

# Class Project

How deep is the ocean?

# Tsunami of December 2004

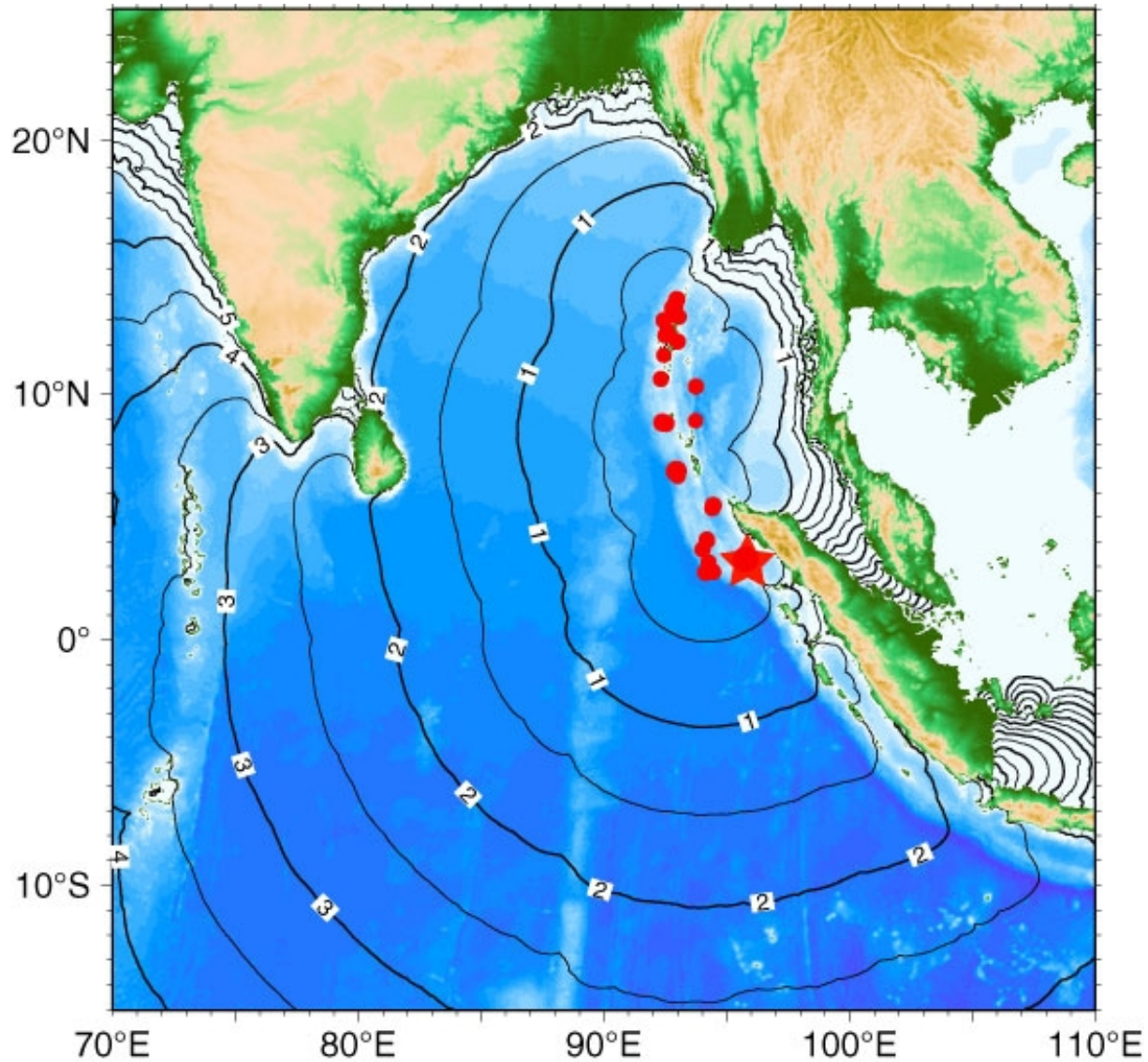
- ☞ Tsunamis propagate as shallow-water gravity waves.
- ☞ What do we need to know to get ocean depth?

