

A Decade of Giant Earthquakes – Is the Mayan apocalypse coming true?

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Mayan Apocalypse? More likely, it is indicative of a Global Great-Earthquake Cycle.

For a nearly 40-yr period after the February 1965, M-8.7 earthquake [Rat Islands, Alaska], the world did not experience a single M-8.5 earthquake; however, in the 7 years since December 2004, there has been a barrage of six great earthquakes:

2004: M 9.1 Sumatra, Indonesia earthquake

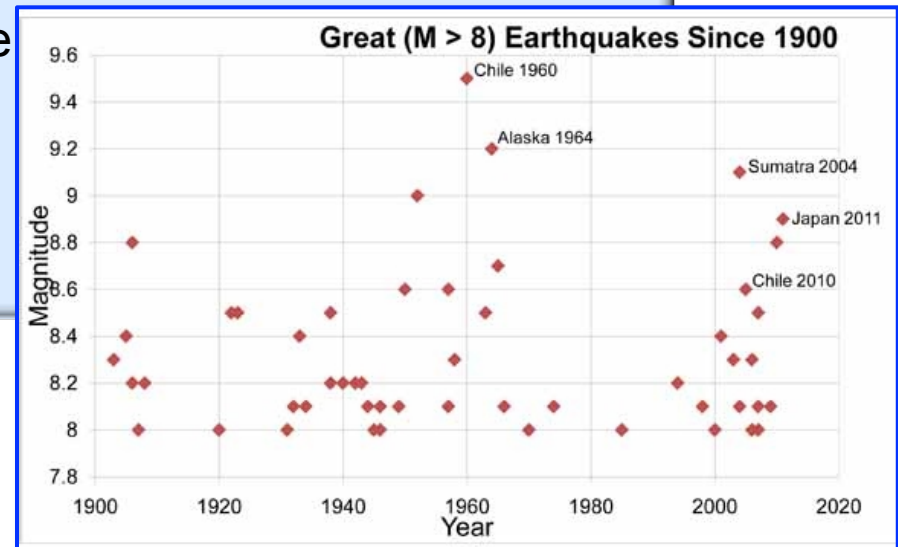
2005: M 8.7 Nias, Indonesia earthquake

2007: M 8.5 Bengkulu, Indonesia earthquake

2010: M 8.8 Maule, Chile earthquake

2011: M 9.0 Tohoku-oki, Japan earthquake

2012: M 8.7 Indian Ocean earthquake

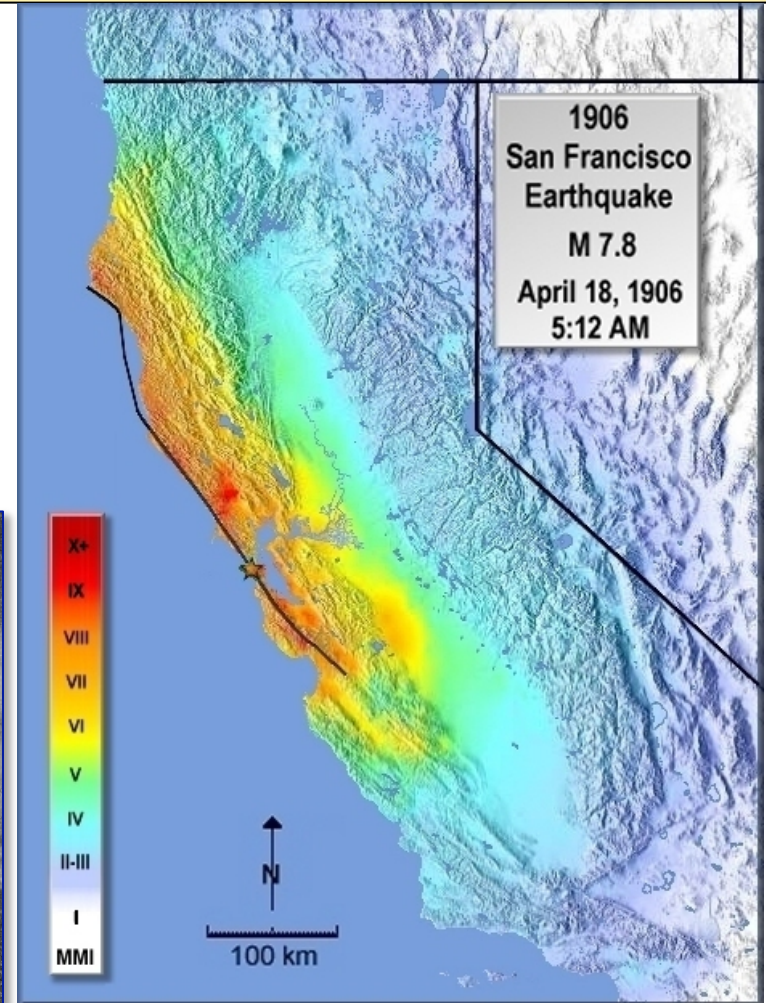


The rash of earthquakes—along with historic “highs” in the number of tornadoes in 2011, global wild fire damage, and extreme weather—has led to a movement predicting the “end of times.”

