

COASTAL PROCESSES (29)

I Main Topics

A Recognition, characterization, risk evaluation, risk assessment

B Selected erosion rates

C Tsunamis in the northeastern Pacific Ocean

II Recognition, characterization, risk evaluation, risk assessment

<http://www.fema.gov/nwz00/erosion.htm> (FEMA study, June 27, 2000)

<http://www.csc.noaa.gov/crs/ALACE/techcd/htm/severity.htm>

A ~ 25% of homes and other structures within 500 feet of the U.S. coastline and the shorelines of the Great Lakes will fall victim to the effects of erosion within the next 60 years

B Average costs to U.S. homeowners: \$500,000,000⁺/yr

C The Atlantic and Gulf coasts account for 45 percent of the U.S. coastline and 63 percent of the structures within 500 feet of the shoreline. The nation's highest average erosion rates - 6 feet⁺/yr - occur along the Gulf coast.

D The average erosion rate on the Atlantic coast is ~2-3⁺/yr. However, actual erosion rates can vary widely from one location to another and from one year to another. A hurricane or other major storm can cause the coast to erode 100 feet or more in a single day.

E Development in several high-risk coastal areas studied has increased by more than 60% over the last 20 years.

F Property owners within the first few hundred feet of the nation's coasts face as large a risk of damage from erosion as they do from flooding.

G Only about half of homeowners in high erosion areas on the Atlantic and Gulf coasts currently hold flood insurance policies.

H To fully reflect erosion risk, insurance rates in the highest hazard coastal areas would have to be double today's rates, on the average.

I ~ 10,000 structures exist on land expected to erode within 10 years.

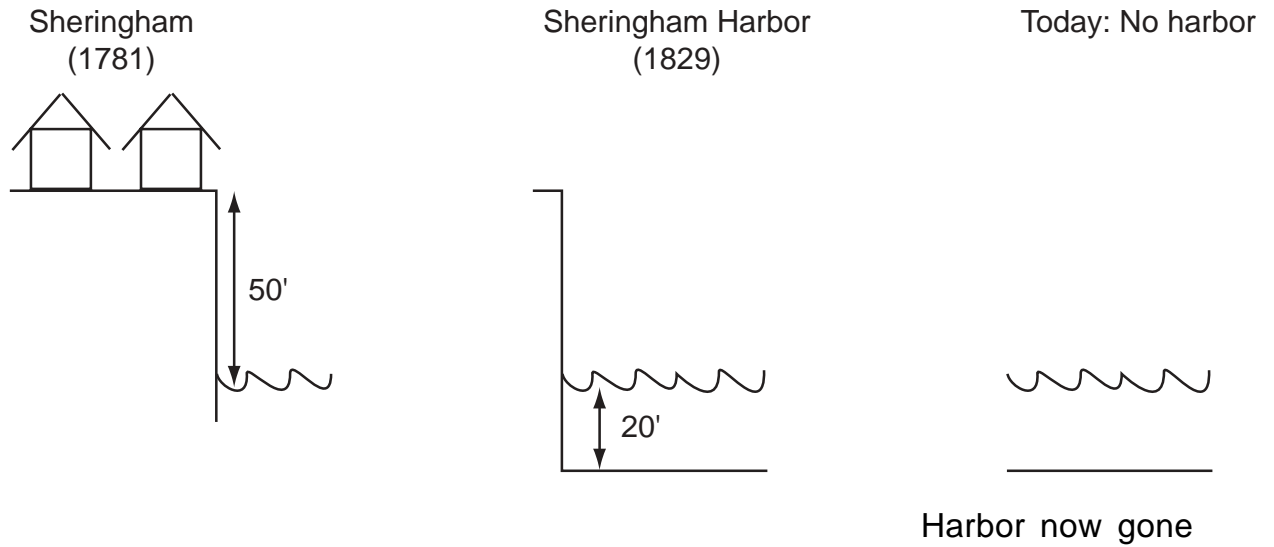
J ~ 87,000 structures within the estimated 60-year erosion zone.

