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Short Communication

Analysis and Importance of Oceanography and Its Various Branches

Haibin Cabral*

Department of Marine Science and Technology, IPB University, Bogor 16680, West Java, Indonesia

DESCRIPTION

Oceanography is the study of the physical, chemical, and biological properties of the ocean, including its ancient history, current state, and future. With oceans threatened by climate change and pollution, coasts eroded and entire species of marine life threatened with extinction [1].

Traditionally, oceanography is discussed in terms of four separate branches but related disciplines: physical oceanography, chemical oceanography, biological oceanography, and geological oceanography.

Physical oceanography

The field of physical oceanography has changed over the last two decades with the advent of modern global ocean observation systems and global eddy-tolerant ocean circulation models. These observations and models have revealed the complexity of ocean circulation across a spectrum of spatial and temporal scales. However, to understand all this complexity, it is essential to have a portfolio of simple conceptual models that enable dynamic understanding. Conceptual models provide a vocabulary that articulates complex dynamic equilibrium and circulation patterns in observations and numerical models [2].

The present day problems of physical oceanography are having variations in the physical environment and its control processes have direct impacts on marine biology, economics, atmospheric and climate sciences, fluid dynamics, and all general oceanographic disciplines. This should be viewed as an exciting challenge rather than a problem, except that current knowledge of processes, especially in the deep sea, is rather superficial. Ocean physicists have difficulty quantifying the vertical flow of materials (such as nutrients) into the photo zone. The effects of different climatic zones on ocean circulation and sediment transport cannot be accurately predicted. We don't know if hurricanes will destroy deep sea life and their ecosystems [3].

Chemical oceanography

Chemical oceanography plays a central role in understanding the distribution and reactivity of chemical constituents in the ocean and at the Earth-ocean, sediment-ocean, and atmosphere-ocean interfaces. The ocean covers about 70% of the earth's surface and has an average depth of about 3900 meters. Transport of materials to the core of the ocean occurs primarily by atmospheric deposition and to a lesser extent by influx from hydrothermal vents, whereas coastal oceans are primarily driven by exchange with rivers, atmospheric processes, and coastal processes. It is affected by the exchange of groundwater with the aquifer. Until recently, ocean reservoirs seemed like territories that humans could not pollute [4].

Biological oceanographers

Biological oceanographers and marine biologists study the flora and fauna of the marine environment. They are interested in the number of marine organisms and how these organisms evolve, interrelate, adapt to their environment, and interact. To do their work, they may use field observations, computer models, or laboratory and field experiments.

Biological oceanographers rely on different tools and use different approaches to help them study marine life. Some studies involve laboratory experiments with individual organisms. In other cases, oceanographers need to go underwater to directly sample and observe certain types of organisms, such as zooplankton. Other approaches include underwater submersibles to access deep-sea communities associated with deep-sea hydrothermal vents. Many oceanographers use research vessels, from which they launch instruments and specialized water sampling devices into the water. Biological oceanographers apply methods from different fields such as molecular biology, immunology, physiology, biochemistry and ecology [5].

Correspondence to: Haibin Cabral, Department of Marine Science and Technology, IPB University, Bogor 16680, West Java, Indonesia, E-mail: cabralhaibin@yahoo.id

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Geological oceanography

Geological oceanography is the study of the earth under the sea. This includes geochemical, geophysical, sedimentological and paleontological surveys of the seafloor and coastal margins. Geological oceanography involves the study of the ocean floor and the processes that form its canyons, valleys, and mountains. Oceanographers study the extent of the ocean floor, plate tectonics, ocean circulation and climate. They examine various marine features such as ridges, seamounts and trenches. Geological oceanography is one of the broadest branches of earth science, encompassing many sub-disciplines such as geophysics and plate tectonics, petrology and sedimentary processes, micropaleontology and stratigraphy.

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