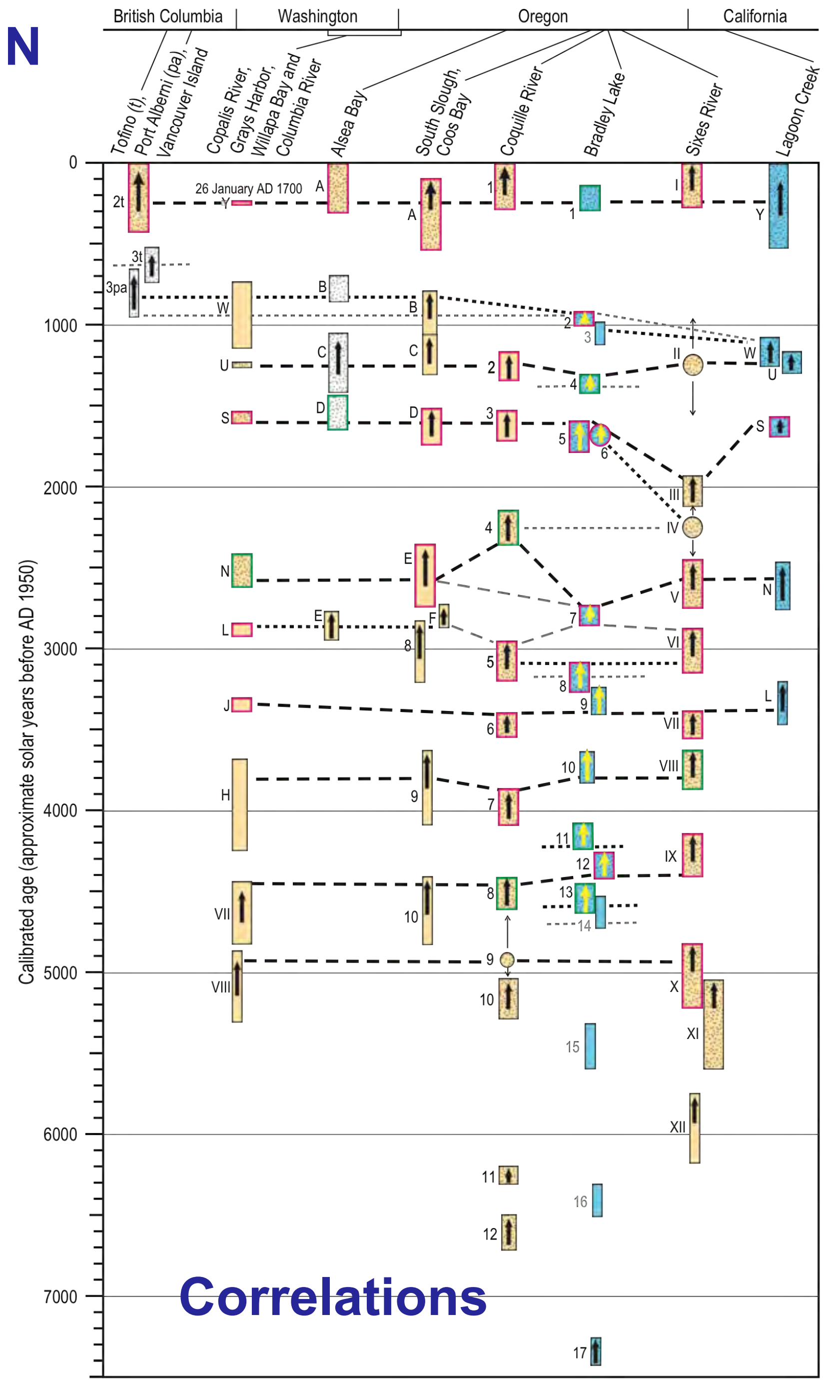
Probability distributions for times of sudden subsidence about 1.6 ka (correlated with turbidite T5) in Oregon tidal marshes (methods of Parnell et al., 2008)

USGS



Overlaps on radiocarbon age distributions are merely consistent with correlations of subsidence stratigraphy from site to site

