

# Environmental Hazards: Volcanoes



**National 5 Geography**

# Volcanoes



Image IBCAO

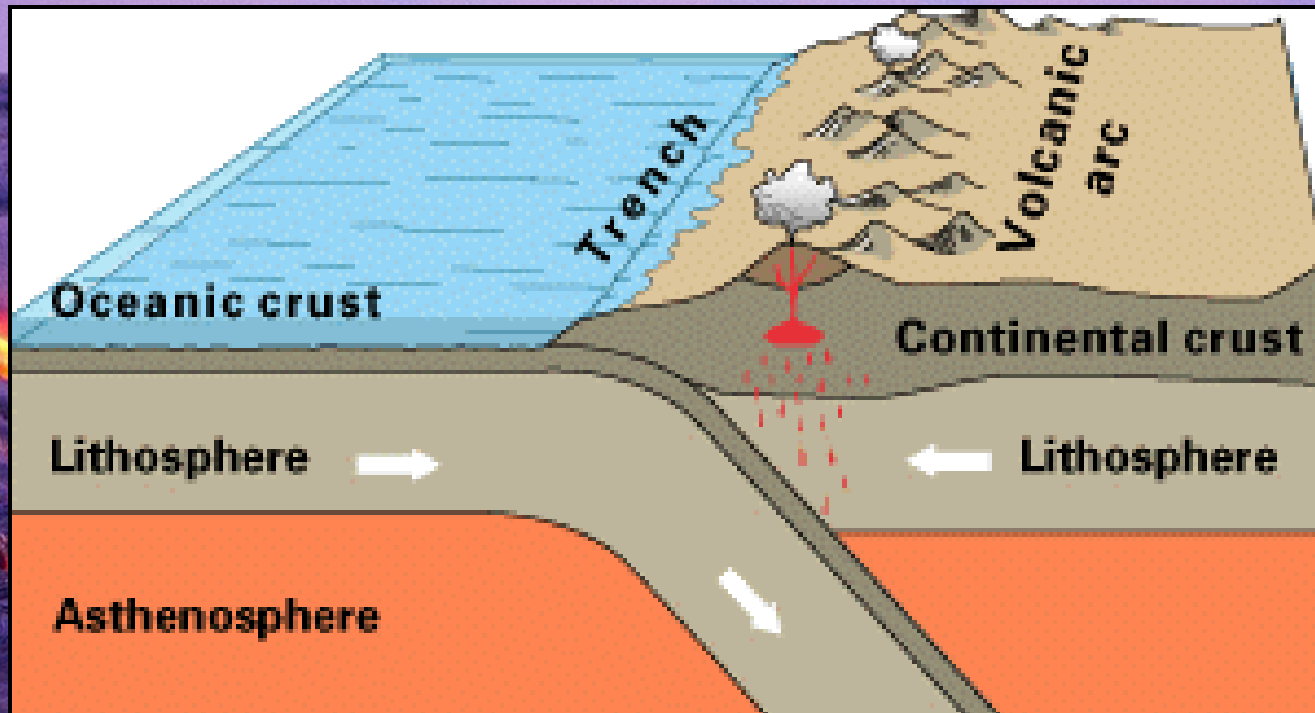
Data SIO, NOAA, U.S. Navy, NGA, GEBCO



# The Formation of Volcanoes

At a Destructive Plate Boundary, convection currents drag one tectonic plate under another one

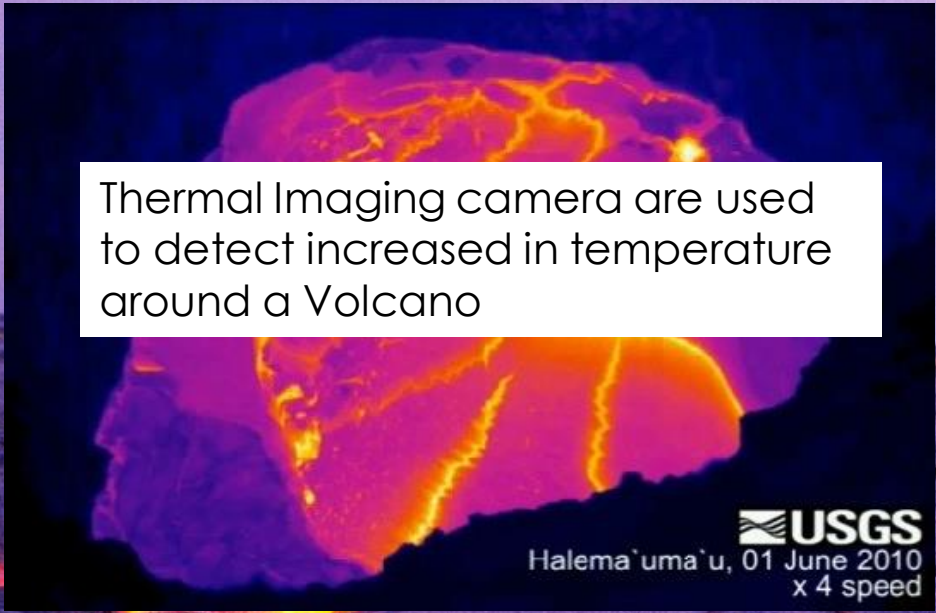
The Oceanic Crust melts in the subduction zone as a result of the heat created by both the friction between the plates and the heat from the Mantle



