

Highlights!
BEST SPOTS

Global

Geopark ITOIGAWA

 Niigata
Prefecture



United Nations
Educational, Scientific and
Cultural Organization



Itoigawa
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Fossa Magna Museum

Kotakigawa Jade Gorge

Oyashirazu Cliffs

Umidani Gorge

Fossa Magna Park

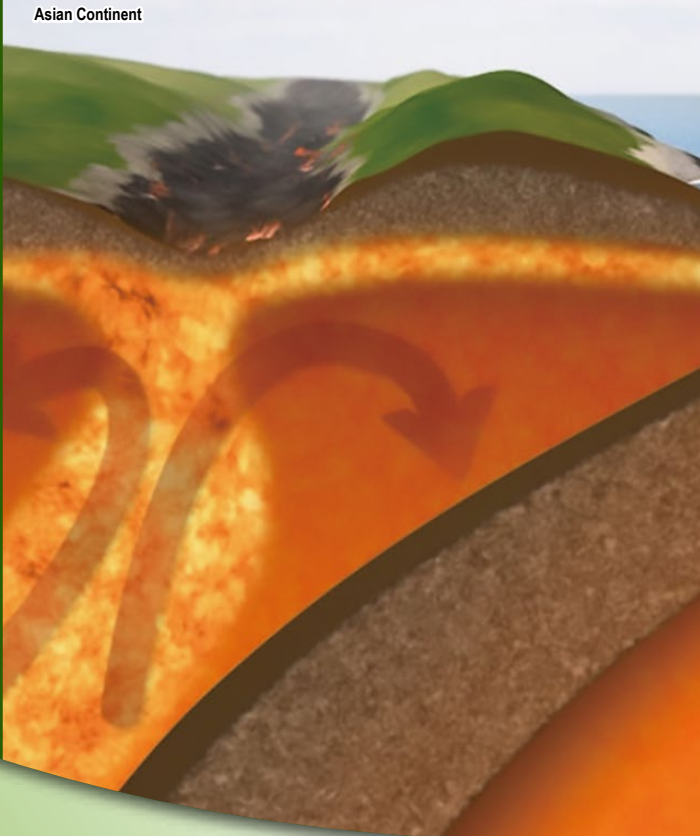
Hamatokuai Sandstone-Mudstone Strata

Collecting Stones on the Coasts in Itoigawa



Kotakigawa Jade Gorge

1 20 million years ago



2 15 million years ago



From the Asian Continent to the Japanese Archipelago, unearth the stories of jade and the Fossa Magna at Itoigawa Geopark



Geoparks are regions with exceptional natural and geological heritage where visitors can learn about the land around us, how it formed and how it has shaped and continues to shape our lives today. Start your journey of discovery at Itoigawa UNESCO Global Geopark!