USGS



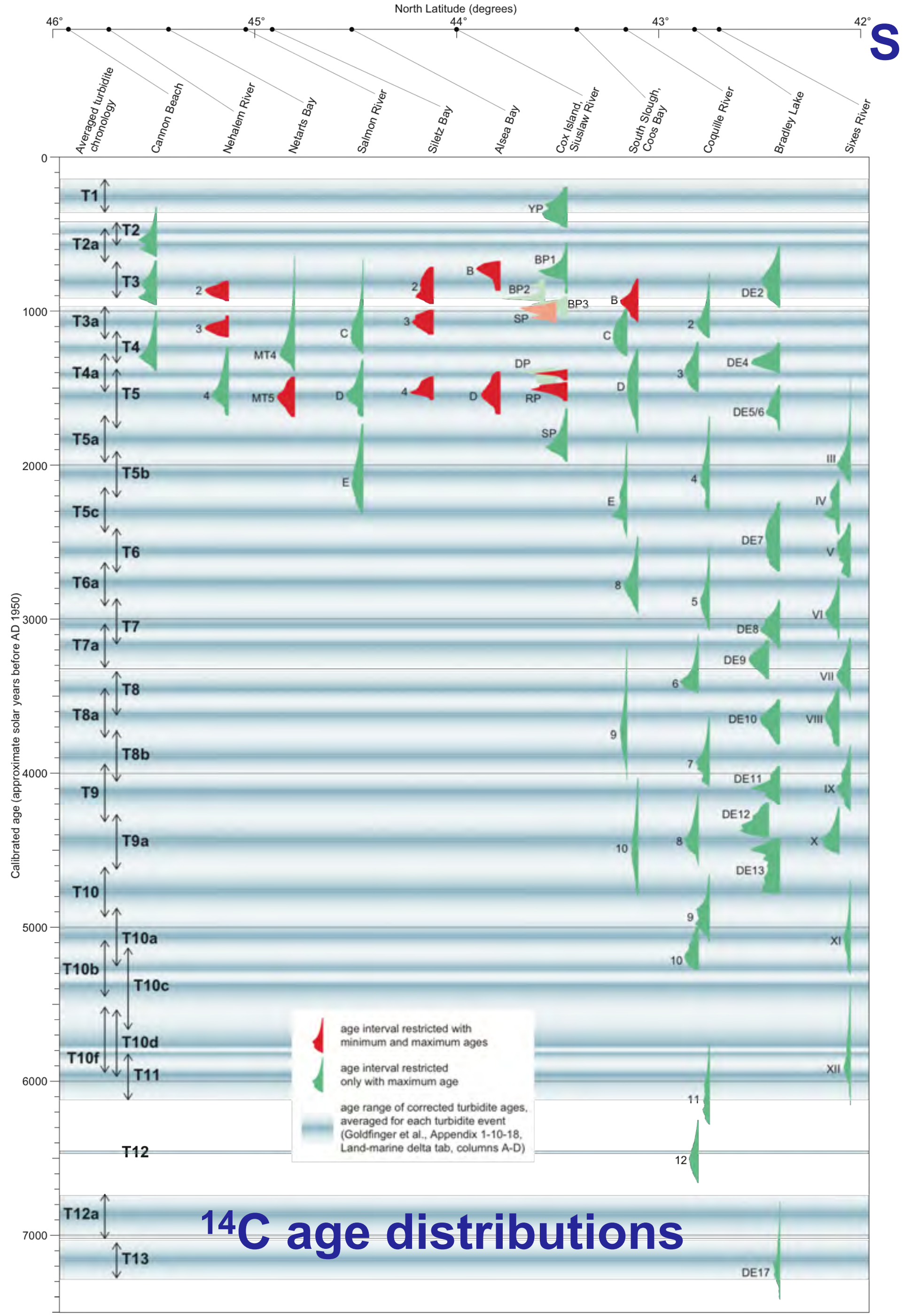


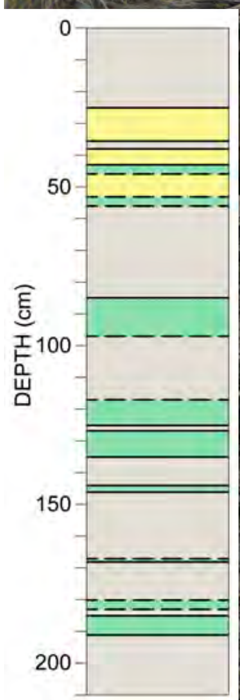
Figure 1. — Nelson, Engelhart, and Bradley *for* Cascadia turbidites and earthquake recurrence workshop, Corvallis, OR—18-19 Nov 2010

