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Commentary

Oceanography's significance and its various branches

Dan Oliver*

Department of Oceanography, University of Melbourne, Melbourne, Australia.

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ABOUT THE STUDY

Oceanography is the scientific study of the oceans. It is also known as oceanology and ocean science. It is an Earth science that studies ecosystem dynamics, ocean currents, waves, and geophysical fluid dynamics, plate tectonics and sea floor geology, and fluxes of various chemical substances and physical properties within and across ocean boundaries. These diverse topics reflect the many disciplines that oceanographers use to gain a better understanding of the world ocean, such as astronomy, biology, chemistry, climatology, and geography. An oceanographer is someone who studies ocean-related topics such as marine geology, physics, chemistry, and biology. Biological oceanography, chemical oceanography, ocean acidification, geological oceanography, and physical oceanography are the five branches of oceanography study.

Biological oceanography

Biological oceanography studies the ecology and biology of marine organisms in the context of their ocean environment's physical, chemical, and geological characteristics. The plants, animals, and other organisms that live in the salt water of seas or oceans, or the brackish water of coastal estuaries, are referred to as marine life, sea life, or ocean life. Marine life has a fundamental impact on the nature of the planet. Microorganisms in the sea produce oxygen and sequester carbon. Marine life shapes and protects shorelines, and some marine organisms even aid in the formation of new land. Most life forms began in marine environments. Oceans cover roughly 90% of the planet's living space by volume. Some of these evolved into amphibians, which spend part of their lives in water and part of their lives on land. One group of amphibians evolved into reptiles and mammals, with subsets of each returning to the ocean as sea snakes, sea turtles, seals, manatees, and whales. Plants such as kelp and other algae grow in water and serve as the foundation for some underwater ecosystems. Plankton, particularly phytoplankton, which is key primary producers, forms the general foundation of the ocean food chain.

Chemical oceanography

Chemical oceanography is the study of the ocean's chemistry. Whereas chemical oceanography is concerned with the study and comprehension of seawater properties and changes, ocean chemistry is concerned with the geochemical cycles. The following is an important topic studied by chemical oceanography.

Ocean acidification

The decrease in ocean pH caused by anthropogenic carbon dioxide (CO_2) emissions into the atmosphere is referred to as ocean acidification. Seawater is slightly alkaline, with a preindustrial pH of approximately 8.2. Anthropogenic activities have steadily increased the carbon dioxide content of the atmosphere in recent years; approximately 30%-40% of the added CO_2 is absorbed by the oceans, forming carbonic acid and lowering the pH through ocean acidification. The current rate of change in ocean chemistry appears to be unprecedented in Earth's geological history, raising questions about how well marine ecosystems will adapt to changing conditions in the near future. The impact of acidification combined with the expected additional stressors of higher ocean temperatures and lower oxygen levels is of particular concern.

Geological oceanography

Marine geology or geological oceanography is the piece of research of the history and composition of the ocean floor. It entails investigations of the ocean floor and coastal zone using geophysical, geochemical, sedimentological, and paleontological methods. Marine geology is closely related to geophysics and physical oceanography. In the years following World War II, marine geological studies were critical in providing critical evidence for sea floor spreading and plate tectonics. The deep ocean floor is the last essentially unexplored frontier, and detailed mapping is driving the research in support of both military (submarine) and economic (petroleum and metal mining) objectives.

Physical oceanography

The study of physical conditions and processes within the ocean, particularly the motions and physical properties of ocean waters, is known as physical oceanography. Physical oceanography is one of several sub-domains within oceanography. Other types of oceanography include biological, chemical, and geological oceanography. Physical oceanography is divided into two types: descriptive and dynamical. Descriptive physical oceanography seeks to understand the ocean through observations and complex numerical models that accurately describe fluid motions.

***Corresponding author:** Dan Oliver, Email: danoliver9078@gmail.com