CHAPTER 5 OCEANS

Objectives

After studying this chapter, students should be able to:

- describe the relief of the ocean.
- state its deposits of the ocean floor.
- describe the salinity of the ocean.
- define ocean currents and explain its causes.

Oceans and seas cover about seventy percent of the Earth's surface. The oceans are the Southern Indian, Pacific, Arctic and Atlantic Ocean. Pacific Ocean is the largest ocean.

5.1 Nature of the ocean floor

Ocean floors have relief features as illustrated in Fig. 5.1.

1. Continental shelf: The age of continents slope gently downwards under the surrounding oceanic waters. It is formed by the submergence of the continent due to a rise in sea level or erosion of land by ware erosion from the sea. Continent shelfs are rich fishing grounds due to the presence of plantations. Also, continental shelf favours the development of natural harbour.
2. Continental slope: This links the continental shelf with the deep sea plain or ocean floor. It has steep slopes.
3. Ocean ridge: The bed of the ocean rises up to form ridges some of which rise above its surface to form oceanic islands.
4. Deep sea plain: This is a wide undulating plain below sea-level also called Abyssal plain.

5. Ocean deep: These are long narrow trenches that plunge as great ocean deeps. They are located close to the continents about 9000metres in depth.

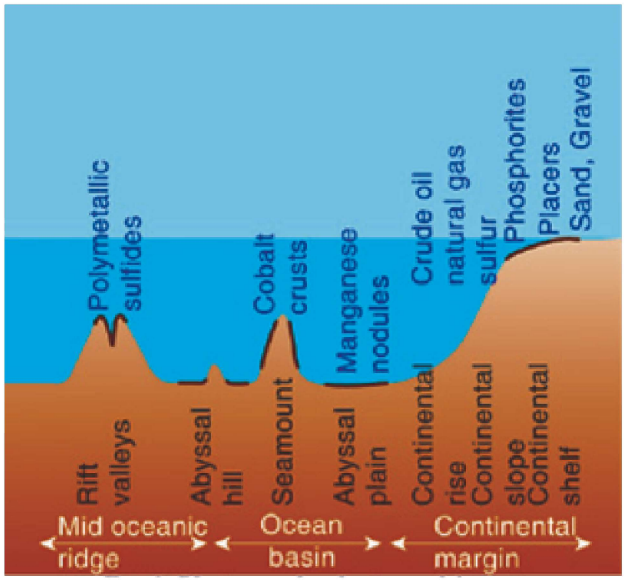

Fig. 5.1: Ocean floor

Deposits of the oceanic floor can be classified into three namely muds, oozes and clays.

(i) Muds: These are materials eroded from the land and deposited on continental shelves. The muds may be hue, green or red depending on their chemical content, they are also called epigenous deposits.

(ii) Oozes: These are remains of marine micro organisms with calcareous or siliceous parts. It also called pelagic deposits.

(iii) Clays: Volcanic dust emitted from volcanoes during volcanic eruption is deposited in the deep parts of ocean basins.

Salinity of the Ocean

Salinity is the degree of concentration of salt solution in oceans. It is measured in percentage or parts per thousand and varies from one ocean to another. Two important salts in oceans are sodium chloride (constitutes

7%) and calcium of shells and bones. These are magues in calcium and magnesium, calcium and potassium. Seas of inland drainage have high salinity such as the Caspian Sea (180 per thousand), Dead Sea (250 per thousand), Lake Van (330 per thousand). Salinity of seas and oceans depends on the following factors.

(i) Rate of evaporation: Areas with high temperatures have high salinity due to high rate of evaporation, while oceans in temperate areas have lower salinity.

(ii) Amount of freshwater added to the ocean in salinity is low in oceans and seas in areas of high rainfall, relative humidity and into which large rivers drain Mediterranean and Red seas are more salty than the oceans because few rivers discharge into them and they are located in regions of high temperature. Black and Baltic seas have lower salinity because they are diluted by freshwater from rivers and melting ice and are located in regions of low temperature.

(iii) Degree of water mixing by currents: Salinity is high in seas such as Caspian and Red Seas which are wholly or enclosed seas whose water does not mix freely with ocean water and ocean currents. Salinity is low where there is free mixing of water by ocean currents.

Ocean Currents

Ocean currents are large masses of surface water that circulate in greater patterns around the oceans.

Types of Ocean currents

There are two main types of ocean currents:

(i) **Warm currents:** These flow from the equatorial regions towards the poles and have high surface temperature e.g. Agulhar current.

(ii) **Cold currents:** They flow from the poles towards the equator and have a low surface temperature e.g. can arises current.

