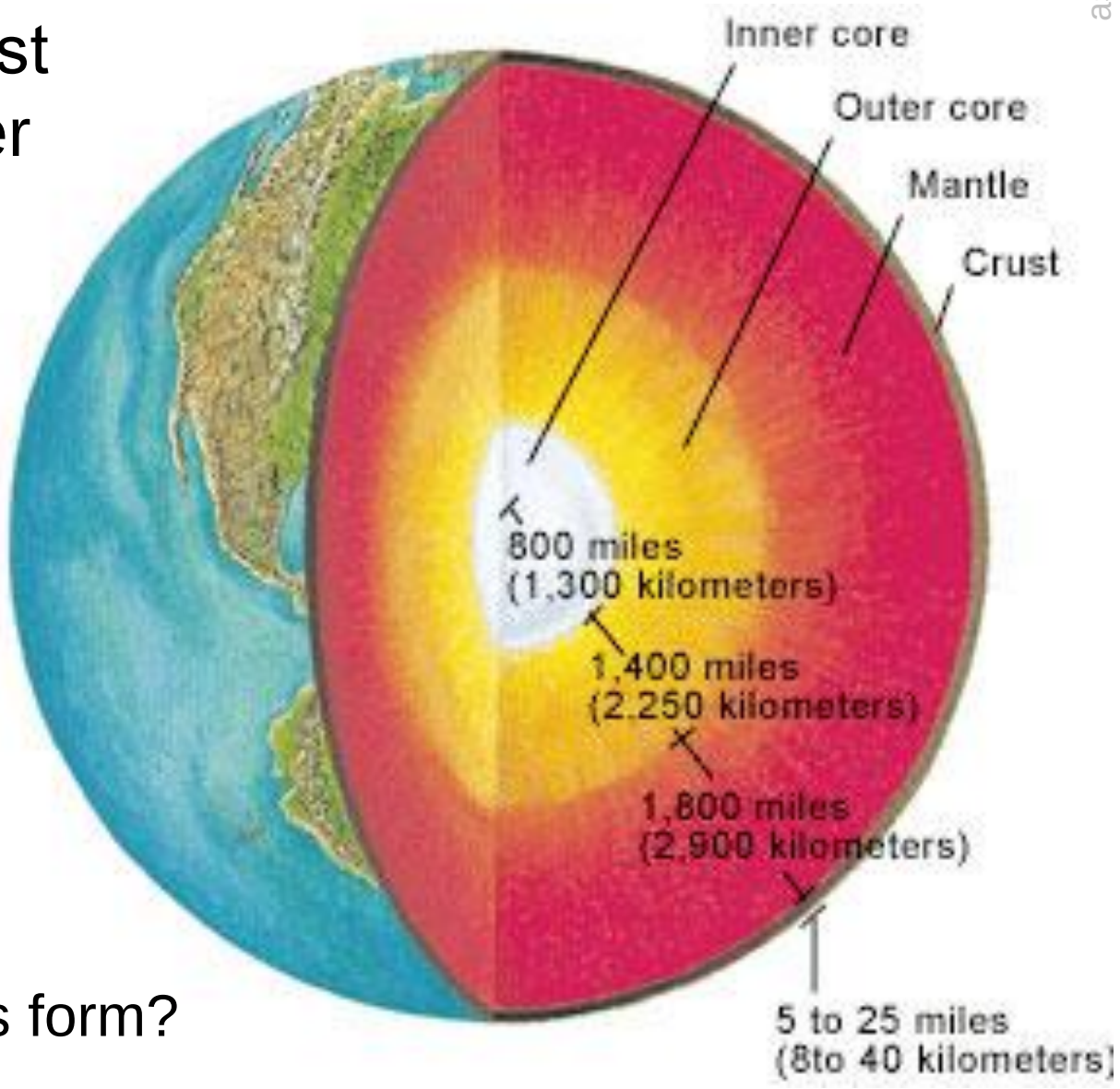
DISASTER ZONE

Volcanoes

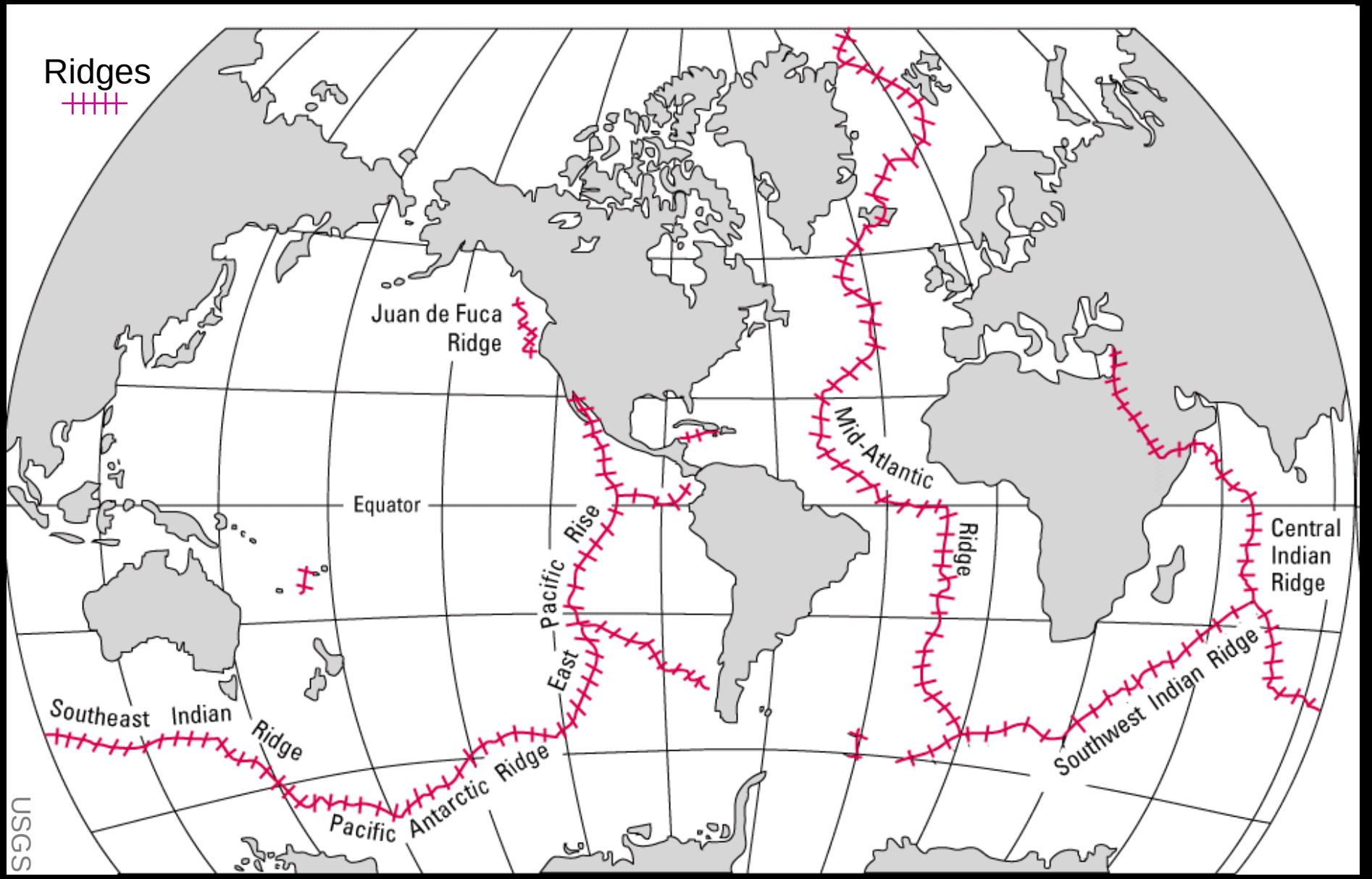
Volcano :