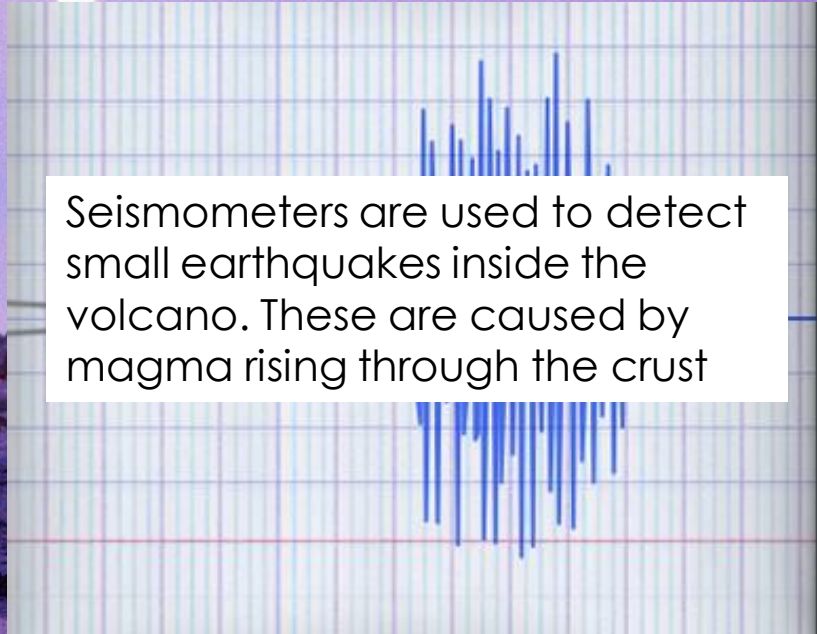
The molten material is hot liquid rock called magma. Some rises to the Earth's surface as it is lighter and less dense than the surrounding rock

The magma collects in a magma chamber and it is eventually ejected through the surface as a volcanic eruption

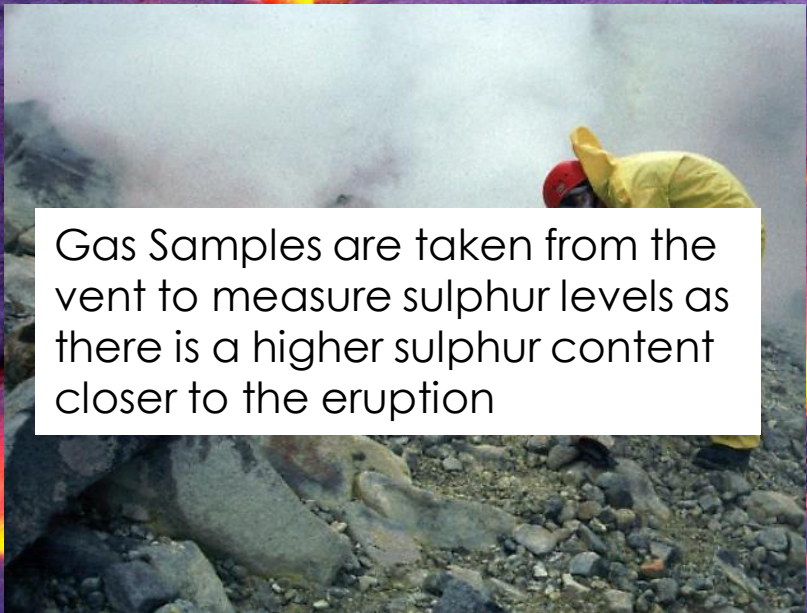
# How can Volcanic Eruptions be Predicted?



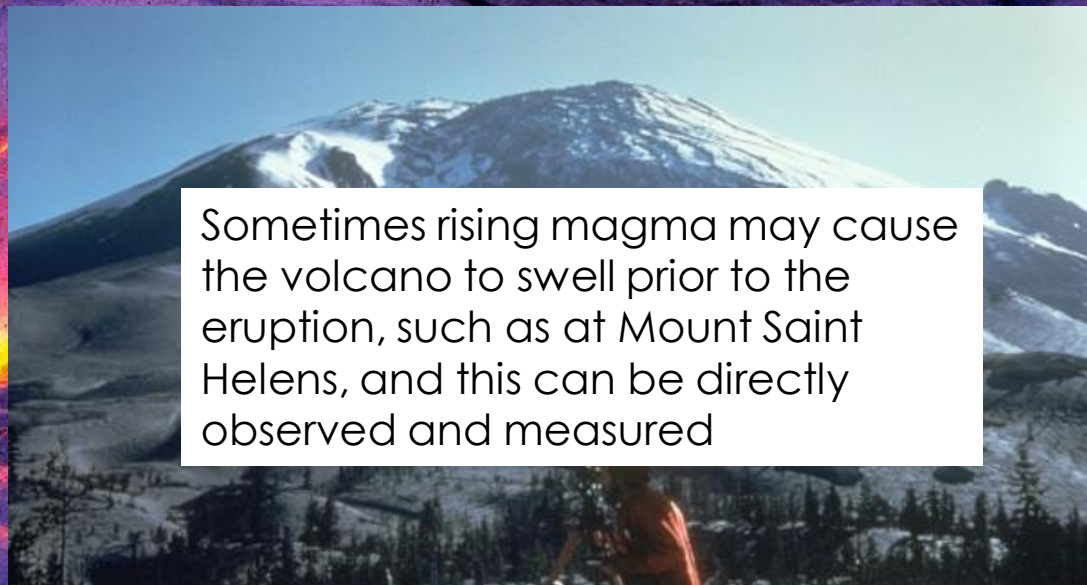
Thermal Imaging camera are used to detect increased in temperature around a Volcano



Seismometers are used to detect small earthquakes inside the volcano. These are caused by magma rising through the crust



Gas Samples are taken from the vent to measure sulphur levels as there is a higher sulphur content closer to the eruption