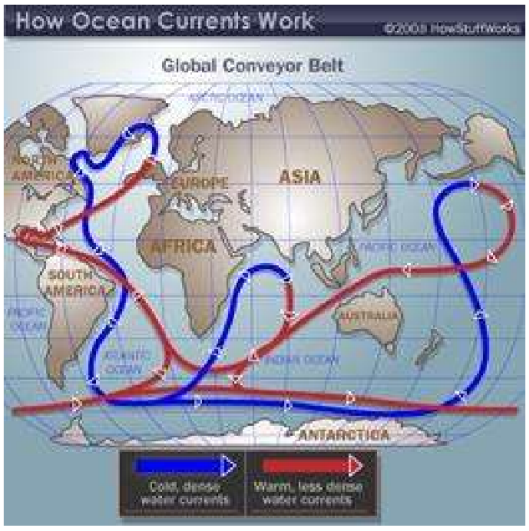

Fig. 5.2: Circulation of ocean currents

Causes of Ocean currents

Ocean currents are caused by the following factors:

1. **Earth rotation:** Earth's rotation deflects ocean current to the right. This is a clockwise direction in the northern hemisphere and anticlockwise direction in the southern hemisphere.
2. **Temperatures:** Ocean water at the equator have high temperature. It is warm, lighter, rises and moves along the surface to the poles. On the other hand, ocean water at the poles is cold, heavy and move slowly along the bottom of the sea towards the equator.
3. **Salinity:** Waters of high salinity are denser and flow at the bottom while waters of low salinity are lighter and flow on the surface.
4. **Shape of the land mass:** Currents flowing westwards pile up against the coasts towards which they flow deflecting the currents

northwards and southwards.

5. **Planetary winds:** These have a greater influence on the floor of ocean currents. Trade winds move equatorial water polewards and westwards and warm the eastern coasts of the continent. In temperate latitude, water lies result in a north – easterly flow of water in the northern hemisphere.

Effects of Ocean Currents on Climate

1. Precipitation: Winds blowing onshore over warm ocean current brings a lot of rain, while winds blowing over cold currents are dry.
2. Fogs: This is formed when warm and cold current meet. Warm moist air over the warm ocean current cools and condenses to form mist and fogs.
3. Temperature: Temperature is covered in coastlands with warm current offshore. Also, coastlands with cold current offshore are cooler than they should be.

Uses of Oceans

1. Ocean water is a mode of transportation.
2. Fishes in oceans serve as a major source of food.
3. Some land margins would have colder winter in the absence of warm currents which would affect agriculture.
4. Sources of minerals are coal, petroleum, etc.
5. Oceans are used for recreation.

Summary

Oceans and seas cover about seventy percent of the Earth's surface.

Ocean deposits are made up of mud, oozes and clays.

Salinity is the degree of concentration of salt solution in oceans.

Ocean salinity is determined by rate of evaporation amount of freshwater added to the ocean and the degree of water mixing by currents.

Ocean currents are large masses of surface water that circulate in greater patterns around the oceans.

Oceans are useful to man and his activities.

Revision Questions

Objectives

1. Which of these is not an ocean?
   - A. Indian ocean
   - B. Pacific Ocean
   - C. Caspian ocean
   - D. Southern ocean
2. Fishing is carried out in the
   - A. continental slope.
   - B. continental shelf.
   - C. ocean deep.
   - D. offshore.
3. Mud deposits are derived from
   - A. land.
   - B. ocean floor.
   - C. marine organisms.
   - D. plants.
4. Oozes are also referred to as
   - A. volcanic dust.

B. terrigenous deposits.

C. pelagic deposits.

D. ocean deposits.

5. Which of these salts has the highest volume in ocean water?

A. calcium bicarbonate.

B. magnesium.

C. potassium

D. sodium chloride

6. Salinity of ocean is measured in

A. percentage.

B. volume.

C. square metres.

D. height above sea level.

7. Which of the following is not a deposit of the ocean floor?

A. clays

B. loess

C. mud

D. oozes

8. Which of the following influences ocean salinity?

A. rate of evaporation

B. addition of freshwater to the ocean

C. water mixing by currents

D. all of the above

9. Which of the following is a warm current?

A. Gulf stream

B. canaries current

C. perarian current

D. Californian current

10. Which of these is not a relief feature of the ocean floor?

A. ridge
B. deep
C. slope
D. rifts

Answers

1. C 2. B 3. A 4. C 5. D 6. A 7. B 8. 9. A 10. D

Essay

1. With aid of a diagram, describe the relief of the ocean floor.
2. State three factors that influence ocean salinity.
3. Discuss the causes of ocean current.
4. Define ocean current.
5. List five uses of oceans.