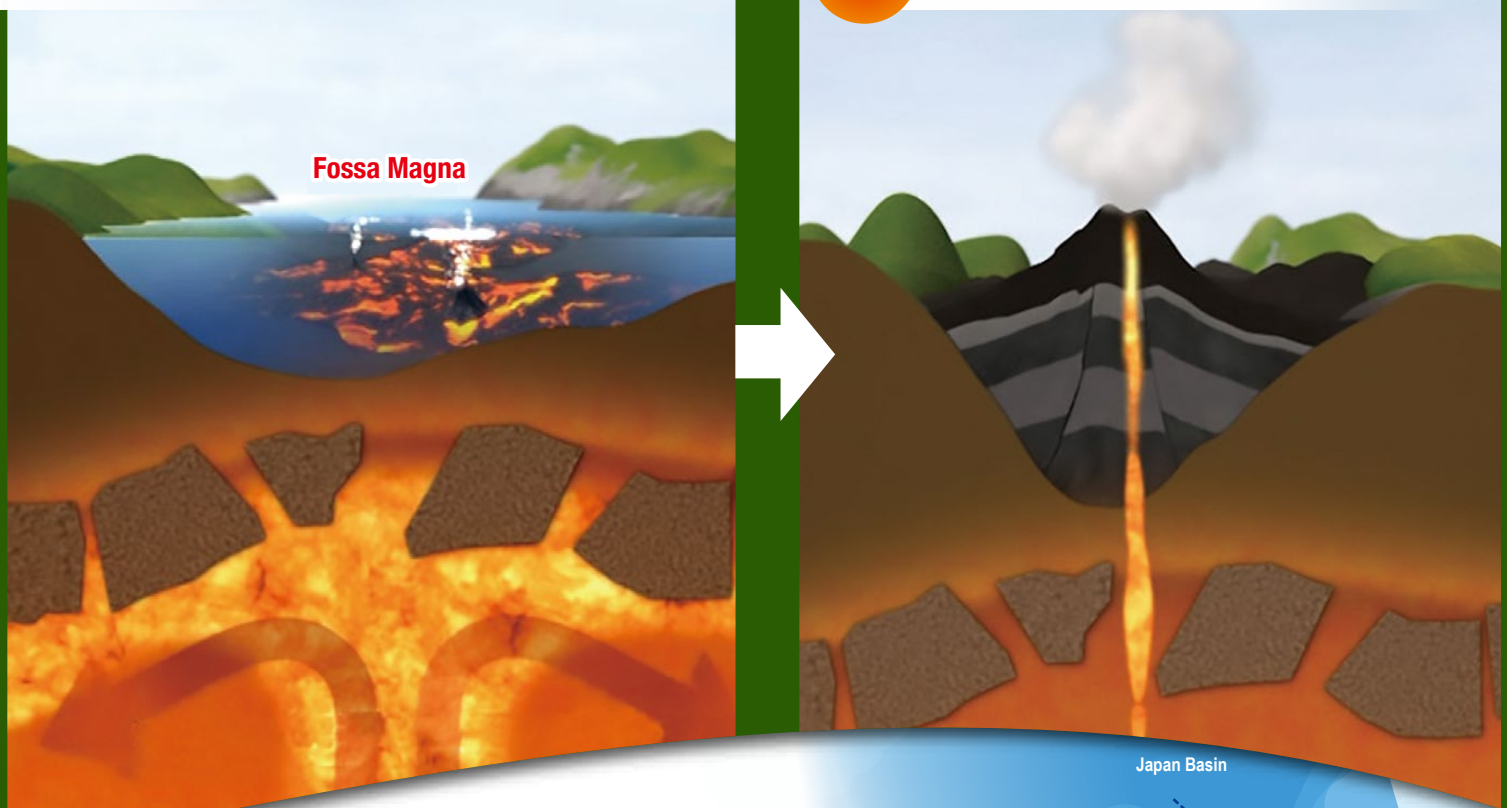
Millions of years ago, as the Japanese Archipelago separated from the Asian Continent, it split in the middle creating a massive fissure we now call the Fossa Magna. The Itoigawa-Shizuoka Tectonic Line—a massive fault which splits Japan between the North American and Eurasian continental plates—forms the west boundary of the Fossa Magna.

Deep in Itoigawa's mountain ravines and along its pebble coasts you can find jade, Japan's National Stone. Jade formed deep underground long before the Japanese Islands did, but as the Japanese Islands took shape, it was pushed to the surface here in Itoigawa by the same geological forces which created the towering Japanese Alps.

At Itoigawa Geopark, learn more about how Japan's jade culture and the Japanese Archipelago formed—a story 500 million years in the making.



3 1 million years ago



The Itoigawa-Shizuoka Tectonic Line roughly follows the Himekawa River. This large fault divides Japan into eastern and western halves, forming the western boundary of the Fossa Magna.

To the west of this fault, the 3,000-meter-high Japanese Alps are made of 100- to 500-million-year-old rocks while the mountains to the east are much younger, with less than 20-million-year-old rocks and strata. What accounts for this difference in geology?

