Overview of California Coastal Processes and Tsunami Inundation

California Seismic Safety Commission

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California Coastal Processes
Tsunami Origins

- Earthquakes
- Volcanoes
- Landslides
- Meteors

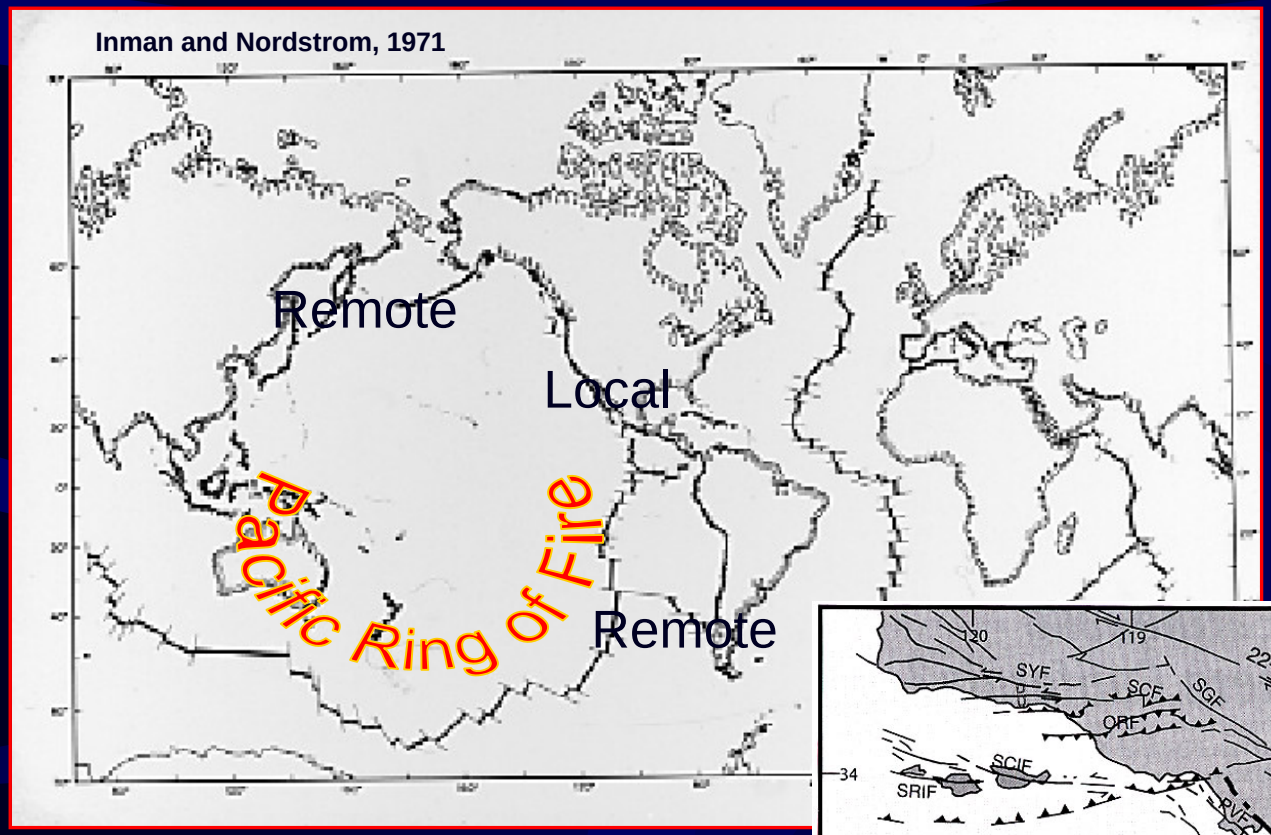
… and Sources

- Remote versus Local

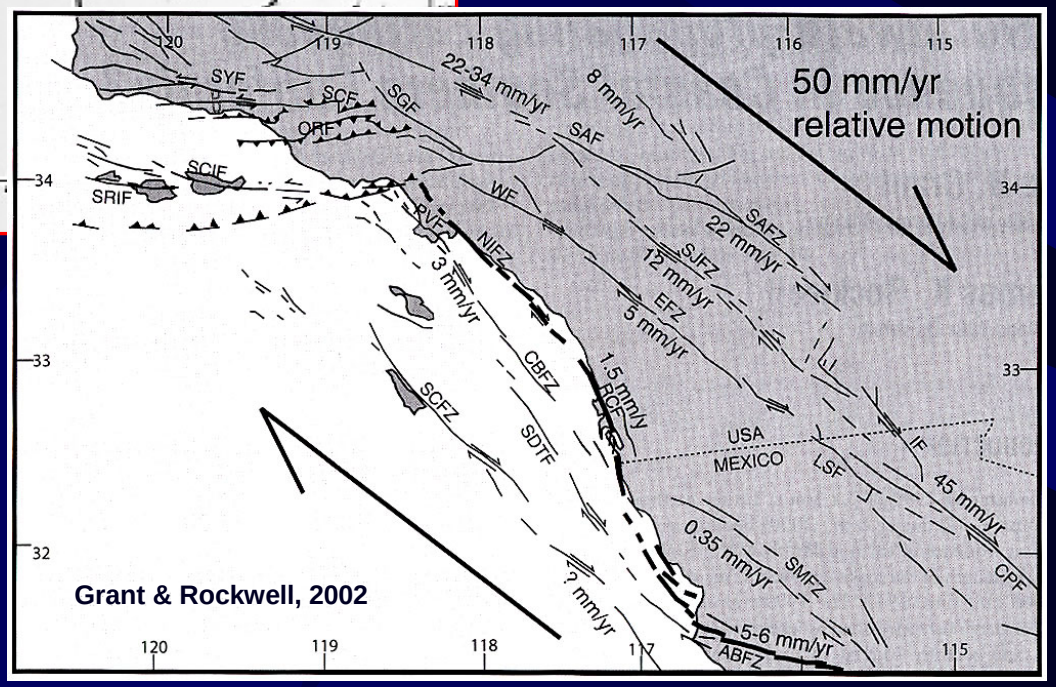
California Coastal Processes and Tsunami Inundation

- Tectonics and Geological Setting
- Tides and Sea Level
- Waves
- Climate
- Sand Budgets
- Human Intervention