December 2012 marks the conclusion of a *b'ak'tun* —a time period in the Mesoamerican Long Count Calendar

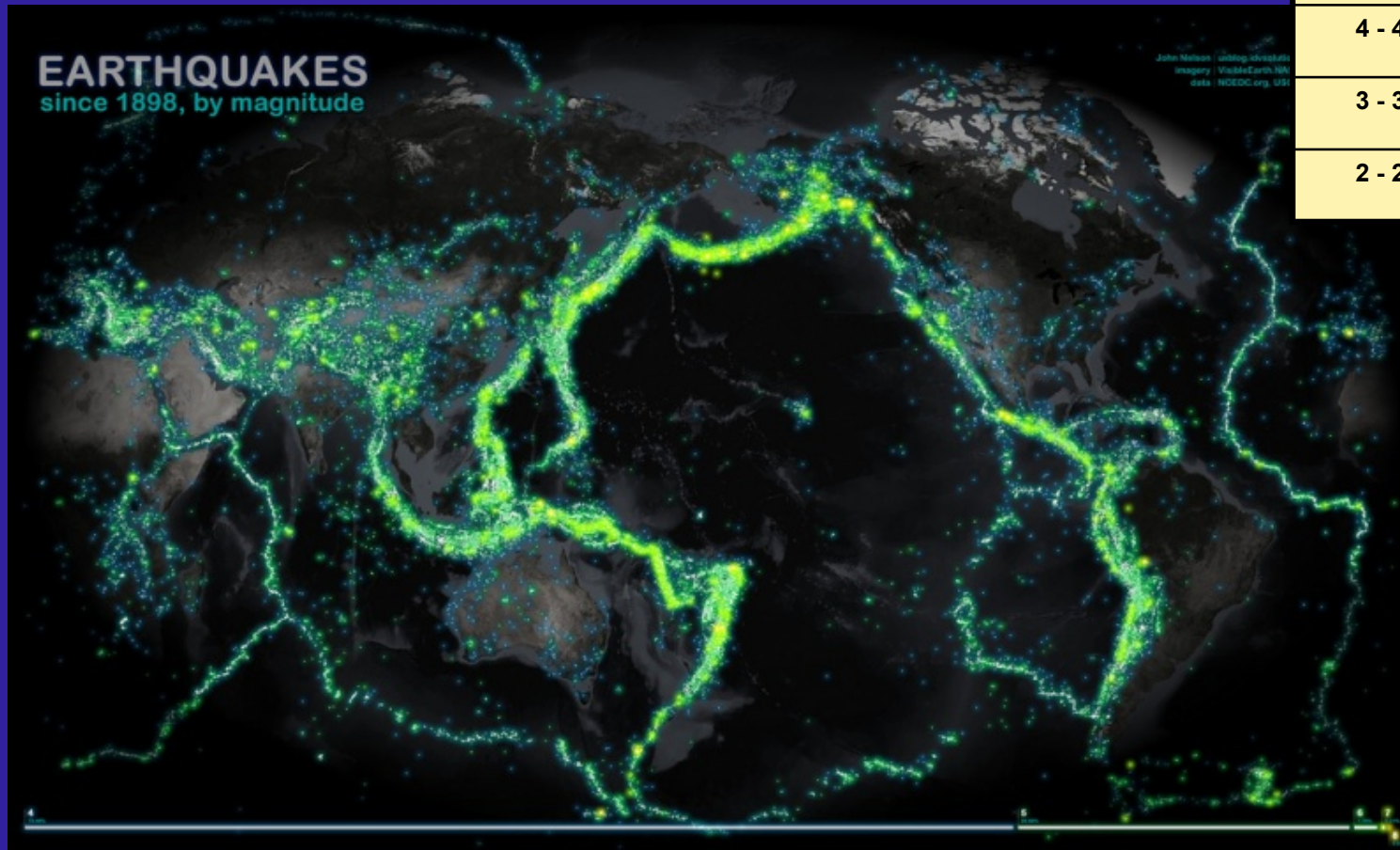


The 1906 San Francisco Earthquake was the beginning of modern Seismology



The Global Earthquake Cycle: Frequency, Energy & Magnitude

| Magnitude | Average Annually |
|--------------|--------------------------|
| 8 and higher | 1 ¹ |
| 7 - 7.9 | 15 ¹ |
| 6 - 6.9 | 134 ² |
| 5 - 5.9 | 1319 ² |
| 4 - 4.9 | 13,000 (estimated) |
| 3 - 3.9 | 130,000 (estimated) |
| 2 - 2.9 | 1,300,000 (estimated) |

