

UPDATED VALUE ADDITION MATERIAL 2024

SALIENT FEATURES OF WORLD'S PHYSICAL GEOGRAPHY

OCEANOGRAPHY



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SALIENT FEATURES OF WORLD'S PHYSICAL GEOGRAPHY: OCEANOGRAPHY

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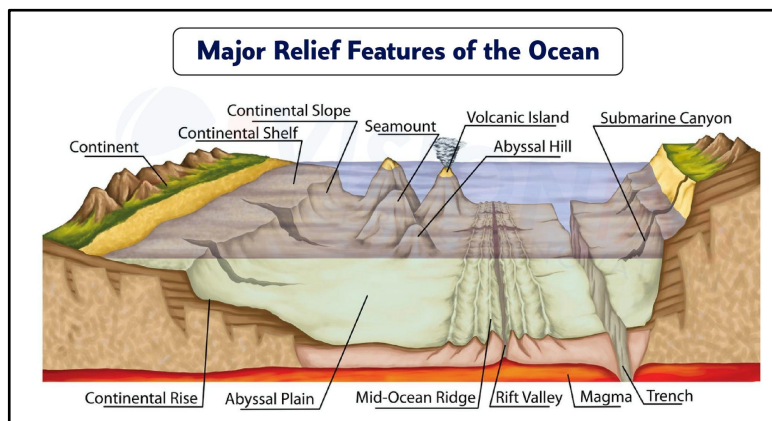
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1. Ocean Relief Features

Student Notes:

Oceans are large saltwater bodies covering over 70% of Earth, crucial for climate regulation and marine life. It is divided into five principal oceans viz. the Pacific, Atlantic, Indian, Southern, and Arctic Oceans. Oceanography is the study of these oceans, focusing on their movement, chemistry, biology, and geology.



Strong forces have shaped the ocean floor, which has terrain like mountains, plains, and trenches that mirror the Earth's surface above.

Major Ocean Relief Features	Description
Continental Shelf	- The continental shelf is a gently sloping extension of a continental plate that stretches into the sea. - These shelves are typically 70 to 80 kilometers wide, though they can vary, like the wide Siberian shelf (up to 1,500 kilometers) and the narrower eastern USA shelf (up to 120 kilometers). - Continental shelves form due to factors like submerged continent parts, sea-level rise, sediment deposits, and wave erosion. - Significance of Continental Shelves. - Rich fishing areas due to abundant plankton and microorganisms. - Sources of fossil fuels, including oil and natural gas. - Deposits of metallic and non-metallic ores.
Continental Slope	- The continental slope is the area that connects the continental shelf to the ocean basins. - The depth of the slope is between 200 and 3,000 meters. Features like canyons and trenches are found here.
Continental Rise	- When the slope reaches a level of between 0.5° and 1°, it is referred to as the continental rise. - With increasing depth the rise becomes virtually flat and merges with the abyssal plain.
Deep Ocean Plains (Abyssal Plain)	- These are the flattest and smoothest regions of the world because of terrigenous and shallow water sediments that buries the irregular topography. - The depths vary between 3,000 and 6,000 m. - These plains are covered with fine-grained sediments like clay and silt.
Oceanic Ridges	- A mid-oceanic ridge is composed of two chains of mountains separated by a large depression. [Divergent Boundary] - These oceanic ridge systems are of tectonic origin and provide evidence in support of the theory of Plate Tectonics. - Iceland, a part of the mid-Atlantic Ridge, is an example.

1.1. Ocean Floor Mapping

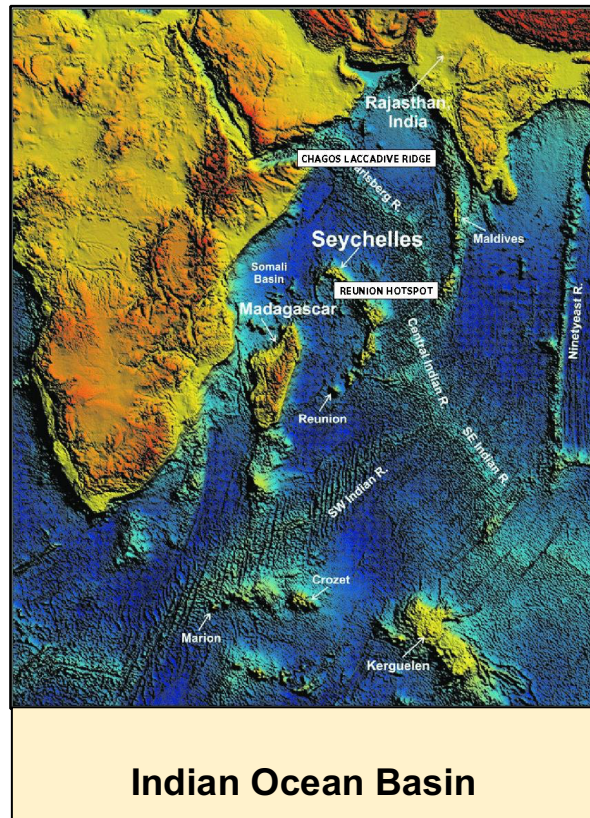
Ocean floor mapping, known as bathymetry, is essential for understanding the topography, geological features, and ecosystems of Earth's oceans. Remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs) equipped with sonar and cameras are used for detailed mapping.

- It identifies underwater features like ridges, trenches, and seamounts, providing insights into tectonic activity and natural resource formation.
- Mapping helps locate fishing zones, identify mineral deposits, and assess the environmental impact of human activities like oil exploration and deep-sea mining.