a vent in Earth's crust through which matter is erupted

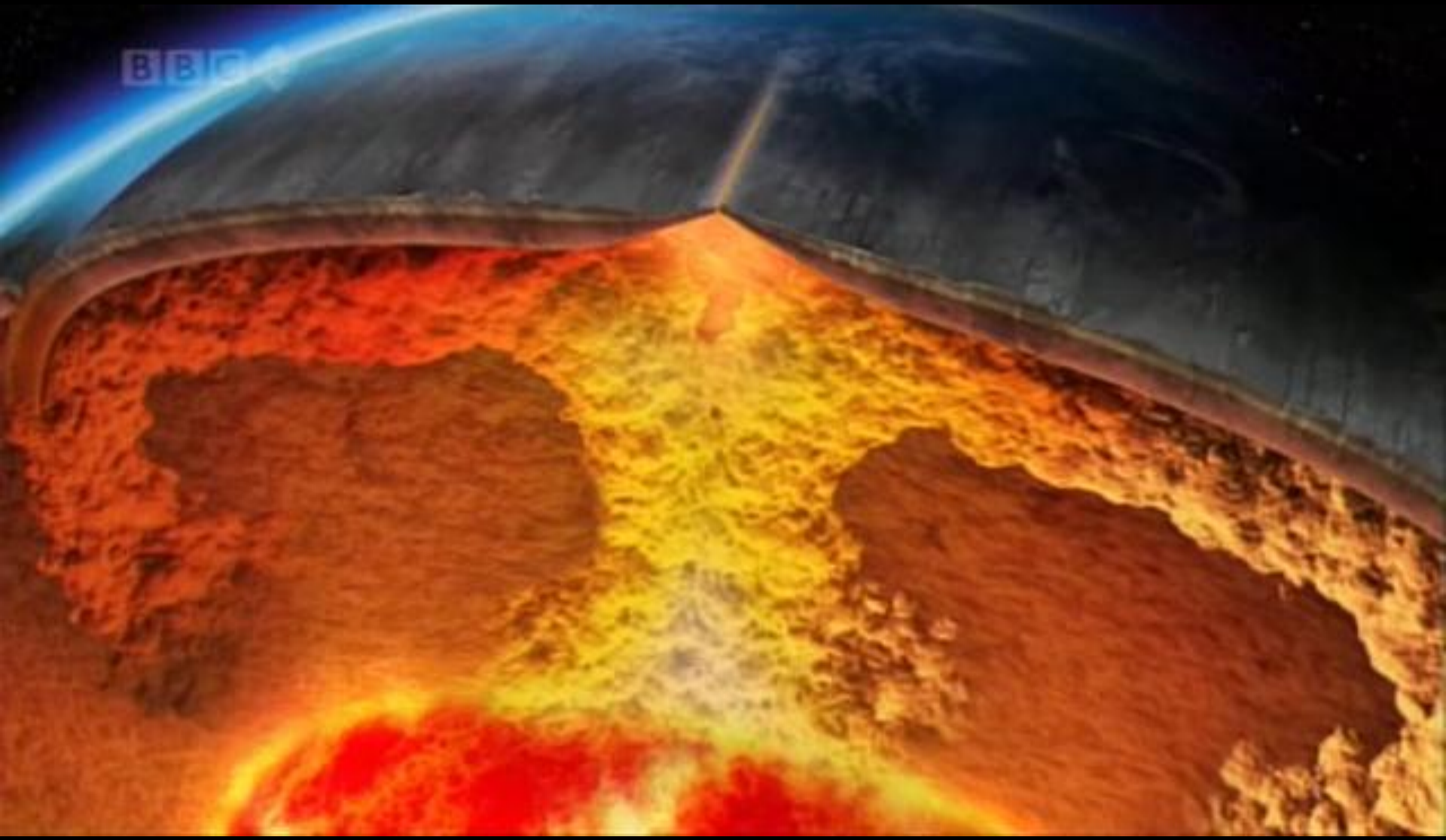


- How and why do volcanoes form?
- Where do volcanoes form?

Mid-Ocean Ridge volcanoes



At mid-ocean ridges, tectonic plates are moving apart



Mid-Ocean Ridge volcanoes

- Partial melting of the mantle results in basaltic magma
- The crust at mid-ocean ridges is very thin – there is no room to store magma
