e-text

Paper-CC9 (*Unit-II)*

Cartographic Techniques

Hypsometric Curve

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Objectives	***To understand the method of drawing hypsometric or hypsographic curve.***
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Hypsometric Curve

Dr. Supriya

Introduction: *A hypsometric curve is essentially a graph that shows the proportion of land area that exists at various elevations by plotting relative area against relative height. "Hypsometric curve,' also called '**Hypsographic Curve', Cumulative Height Frequency Curve** for the Earth's surface or some part thereof.*

In the hypsometric curve of the total Earth surface there exist two maxima of frequencies—at the 100-metre (109-yard) and the 4,700-metre (5,140-yard) elevations, which correlate with the mean level of the lowland continental areas and the deep-sea floor. This aspect of the Earth's surface, revealed by hypsometric analysis, supports the theory of a crust consisting of simatic (peridotitic, specific gravity about 3.3) materials under the oceans and of sialic (granitic to gabbroic, specific gravity about 2.7) materials of the continents. Differences in hypsometric curves between landscapes arise because the geomorphic processes that shape the landscape may be different.

When drawn as a 2-dimensional histogram, a hypsometric curve displays the elevation (y) on the vertical, y-axis and area above the corresponding elevation (x) on the horizontal or x-axis.

Wooldridge tried to show clearly 200 feet 'platform' or planation surface in the London basin by drawing a series of hypsographic curve using Ordnance Survey half-inch series map.

The curve can also be shown in non-dimensional or standardized form by scaling elevation and area by the maximum values. The non-dimensional hypsometric curve provides a hydrologist or a geomorphologist with a way to assess the similarity of watersheds — and is one of several characteristics used for doing so. The hypsometric integral is a summary measure of the shape of the hypsometric curve.

Arthur Strahler proposed a curve containing three parameters to fit different hypsometric relations:

$$y = \left[\frac{d-x}{x} \cdot \frac{a}{d-a}\right]^z,$$

where a, d and z are fitting parameters. Subsequent research using two-dimensional landscape evolution models has called the general applicability of this fit into questionas well as the capability of the hypsometric curve to deal with scale-dependent effects.

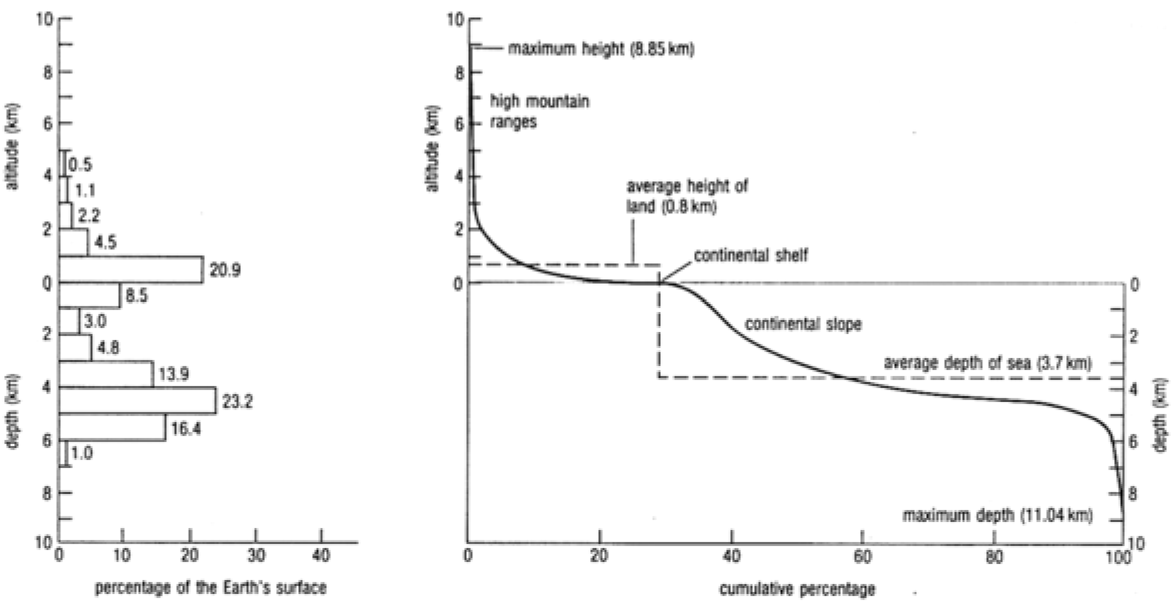

Figure 1

Uses of hypsometric Curve or similar graphs:

The hypsometric curve is used when discussing

- *Isostasy - buoyancy of the oceanic crust, elevation changes due to temperature changes in the crust,*
- *Continental and oceanic crust - determining the elevation of oceanic and continental crust, differentiating between oceanic and continental crust.*

- *Planetary geology - the examination of other planets to look for different surfaces, the examination of planetary surfaces for evidence of plate tectonics.*

In addition to these, cumulative percent graphs like the hypsometric curve are used in a wide variety of contexts both in the geosciences and in many other fields. However once you learn to interpret one, you can read them all!

