Seismic Modeling

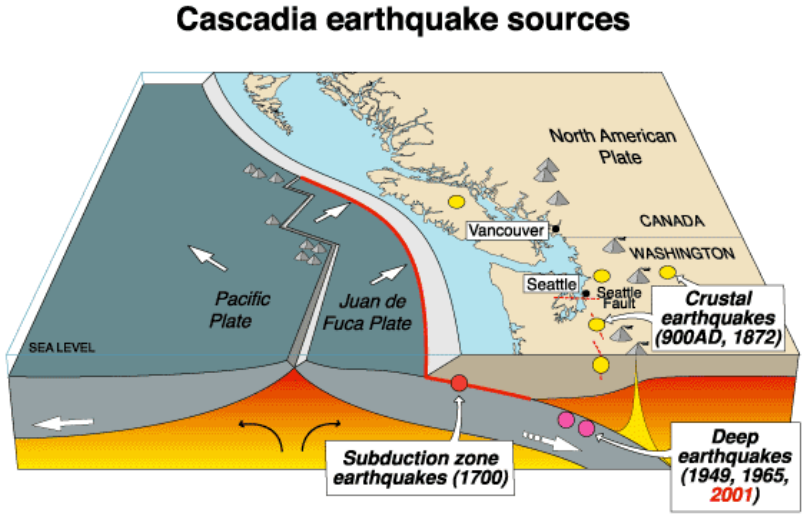
Chris Vogl

Applied Mathematics Department

UNIVERSITY of WASHINGTON

Motivation: Earthquake Generated Tsunamis

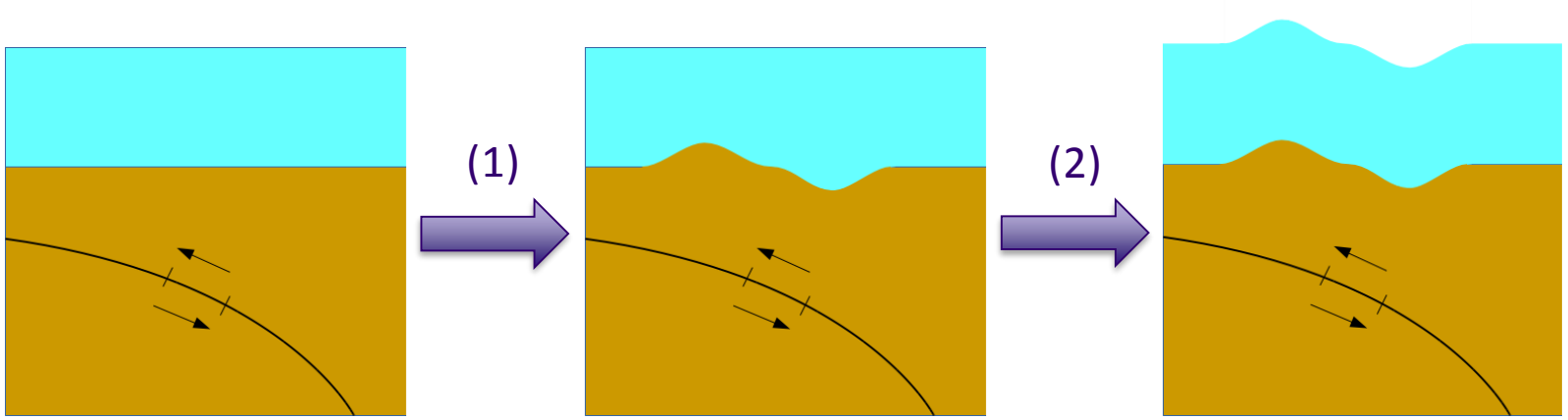
- Land mass is added to the Juan de Fuca plate at the ridge
- This pushes the Juan de Fuca plate under the North American plate.
- The locking and unlocking of these plates generate various types of earthquakes
- Subduction zone quakes occur under the ocean floor and generate tsunamis



Source	Affected area	Max. Size	Recurrence
Subduction Zone	W.WA, OR, CA	M 9	500-600 yr
Deep Juan de Fuca plate	W.WA, OR,	M 7+	30-50 yr
Crustal faults	WA, OR, CA	M 7+	Hundreds of yr?

Image from Wikipedia

Modeling the Sea Surface Deformation



- Geoclaw accomplishes (1) using the Okada solution, which assumes homogeneous half-space
  - What about variable density ground layers?
  - What happen when bathymetry is incorporated?
  - Do time dependent effects matter?

- Geoclaw accomplishes (2) assuming instantaneous motion of water column
  - Do time dependent effects matter?

Current Work and Needs

- SeisClaw? SiesmoClaw? RumbleClaw?
  - Currently have 2D examples to look at seafloor deformation and sea surface deformation
  - Almost completed 3D example to look at seafloor deformation
- Current Needs
  - Coupling output to Geoclaw's initial condition
  - 3D visualization work to view results