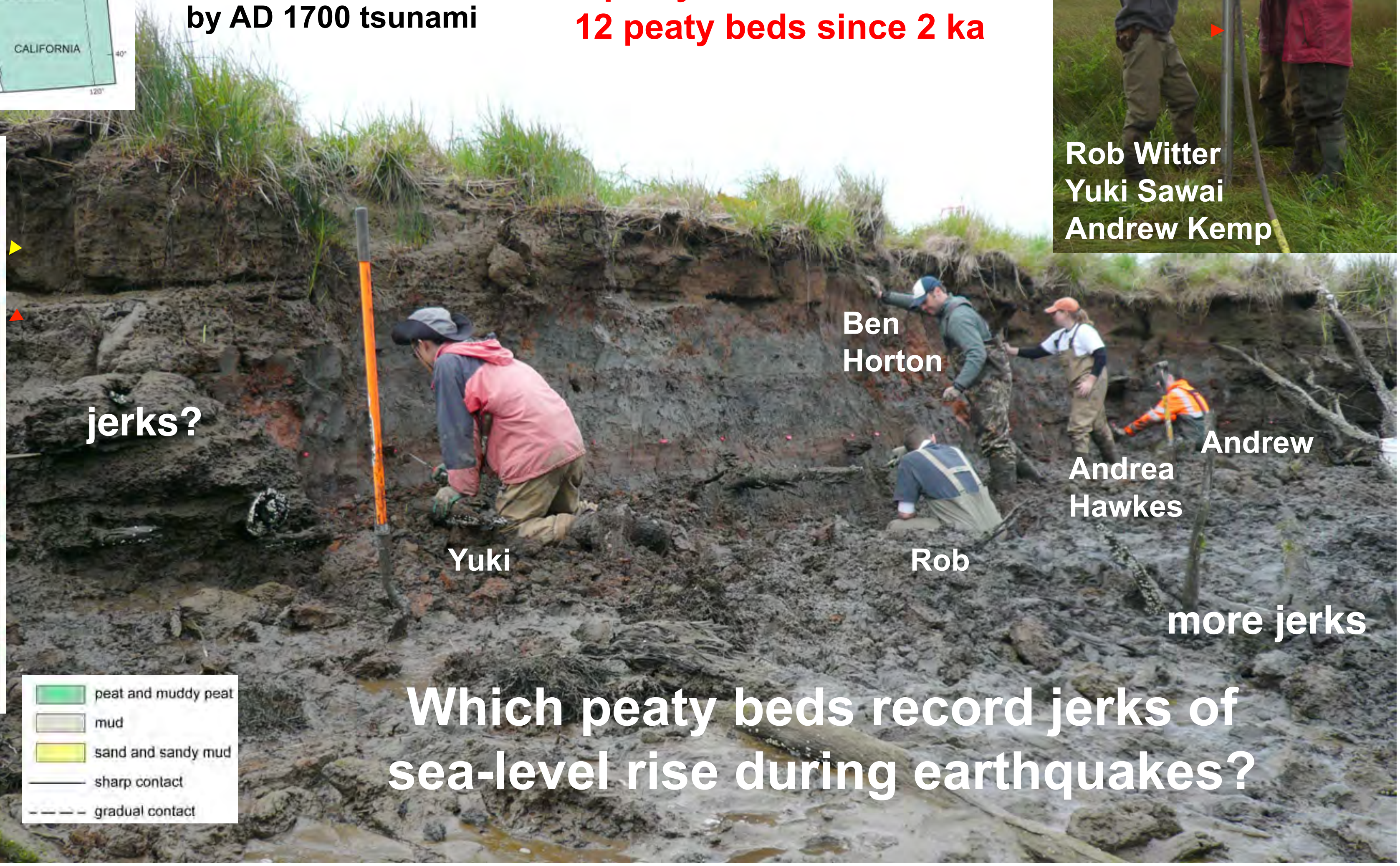
Cox Island, Siuslaw River

(USGS-NSF-GSJ supported – May 2008)

Sand bed deposited by AD 1700 tsunami

9 peaty beds since 2 ka
12 peaty beds since 2 ka





Which peaty beds record jerks of sea-level rise during earthquakes?