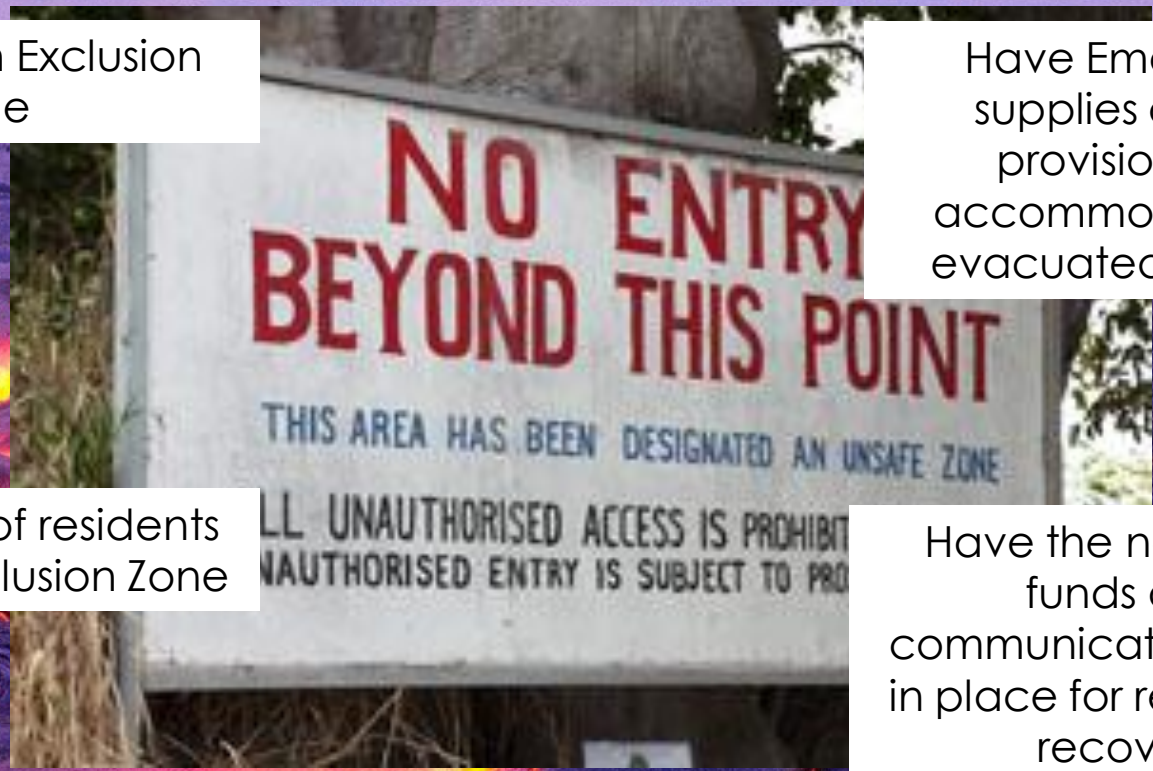


Sometimes rising magma may cause the volcano to swell prior to the eruption, such as at Mount Saint Helens, and this can be directly observed and measured

# How can People prepare for a Volcanic Eruptions?

Preparing and Planning for a Volcanic Eruption is likely to include the following:

Creating an Exclusion Zone



Have Emergency supplies of basic provisions and accommodation for evacuated residents

Evacuation of residents from that Exclusion Zone

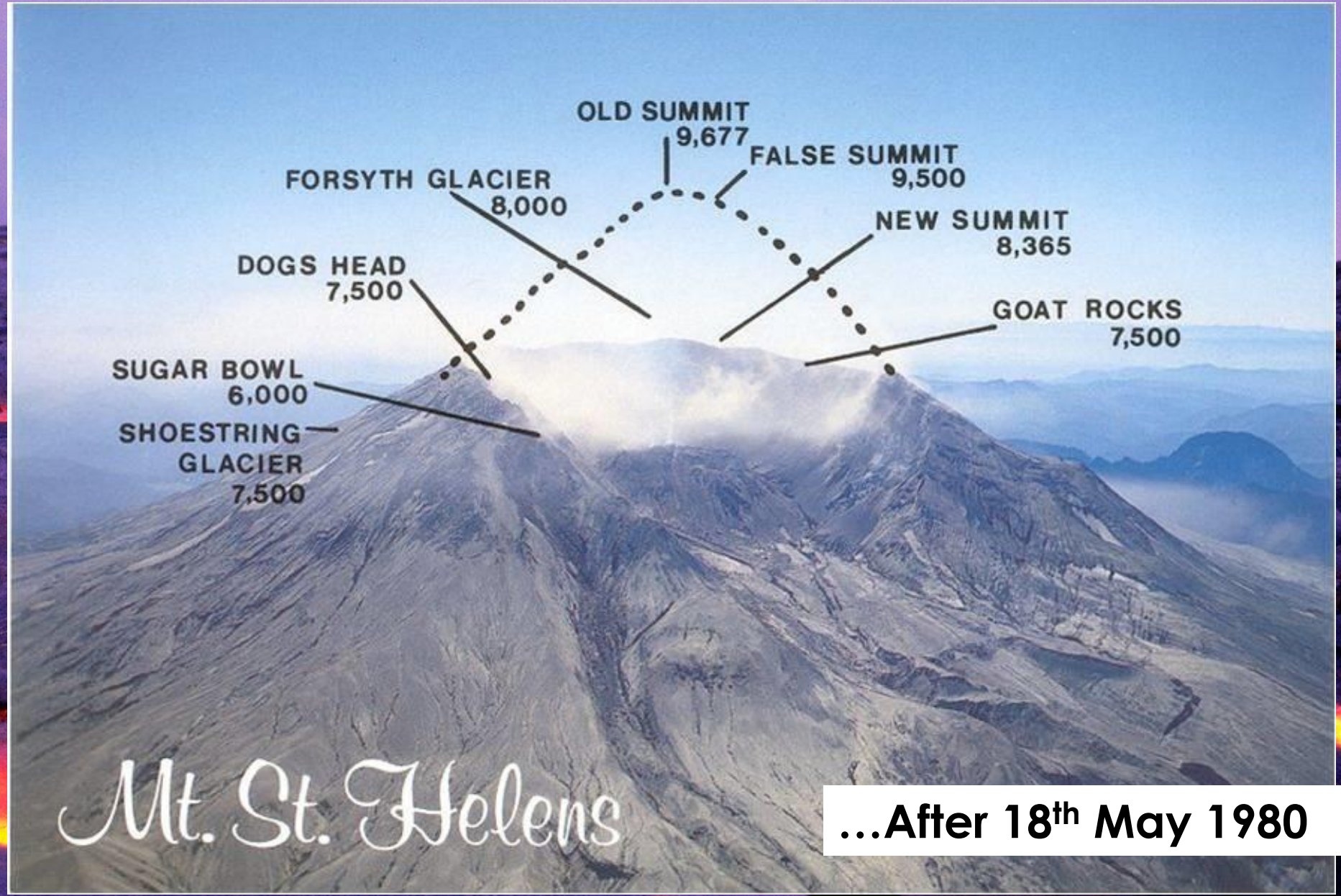
Have the necessary funds and communication system in place for rescue and recovery

# Volcano Case Study: MT ST HELENS, USA



Before 18<sup>th</sup> May 1980.....

