

Geology of the Goto Islands

The Goto Islands are part of a geological stratum called the Goto Group that formed 22 to 17 million years ago as part of the Eurasian continental plate. The story of how inland lakes and rivers transformed into mountainous islands far from the mainland is a testament to the dynamic geological forces that shape our planet.

From Continent to Archipelago

Twenty-two million years ago, the land that is now Japan was a volcanic mountain range on the eastern edge of the Eurasian continent. About 19 million years ago, the movement of tectonic plates began to pull the mountain range in two, creating lower-lying flats that filled with rain and mountain runoff to form lakes. As the plates continued to pull apart, the eastern side of the mountains split off, becoming the Japanese archipelago. That separation caused the lake lands to sink. Sea water flowed in, flooding the gap between the new land and the old continent to create the Sea of Japan. At that time, the Goto Islands were still connected to the southern island of Kyushu, which was the last landmass to separate from Eurasia.

Volcanic Deposits and New Rifts

About 16 million years ago, magma pushed the landmass up and violent pyroclastic flows (scorching bursts of ash and solidified chunks of lava) reached the surface, dramatically changing the landscape. The old lakebeds that had formed during the previous age were split by huge masses of newly formed igneous rocks like granite, rhyolite, and tuff. This was a period of felsic magmatic activity, meaning the rocks had high percentages of silica. Silica tends to form extensive chain molecules, making magma more viscous (thick and slow-flowing). This prevents dissolved gases from escaping and generally causes more explosive eruptions.

About 7 million years ago, another tectonic shift pulled along the original fault line, and the stress caused new perpendicular faults to open up as large sections of land slipped apart. Over time, erosion worked on these new fault lines, creating valleys that would eventually become the straits between the islands of the Goto Group. This process created the islands' complex coastlines.

Lava Shapes the Land

Finally, starting about 1 million years ago, the islands entered another period of volcanic activity, this time of the basaltic type. Basaltic flows have low amounts of silica and more iron and magnesium. As the name suggests, they commonly form basalt rock. Lower amounts of silica mean the flows tend to be less viscous and less explosive, forming wide lava plateaus as they flow slowly toward lower ground.

In the Goto Islands, these basaltic eruptions largely took place at the northern and southern ends of the volcanic group. Although the eruptions emerged at different places and across the span of nearly a million years, each one originated from the same source of underground magma—a phenomenon known as a monogenetic volcanic field. The Goto Islands are one of only three places in Japan where this type of volcanic field can be found.

Many of Fukue Island's most iconic natural features were formed during this period, including the jagged black coastline of Abunze and the rounded top of Mt. Onidake, a cinder (or scoria) cone volcano. Scoria is an igneous rock filled with bubble-like cavities formed by escaping gases as magma cools. Based on scoria fall in the geological record, the last volcanic activity is believed to have been about 2,300 years ago, meaning the volcanic group is considered still active.

From Peninsula to Island Chain

When the Goto Islands broke off from the continent, they were still part of Kyushu, the largest southern island in the Japanese archipelago. The islands were also still connected to each other, because at that time, much of the earth's water was trapped in glaciers and sea levels were much lower. However, with the melting of glaciers at the end of the last ice age, sea levels rose approximately 120 meters, creating the string of islands seen today.

The islands' geological history is a complex mosaic: sedimentary rocks dotted with freshwater fossils lie beside massive boulders of silica-flecked granite dusted with tiny Pele's tears, shards of black volcanic glass formed during basaltic lava flows. The Goto Islands have a uniquely diverse landscape that is remarkable for so small an area—one that offers countless opportunities to explore how geological forces have shaped our world.