- *Other geological contexts that use cumulative percent graphs include:*
  Igneous Rocks - Igneous rock identification
  Sedimentology - Grain size distributions

Steps of plotting Hypsometric Curve:

Example1: Prepare a Hypsometric curve from the given table.

Table 1

Elevation (Meter)	***% of Total Area***	***Actual Area(Sq KM)***
Above 4000	*=1.42*	*(1.42* 1785)/100 =25.347*
Above 3500	*1.42 +5.20 = 6.62*	*(6.62* 1785)/100 =118.167*
Above 3000	*6.62 + 14.10 = 20.72*	*(20.72* 1785)/100 =369.852*
Above 2500	*20.72 + 29.82 = 50.54*	*(50.54* 1785)/100 =902.139*
Above 2000	*50.94 + 38.40 = 88.94*	*(88.94* 1785)/100 =1587.579*
Above 0	*88.94 + 11.06 = 100*	*(100* 1785)/100 =1785.000*

- *Represent the areas in square miles along a conveniently selected horizontal scale with zero on the left.*
- *Or the areas enclosed by successive pairs of contours may be marked along with horizontal scale as a percentage of the total area of the island.*
- *Make a vertical scale on the left side of the baseline two mark elevation at a suitable intervals.*
- *Then plot each area against the respective controls interval and the hypsographic curve will be obtained by joining the various points thus plotted. See figure2*

