

5. Volcanoes

Geothermal heat is released from the Earth's core at the surface mainly through *volcanoes*. Magma pours onto the surface as lava – *acid & basic*.

Acid lava volcano = mainly steep-sided, common along *destructive plate boundaries*, magma = melting of basaltic oceanic crust and marine sediments, e.g. volcanoes of Phillipines.

Figure 1 (blackboard): magma chamber (magma/lava + steam), lava tube, alternate layers are formed (layer of lava, layer of ash), secondary (parasitic) cone, sticky acid lava cools quickly => cone's steep sides <=> Figure 2 photocopy

Basic lava volcano = common along *constructive plate boundaries*, magma = basalt arising directly from the mantle, e.g. Mauna Loa in Hawaii

Figure 2 (blackboard): magma chamber (magma/lava + gases), lava tube, alternate layers are formed (layer of lava, layer of ash), side vent, fluid basic lava flows a large distance => wide cones with shallow sides => shield volcanoes

Hawaiian Islands (lie in the middle of Pacific "Ring of Fire") = string of volcanic islands in the middle of the Pacific plate. Magma erupts on the sea floor by strong convection currents = above sea level has formed an island. Movement of the Pacific plate carries the island off the *hot spot* and volcanic activity there ceases, only to continue forming another island on the new surface above it.

Youngest island are connected to hot spot, older ones not.

Task: Using an atlas and your map of plate boundaries name the type of volcano (acid or basic) you would expect to find in each of the following places:

- a) Iceland (b) Chile (a) c) Alaska (a) d) Hawaii (b) e) Japan (a)

Note: (a) = acid (b) = basic

Geothermal activity

Areas with geothermal activity = crust is thin and magma is present at quite shallow depth => magma heats rocks above it (350°C at a depth of less than 5 km). Percolating groundwater is heated and then driven upwards by convection through cracks in the crust. Superheated water begins to boil closer to the surface and then is emitted onto the surface =>

- *fumerole* (superheated water turned to steam because of the sudden drop in pressure)
- *mudpool* (bubbling pool of mud – liquefied soil where steam condenses near surface)
- *hot spring* (superheated water + cold groundwater = hot spring at the surface)
- *geyser* (regular eruption of hot water and steam, e.g. geysers in New Zealand)

Geothermal activity is caused by superheated groundwater.

Most famous, the biggest geyser in Slovakia? (Herľany)

Example of human use of hot springs? (spas)

Keywords:

geothermal heat/activity, volcanoes, acid/basic lava, ash, magma chamber, lava tube, parasitic cone, crater, hot spot, percolating groundwater, superheated water, fumerole, mudpool, hot spring, geyser, spa