

## Earthquake Hazards in Western Washington

- The mega-thrust at the coast
- Shallow thrusts in the crust of Puget Sound
- Normal faulting in the subducted Juan de Fuca Plate

Which should you worry  
about?

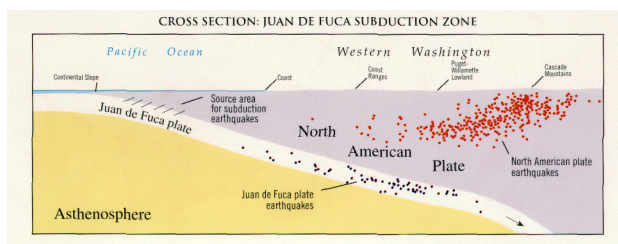
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There have been 3 events in the last 60 years: 1949, 1965 and 2001.

There WILL be more in YOUR lifetime.

The last one caused \$1,000,000,000 in losses that were largely preventable.



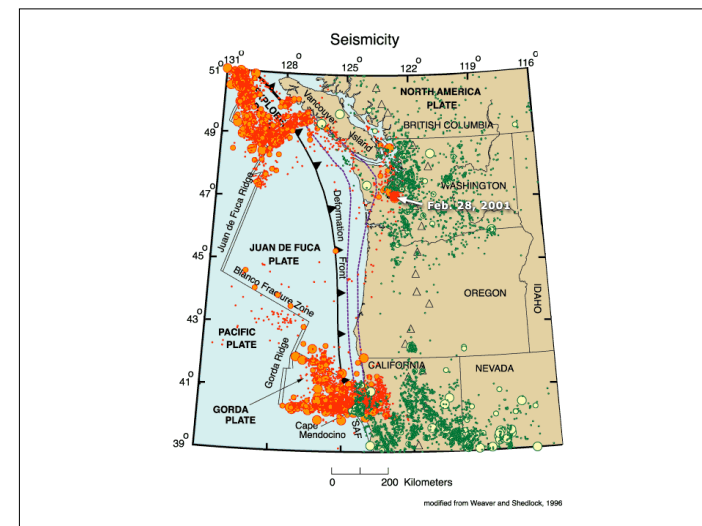
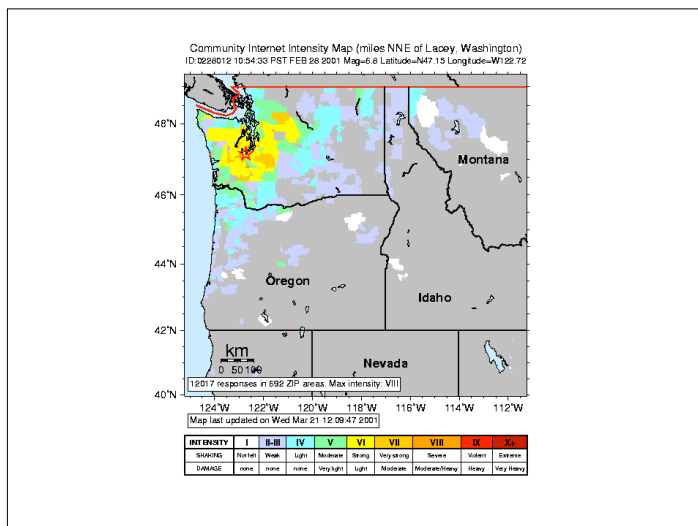
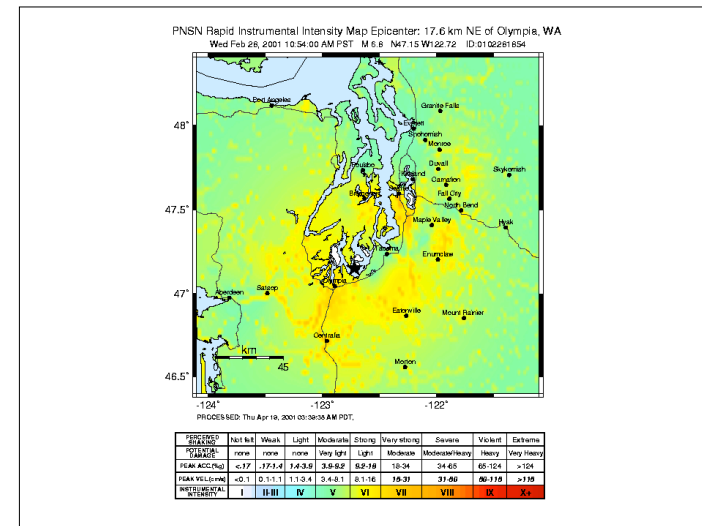
## The Nisqually Earthquake

