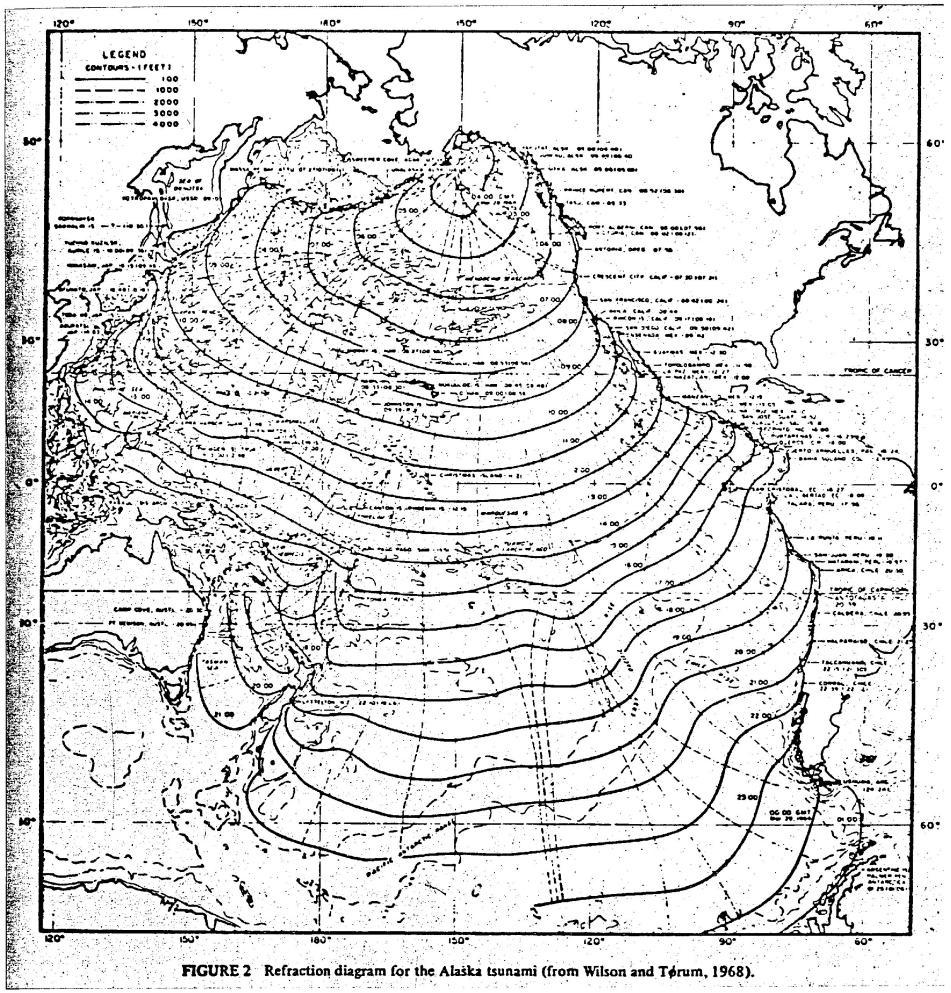



**FIGURE 2** Refraction diagram for the Alaska tsunami (from Wilson and Tørum, 1968).

4/18

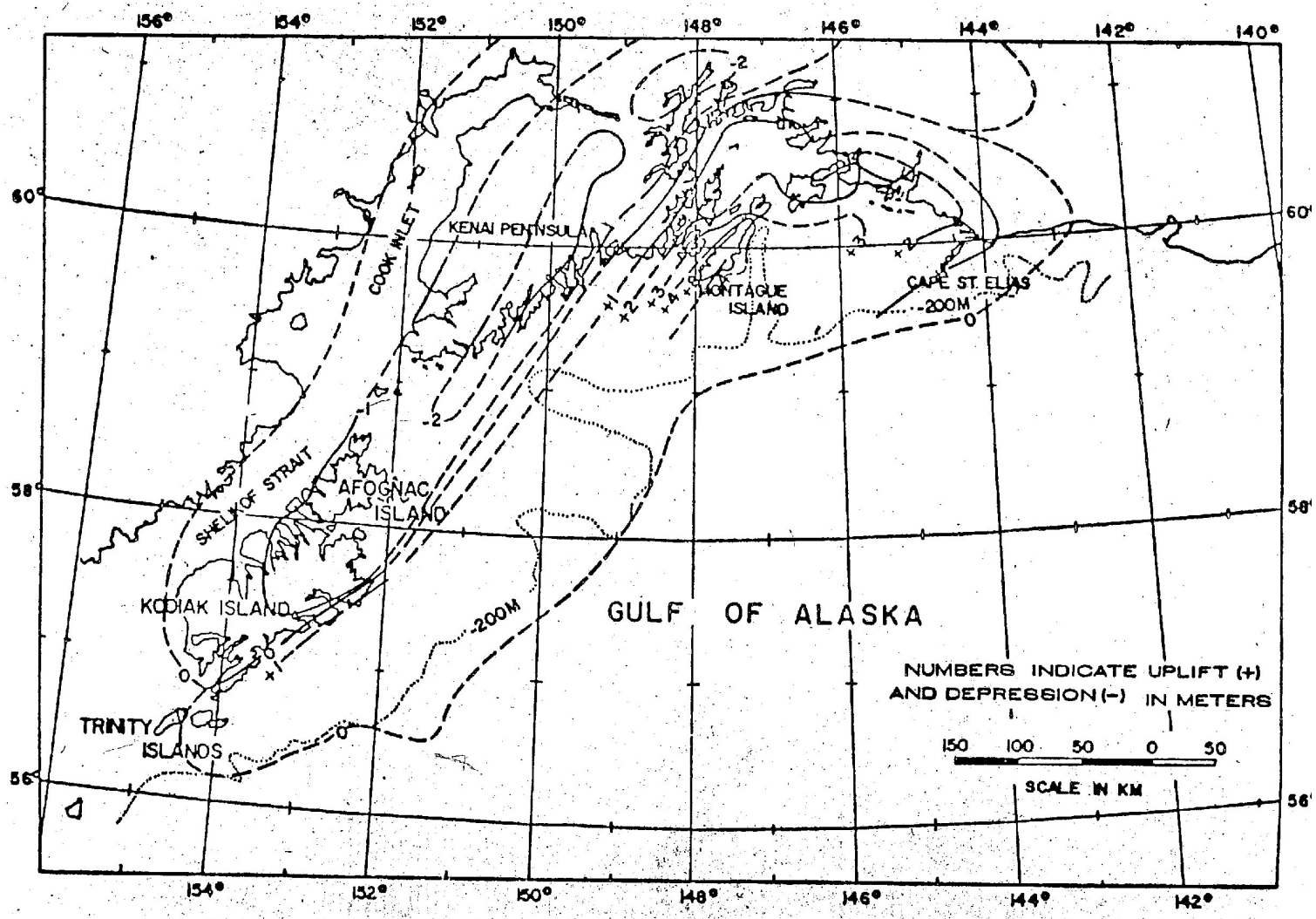
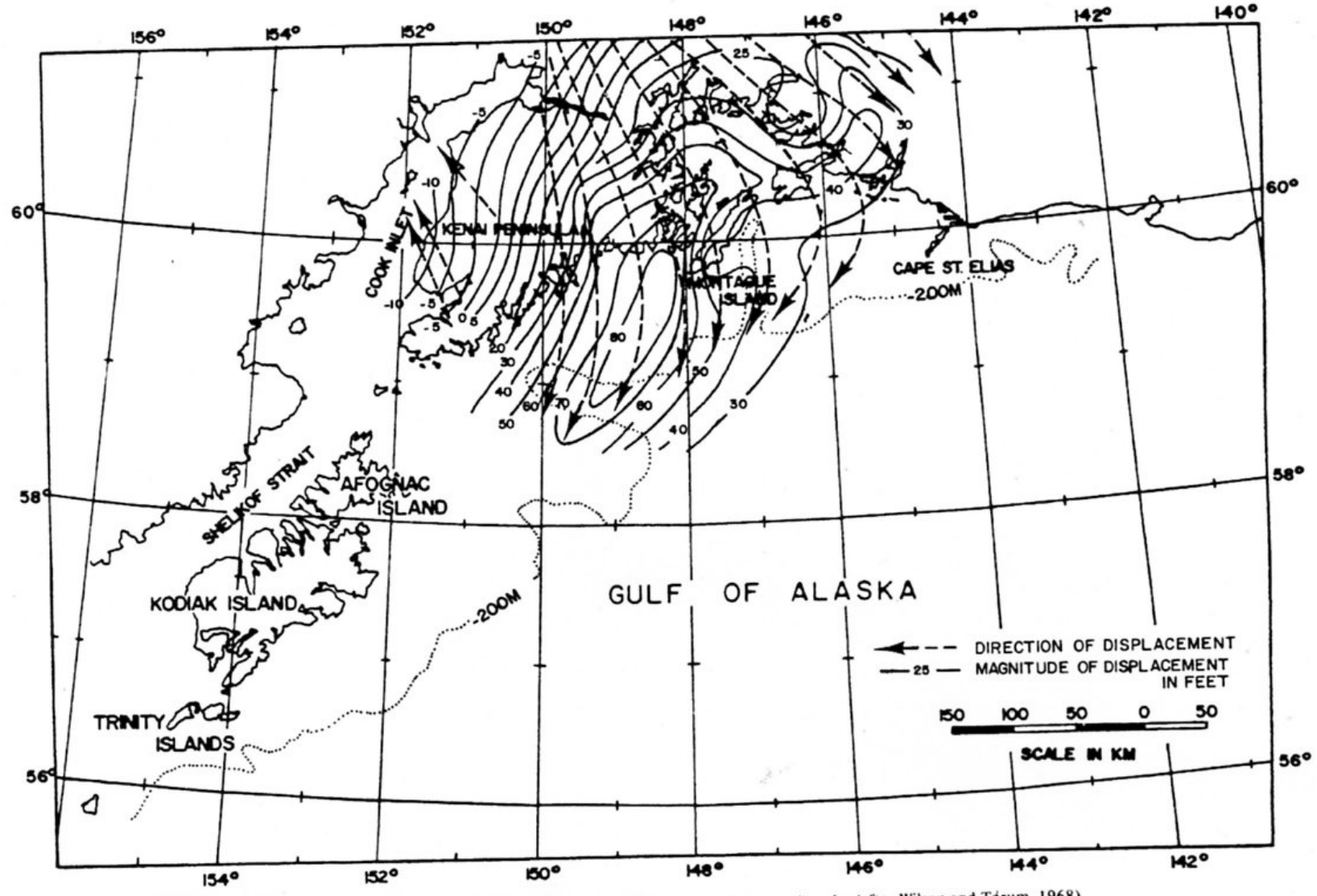
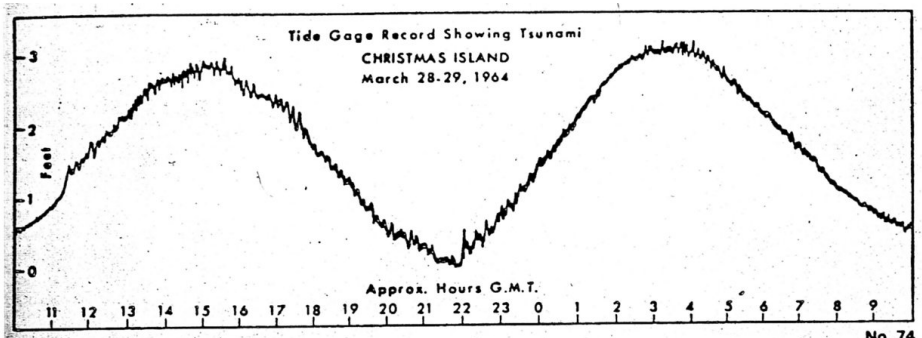


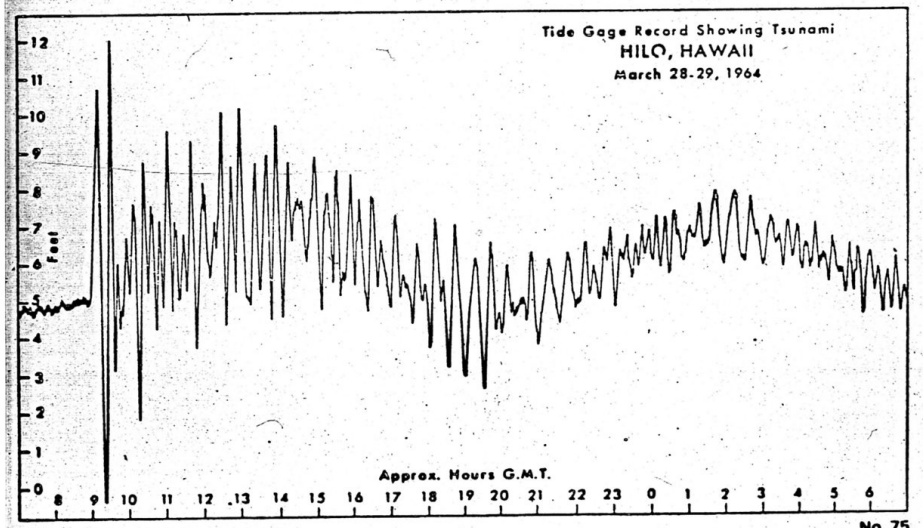

FIGURE 5 Vertical crustal displacement associated with the Alaska earthquake (after Plafker, 1965).




...crustal displacements associated with the Alaska earthquake (after Wilson and Tørum, 1968).