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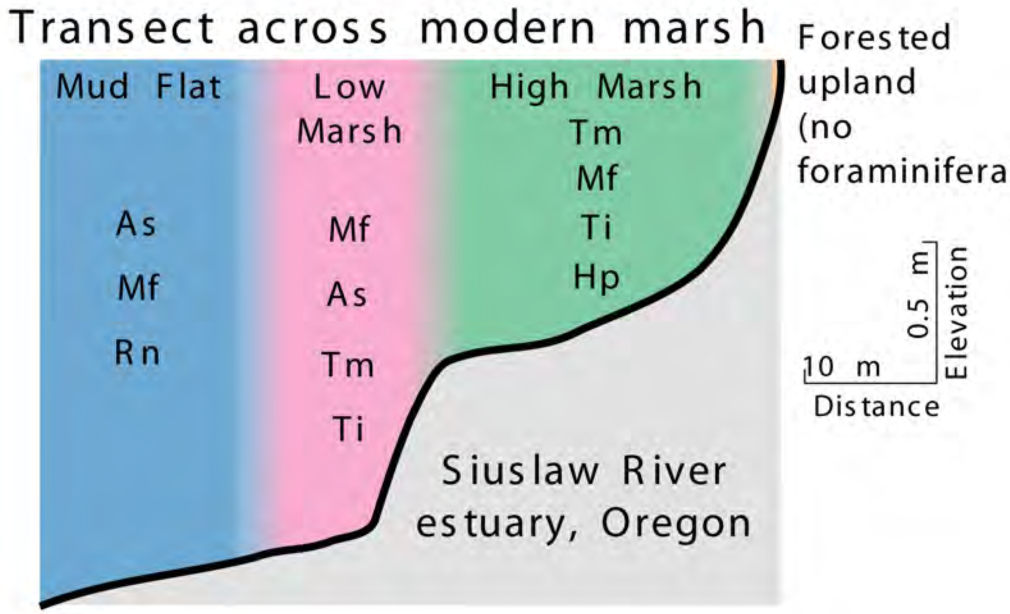
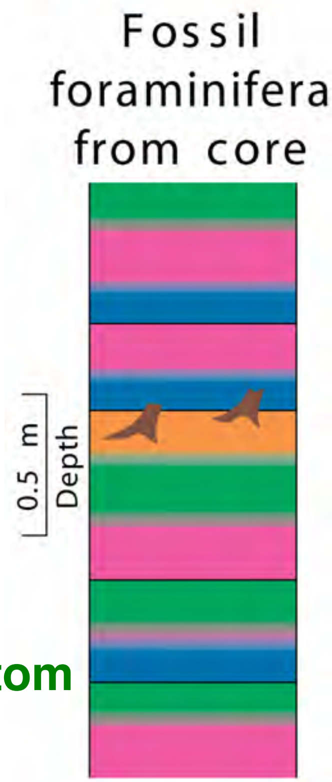