# Volcano Case Study: MT ST HELENS, USA



*Mt. St. Helens*

**...After 18<sup>th</sup> May 1980**

# Volcano Case Study: MT ST HELENS, USA

Mt St Helens is found in Washington State on the West Coast of the USA

The Volcano forms part of the Cascade Mountain Range, stretching from the Canadian Border to Northern California

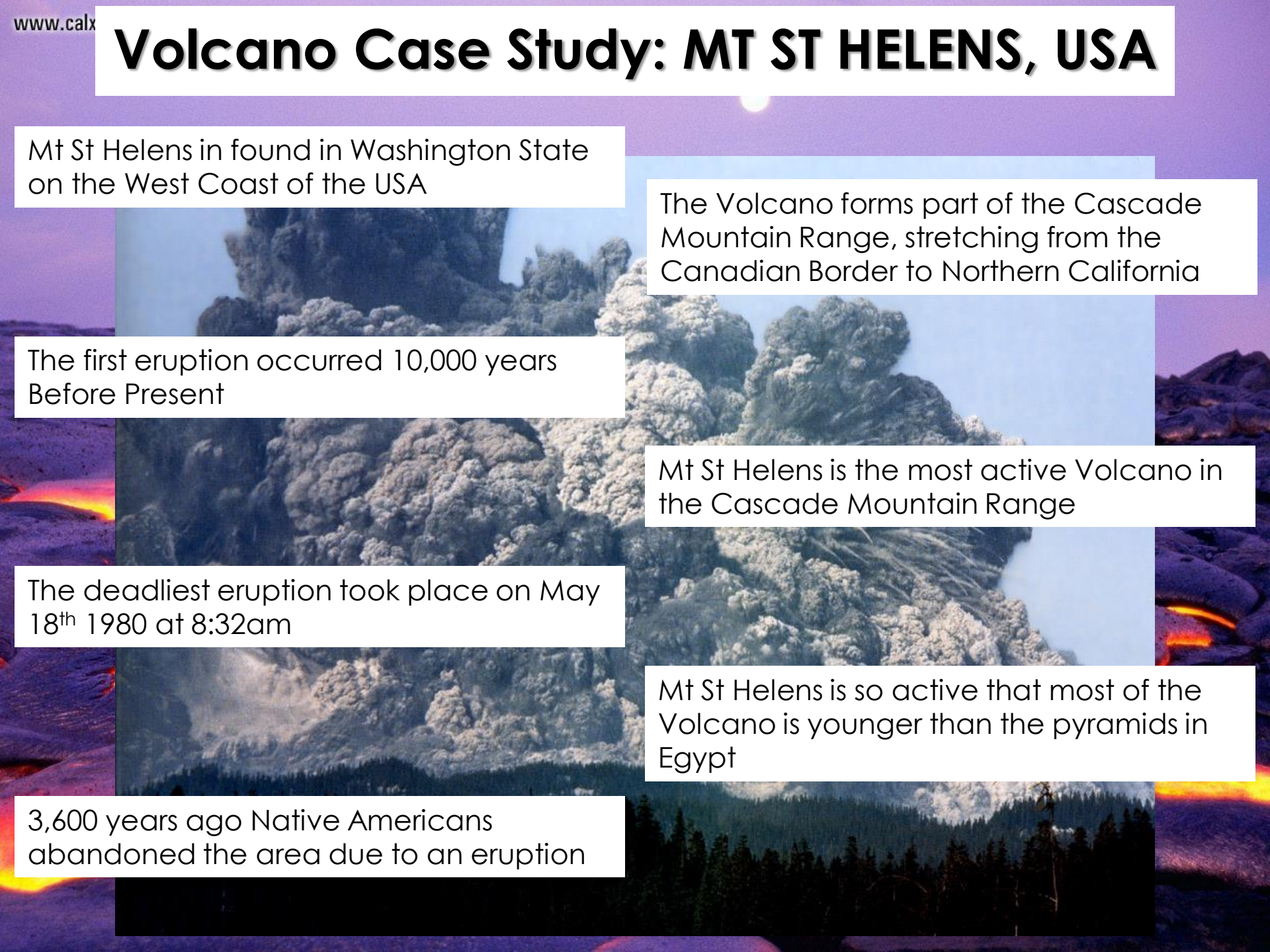
The first eruption occurred 10,000 years Before Present

Mt St Helens is the most active Volcano in the Cascade Mountain Range

The deadliest eruption took place on May 18<sup>th</sup> 1980 at 8:32am

Mt St Helens is so active that most of the Volcano is younger than the pyramids in Egypt