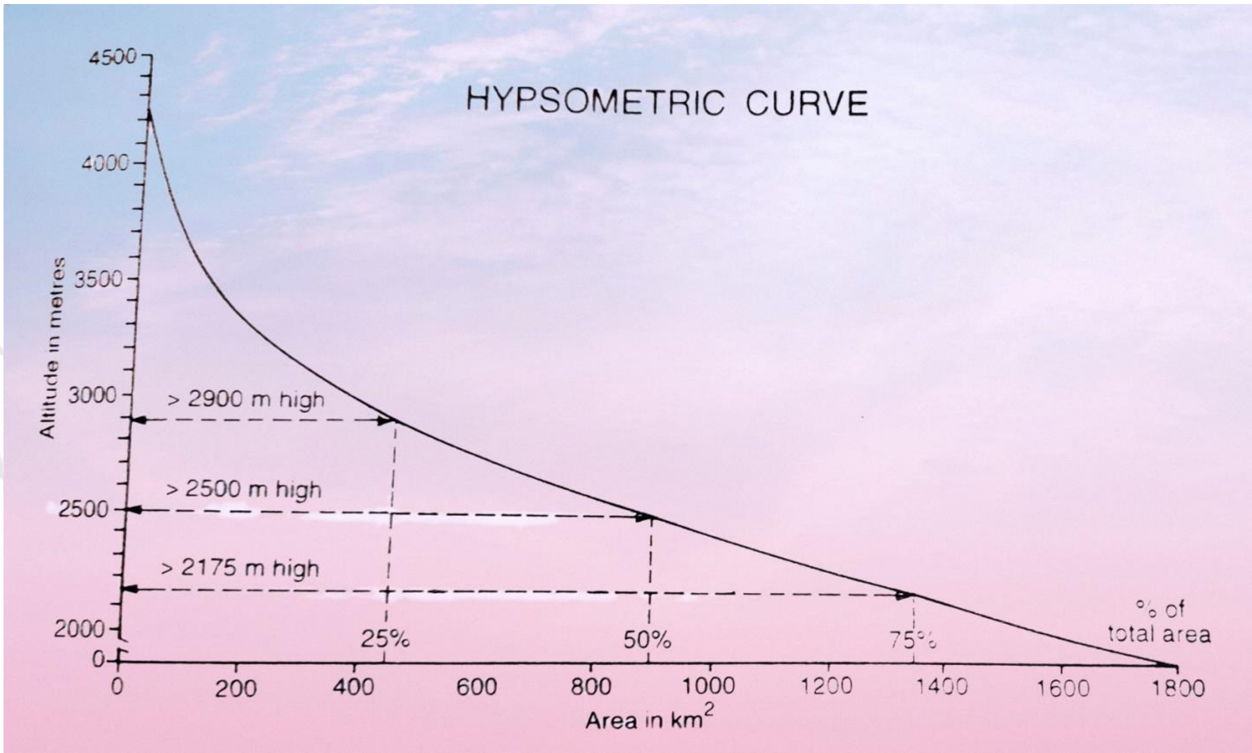

Figure 2

***NOTE:** In case of an island or instance the following calculation need to be done.*

i. The area enclosed within the 100 foot contour,

ii. The areas enclosed within successively higher contours

iii. The total area of the island.

Modal Questions:

Q1. What is hypsometric curve? Discuss its importance and plotting method by suitable example and illustrate in a diagram.

Q2. Determine the % of the Earth's surface that is below sea level from the given diagram (fig-3).

Q3. Determine the percentage of the Earth's surface between 5 km below sea level and 1 km below sea level from the given diagram (fig-3).

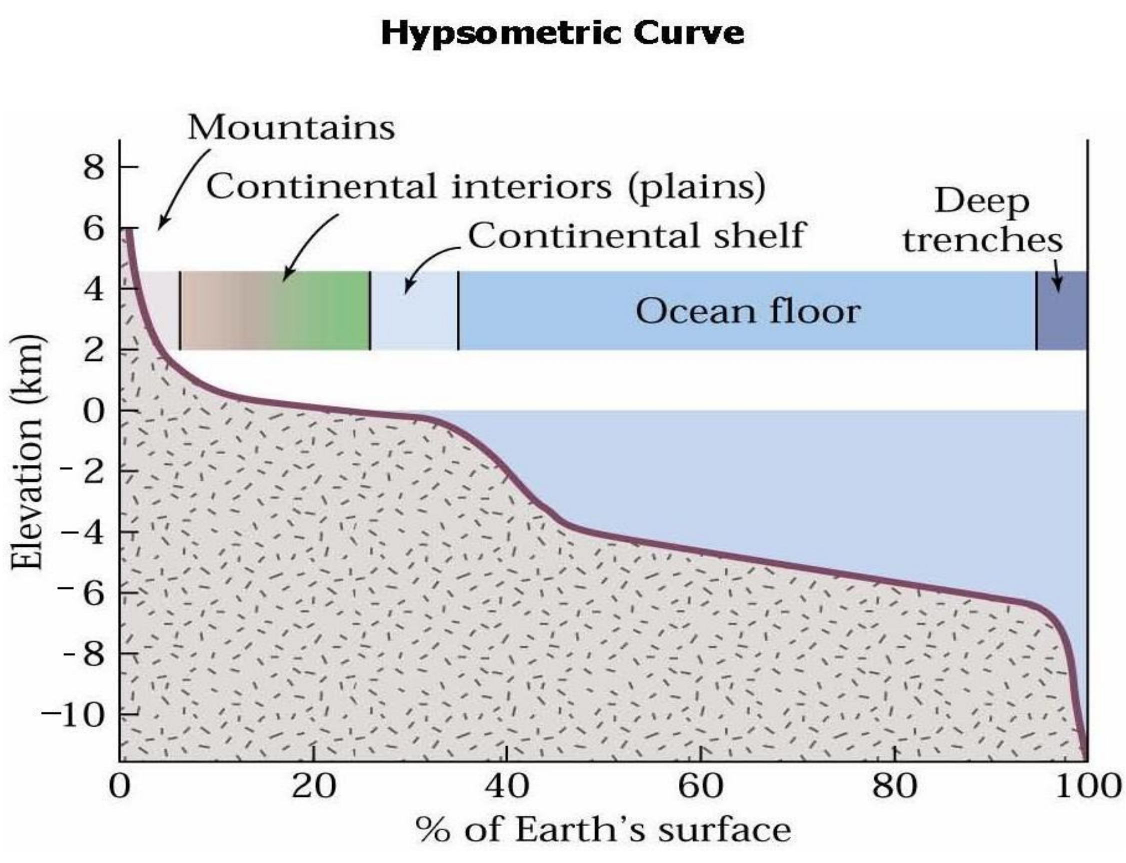

Figure 3

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