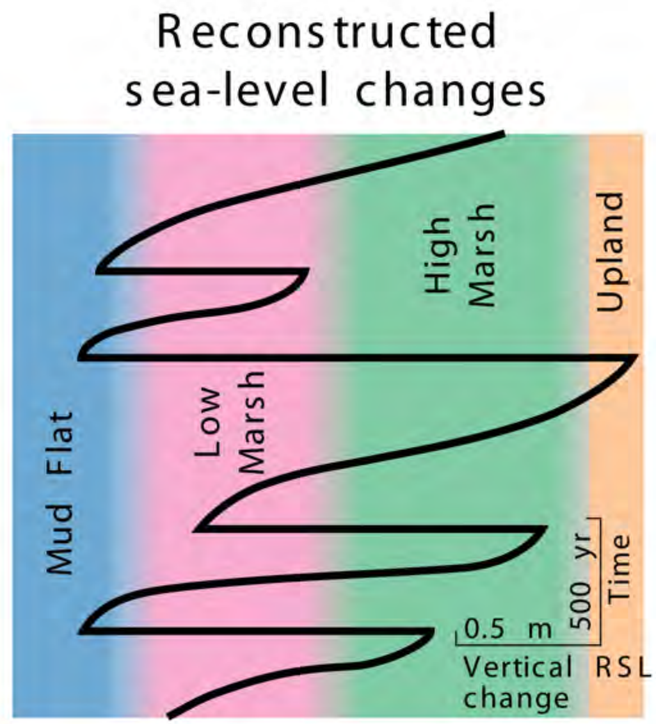
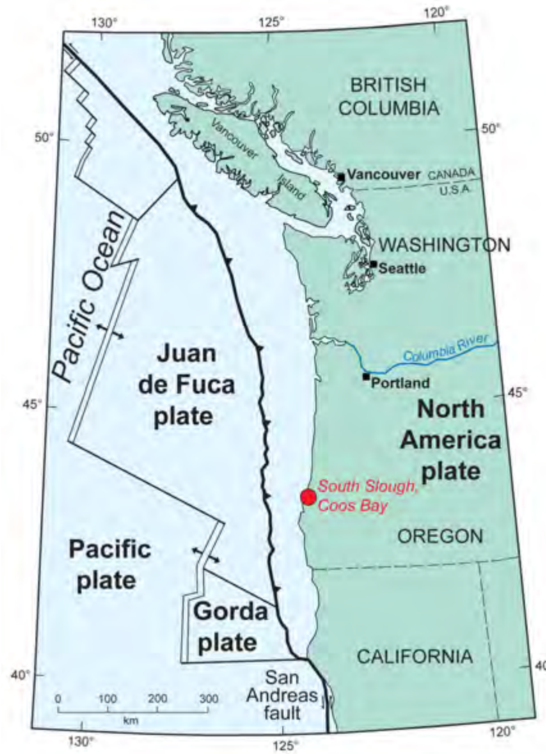
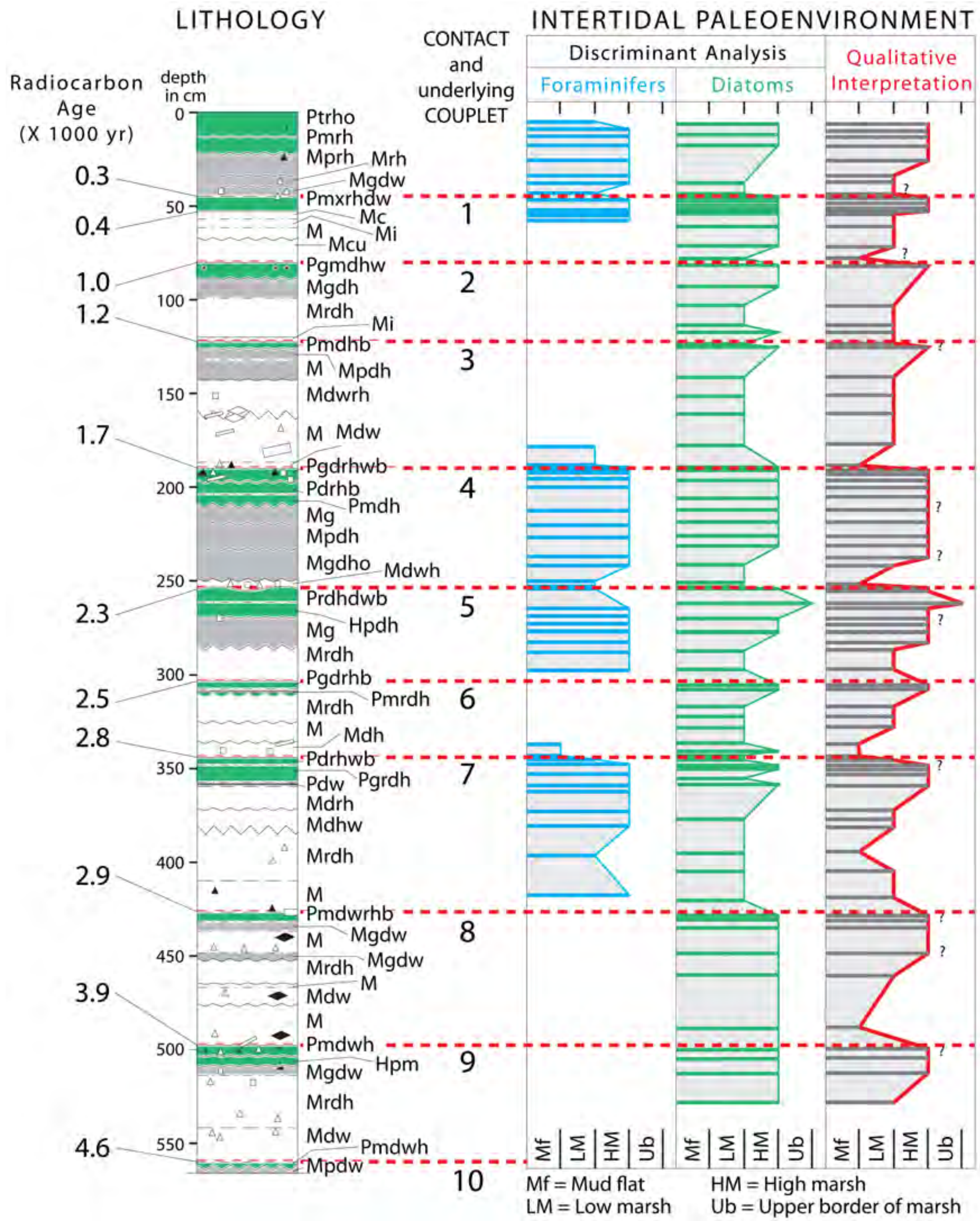