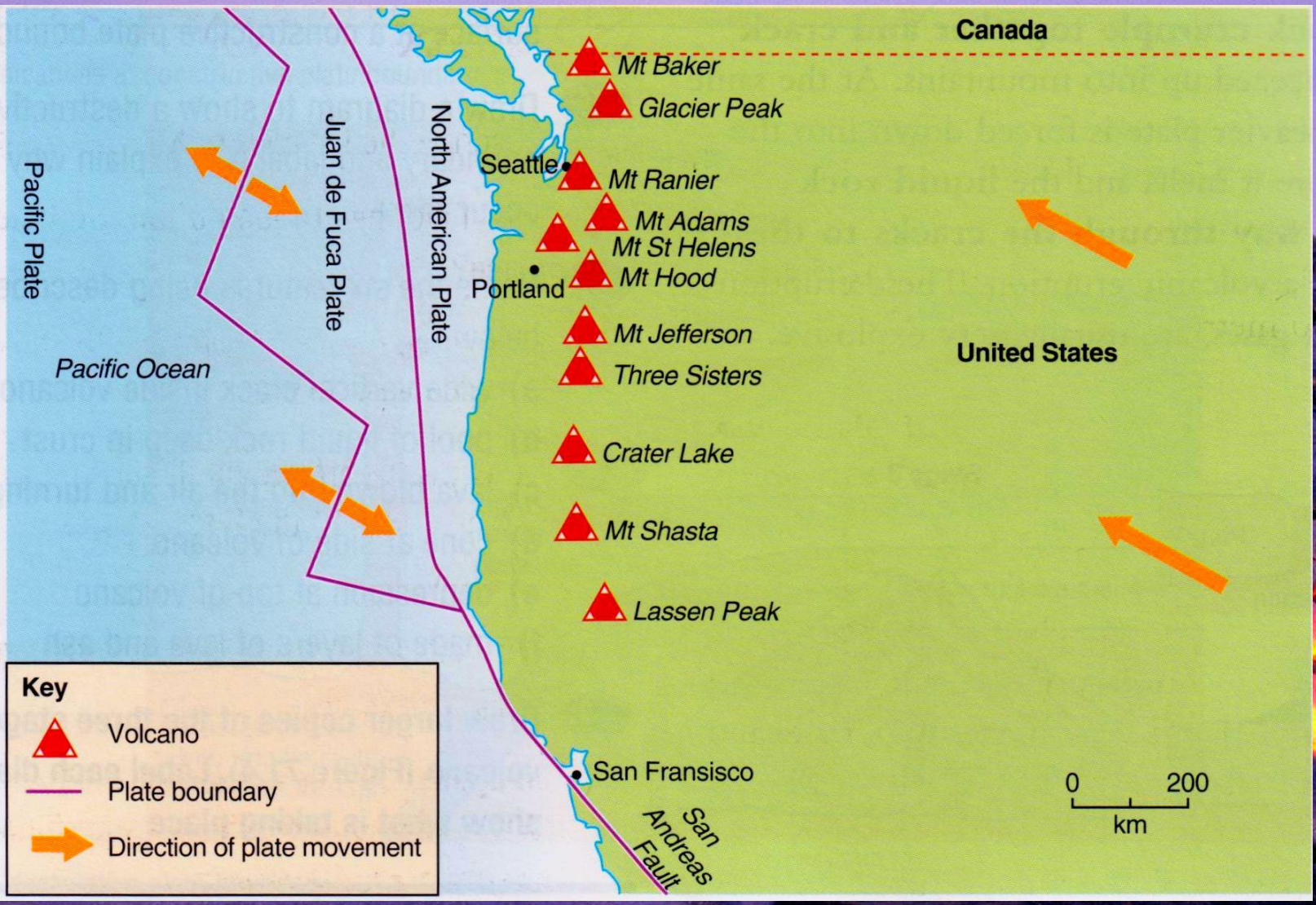
3,600 years ago Native Americans abandoned the area due to an eruption





# Volcano Case Study: MT ST HELENS, USA

**TASK: Complete your map by adding the location details of the Mt St Helens Earthquake**



# Volcano Case Study: MT ST HELENS, USA



# Volcano Case Study: MT ST HELENS, USA



# MT ST HELENS: Causes of the Eruption

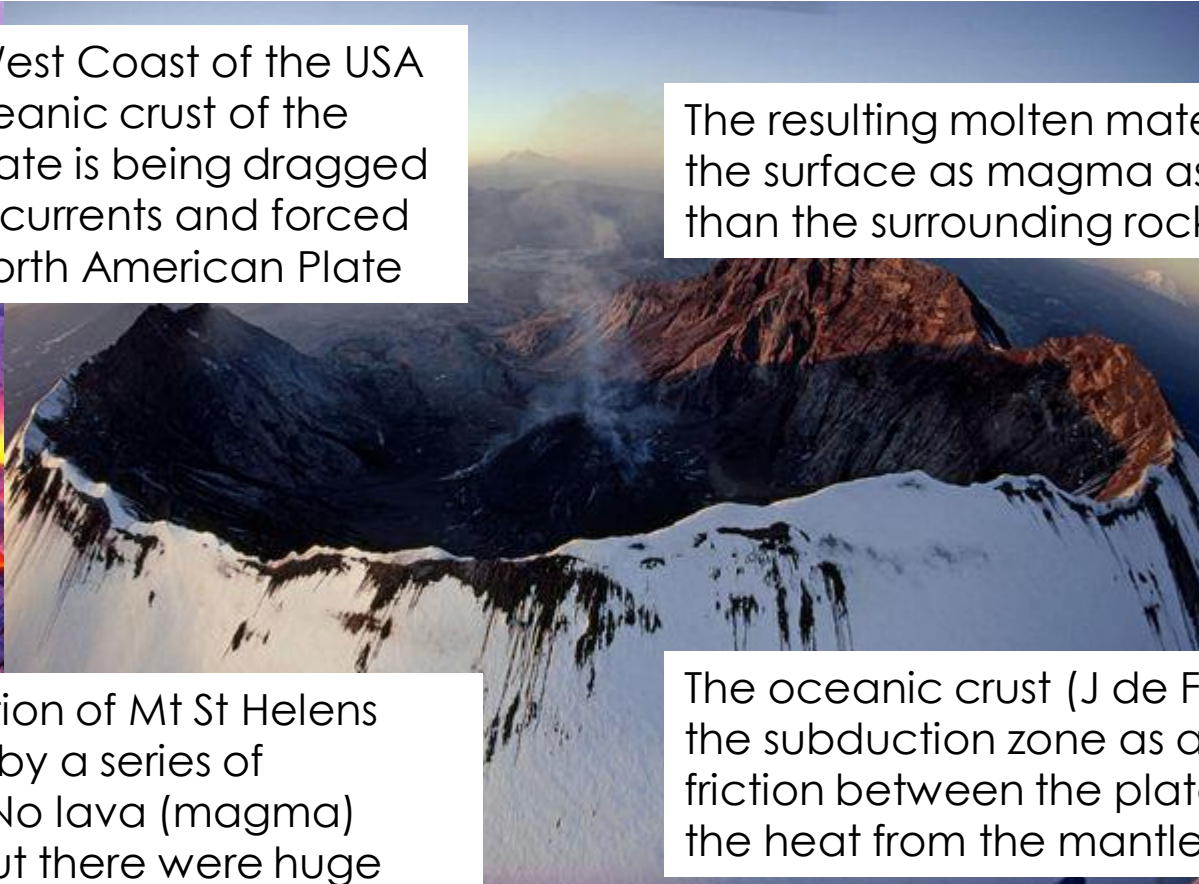
**TASK: Put the following statements in the correct order showing the cause of the eruption of Mt St Helens**