No. 74




No. 75

4/19

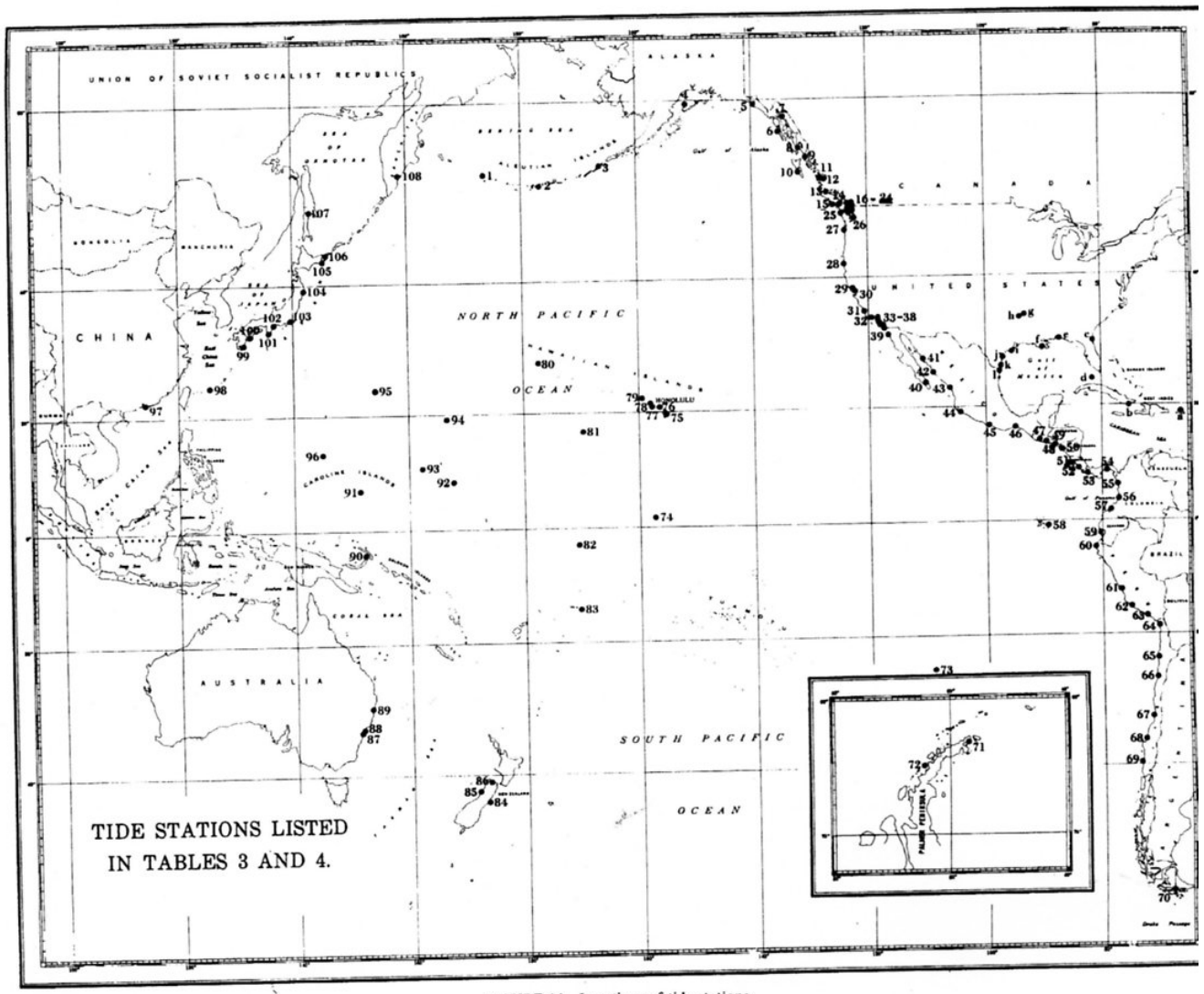
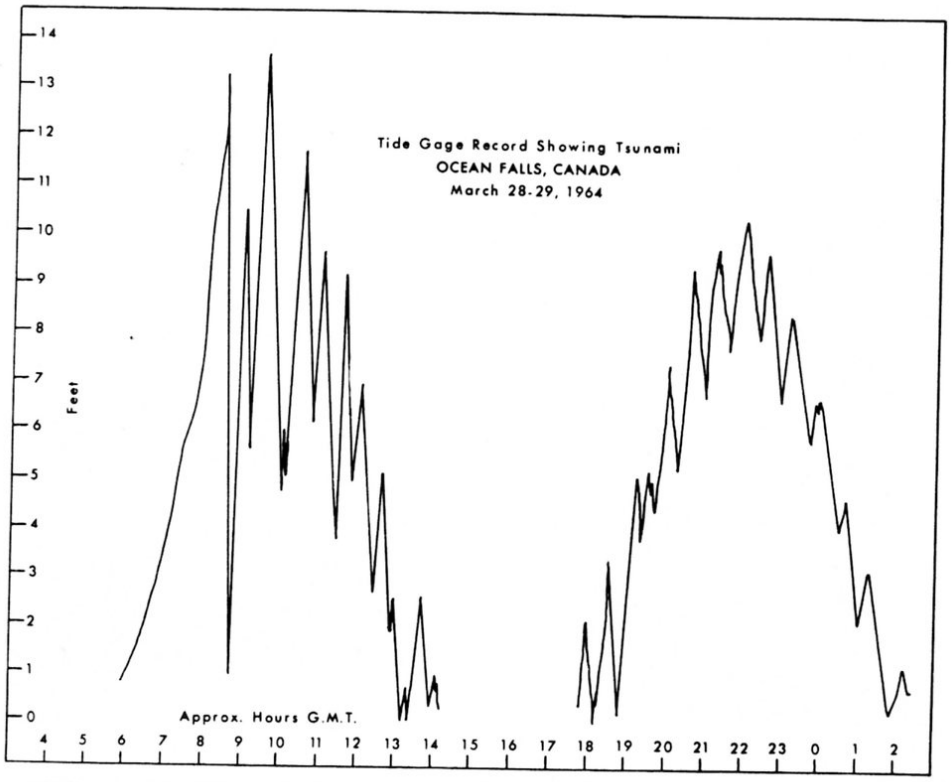
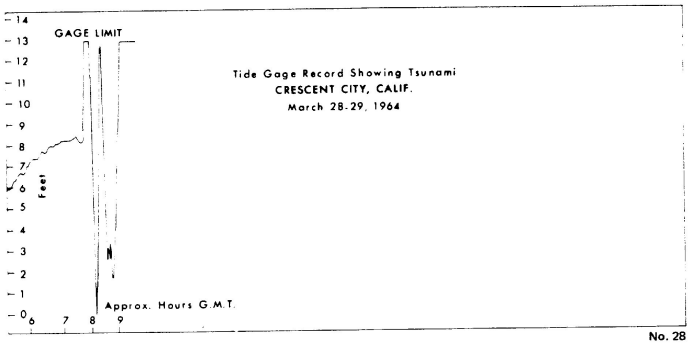


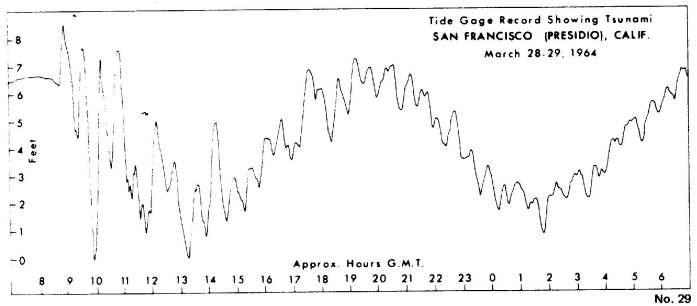

FIGURE 11 Locations of tide stations.


Tide Gage Record Showing Tsunami
OCEAN FALLS, CANADA
March 28-29, 1964
Feet
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Approx. Hours G.M.T.
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0 1 2

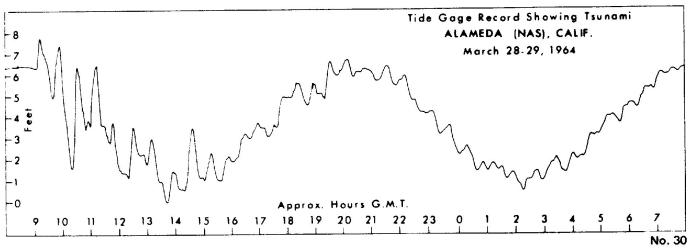
No. 12




No. 28




No. 29

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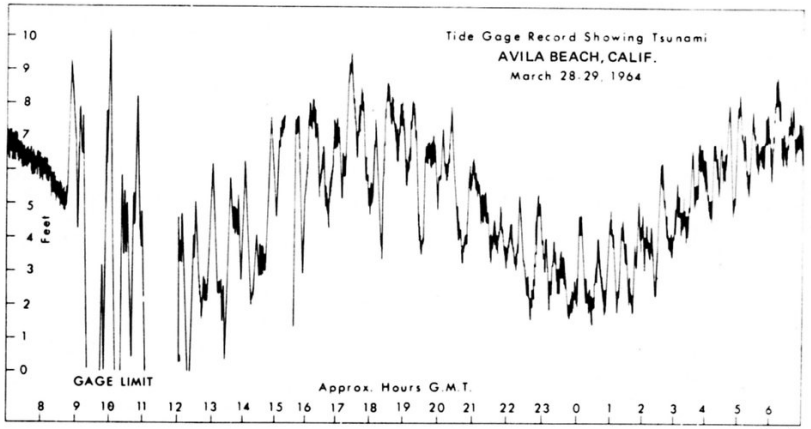
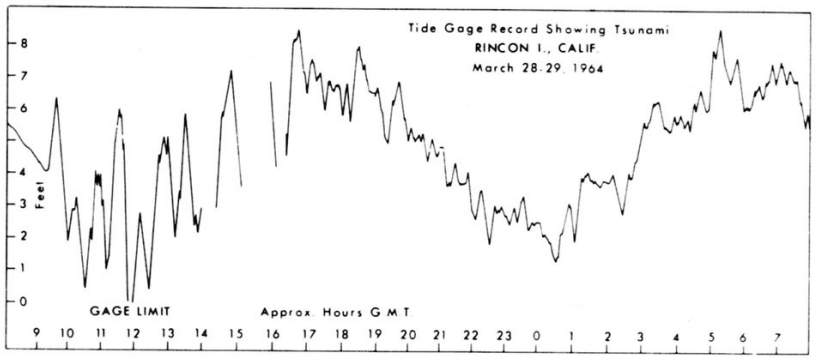
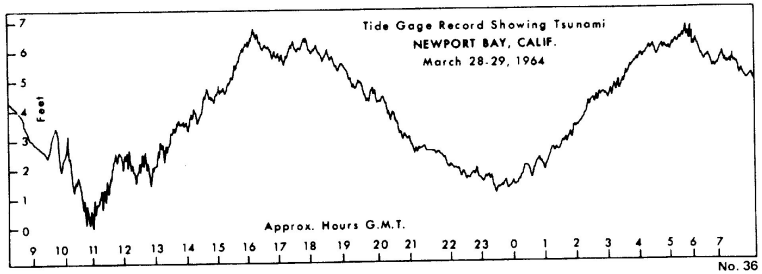

Tide Gage Record Showing Tsunami
AVILA BEACH, CALIF.
March 28-29, 1964
Feet
GAGE LIMIT
Approx. Hours G.M.T.

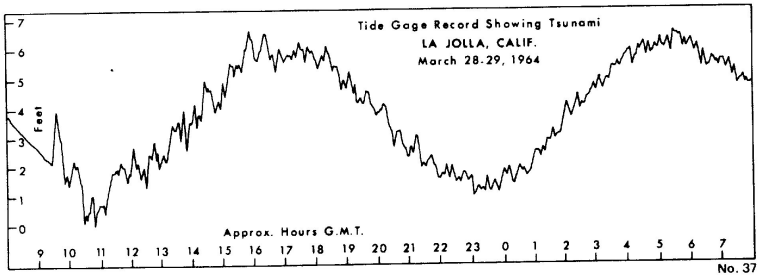
No. 31


Tide Gage Record Showing Tsunami
RINCON I., CALIF.
March 28-29, 1964
Feet
GAGE LIMIT
Approx. Hours G.M.T.

No. 32




No. 36

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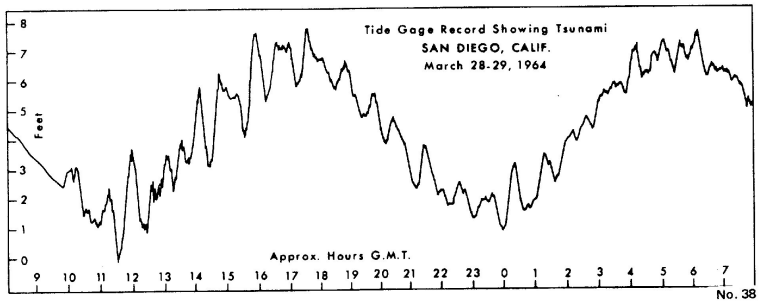
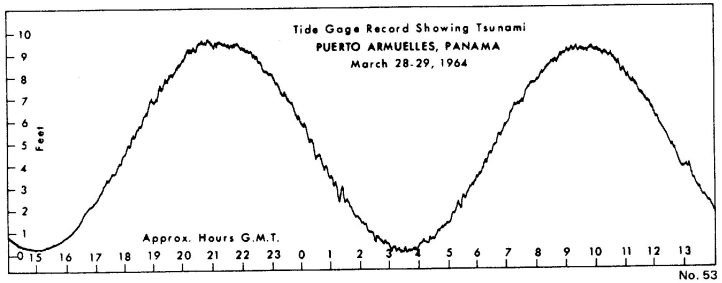
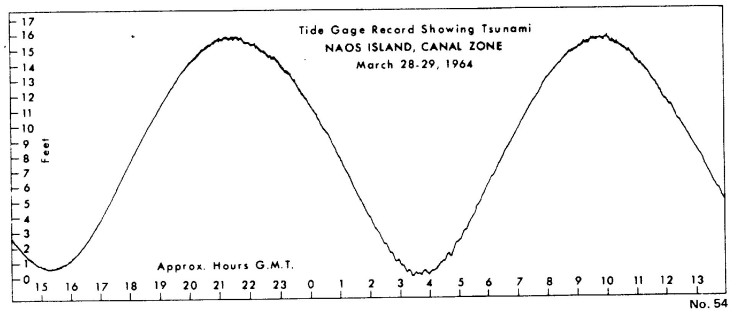
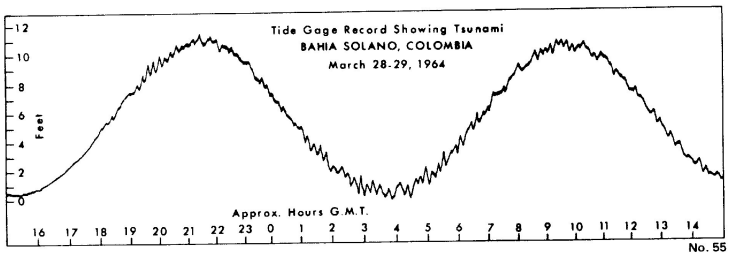
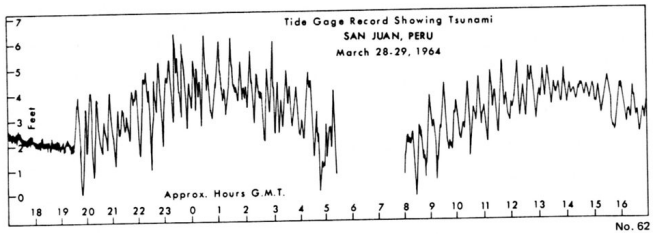



