# Subduction zone paleoseismology and tsunami studies in Alaska (50 years after 1964)

Rich D. Koehler

State of Alaska

Division of Geological and Geophysical Surveys

Osher Lifelong Learning Institute

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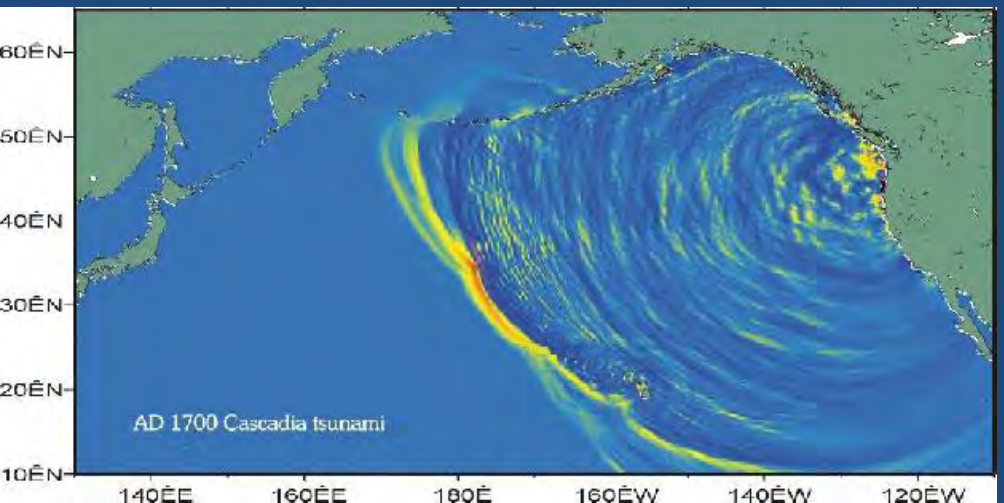
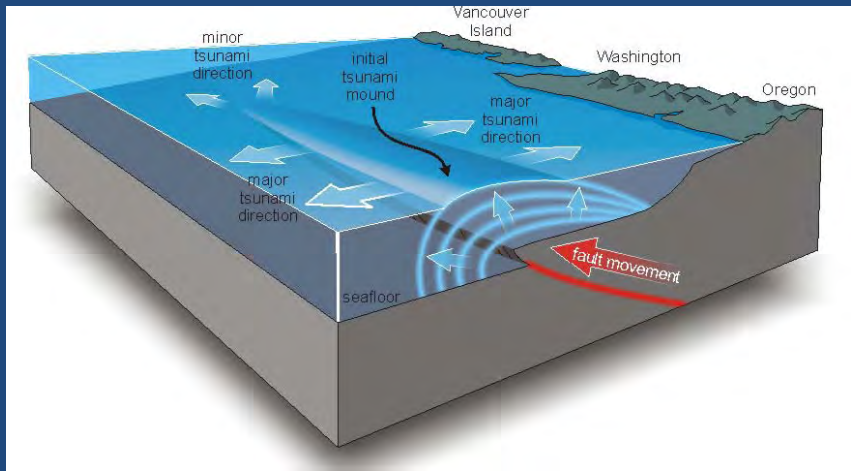
# Outline

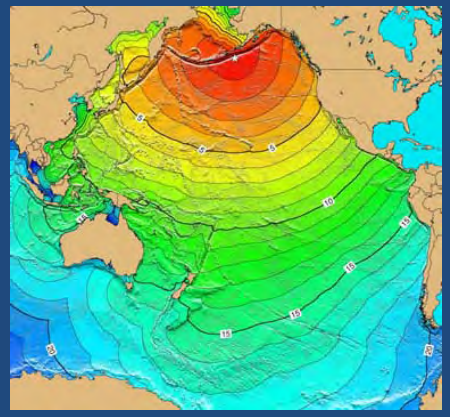
- Review of subducion zone earthquake sources and Alaska tectonics.
- What is Subduction zone paleoseismology?
- Field studies on earthquakes and tsunamis in Alaska (Copper River delta and Sedanka Is.).
- Tsunami inundation mapping (forecasting).
- 1964 anniversary preparation/activities.