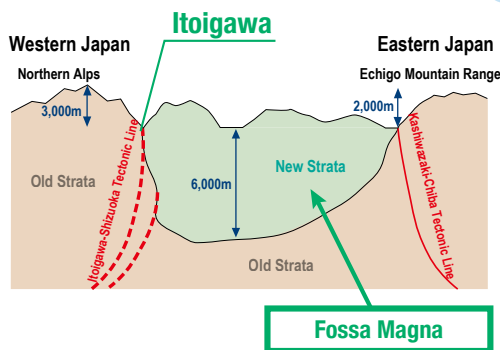
The Fossa Magna started to form about 20 million years ago as a huge depression in the middle of the Japanese Archipelago as it separated from the Asian continent (Fig. ① and ② above). It filled with water becoming a sea which connected the Sea of Japan and Pacific Ocean. Meanwhile, underwater volcanoes formed, covering the seabed in large amounts of volcanic ash and lava.

During this time the Fossa Magna continued to deepen while the mountains on either side rose higher. Sand, mud and debris flowed from the land, filling the Fossa Magna and forming thick layers called strata.

The Japanese Archipelago then began compressing into its current shape, pushing the Fossa Magna's strata up out of the sea.

As the islands began to take shape, magma pushing through the Fossa Magna's strata erupted into many volcanoes including Mt. Fuji, Mt. Yatsugatake, and Mt. Yakeyama (Fig. ③ above), creating the region's current landscape and geographical features as seen in the figure below.

Through boring surveys, in which deep holes are drilled into the Earth to collect samples, we know that the Fossa Magna is at least 6,000 meters deep.



Secrets of the Ocean Floor

The sea around Itoigawa does not have a well-defined continental shelf, instead the sea drops suddenly into what is called the Toyama Trough. This trough is thought to be an extension of the Fossa Magna.

In the Toyama Trough, submarine canyons connected to Toyama's Jinzū and Kurobe Rivers merge with canyons connected to the Ōmi, Himekawa and Hayakawa Rivers to form the massive Toyama Deep-Sea Channel.

The Toyama Deep-Sea Channel meanders northward for about 800 kilometers beyond Toyama Bay, opening into the Japan Basin at a depth of 3,400 meters—the deepest part of the Sea of Japan.

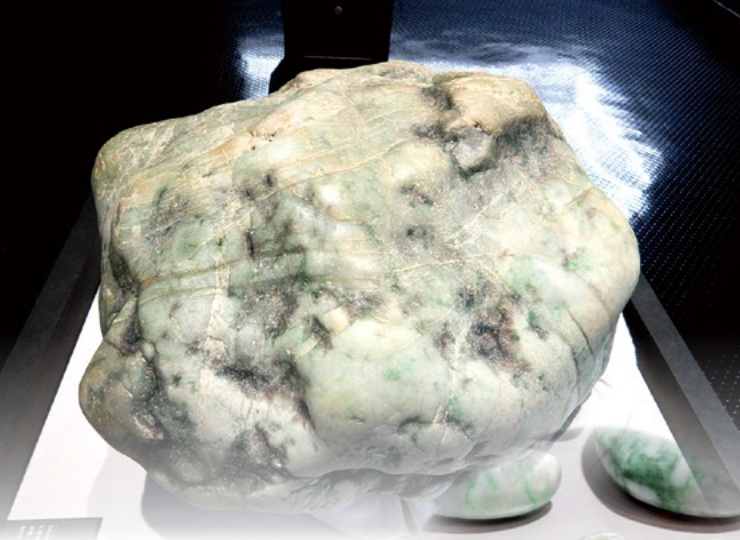
There is still a lot we don't know about how this underwater landscape formed, but it is clear that the Sea of Japan and the mountains of the Northern Alps are closely connected. At Itoigawa UNESCO Global Geopark, uncover the amazing secrets hidden within our beautiful planet.

