

## Quadrant II – Transcript and Related Materials

**Programme: Bachelor of Science (First Year)**

**Subject: Geology**

**Paper Code: GEG - 102**

**Paper Title: Physical Geology**

**Unit: 1**

**Module Name: Hypsographic Curve; Morphological features of the ocean floor**

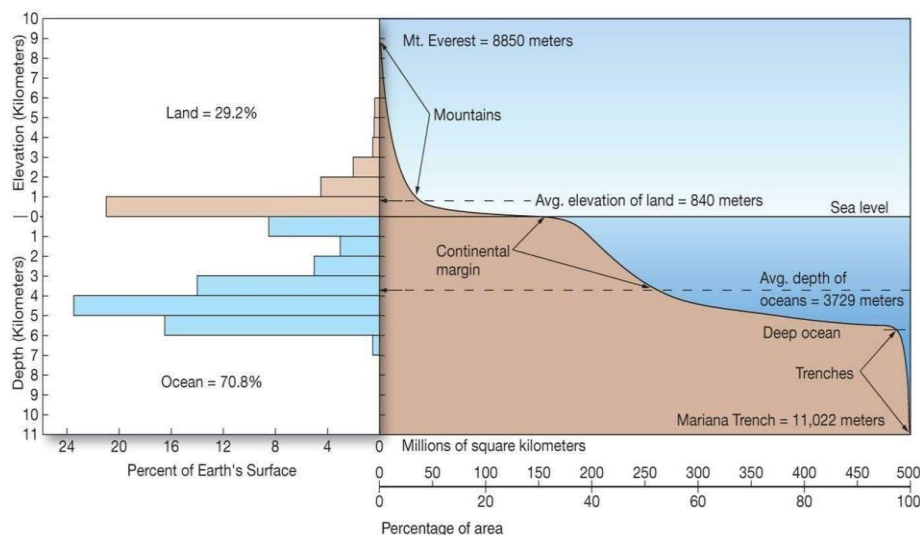
**Module No: 02**

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### Notes

## The Hypsographic Curve

The hypsographic curve shows the amount of Earth's surface at various elevations and depths.



Y-axis indicates the height above and below the seafloor. Horizontal bars indicate the height of the continent and Ocean (Shown in light brown and blue colour). While the X axis

indicates the percentage distribution of the total area. The elevation features of the ocean floor- shelves, slopes, rise, plains, ridges, and trenches are quantitatively summarized by oceanographers, along with the distribution of dry land at different altitudes, in a graph called the hypsographic curve.

The hypsographic curve shows what percentage of the earth's surface rises above present-day sea level to a given height, or sinks below it to a given depth.

The curve shows that a small percentage of the earth's surface consists of continental lowlands. Continental shelves and slopes account for about another 15 percent, abyssal plains, and mid-oceanic ridge systems for almost 50 percent, and deep-sea trench accounts for a small fraction. The fact that the earth's surface is comprised mostly of flat plates of continental and oceanic crust, with mountains and deep-sea trenches occurring only along their edges where the plate collides gives the hypsographic curve its characteristics shape.

## **Morphological features of the ocean floor**

The ocean profile begins from the shore, which is an irregular boundary where the surface of a continent descends first to a sea-level fluctuation and the ocean floor profile starts.

The following sequence of bottom features is typically seen.

### **1) Continental Shelf**

The flat wide margin which starts after a shoreline is known as the Continental shelf. The continental shelf is an area of relatively shallow water, usually less than a few hundred feet deep, that surrounds the land. It is narrow or nearly nonexistent in some places; in others, it extends for 70 to 1000 km. The waters along the continental shelf are usually productive, both from light and nutrients from upwelling and runoff. The average width of a continental shelf is and has a slope angle of  $0.1^\circ$  or 1.7 meters per kilometer.

### **2) Continental Slope**

The sudden change in the slope of the continental shelf is called the shelf break. Beyond the shelf break, the slope or continental slope of the ocean floor begins. The slope is relatively steeper with a slope angle of  $4^\circ$  and can go up to  $25^\circ$ . The steep slope is known to consist of submarine canyons and gullies. The continental slope on average is about 16 km wide and descends to a depth of about 2.4 km.

### **3) Continental rise**

At the base of continental slopes, the steep gradients of the slope decrease to 1 degree or less continuing into the abyssal hills or plains. This gentle slope area is

known as Continental Rise. Continental Rise is composed of fine-grained continental sediments (silt and clay) which are brought by the submarine canyons.

#### **4) Abyssal Plain**

Continuing further down from a steep plain of the continental slope and rise to a nearly leveled surface is called the Abyssal Plain. They are mainly found at depths below 4 kilometers and go up to several 1000 km. Abyssal plains are the largest habitat on earth. Sunlight does not penetrate to the seafloor, making these deep, dark ecosystems less productive than those along the continental shelf. But despite their name, these “plains” are not uniformly flat. They are interrupted by features like hills, valleys, and seamounts (underwater mountains that are also a hotspot for biodiversity).

**Abyssal hills:** Small hill on the ocean floor

**Seamounts:** Abyssal hills with more than 1km height from the ocean floor

**Guyots or Table mounts:** Seamounts with a flat top

#### **Mid-Ocean Ridge**

Beyond the abyssal plain, which may be several hundred kilometers wide, the ocean floor begins to ascend again with a gentle slope. These are the flank of the mid-oceanic ridge. mid-oceanic ridge are long undersea mountain chains that usually extends down the middle of the ocean.

#### **Rift Valleys (Associated with Divergent plate)**

Along the center of the mid-oceanic ridge, there is a deep V-shaped valley notch which is referred to as a Rift Valley. From this valley, the new oceanic crust is constantly being extruded to the surface of the ocean floor.

#### **Ocean trenches**

Ocean trenches are steep depressions in the deepest parts of the ocean. The Mariana Trench is an example of an ocean trench, the deepest place in the ocean with 36,201 feet i.e nearly 11km deep.