Off the North West Coast of the USA the heavier oceanic crust of the Juan de Fuca plate is being dragged by convection currents and forced beneath the North American Plate

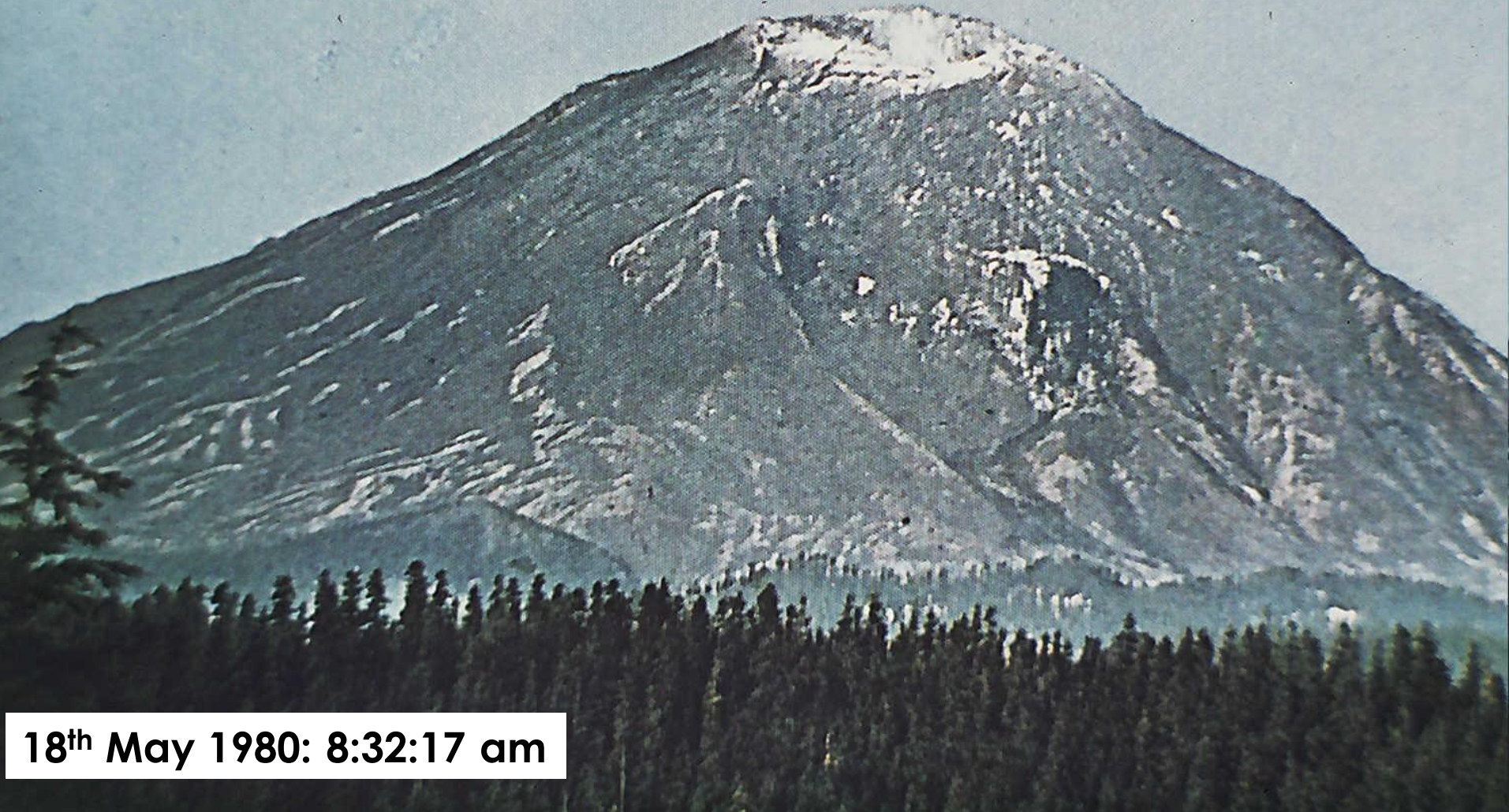
The resulting molten material rises to the surface as magma as it is lighter than the surrounding rock

The 1980 eruption of Mt St Helens was triggered by a series of earthquakes. No lava (magma) poured out, but there were huge quantities of ash, gas and steam emitted

The oceanic crust (J de F) melts in the subduction zone as a result of friction between the plates and also the heat from the mantle



# MT ST HELENS: The Eruption



18<sup>th</sup> May 1980: 8:32:17 am

# MT ST HELENS: The Eruption



18<sup>th</sup> May 1980: 8:32:22 am

# MT ST HELENS: The Eruption



18<sup>th</sup> May 1980: 8:32:27 am

# MT ST HELENS: The Eruption



18<sup>th</sup> May 1980: 8:32:32 am



# MT ST HELENS: The Eruption

**TASK: Put the following statements in the correct order showing, in detail, the eruption of Mt St Helens**

There were huge mudflows consisting of ash, melted snow and ice. These followed the courses of the rivers which drained the flanks of the mountain