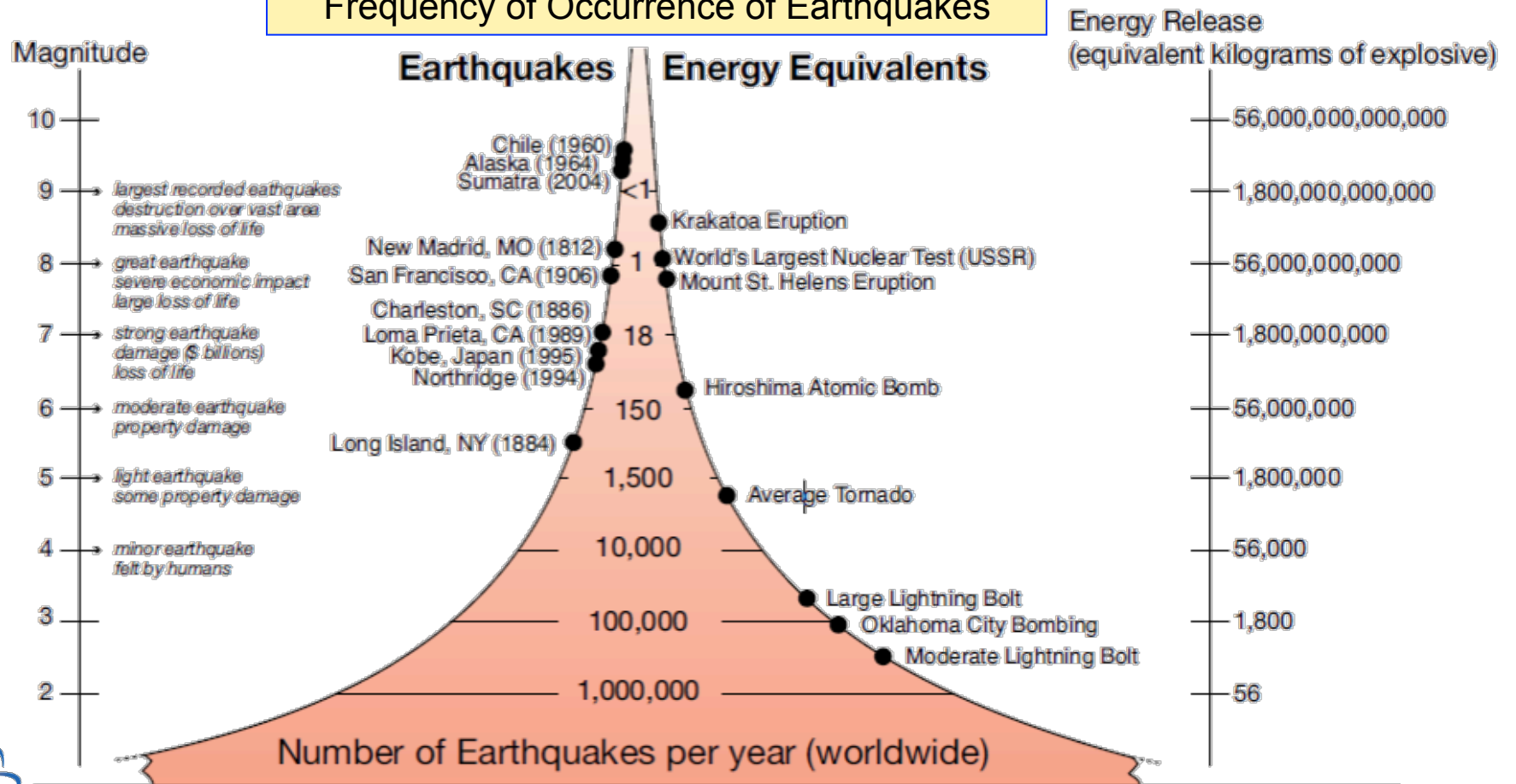


The distribution of lithospheric plates



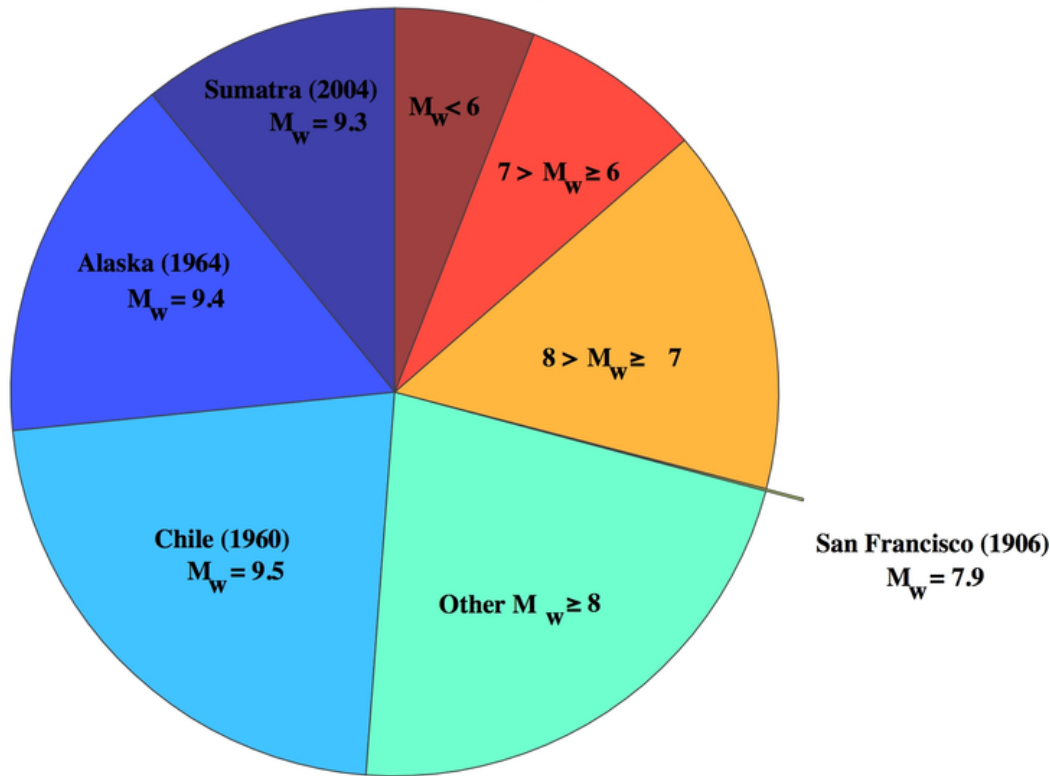
The Global Earthquake Cycle: Frequency, Energy & Magnitude

Frequency of Occurrence of Earthquakes