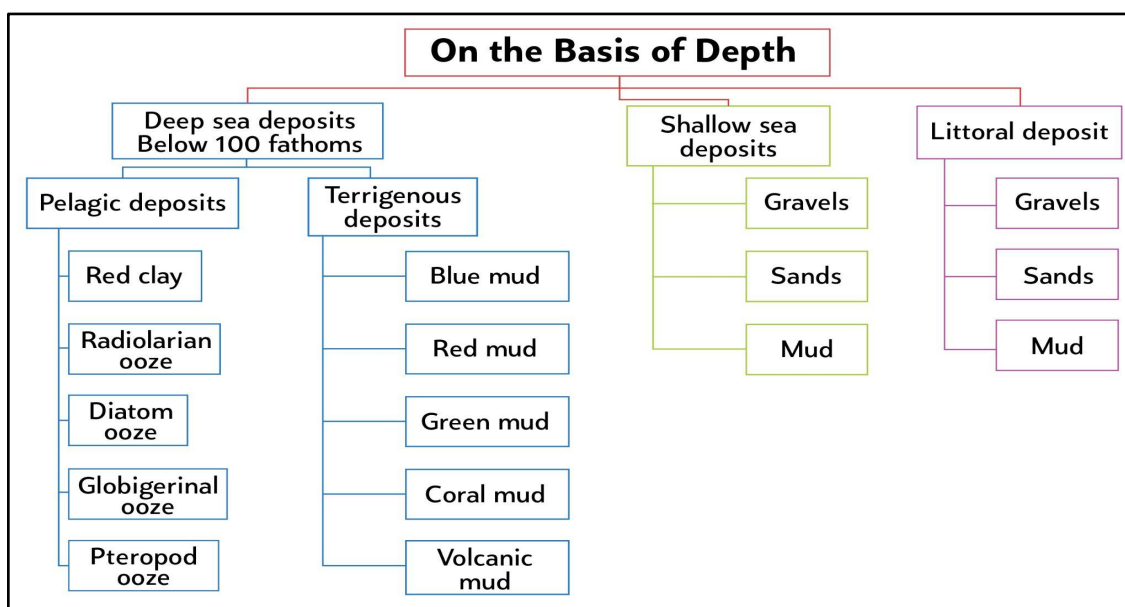
International Projects:

- The General Bathymetric Chart of the Oceans (GEBCO) provides global bathymetric data.
- Seabed 2030 aims to map the entire ocean floor by 2030.
- Many countries have national programs for ocean floor mapping.

India's Samudrayaan: Initiated in 2021, this deep ocean mission aims to explore the ocean bed at 6,000 meters depth in the central Indian Ocean. The mission uses the Matsya6000 submersible to study the deep ocean environment, focusing on resource exploration and marine research.



1.2. Ocean Deposits



Ocean deposits are accumulations of material that have settled on the seafloor. These materials come from various sources, both living and nonliving. Here's a quick breakdown of the main types:

- **Terrigenous Deposits:** These are land-derived sediments transported to the ocean by rivers, wind, and glaciers. Their composition varies depending on the source.
- **Biogenous Sediments:** These originate from the remains of dead marine organisms. The two main types are:
 - **Siliceous Ooze:** Formed from the silica shells of tiny organisms like diatoms and radiolarians.
 - **Calcareous Ooze:** Formed from the calcium carbonate shells of organisms like foraminifera and coccolithophores.
- **Cosmogenous Sediments:** These rare deposits come from outer space, including micrometeorites, meteorite fragments, and tektites.
- **Pelagic Deposits:** These offer a glimpse into life in the deep ocean and consist of:
 - **Ooze:** A soft, mud-like substance made from microscopic shells.
 - **Deep-sea Clay:** Extremely fine particles that settle from the water column.
- **Hydrogenous Deposits:** These form through chemical reactions in seawater, with minerals like manganese nodules and phosphorites precipitating and settling on the ocean floor.

Minerals present in seabed

The seabed contains three main types of mineral deposits that are being considered for commercial exploitation:

- **Polymetallic nodules:** These small lumps are found scattered across the ocean floor, often partially buried in sediments. They contain a variety of metals including **manganese, iron, copper, nickel, cobalt, lead, and zinc**. (Note:-Detailed discussion of polymetallic nodules is covered in the resource topic)
- **Seafloor massive sulfides (SMS):** Also known as polymetallic sulfides, these deposits are rich in copper, iron, zinc, silver, and gold. They form through hydrothermal processes along mid-ocean ridges and volcanic arcs.
- **Cobalt-rich ferromanganese crusts:** These crusts precipitate minerals from seawater onto seamounts and ridges at depths between 400 and 7,000 meters. They contain iron, manganese, nickel, cobalt, copper, and rare earth elements.

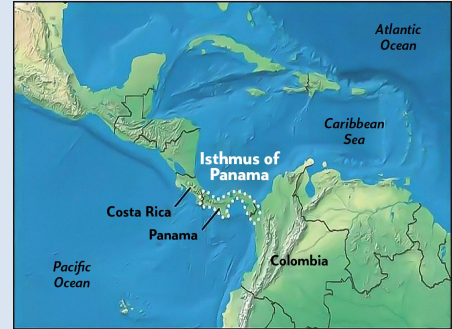
The **International Seabed Authority (ISA)** has so far approved 28 exploration contracts covering over 1.3 million square kilometers of seafloor to study these mineral deposits. However, the environmental impacts of deep-sea mining remain poorly understood and are a major concern

The significance of ocean deposits:

- **Scientific Research:** Ocean deposits provide insights into Earth's geological history and climate, helping scientists understand past events, environmental changes, and the formation and evolution of oceans and continents.
- **Resource Availability:** Ocean deposits can indicate potential mineral resources, such as manganese nodules rich in nickel, copper, and cobalt, which form over millions of years. Economically, the extraction of these deposits significantly contributes to the global economy.
- **Biodiversity:** Ocean deposits provide habitats for diverse marine life. Coral reefs, for example, support a wide range of species and play a vital role in marine ecosystems.
- **Climate Regulation:** Sediments in ocean deposits store carbon and help regulate the Earth's climate by controlling the carbon cycle and influencing oceanic carbon sequestration.