No. 38

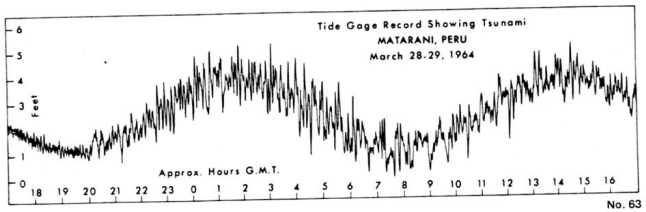

Tide Gage Record Showing Tsunami
PUERTO ARMUELLES, PANAMA
March 28-29, 1964
Feet
Approx. Hours G.M.T.
No. 53


Tide Gage Record Showing Tsunami
NAOS ISLAND, CANAL ZONE
March 28-29, 1964
Feet
Approx. Hours G.M.T.
No. 54

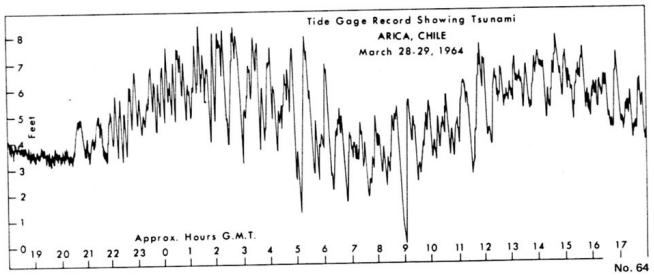

Tide Gage Record Showing Tsunami
BAHIA SOLANO, COLOMBIA
March 28-29, 1964
Feet
Approx. Hours G.M.T.
No. 55




No. 62




No. 63

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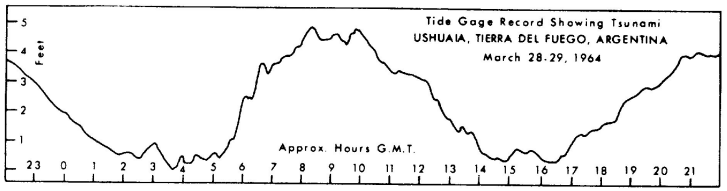
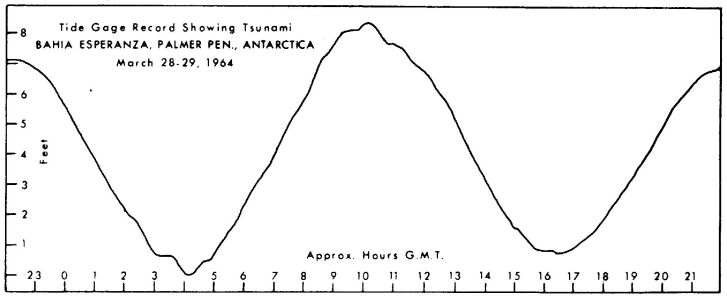
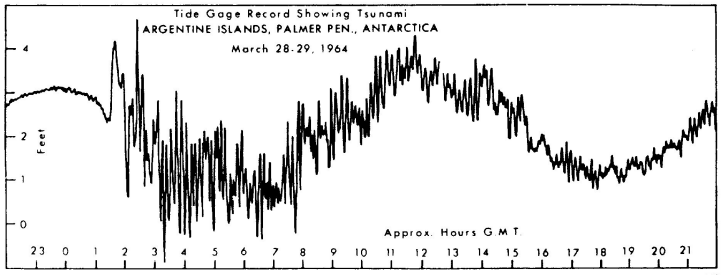


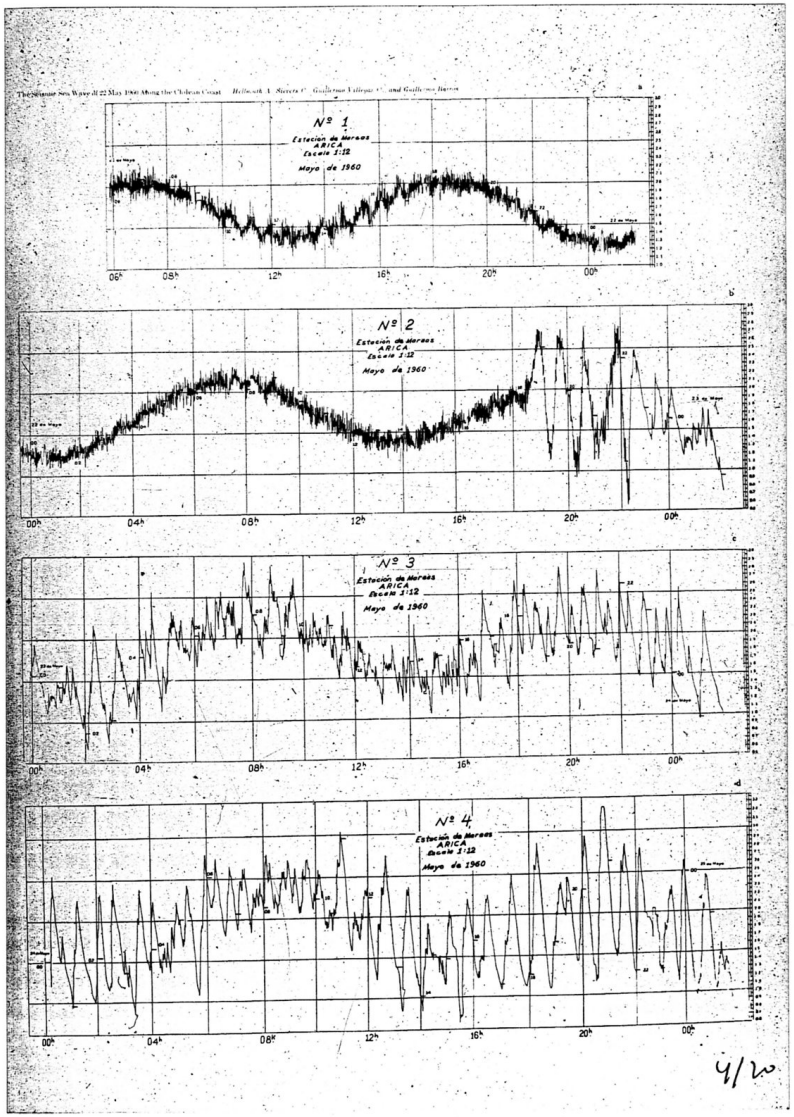

No. 70



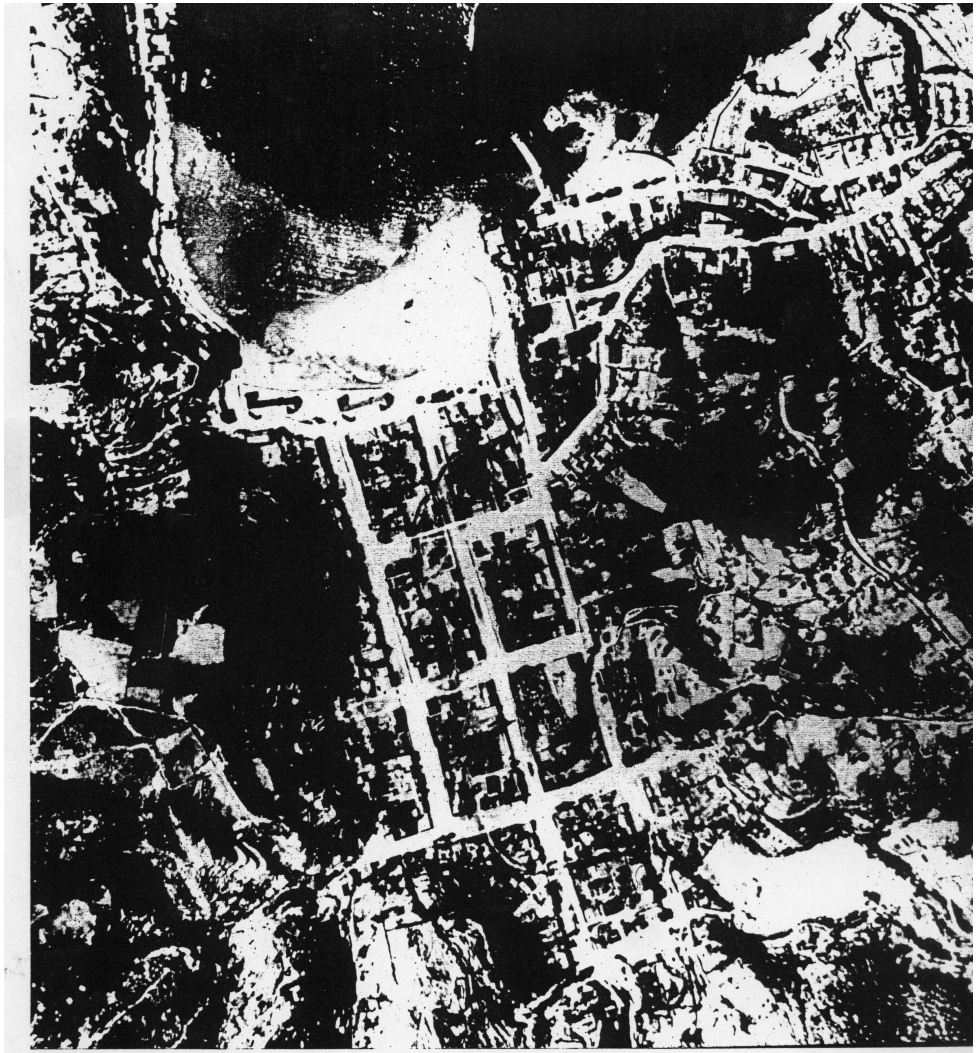

No. 71




No. 72


Nº 1
Estación de Mareas
ARICA
Escala 1:12
Mayo de 1960
06h
08h
12h
16h
20h
00h
Nº 2
Estación de Mareas
ARICA
Escala 1:12
Mayo de 1960
00h
04h
08h
12h
16h
20h
00h
Nº 3
Estación de Mareas
ARICA
Escala 1:12
Mayo de 1960
00h
04h
08h
12h
16h
20h
00h
Nº 4
Estación de Mareas
ARICA
Escala 1:12
Mayo de 1960
00h
04h
08h
12h
16h
20h
00h

4/20



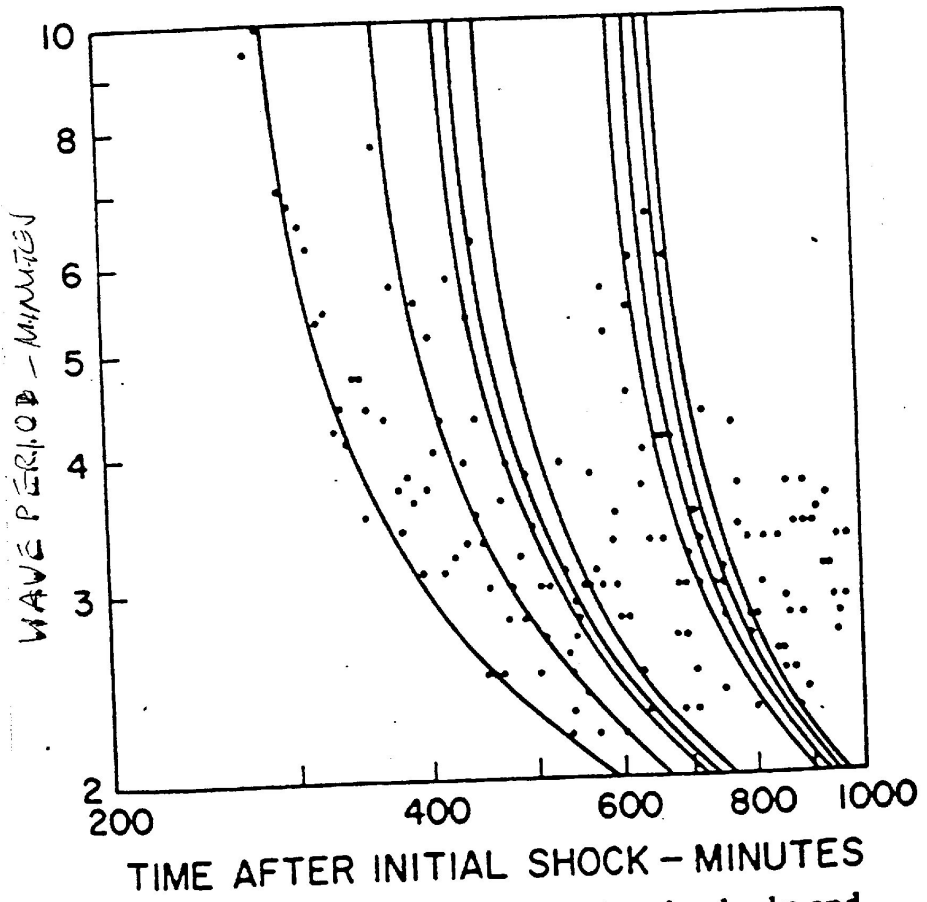
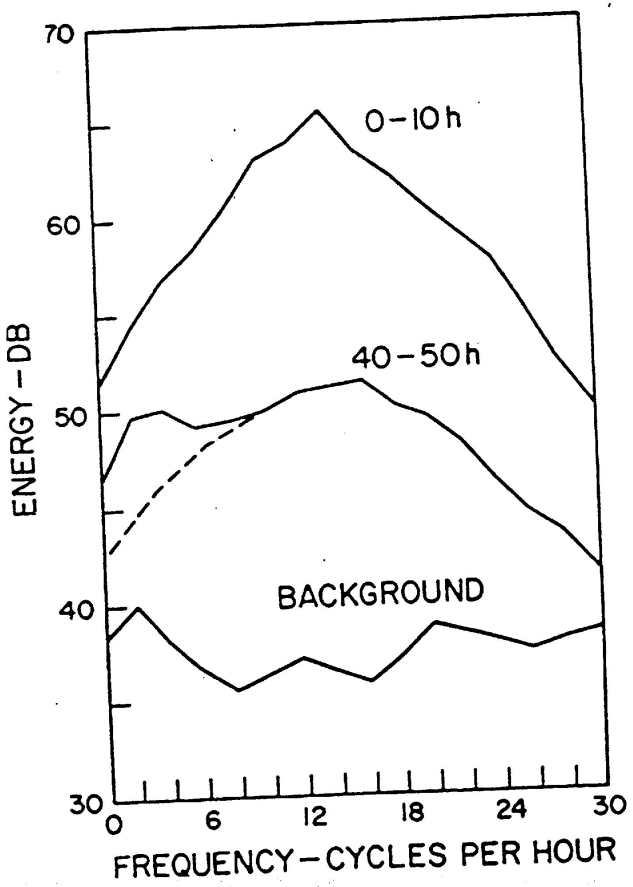



FIG. 8. Dispersion curves for early earthquake shocks and ave arrival times for the 9 March 1957 tsunami at Wake Island.