The Global Earthquake Cycle: Before Sendai, three earthquakes dominated the seismic moment and energy

Global Seismic Moment Release January 1906 - December 2005



Total Moment: 1.0×10^{24} Newton-meters

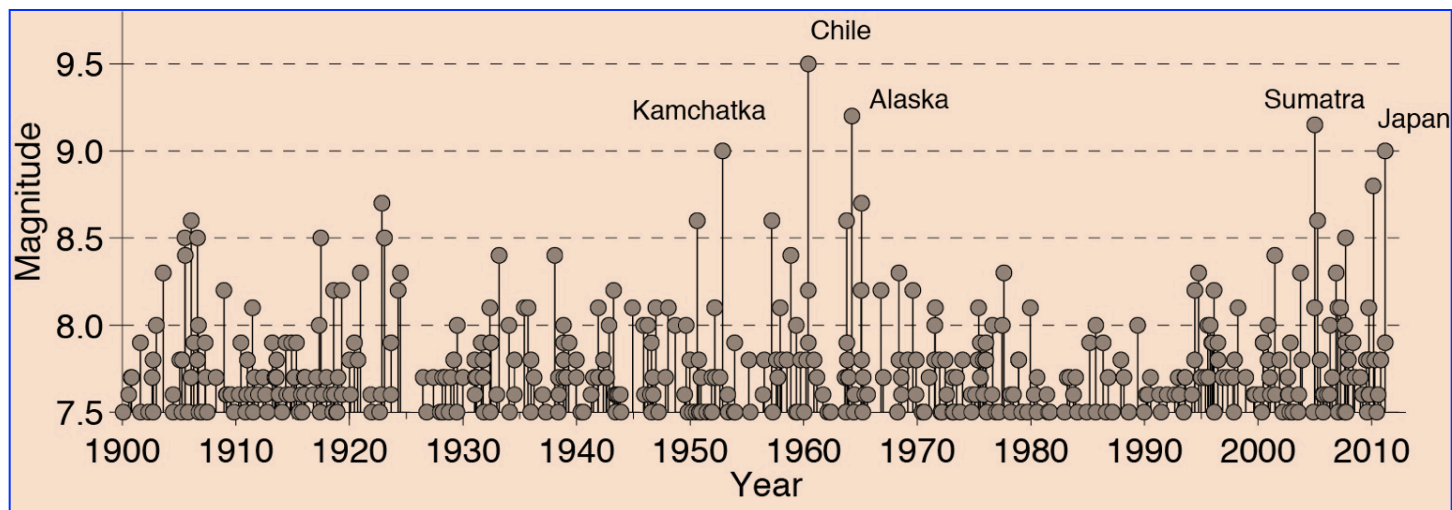
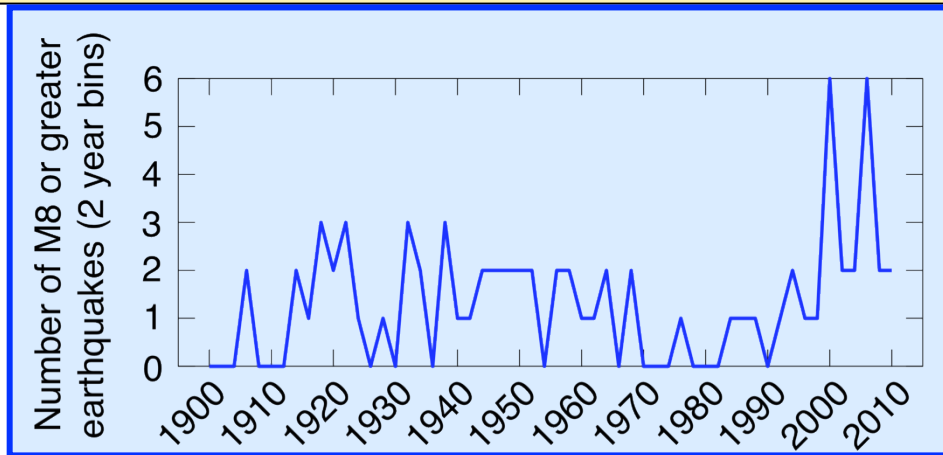
Largest quakes