Difference between Isthmus and Strait

Student Notes:

Feature	Isthmus	Strait
		
Definition	A narrow strip of land connecting two larger land areas and separating two bodies of water. 	A narrow body of water connecting two larger bodies of water and separating two land masses. 
Importance/Significance	• Strategic military and economic routes (e.g., Panama Canal) • Facilitates land-based transportation and trade between continents • Influences ocean circulation, which in turn affects weather patterns on both sides.	• Development of ports and harbours, maritime routes for global shipping and trade (e.g., Suez Canal) • Strategic military chokepoints, e.g., Straits of Malacca. • Biodiversity hotspots due to mixing of different marine environments. e.g., the Coral Triangle in Southeast Asia, where Indian Ocean and Pacific meet.

Difference between Bay and Gulf

Student Notes:

Feature	Bay	Gulf
	 	 
Definition	A bay is a large body of water partially enclosed by land but with a wide mouth, providing access to the sea. Example- Bay of Bengal	A gulf is a large body of sea or ocean, partially enclosed by land, typically with a narrower opening compared to a bay. Example- Persian Gulf
Formation	Bays are formed due to the erosion of coastlines and the subsidence of land.	Formed by tectonic activity, such as the movement of plates, which creates larger indentations in the land.
Significance	Bays often serve as excellent harbours and fishing grounds, providing safe anchorage and shelter from storms.	Gulfs are significant for international shipping routes, rich marine biodiversity, and oil reserves.

2. Movement of Ocean Water

The movement of ocean water is a complex process driven by various forces and factors. Understanding these movements is crucial for comprehending marine ecosystems, climate patterns, and navigation. The major types of ocean water movement include:

- Waves:** Waves are the oscillating movements of water caused mainly by wind blowing across the surface of the sea. Key factors influencing wave formation include wind speed, wind duration, and the distance over which the wind blows (fetch).
- Tides:** Tides involve the rhythmic rise and fall of entire sea levels. This occurs roughly once or twice daily due to the gravitational pull of the moon, influenced by the sun and Earth's rotation.

Tides can be categorized in two ways:

- Frequency:**
 - Semi-diurnal:** Two high tides and two low tides occur in a 24-hour period.
 - Diurnal:** Only one high tide and one low tide occur in a day.

- **Sun-Moon Alignment:**

- **Spring tides:** When the sun, moon, and Earth are aligned, their combined gravity creates more extreme high and low tides.
- **Neap tides:** When the sun and moon are at right angles to Earth, their opposing forces produce less dramatic tidal changes.

Characteristics of Tides

The characteristics of tides are influenced by the gravitational forces of celestial bodies and the Earth's physical geography, including continental shelves, islands, and coastal features.

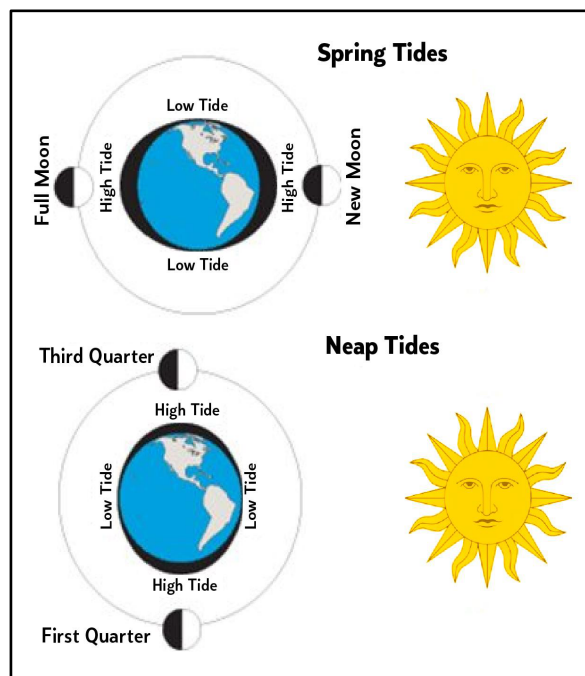
- **Tidal Bulges on Continental Shelves:**

Tides are higher on broad continental shelves due to the barrier effect of land, making them more pronounced in these areas.

- **Tidal Bulges at Mid-Oceanic Islands:** In open ocean areas around mid-oceanic islands, tides are lower because there is no barrier effect, resulting in less pronounced tidal changes.

- **Influence of Coastal Topography:** Coastal features like bays and estuaries can intensify tides through a funneling effect. The Bay of Fundy in Canada, with its funnel shape, experiences some of the world's highest tides, up to 15-16 meters.

- **Westward Propagation Blocked by Continents:** As the Earth rotates, large continents block tidal bulges from moving westward freely. This causes tidal patterns to vary significantly between different oceans and locations.