February 28, 2001

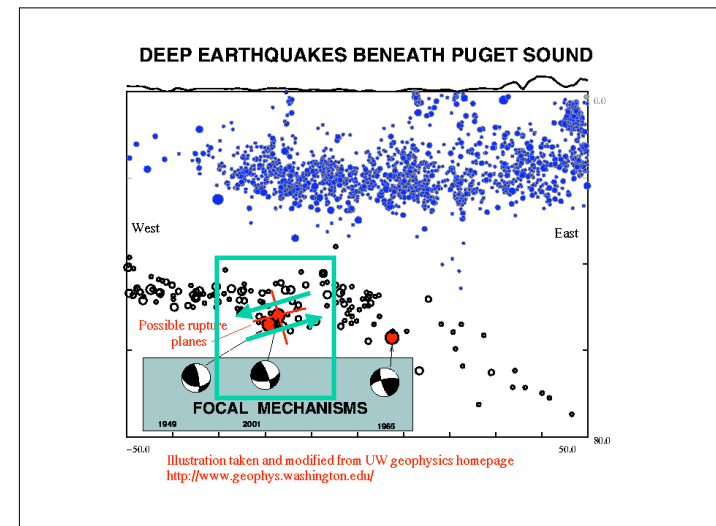
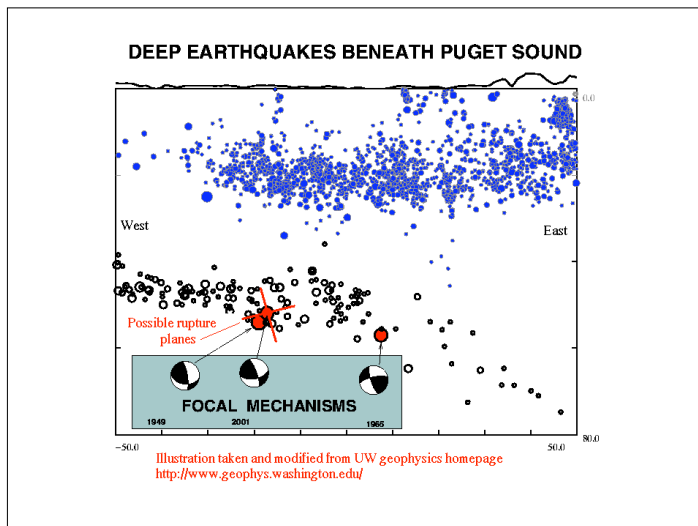
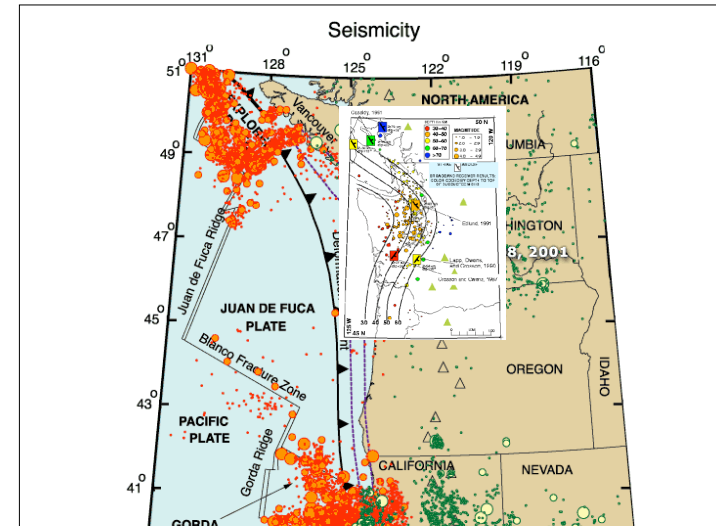
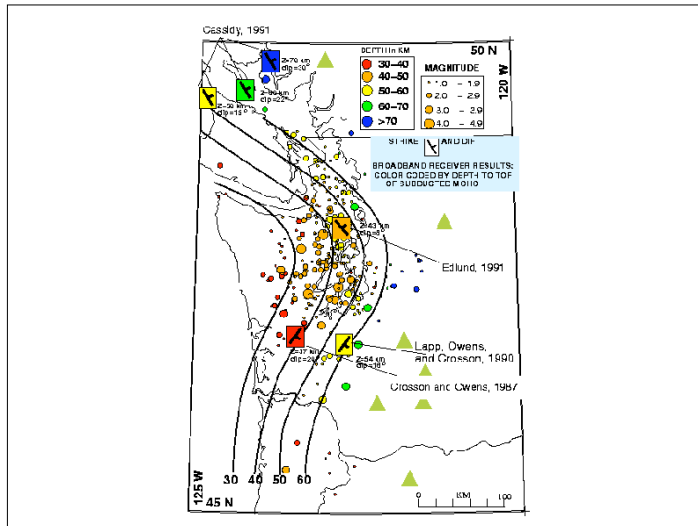
10:54:33 AM PST

Magnitude 6.8

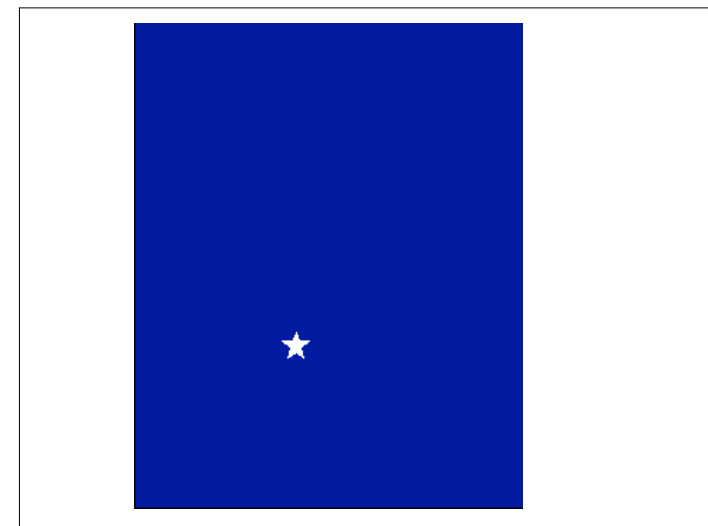
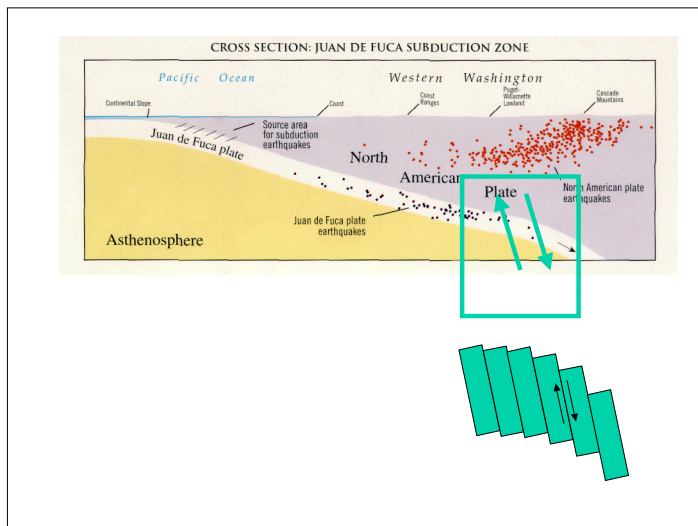
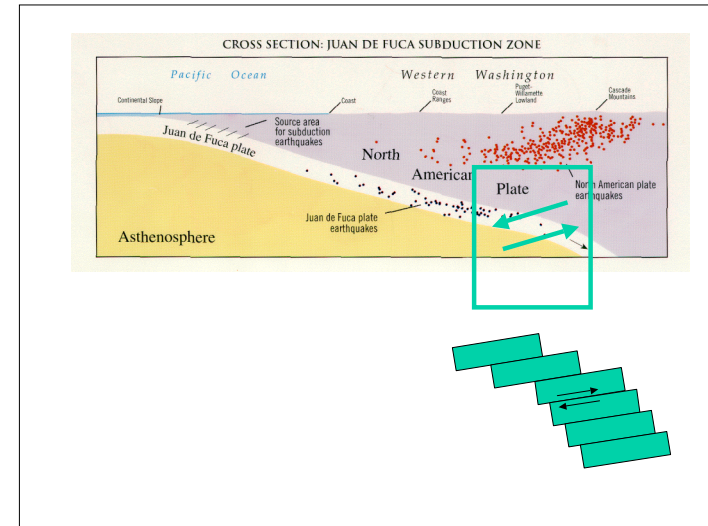
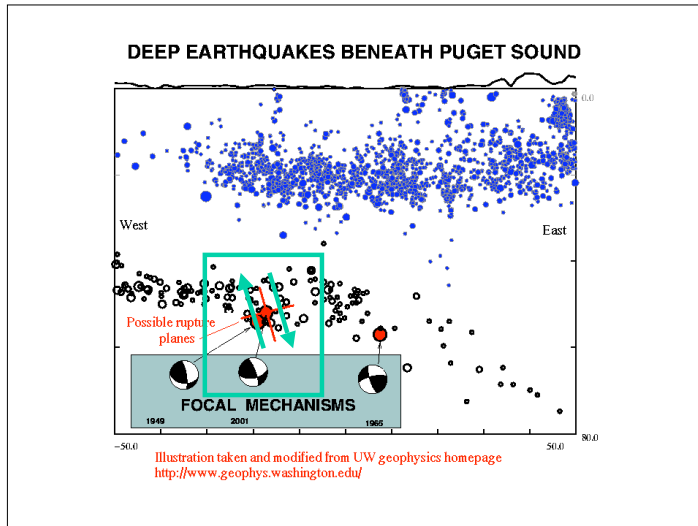