The world's highest-magnitude earthquakes since 1900:

| Location | Year | Mag. |
|-------------------------------|------|------|
| Chile | 1960 | 9.5 |
| Prince William Sound, Alaska | 1964 | 9.2 |
| Off coast of Northern Sumatra | 2004 | 9.1 |
| Kamchatka, Russia | 1952 | 9.0 |
| Honshu Coast, Japan | 2011 | 8.9 |
| Off coast of Ecuador | 1906 | 8.8 |
| Chile | 2010 | 8.8 |
| Rat Islands, Alaska | 1965 | 8.7 |
| Northern Sumatra, Indonesia | 2005 | 8.6 |
| Assam, Tibet | 1950 | 8.6 |
| Andreanof Islands, Alaska | 1957 | 8.6 |
| Southern Sumatra, Indonesia | 2007 | 8.5 |
| Banda Sea, Indonesia | 1938 | 8.5 |
| Kamchatka, Russia | 1923 | 8.5 |
| Chile-Argentina border | 1922 | 8.5 |

Source: U.S. Geological Survey © 2011 MCT

The Global Earthquake Cycle: Earthquakes >M8 since 1900

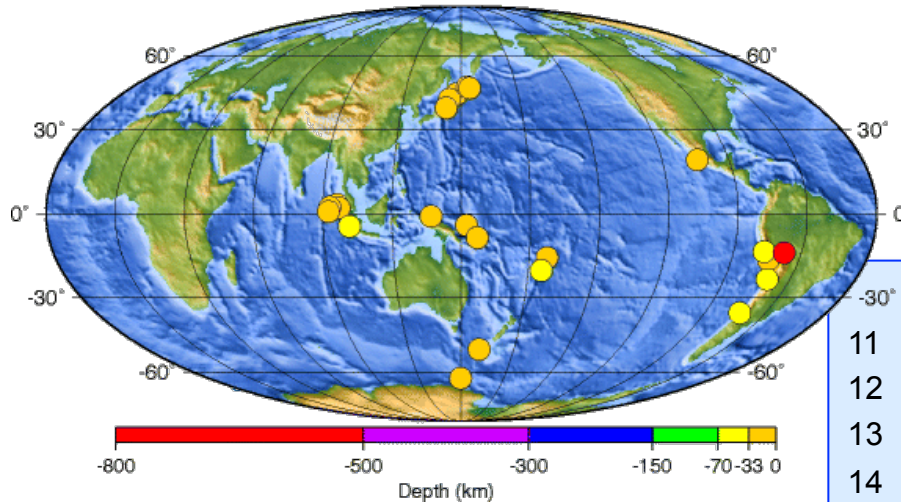


Modified from Ammon, Lay, and Simpson (2010)

