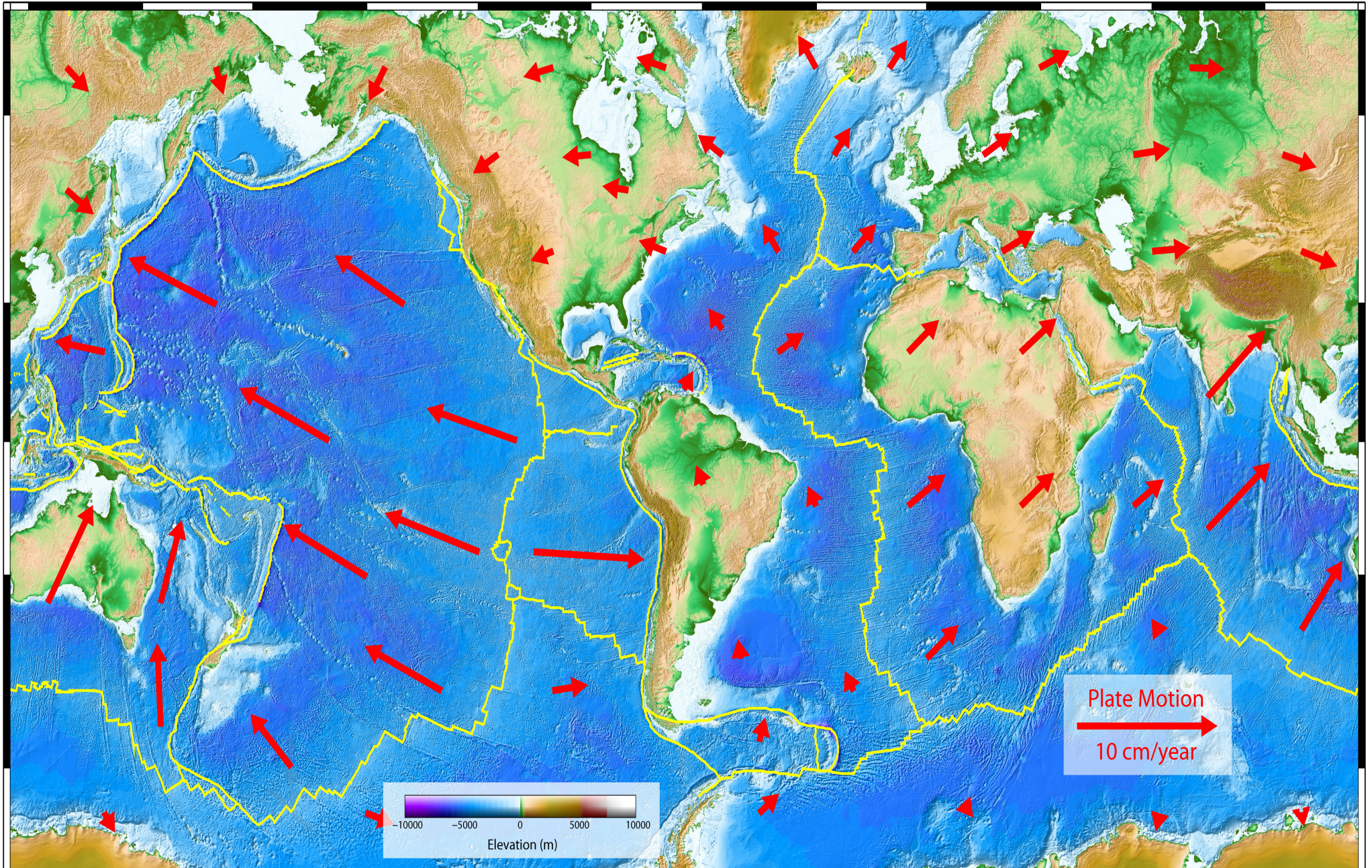