Tectonic Classification of Coasts

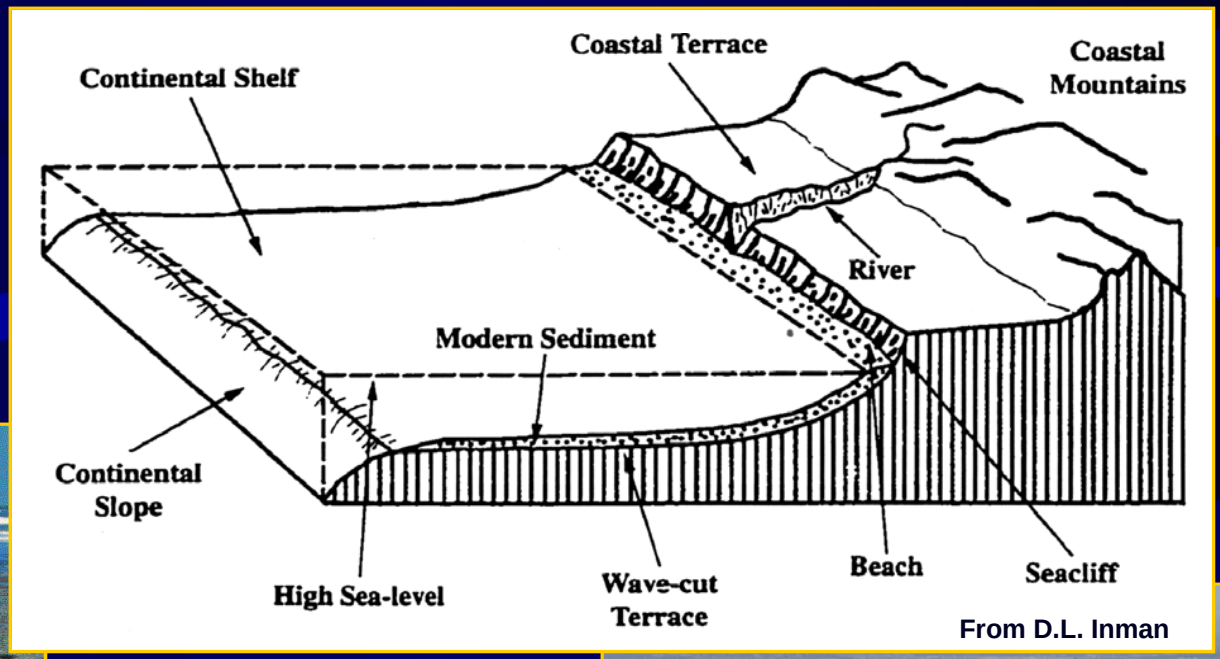


Faults produce beauty and hazard



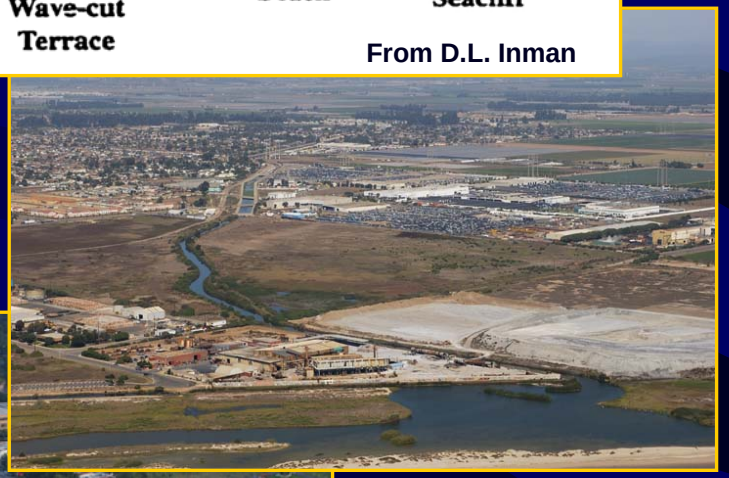
Geological Setting

- Tectonic uplift