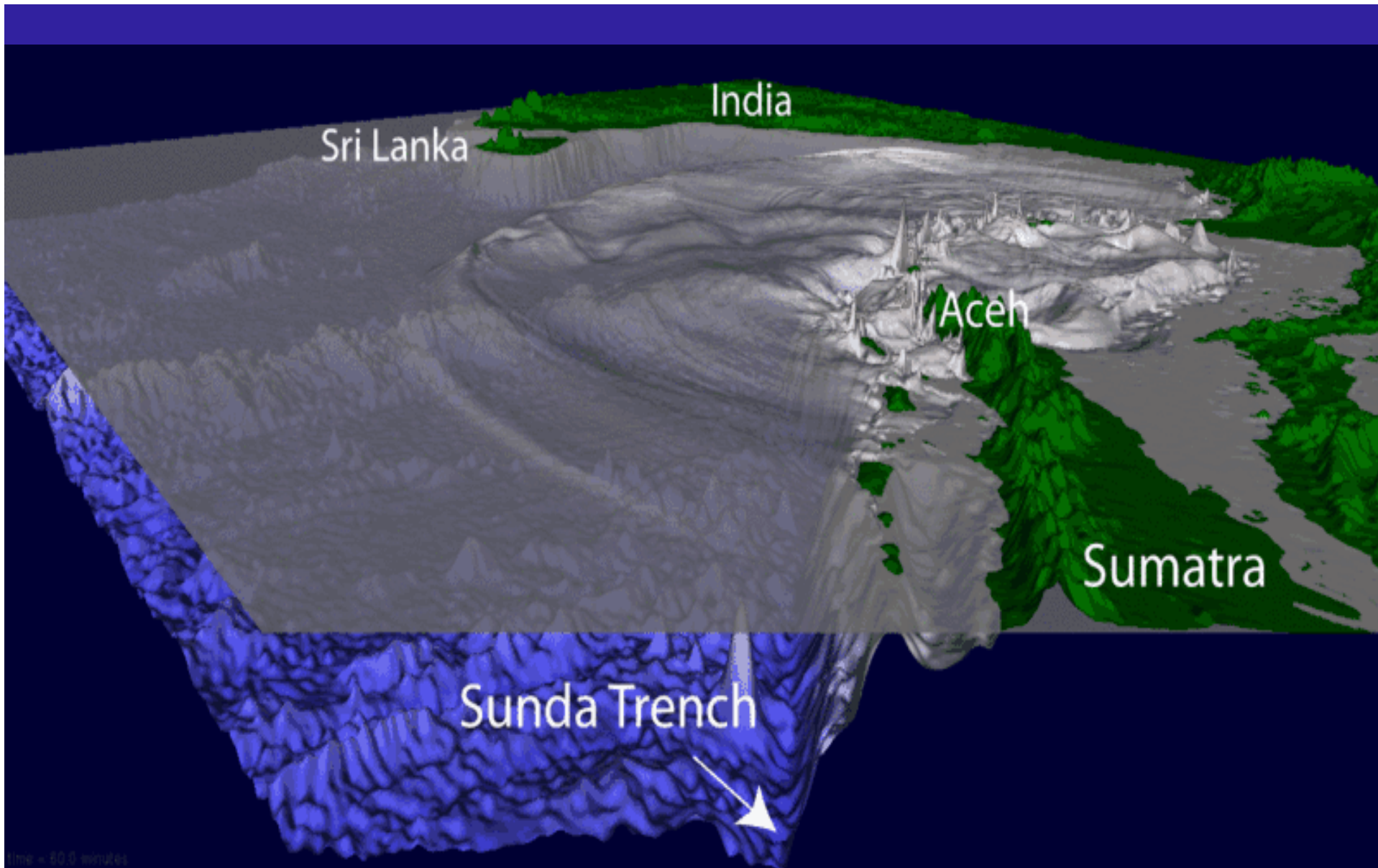
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Data suggest that we are currently in an Active Cycle of Great Earthquakes