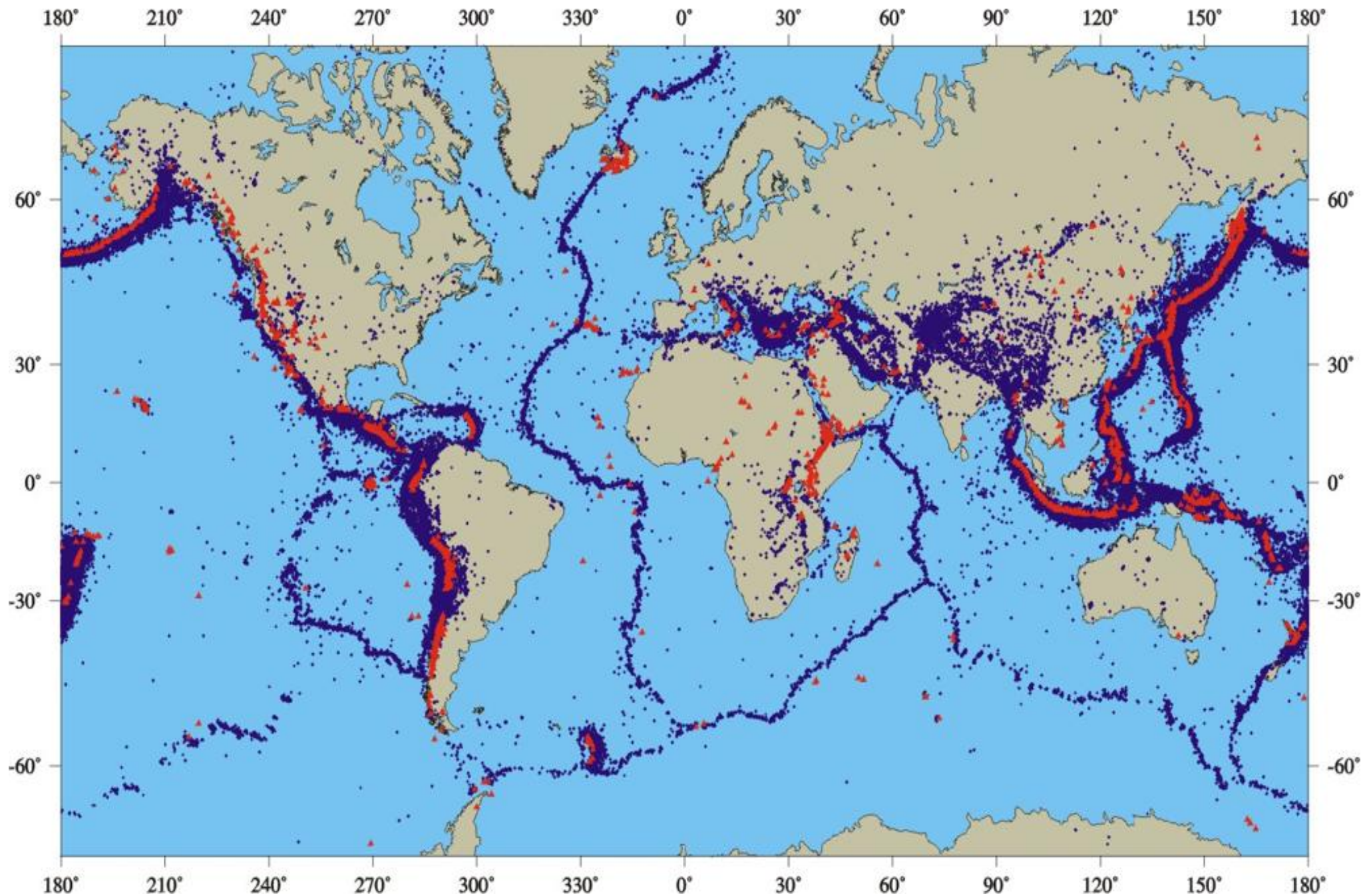