- Sea level rise



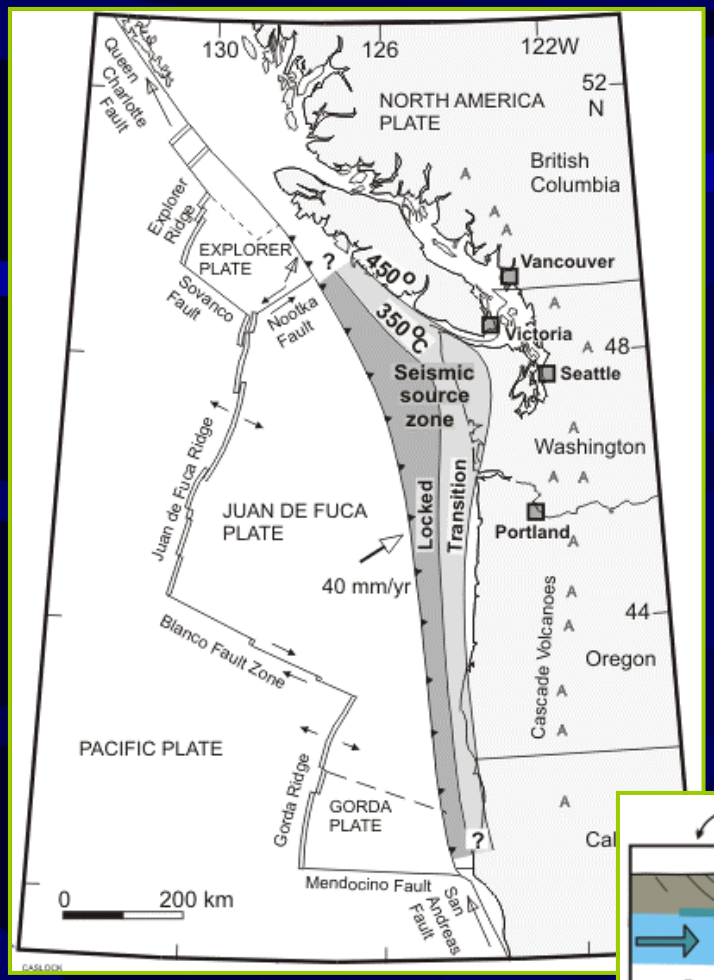
From D.L. Inman


TerraCosta Consulting Group

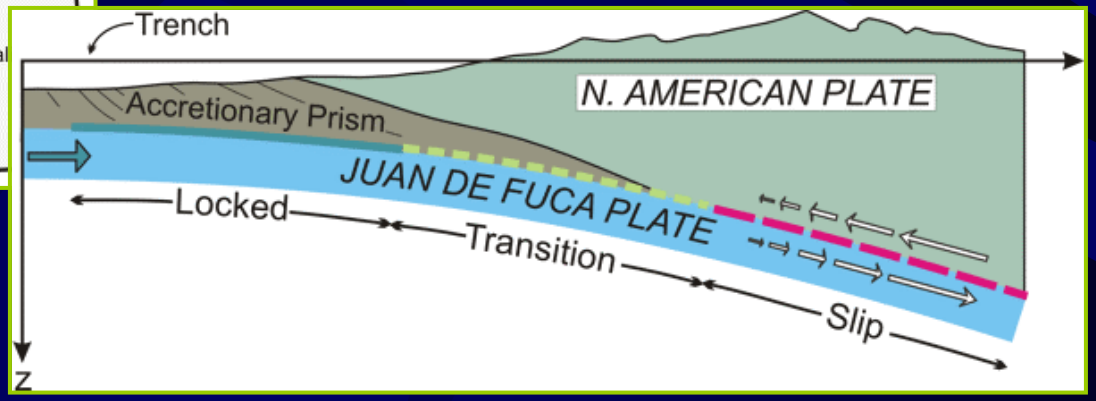



California Coastal Records Project (x3)

