



The
Geological
Society

serving science & profession

Choose Earth science!

***Make a difference, do something useful, see the world and be well paid.
Be an Earth scientist.***

Earth science, sometimes also called geoscience, geology or geophysics, is the study of our planet's structure and history. Earth scientists find and produce almost everything that civilization needs – all its power and all its raw materials. If something cannot be grown, they must find and produce it. This brings with it the responsibility to clean up industrial or extraction sites afterwards, as part of the larger challenge to preserve the Earth's delicate climate and environmental systems.

Water



Many people who live in the south east of England, where rocks are porous and rainfall low, get their drinking water from underground, or piped from dams in the north and west of England. Developing and managing both underground water resources and dams needs hydrogeologists and geotechnical engineers. Overseas, Earth scientists also work in many organisations that help those in developing countries locate and extract safe drinking water, which is a serious issue for many countries.

Job titles include: Hydrogeologist, Geotechnical Engineer, Groundwater Modeller, Sedimentologist

Natural Hazards

Natural hazards may seem minor in a geologically quiet place like the UK. Yet when Eyafjallajökull volcano in Iceland (2010) shut down Europe's airports, it provided a reminder of how severely our lives can be affected by events nearby. In addition, thanks to geological research, we now also know that we should not assume that the UK is safe from such exotic-sounding events as tsunamis.



Earth scientists will be crucial players in future emergencies. Many UK-trained Earth scientists are leading advisers to governments on coping with disasters.

Job titles include: Seismologist, Volcanologist, Hazard Analyst, Flood Risk Consultant

Earth and Health

Geology may appear remote from human health. However, rocks are the fundamental building blocks of the Earth's surface, full of important minerals and chemical elements. Most elements are taken into the human body in air, food and water.

Rocks are broken down by weathering processes to form the soils on which crops and animals are raised. Drinking water travels through rocks and soils as part of the water cycle, and much of the dust and some of the gases contained in the atmosphere are of geological origin.

Earth and Health, or “Medical Geology”, is concerned with the relationship between natural geological factors and human and animal health. Medical Geology brings together Earth scientists and medical/public health researchers to address health problems caused, or exacerbated by geologic materials (rocks, minerals and water) and processes - such as volcanic eruptions, Earthquakes and atmospheric dust.

Job titles include: Medical Geologist, Public and Environmental Health, Geochemist, Minerologist, Forensic Geologist



Megacities



Megacities are defined as urban areas with more than five million inhabitants and are more than just large cities. Their scale creates new dynamics, new complexity and new simultaneity of events and processes – physical, social and economic. Scientists estimate that by 2015 the world may contain as many as 60 megacities, together housing more than 600 million people.

Earth scientists play a vital role in contributing towards a better understanding of megacities, improving their management and attaining more sustainable development. This requires wise use of human and natural resources while, at the same time, reducing the risk and improving the lives for all those who live in megacities, or those who are impacted by them.

Job titles include: Engineering Geologist, Hazard Analyst, Flood Risk Consultant, Environmental Consultant

Food

Most of the food that we eat is produced using chemical fertilisers like phosphates and nitrates. Without them, the world’s population would have starved decades ago. Phosphates are found and produced by Earth scientists, while nitrate fertilizers are produced using energy derived from oil and gas. Geology is also essential in understanding and maintaining soil quality.



©BGS

Minerals and mining



Close-up of gold specimen ©BGS

Mobile phones, computers, games consoles, televisions, concrete for construction, steel for reinforcing bars, plaster for walls, paint, bricks, ornamental stone, insulation, plastics – *everything* you can hold in your hand that is not either food or a natural fibre like wood, linen or cotton, is a mineral - and once came out of a hole in the ground.

Mining coal in the UK is now quite a small scale activity. But new ways of extracting energy that leaves the coal underground - together with the unwanted carbon - are being developed. These new technologies (coal bed methane and underground gasification) will require Earth scientists' expertise.

Mining also generates enormous wealth in Africa, Australia, central Asia and the Americas with the help of UK-trained Earth scientists. Metals, industrial minerals, gemstones, and aggregates are all big business and very important to local economies.

Job titles include: Mining Engineer, Exploration Geologist, Mineralogist, Borehole Geologist

Waste

Waste, by contrast, often needs to be put back into the ground. Safe landfill depends upon the combined skills of many Earth scientists, including hydrogeologists and environmental geochemists. Radioactive waste can only be safely stored underground. Carbon dioxide emissions from power stations will in future be put back underground, and the knowledge of Earth scientists have built up in over a century of taking oil and gas *out* of the ground will be needed to ensure that they stay put.



Landfill site with methane vent ©BGS

Job titles include: Hydrogeologist, Environmental Geochemist, Environmental Engineer

Damaged land



Landfill redevelopment

Much land, especially in cities, has been contaminated by industry and needs to be cleaned up before it can be used again. This work is the speciality of the environmental geologist and geochemist.

Job titles include: Environmental Geochemist, Contaminated Land Consultant, Remediation Engineer

Energy

We all want to move to low-carbon forms of energy, such as wind, solar power and other 'green' energy sources, but it can't happen overnight and we cannot do without power. So we will need oil, gas and coal for many years, both for transport and to make electricity. Many Earth scientists graduating in UK universities work overseas, creating wealth in oil and gas-rich countries in Africa, India and the Americas. And nuclear power, an essential part of future world energy sources, depends on uranium - a naturally radioactive element that also has to be found and mined by Earth scientists.

Job titles include: Petroleum Geologist, Exploration Geophysicist, Field Seismologist



Drilling ship exploring for oil in the North Sea ©BGS

The economy

Earth science delivers huge wealth. Industries based on producing oil, gas, coal, limestone, clay, aggregates and other minerals, as well as groundwater and putting wastes back into the ground generated 13% of the UK's total non-service GDP (gross domestic product) in 2007. Energy and mineral companies figure largely in the Financial Times share index. Many professional Earth scientists are correspondingly very well paid for their contribution to the economy. The average starting salary for an Earth scientist is over £24,000.

Geoscientists: essential to all our futures

As global population grows, the need to reduce each person's impact on the planet means an ever-greater emphasis on sustainable living. We also need to improve our understanding of natural disasters such as volcanoes, earthquakes, and tsunamis so we can prepare for them and cope better with their effects.

- Forecasting climate change, and finding ways of coping with it, relies upon our knowledge of environmental change that happened in the past. Earth scientists are learning more and more about past events through improved dating techniques. This improves our understanding of the changes that humans are now causing by burning fossil fuels. The more we understand about how our planet worked in the past, the more well-informed governments' decisions will be.
- Earth scientists will be needed to help cut greenhouse gas emissions by putting them back where they came from - underground. The UK government is committed to capturing waste carbon dioxide and putting it safely back underground. The skills of the petroleum geoscientist, expert in predicting how fluids move in the pore spaces of rocks, will be of prime importance. Putting carbon dioxide underground is set to grow into a vast new industry, as big as the oil business today.

Providing for people's material and energy requirements while at the same time preserving our planet for the future is a challenge that only the Earth scientist is properly equipped to tackle. Earth science graduates can therefore be sure that their skills will remain in demand as governments and companies strive to cope with the needs of an increasingly crowded planet.

To see careers profiles in Earth science, please visit our website

www.geolsoc.org.uk/education