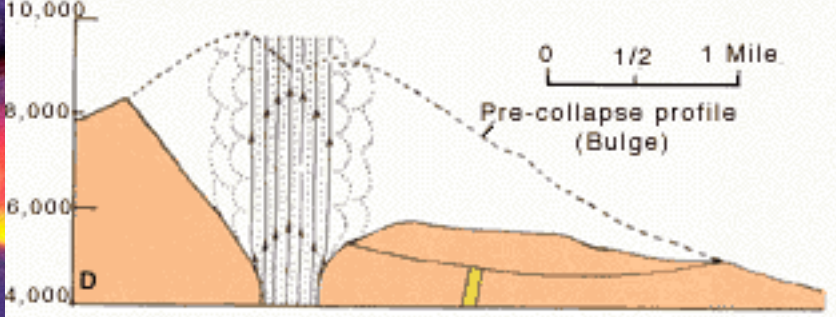
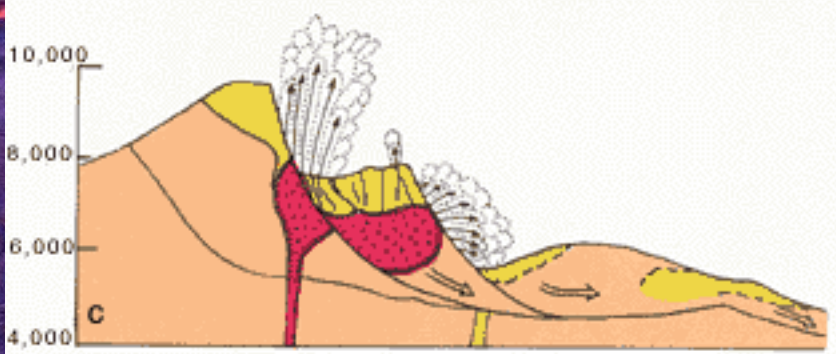
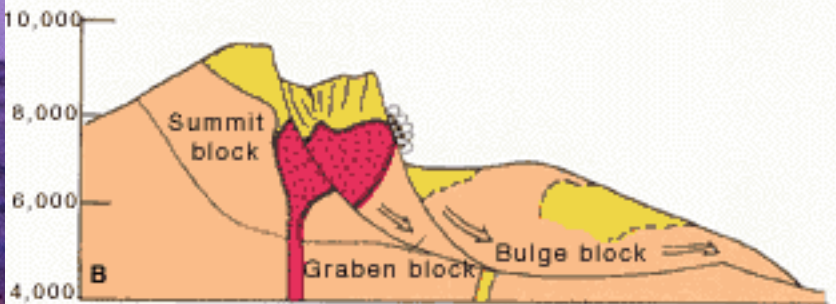
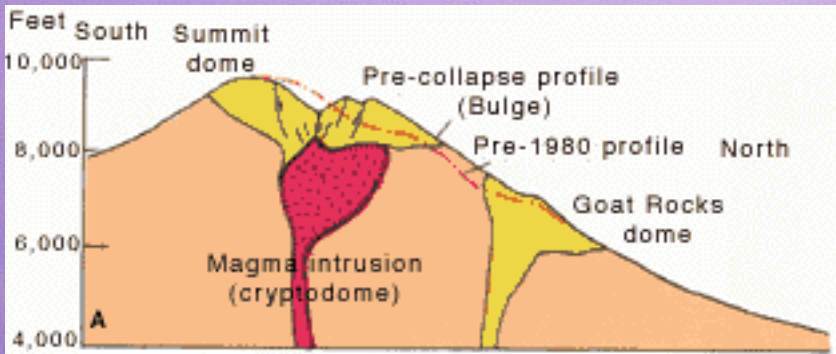
Before the eruption a huge bulge was noticed on the north side of the mountain. An earthquake measuring 5.1 on the Richter Scale caused the bulge to be displaced. This mass movement was the largest landslide ever recorded!

A huge column of ash was produced, which was then spread by high altitude winds. It fell and covered 20% of the USA land area

The landslide exposed the magma inside the volcano and this caused a huge lateral blast of volcanic gas, ash and rock (Pyroclastic flow). This moved Northwards as speeds of 1000km/hr killing everything in its path



# MT ST HELENS: The Eruption



# MT ST HELENS: Impact of The Eruption



The eruption of ash blew away the top of the mountain. The summit shrank by almost 500 metres. At the top a 500 metre deep crater formed.



The eruption killed all living things 25km North of the Volcano. 7000 animals were killed, including elk and bears

The mudflow choked rivers, killing all fish and water life and completely filling Spirit Lake with debris. About 12 million salmon died and the mud clogged up Portland Harbour as it entered the sea

