Plate Tectonics

Earth's outer surface consists of around 15 loosely interlocking tectonic plates. These move continuously, shifting toward, away from, or alongside each other. The movement of these plates forms geological features such as mountains, volcanoes, and ocean trenches. Four tectonic plates converge around Japan.

What are tectonic plates?

Tectonic plates are segments of Earth's crust and uppermost mantle. They form the lithosphere, the coolest and most rigid part of the planet. The plates lie on top of a partially molten layer of rock called the asthenosphere and are continually moving due to convection currents. These currents occur within the mantle as heated rock becomes less dense and rises, and the semi-molten rock cools and sinks. The convection currents cause Earth's plates to move relative to each other at rates of up to 10 centimeters per year.

What happens when plates meet?

The tectonic plates fit roughly together like a jigsaw puzzle, and the area where one plate meets another is called a plate boundary. There are many different types of plate boundaries, and what happens when two plates meet depends on the plates' densities and whether the plates are oceanic or continental. Plates can meet and collide, spread apart, or slide past one another. Their interaction causes the formation of geological features, phenomena such as earthquakes, and the generation and destruction of crust.

Collision

When plates collide, one may move underneath the other in a process called subduction. Volcanoes often form along boundaries where subduction occurs, and some of the world's most powerful earthquakes and eruptions occur in these zones. The subducting plate sinks into the mantle and later emerges as new crust through volcanic activity. Earth's crust is thus recycled in subduction zones.

Spreading

Plates that spread apart cause rifts and rift valleys to form. These are found both on land and at the bottom of the ocean. When spreading occurs on the seafloor, new crust is generated by magma as it escapes the mantle and cools.

Sliding

Plates that slide past one another do not create or destroy crust. Rather, they cause faults along which shallow earthquakes may occur.

Tectonic plates and Japan

The islands of Japan lie in one of the most tectonically active places on Earth: a region of subduction zones where the Pacific, North American, Eurasian, and Philippine plates converge. This convergence generates frequent seismic and volcanic activity, making the country prone to earthquakes and eruptions. It is this activity, however, that has produced many of the country's most impressive natural features, from abundant hot springs and enormous calderas to towering mountains and steep gorges.