# Background

- Origin: 00:58:53 UTC on December 26, 2004
- Earthquake with an epicenter off the west coast of Sumatra, Indonesia.
- Magnitude 9.1-9.3
  - second largest earthquake ever recorded on a seismograph.
  - longest duration of faulting ever observed, between 8.3 and 10 minutes.
- Entire planet vibrated as much as 1 cm (0.5 inches) and triggered other earthquakes as far away as Alaska.
- Sea bed estimated to have risen by several meters, displacing an estimated 30 km<sup>3</sup> (7 cu mi)
- The wave reached a height of 24 m when coming ashore along large stretches of the coastline, rising to 30 m (100 ft) in some areas when travelling inland.

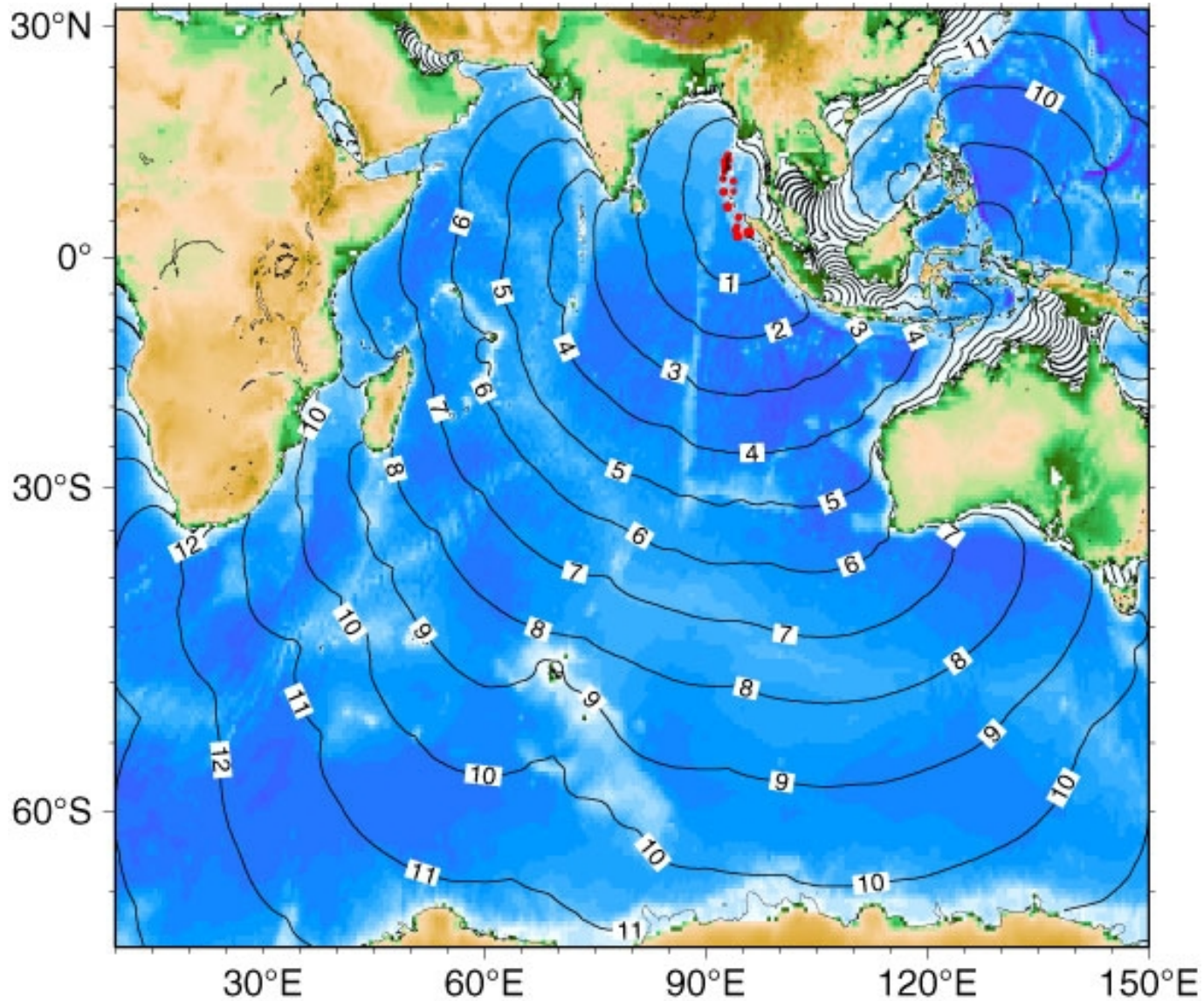
(Source: Wikipedia and references therein)