70
60
50
40
30
ENERGY – DB
0–10 h
40–50 h
BACKGROUND
0
6
12
18
24
30
FREQUENCY – CYCLES PER HOUR

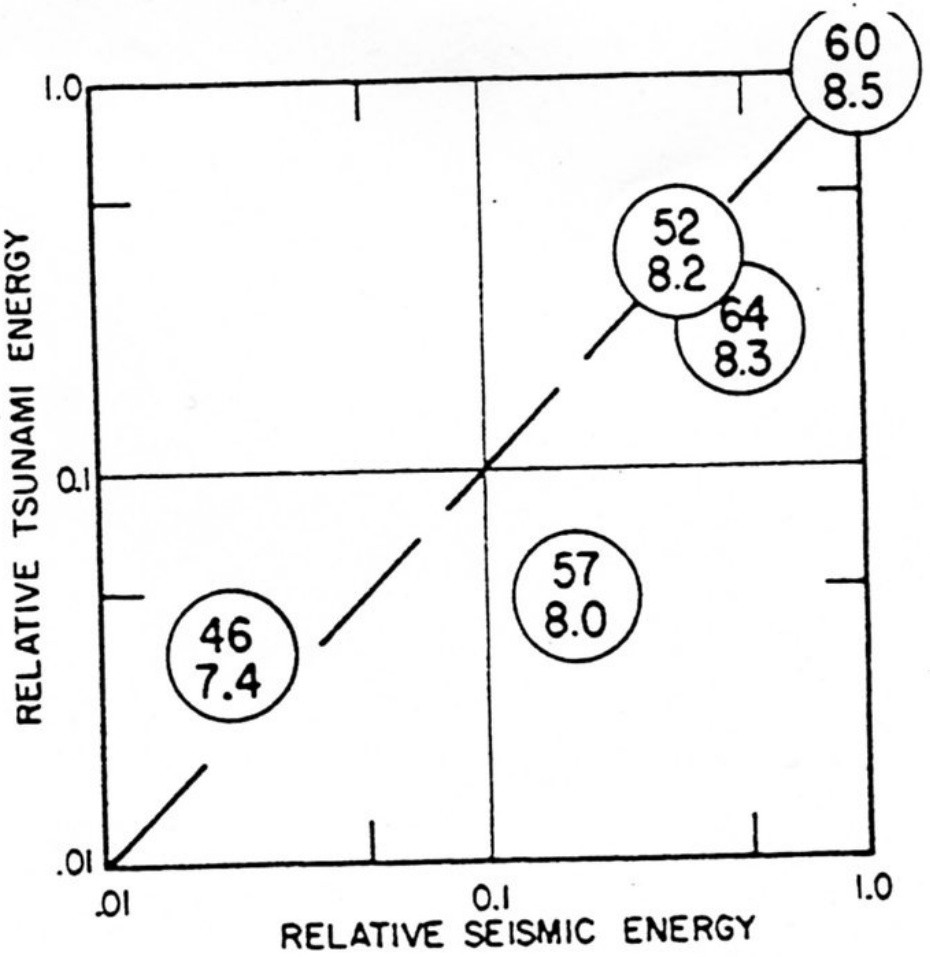



FIG. 4. Regression line for tsunami versus seismic energy.

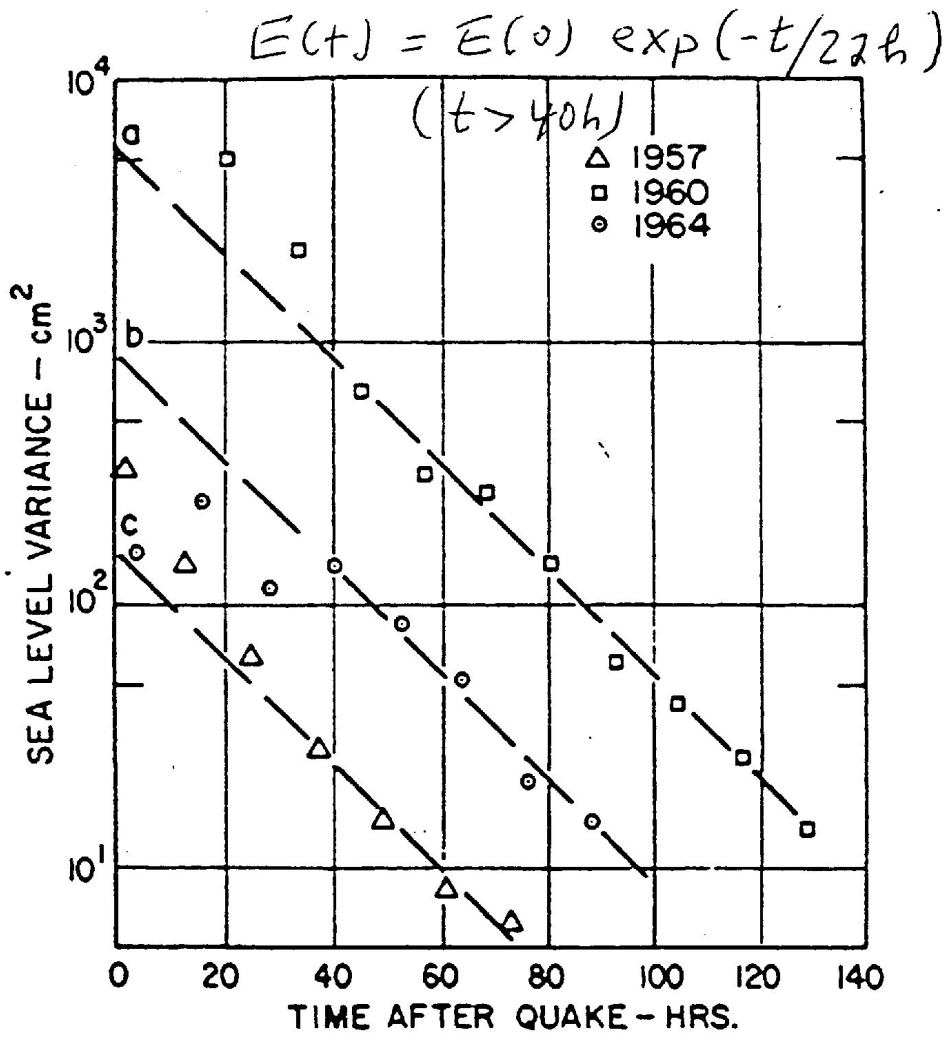
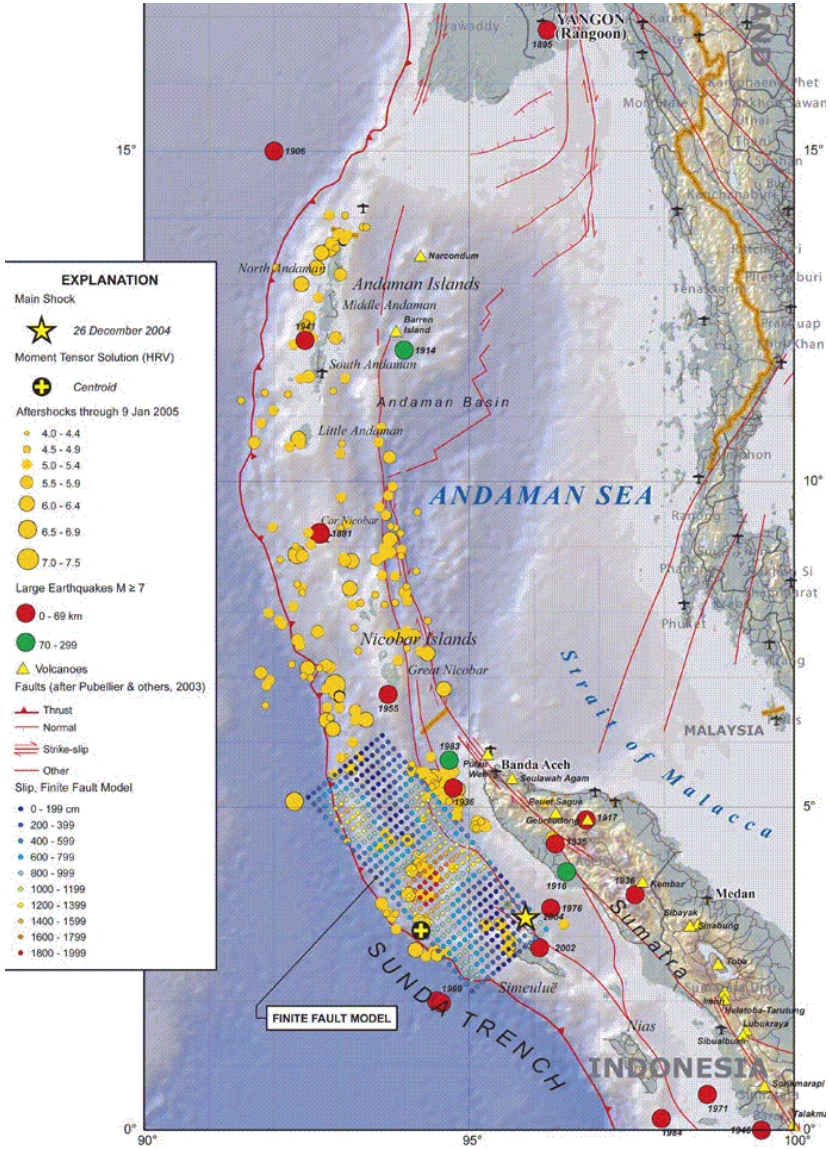
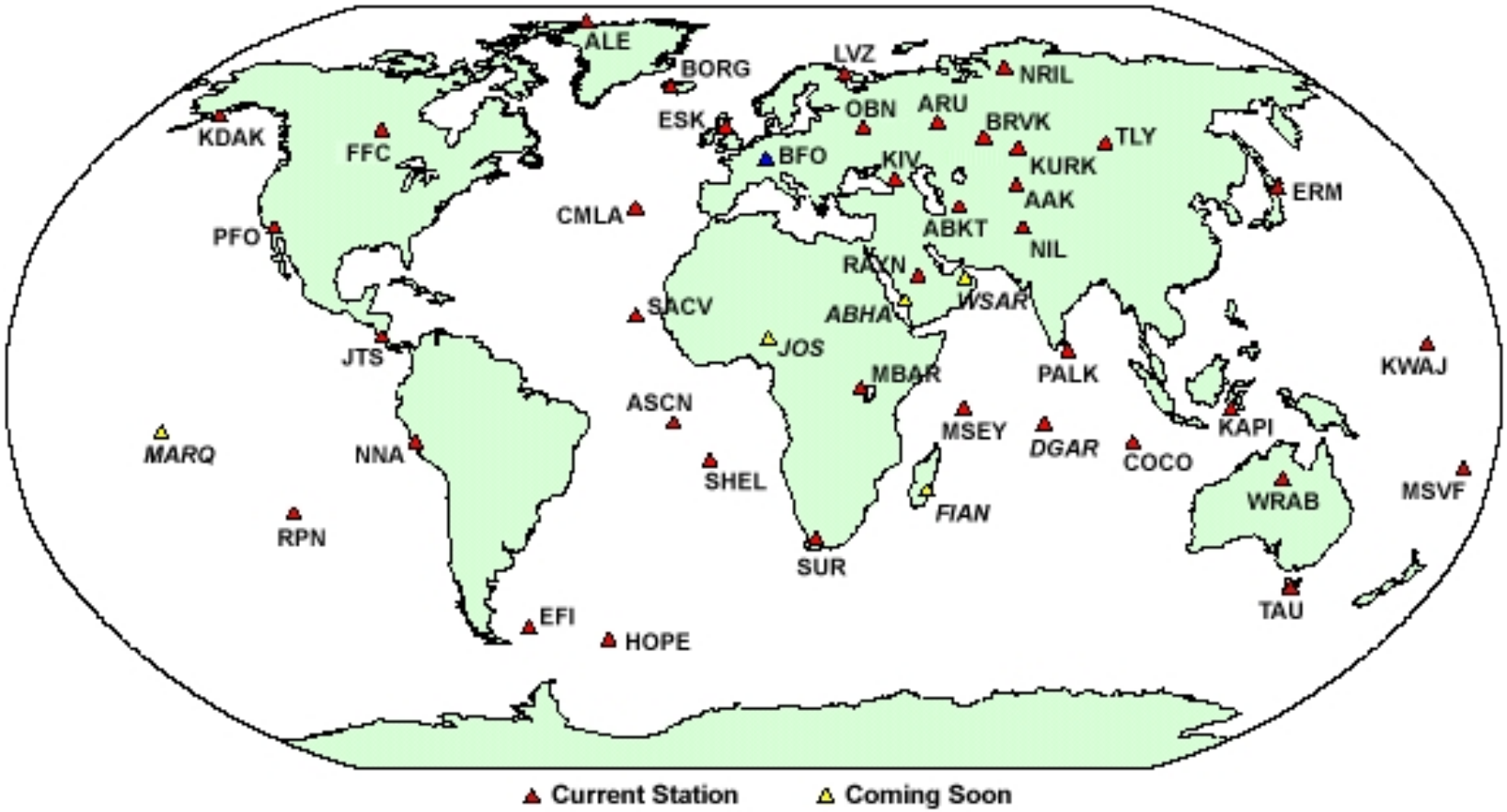
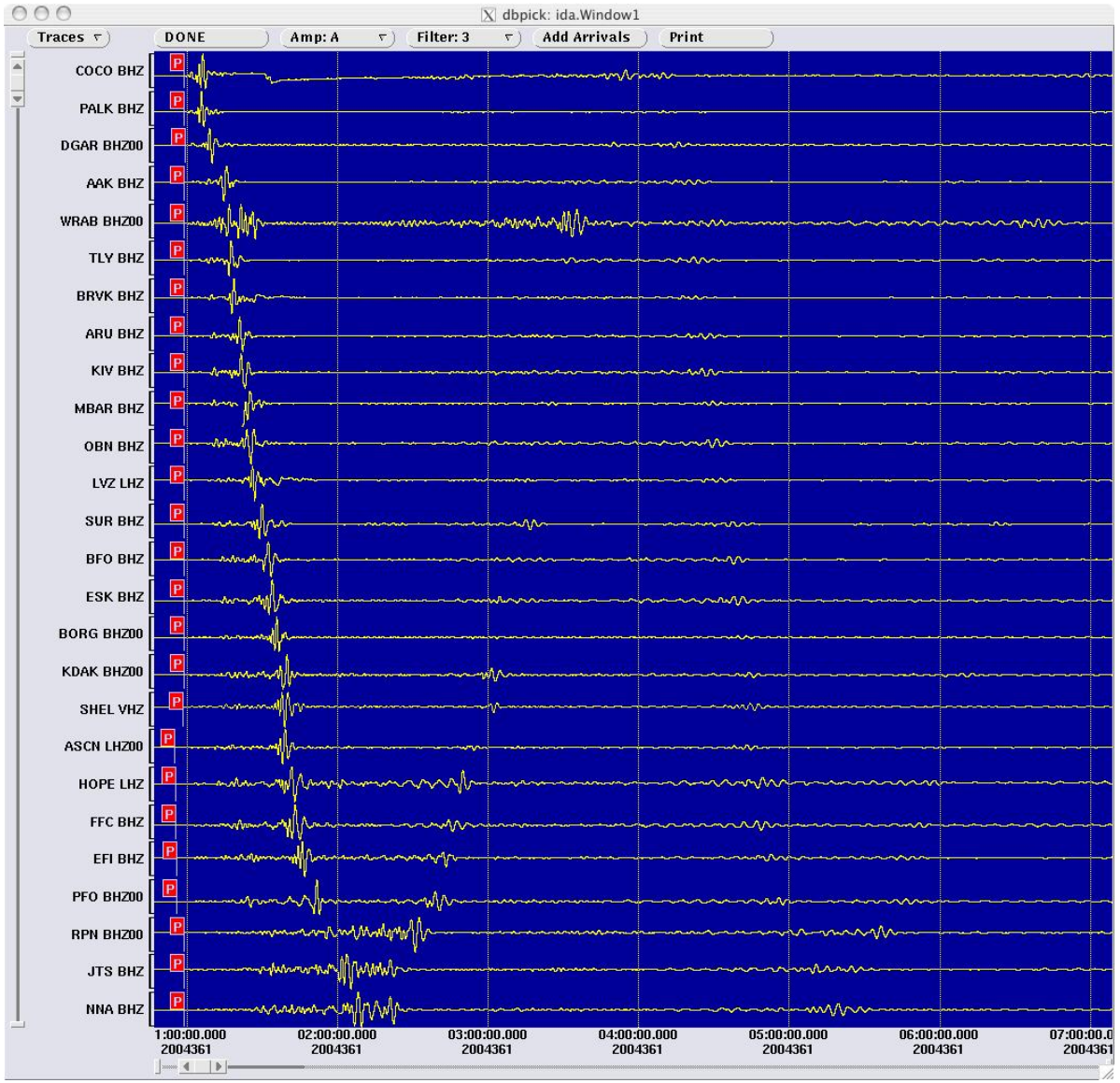