Cascadia Subduction Zone



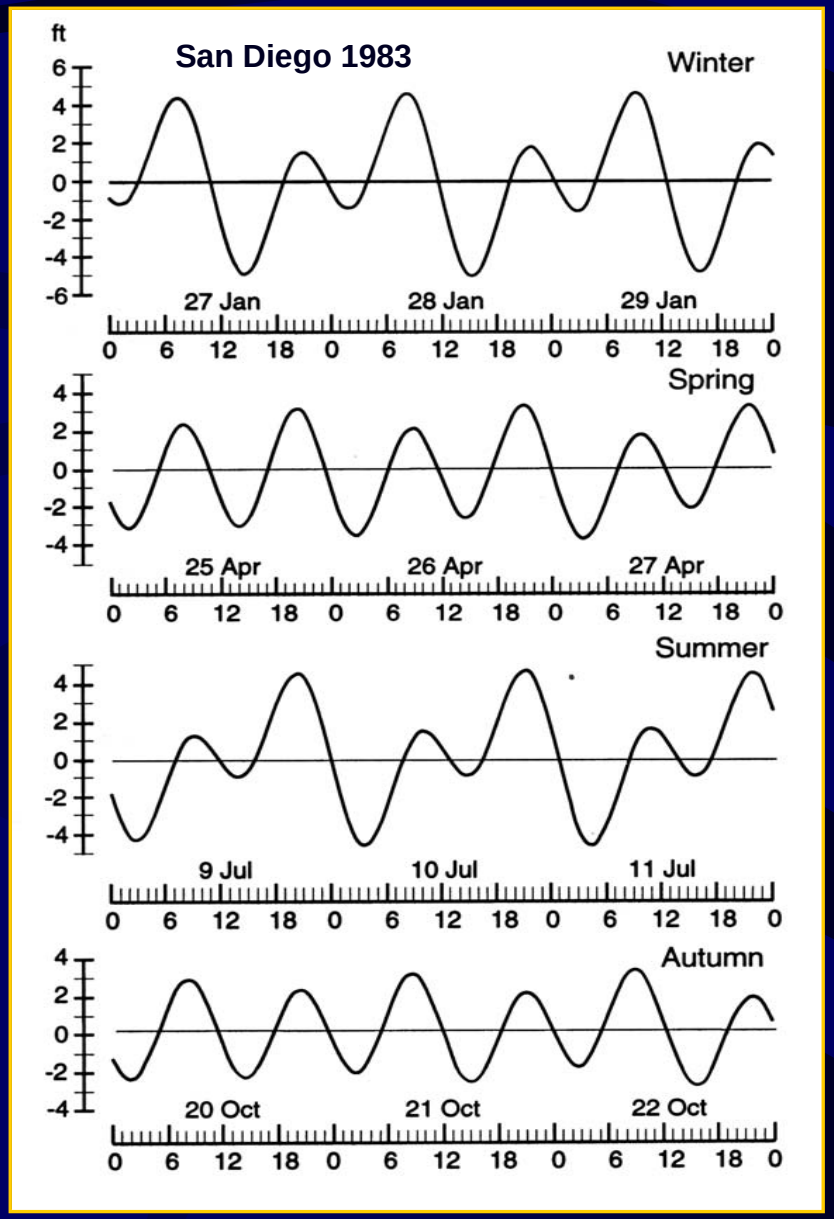
- One historic earthquake since 1700 (1992)
- Large pre-historic earthquakes



