

Explain how the study of plate tectonics has helped us to understand the global distribution of volcanoes.

(30 marks)

The most common location for volcanoes to occur is at plate boundaries but they can also occur at hotspots which are found at various locations around the world.

The most active volcanic zone is the Pacific Ring of Fire around the Pacific plate where plates are colliding and separating. At destructive plate boundaries, such as where the Pacific plate and Eurasian plate colliding, the Pacific plate subducts to form the Aleutian islands between Russia and America. In this situation, the oceanic plate subducts under the light continental crust in the far north of the Pacific ocean. As the Pacific plate is subducted it melts into the asthenosphere and changes the make up of the magma. When this lava flows out from under the crust it produces the explosive and sticky *acidic lava*. Volcanoes formed in this way are more explosive because gases are trapped within the sticky lava.

For constructive plate boundaries, where two oceanic crusts separate, and volcanoes are regularly found (eg. Mt. Hekla on the volcanic island of Iceland), the sea bed tends to be youngest at the centre of the ocean basins and along mid-ocean ridges, or along submarine ridges where new seafloor is created. Here basalt forms on the ocean floor, as volcanic eruptions continue to occur as the constructive oceanic plate boundaries separating due to convection current. In fact all our sea basin consist of basalt for this reason.

In relation to hotspots, the Hawaiian Islands are located near the centre of the Pacific Plate where a plume of magma remains stationary within the asthenosphere as the Pacific plate passes over it. At the south of the island chain, many volcanoes are still active, while those to the north are mainly dormant because the northern islands have now passed over and are beyond the reach of this hotspot. Here basic lava, with a silica content of 55% or less, flows freely from vents to form broad shield volcanoes which rise from the ocean floor. This lava is different to the acidic lava because gases are not trapped inside it and it is quite runny so spreads across wide distances quickly before it cools down. The most recent eruptions in Hawaii in July 2018 showed how devastating these eruptions can be. Also the rift valley found on the African Plate in the eastern area of the continent, shows the creation of the next ocean on our planet as Africa is split by upwelling currents beneath and volcanoes form.

Therefore volcanoes can be found at destructive plate boundaries, constructive plate boundaries and hotspots and not at passive plate boundaries.