

May 26, 1983 Tsunami in the Sea of Japan



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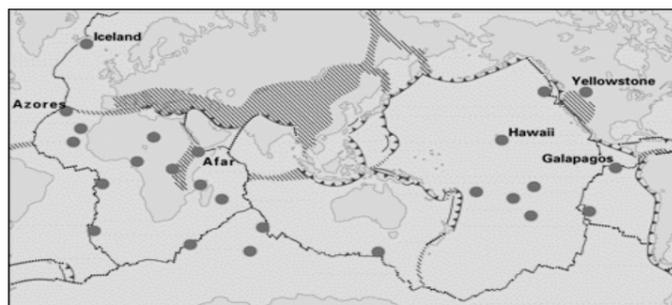
Geography of Japan



Geology of Japan

- Described as very complex
- Eastern Japan: Pacific plate is subducting under North American. This forms Kuril Trench and Kuril Island Arc
- Western Japan: Okhotsk Subplate (North American) and Eurasian Plate collide. This represents the Hikada Collision Zone (HCZ)

Geology of Japan

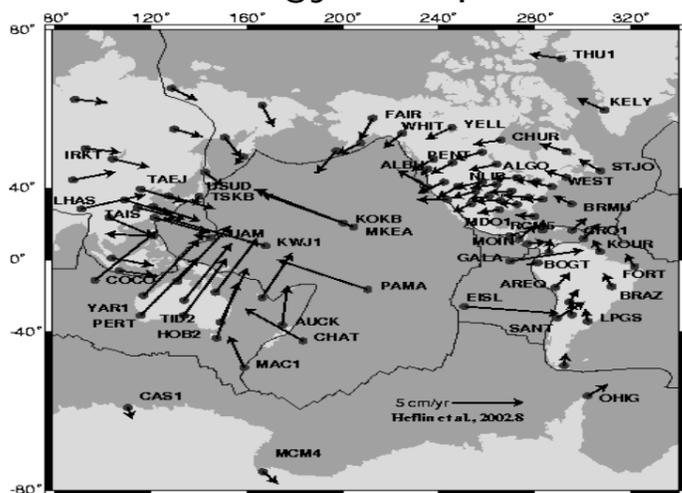


EXPLANATION

— Divergent plate boundaries— Where new crust is generated as the plates pull away from each other.	— Transform plate boundaries— Where crust is neither produced nor destroyed as plates slide horizontally past each other.
— Convergent plate boundaries— Where crust is consumed in the Earth's interior as one plate dives under another.	■ Plate boundary zones—Broad belts in which deformation is diffuse and boundaries are not well defined.

● Selected prominent hotspots

Geology of Japan



Pre-Disaster Preparation

- Tsunami Buoys
- Tsunami Walls and Tetrapods (wavestoppers)
- Seismic Monitoring along sea floor faults
- Warning Issued when data corresponds to the occurrence of a tsunami

Tsunami Buoys



Tetrapods



Precursors of the Event

- Only one precursor
- April 30, 1983 earthquake occurred off the coast of Hokkaido (41.47 N, 143.76 E)
- Magnitude of 5.8

Pre-Disaster Awareness

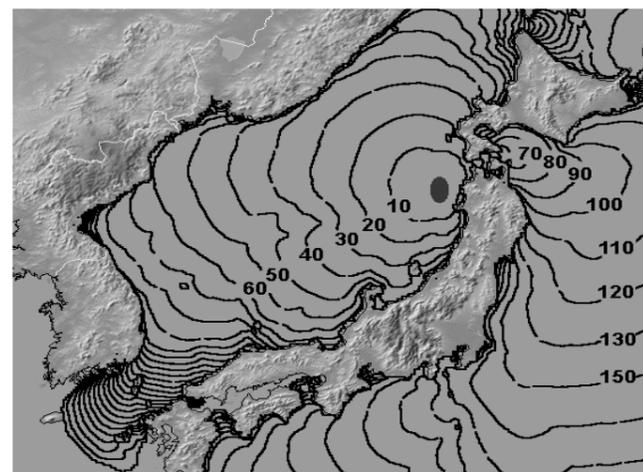
- Because Japan is a hotbed for tectonic activity, public awareness of earthquakes and waves accompanying earthquakes is high.



The Event

- May 26, 1983 at 12:00 pm
- 7.7 magnitude earthquake occurs off the west coast on Honshu (40.46 N, 139.10 E)
- Earthquake a direct result of reverse faulting
- Abruptly changed bathymetry in Sea of Japan which generated destructive Tsunami along the coasts of S. Korea, Japan, and USSR.
- Warning and evacuation orders made 13-15 minutes after EQ

Wave Times to Shore





Tsunami in Japan

- Wave hit Akita Prefecture (Japanese State) 7 minutes after EQ
- Remember that warning was issued 13-15 minutes after EQ!!!
- There was no sufficient time to issue warning to this area because EQ epicenter occurred too close to the coast

Wave Heights

- Minehama, Honshu 14M
- Southern Hokkaido and Northern Honshu 2-6m
- Coast of Soviet Union 8m
- South Korea 2-7.5m

Death and Destruction in Japan

- Most of damages and deaths occurred in Japan, especially the Akita Prefecture
- 104 deaths (4 from EQ, 100 from tsunami)
- 700 boats destroyed
- 59 houses destroyed
- Total of \$800 million in damages (1983 \$'s)

Death and Destruction in Korea

- ~90 minutes to reach Korean Peninsula
- 20 houses destroyed or damaged
- 3 people killed
- \$500,000 total damage (1983 dough)

Comparison to other Tsunamis

- Dec 26, 2004 Sumatra Tsunami
- Wave Heights of 10m
- Generated by 8.9 magnitude EQ
- 283,000+ people killed

Other tsunamis

- May 22, 1960 Chile Tsunami
- Generated by 9.5 magnitude EQ off coast of Chile
- Wave heights from 4.5m-11m
- Tsunami Reached and caused devastation as far as Honshu, Japan
- Responsible for 2000+ deaths

Mitigation after Disaster

- Again, there is considerable awareness of such occurrences, but after this particular event there were increased efforts to inform the public of the warning signs and dangers of tsunamis
- Also established a regional warning system to more effectively issue warnings
- Bathymetry of Sea of Japan studied more to determine points of future tsunami origin

Evaluation

- The people of Japan were properly prepared for such a disaster, loss of life was kept to a minimum
- No way of preventing wave taller than tsunami wall from crashing over tsunami wall, unless you build a bigger wall
- Damage wise not very efficient

Questions?