- This means magma cannot evolve – nearly all erupted lava is basaltic

Mid-Ocean Ridge volcanoes

Mid-Ocean Ridge volcanoes – on land!

Afar Consortium

Afar, Ethiopia

Mid-Ocean Ridge volcanoes – on land!

Afar, Ethiopia

Afar Consortium

Mid-Ocean Ridge volcanoes – on land!

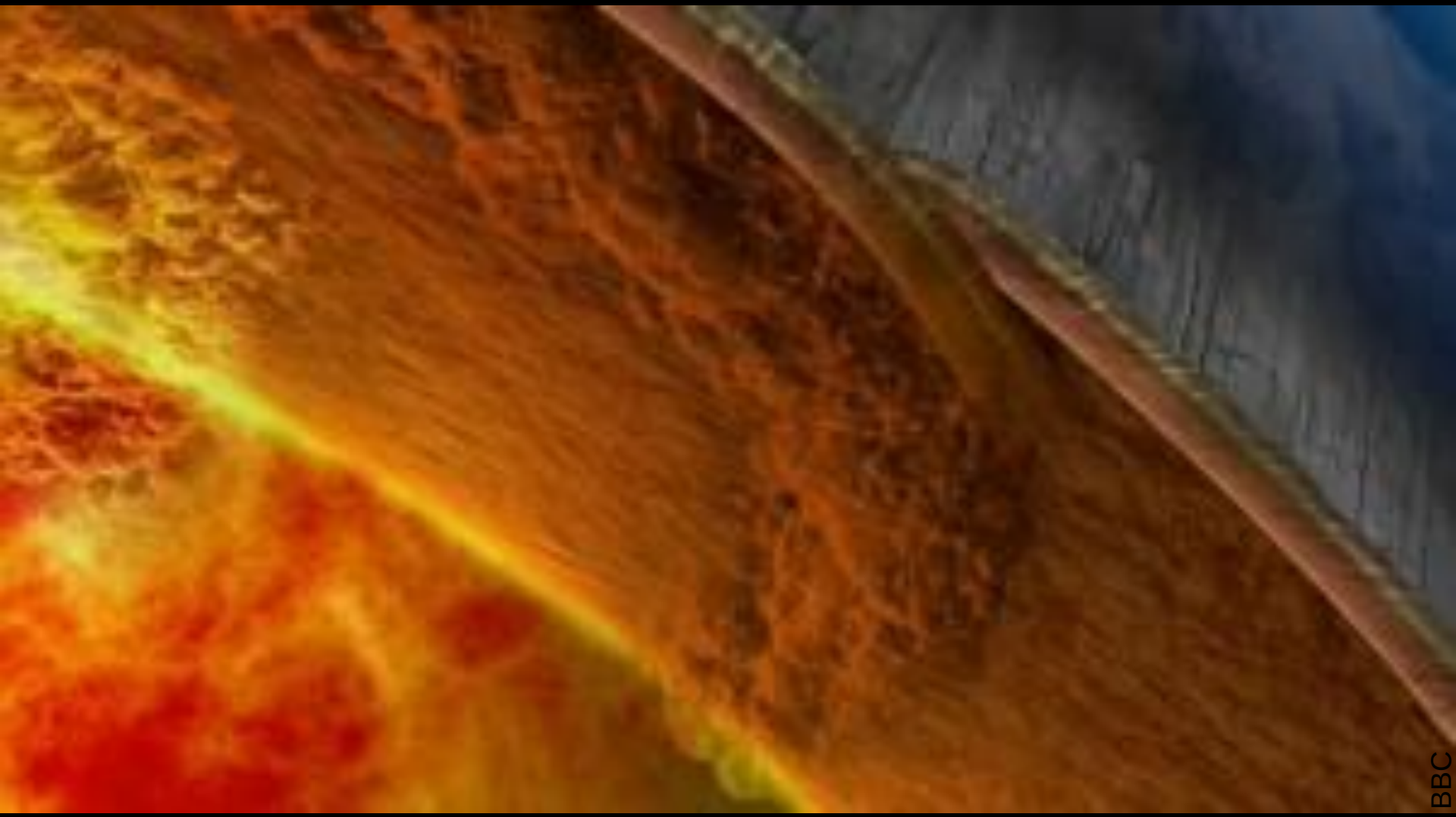
Lava lake, Afar, Ethiopia

Afar Consortium

Volcanoes form where tectonic plates are moving apart….

