



The Geology of Antarctica

Antarctica has a very varied geology, which is not surprising given its massive size and the many changes in tectonic activity, environment, and climate it has experienced over millions of years. However, because more than 99% of the continent is covered in ice, only a very small portion of its rocks – about 0.4% – is exposed and visible at the surface. This makes it difficult to study Antarctica's geology in detail. To understand what lies beneath the ice, scientists rely on advanced technologies to allow them to gather information about the structure and composition of the rocks hidden beneath the ice.

Although much of Antarctica's volcanic activity happened in the past, some volcanic areas are still active today. The continent also contains mineral and rock resources, but these are not currently being mined due to environmental and political restrictions. Interestingly, Antarctica is one of the best places in the world to find meteorites, meaning it is not only useful for understanding Earth's geological past but also gives scientists clues about the history of the solar system.

East and West Antarctica are quite different from each other geologically. East Antarctica is much larger and is made up mostly of extremely old rocks that form a continental shield, also known as a craton. These ancient rocks are mainly igneous and metamorphic, and some are over 3 billion years old. On top of this ancient base, there are younger sedimentary rocks such as sandstone, limestone, shale, and even coal.

Around the edges of East Antarctica, there are areas of basalt rock that were formed when lava flowed onto the surface as the continents began to split apart, and volcanic activity created huge layers of basalt through fissure eruptions. In some places, the magma didn't reach the surface but instead solidified underground. These rocks have been dated to around 180 million years ago, in the Jurassic Period.

In contrast, the geology of West Antarctica is more like that of the Andes Mountains in South America. This region was formed mainly by subduction which began around 200 million years ago and continued until about 35 million years ago. The result of this subduction was volcanic activity and mountain building along the edge of what is now South America and West Antarctica. Over time, this created new land, including the Antarctic Peninsula.

West Antarctica is made up of several smaller fragments of Earth's crust that were pushed together by compression. This process folded, faulted, and uplifted existing rocks, creating impressive landscapes such as the Ellsworth Mountains, which contain Antarctica's highest peak, Mount Vinson.

The Transantarctic Mountains, however, were not formed by compression. Instead, they formed due to rifting, where the Earth's crust was pulled apart. This rifting between East and West Antarctica began in the Late Cretaceous Period and is still ongoing today in places. The rift system is responsible for present-day volcanic activity, including Antarctica's most active volcano, Mount Erebus. Located on Ross Island near the Ross Sea, Mount Erebus is one of the few volcanoes in the world with a constantly active lava lake at its summit. Several other volcanoes in the region are now inactive, but their presence shows that Antarctica continues to be shaped by powerful geological forces.

Adapted from <https://discoveringantarctica.org.uk> (Antarctica's Geology)