# Alaska is at risk of damage from tsunamis from local and distant sources!

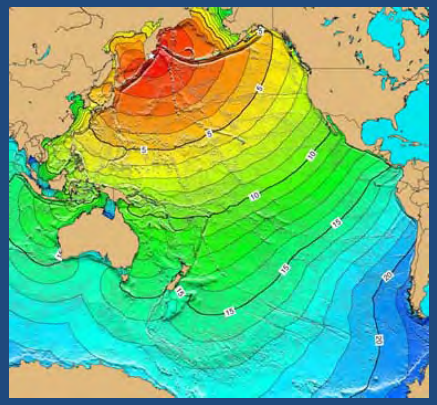



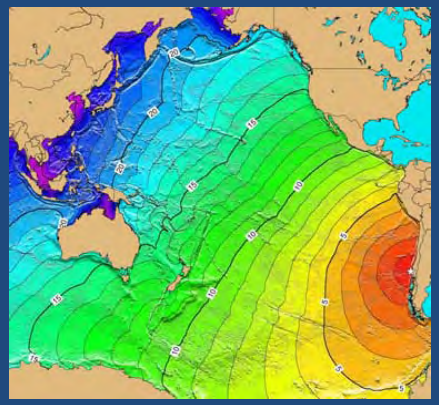
Unimak Island, AK, 1946



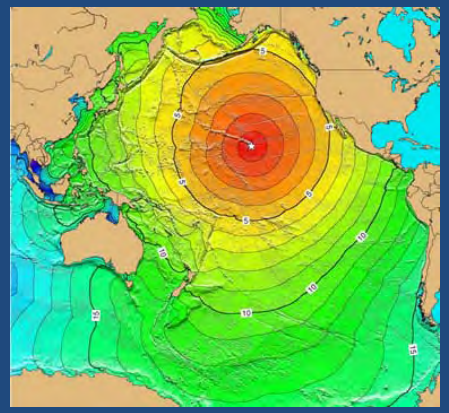
Kamchatka, Russia, 1952



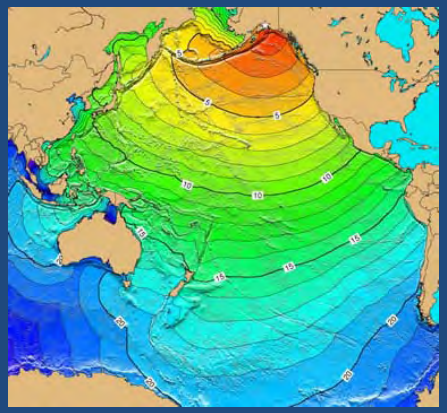