Start your journey to the Itoigawa UNESCO Global Geopark here!

Fossa Magna Museum



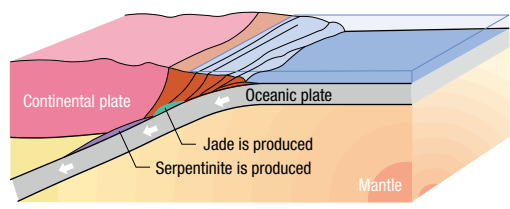
Discover the 500-million-year old story of Itoigawa—from the formation of jade and limestone to the birth of the Fossa Magna and Mt. Yakeyama.



Itoigawa's jade formed deep underground 500 million years ago. It was likely produced as an oceanic plate sunk underneath a continental plate, creating high pressure which caused rocks wedged between the plates to transform. Jade always forms in the same area as a rock called serpentinite. Not only does serpentinite help push the jade to the surface, it also provides the impurities which give jade its vibrant green color.

(1) Formation of Jade

500 to 300 million years ago



Jade was formed under low-temperature and high-pressure conditions in the lower part of the continental plate.

(2) Jade Rises to the Surface

200 million years ago

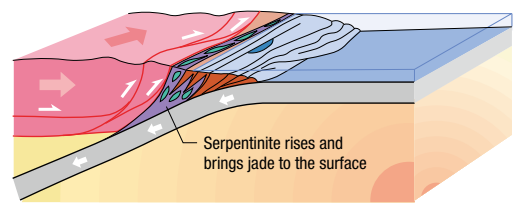


Plate movement causes the relatively light serpentinite to rise and envelop the jade, carrying it to the surface.



Scan the QR code here for more information



Many think of jade as a green mineral, but pure jade is actually white! It gets its beautiful color from impurities, such as iron and chrome which give it its brilliant green color. Titanium and manganese turn it a light purple called lavender jade. It becomes a rich blue color when combined with iron and titanium. Jade rocks and pebbles in a variety of colors including green, white, blue, lavender and black—are on display at the Fossa Magna Museum.

A 300-million-year-old coral reef carried from the South Pacific.

Kotakigawa Jade Gorge

In addition to its magnificent landscape, with the massive rock cliffs of Mt. Myōjō towering high, Kotakigawa Jade Gorge gives visitors a chance to see raw jade up close.

Jade artifacts found in archaeological sites all over Japan are thought to have originated in Itoigawa.

Kotakigawa Jade Gorge is designated a National Cultural Property (Natural Monument), and the removal or damage of any plants, animals, or minerals from the area is strictly prohibited.



Mt. Myōjō seen from the Jade Gorge Observation Deck



Exhibit at the Fossa Magna Museum

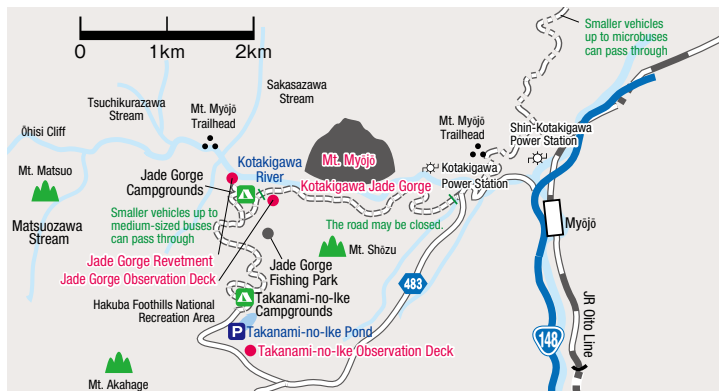
The 1,188 meter high Mt. Myōjō is made of fossil-rich limestone. About 300 million years ago, tropical coral reefs forming on underwater volcanoes were gradually pushed here by plate movement over tens of millions of years. The reefs became limestone, rising to the surface to become Mt. Myōjō. The limestone here is rich in various fossils of ancient life that thrived in these coral reefs, including coral, brachiopods (lamp shells) and fusulinids.