III Selected erosion rates (recognition)

(From Bascom, 1980)

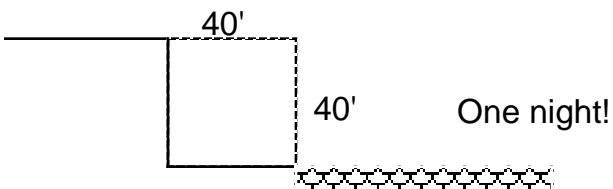
A England

1 Sheringham



2 Cromer: "Long-term" sea cliff retreat of 19'/yr (6m/yr)

3 Suffolk (1953) (A nearby lower cliff retreated 90')



B Southern California coast



<http://www.nationalgeographic.com/xpeditions/atlas/index.html>

- 1 Encinitas (From Bascom, 1980)
 - a 1883-1976: six city blocks lost, maximum retreat of 800'
 - b Retreat concentrated in storms of 1884, 1886, 1889, and 1891
 - c Choice of action: acceptance of hazard & change in assessed property value

- 2 Santa Barbara breakwater (1928)

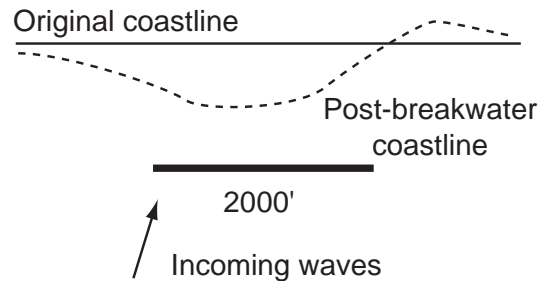
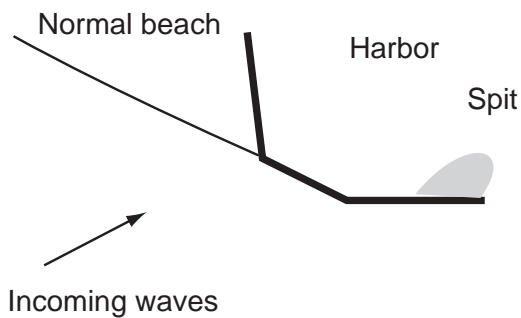
<http://ci.santa-barbara.ca.us/departments/waterfront/index2.html>

 - a Project completed in 1928 to form a harbor
 - b Sand accretion immediately upon completion
 - c Federal dredging authorized in 1935 at \$30,000 per year
 - d Federal dredging costs in 1992: ~\$800,000 per year

3 Santa Monica breakwater (1934)

http://www.smmirror.com/Volume1/issue41/city_plans_to.html

- Built in 1934 to protect boats along the Santa Monica Pier. Built from scrapped cars.
- Design intended to allow sand to pass by breakwater
- Results: deposition behind breakwater, erosion "downstream"
- Status: Allowed to deteriorate. Being considered for restoration to allow the long-unused harbor to be used again.



Deposition at the Santa Barbara breakwater
Modified from Costa & Baker, 1981)

Deposition at the Santa Monica breakwater
Modified from Costa & Baker, 1981)

4 Channel Islands Harbor harbor and breakwater, Oxnard (1963)

<http://www.spl.usace.army.mil/co/navigation/chnlisln/channel.html>

- Dredging from mid-1950's to 1963.
- Designed to lessen the effect of downshore beach erosion, provide dredged material for beach replenishment for downcoast beaches, and prevent sand loss to the submarine canyon off of Port Hueneme.
- Currently, authorized by Congress for dredging on a biennial basis; ~1.8 million cubic yards of material will be dredged biennially.



