

Batholiths

A large body of magmatic material that cools in the deeper depth of the crust develops in the form of large domes. They appear on the surface only after the denudational processes remove the overlying materials. They cover large areas, and at times, assume depth that may be several km. These are granitic bodies. Batholiths are the cooled portion of magma chambers.

Lacoliths

These are large dome-shaped intrusive bodies with a level base and connected by a pipe-like

conduit from below. It resembles the surface volcanic domes of composite volcano, only these are located at deeper depths. It can be regarded as the localised source of lava that finds its way to the surface. The Karnataka plateau is spotted with domal hills of granite rocks. Most of these, now exfoliated, are examples of lacoliths or batholiths.

Lapolith, Phacolith and Sills

As and when the lava moves upwards, a portion of the same may tend to move in a horizontal direction wherever it finds a weak

Activity : Locating an Epicentre

For this you will need

Data from 3 seismograph stations about the time of arrival of P-waves, S-waves.

Procedure

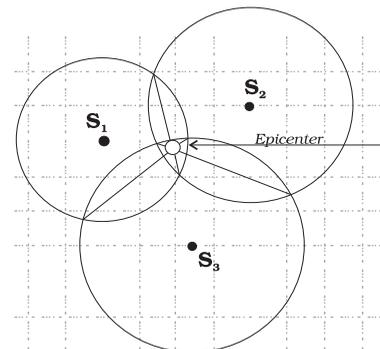
1. Find the time of arrival of P and S-waves of the given quake for the three stations for which you have the data.
2. Compute the time lag between the arrival of P and S-waves for each station; it is called time lag. (Note that it is directly related to the distance of the seismograph from the focus.)
- A. *Basic rule : For every second of time lag, the earthquake is roughly 8 km away from you.*
3. Using the rule quoted above, convert the time lag into distance (# seconds of time lag * 8) for each station.
4. On a map locate the seismograph stations.
5. Draw circles, taking the seismograph stations as the centre, with the radius equal to the distance you have calculated in the previous step. (Do not forget to convert distance as per the map scale.)
6. These circles will intersect each other in a point. This point is the location of the epicentre.

In normal practice, the epicentres are located using computer models. They take into account the structure of the earth's crust. The locations with accuracy within a few hundred metres can be achieved. The procedure outlined here is a much simplified version of what is normally done, although the principle is the same.

In the following diagram, the epicentre is located using this procedure. It also contains a table giving necessary data. Why don't you try for yourself?

Data						
Station	Arrival time of					
	P-waves			S-waves		
	Hour	Min.	Sec.	Hour	Min.	Sec.
S1	03	23	20	03	24	45
S2	03	22	17	03	23	57
S3	03	22	00	03	23	55

Scale of the map 1cm = 40km



plane. It may get rested in different forms. In case it develops into a saucer shape, concave to the sky body, it is called *lapolith*. A wavy mass of intrusive rocks, at times, is found at the base of synclines or at the top of anticline in folded igneous country. Such wavy materials have a definite conduit to source beneath in the form of magma chambers (subsequently developed as batholiths). These are called the phacoliths.

The near horizontal bodies of the intrusive igneous rocks are called *sill* or *sheet*, depending on the thickness of the material. The thinner ones are called sheets

while the thick horizontal deposits are called sills.

Dykes

When the lava makes its way through cracks and the fissures developed in the land, it solidifies almost perpendicular to the ground. It gets cooled in the same position to develop a wall-like structure. Such structures are called dykes. These are the most commonly found intrusive forms in the western Maharashtra area. These are considered the feeders of the eruptions that led to the development of the Deccan traps.

EXERCISES

1. Multiple choice questions.
 - (i) Which one of the following earthquake waves is more destructive?

(a) P-waves	(c) Surface waves
(b) S-waves	(d) None of the above
 - (ii) Which one of the following is a direct source of information about the interior of the earth?

(a) Earthquake waves	(c) Gravitational force
(b) Volcanoes	(d) Earth magnetism
 - (iii) Which type of volcanic eruptions have caused Deccan Trap formations?

(a) Shield	(c) Composite
(b) Flood	(d) Caldera
 - (iv) Which one of the following describes the lithosphere:

(a) upper and lower mantle	(c) crust and core
(b) crust and upper mantle	(d) mantle and core
2. Answer the following questions in about 30 words.
 - (i) What are body waves?
 - (ii) Name the direct sources of information about the interior of the earth.
 - (iii) Why do earthquake waves develop shadow zone?
 - (iv) Briefly explain the indirect sources of information of the interior of the earth other than those of seismic activity.
3. Answer the following questions in about 150 words.
 - (i) What are the effects of propagation of earthquake waves on the rock mass through which they travel?
 - (ii) What do you understand by intrusive forms? Briefly describe various intrusive forms.