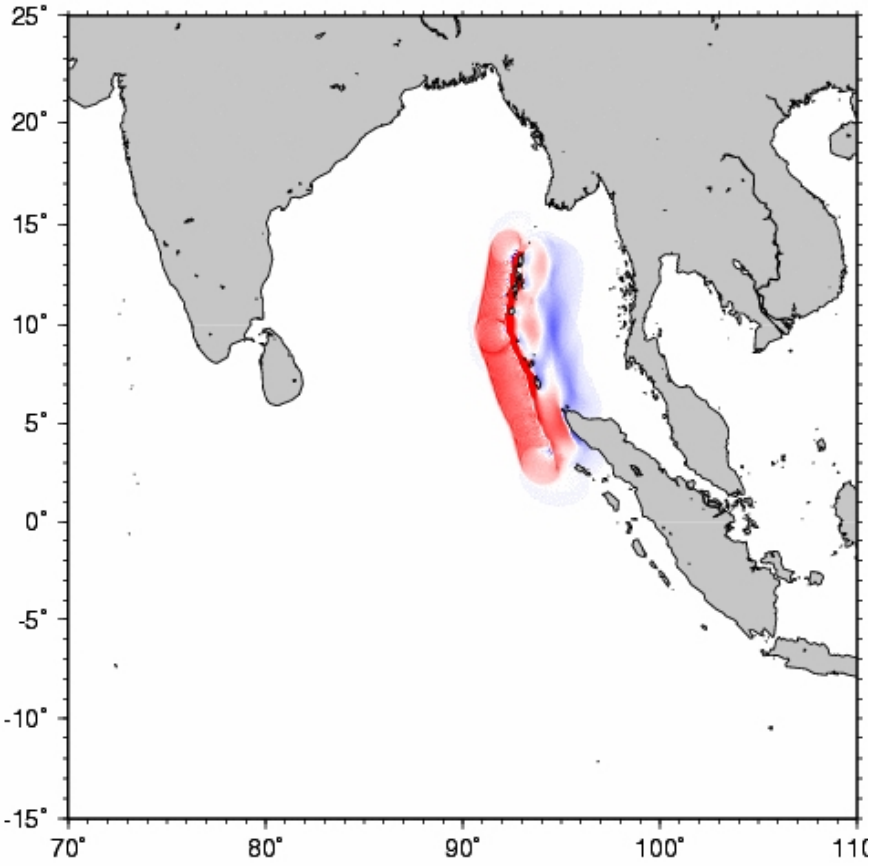

FIG. 2. Decay of variance for three tsunamis at Attu, Aleutian Islands.


EXPLANATION
Main Shock
26 December 2004
Moment Tensor Solution (HRV)
Centroid
Aftershocks through 9 Jan 2005
4.0 - 4.4
4.5 - 4.9
5.0 - 5.4
5.5 - 5.9
6.0 - 6.4
6.5 - 6.9
7.0 - 7.5
Large Earthquakes M ≥ 7
0 - 69 km
70 - 299
Volcanoes
Faults (after Pubellier & others, 2003)
Thrust
Normal
Strike-slip
Other
Slip, Finite Fault Model
0 - 199 cm
200 - 399
400 - 599
600 - 799
800 - 999
1000 - 1199
1200 - 1399
1400 - 1599
1600 - 1799
1800 - 1999
FINITE FAULT MODEL
YANGON (Rangoon)
1895
1906
Narcondum
North Andaman
Andaman Islands
Middle Andaman
Barren Island
1941
1914
South Andaman
Andaman Basin
Little Andaman
ANDAMAN SEA
Car Nicobar
1881
Nicobar Islands
Great Nicobar
1955
1983
Banda Aceh
Seulawah Agam
1936
Peulet Sagoe
Geurutinting
1917
1935
1916
1936
Kembar
Medan
1976
2004
Sibayak
Sinabung
2002
Toba
1969
Simeulue
Nias
Lubukraya
Sibualbuali
INDONESIA
1971
1984
1940
Strait of Malacca
MALAYSIA
SUNDA TRENCH
Sumatra
15°
10°
5°
0°
90°
95°
100°

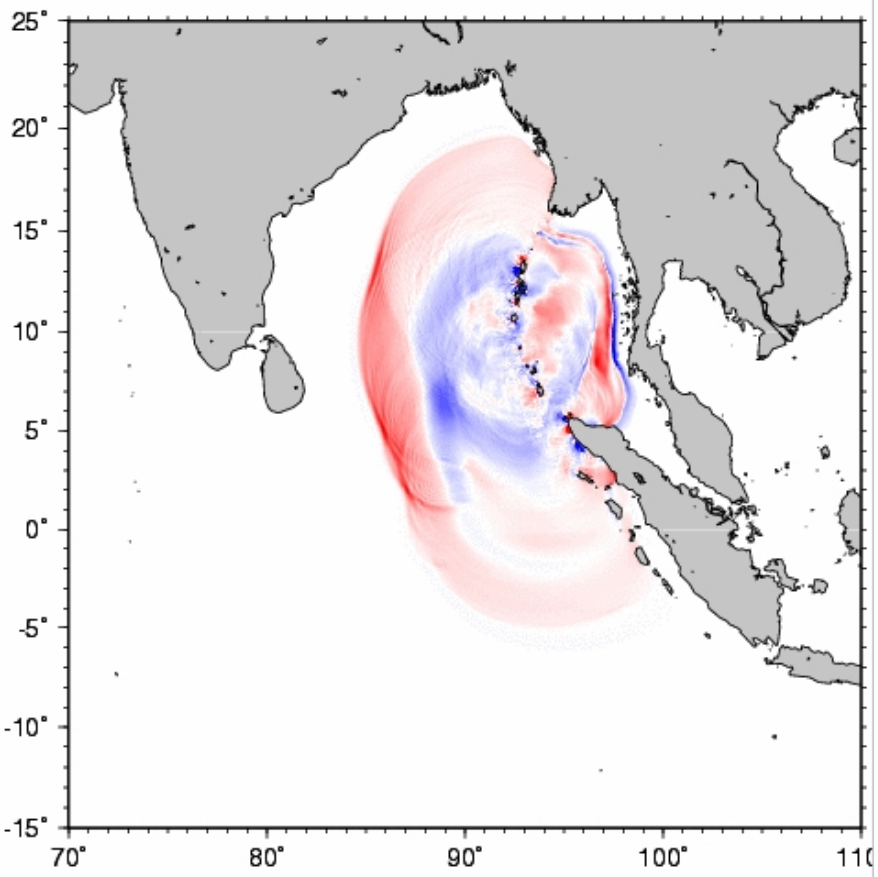

ALE
BORG
LVZ
NRIL
OBN
ARU
ESK
BRVK
TLY
KDAK
FFC
BFO
KIV
KURK
ERM
AAK
CMLA
ABKT
PFO
NIL
RAYN
WSAR
SACV
ABHA
JOS
JTS
KWAJ
MBAR
PALK
ASCN
KAPI
MSEY
DGAR
COCO
MARQ
NNA
SHEL
WRAB
MSVF
FIAN
RPN
SUR
TAU
EFI
HOPE
Current Station
Coming Soon

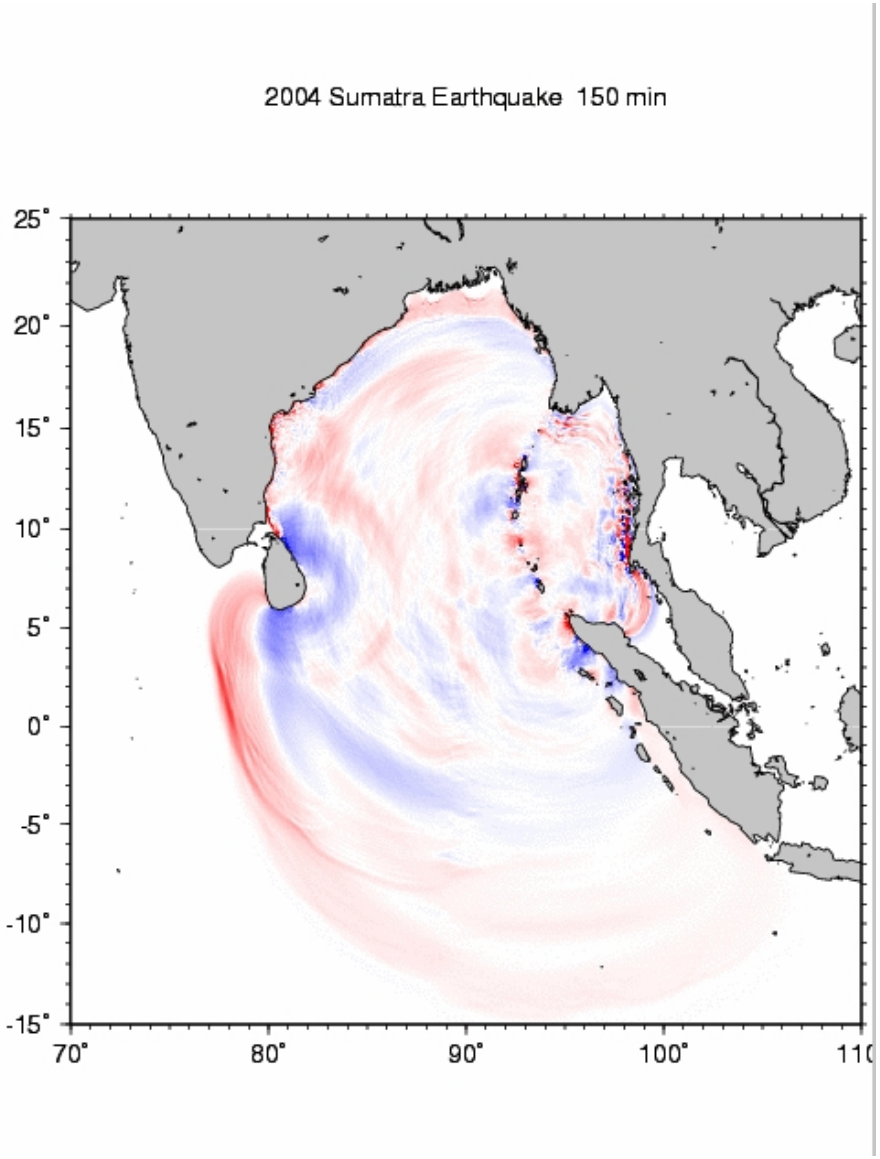

dbpick: ida.Window1
Traces
DONE
Amp: A
Filter: 3
Add Arrivals
Print
COCO BHZ
PALK BHZ
DGAR BHZ00
AAK BHZ
WRAB BHZ00
TLY BHZ
BRVK BHZ
ARU BHZ
KIV BHZ
MBAR BHZ
OBN BHZ
LVZ LHZ
SUR BHZ
BFO BHZ
ESK BHZ
BORG BHZ00
KDAK BHZ00
SHEL VHZ
ASCN LHZ00
HOPE LHZ
FFC BHZ
EFI BHZ
PFO BHZ00
RPN BHZ00
JTS BHZ
NNA BHZ
1:00:00.000
2004361
02:00:00.000
2004361
03:00:00.000
2004361
04:00:00.000
2004361
05:00:00.000
2004361
06:00:00.000
2004361
07:00:00.0
2004361