Taking a break from diatom paleogeodesy in 1990



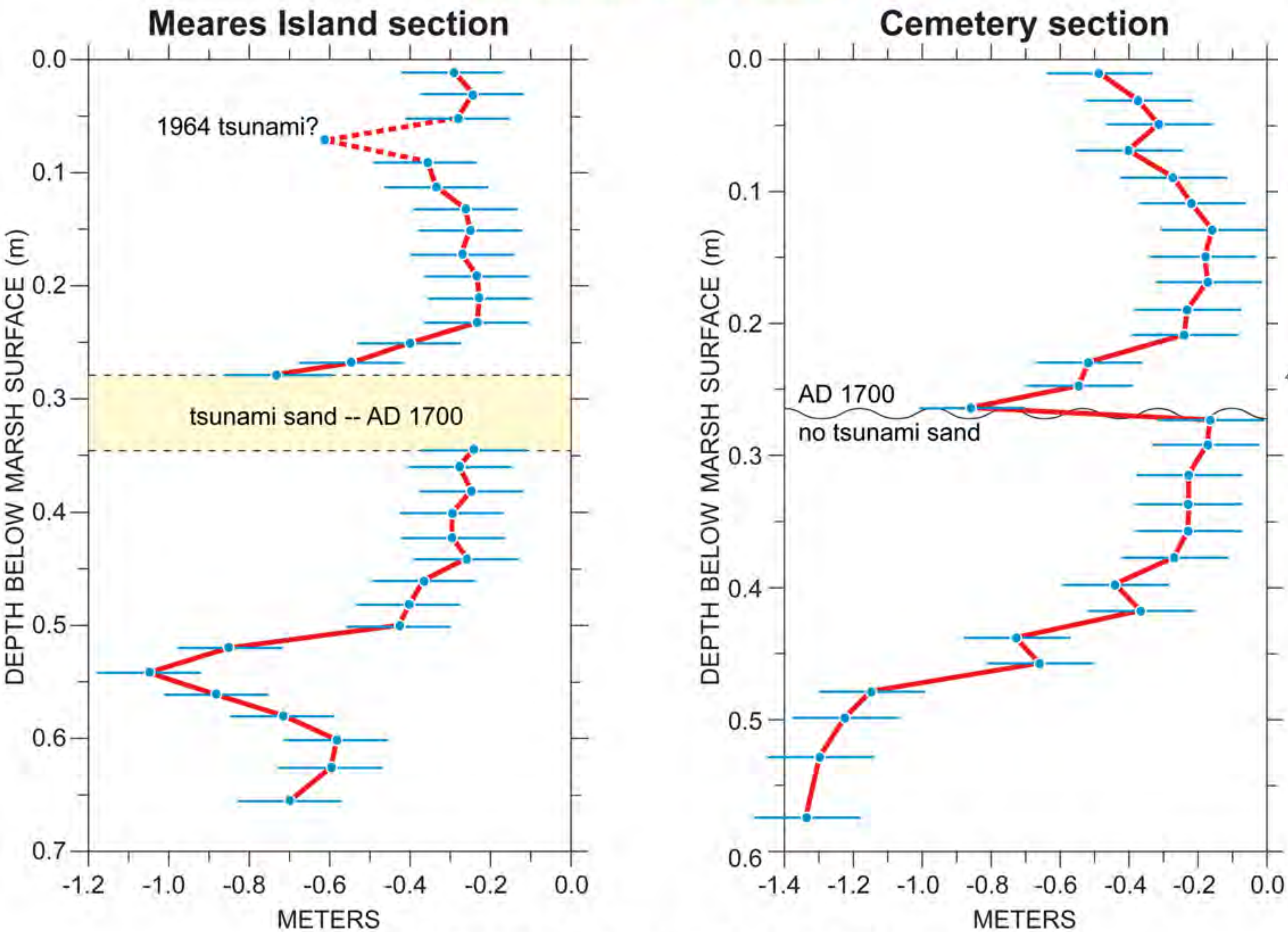


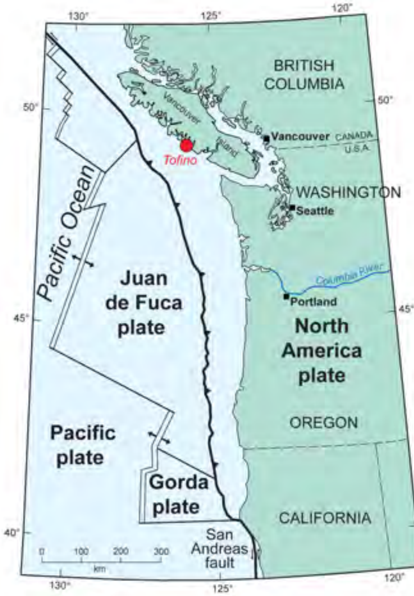
South Slough, Coos Bay

Discriminant analysis used to classify fossil assemblages into tidal elevational zones

