

Earth and Space – The Hydrosphere

- Earth's outer layer of water found as liquid gas or solid.

Stats:

- 71% of earth is water
- 2.5% left is rivers, lakes, icecaps and glaciers
- 97.5% of this water is in the oceans
- 79% of the 2.5% is frozen

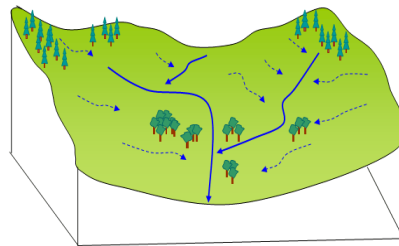
We can “separate” the hydrosphere into 3 general categories:

1. Inland water

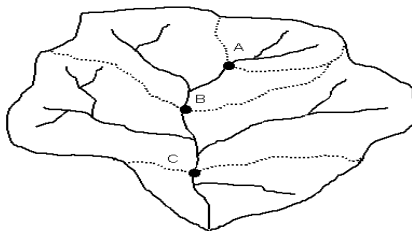
Def: _____

Catchment areas or watershed

Def: _____



Pollutants, catchment areas and watersheds



Aspects which affect a watershed:

- topography: Natural and artificial features of the area
- climate
- vegetation: plant life
- geology: rocks
- agriculture: farming

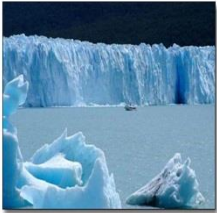


2. The cryosphere

Def: _____

The cryosphere encompasses:

ice floes, glaciers, permafrost, frozen lakes and rivers and snow

Glaciers vs Ice Floes vs icebergs

	Glaciers	Ice floes (ice pack)	Icebergs
Formation	Formed as a slow sliding mass of ice formed on land which does not float in the water.	Are composed of slabs of ice and snow floating on the surface of the water. Travels from the poles and then melts when it gets to the equator.	Pieces of glaciers breaking off into the sea.
Pictures			
Type of water			
Affect salinity?			
Affect sea level?			
Extra info			

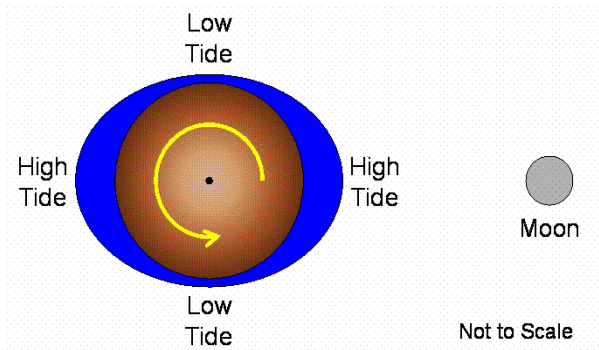
The Oceans

- Large masses of salt water
- There are two types of currents
 - 1- Surface currents
 - 2- Subsurface currents (Deep currents) also called thermohaline circulation

Surface currents

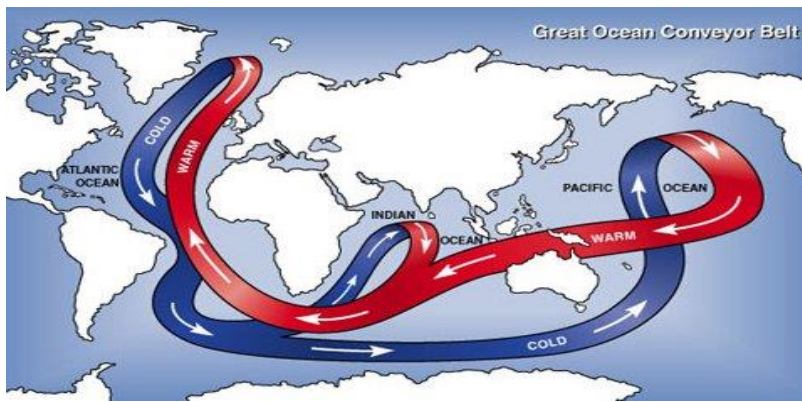
- _____
- _____
- _____

How does the rotation of the earth affect surface currents?