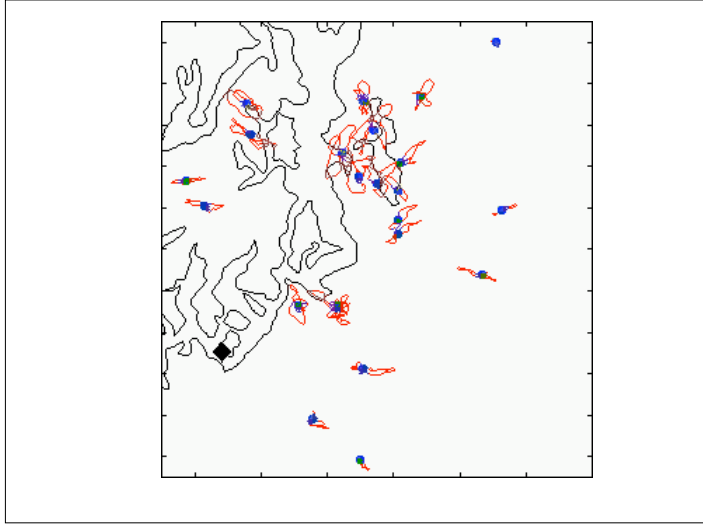






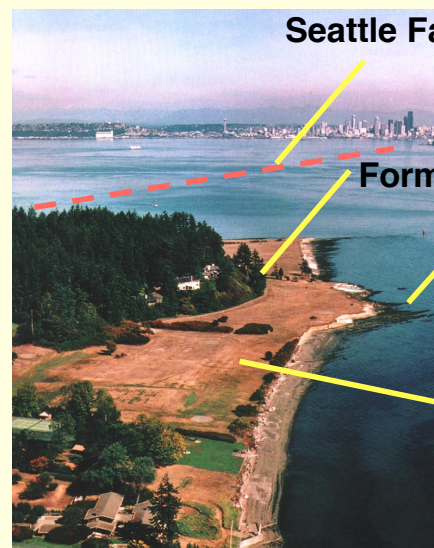








**Restoration Point**



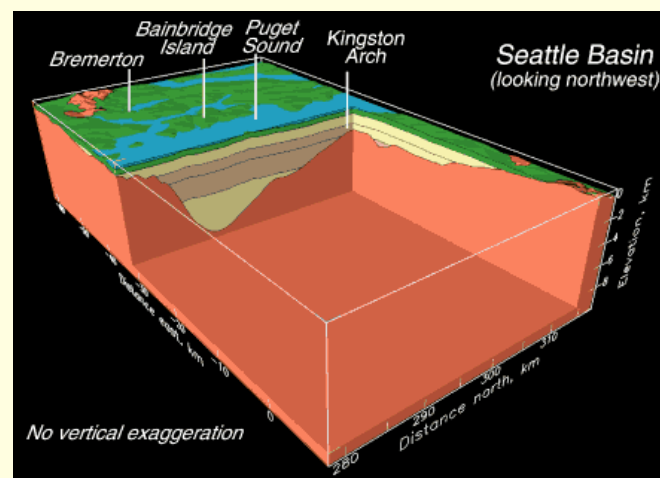
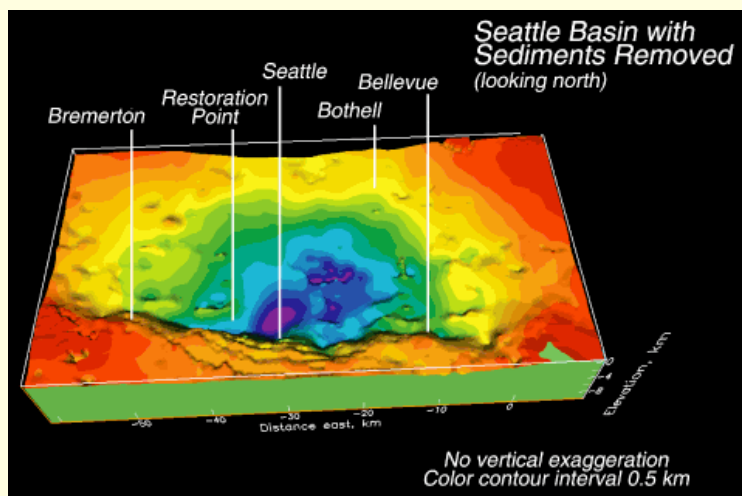
**Seattle Fault**