Of 10 buried marsh soils, only 3 clearly submerged suddenly

TOFINO, VANCOUVER ISLAND
FORAMINIFERAL ANALYSIS



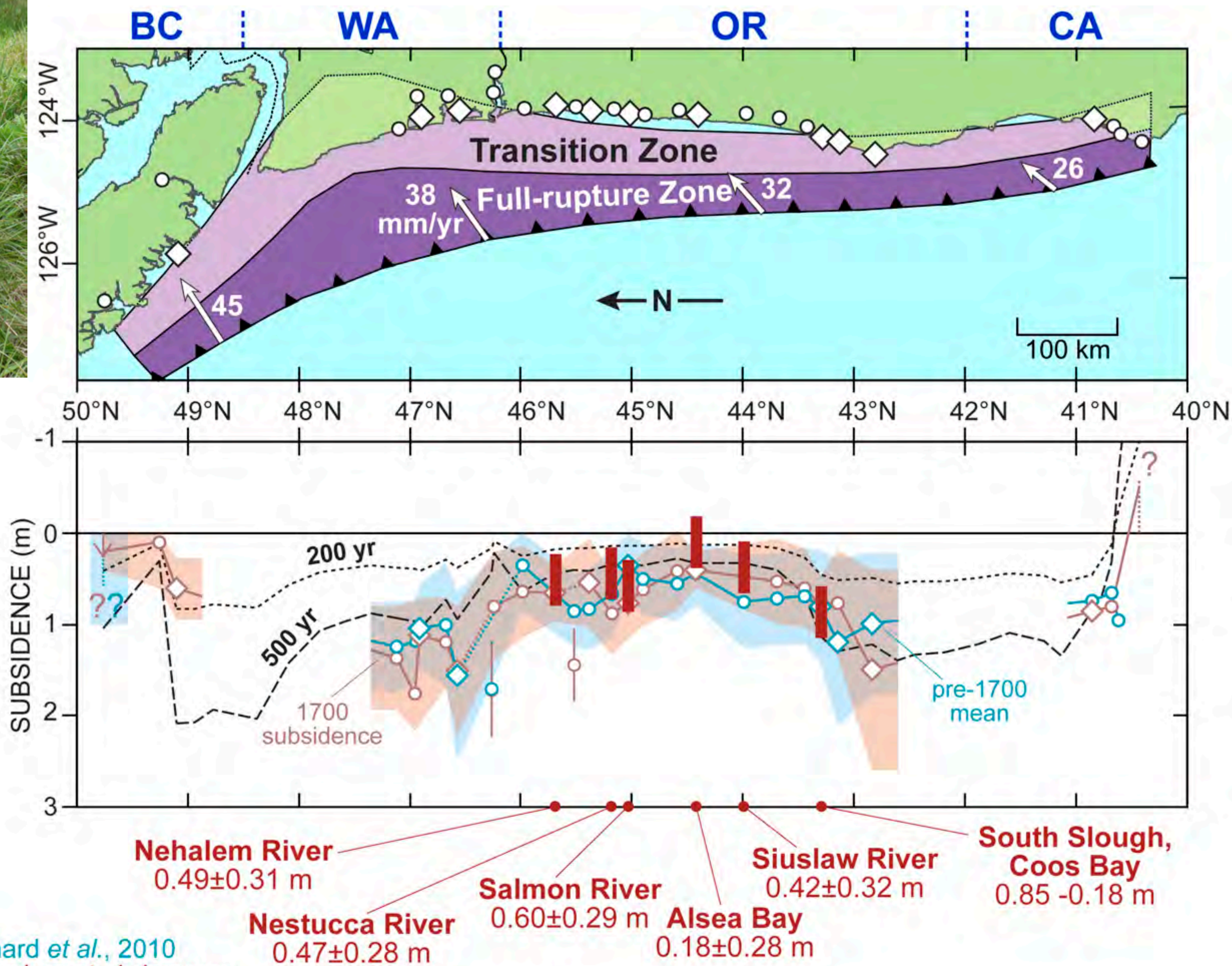


RECONSTRUCTED ELEVATION CHANGE

Transfer function analysis

(Guilbault et al. 1995, 1996)

