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COAST NOTES

A Virgin Islands Marine Advisory Services Publication

VIMAS is a branch of

the University of Puerto Rico Sea Grant College Program & the University of the Virgin Islands Eastern Caribbean Center.



Marine Careers Series

CIRCULATING COPY

Careers in Physical and Chemical Oceanography

Physical oceanography involves the study of the physical properties of the ocean such as wave patterns, currents, tides and the changing contours of the ocean floor and shorelines. Chemical oceanography is the study of the chemical properties of seawater and the chemical processes that take place in the sea.

What do oceanographers do?

Physical oceanographers gather data and information that can be used in navigation, coastal construction, energy production and in the design of ocean vessels. They study ocean currents, tides, wave patterns, and the factors that affect the movement of water. Physical oceanographers also study the interactions between the ocean and the air, the sea floor and the shoreline. Temperature and climate change are important areas of research and study for oceanographers. Some physical oceanographers specialize in marine geology and study shoreline changes, the minerals and sediments of the seafloor, and the location of underwater petroleum deposits.

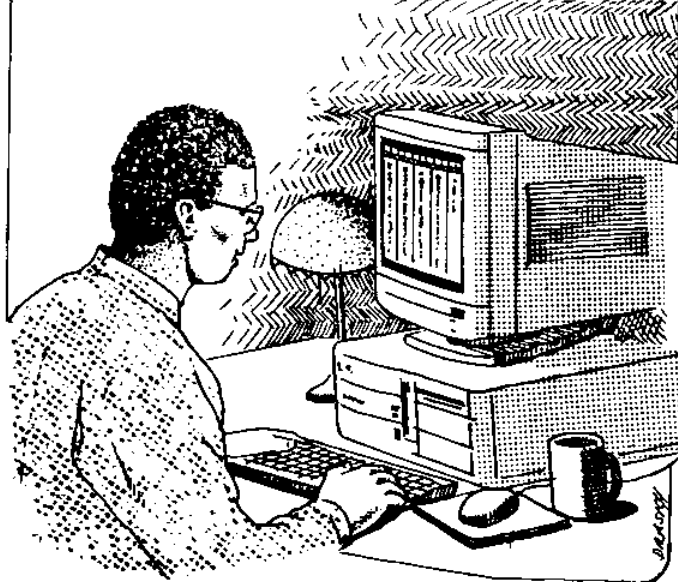
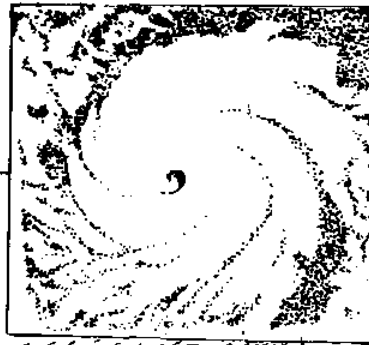
Research and findings from physical oceanographic studies can be used to determine the movement of pollution or toxins in the water. Other studies are focused on harnessing energy from the movement of ocean water (currents and tides), or from

temperature differences between surface and deep water (ocean thermal energy conversion, known as OTEC).

Chemical oceanographers study the chemical processes occurring in seawater and in

marine organisms. Increasingly, career opportunities are available in the investigation of chemical processes caused by human activities. Studies focused upon the effects of pollution from sewage, pesticides and fertilizers, industrial wastewater and oil spills, for instance, are important for both environmental and human health.

Oceanographers may also study the complex reactions and processes related to the recently discovered deep sea vents.



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Education

All careers in physical and chemical oceanography require an advanced degree (preferably a Ph.D.). At the undergraduate level, a bachelor's degree in physics, biology, geology, math or computers is a good preparation for entry in the field of oceanography.

High school students can best prepare for a career in oceanography by completing as many math and science courses as possible, including calculus, chemistry, physics, earth science and biology. Computer courses are also very important. Math and science courses at the high school level (including advanced placement or college courses where possible) will prepare students for more specialized courses in college.

At the undergraduate level it is not necessarily better to select a large school with a large marine science program. Often, smaller schools provide greater opportunities for working closely with faculty on research projects. When selecting a school, choose a size and location where you are comfortable.

Financial aid, work study and scholarships are often available to help pay the cost of completing the bachelor's degree. Check with the college or university of your choice for more details. Most universities offer scholarships, fellowships and assistantships or internships for oceanographic studies at the graduate level.

Careers in Oceanography

Cartographer - develops maps showing contours and features of the ocean floor and the coasts for use in exploration and navigation. Computers are increasingly important in this field.

Chemical oceanographer - studies the chemical composition of seawater and the relationships between organic and inorganic compounds found in the ocean; performs chemical research on sediments; studies desalination processes as well as the extraction of diverse compounds from sea water.

Geological oceanographer - studies the rocks, sediments and topographic features of the ocean floor; identifies changes in the ocean floor over time through fossils, rocks and minerals; assists in locating petroleum and mineral deposits beneath the seas.

Geomagnetist/paleomagnetist - studies the geomagnetic field of the Earth, and its changes over time as represented in rock and mineral deposits; studies and formulates theories about sea-floor spreading and continental drift.

Marine geographer - generates and analyzes maps, aerial photos, observational data and data supplied by GIS (geographic information systems) of marine and coastal areas; determines maritime (political) boundaries between countries or states; determines maritime (physical and environmental) boundaries between habitats/ecosystems.

Marine physicist - observes and analyzes energy, the structure of matter and the relationships between energy and matter in the marine environment.

Meteorologist - studies atmospheric conditions and related data for long and short-term weather forecasting; studies radio wave propagation for communication purposes; studies and predicts weather development and the movement of phenomena such as hurricanes and typhoons.

Physical oceanographer - studies the physical properties of the oceans: temperature, salinity, water density, transmission of light and sound, currents, tides, and the relationship between the atmosphere and the sea.

Seismologist - studies earthquakes and predicts their occurrence; studies the geologic layers beneath the ocean; uses seismic data to locate oil deposits and valuable minerals.

by Laurie Fletcher-Hall
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This is one of a series of *Coast Notes on marine careers*. The series includes *Careers in Marine Biology; Physical and Chemical Oceanography; Ocean Engineering; Medicine and Health; Planning, Management and Legal Professions; and Technical Careers*.

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