2004 Sumatra Earthquake 010 min

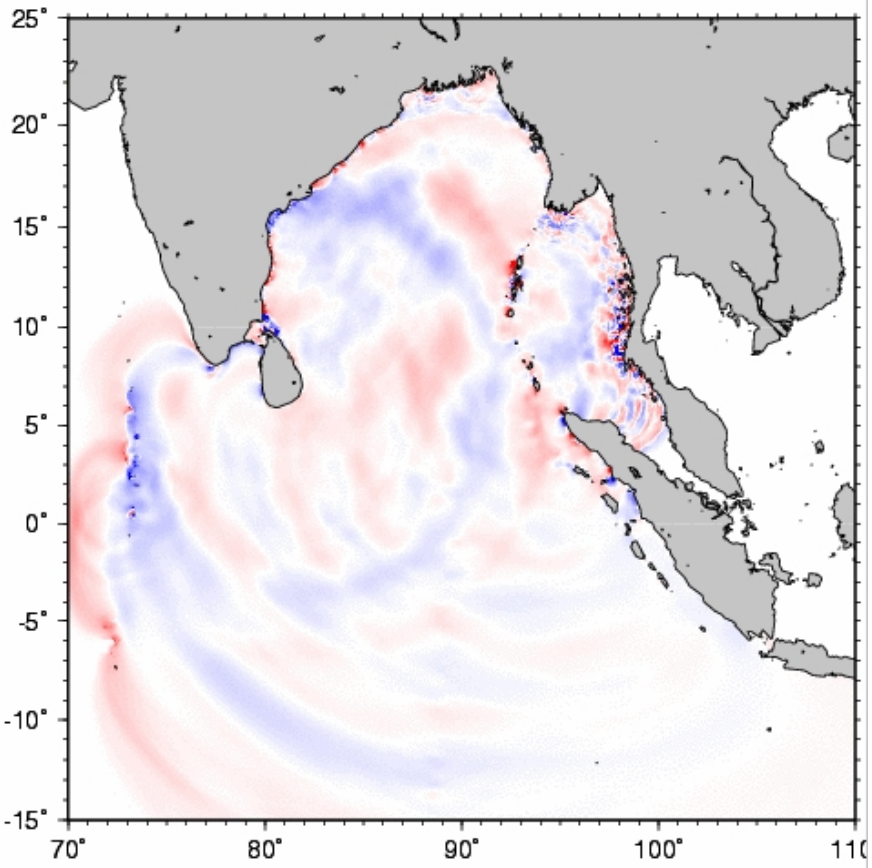


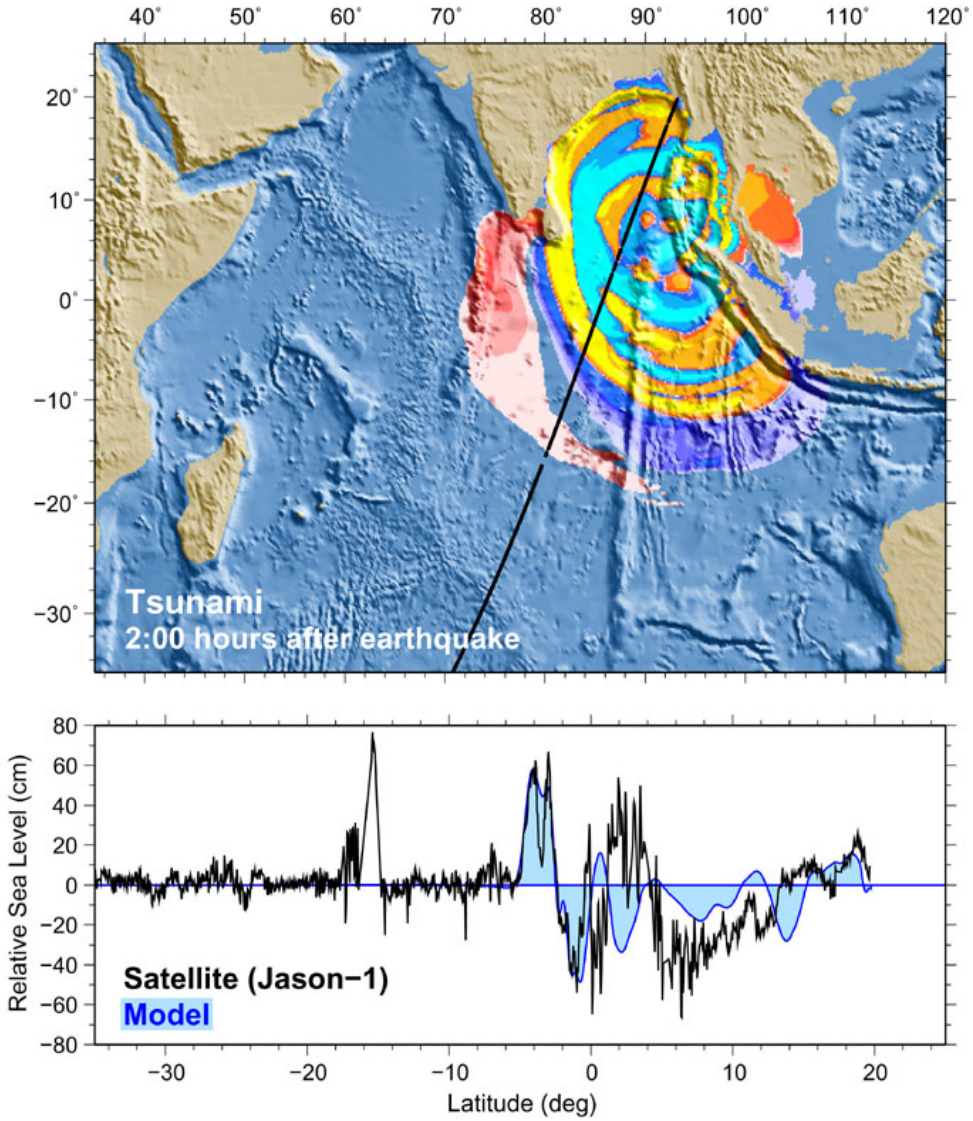
2004 Sumatra Earthquake 070 min

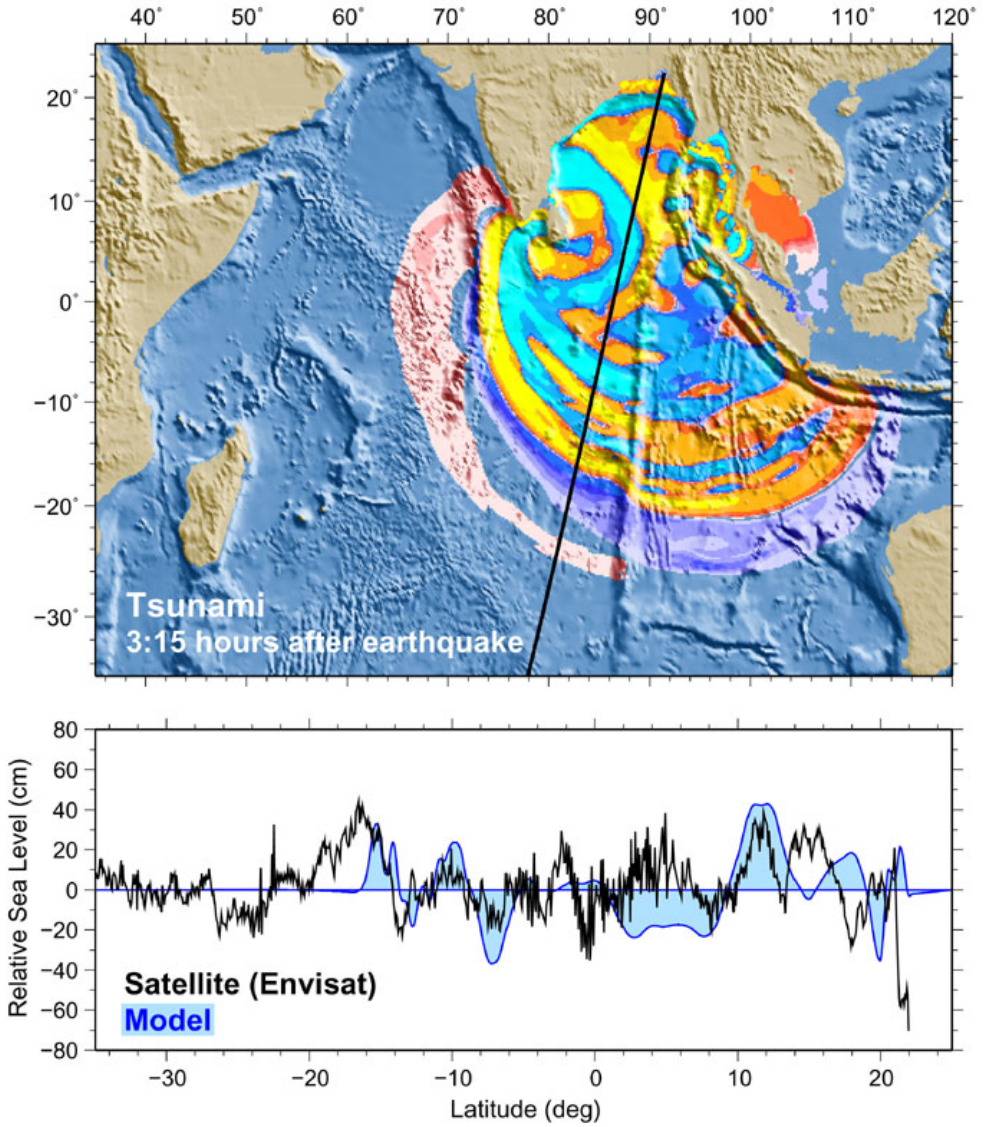


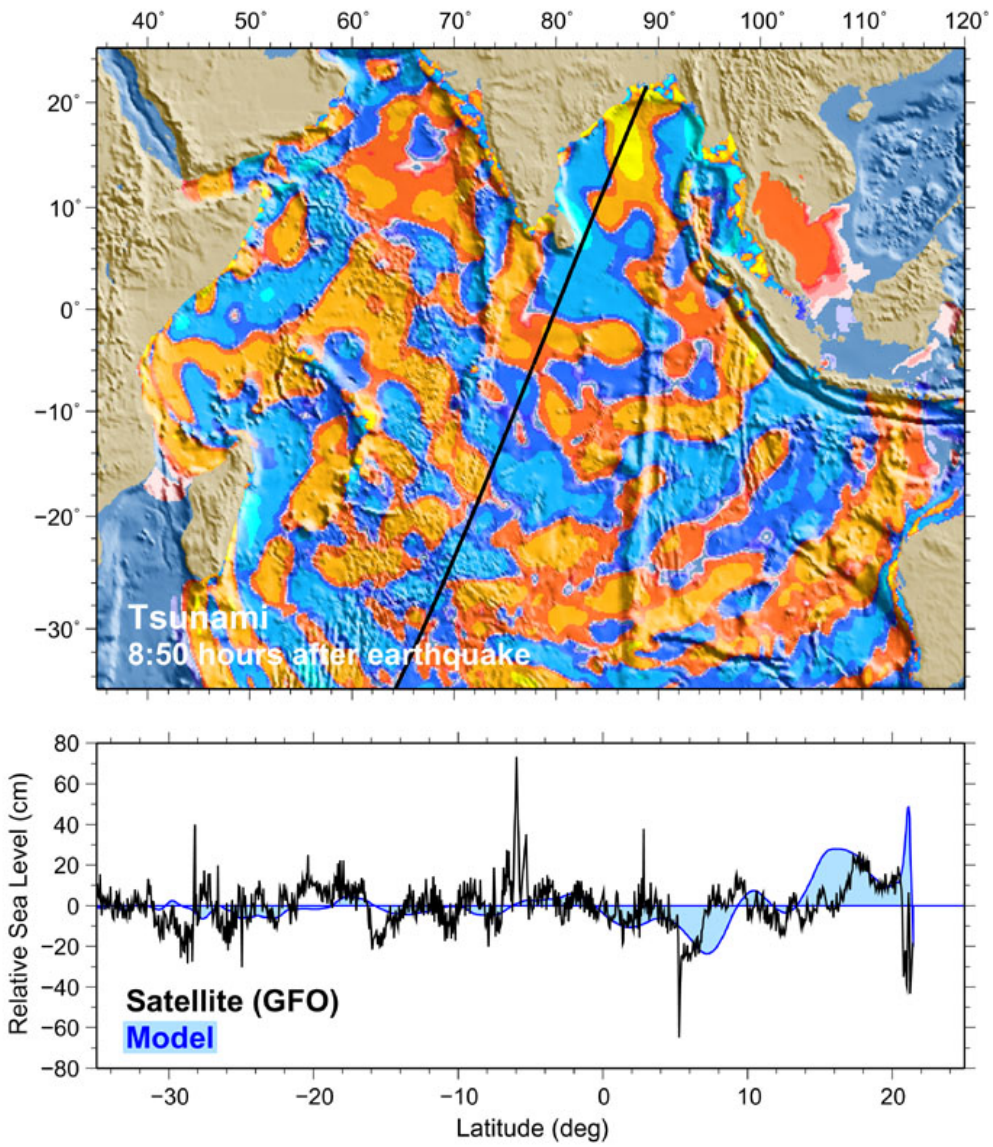

2004 Sumatra Earthquake 150 min
25°
20°
15°
10°
5°
0°
-5°
-10°
-15°
70°
80°
90°
100°
110

2004 Sumatra Earthquake 230 min

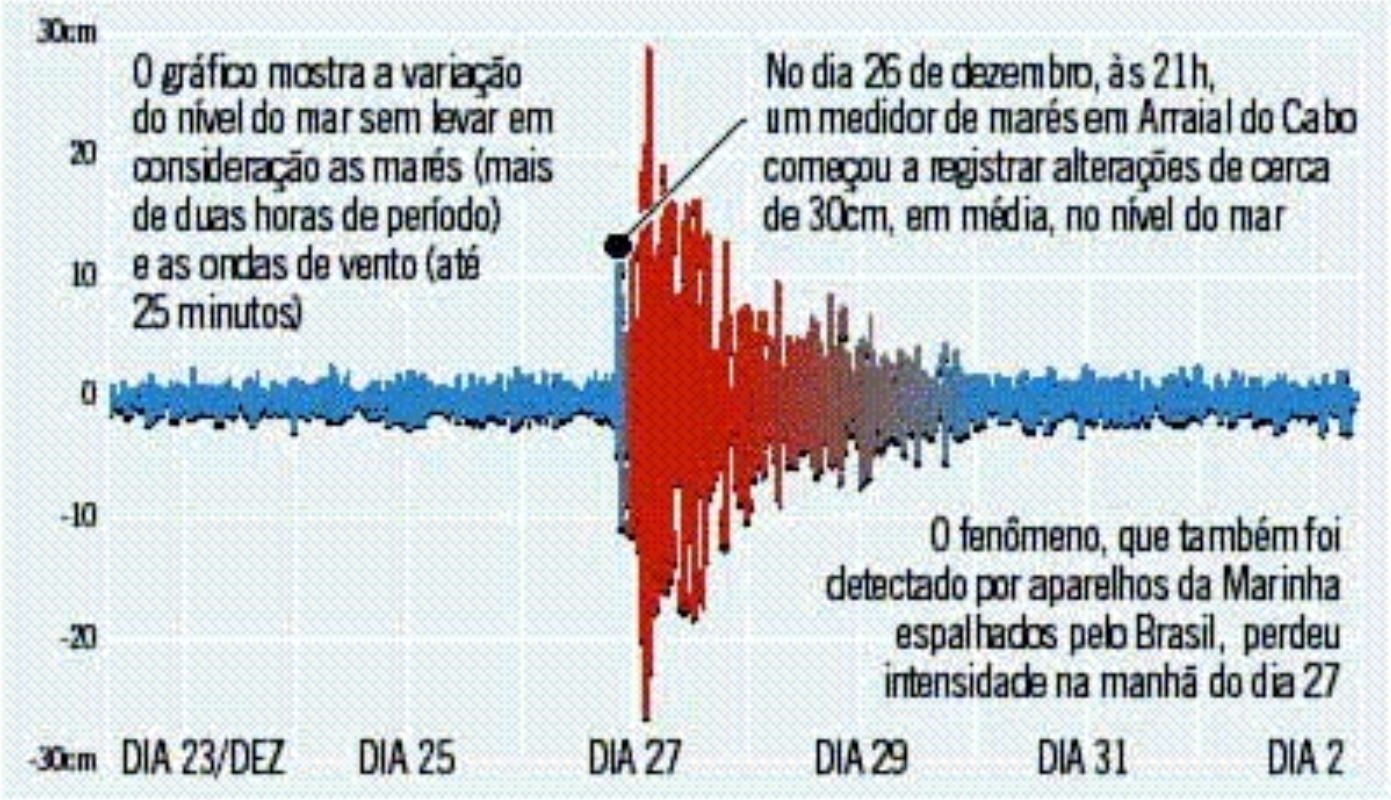



40°
50°
60°
70°
80°
90°
100°
110°
120°
20°
10°
0°
−10°
−20°
−30°
Tsunami
2:00 hours after earthquake
80
60
40
20
0
−20
−40
−60
−80
Relative Sea Level (cm)
Satellite (Jason−1)
Model
−30
−20
−10
0
10
20
Latitude (deg)