Mixed Tides are Important in California

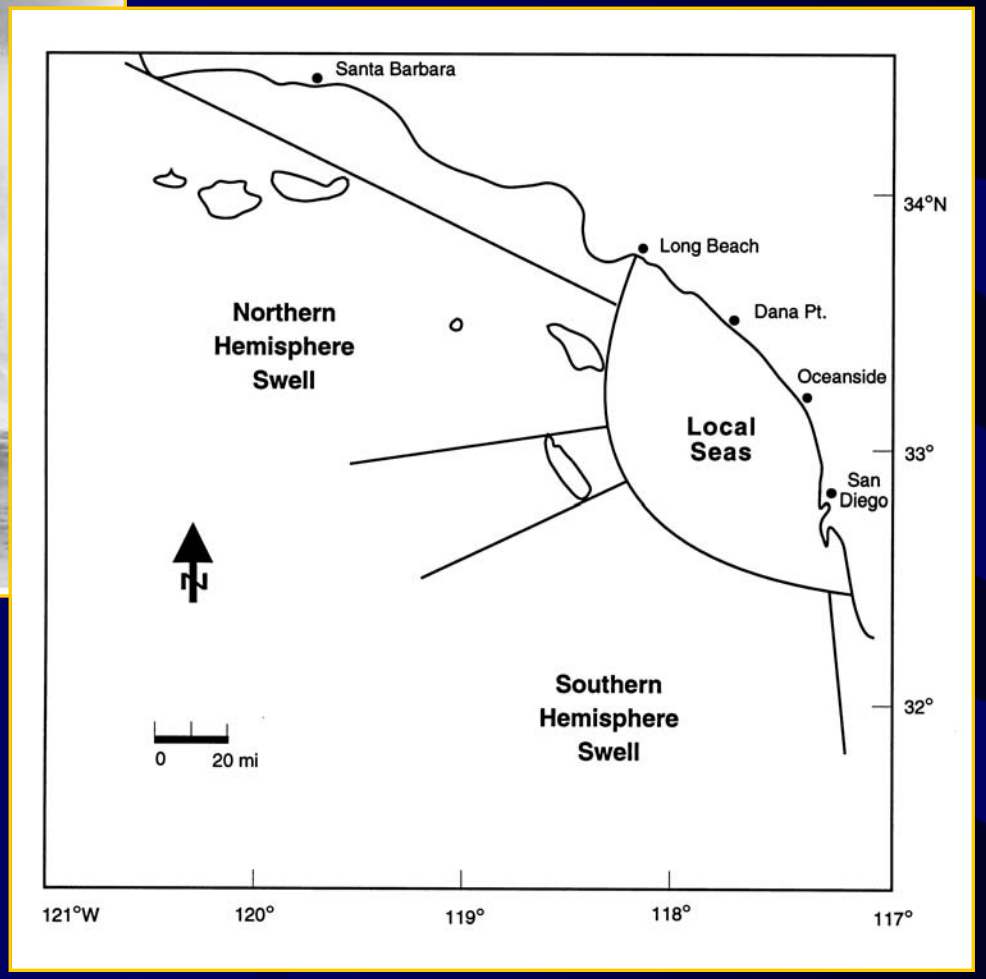
- Mean Range 3.5 - 6 ft (S - N)
- Extreme Range 9 - 12 ft
- Extreme Tides

  Winter AM, Summer PM



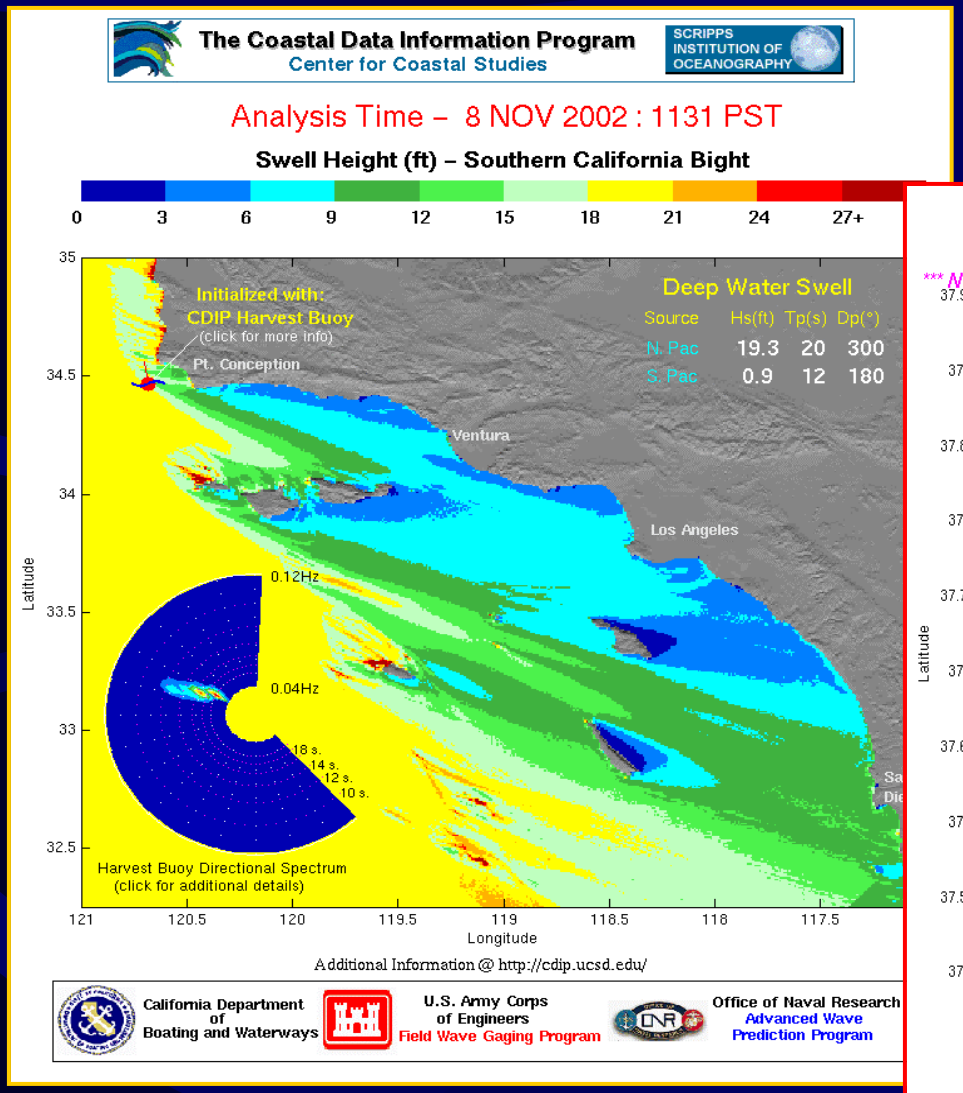
Wind Waves are Biggest Source of Coastal Energy