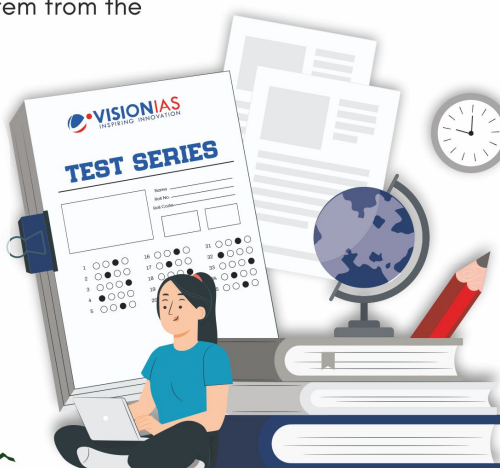
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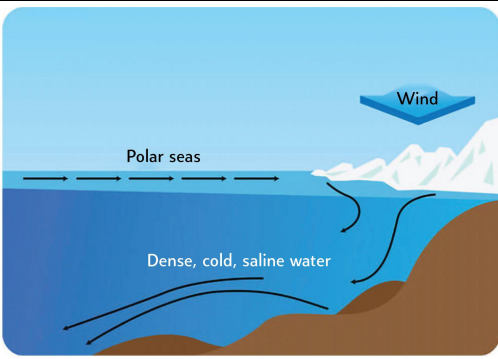
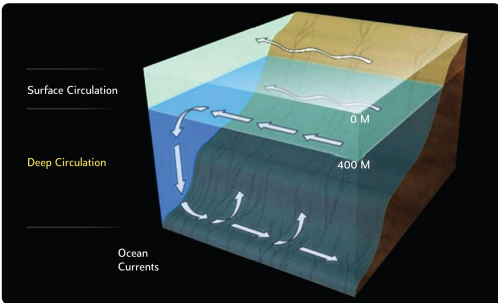
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3. Ocean currents:

Ocean currents are large, continuous movements of seawater that flow through the world's oceans. They are driven by factors such as wind, the Earth's rotation, temperature differences, and salinity levels. Notably, ocean currents play a critical role in regulating Earth's climate by transporting heat around the globe.

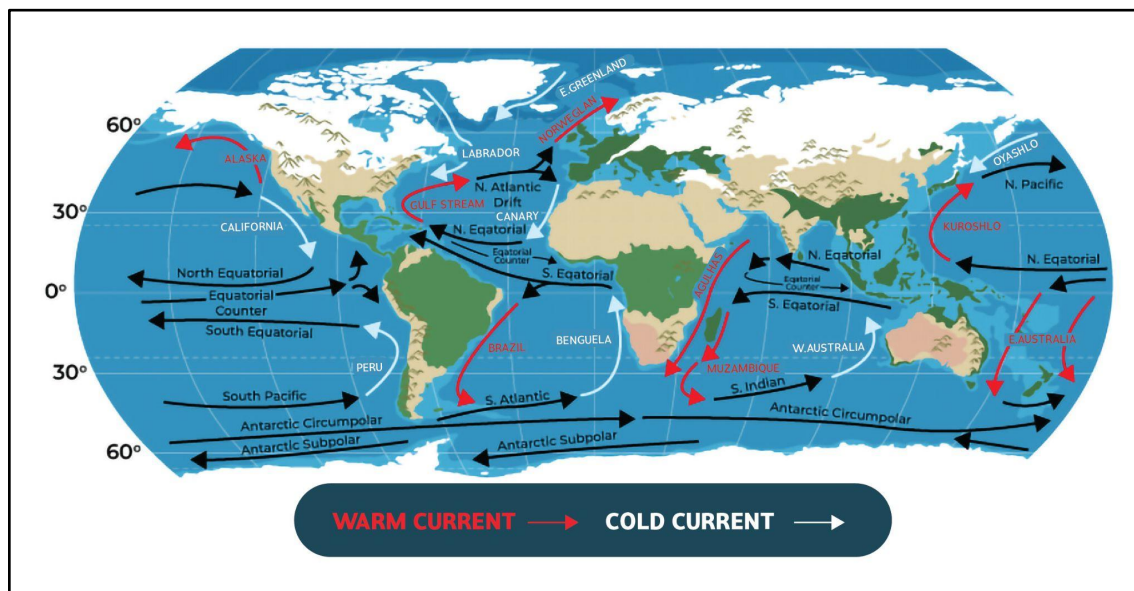
2.1. Types of Ocean Currents

Ocean Currents based on Depth:

Type	Description	Location	Percentage of volume
 Surface currents	Driven by wind and friction, these currents flow in the upper 400 meters of the ocean, influencing weather patterns and marine life. For example Kuroshio Current.	Uppermost layer of the ocean	10%
 Deep water currents diagram	These massive currents move slowly throughout the ocean basins, primarily influenced by differences in water density and gravity. They play a crucial role in global heat distribution. For example Atlantic Meridional Overturning Circulation (AMOC)	Ocean basins at various depths	90%

Ocean Currents based on Temperature:

Type	Description
Cold currents	Transporting cold water from polar regions towards the equator, often found along the west coasts of continents . For example North equatorial current
Warm currents	Carrying warm water from near the equator towards higher latitudes, these currents have a significant impact on global climate and influence marine life. They are commonly found along the east coasts of continents . For Example- Gulf stream



Primary Forces behind ocean current

1. **Insolation:** Solar radiation heats the equator, causing water to expand and bulge slightly compared to cooler poles. This creates a subtle slope, influencing water movement.
2. **Atmospheric Circulation:** Winds blow across the ocean surface, pulling the water along through friction. The direction and strength of the wind determine the path and intensity of the currents, reflecting the patterns of atmospheric circulation. For example- The North Atlantic Drift in the Atlantic and the North Pacific current in the Pacific move in the northeast direction under the influence of westerlies.
3. **Coriolis Force:** The Earth's rotation bends the path of moving currents. In the Northern Hemisphere, currents deflect to the right (e.g., Gulf Stream), while in the South, they deflect left (e.g., Brazilian Current).
4. **Salinity:** Variations in water density due to salinity differences influence vertical movements within currents. Denser, saltier water tends to sink, while lighter, fresher water rises, creating a circulation pattern.
5. **Land Masses:** Continents and islands act as barriers, deflecting and shaping currents. For example, the tip of South America redirects the West Wind Drift northward, forming the Peru Current.