….but also where plates are moving toward each other

Subduction zone volcanoes

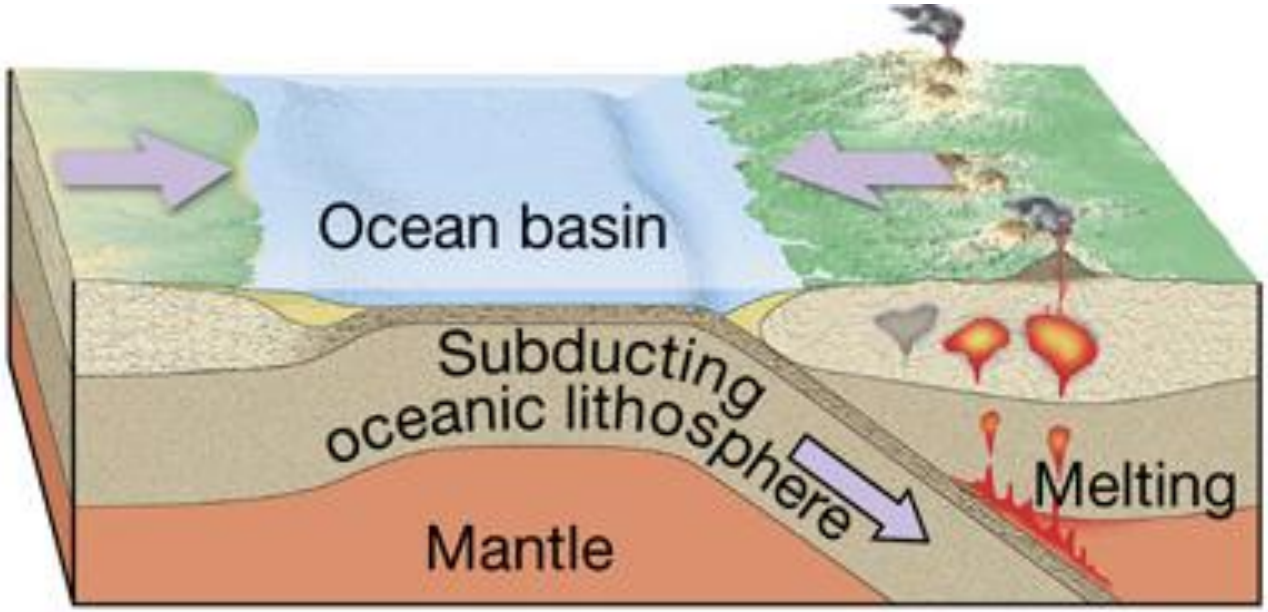


“Subduction” – the sinking of one plate beneath another

What happens when tectonic plates collide?

- Tectonic plates can be oceanic or continental

- When an oceanic plate collides with another plate, it begins to sink into the mantle



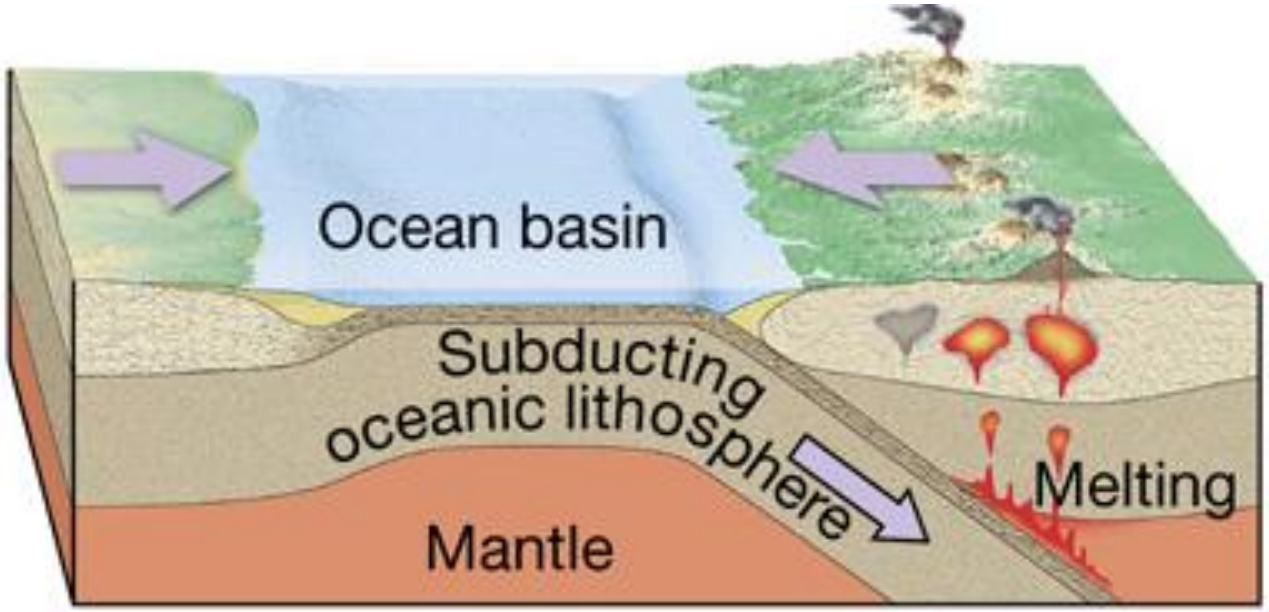
The mantle is contaminated by ‘subduction’ fluids