Plate tectonics, continental drift & subduction prevail



Earthquakes are a daily occurrence



Subduction zones create volcanoes



Image Credit : US Geological Survey

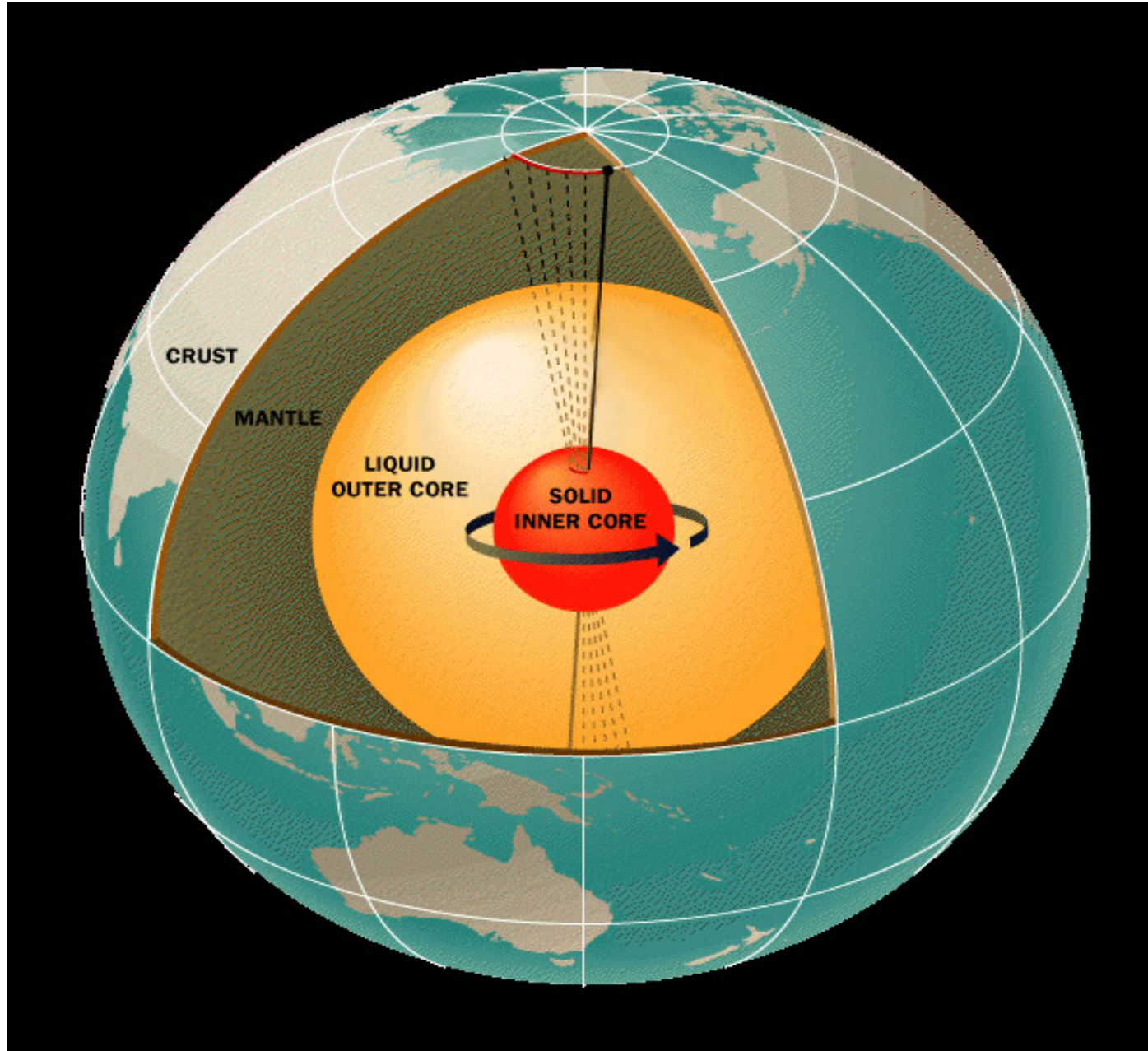
The Ring of Fire includes 452 major volcanoes!



