

INTEGRATING EARTH SCIENCE**● Radioactivity Within the Earth****Nuclear Decay Produce Energy**

Trace amounts of radioactive isotopes lie deep below Earth's surface. As these isotopes decay, they release energy as heat. Near Earth's center, the temperature is raised by decay reactions and can exceed 6,000°C (10,800°F). Energy from these decay reactions may contribute to dramatic changes in features of Earth's surface.

The Layers of Earth's Interior

Earth's interior is divided into four major layers: the crust, the mantle, the outer core, and the inner core. The crust is the outermost layer and is relatively thin. Beneath the crust is the much thicker mantle, which is about 2,900 km (1,800 mi) thick. The mantle is composed of rock under extreme pressure. It can flow like a thick syrup, though it does so very slowly.

Currents of Energy Flow in Earth's Interior

The way in which energy is transferred outward from Earth's interior can be illustrated by a pan of water being heated on a stove. As the water at the bottom of the pan gets heated first, it becomes less dense and rises to the top. The water that began at the top of the pan is cooler and denser, so it sinks to the bottom, where it, too, will become heated. This process of rising and sinking causes currents that keep flowing, and eventually all of the water is heated to about the same temperature.

Similarly, energy from Earth's interior moves in currents within the mantle. Some scientists believe that these currents are the major cause of movement of the plates that form Earth's surface. This movement is responsible for earthquakes, volcanoes, and even the shape of the continents.

Your Turn to Think

1. What is one effect of radioactive decay in Earth's interior?
2. Explain why particles of a fluid at a higher temperature rise above particles of the same fluid at a lower temperature.
3. Explain the conditions that make it possible for the mantle to flow, even though it is made of rock.