Coral fossil

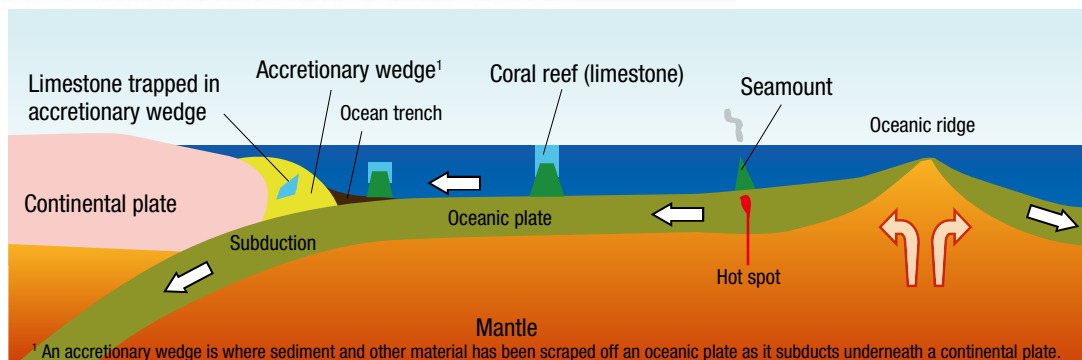


Raw jade (whitish rock in the middle) can be seen in the Kotakigawa River



Kotakigawa Jade Gorge

Scan the QR code for more information



Over 300 million years ago, coral reefs grew on underwater volcanoes. Over time, the heavy oceanic plate drifted and sank, or subducted, below the Asian continental plate. Volcanoes, coral reefs and other material are scraped off and attach to the continental plate at the accretionary wedge, becoming limestone. As the Japanese Archipelago separated from the continent, the limestone was carried to its current location.

Where the **Asian Continent** split, exposing **100-million-year-old** rocks

Oyashirazu Cliffs

**"The Greatest Precipice under Heaven"
Crossed by Uesugi Kenshin and
Matsuo Bashō**



Oyashirazu Cliffs

Scan the QR code here
for more information



*Oyashirazu / ko wa kono ura no / namimakura
Koshiji no iso no / awa to kieyuku*
**Parent unaware / A child is carried on the waves
vanishing in the sea off the Koshiji Road**

Since ancient times, Oyashirazu has been known as the most perilous section of the Hokuriku Road. 12th century general Taira no Yorimori fled to Echigo (present-day Niigata Prefecture) after his clan was defeated by the Minamoto Clan ending the bloody Genpei War. His wife left Kyoto to follow after him, but while crossing the treacherous Oyashirazu Cliffs, their young child was swept away by the crashing waves. She is said to have composed the poem above in her sorrow, giving the cliffs their name, which means "Parents-Don't-Know."

*The Oyashirazu Cliffs are designated a National Site of Scenic Beauty



Echigo Oyashirazu by Utagawa Hiroshige



Map of Oyashirazu Cliffs (1855) (Housed at the Itoigawa City Museum of History and Folklore)

The Oyashirazu Cliffs were said to be the most dangerous spot on the Hokuriku Road. Until the first modern road was cut into the cliffs in 1883, travelers were forced to pass along the shore at the base of the cliffs. In winter, the fear of being carried away by the crashing waves was ever-present. When the sea turned rough, travelers sought safety in hollows or crevices in the cliffs, sometimes adding a week or more to their journey. The names "Oyashirazu" (Parents-Don't-Know) and "Koshirazu" (Children-Don't-Know) come from this dangerous passage.

It is thought that the famous samurai general Minamoto no Yoshitsune passed through here in the Kamakura Period (1185 - 1333), as did Uesugi Kenshin in the Sengoku (Warring States) Period (1467 - 1615). In the Edo Period, it was visited by poet Matsuo Bashō and cartographer Inō Tadataka.