**Restoration Point**

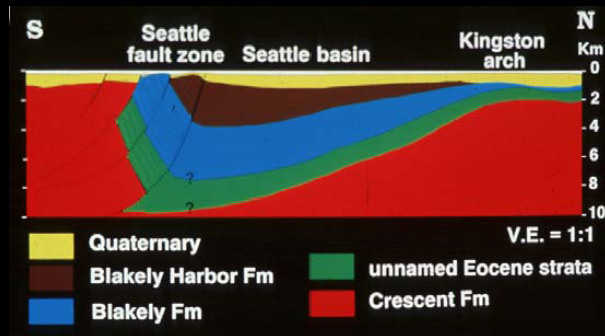
**Former sea cliff**

**Present terrace**

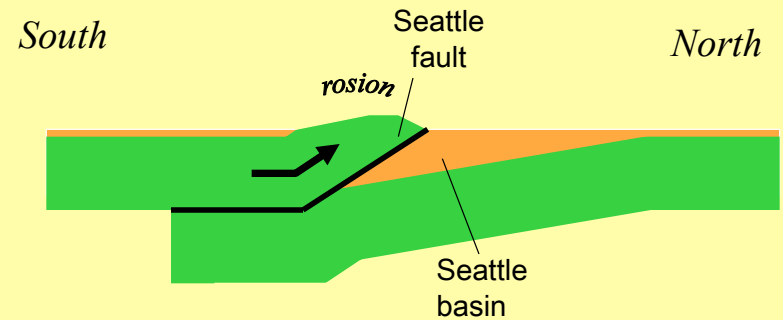
**Raised wave-cut terrace**



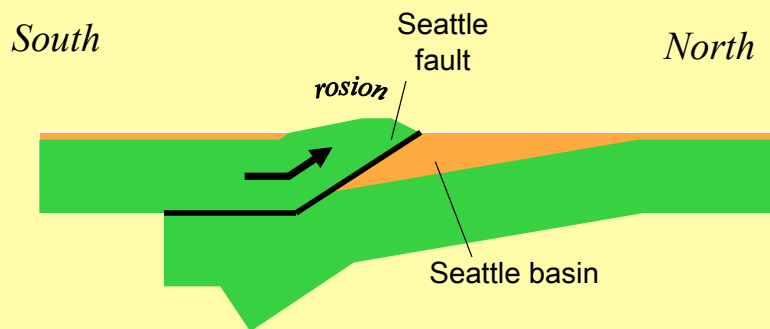




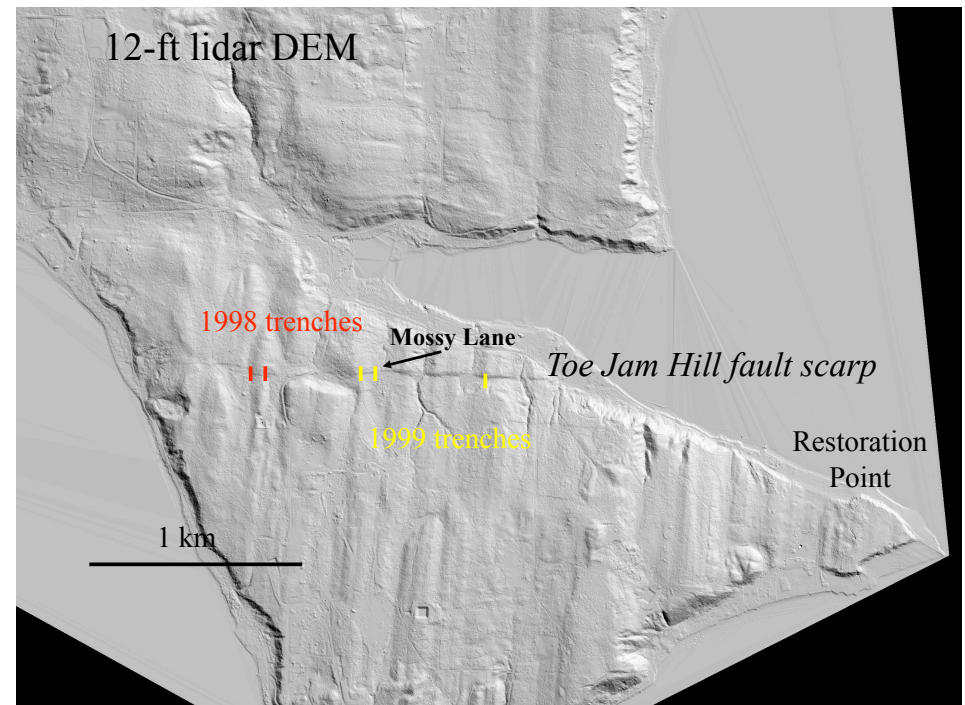
## Seattle fault uplift



*N-S contraction drives  
uplift and basin formation*



- ~ 6 km subsidence in 15 million years implies about 500 m/million years offset on the Seattle Fault.
- If each big earthquake moved the fault 5 m, there must have been 100 events in the last million years.
- This implies one event every 10,000 years.



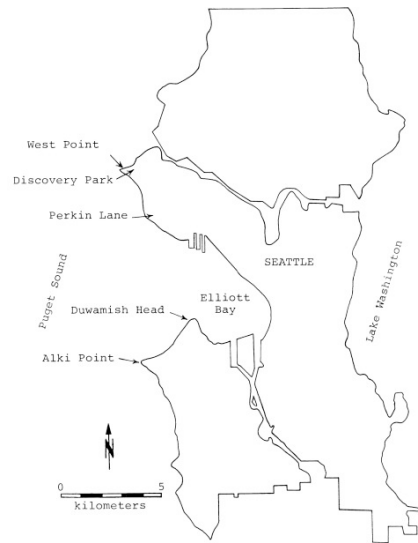
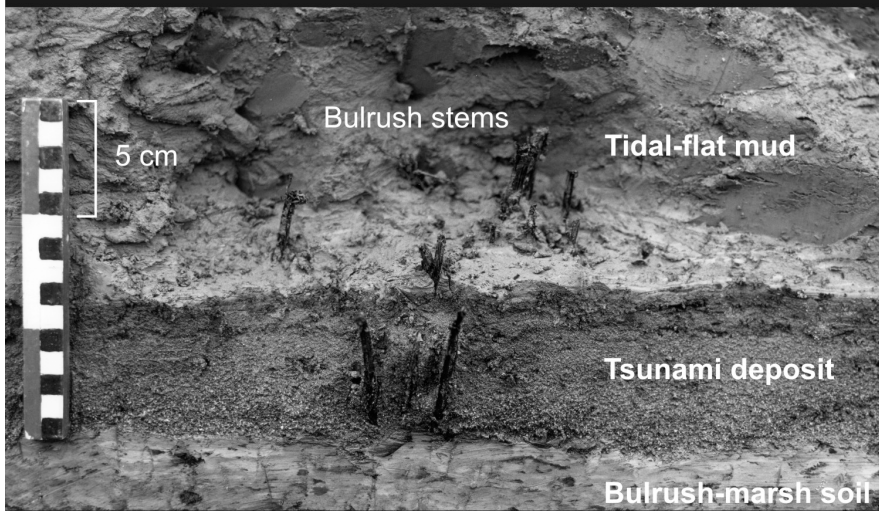


