



# GEOSCIENCE CAREERS

## WHERE DO GEOSCIENTISTS WORK?

Geoscientists may be found sampling the deep ocean floor or examining rock specimens from the Moon or Mars. But the work of most geoscientists is more “down to Earth.” They work as explorers for new mineral and hydrocarbon resources, consultants on engineering and environmental problems, researchers, teachers, writers, editors, and museum curators, as well as other challenging positions. They often divide their time among work in the field, the laboratory, and the office.

Field work usually consists of making observations, exploring the subsurface by drilling or using geophysical tools, collecting samples, and making measurements that will be analyzed in the laboratory. For example, rock samples may be x-rayed, studied under an electron microscope, and analyzed to determine physical and chemical properties. Geoscientists may also conduct experiments or design computer models to test theories about geologic phenomena and processes.

In the office, they integrate field and laboratory data and prepare reports and presentations that include maps and diagrams that illustrate the results of their studies. Such maps may pinpoint the possible occurrence of ores, coal, oil, natural gas, and water resources, or indicate subsurface conditions or

hazards that might affect construction sites or land use.

The employment outlook in the geosciences—as in any profession—varies with the economic climate of the country. The long-range outlook is good at this time. Dwindling energy, mineral and water resources along with increasing concerns about the environment and natural hazards present new challenges to geoscientists.

## INTERESTED???

A strong interest in science and a good education are the most important elements in becoming a geoscientist. The geosciences draw on biology, chemistry, mathematics, physics, and engineering. High school courses related to these subjects plus a geology earth science course, or an integrated science curriculum, will help prepare you for college. Also, get a solid grounding in English, because geoscientists need to be able to write and speak clearly. In choosing a college or university, look at the course listings for departments of geology, geoscience, earth-systems science, or environmental science to identify the geoscience programs that best match your interests. As in any profession, the applicants with the best qualifications get the best jobs. Most professional positions in the geosciences require a master's degree. A Ph.D. is needed for advancement in college teaching and in most high-level research positions.

*Atmospheric scientists* study weather processes; the global dynamics of climate; solar radiation and its effects; and the role of atmospheric chemistry in ozone depletion, climate change and pollution.

*Economic geologists* explore for and develop metallic and nonmetallic resources; they study mineral deposits and find environmentally safe ways to dispose of waste materials from mining activities.

## WHAT DO GEOSCIENTISTS DO?

Geoscientists gather and interpret data about the earth and other planets. They use their knowledge to increase our understanding of earth processes and resources to improve the quality of human life. Their work and career paths vary widely because the geosciences are broad and diverse. The National Science Foundation recognizes geology, geophysics, hydrology, oceanography, marine science, atmospheric science, planetary science, meteorology, environmental science, and soil science as the major geoscience disciplines. The following list gives a glimpse of what geoscientists do in these disciplines and a variety of sub-disciplines.



*Engineering geologists* apply geological data, techniques, and principles to the study of rock and soil surficial materials and ground water; they investigate geologic factors that affect structures such as bridges, buildings, airports and dams.

*Environmental geologists* study the interaction between the geosphere, hydrosphere, atmosphere, biosphere, and human activities. They work to solve problems associated with pollution, waste management, urbanization, and natural hazards, such as flooding and erosion.

*Geochemists* use physical and inorganic chemistry to investigate the nature and distribution of major and trace elements in ground water and earth materials; they use organic chemistry to study the composition of fossil fuel (coal, oil, and gas) deposits.

*Geochronologists* use the rates of decay of certain radioactive elements in rocks to determine their age and the time sequence of events in the history of the earth.

*Geologists* study the materials, processes, products, physical nature and history of the earth.

*Geomorphologists* study earth's landforms and landscapes in relation to the geologic and climatic processes and human activities that form them.

*Geophysicists* apply the principles of physics to studies of the earth's interior and investigate earth's magnetic, electric and gravitational fields.

*Glacial geologists* study the physical properties and movement of glaciers and ice sheets.

*Hydrogeologists* study the occurrence, movement, abundance, distribution and quality of subsurface waters and related geologic aspects of surface waters.

*Hydrologists* are concerned with water from the moment of precipitation until it evaporates into the atmosphere or is discharged into the ocean; for example, they study river systems to predict the impacts of flooding.

*Marine geologists* investigate the ocean-floor and ocean-continent boundaries; they study ocean basins, continental shelves, and the coastal environments on continental borders.

*Meteorologists* study earth's atmosphere, including its movements and other phenomena, especially as they relate to weather forecasting.

*Mineralogists* study mineral formation, composition, and properties.

*Oceanographers* investigate the physical, chemical, biological, and geologic dynamics of oceans.

*Paleoecologists* study the function and distribution of ancient organisms and their relationships to the environment.

*Paleontologists* study fossils to understand past life forms and their changes through time and to reconstruct past environments.

*Petroleum geologists* are involved in exploration for and production of oil and natural-gas resources.

*Petrologists* determine the origin and natural history of rocks by analyzing mineral composition and grain relationships.

*Planetary geologists* study planets and their moons in order to understand the evolution of the solar system.

*Sedimentologists* study the nature, origin, distribution, and alteration of sediments, such as sand, silt, and mud. Oil, gas, coal, and many mineral deposits occur in such sediments.

*Seismologists* study earthquakes and analyze the behavior of earthquake waves to interpret the structure of the Earth.

*Soil scientists* study the role of soils in plant growth, their impact on construction and waste disposal, and ways to restore and use land resources.

*Stratigraphers* investigate the time and space relationships of rocks, on a local, regional, and global scale throughout geologic time—especially the fossils and mineral content of layered rocks.

*Structural geologists* analyze rocks by studying deformation, fracturing, and folding of the Earth's crust.

*Volcanologists* investigate volcanoes and volcanic phenomena to understand these natural hazards and predict eruptions.

## Teacher Feature continued...

For more information about geoscience careers, visit these web sites:

**American Institute of Professional Geologists**  
<http://www.nbmng.unr.edu/aipg/>

**Association for Women Geoscientists**  
<http://www.awg.org/>

**Association of American State Geologists**  
<http://www.kgs.ukans.edu/AASG/AASG.html>

**Association of Earth Science Editors**  
<http://www-odp.tamu.edu/publications/AESE/index.html>

**Association of Engineering Geologists**  
<http://aegweb.org/>

**Geological Society of America**  
<http://www.geosociety.org/>

**Geoscience Information Society**  
<http://www.lib.berkeley.edu/GIS>

**Mineralogical Society of America**  
<http://geology.smith.edu/msa/msa.html>

**National Association of Geoscience Teachers**  
<http://oldsci.eiu.edu/geology/nagt/nagt.html>

**Paleontological Society**  
<http://www.uic.edu/orgs/paleo/homepage.html>

**Seismological Society of America**  
<http://www.seismosoc.org/ssa/>

**Society of Economic Geologists**  
<http://www.mines.utah.edu/~wmgg/SEG.html>

**Society of Exploration Geophysicists**  
<http://www.seg.org/>

**Society of Independent Professional Earth Scientists**  
<http://www.sipes.org/>

**Society of Vertebrate Paleontology**  
<http://eteweb.lscf.ucsb.edu/svp/>

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