

YEAR 8 UNIT 3 - Tectonic Hazards

Key Terms

Mid Atlantic Ridge – a mountain chain that runs north—south in the middle of the Atlantic Ocean.

Rift Valley – a narrow steep-sided valley formed by the collapse of a central block of land.

Fault – a tear or fracture in the Earth's crust.

Plate Tectonics – the theory used to explain the formation of Earth's major landforms.

Crust – the thin outer layer of earth, made of rock.

Plate – a slab of Earth's crust.

Earthquake – sudden violent shaking of the ground.

Epicentre – the point on the ground's surface directly above the focus of an earthquake.

Seismic waves – shock waves radiating out from the focus of an earthquake.

Seismograph – an instrument that measures and records earthquakes.

Richter Scale – the scale used to describe the magnitude (strength) of an earthquake.

Tsunami – a destructive wave caused by an underwater earthquake or volcanic eruption.

Focus – the point underground where the earthquake is triggered.

Volcano – typically, a cone shaped landform with a broad base and narrow top, where lava erupts at the Earth's surface.

Crater – the bowl-shaped top of a volcano.

Magma – melted rock below Earth's surface.

Lava – magma that erupts above ground.

Vent – a channel through which magma travels to reach Earth's surface.

Hot Spot – small areas where the Earth's crust is so thin that hot magma melts and breaks through the rock above it, often building up over time to form an island.

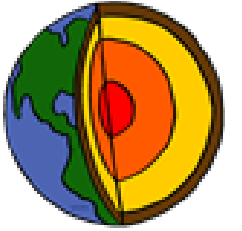
Caldera – a huge volcanic crater that has collapsed following an eruption.

Structure of the Earth

The Crust - Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.

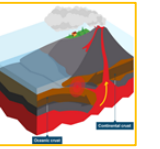
The Mantle - Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.

The inner and Outer Core - Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.



Types of Plate Margin

Destructive Plate Margin - When the denser plate subducts beneath the other, friction causes it to melt and become molten magma. The magma forces its way up to the surface to form a volcano. This margin is also responsible for devastating earthquakes.



Constructive Plate Margin - Here two plates are moving apart causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the Mid Atlantic Ridge.



Conservative Plate Margin - A conservative plate boundary occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.



Convection Currents

The crust is divided into tectonic plates which are moving due to convection currents in the mantle.

1. Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2. When lower parts of the mantle molten rock (Magma) heat up they become **less dense** and **slowly rise**.
3. As they move towards the top they cool down, become **more dense** and **slowly sink**.
4. These **circular movements** of semi-molten rock are **convection currents**
5. Convection currents create **drag** on the base of the tectonic plates and this causes them to move.

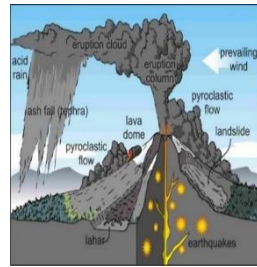
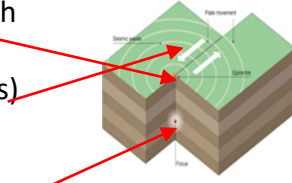
Causes of Earthquakes

Earthquakes are caused when two plates become locked causing friction to build up. From this stress, the pressure will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of seismic waves, to travel from the focus towards the epicentre. As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the **EPICENTRE**.

SEISMIC WAVES (energy waves) travel out from the focus.

The point at which pressure is released is called the **FOCUS**.



Volcanic Hazards

Ash Cloud - Small pieces of pulverised rock and glass which are thrown into the atmosphere.

Gas - Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.

lahar - A volcanic mudflow which usually runs down a valley side on the volcano.

Pyroclastic flow - A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.

Volcanic Bomb - A thick (viscous) lava fragment that is ejected from the volcano.

Types of Volcano

Shield - Made of basaltic rock and form gently sloping cones from layers of runny lava.

Location: hot spots and constructive margins.

Eruptions: gentle and predictable

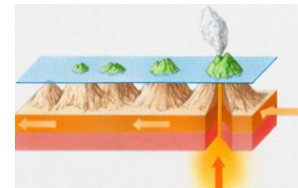
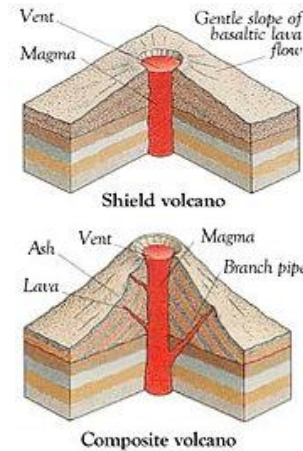
Composite - Most common type found on land.

Created by layers of ash and lava.

Location: Destructive margins

Eruptions: explosive and unpredictable due to the build of pressure within the magma chamber.

Hot Spots - These happen away from any plate boundaries. They occur because a plume of magma rises to eat into the plate above. Where lava breaks through to the surface, active volcanoes can occur above the hot spot. E.g. Hawaii.



Case Study: Mount Fuego 2018

Causes

- Fuego is a stratovolcano, meaning its 12,346-foot-tall (3,763 meters), mountainous peak is made up of layers of lava, volcanic rock fragments called tephra and pyroclastic flows.
- It sits on the western edge of the Caribbean tectonic plate, along an active subduction zone.

Effects

At least 69 people are known to have died.

Most of them lived in villages on the slopes of the 3,763m-high volcano and were killed by what is known as pyroclastic flow, a searing cloud of debris.

Authorities calculate that 1.7 million people have been affected by the eruption and large areas remain covered in ash.

Responses

All air travel in the area was cancelled after an ash cloud started to spread for miles around.

Emergency services worked through the night after lava flows hit El Rodeo and other towns on the slopes of Fuego.

Case Study: Eyjafjallajökull Eruption. Iceland 2010



Causes

- The North-American and Eurasian plates move apart- called constructive plate boundary.
- The disruption caused by Eyjafjallajökull was the result of a series of small volcanic eruptions, starting on the 20th March and ending in the October.

Effects

The thick ice cap melted which caused major flooding.

No reported deaths.

Airspace closed across Europe, with at least 17,000 flights cancelled

Costed insurers £65million to customers with cancelled flights.

Management

Iceland had a good warning system with texts being sent to residents within a 30 minutes warning.

Large sections of European airspace were closed down due ash spreading over the continent.

Airlines developed ash monitoring equipment

Managing the risk from tectonic hazards

Management strategies can reduce the number of people killed, injured, made homeless or made unemployed;

Monitoring – Networks of seismometers and lasers monitor earth movements.

Prediction – Earthquakes cannot be reliably predicted but monitoring can help forecasting so preparation can occur.

Protection – Buildings designed to withstand earthquakes. Bridges can be strengthened so they don't collapse under the weight of ash.

Planning – People can be educated so they know what to do. Emergency services can train and prepare for disasters.