Figure 1. Location map

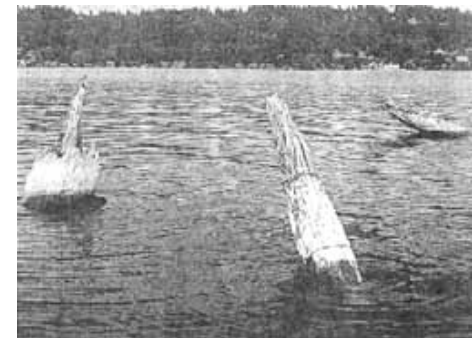
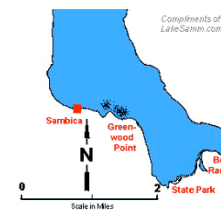
## West Point Sewage Treatment Plant construction excavation

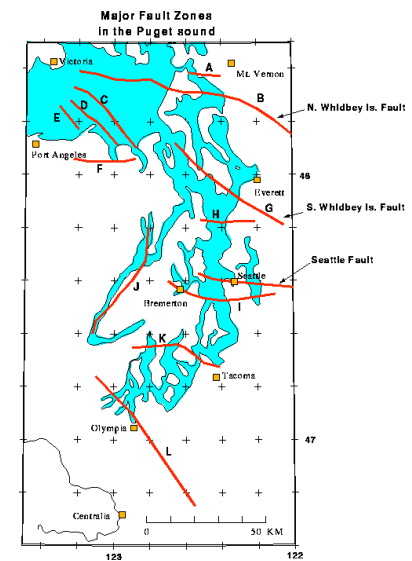
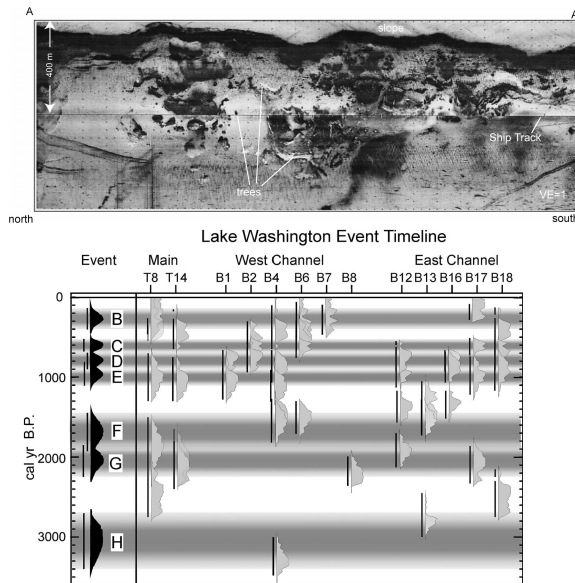
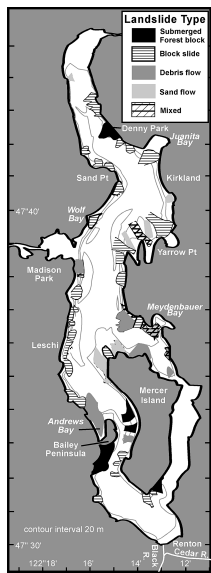


## WEST POINT



## “Snags” in Lake Sammamish: 1100 years old





## Conclusions

- An event that would have had catastrophic consequences occurred about 900 AD.
- Individual faults have long recurrence times (1000's of years).
- Many active faults are known and more are being identified.
- Jury still out on how often we can expect a devastating crustal quake.



When was the last **big**  
earthquake in the Pacific  
Northwest?

Hint: It was NOT  
February 28, 2001

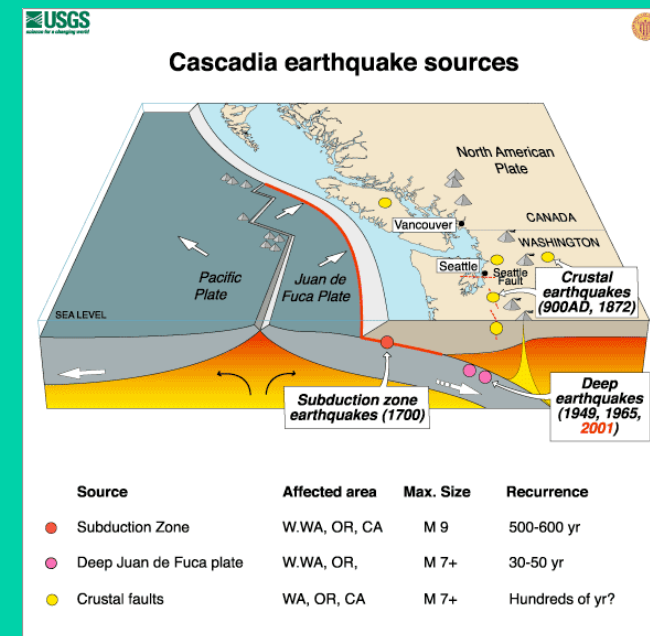
The last “Big One” in the  
Pacific Northwest occurred

