

The Basics: Review of the Cascadia Region

This is an image of the Cascadia region:

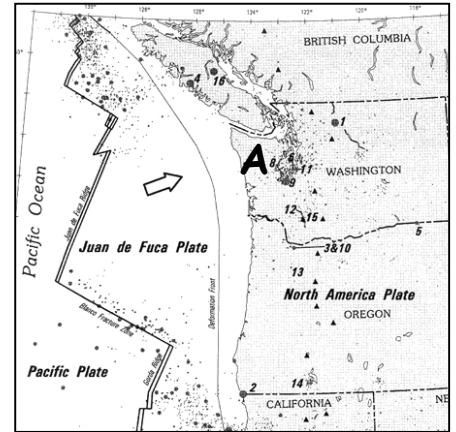
Let's review a few things:

1. What type of boundary exists between the Juan de Fuca plate and the North American plate?

2. What types of tectonic plates are they?

Juan de Fuca: _____

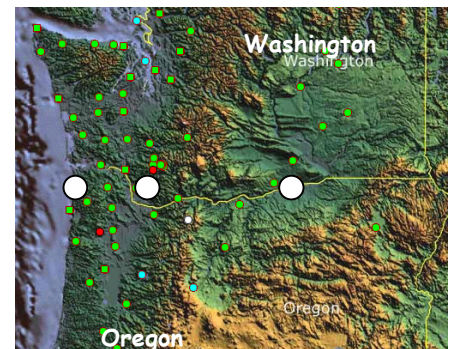
North American: _____



3. The Juan de Fuca Plate is more dense than the North American Plate, so it's slipping below the North American Plate. What is the name of this process?

4. a. Compare the animation to the Cascadia region. What overall direction would you expect point A (on the map above) to be moving due to the deformation? How do you - know that?

b. Think about the Gumdrops Introduction To GPS & Cascadia GPS Analysis activities we did with the GPS data from the coast, the urban corridor, and eastern areas. From the white dots, draw arrows showing approximate direction and distance moved.



Evidence #1: Hmmm . . . What's Happening Here?

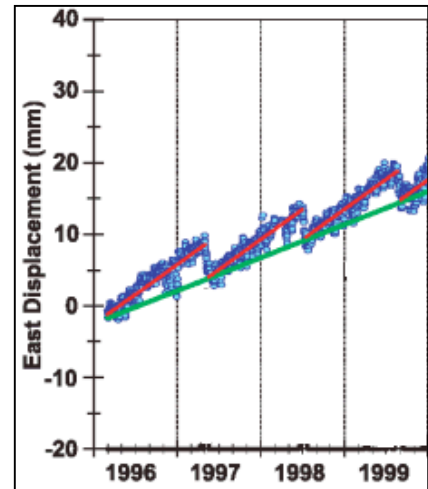
Strange seismic signals that lasted a really long time - weeks - as opposed to seconds or minutes. They released the same amount of energy as a sudden earthquake - it was just spread out over a longer time.

Evidence #2: What was that???

GPS monuments in certain areas were showing reversals of their long term northeast movement. Every so often they'd move southwest.

Evidence #3: A Pattern Seems to Emerge . . .

- From looking at the data, describe the direction of movement of the western edge of the North American Plate between 1996 and 1999. Remember this is a time series plot - look carefully at what is being measured on the Y-axis!
- About how often is the reverse motion happening?
- Approximately how many millimeters of reverse motion occurs during each slip event?



Evidence #4: Putting the Pieces Together

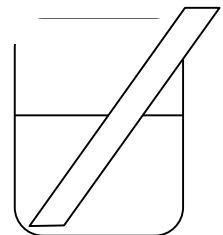
- Now, what do you notice about the seismograms?

Now What? The Implications of What We've Learned

- What is the data showing here? Did PABH experience a reverse motion or slow slip event?
- Explain how the data from PABH are different from observations at ALBH.

Let's try to model what's happening with the Juan de Fuca Plate as it moves under the North American Plate.

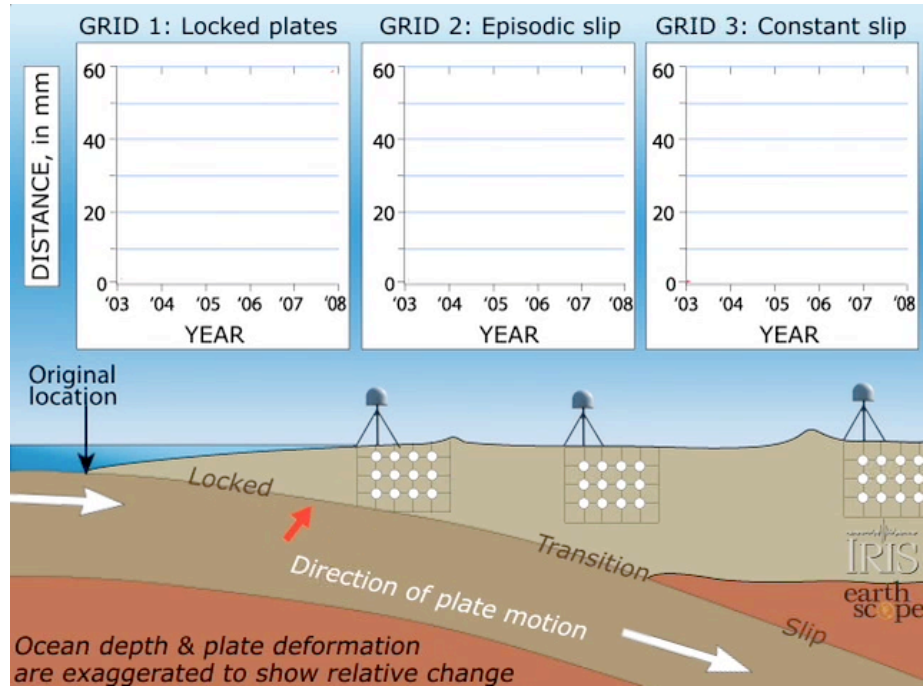
- Take the noodle out of the water. Gently bend the lasagna on the part that was under the warm water. Describe what happens.
- Now, using the same amount of pressure as you did in number 11, try to bend the part that was not in the water. What happens?



13. Keep applying pressure to the cool, dry lasagna. What eventually happens?
14. How do you think this models what's happening with the subducting Juan de Fuca plate?
Tie in the idea of the 'locked' zone and the 'slip' zone.

15. After watching the animation, draw in what the time series plots look like for the 3 areas:

- Locked
- Slow slip
- No slip



Predicting the Future!

Why Episodic Tremor and Slip Matters

16. Draw a sketch of what the time series plots looked like for Stations located at C and D on the map. This is just one campaign of one slow-slip event. Don't worry about where to start the line - you can start it either below the 0 line or right on it.

