2004 Sumatra Earthquake

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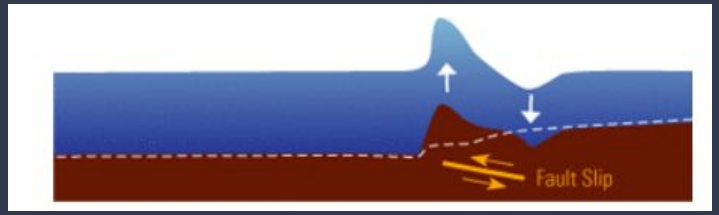
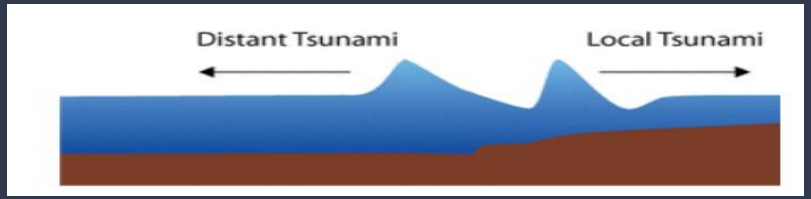
When: December 26, 2004, at 7:59 AM local time

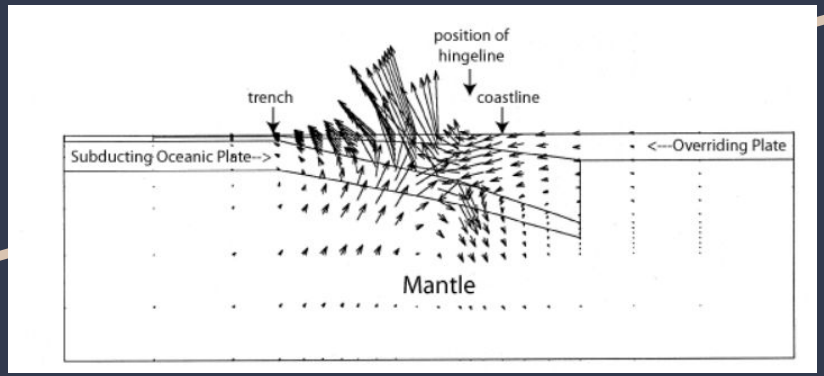
Where: Indonesian island of Sumatra, Sri Lanka, India, Maldives, and Thailand

What: Tsunami triggered by undersea earthquake. 3rd Largest Earthquake

Tectonic Setting







- Occurred along a tectonic subduction zone, where the India Plate subducted under the Burma plate.
- Interplate thrust fault - vertical displacement causing the seafloor to move above the lower block generating a tsunami
- Released in a thrust motion, as opposed to a horizontal displacement which usually don’t generate tsunami’s

Geologic Setting

Indian Ocean. Epicenter

- The epicentre was off the coast of northern Sumatra, Indonesia.
- It was near several surrounding countries Indonesia, Sri Lanka, India, Thailand.
- Indonesia is located between the Eurasian plates and Australian plates.
- Surrounded by volcanic arc in western Indonesia
- Formed by the subduction of the Indian plate underneath the Eurasian continental plate
- Caused Fault deformation along the northwestern Indonesian coast.

Geologic Hazard

M=9.1

- Centuries of elastic strain is accumulated from ongoing subduction of the India plate beneath the Burma microplate
- On December 26, 2004, at 7:59 AM local time Thrust faulting occurs where the seafloor gets vertically displaced above the lower block
- The faulting is released (1.1 * 10^17 J), energy equivalent to 1,500 times Hiroshima atomic bomb.
- Earth vibrates for 10 minutes which causes the seafloor to rise by ~40 meters, pulsing waves which generates a tsunami
- The tsunami is now 100 foot waves and crashes onto Sumatra and surrounding countries hours later.
- Liquefaction and tectonic subsidence were major factors in the destruction.
- Result: Millions in damage and ~230,000 missing and/or dead.

Conclusion

- 168 nations agreed to the Hyogo Framework for action - Allowed for global cooperation for disaster risk reduction.
- Ocean Seafloor earthquake sensors have been installed to sense for early warnings
- Many local communities trained for evacuation and disaster response procedures
- Governments and aid groups now prioritize disaster risk reduction and preparedness

“We now have more efficient early warning systems and better evacuation procedures in place. This is also greater understanding and awareness globally of the broad damage that disasters can inflict on our societies”

- Margareta Wahlström, head of the UN Office for Disaster Risk Reduction (UNISDR).

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