Southern Chile, 1960



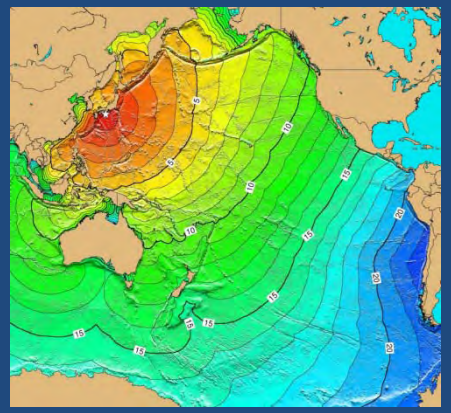
Hawaii, 1975

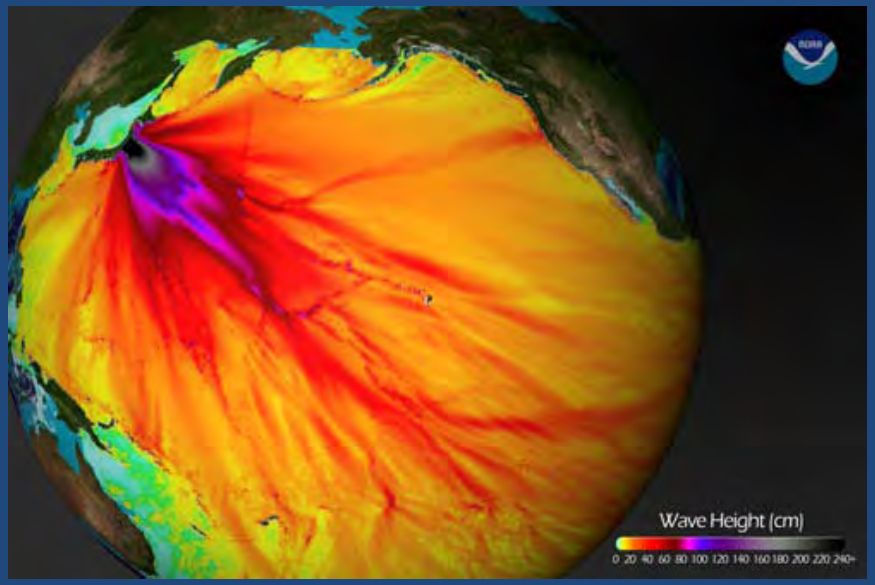


Prince William Sound, AK, 1964



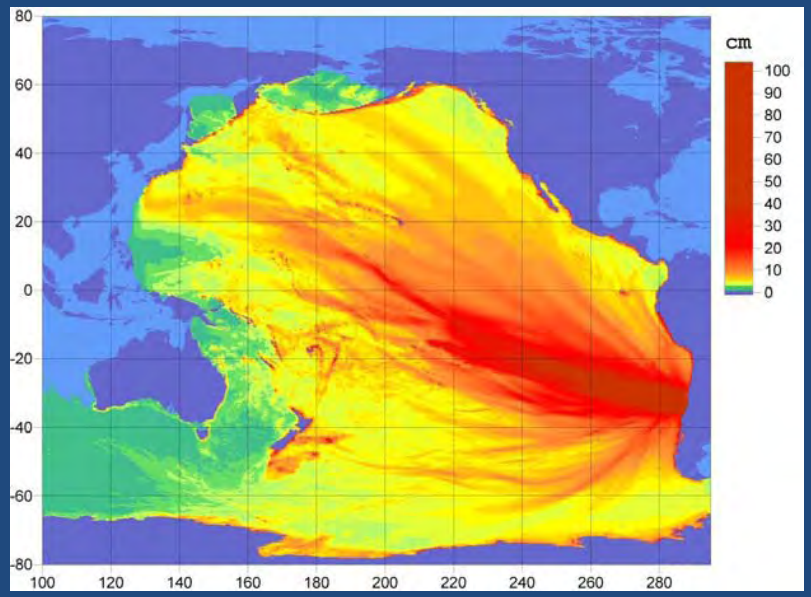
Honshu, Japan, 1968






2011 Tohoku earthquake and tsunami.  M9