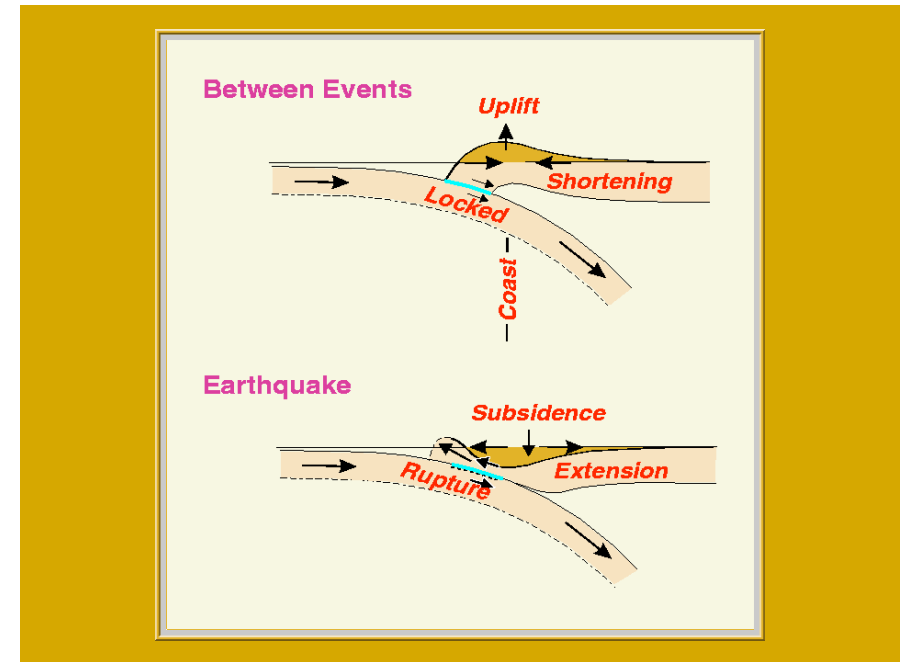
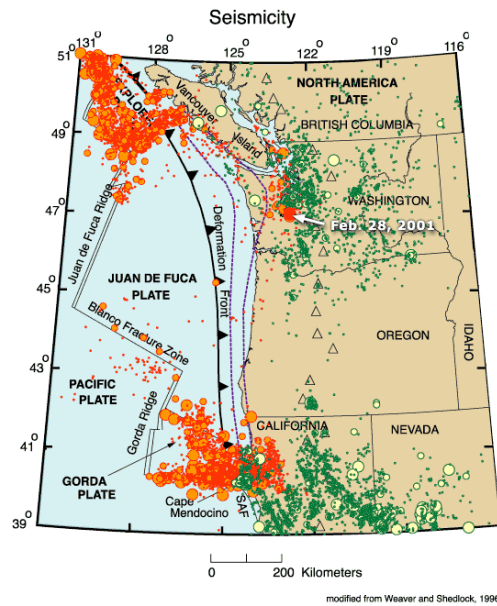
January 26, 1700  
at about 9 PM

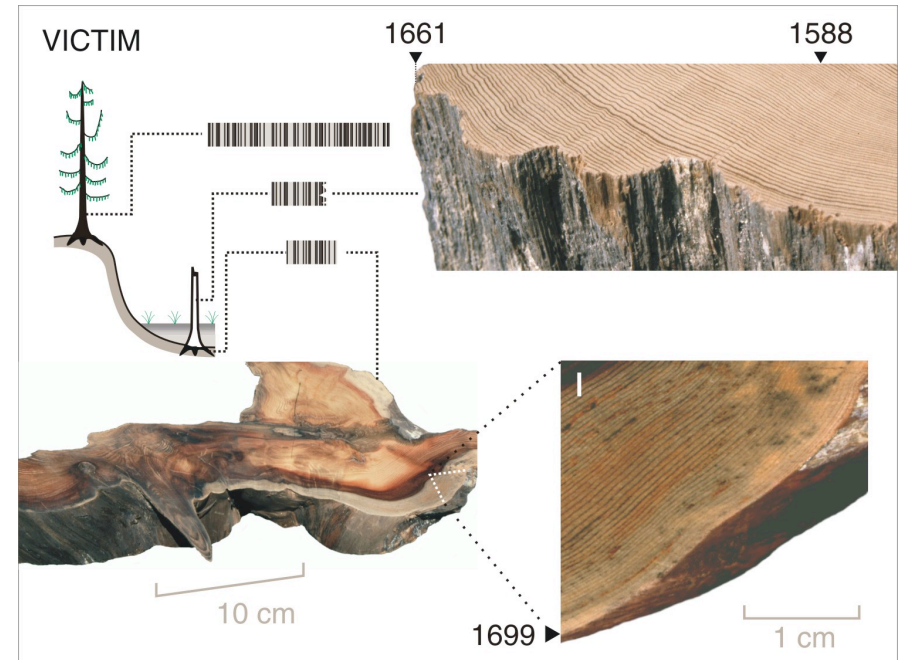
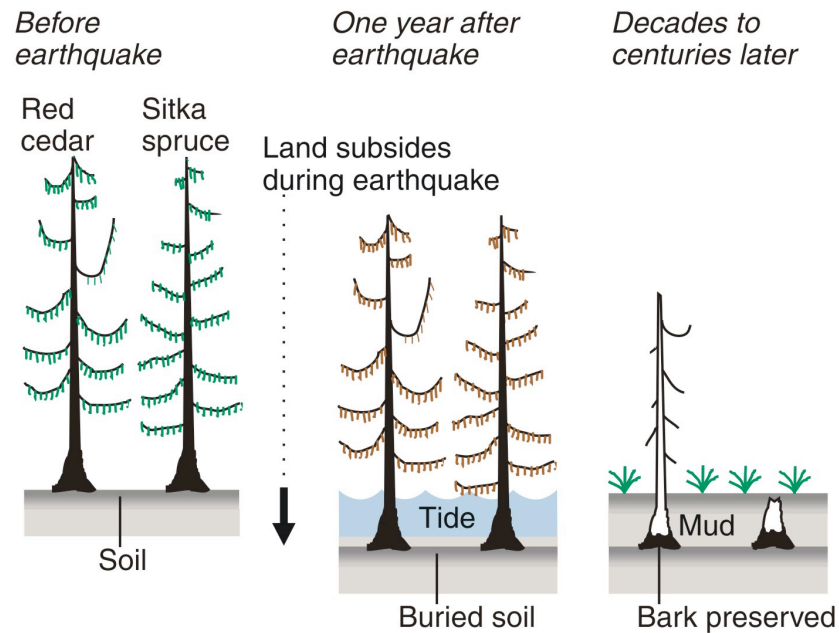
The last “Big One” in the  
Pacific Northwest occurred

January 26, 1700  
at about 9 PM

**How do we know?**







Conclusion so far...