# Travel Times



(Source: National Institute of Advanced Industrial Science and Technology, Japan Active Fault Research Center )

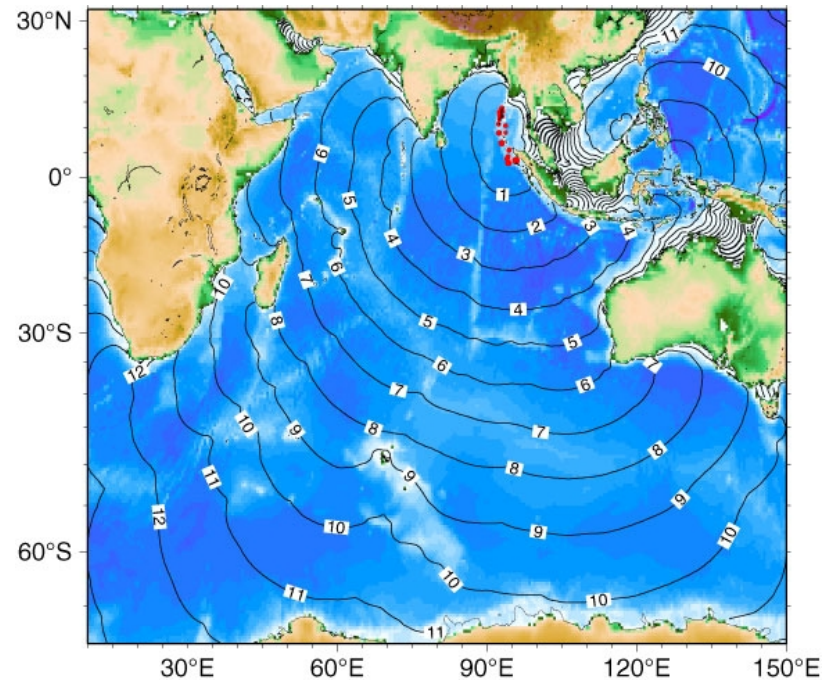
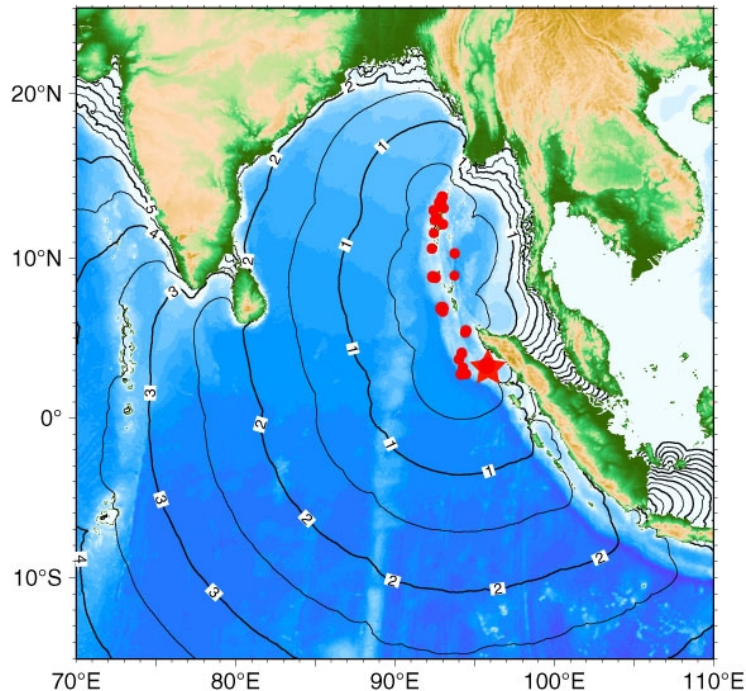
# Travel Times



(Source: National Institute of Advanced Industrial Science and Technology, Japan Active Fault Research Center )

# 3 Tasks

1. Propagation to Sri Lanka and Madagascar: What is the depth of the ocean?
2. What's going on in the (slow) propagation to Thailand?
3. Can we deduce the height of some mid-ocean ridges?



(Figures source: National Institute of Advanced Industrial Science and Technology, Japan Active Fault Research Center )