# February 27 Tsunami, 2010. M8.8

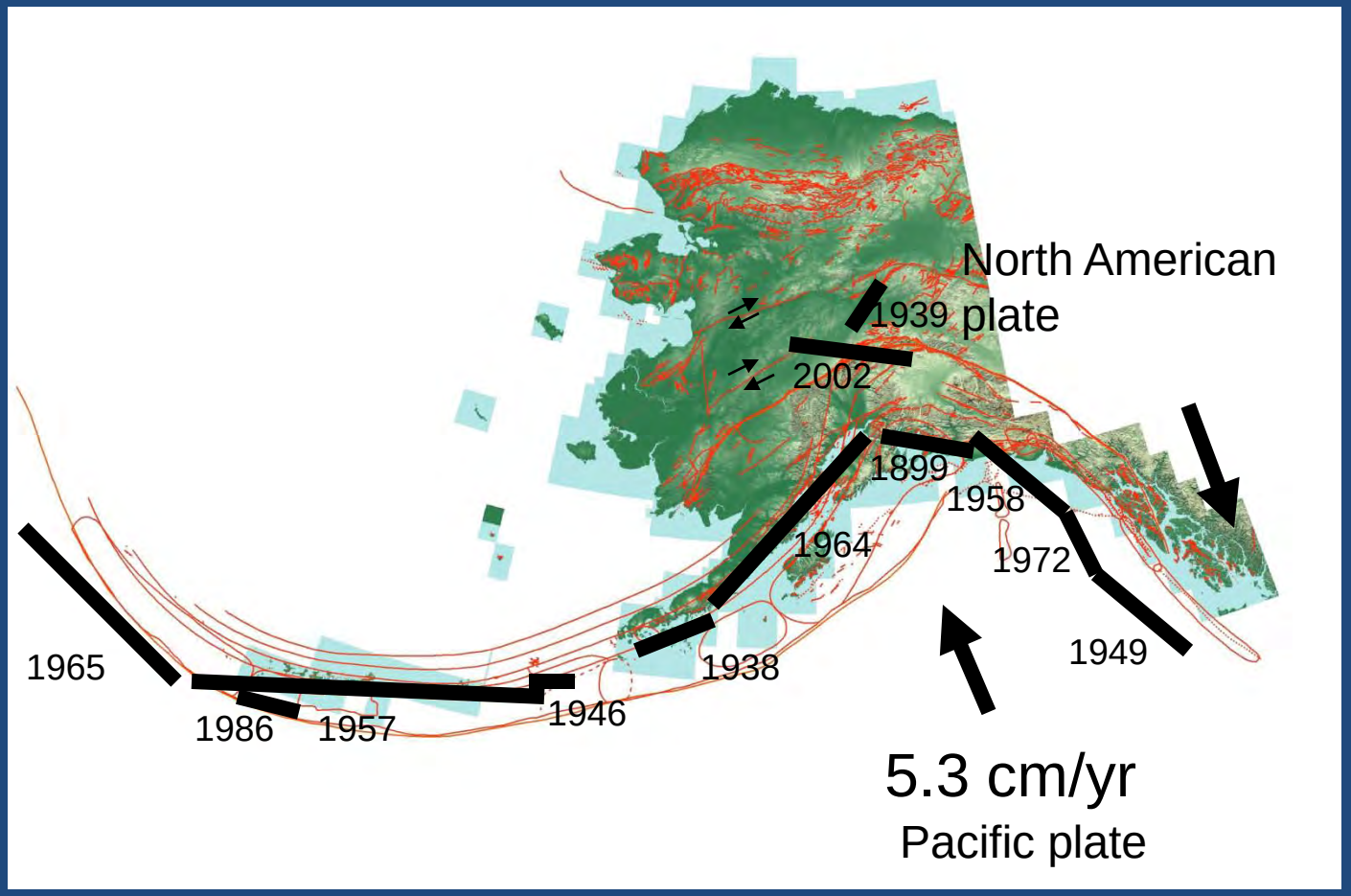



Images from California Seismic safety commission

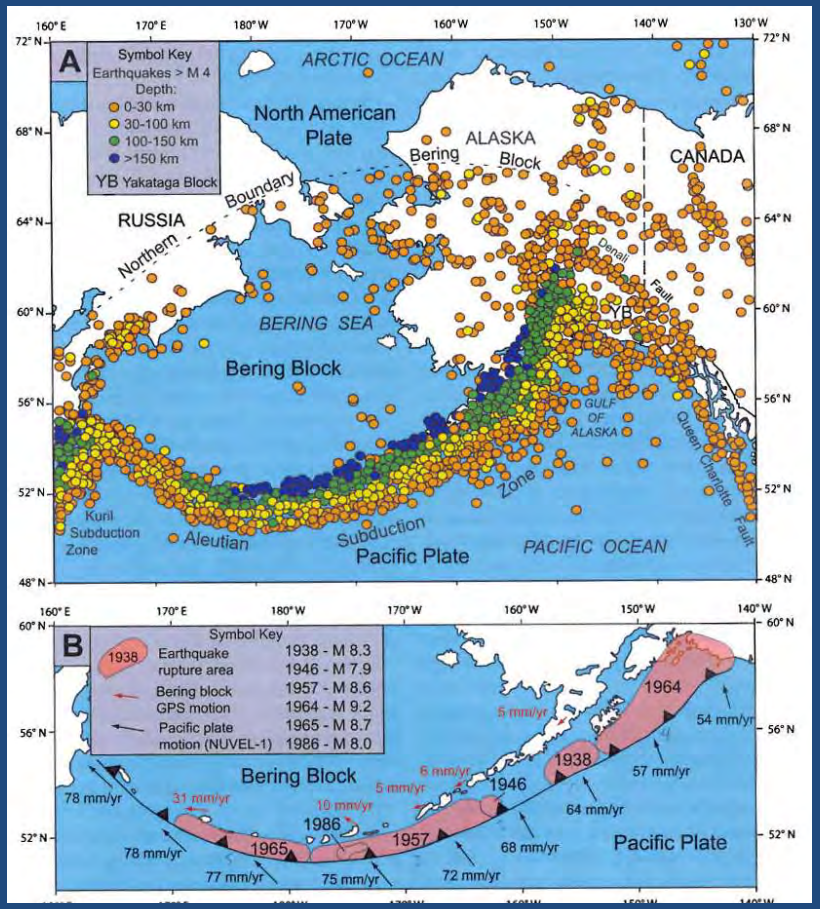
The Chile event serves as a remindner that the Aleutian subduction zone will produce future M>8+ earthquakes and tsunamis.