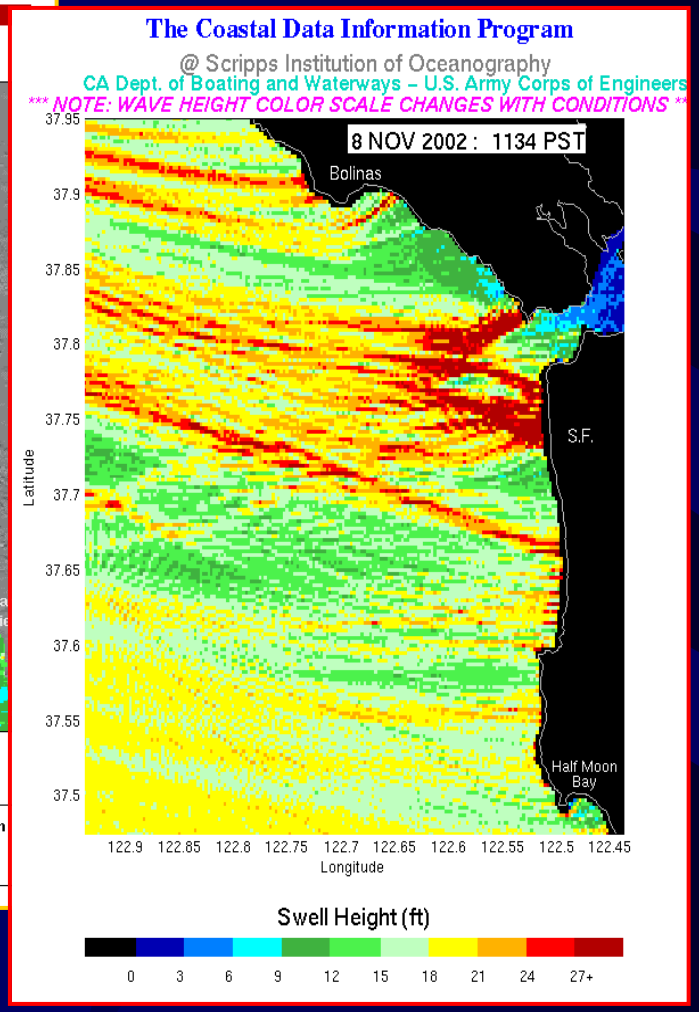
- Flooding
- Sand Motion
- Surfing



Wind Wave Modeling

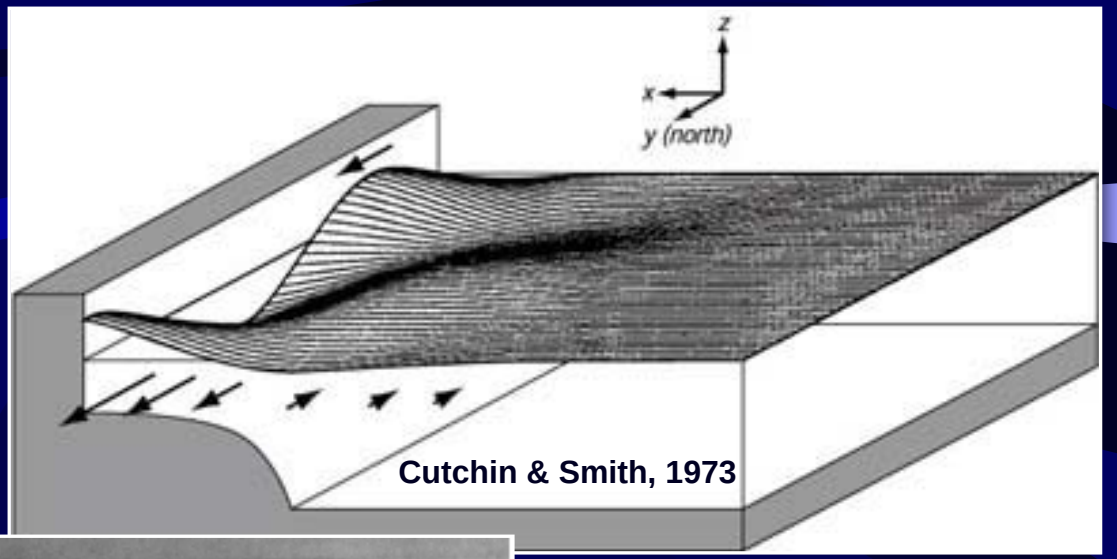
- Refraction - Bathymetry
- Sheltering





Edge Waves

- Trapped nearshore by refraction
- Travel alongshore
- Common at all scales