By understanding these forces, we gain a deeper appreciation for the ocean's dynamic nature and its profound impact on our planet's climate.

Impact of Ocean current on Climate and Geography

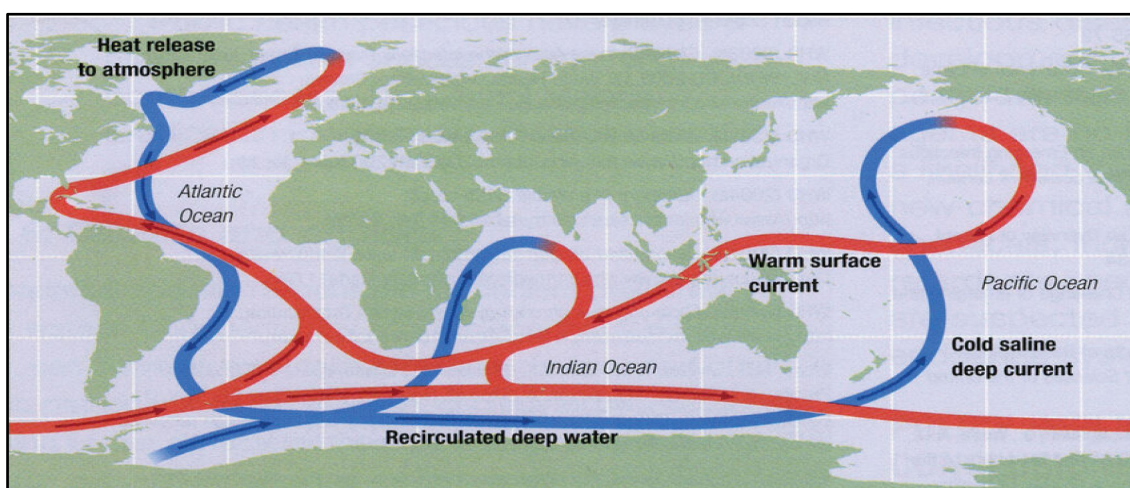
- **Desert Formation:** Cold ocean currents contribute significantly to the formation of deserts along the west coasts of tropical and subtropical continents. They cause fog and aridity by reducing moisture content and drying out the areas. for Example **Namib Desert**
- **Rainfall:** Warm ocean currents bring rainfall to coastal areas and interiors. Warm currents flowing parallel to the east coasts of tropical and subtropical continents result in warm and rainy climates. For example, **Kuroshio Current** brings warm and humid air, contributing to a warm and rainy climate in the region
- **Moderating Effect:** Ocean currents moderate temperatures along coasts. The North Atlantic Drift brings warmth to England, while the Canary cold current cools Spain and Portugal.
- **Fishing:** The mixing of cold and warm ocean currents creates rich fishing grounds, such as the Grand Banks near Newfoundland, Canada, and the northeastern coast of Japan. This interaction replenishes oxygen and promotes plankton growth, the primary food source for fish, making these mixing zones the best fishing grounds.

- **Tropical Cyclones:** Warm water accumulated by ocean currents in the tropics serves as a major force behind tropical cyclones.
- **Navigation:** Ocean currents assist in navigation by providing predictable pathways that can speed up or slow down ships, aiding in efficient maritime travel.

2.2. Deep Water Circulation (DWC)

It refers to the movement of water in the deep ocean, primarily driven by density differences between water masses. These differences arise from variations in temperature and salinity.

- For example: In Polar Regions, ocean water cools significantly, leading to the formation of sea ice. The formation of sea ice leaves salt behind in the surrounding seawater, increasing its salinity and density, causing it to sink.
- This process draws in surface water, which also becomes cold and salty enough to sink, establishing a circulation pattern known as **Thermohaline circulation** or **Atlantic Meridional Overturning Circulation (AMOC)**



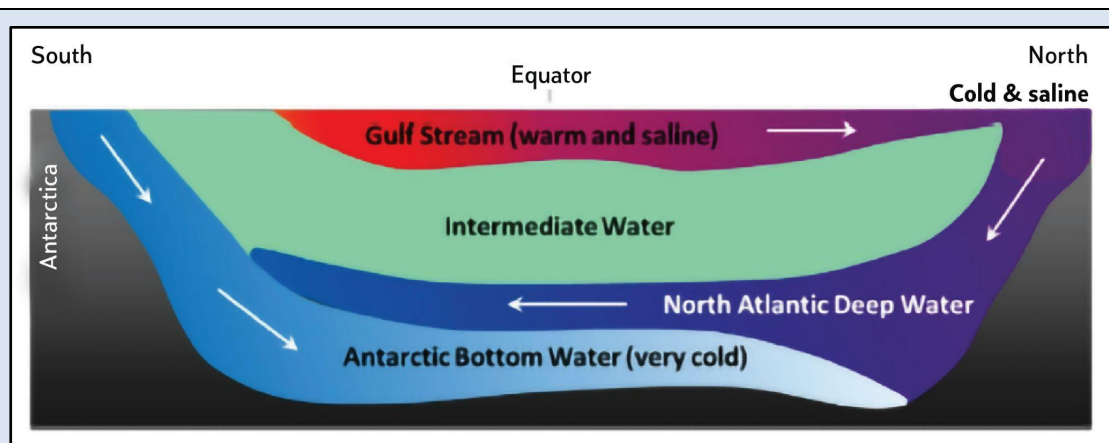
Significance of Deep Water Circulations:

1. **Global Heat Distribution:** DWC aids in the global distribution of heat, regulating Earth's temperature and mitigating extreme temperatures across different regions.
2. **Carbon Dioxide Regulation:** It plays a crucial role in controlling atmospheric carbon dioxide by transporting carbon from the surface to the deep ocean for long-term storage.
3. **Influence on Ocean Currents:** DWC shapes ocean currents and circulation patterns, impacting marine ecosystems, weather patterns, and coastal regions.
4. **Sea Level Regulation:** It affects sea levels by redistributing heat and influencing thermal expansion, as warm water is less dense than cold water.

Impacts of AMOC Instability on Climate and Sea Levels

Recent studies show that the Atlantic Meridional Overturning Circulation (AMOC) is becoming less stable, which could have serious effects worldwide:

- **Colder Climate in Europe:** If the AMOC weakens, Europe might experience colder winters and more extreme weather.
- **Sea Level Rise:** The east coast of North America could see rising sea levels.
- **Rainfall Changes:** Global rainfall patterns, including monsoon systems, could shift, affecting agriculture and water supplies.
- **Marine Ecosystem Disruption:** Changes in ocean circulation could impact marine life by altering nutrient distribution and water conditions.



Concept of Water Mass

A water mass is a body of water with distinct physical and chemical characteristics, formed due to specific processes in the ocean or other large water bodies. These characteristics remain relatively stable over a significant depth range, making it identifiable from surrounding water. **Examples of Water Masses are**

- **North Atlantic Deep Water (NADW):** Formed in the North Atlantic Ocean, it is characterized by cold temperatures and high salinity. NADW sinks to great depths and spreads southward, influencing global ocean circulation.
- **Antarctic Bottom Water (AABW):** This water mass forms around Antarctica through processes like sea ice formation.

Characteristics of Water Masses

1. **Temperature and Salinity:** Water masses have unique temperature and salinity values, which are relatively stable over time and distinguish them from adjacent water.
2. **Density:** The combination of temperature and salinity determines the density of a water mass. Differences in density influence vertical and horizontal movement within the ocean.
3. **Formation Region:** Water masses are formed in specific regions where conditions like evaporation, precipitation, ice formation, and freshwater input significantly influence their properties.
4. **Depth Range:** Water masses typically occupy distinct depth ranges. For example, some water masses form at the surface, while others form in deeper layers.
5. **Stability:** Once formed, water masses can remain stable and retain their characteristics over long periods, allowing them to be tracked across the ocean.

Water masses are integral components of the ocean's structure and dynamics, affecting global climate patterns, marine ecosystems, and ocean circulation. Understanding their characteristics and distribution helps in studying the ocean's role in the Earth's climate system.

3. Ocean Temperature

Ocean surface temperatures can range from about -2°C in Polar Regions to over 30°C in equatorial regions. The distribution of ocean temperature is influenced by several factors that include both natural processes and geographic features.

Factors Affecting Temperature Distribution of Ocean

- **Latitude and Solar Radiation:** Equatorial regions receive direct sunlight year-round, leading to higher temperatures. Polar regions receive less sunlight due to the sun's angle, resulting

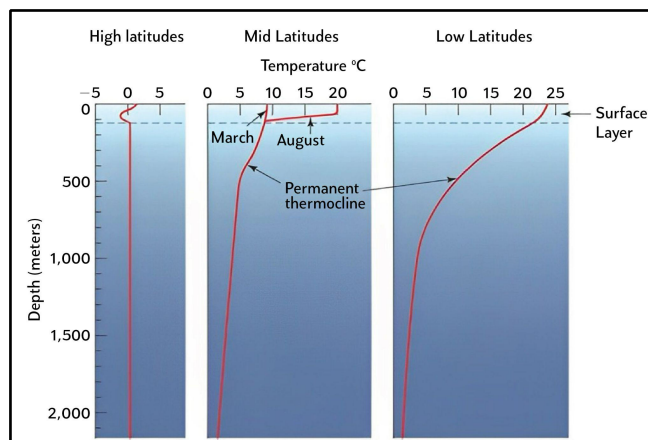
in lower temperatures. The surface ocean layers are warmer due to direct sunlight, while deep ocean layers are colder as sunlight does not reach them.

- **Ocean Currents** : Warm currents, like the Gulf Stream, move warm water from the equator toward the poles. Cold currents, such as the Labrador Current, bring cold water from the poles toward the equator.
- **Geographical Features and Wind Patterns**: Shallow areas like continental shelves are warmer, while deep ocean basins are colder. Wind patterns, including trade winds and monsoons, can shift warm surface water and alter temperatures significantly.
- **Evaporation, Precipitation**,: High evaporation cools the ocean surface by removing heat, and high precipitation lowers surface temperatures by adding cooler freshwater.
- **Upwelling, and Down welling**: Upwelling brings cold, nutrient-rich water to the surface, cooling it, while down welling moves warm surface water to deeper layers.
- **Human Activities**: Climate change increases global ocean temperatures through the greenhouse effect, and pollution can locally alter temperature distributions through chemical and thermal effects.

Vertical variation in oceanic temperature

The vertical distribution of temperature in the deep ocean is influenced by **density-driven** water movements.

- The maximum temperature of oceans is found at the surface due to direct solar energy.
- Heat conduction alone transfers only a small proportion of heat downward; convection plays a crucial role in transmitting heat to lower sections of the oceans.