Paleoseismic record may not be complete for M=7-8 earthquakes.

# Background
# Overview of Alaska tectonics

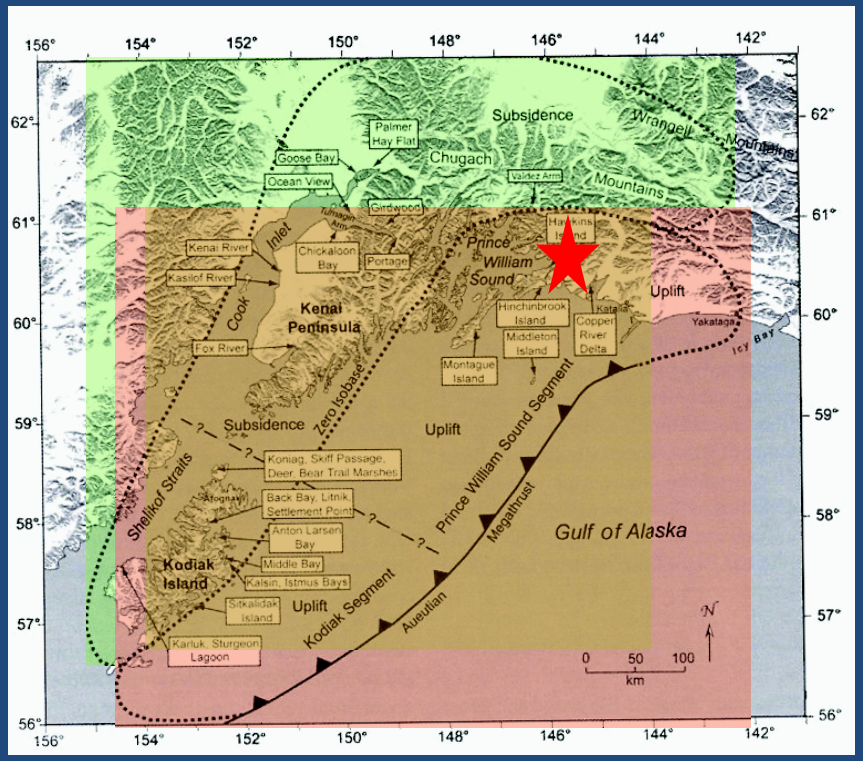


# Aleutian subduction zone




Carver et al., 2009

# Prince William Sound segment 1964



Drowned spruce, Latouche Is.

