

BSSb1194

Earth  
is trying to kill  
us

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JAKUB DRMOLA



# Volcanoes

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- Santorini, ~1600BC
  - probably caused collapse of Minoan civilization
- Laki, 1783
  - 25+% of Iceland dead from poison gas
- Tambora, 1815
  - “year without summer” -> famines
  - 10-50 thousand direct casualties
- Krakatoa, 1883
  - 40-200 thousand direct casualties



# Volcanoes - effects

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- pyroclastic flows, mudflows, rocks and ash
- inhaling toxic gases and ash
- earthquakes and tsunamis
- climate impact
  - short regional greenhouse effect
  - acid rains, ozone depletion
  - cooling from aerosols (albedo)
  - long-term CO<sub>2</sub> warming
- but also bring resources to the surface
- release of CO<sub>2</sub> can reverse runaway global cooling





# Limnic eruptions

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- aka “lake turnovers”
- Lake Nyos, 1986
  - Cameroon, 1700 dead
- Lake Kivu, not yet
  - DRC/Rwanda border, potentially up to a million

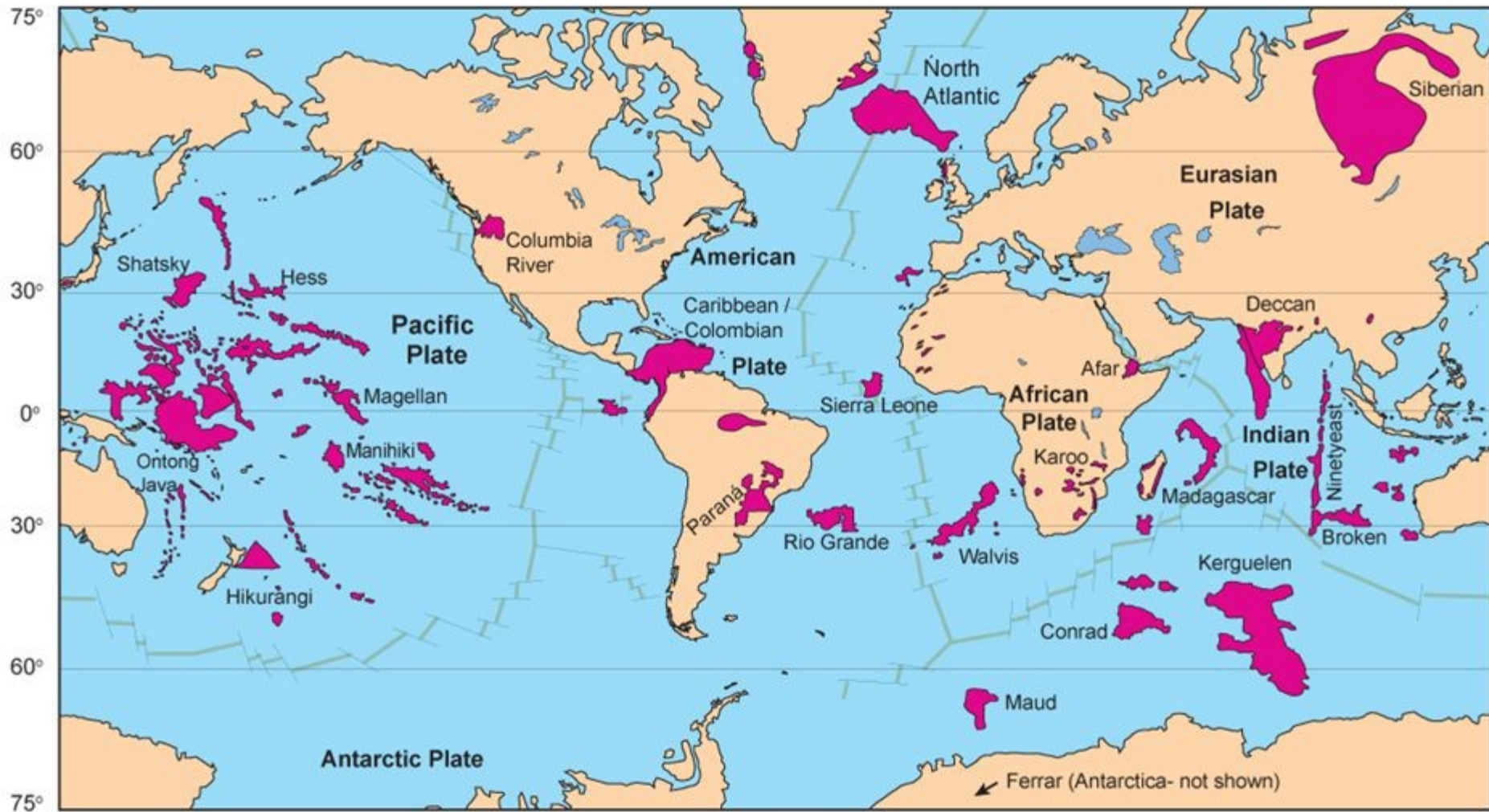


# Large Igneous Provinces

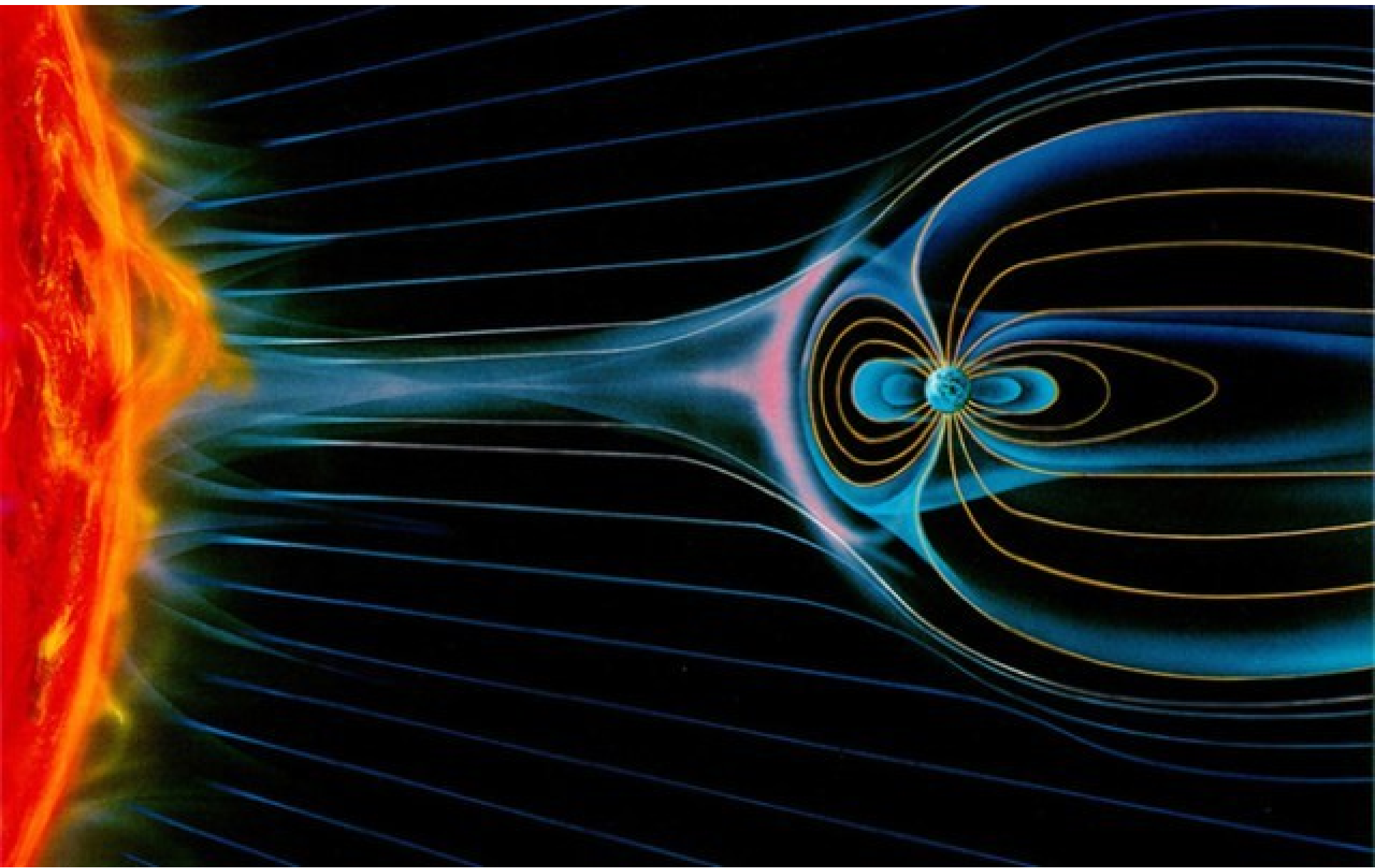
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- massive lava outflows
- most common cause of mass extinctions
- can last up to millions of years
  
- e.g. Siberian Traps, Deccan Traps
- we are “due” for one (15 mil. years)

# Large Igneous Provinces (LIPs)



**Figure 15.1.** Map of the major large igneous provinces (LIPs) on Earth, including continental flood basalt provinces, volcanic passive margins, oceanic plateaus, aseismic submarine ridges, ocean basin flood basalts, and seamount groups. After Saunders et al. (1992) and Saunders (pers. comm.).



# Geomagnetic reversal

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- magnetic poles move constantly
- magnetic poles reverse at “random” intervals
  - couple hundred of thousands of year on average
- it usually takes 1000s of years
  - during which the magnetic field is weak
- observations suggest we might be heading for one
  - consequences?