↓

This makes the mantle melt

↓

Volcanoes form



The mantle is contaminated by ‘subduction’ fluids

↓

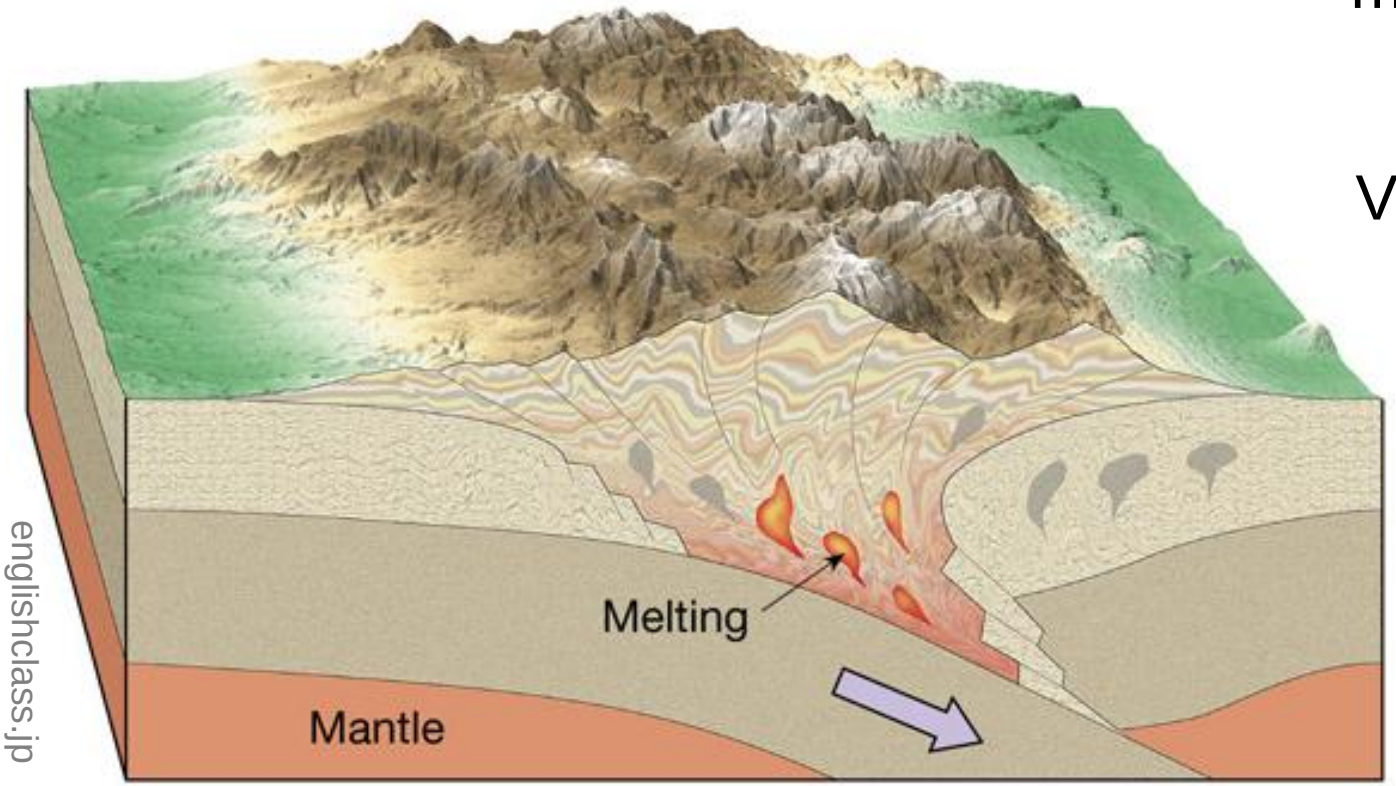
This makes the mantle melt

↓

Volcanoes form

↓

Volcanoes grow



Subduction zone volcanoes

- Volcanoes are often high cones
- Lava, pumice, ash, and gas are erupted
- These rocks are quite different….