- Gonzalez, et al., Mendocino 1992



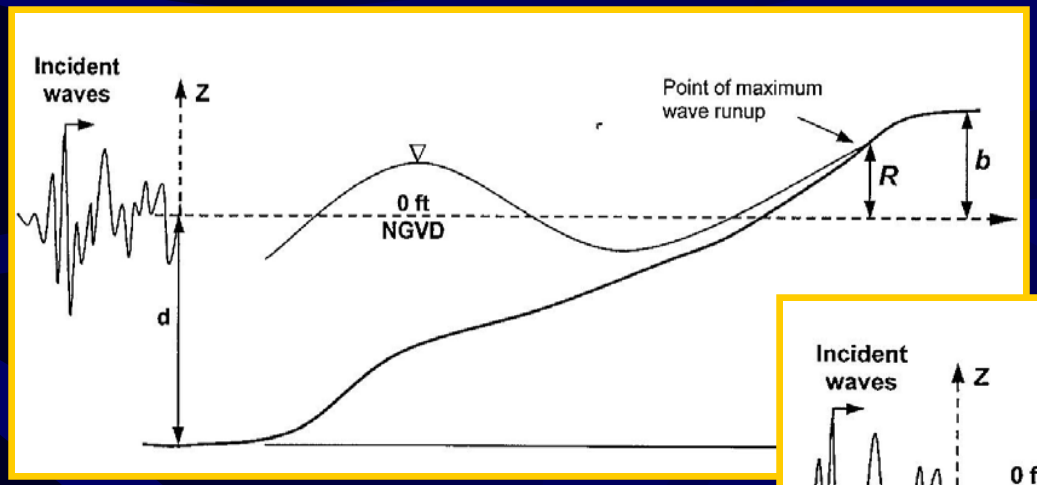
Cutchin & Smith, 1973

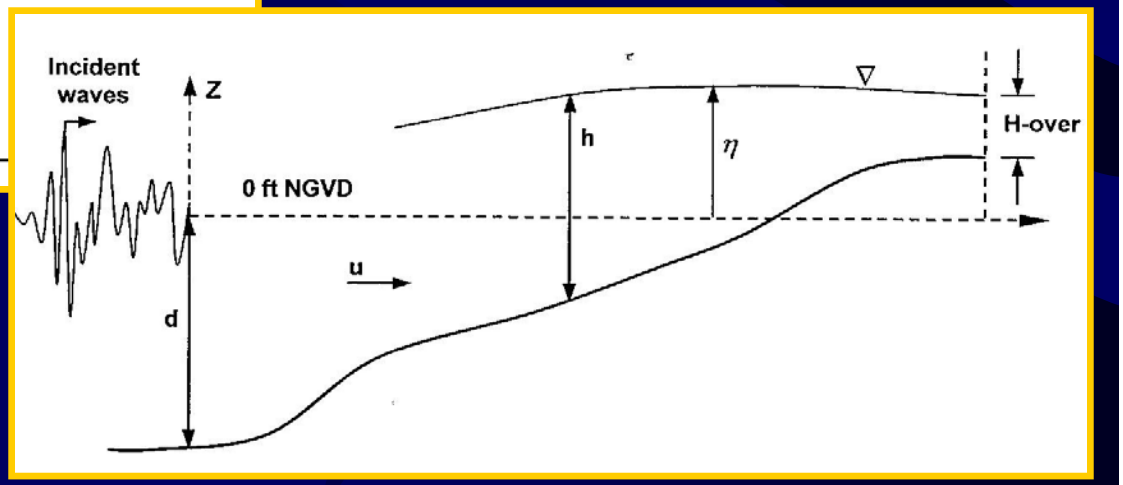
Wave and Tsunami Runup

- Empirical formulas
- Lab tests (COE – SPM)
- Non-linear shallow water waves

  Analytical approaches (Carrier & Greenspan)