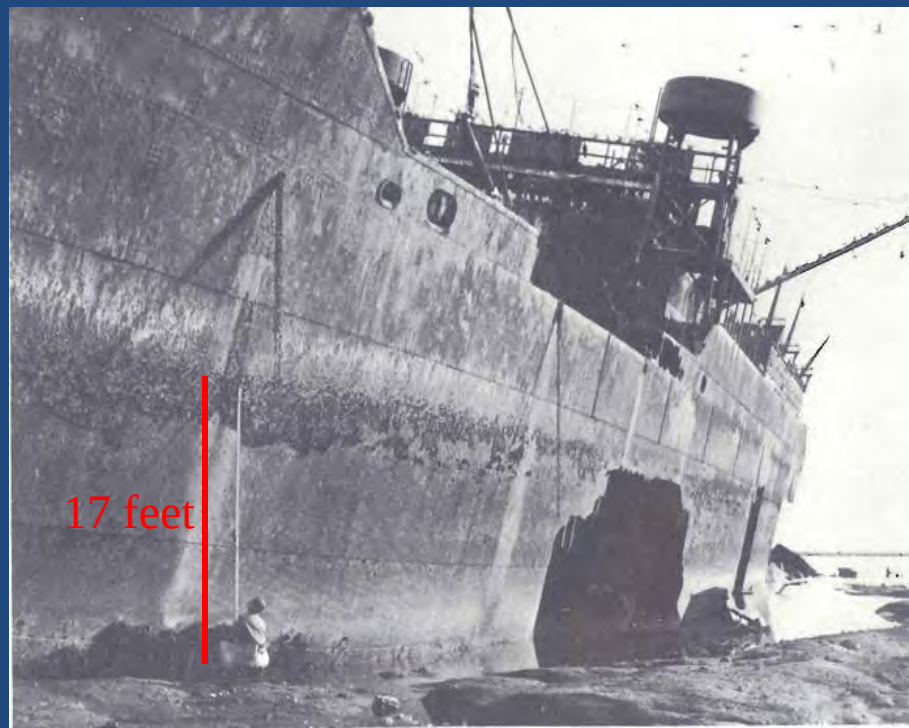
Barnacle line, Montague Is.

## Vertical deformation in 1964

Plafker, 1969

Barnacle line, Port Bainbridge

Barnacle line, S.S. Coldbrook, Middleton Is.