40°
50°
60°
70°
80°
90°
100°
110°
120°
20°
10°
0°
−10°
−20°
−30°
Tsunami
3:15 hours after earthquake
80
60
40
20
0
−20
−40
−60
−80
Relative Sea Level (cm)
Satellite (Envisat)
Model
−30
−20
−10
0
10
20
Latitude (deg)


40°
50°
60°
70°
80°
90°
100°
110°
120°
20°
10°
0°
−10°
−20°
−30°
Tsunami
8:50 hours after earthquake
Relative Sea Level (cm)
80
60
40
20
0
−20
−40
−60
−80
Satellite (GFO)
Model
−30
−20
−10
0
10
20
Latitude (deg)

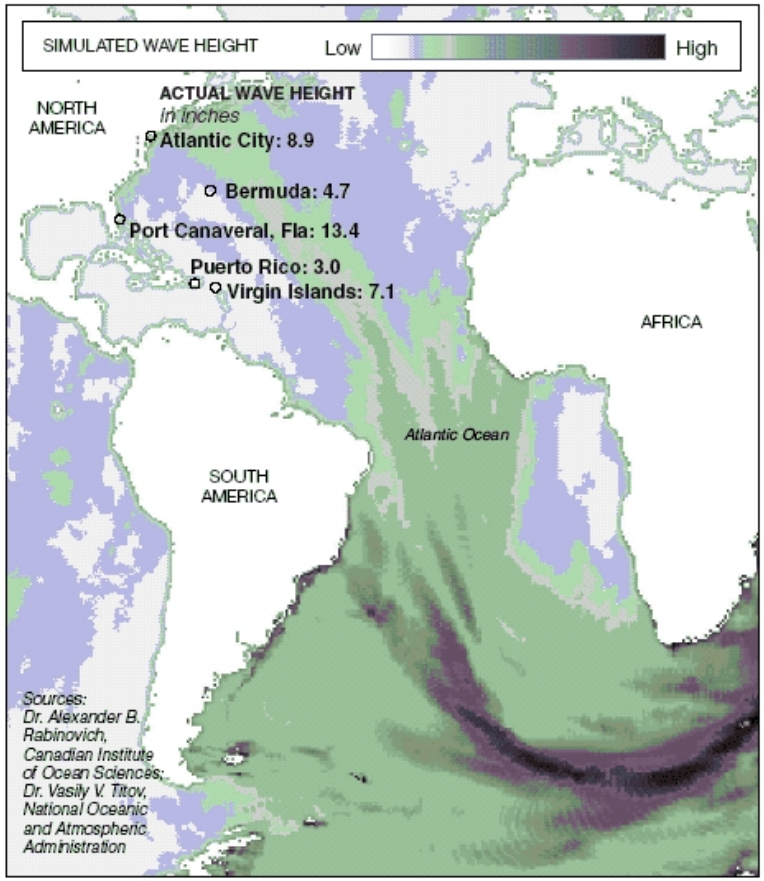
# O reflexo das ondas gigantes



The New York Times January 7, 2005

# Even in the Atlantic

Scientists found evidence that the tsunami from the Dec. 26 earthquake was felt along the eastern United States about 32 hours later. Tide gauge data gibed with computer simulations of the wave (background shading).




The New York Times

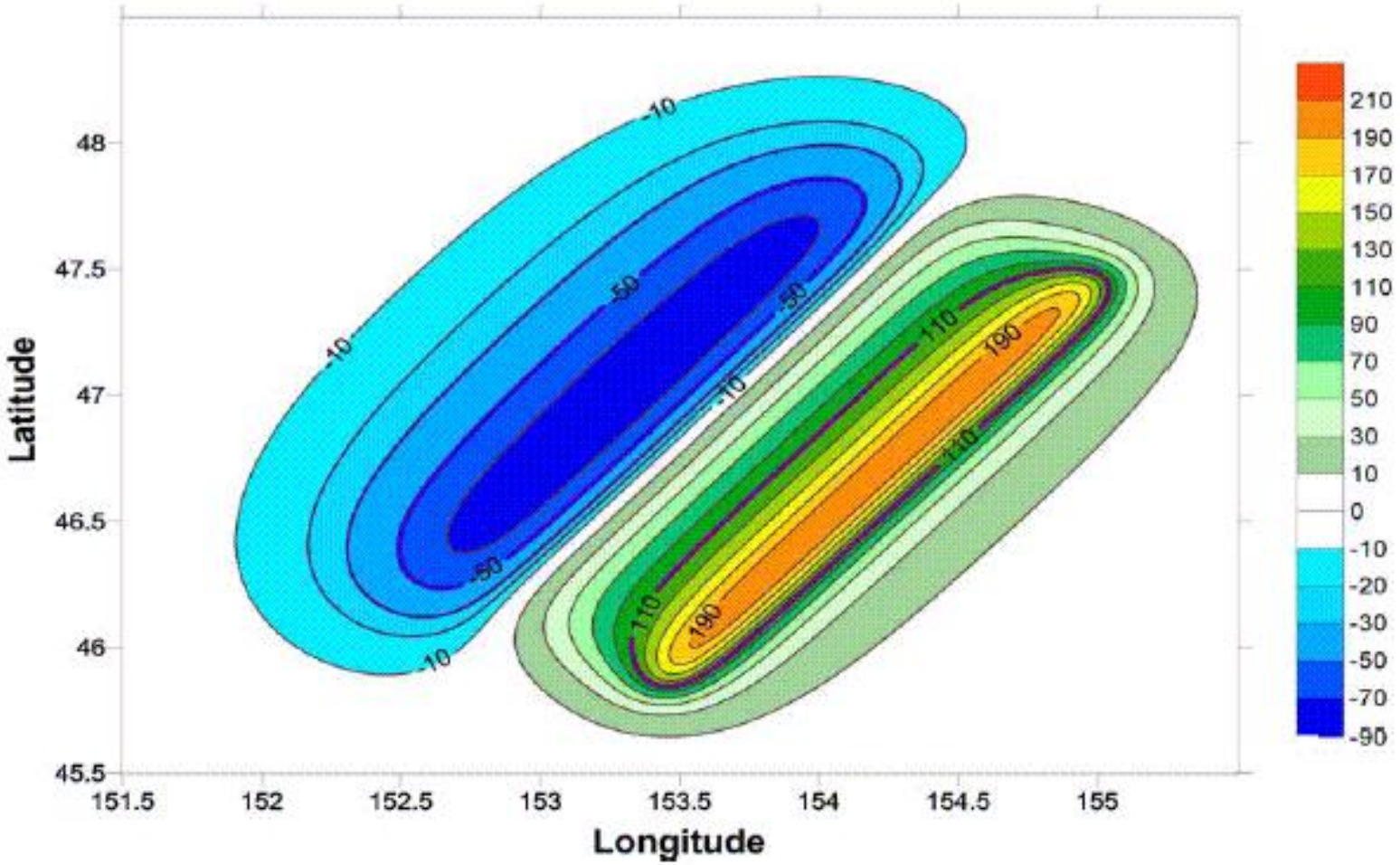



*Figure 1.* The source function for the tsunami of 15 Nov.2006.

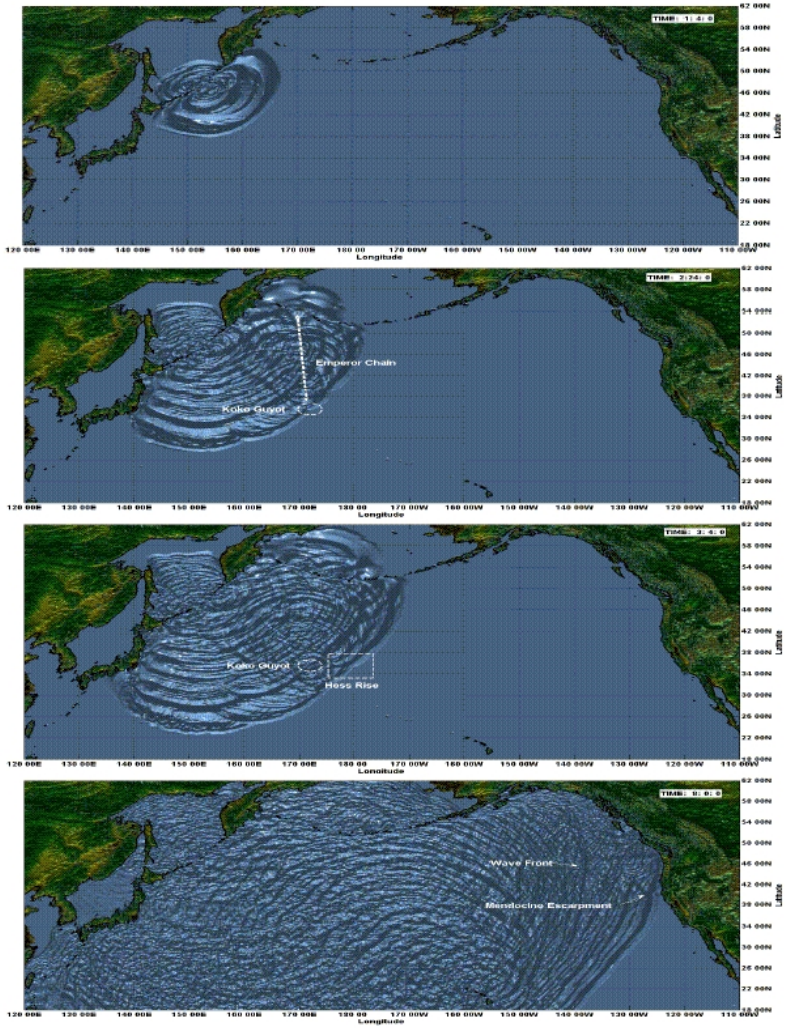



*Figure 4.* Snapshots of Kuril tsunami development in the Northern Pacific. Large bathymetric features, like Koko Guyot and Hess Rise scatter tsunami in directions different from the incident direction. Time is given from the tsunami onset.

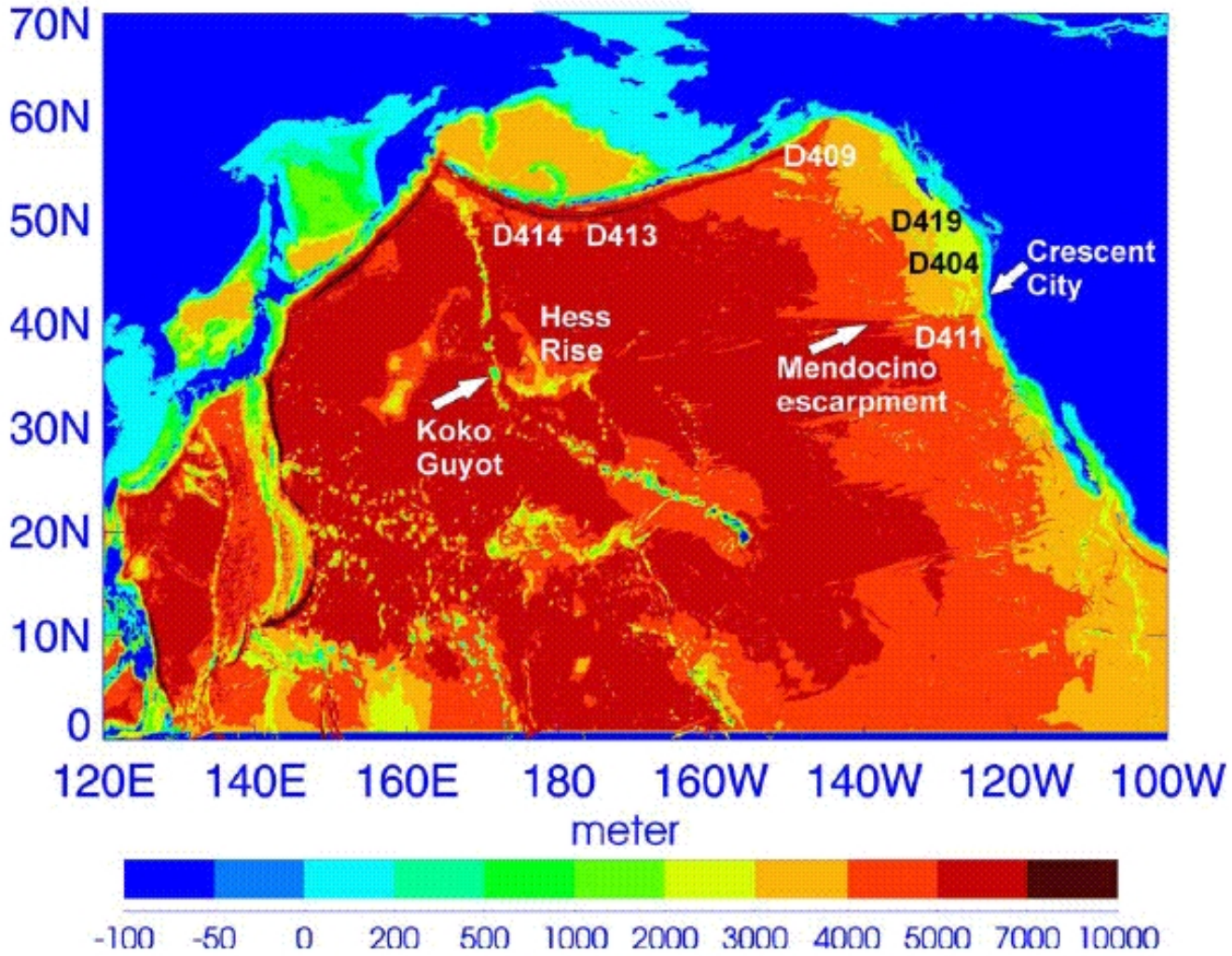



*Figure 3.* One minute resolution bathymetry based on the GEBCO Atlas. Shown are dart buoys used in comparison with model.