Coseismic subsidence in AD 1700
Foraminiferal transfer function analysis



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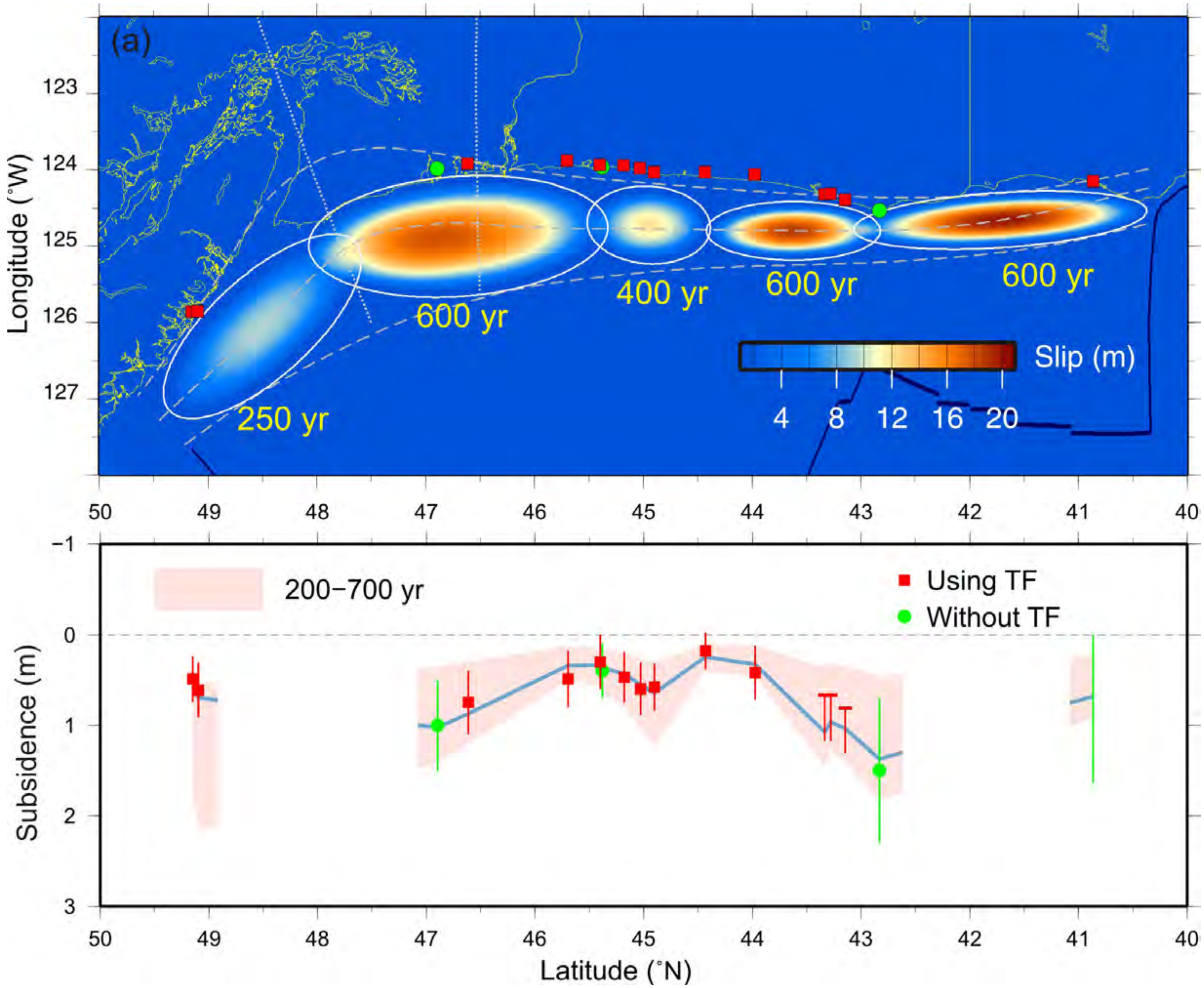
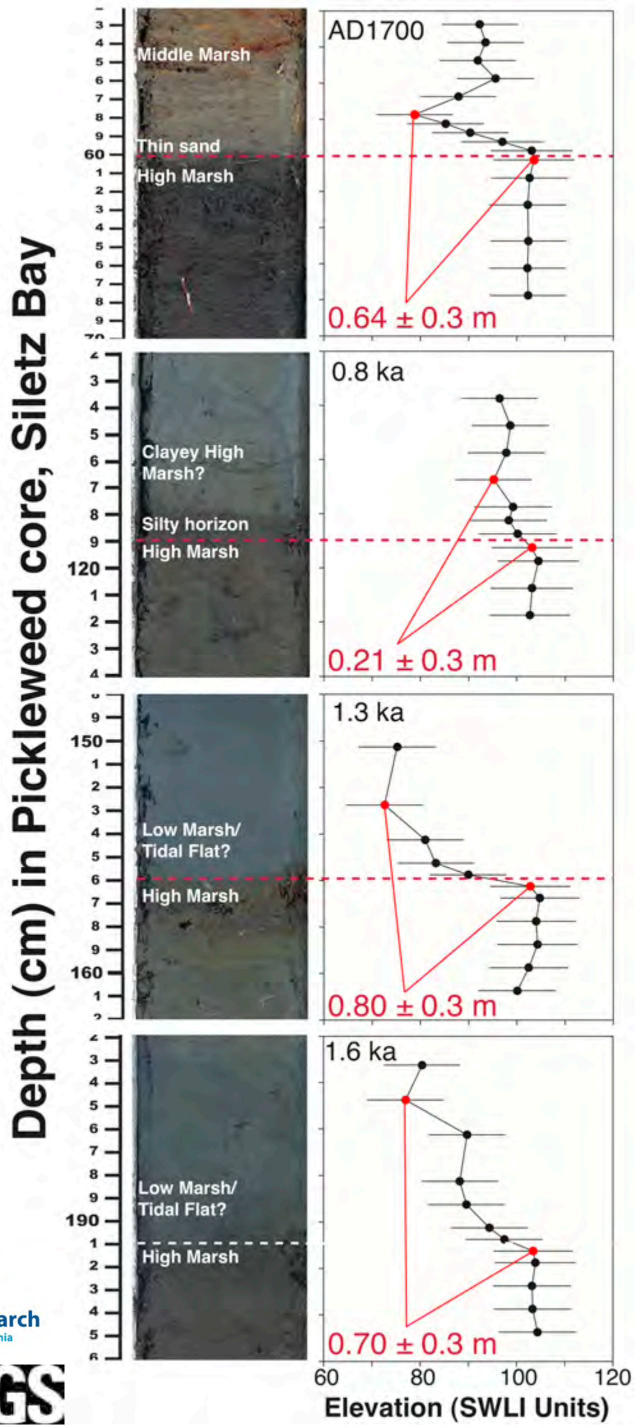
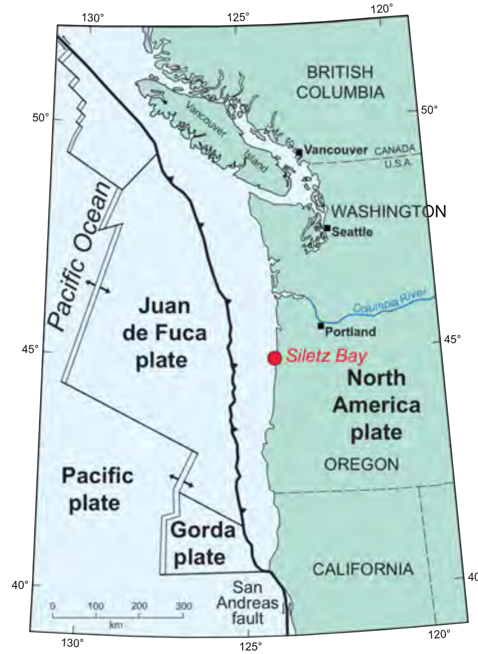
from Leonard *et al.*, 2010
data of Hawkes *et al.*, in press



Modeled coseismic subsidence in AD 1700 (Pei-Ling Wang, 2011)





Preliminary foraminiferal transfer function results, Siletz Bay spit

Great earthquakes of different sizes or differences in post-seismic land-level change and (or) tidal sedimentation?

(Engelhart et al., unpublished)
(NSF-USGS supported – 2009-2010)

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