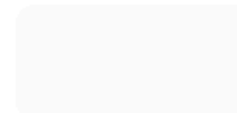
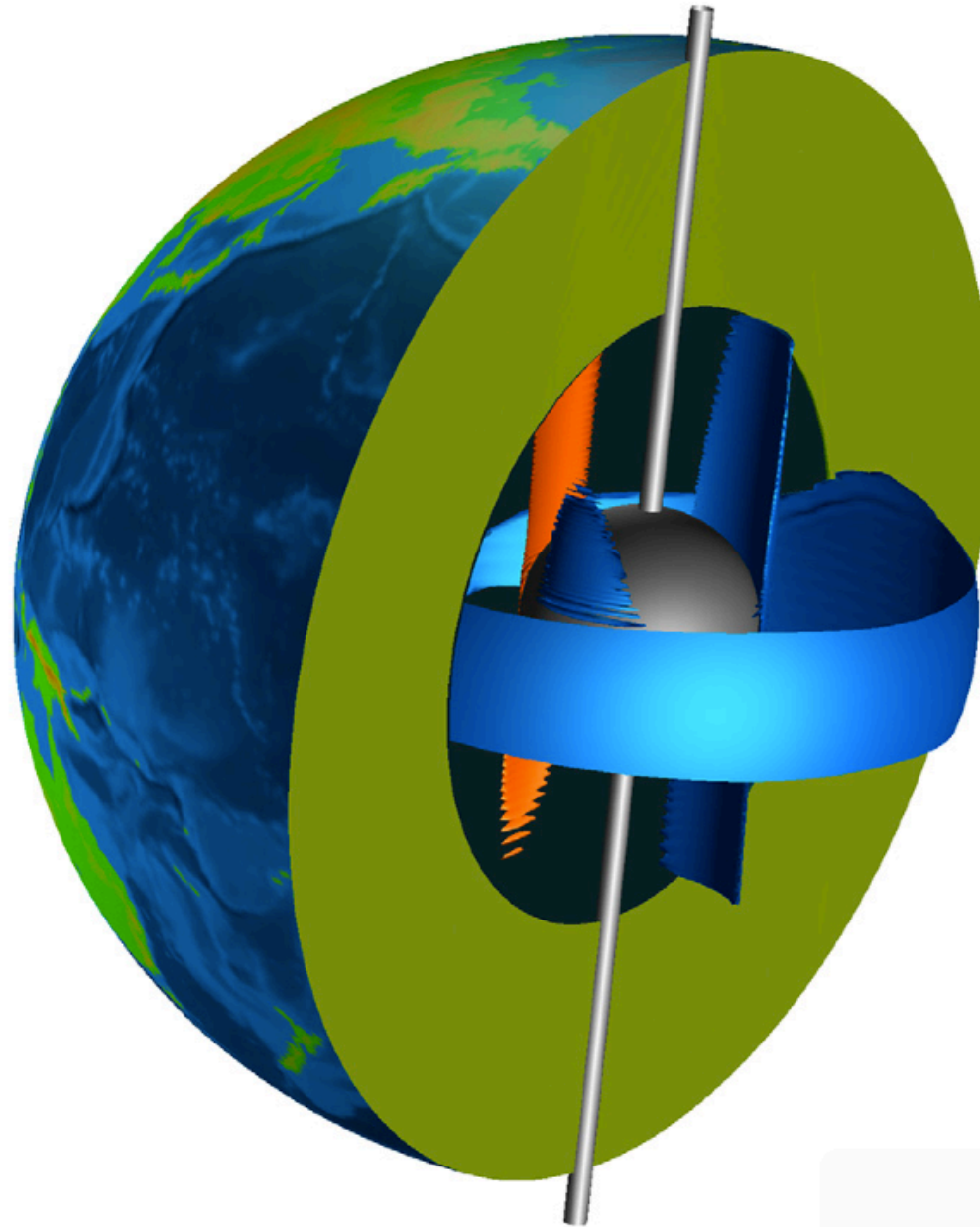
Daily, an average 20 volcanoes out-gas aerosols & CO₂



The Earth's dynamic core is full of mysteries



Earth's magnetic axis drifts and sometimes flips!



Our Natural & Social Systems are interwoven

They interact and sometimes we see:

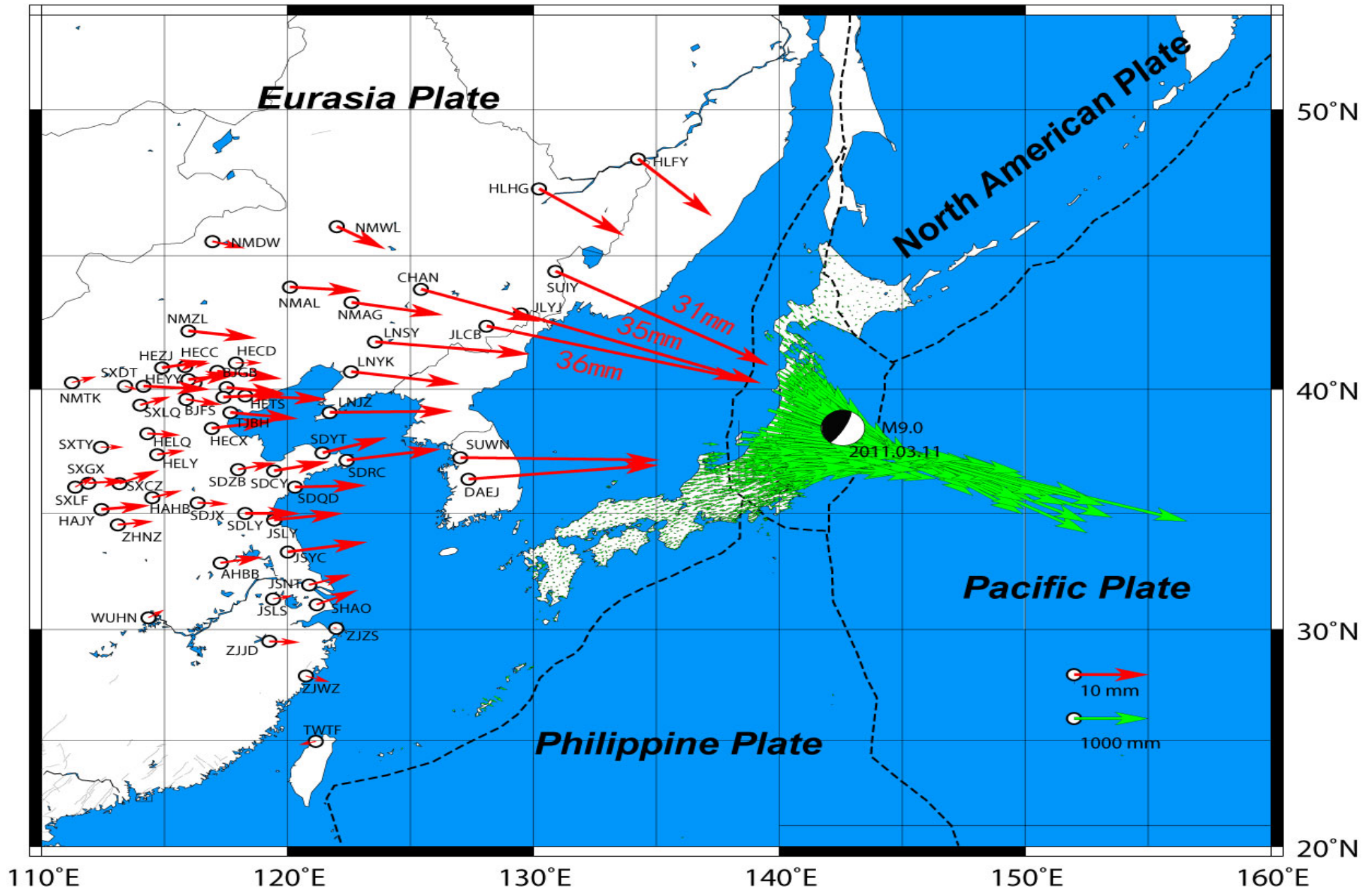
- Sequential collapse
- Synchronous collapse
- Multiple synchronous collapse

cascading across the boundary!

Frequent Natural-Social cascading crises ...

- 2000 SE Asia smoke haze
- 2003 European heatwave
- 2004 Sumatra tsunami
- 2005 Hurricane Katrina
- 2007 England floods
- 2008 Wechuan earthquake
- 2010 Haiti earthquake
- 2010 Icelandic ash cloud
- 2010 Russian heatwave
- 2010 Deepwater Horizon oil spill
- 2011 Pakistan floods
- 2011 Queensland floods
- 2012 Superstorm Sandy
- 2013 North German floods
- 2013 Supertyphoon Haiyan