D Hawaii <http://www.soest.hawaii.edu/SEAGRANT/CEaBLiH.html>

~25% (17 miles) of Oahu's beaches have been lost or significantly narrowed over this century

V Historic large tsunamis that have affected Hawaii

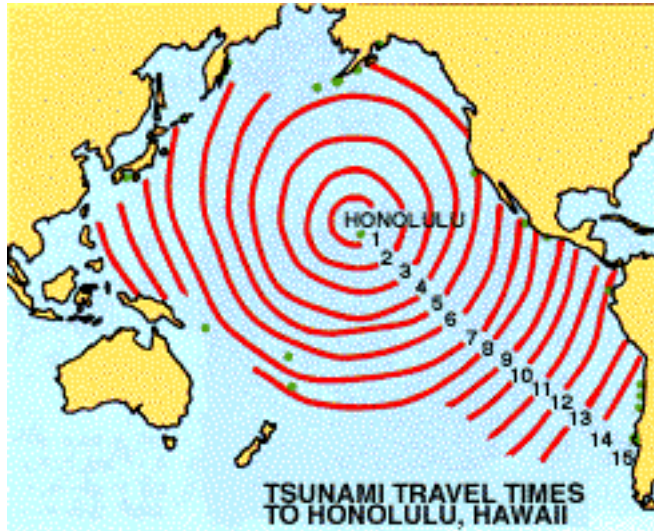
<http://www.tsunami.org/>

<http://www.soest.hawaii.edu/tsunami/>

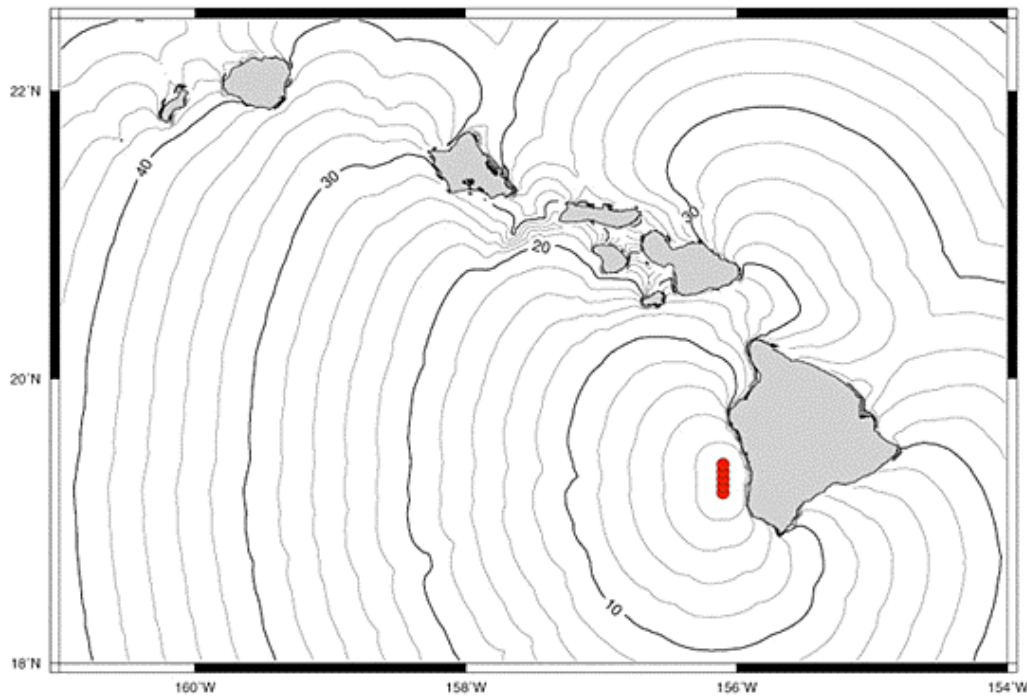
<http://www.usc.edu/dept/tsunamis/alaska/1946/webpages/>

A Distant sources: 1946, 1960. Great damage in Hilo

B Local sources: 1868, 1975. 14+m run ups near Halape



<http://pubs.usgs.gov/gip/hazards/tsunamis.html>



<http://www.soest.hawaii.edu/tsunami/>