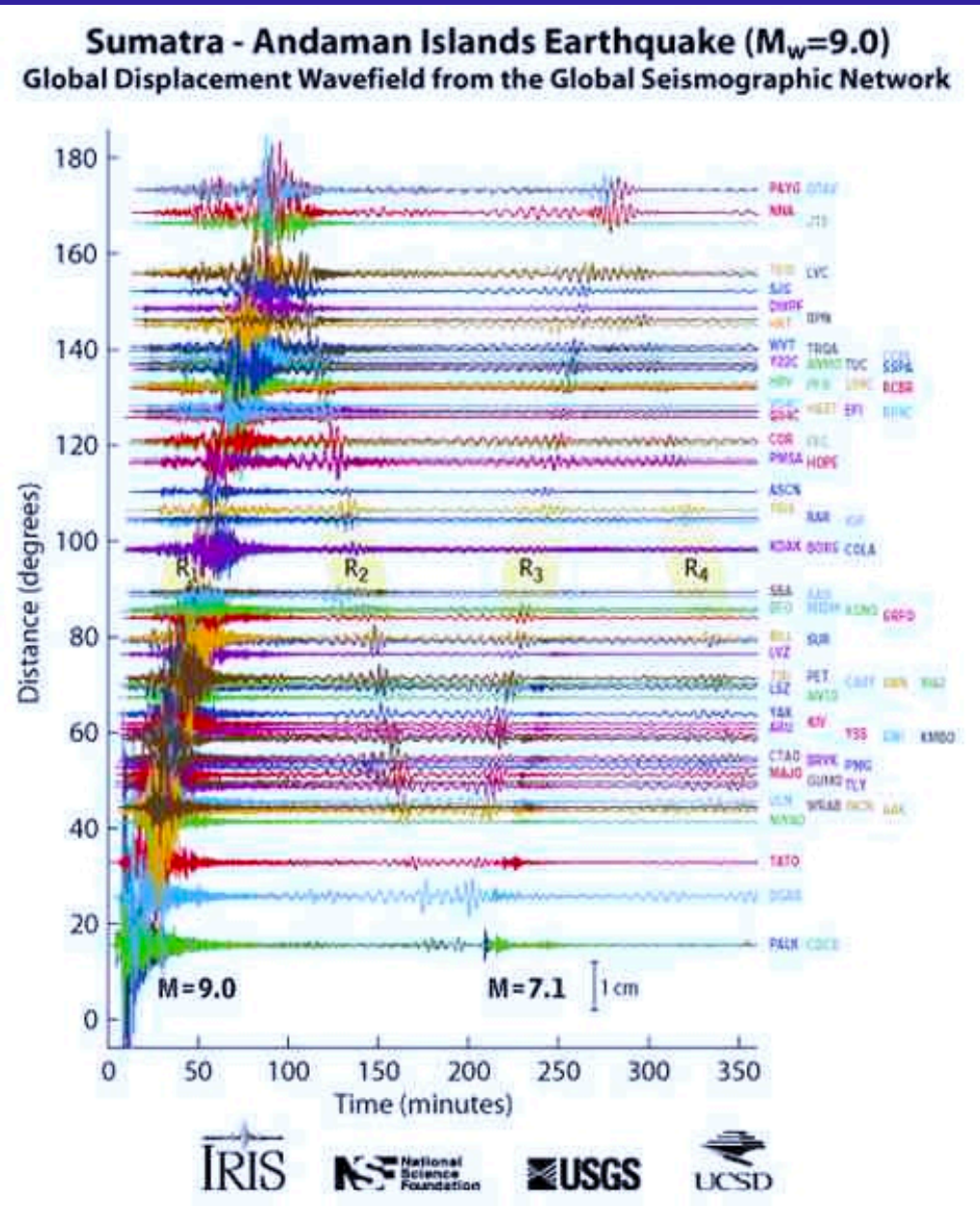
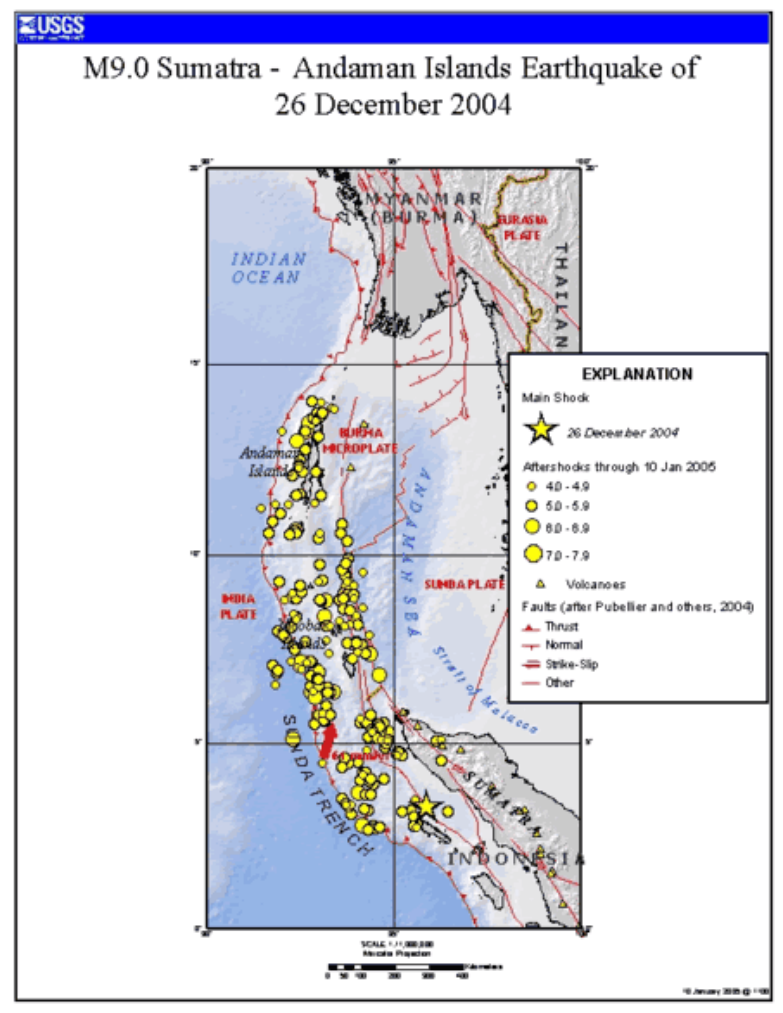
Earthquakes Magnitude 8.0 and Greater since 1990