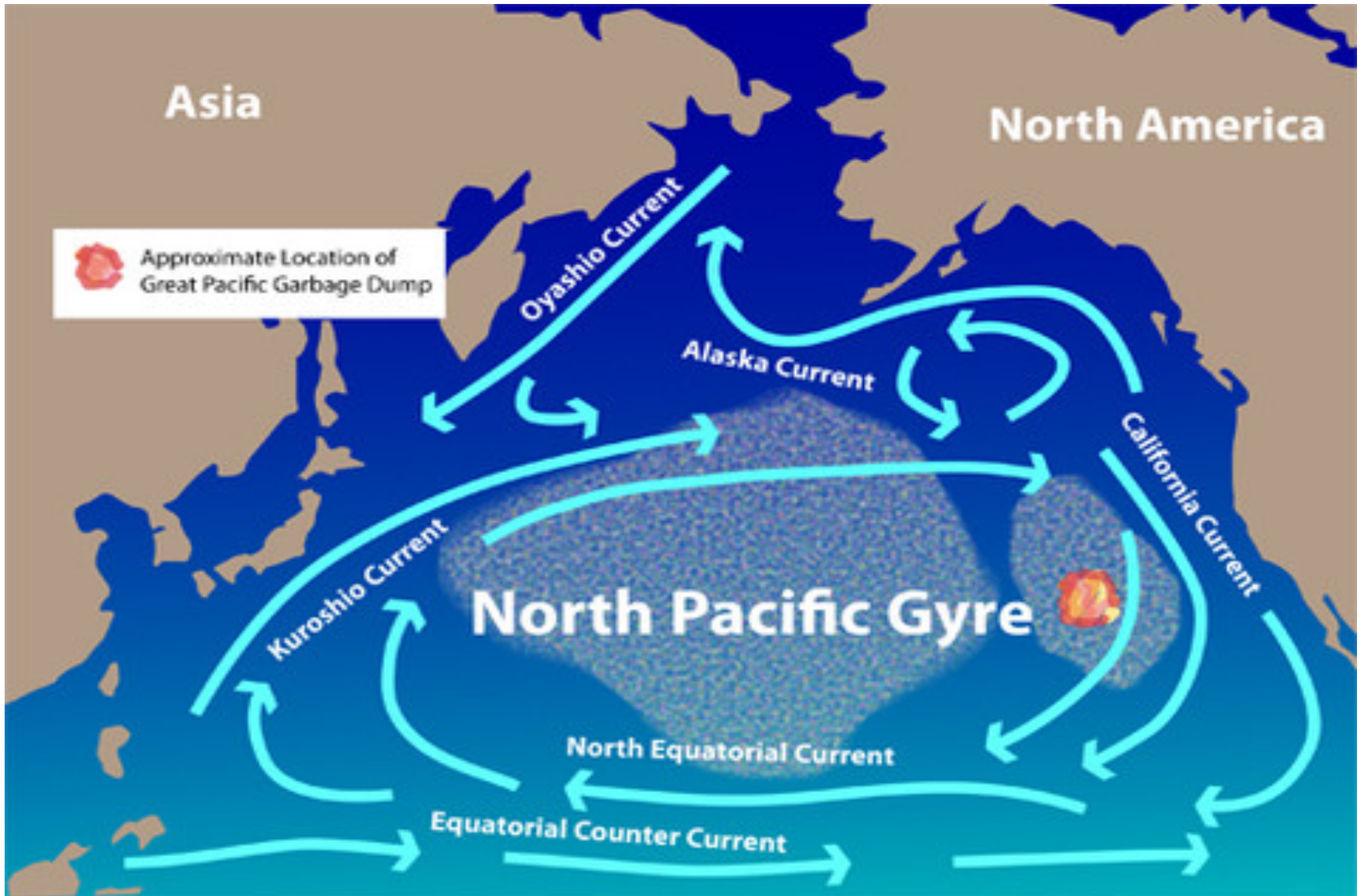
The Great East Japan Earthquake 11 March 2011