There was a big earthquake  
between the growing seasons of  
1699 and 1700

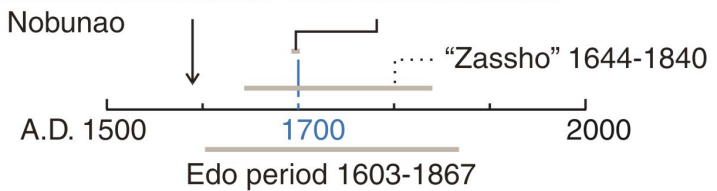
#### Feudal lords



Nobunao



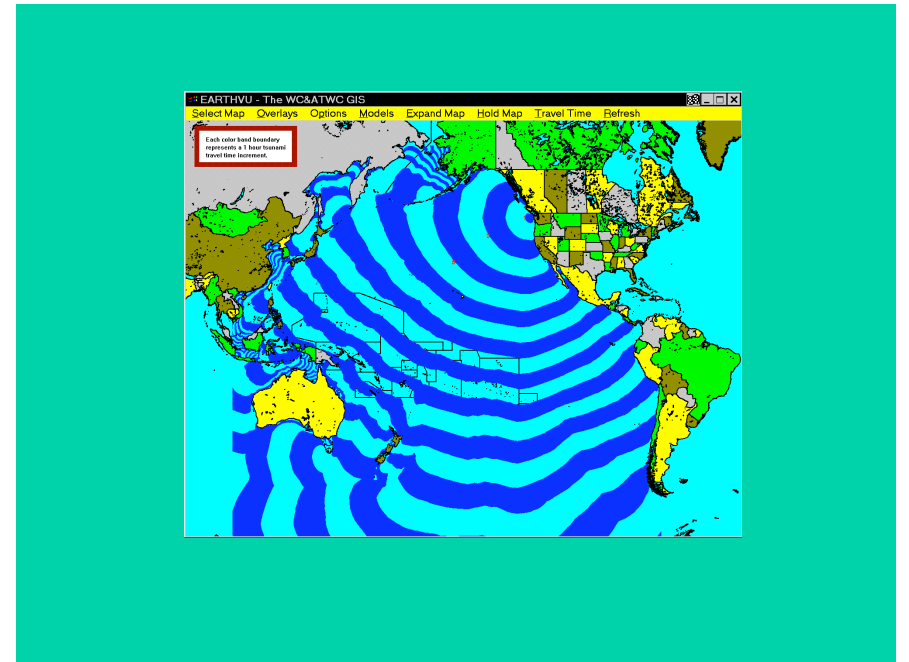
Yukinobu

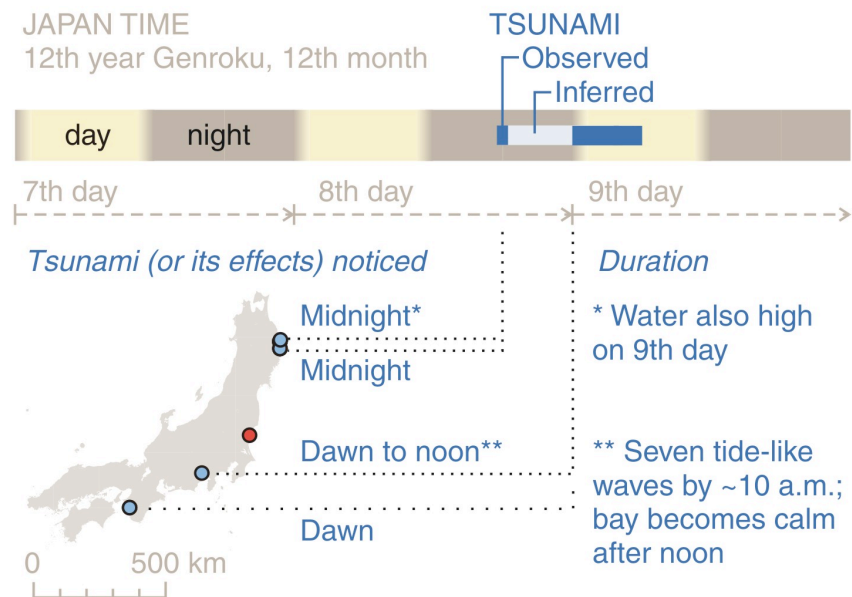
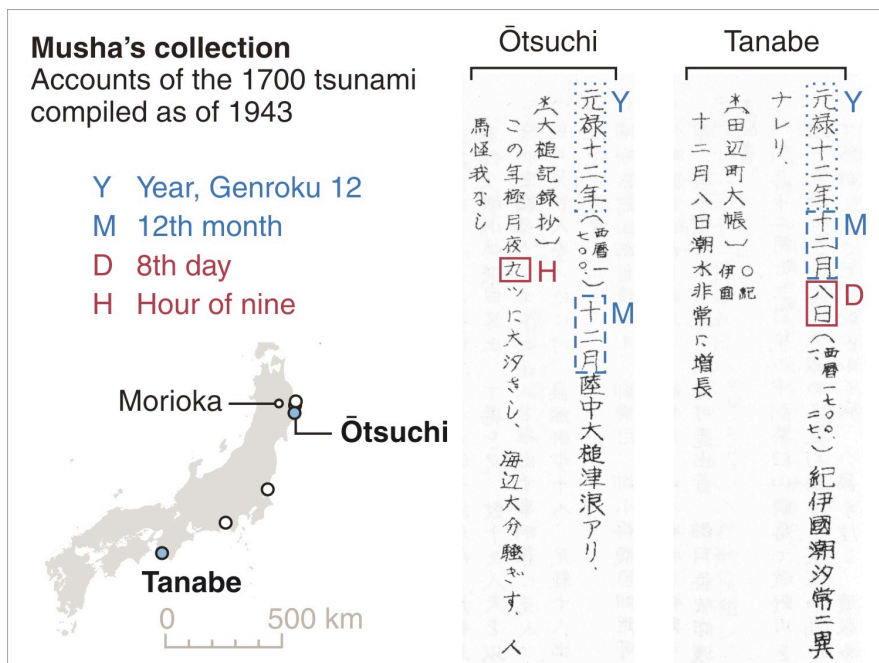
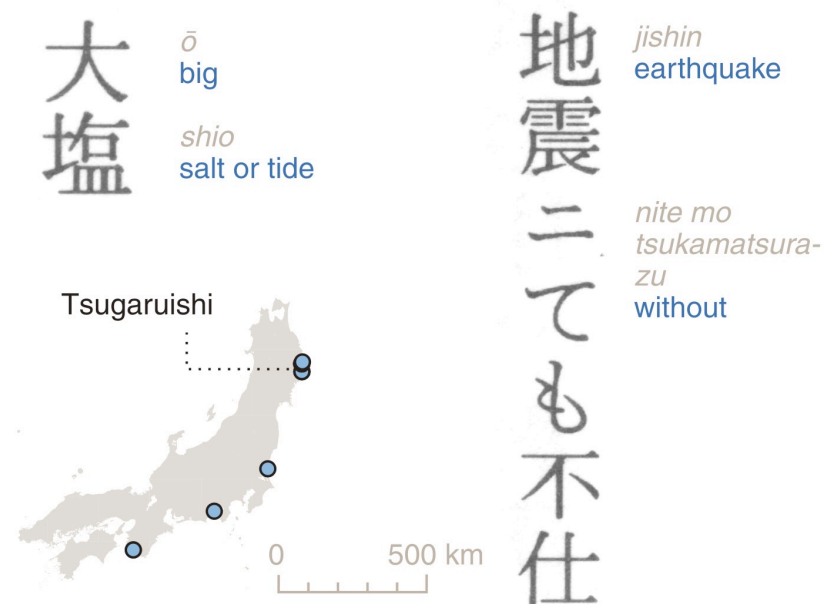
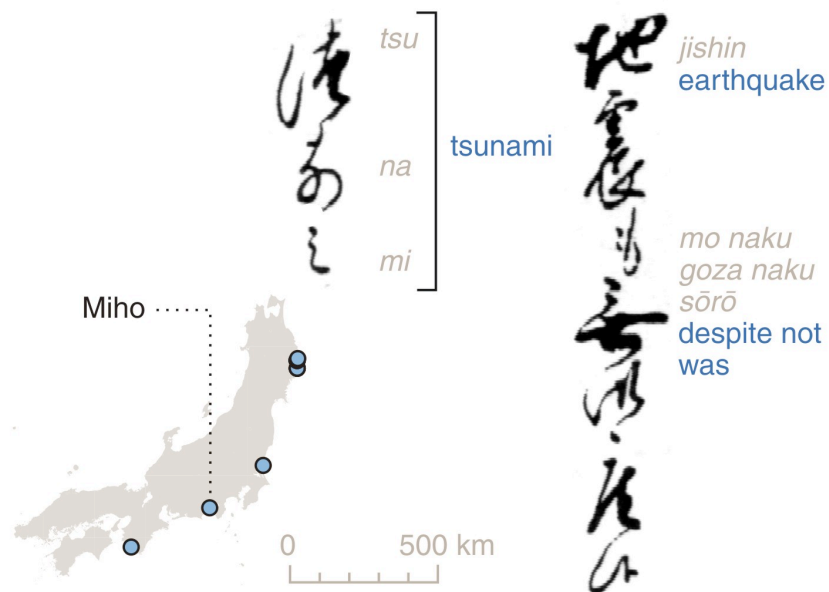