Subsurface currents- thermohaline circulation

- _____
- _____
- _____
- _____



How it works

Salt Differences?

- ---
- ---
- ---
- ---

Density of water is affected by 2 factors:

1-

 2

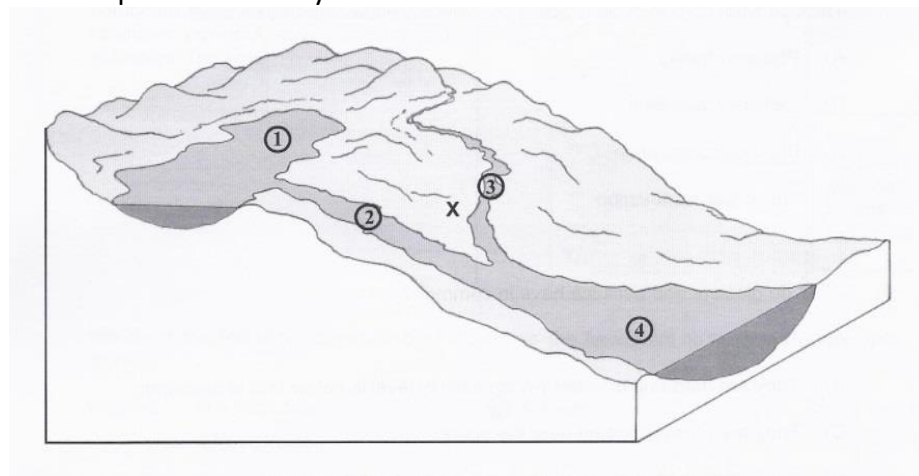
Most dense water =

 Least dense water =

What affect will pack ice and glaciers melting have on thermohaline circulation?

Past Exam Questions

1. The diagram below shows four different locations (1,2,3 and 4) and the site of a toxic spill identified by the letter X.



Which statement about the impact of the toxic spill is TRUE?

- A) Location 1 will be the most affected, since the flow of water will carry the toxic substance into the lake.
- B) Location 2 will be only slightly affected, since the current will prevent the toxic substance from accumulating.
- C) Because of the terrain, only location 3 will be affected.
- D) Location 4 will be affected the most, since it is downstream from the spill.
2. Which of the following statements describes the impact of thermohaline circulation on climate?
- A) It regulates the world's climate
- B) It decreases the world's average temperature
- C) It increases the world's average temperature
- D) It has no notable impact on the world's climate.
3. The average salinity of the ocean is 35 g/L, but may vary from one area to another depending on certain conditions. The following table lists observations regarding four different areas of an ocean.

Area	Observation
1	Area that receives water from a melting coastal glacier
2	Tropical area with strong surface winds
3	Area with a large amount of water is lost through evaporation
4	Arctic area where pack ice is formed

Which area of this ocean has the lowest salinity level?

- A) Area 1 B) Area 2 C) Area 3 D) Area 4

4. Ocean circulation involves two types of ocean currents: surface currents and deep currents.

The following table lists the four factors that influence ocean circulation.

Factors influencing ocean currents

1	Rotation of the earth
2	Differences in water salinity
3	Differences in water temperature
4	Prevailing winds

Which choice correctly matches the factors that influence ocean circulation with the types of currents they affect?

	Surface currents	Deep currents
A	1 and 3	2 and 4
B	1 and 4	2 and 3
C	2 and 3	1 and 4
D	2 and 4	1 and 3

5. What do glaciers and pack ice have in common?

- A) They float on the ocean
- B) They are made up of water whose salinity level is below that of seawater
- C) They are always located near the poles
- D) When they melt, they do not affect the salinity of the oceans

6. On December 6, 2010, a major storm devastated the Lower St. Lawrence and Gaspé Peninsula. This storm, combined with extremely high tides, produced powerful waves and caused extensive damage.

Which of the following diagrams best illustrates the formation of the tides during this storm?