# Earthquakes

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- Haiti, 2010
    - 100-200 000 casualties
  - China, 1976
    - 200-600 000 casualties
  - China, 1556
    - 0.5-1 million casualties
- around 20 earthquakes with around 100k or more

# Earthquakes - effects

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- collapse of buildings, rock and mud slides
- fires and floods from damaged infrastructure



# Tsunamis

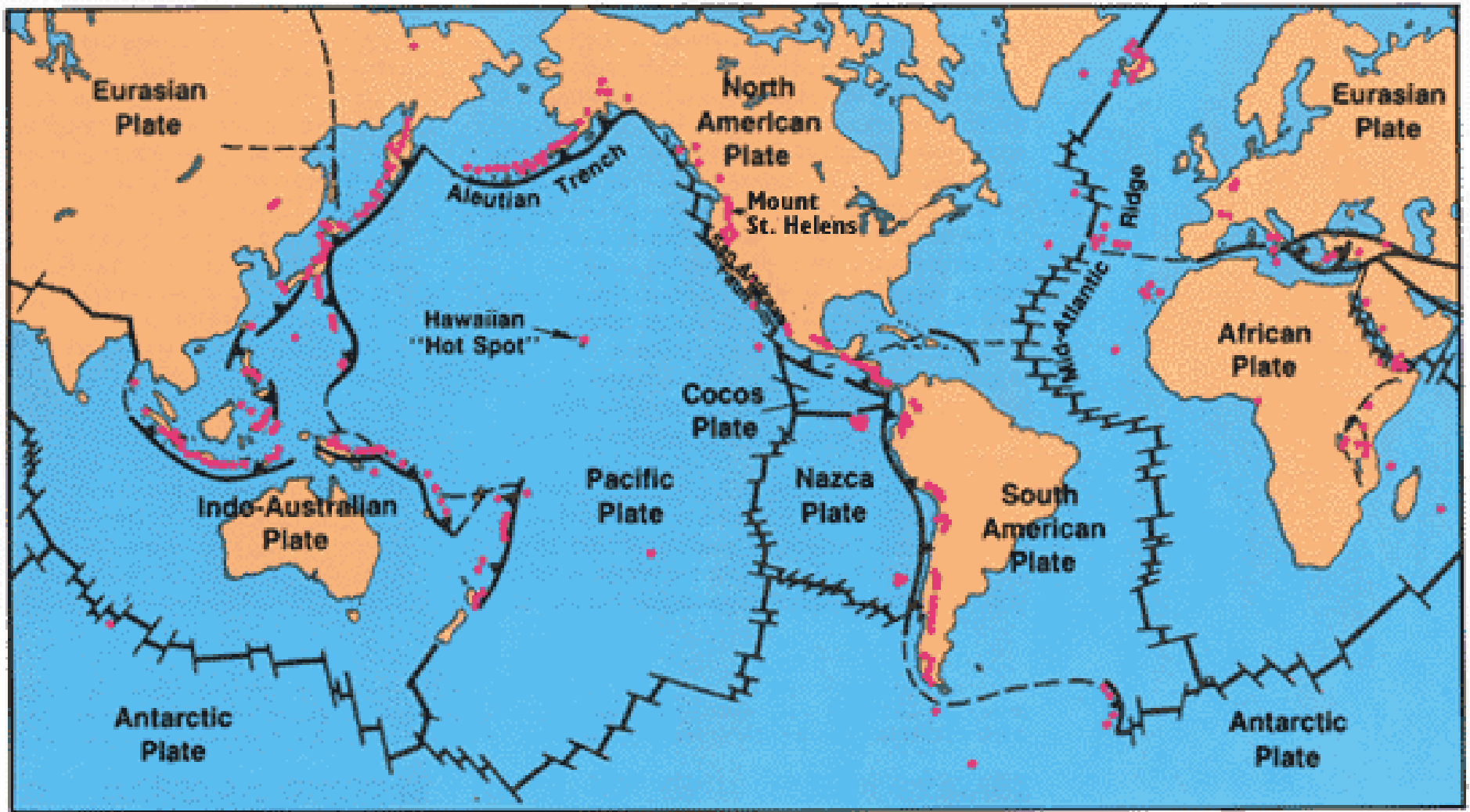
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- generally a secondary effect
  - of eruptions, earthquakes, impacts, rockslides
- 2011, Japan
  - Fukushima meltdown
- 2004, Indian Ocean
  - 280 000 dead, the worst recent disaster
  - probably deadliest tsunami in history
- 1908, Italy
  - 80-100 000 dead





# Active volcanoes of the world



  
Divergent (Spreading)

  
Convergent

  
Volcanoes



# Cultural impact

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- 1755, Lisbon

- collapsed buildings, tsunami, fires
- up to 100 000 casualties
- devastating for Portugal economically and politically
- impetus for Enlightenment, religion and philosophy