# Cape Cleare, Montague Island, Prince William Sound

Former seafloor with exposed calcareous algae and bryozoans

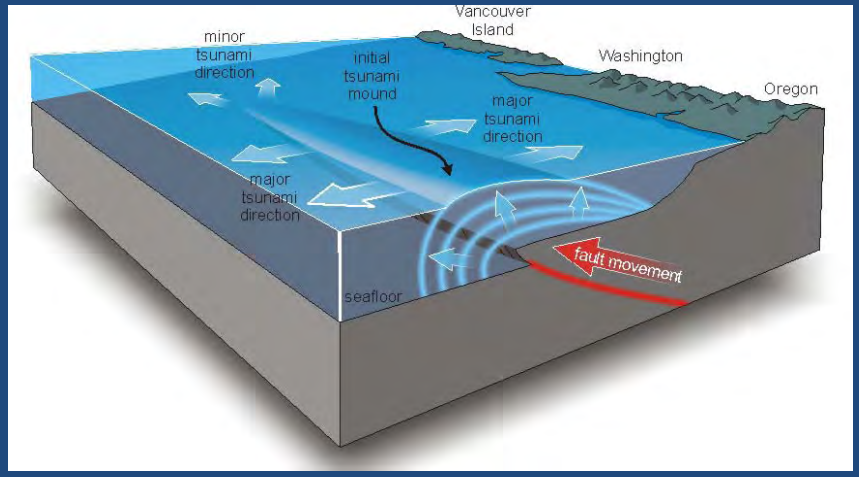
Plafker, 1969

# Paleoseismology background

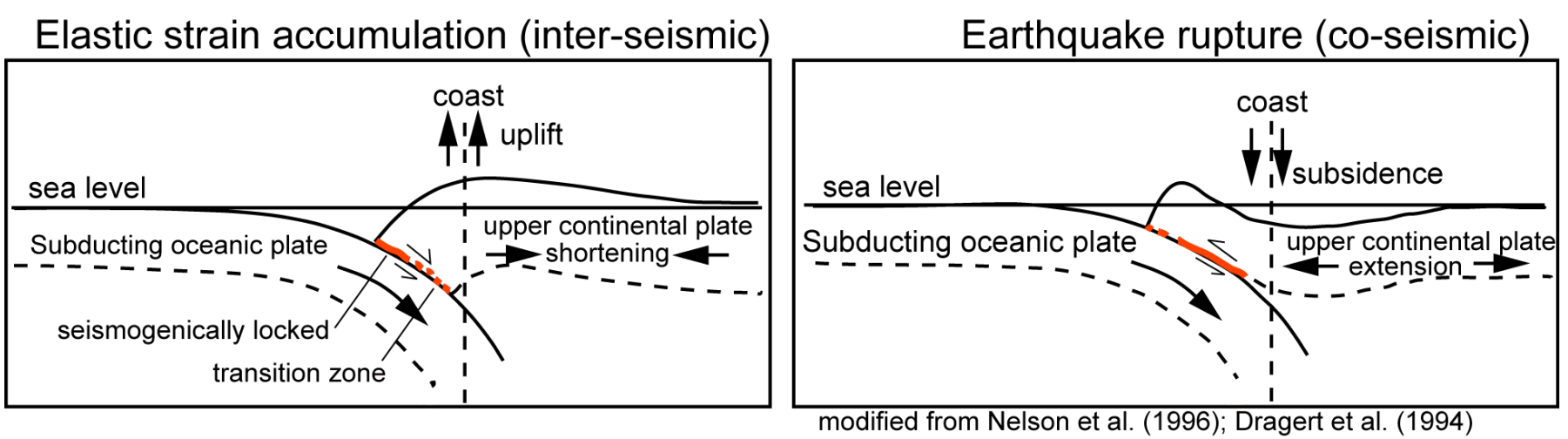
- Paleoseismology is the study of prehistoric earthquakes in particular earthquake location, timing, and size.
- Interpret geologic evidence of earthquakes focused on instantaneous deformation of sediments and landforms.
- Evaluate distribution of earthquakes in space and over time periods of years to tens of thousands of years.
- Long histories are needed to understand regional neotectonics and the earthquake potential of individual faults.
- Contributes to understanding the probability and severity of future earthquakes.

# Paleoseismology in subduction zones

## Displacement of the seafloor, usually subduction earthquakes

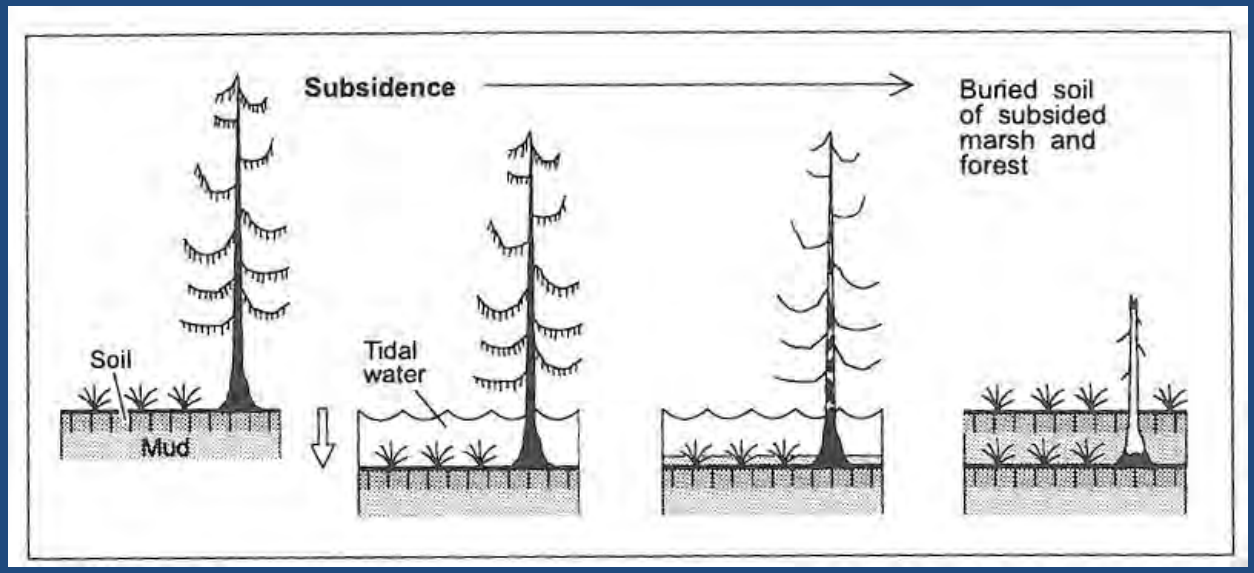



## land level change




modified from Nelson et al. (1996); Dragert et al. (1994)

# Paleoseismology in subduction zones




Archaeological excavations

Detailed stratigrapic analyses