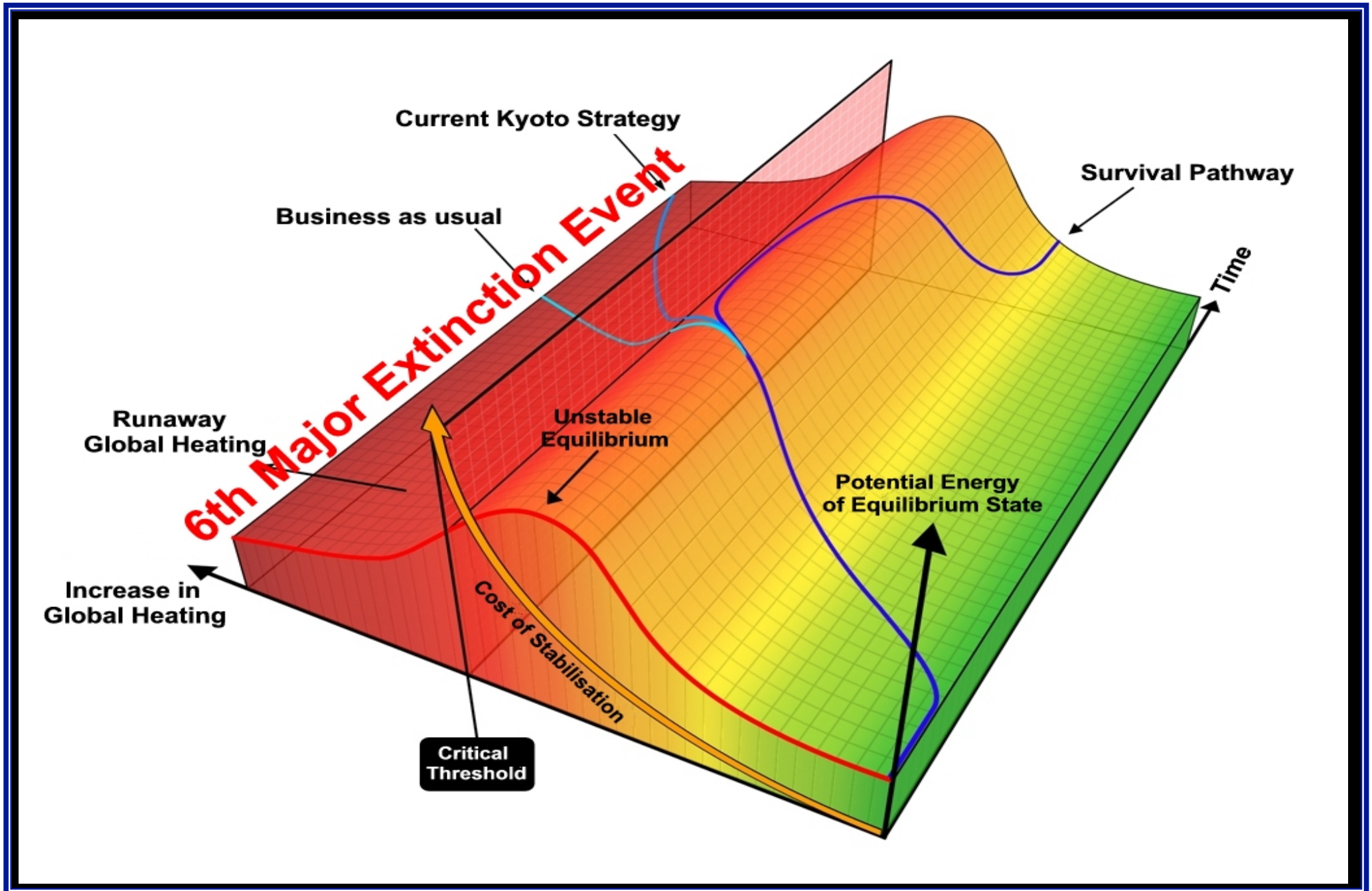
Causing multiple cascading disruption and collapse!

- M9.0 earthquake offshore
- 10m tsunami strikes NE coastline of Japan
- Water surge to 45m height in coastal valleys
- 400,000 structures destroyed + 18,500 lives
- Global manufacturing supply chain disrupted
- 3 nuclear reactors meltdown - towns evacuated
- TEPCO bankrupt, Prime Minister Kan resigns
- Switzerland & Germany decommit nuclear power
- Global nuclear industry standards changed forever
- And now nuclear contamination of the Pacific biosphere

Bioaccumulation within the North Pacific Gyre



Is society aware of Earth's planetary boundaries?





**Helping guide the successful transformation of human society
in an era of rapid climate change and frequent natural disasters.**

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