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

Inman and Nordstrom, 1971

Remote

Local

Pacific Ring of Fire

Faults produce beauty and hazard

Grant & Rockwell, 2002

50 mm/yr relative motion

Faults produce beauty and hazard
Geological Setting

- Tectonic uplift
- Sea level rise

From D.L. Inman

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 the 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

![Diagram of wave and tsunami runup](image)
Seawalls

Offer protection under some circumstances

California Coastal Records Project

California Coastal Records Project
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