# MT ST HELENS: Impact of The Eruption

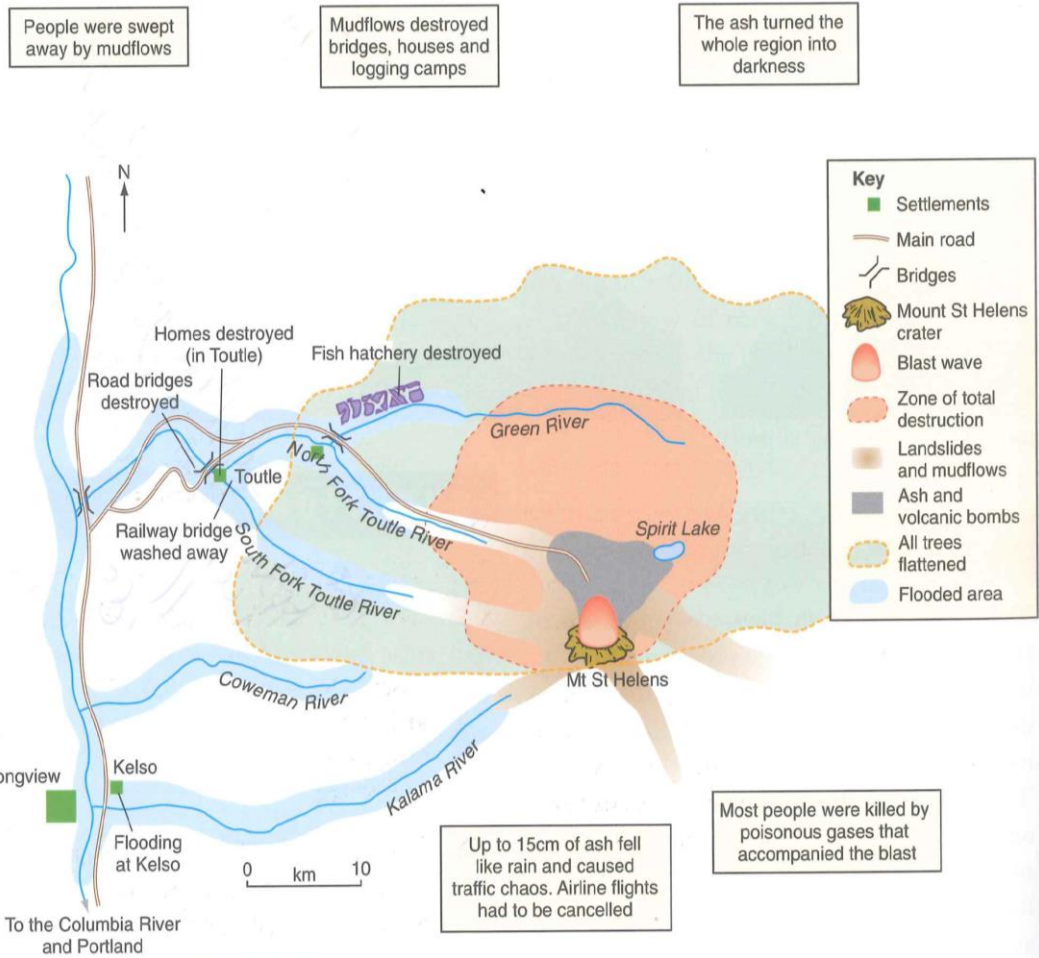


# MT ST HELENS: Impact of The Eruption

**TASK: What were the impacts of the eruption on people living in the area? Add some of the points below to your notes**



USGS



People were swept away by mudflows

Mudflows destroyed bridges, houses and logging camps

The ash turned the whole region into darkness

Up to 15cm of ash fell like rain and caused traffic chaos. Airline flights had to be cancelled

Most people were killed by poisonous gases that accompanied the blast

The ash caused serious damage to car engines and farm machinery. It covered crops, preventing them from growing. The cost to farmers was more than £100 million

The blast flattened buildings and trees, crushing people to death. It knocked out telephones and electricity supplies

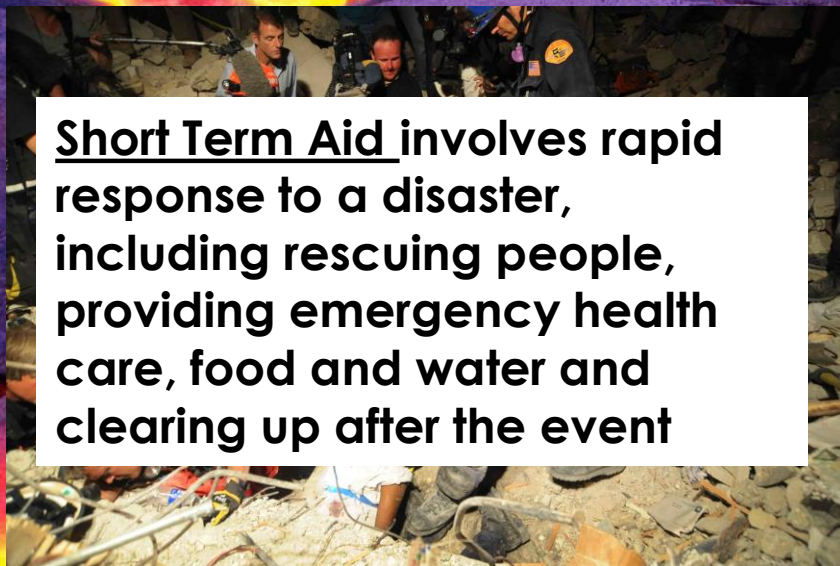
# MT ST HELENS: Aid after the Eruption

Scientists were able to predict fairly confidently Mount St Helens would erupt, based on the observations taken in the weeks and months leading up to the eruption

They were however surprised by the nature and severity of the eruption and its effects were devastating

Although many charities were involved in the relief work the biggest aid agency was the Government (State and Federal)

Aid can be given by many different organisations and is generally divided into 2 broad categories:




**Short Term Aid** involves rapid response to a disaster, including rescuing people, providing emergency health care, food and water and clearing up after the event




**Long Term Aid** is concerned with returning an area back to its original state through rebuilding

# MT ST HELENS: Long Term or Short Term Aid?

**TASK:** Are the following forms of aid short term or long term? Sort them into the correct space on your worksheet.



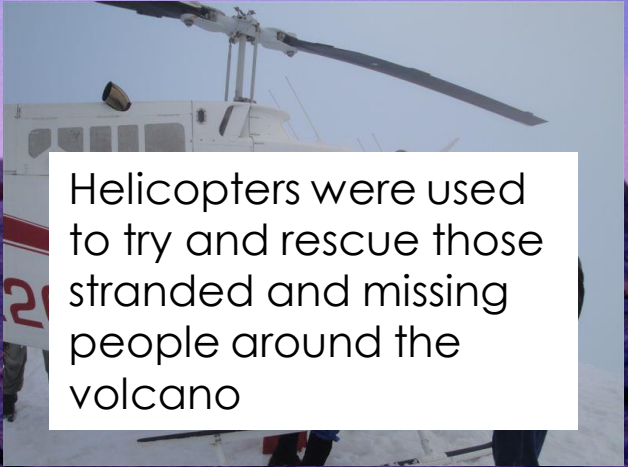
200,000 people were employed to clean up 1 million tonnes of ash



**ST. HELENS**  
CLIMBING PERMITS

The new found fame of Mt St Helens brought people, and money into the area


**ON SALE FEB. 1**  
"YOU'LL HAVE A BLAST"




Helicopters were used to try and rescue those stranded and missing people around the volcano



New tourist facilities were built to attract people back to the area. Mt St Helens was made a National Monument in 1982



In Yakima, it cost £1 Million and took 10 months to remove the ash



River channels were dredged to remove logs and levees were rebuilt to reduce future floods