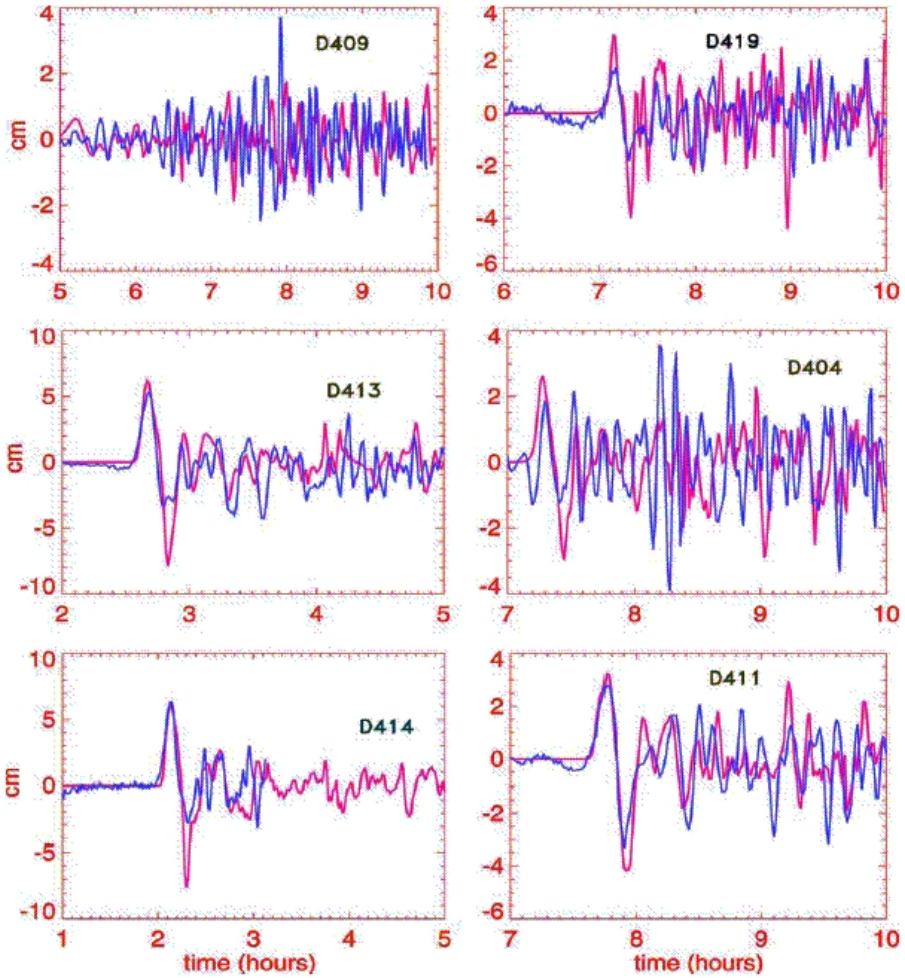



*Figure 5.* Sea level during Kuril Tsunami of Nov. 15, 2006. Blue color: recorded by dart buoys, red color: model computation. Time is given from the tsunami onset.

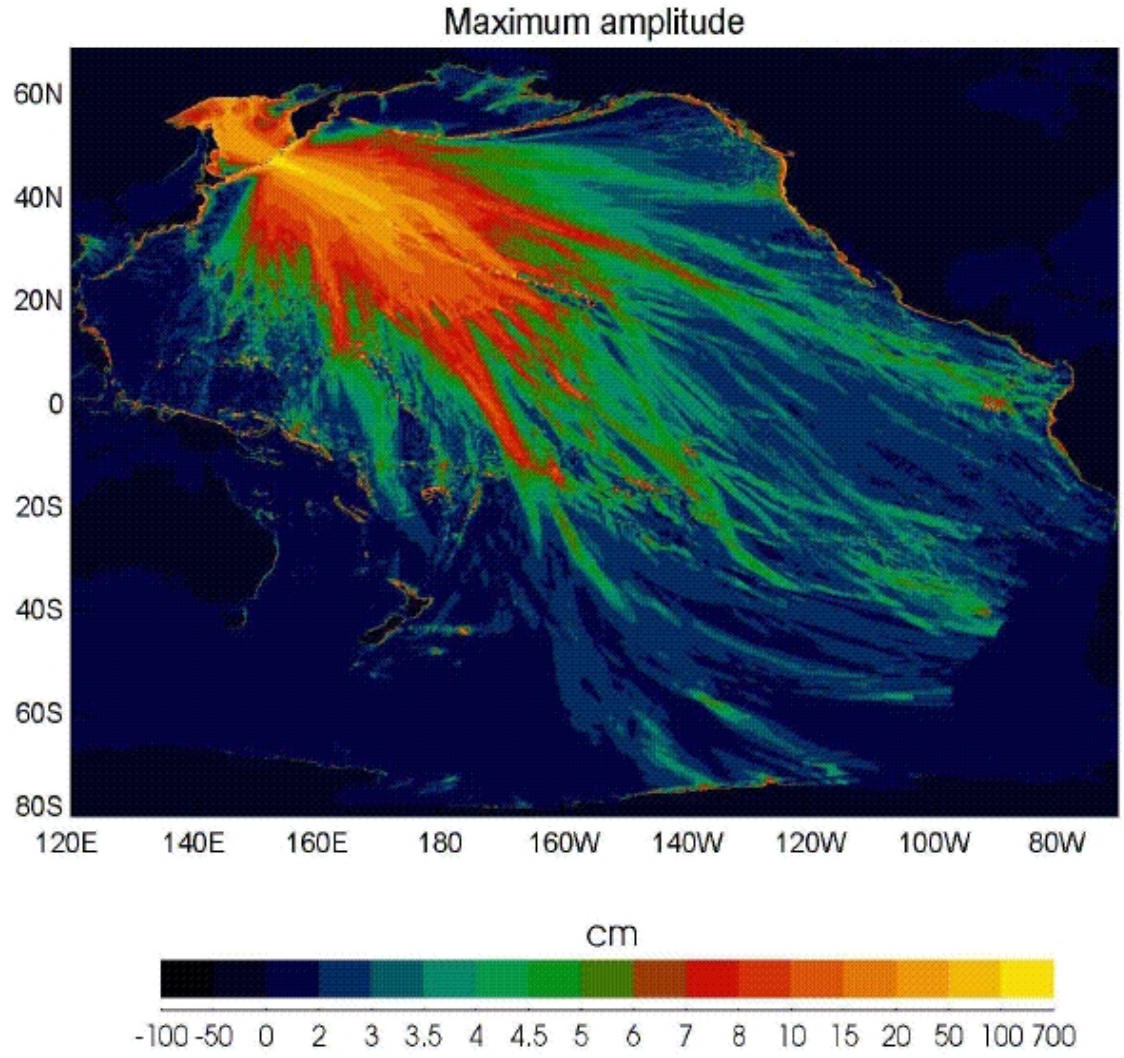
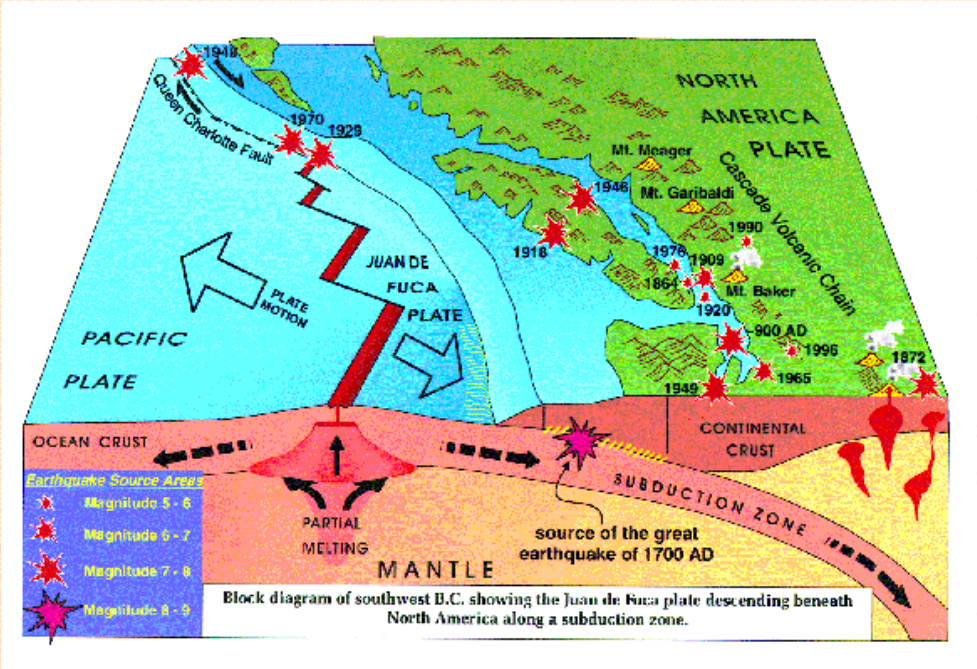



*Figure 2.* Maximum modeled tsunami amplitude in the Pacific.

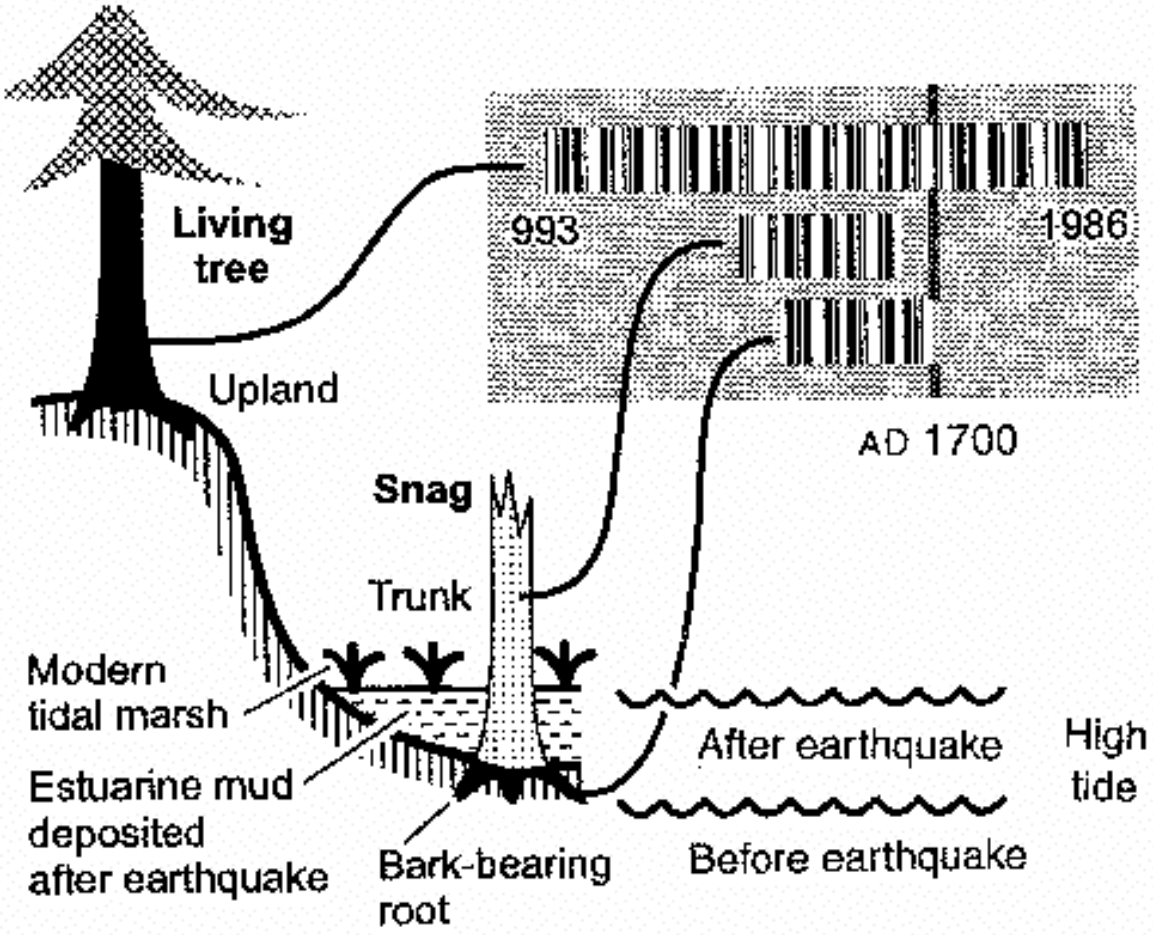



# The Cascadia subduction zone

This block diagram shows subduction of the oceanic Juan de Fuca plate beneath continental crust of North America. Geophysical evidence demonstrates that the subduction zone is locked and accumulating strain that will be released in future great (magnitude 8 or larger) earthquakes. There is abundant geological evidence in tidal marshes along the Pacific coast from Vancouver Island to northern California for repeated, historically unprecedented great earthquakes in the recent past. The diagram also shows the locations of large (magnitude 6–7+), historic, crustal and subcrustal earthquakes in southern British Columbia and northern Washington.

# Tsunami sand beneath tidal marsh at Tofino, BC

A layer of clean sand is sharply bounded by peat and mud in a pit dug at a marsh just east of Tofino on the west coast of Vancouver Island. The sand occurs as a sheet that thins and fines landward and contains marine microfossils. It was deposited by a landward surge of seawater at the time of the last great earthquake at the Cascadia subduction zone in A.D. 1700. (photo by John Clague).


Living tree
Upland
993
1986
AD 1700
Snag
Trunk
Modern tidal marsh
Estuarine mud deposited after earthquake
Bark-bearing root
After earthquake
Before earthquake
High tide

Western red cedar snags along the Pacific Northwest coast of the U.S. bear evidence of the 1700 tsunami. These