….because they rise through thick crust, they are often stored in chambers where basalt can evolve

Jon Stone

Santiaguito, Guatemala

Subduction zone volcanoes are often explosive – and very dangerous

Plinian column – Pinatubo, Philippines

Pyroclastic flow – Pinatubo, Philippines

Explosive eruptions can be devastating

Los Chocoyos, Guatemala

Large eruptions leave very thick deposits

Ash cloud from Mount St Helens, USA

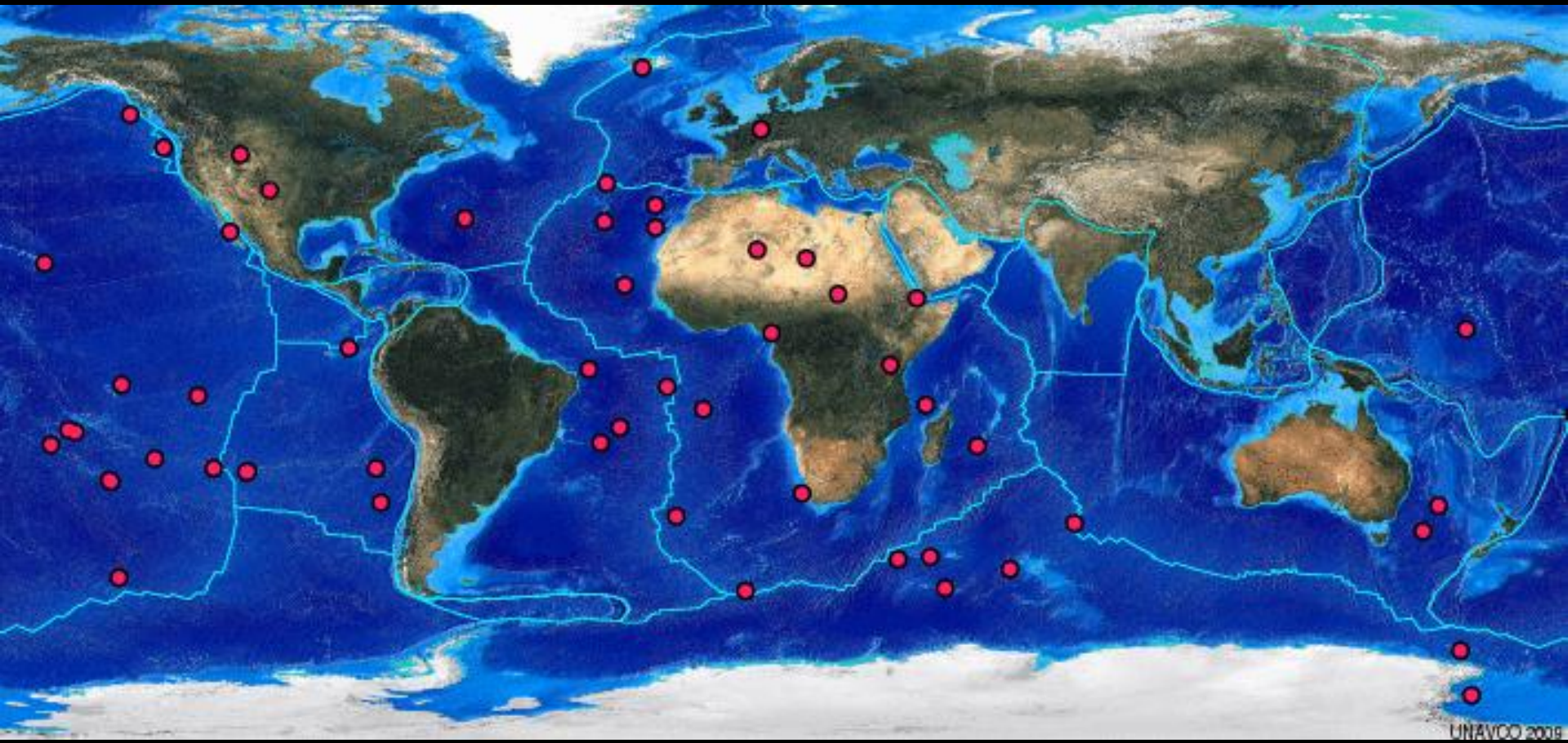
USGS

Plinian column – Chaiten, Chile

Lahar – Ruapehu, New Zealand

Lahars – Santiaguito, Guatemala

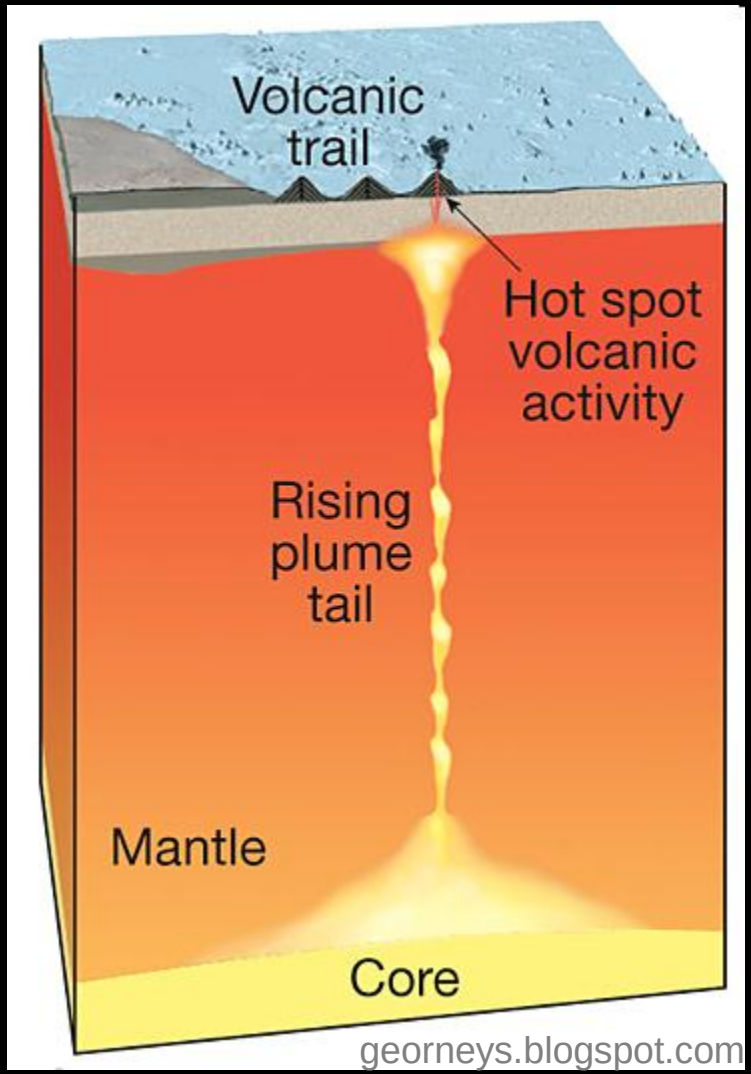
Hotspot volcanoes



These are not at the edges of tectonic plates!

Hotspot volcanoes

- Very hot plume of mantle rock rises from the Earth's core
- This rock is so hot it rises through the crust
- Partial melting occurs here because of the decrease in pressure
- Hawaii is the most famous hotspot volcano