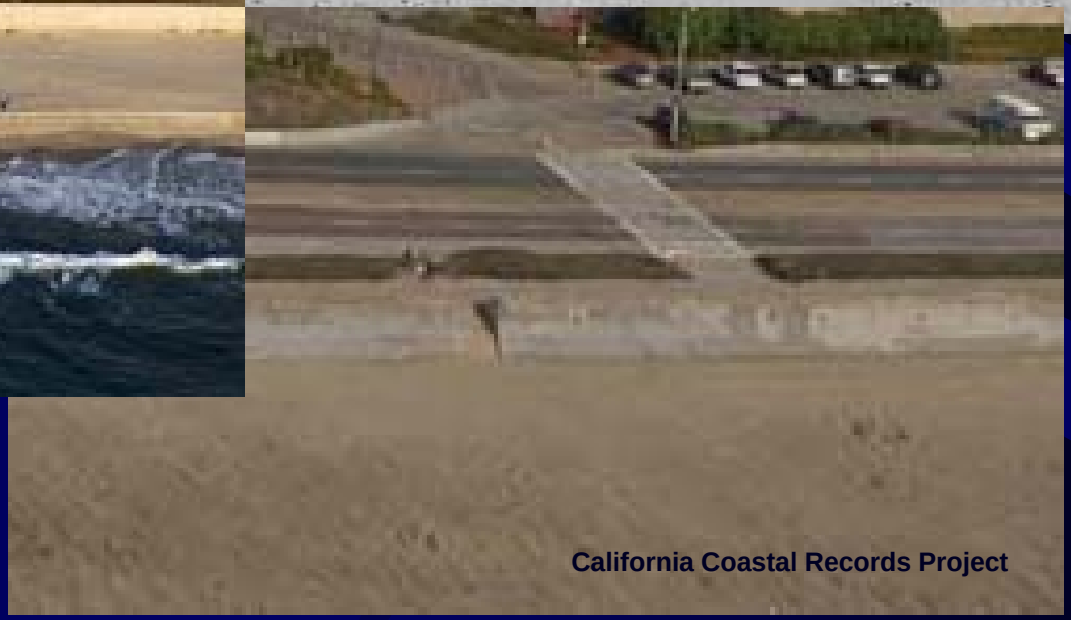
  Synolakis, Kobayashi numerical methods





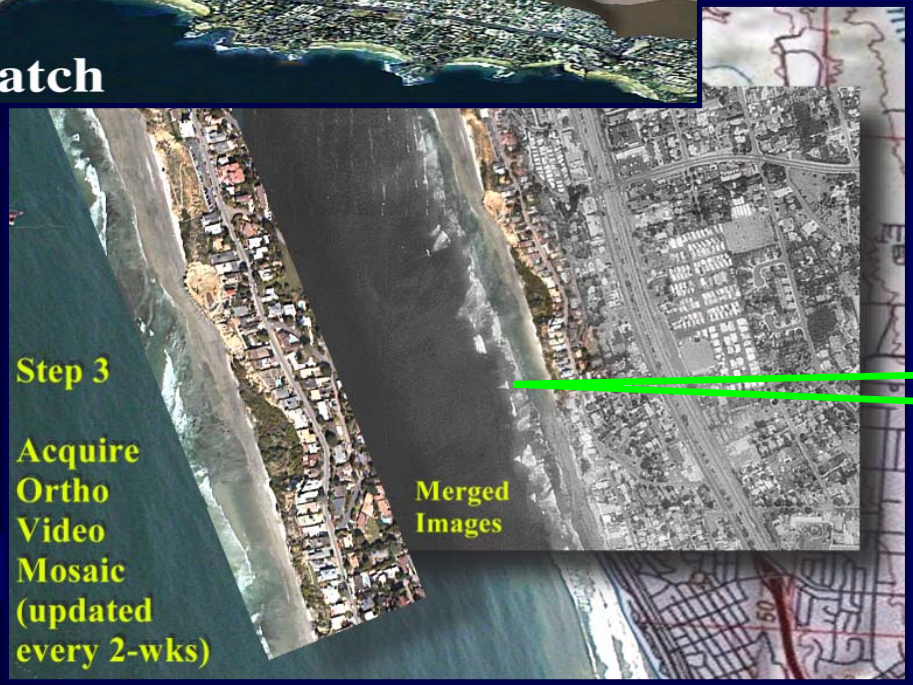
Seawalls

Offer protection under some circumstances



Low-Cost Rapid Assessment or Rescue

- Real-time ground link
- Damage location surveys
- Offshore rescue



Summary and Looking to the Future…

- Processes causing local tsunami hazard also mitigate
- Coastal study has advanced understanding
- Technology and communication ready to apply