Variation of Temperature with depth at various latitudes

1. Surface Layer (Mixed Layer):

- Depth: Extends from the ocean surface to about 200 meters.
- Temperature: Warmer due to sunlight and mixing by wind and waves.
- Variation: Changes with seasons as it interacts with the atmosphere.

2. Thermocline:

- Depth: From about 200 meters to 1,000 meters.
- Temperature: Rapid decrease with depth, less pronounced in polar regions.
- Stability: Acts as a barrier to mixing, separating warm surface water from cold deep water.

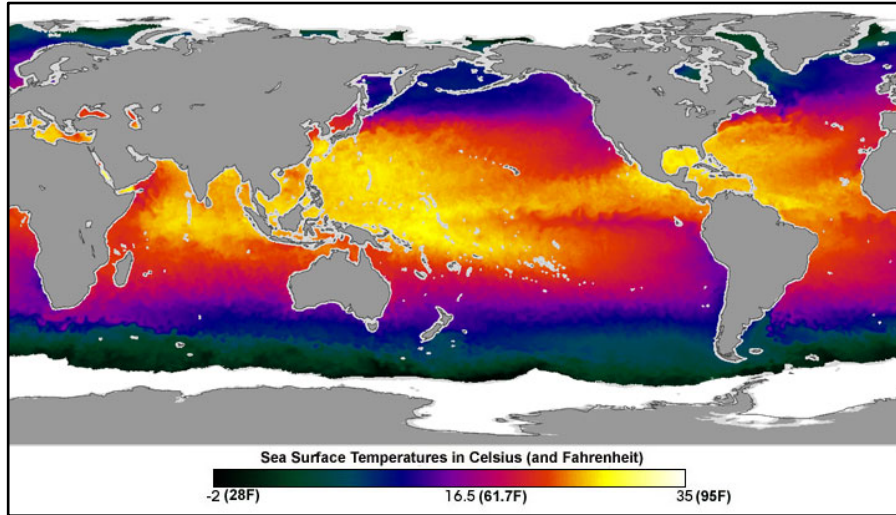
3. Deep Ocean:

- Depth: Below 1,000 meters to the ocean floor.
- Temperature: Cold and uniform, typically between 0°C and 3°C.
- Stability: Very stable with little temperature change over time.

Horizontal Distribution of Ocean Temperatures

- Ocean temperatures are warmest near the equator, ranging from 26°C to 28°C, and decrease by about 0.5°C per degree of latitude as you move toward the poles, where temperatures approach freezing.

- Ocean regions in the Northern Hemisphere are slightly warmer due to greater landmass, which heats and cools faster, while the Southern Hemisphere has more stable and cooler temperatures due to larger ocean expanses.
- Regional variations occur as warm currents like the Gulf Stream and cold currents like the California Current create temperature differences.



4. Salinity of Oceans

Ocean salinity measures the amount of dissolved salts in seawater, expressed in parts per thousand (ppt). For example, a salinity of 35 ppt means there are 35 parts of salt in every 1,000 parts of water. Water with salinity above 24.7 ppt is considered brackish.

Isohalines are lines on maps connecting locations with equal salinity, helping visualize salinity distribution.

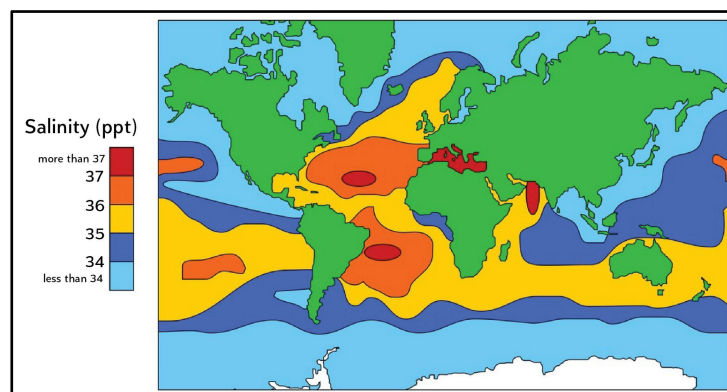
Factors determining ocean salinity

- **Freshwater Influx:** The inflow of freshwater from rivers and melting glaciers dilutes ocean salinity. For example, Polar Regions have lower salinity compared to equatorial regions due to less evaporation and the mixing of fresh water from ice melt.
- **Evaporation:** Arid regions and subtropical high-pressure zones, such as the Mediterranean Sea, experience higher evaporation rates, which increases salinity.
- **Ocean Currents:** Ocean currents redistribute water with varying salinity levels. The Gulf Stream, for instance, elevates salinity along the western margins of the North Atlantic Ocean.
- **Temperature:** Salinity, temperature, and water density are interconnected. High temperatures generally correlate with high salinity regions. For example, tropical areas typically have higher salinity due to increased evaporation rates.

Understanding these factors is crucial as they play a significant role in ocean circulation, marine ecosystems, and global climate patterns.