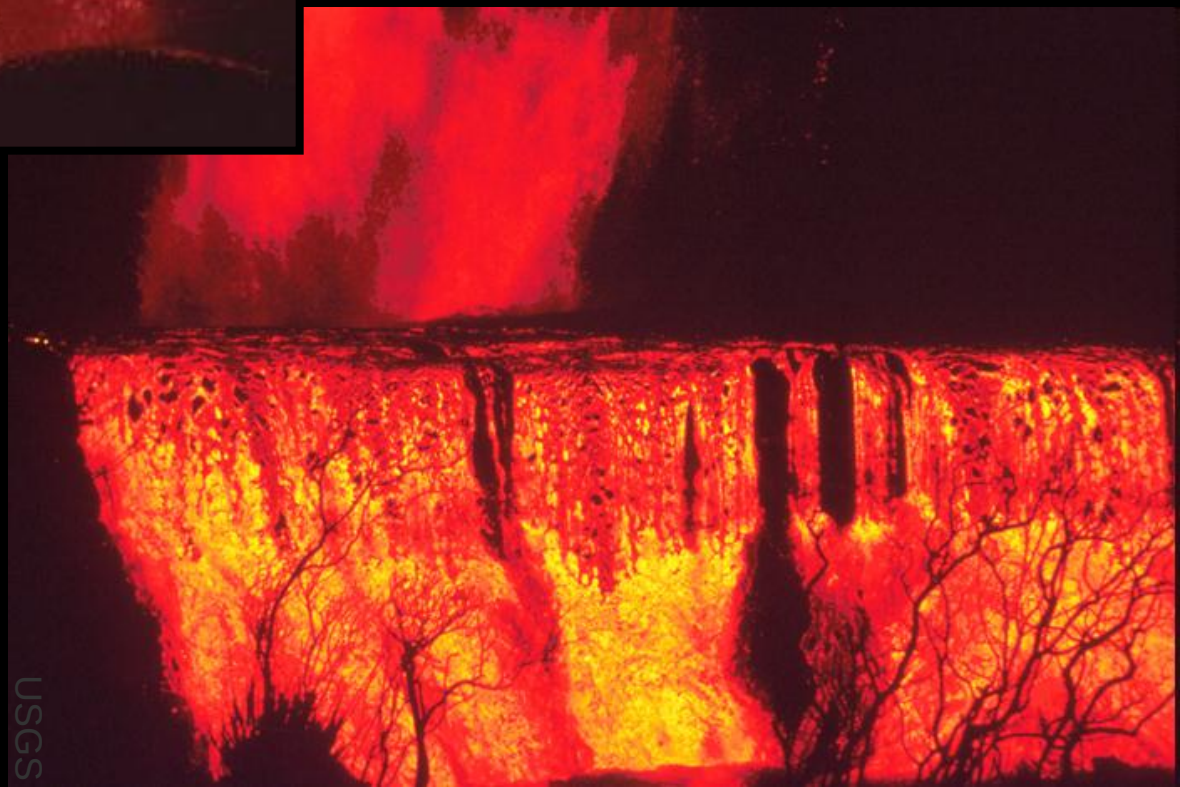


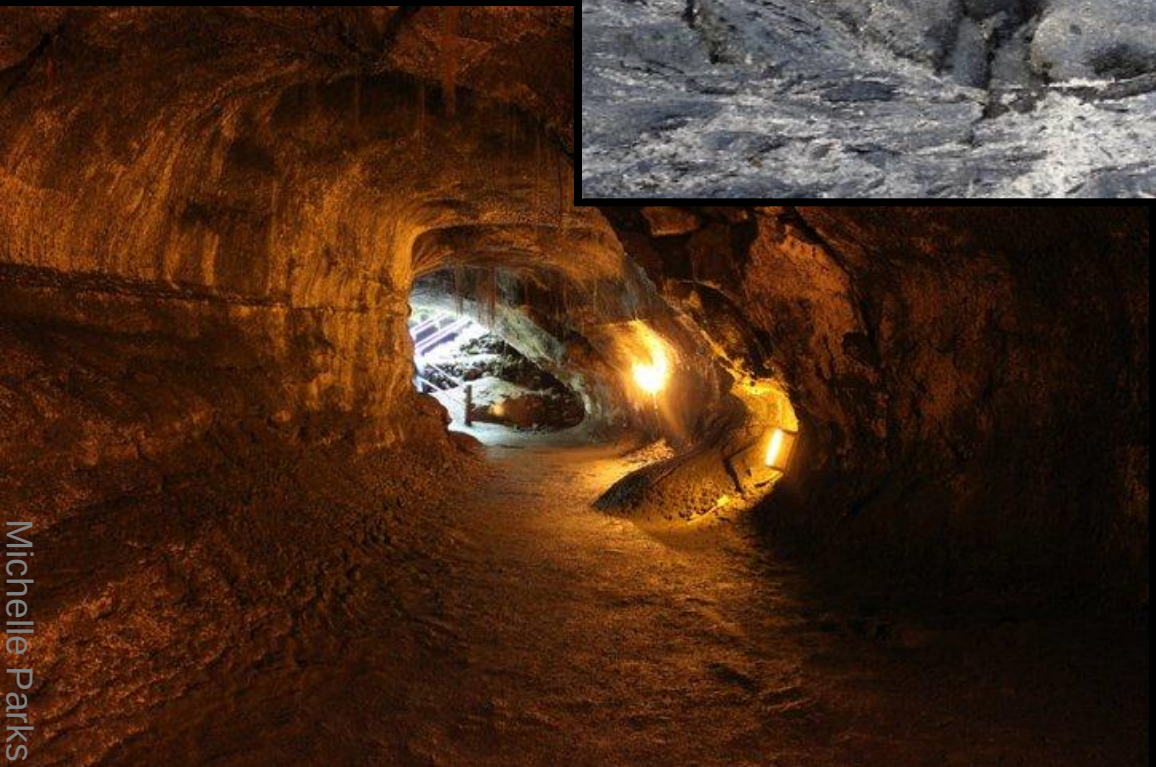
Most eruptions are non-explosive

Lava forms lakes….

….rivers….

….fountains,
cascades….





….and insulated tubes….

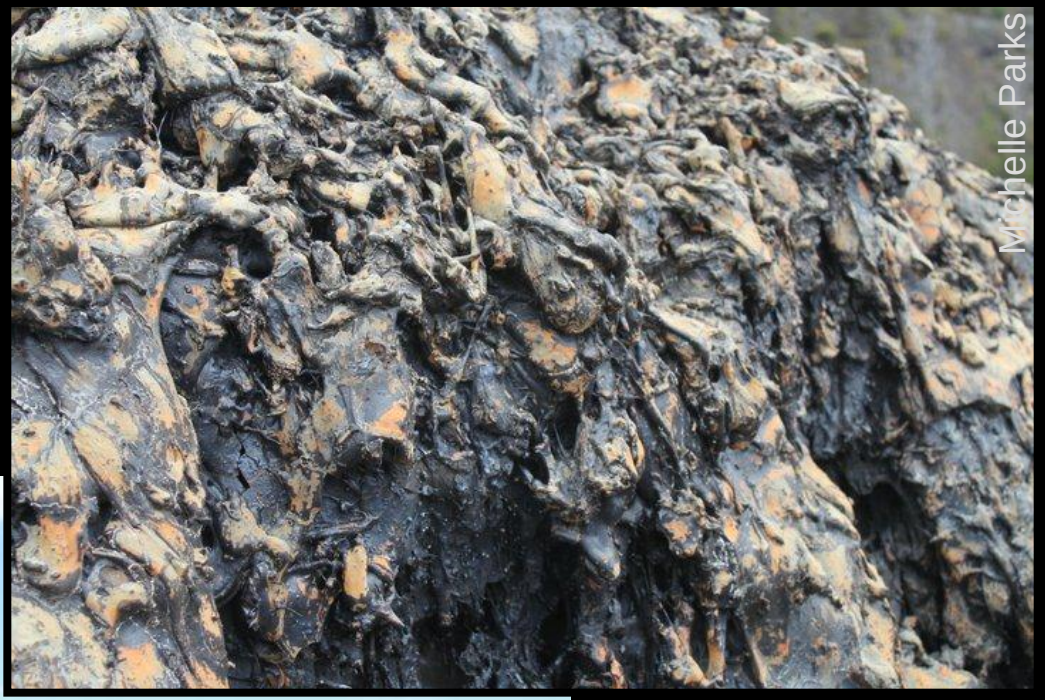
… it’s not always very fast!

Michelle Parks

….but it is still dangerous

This lava forms a skin as it cools

Some lava ‘freezes’ as spattered drops or thick ‘foam’



Mid-ocean ridge volcanoes	Subduction zone volcanoes	Hotspot volcanoes
Where tectonic plates are moving apart	Where tectonic plates are colliding	Anywhere
Magma forms from ‘pure’ mantle	Magma forms from ‘contaminated’ mantle	Magma forms from ‘pure’ mantle
Most eruptions are underwater – away from people	Eruptions are often explosive – very dangerous	Eruptions are often not explosive