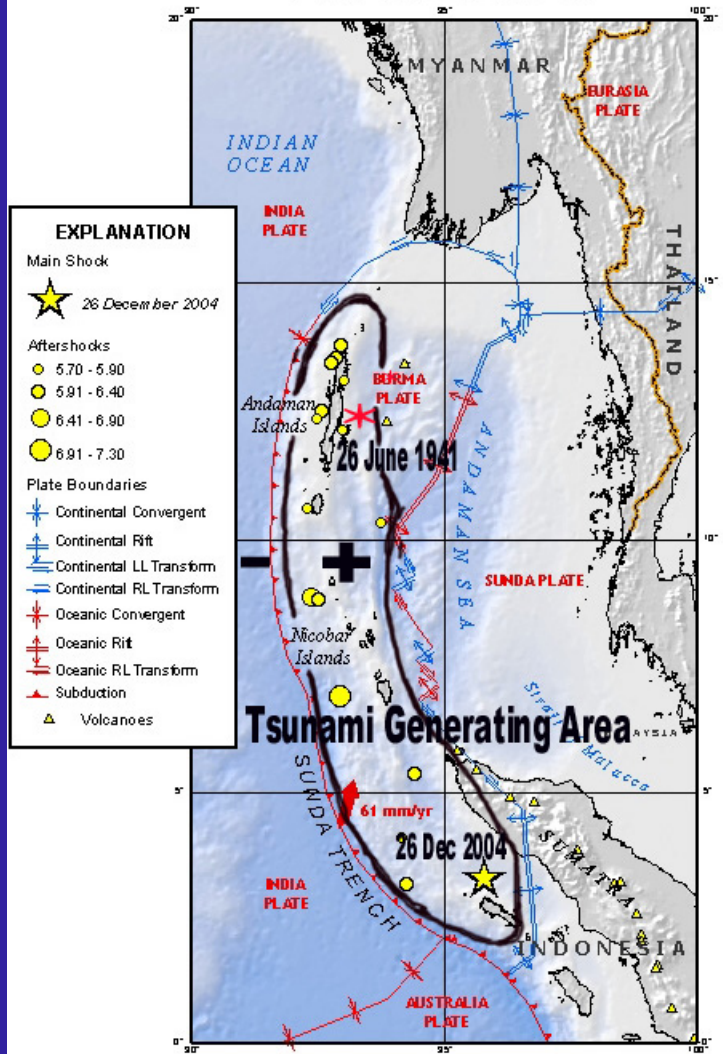
| | <u>DATE</u> | <u>MAG</u> | <u>LOCATION</u> |
|----|-------------|------------|------------------------------------|
| 11 | 2004 12 26 | 9.1 | Off West Coast of Northern Sumatra |
| 12 | 2005 03 28 | 8.6 | Northern Sumatra, Indonesia |
| 13 | 2006 05 03 | 8.0 | Tonga |
| 14 | 2006 11 15 | 8.3 | Kuril Islands |
| 15 | 2007 01 13 | 8.1 | East of the Kuril Islands |
| 16 | 2007 04 01 | 8.1 | Solomon Islands |
| 17 | 2007 08 15 | 8.0 | Near the Coast of Central Peru |
| 18 | 2007 09 12 | 8.5 | Southern Sumatra, Indonesia |
| 19 | 2009 09 29 | 8.1 | Samoa Islands region |
| 20 | 2010 02 27 | 8.3 | Offshore Maule, Chile |
| 21 | 2011 03 11 | 9.0 | Near east coast of Honshu, Japan |
| 22 | 2012 04 11 | 8.7 | Off W coast of northern Sumatra |
| 23 | 2012 04 11 | 8.2 | Off W coast of northern Sumatra |



Sumatra – Andaman Islands Earthquake, 26 DEC 2004

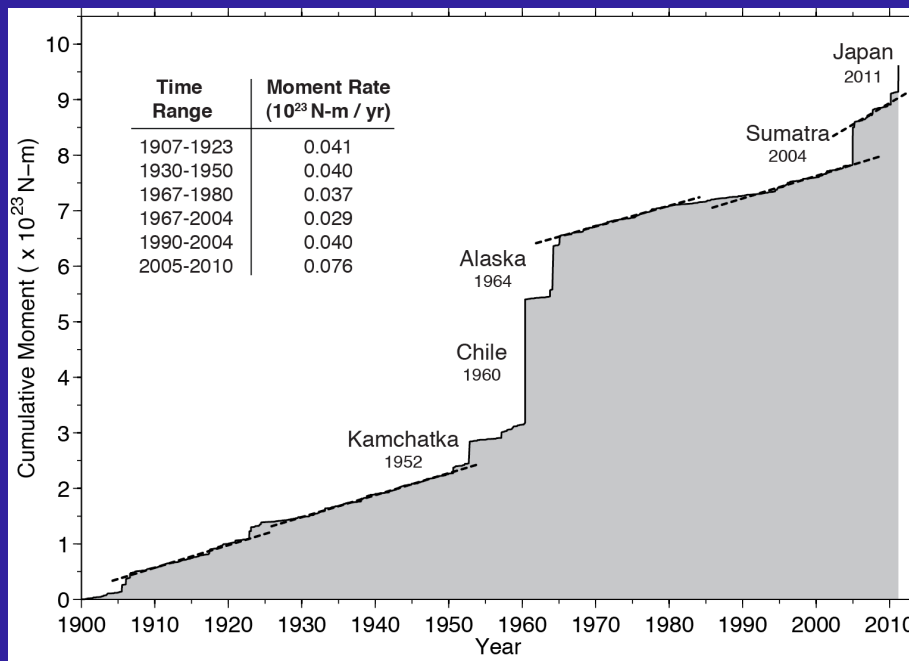


M9.0 Andaman - Nicobar Islands Earthquake of 26 December 2004



Is the Moment Rate Changing?

Does this mean
plate tectonics
is speeding up?



Modified from Ammon, Lay, and Simpson (2010)