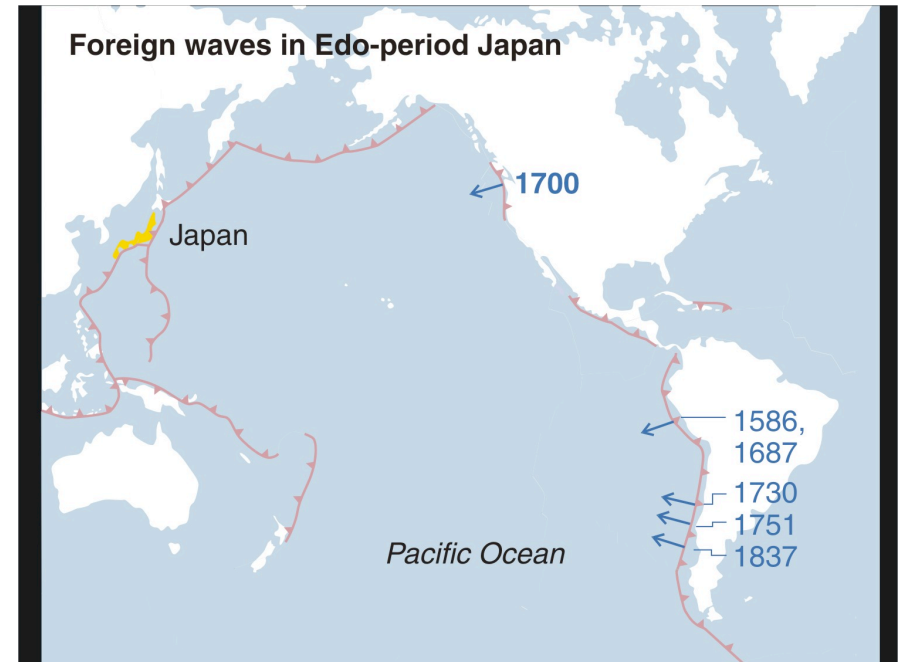
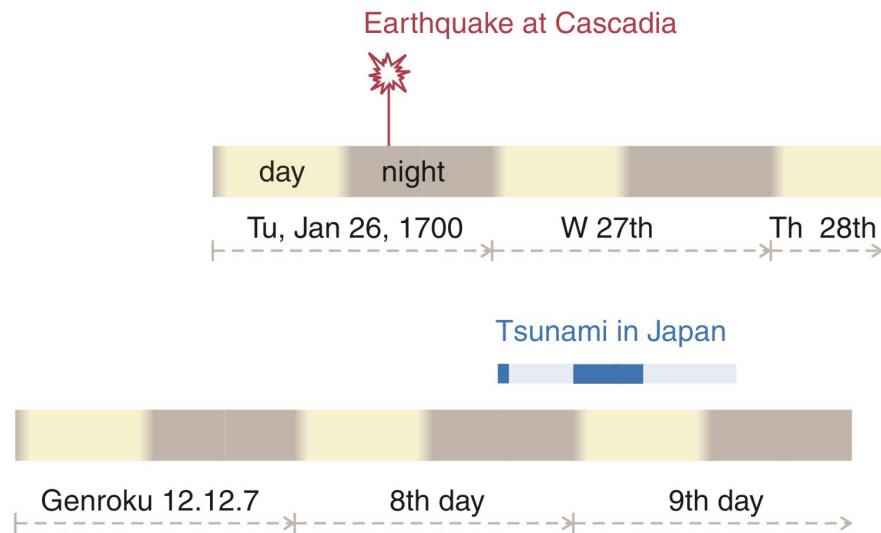




元禄十二  
 Genroku  
 Genroku era  
 jūni  
 12th year







The last “Big One” in the  
Pacific Northwest occurred

January 26, 1700  
at about 9 PM