

Geological Agents of Change

Volcano

Volcanism

- Volcanism is the process related to the eruption of magma to the surface of the earth. A volcano is a conical or dome shaped hill or mountains formed by the extrusion of lava a vent.

Causes

- Volcanism is considered to be the out come of the release of high pressure which build up with in the magma chambers below the ground surface. It is one of the most important evidences of the dynamic nature of earth.

Origin of volcanism

The origin of volcanism can be dealt with the explanation for-

- The origin of magma with its high temperature.
- The origin of volcanic gases and
- the extrusion of magmas

Production of Magma

Magmas may be produced because of the factors like:

- The increase of temperature with depth
- Accumulation of radioactivity produced by heat
- Release of pressure locally etc.

It is also believed that water percolating through the crust gets converted into steams due to increase of temperature with depth. Beside a number of gases may be produced due to effect of magma on the surrounding rocks. The steam and other gases may force the magma upward causing eruption. Whenever, the magmatic materials is ejected from an opening it spreads around the outlet and gradually cools and consolidates.

Volcanic products: -

- Huge quantities of these materials are thrown out by already cooled lava. The rock fragments ejected during eruption is called Agroclasts or tephra.
- According to size and shape, the pyroclastic materials are classified as –
- Volcanic blocks: These are usually angular and diameter above 32mm.
- Volcanic bombs: - These are rounded masses with twisted ends and diameter above 32mm.
- Cinders or lapilli: - These are fragments with diameters 4mm to 32mm.
- Ash: - Fine particles, size ranges from 0.25mm to 4mm.
- Volcanic dust: - Dusts having diameter less than 0.25mm.

Liquid products

- Lavas are the major and most important liquid product of volcano lava is of 3 types.
- Acidic lava : having high proportion of SiO_2
- Intermediate lava : - having SiO_2 content between 55% to 60 %
- Basic lava:- having $<50\%$ SiO_2

Gaseous products

- Steam and various gases are the gaseous product of volcanism. Water vapour constitutes about 60-90% of the total gases. The major gases are CO_2 , HCl , SO_2 , H_2 , N_2 , Boric acid vapours, arsenic vapours, phosphorous etc.

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Volcanism and landforms

- Volcanoes produce distinctive land-forms, through a volcano. The volcanic topography includes both positive as well as negative relief features. The positive relief feature consists of the hills, mountains, lava, plateau, etc. While the negative relief features include the depressed forms like craters, volcanoes depressions etc.

Effects of volcanoes: -

Effect of volcanic activity is of two –

- Primary effect
- Secondary effect

Primary effect of volcanic activity

- Primary effect of volcanic activity includes lava flows, ash flow, lateral blasts or ash –falls.
- Lava flows are the most familiar product of volcanic activity. They result when magma pushes the surface and overflows. Lavaflows that are low in SiO_2 generally non-explosive while flows with SiO_2 explosive activity.
- Pyroclastic activity (ash flow, fall and blast) is characteristic of high silicates magma. During eruption a vast amount of natural glasses fragments and gases are blown high into the air and cover thousands of sq kilometers. It creates various damages.
- Volcanic ash flows which may move as fast 100km per hour down. The sites of such volcanoes can be very dangerous if populated area is in the path flow.
- Pyroclastic flow is base surge, which forms when ascending magma comes in contact with water on or near the earth's surface in violent steam explosion.

Secondary effects

- Secondary effects include mudflows, floods and fires. Even though volcanoes cause a lot of destruction some of its effects are also beneficial to mankind. In certain cases it is possible to use underground heat generated by volcanism to meet the energy requirement of future. This energy is called Geothermal Energy. Besides volcanic eruption release soil which are used for cotton cultivation.
- Chemicals obtained from volcanic sources are used as goods for building material.