Horizontal Distribution of Ocean Salinity:

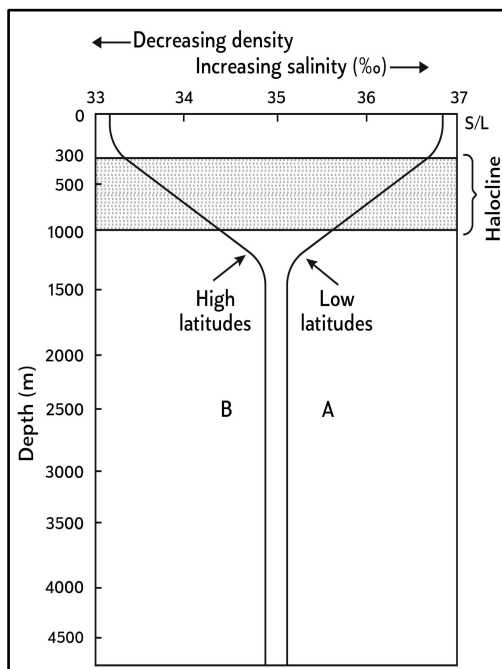
- **Tropical Regions:** Near the equator and in tropical regions, the ocean tends to be more saline due to high evaporation rates, leaving the salts behind and increasing the salinity.



- **Subtropical High-Pressure Belts** are characterized by sinking air, clear skies & low precipitation leading to high salinity levels.
- **Sub polar Regions** experience influx of freshwater from melting glaciers leading to lower salinity levels.

Vertical Distribution of Ocean Salinity:

- **Surface Salinity:** Influenced by processes of evaporation, precipitation, and freshwater input from rivers and melting ice. These processes can lead to higher or lower salinity levels at the ocean's surface.
- **Halocline:** This zone is characterized by a significant decrease in salinity due to the mixing of more saline surface waters with deeper, less saline waters.
- **Deep Ocean Salinity:** In the deep ocean, salinity does not vary much with depth.



4.1. Ocean Salinity: A Regional Look

Here's a quick dive into how it varies across different regions:

Indian Ocean:

- Overall, it averages around 35 parts per thousand.
- The Bay of Bengal sees lower salinity due to freshwater influx from mighty rivers like the Ganges.
- In contrast, the Arabian Sea boasts higher salinity due to high evaporation and minimal freshwater input.

Pacific Ocean:

- Its vast size and unique shape play a key role in salinity variation.
- Upwelling in the eastern Pacific lowers surface salinity.
- Warmer, tropical and subtropical regions in the west experience high evaporation, leading to higher salinity.

Atlantic Ocean:

- Northern regions, like the subpolar North Atlantic, have lower salinity due to melting ice and precipitation.
- As water travels south, evaporation rates increase, and warm currents like the Gulf Stream contribute to higher salinity.
- The saltiest pockets are often found in subtropical high-pressure zones like the Sargasso Sea.

How Climate Change Affects Ocean Salinity

- **Precipitation:** Increased rainfall adds freshwater to oceans, reducing salinity. For example, areas near the equator, like the North Pacific Ocean, see heavy rainfall, lowering salinity.
- **Evaporation:** Warmer regions, such as the North Atlantic Ocean, experience higher evaporation, leaving saltier water, resulting in patches of high salinity.
- **River Runoff:** Rivers contribute freshwater to the oceans, affecting salinity. Climate change alters river flows, with some rivers having reduced flow due to droughts, increasing salinity.
- **Ice Melting:** Melting glaciers and sea ice add freshwater to oceans, decreasing salinity, especially in polar regions. Climate change accelerates ice melting, enhancing this effect.

Impact of Salinity Changes on Climate

- **Ocean Circulation:** Salinity affects ocean currents that distribute heat globally. Changes can slow these currents, affecting climates by warming equatorial regions and cooling polar areas.
- **Hydrological Cycle:** High salinity water needs more heat to evaporate, leading to less evaporation, cloud formation, and precipitation, impacting weather patterns and rainfall distribution.
- **Temperature Changes:** High salinity water absorbs more heat, raising temperatures in regions like Canada and Northern Europe, contributing to extreme weather.
- **Cyclones:** Lower salinity in tropical areas can increase air moisture, fueling more intense cyclones, such as those in the North Indian Ocean.

Overall, changes in ocean salinity due to climate change disrupt oceanic and atmospheric balance, leading to extreme weather events with socio-economic impacts. Understanding these connections is vital for developing strategies to mitigate climate change effects on ocean salinity and global climate.

PYQ on Oceanography

2014: Critically evaluate the various ocean resources that can be harnessed to address the world's resource crisis.

2015: What factors cause ocean currents? How do they influence regional climates, fishing, and navigation?

2017: Explain the variations in ocean salinity and discuss its multifaceted effects.

2019: How do ocean currents and water masses differ in their impacts on marine life and coastal environments? Provide relevant examples.

2022: What forces influence ocean currents? Describe their role in the global fishing industry.

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Heartiest Congratulations

to all Successful Candidates



**1
AIR**

Aditya Srivastava

16

in **TOP 20** Selections in **CSE 2023**

from various programs of **Vision IAS**



**2
AIR**

**Animesh
Pradhan**



**5
AIR**

Ruhani



**6
AIR**

**Srishti
Dabas**



**7
AIR**

**Anmol
Rathore**



**9
AIR**

Nausheen



**10
AIR**

**Aishwaryam
Prajapati**

39
Selections

in **TOP 50**
in **CSE 2022**



**1
AIR**

**Ishita
Kishore**



**2
AIR**

**Garima
Lohia**



**3
AIR**

**Uma
Harathi N**

**1
AIR**



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CIVIL SERVICES
EXAMINATION 2020



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Apsara Arcade, 1/8-B 1st Floor,
Near Gate-6 Karol Bagh
Metro Station

DELHI

MUKHERJEE NAGAR CENTER

Plot No. 857, Ground Floor,
Mukherjee Nagar, Opposite Punjab
& Sindh Bank, Mukherjee Nagar

GTB NAGAR CENTER

Classroom & Enquiry Office,
above Gate No. 2, GTB Nagar
Metro Building, Delhi - 110009

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RANCHI