

Module 1: What is Oceanography

Topic 2 Content: The Branches of Oceanography Notes

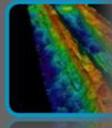
Branches of Oceanography

The study of oceanography includes all aspects of the ocean, from examining microscopic plankton and monitoring the ocean's chemistry, to exploring deep ocean hydrothermal vents and tracking the global circulation of ocean currents.



BIOLOGICAL OCEANOGRAPHY

Biological oceanography includes the study of ocean life and the relationship between organisms and their adaptations to the marine environment.



Why is it that some whales appear off the coast of Virginia during certain seasons? Why don't clown fish feel the sting of anemones? To find the answers, you might ask a biological oceanographer.

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There are many different species of plants and animals found in the Earth's oceans. Organisms must interact with one another in order to survive – a relationship scientists call symbiosis.

Also included in this branch is the study of ways to harvest seafood without destroying the oceanic environment. Overfishing is a threat to many species of animals that live in the oceans. Anglers rely on the life in the sea to support their families. However, they must maintain a balance; if they take too much ocean life, there is a chance that the ocean environment will change forever.

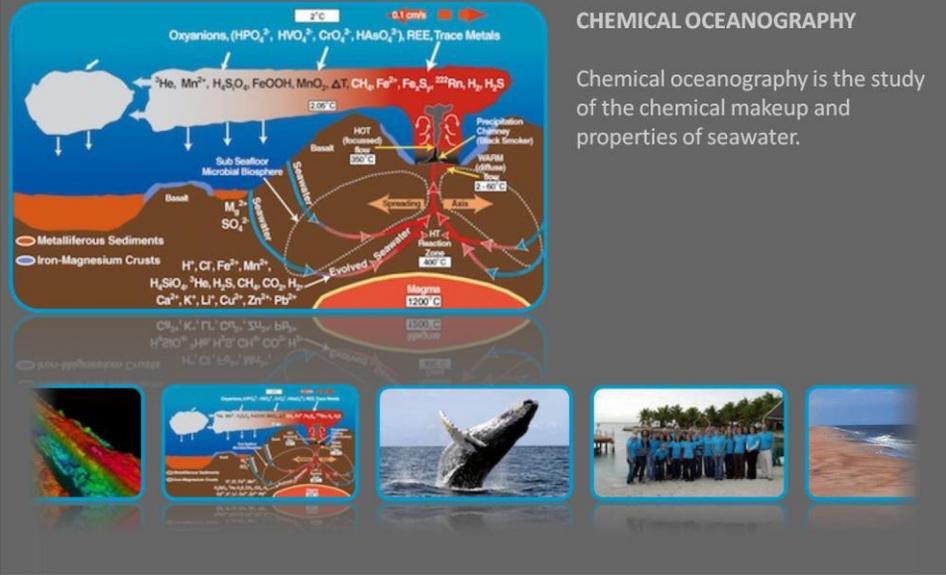
Image source: Whit Welles

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It's amazing that a planet covered by so much water can experience a water shortage. When you hear about water shortages, they're usually in reference to freshwater shortages. Wouldn't it be amazing if we could use the massive amounts of salt water in our oceans to provide water for those who don't have enough? If only it wasn't so difficult and expensive to separate the salt from the water! But, if you really wanted to do so, you'd likely ask a chemical oceanographer.

Chemical oceanography is the study of the chemical makeup and properties of seawater. This branch also studies the effects of pollutants found in seawater.

Water is a universal solvent because many substances dissolve in it. As a solute, salt dissolves in ocean water to form a solution. Ocean water is also a mixture of salt and water because it is possible to separate the mixture by various means. One way to separate salt from water is to place ocean water in a beaker and allow the water to evaporate, leaving a salt residue behind.

The salt found in seawater is a compound called sodium chloride, or NaCl. There are other compounds found in ocean water such as calcium carbonate, or CaCO₃, which is the main component of seashells and the limestone that makes up coral reefs.

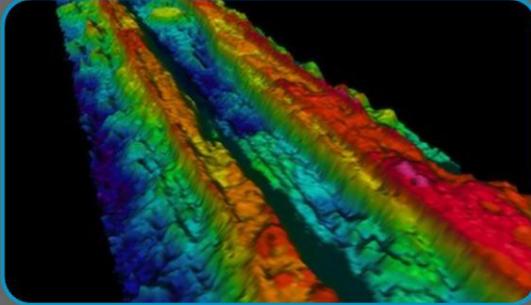
Image source: NOAA

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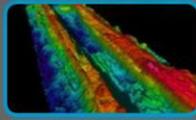
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GEOLOGICAL OCEANOGRAPHY

Geological oceanography includes the study of the sea floor structures, how these structures emerged and have changed through time, and the history of the sediments deposited there.



Have you ever imagined what life would be like at the bottom of the ocean? What made the high ridges and deep canyons of the ocean floor? You'll find the answers to these questions and more when you look into geological oceanography.

Geological oceanography includes the study of the sea floor structures, how those structures emerged and have changed through time, and the history of the sediments deposited there.

Theories such as continental drift and plate tectonics explain the formation of the oceans and sea floor structures. During sea floor spreading, an ongoing process, magma rises up from the Earth's oceanic crust and causes the plates of the Earth's crust to move apart. As the magma moves up to form the Mid-Atlantic ridge in the middle of the Atlantic ocean, the plates move apart creating new ocean floor.

Hydrothermal vents, known for their amazing ability to host marine life in the absence of sunlight, are also very interesting features that are studied in this branch of oceanography.

Image source: UCSB, University of South Carolina, NOAA, WHOI

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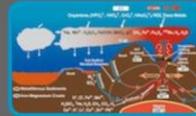
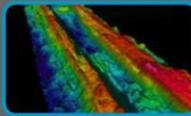
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PHYSICAL OCEANOGRAPHY

Physical oceanography describes the relationship between the ocean and the atmosphere, and how this relationship influences weather and climate.



It can be a lot of fun to play in the surf at the beach and to ride the waves on a surfboard. Did you ever wonder why, when you enter the water at one point you find that sometime later, you're quite a distance from where you jumped in? These circumstances are all due to tides, waves, and currents. To study these concepts, we need to learn about physical oceanography.

Physical oceanography describes the relationship between the ocean and the atmosphere, and how this relationship influences weather and climate. This branch of oceanography also studies the transmission of light and sound in the oceans.

Tides, waves, and currents result from many forces. Tides rise and fall according to the moon's pull and the gravitational effects of the Earth's rotation on ocean waters. Waves are a result of winds blowing across the ocean surface, causing ocean surface currents. Temperature and salinity cause vertical ocean currents. Tides and waves may also cause ocean currents.

Image source: NOAA

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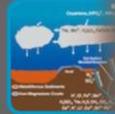
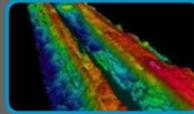
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RELATED CAREERS

If you ask, many oceanographers may tell you that a wonderful teacher or professor influenced their interest in the field.



What about other related careers? Teaching is another great career opportunity. If you ask, many oceanographers may tell you that a wonderful teacher or professor influenced their interest in the field.

To become an oceanographer, you'll need to learn all about the field. Teachers and professors of oceanography help this field of science progress by educating and training the next generation of oceanographers.

Image source: NOAA