When the lord of the wealthy Kaga Domain (present-day Kanazawa) passed through on his annual journey to and from Edo (Tōkyō), more than 1,000 local farmers and fishermen were employed to protect the long procession from the waves.



Diorama shown at the observation deck on the Oyashirazu Community Road



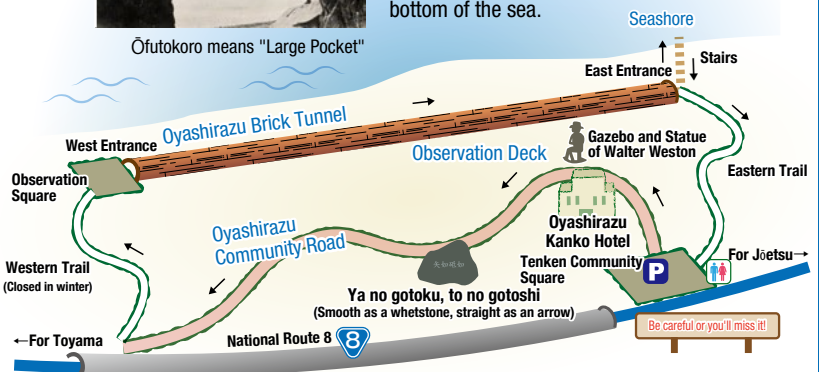
Ōfutokoro means "Large Pocket"

Walter Weston, an English clergyman and mountaineer who helped popularize recreational mountaineering in Japan, called Oyashirazu "the starting-point of the Japanese Alps."

This is where the Northern Alps, with nearly 3,000 meter high mountains including Mt. Shirouma and Mt. Asahi, collapse almost directly into the Sea of Japan, plunging beneath the waves to a depth of 3,000 meters at the deepest. The Oyashirazu Cliffs stand in the middle of this 6,000 meter difference in elevation from the top of the mountains to the bottom of the sea.



Human labor was used to cut into the cliffs to make the first modern road. (2nd Generation)



A complete circuit of the Oyashirazu Community Road and Brick Tunnel is about 2 kilometers and takes 60 to 90 minutes to walk.

(Both trails are uneven and on steep slopes. The Western Trail is closed from December until March.)

An underwater volcano lifted up above ground.

Umidani Gorge

This impressive cliff is actually a cross-section of an underwater volcano. The diagonally striped pattern shows past eruptions.

Zenmai Jizō

Zenmai Jizō

This rock juts out of the cliff face. Depending on how you look at it, it looks like zenmai (edible royal fern) or like a Buddhist Jizō statue.

The rocks and mountains of Umidani Gorge were created by underwater volcanic activity in the Fossa Magna Sea about 3 million years ago. The cliff directly across from the observation deck is actually a cross-section of a large underwater volcano, exposed by erosion from the river below. Standing 600 meters high above the riverbed, it is called the Great Cliff of Mt. Senjōgatake.

Mt. Senjōgatake as seen from the Umidani Sankyō Park Observation Deck

Umidani Gorge

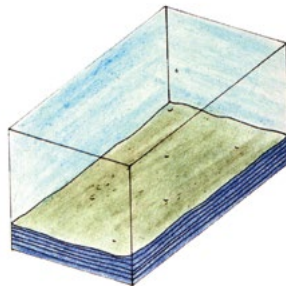
Scan the QR code for more information



History of Umidani Gorge

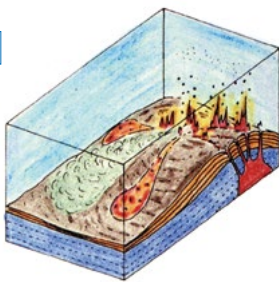
Underwater volcanic activity started forming the mountains around Umidani Gorge 3 million years ago. The rising of the land and river erosion finished the job. Once at the bottom of the Fossa Magna Sea, this area gradually became the tall mountains we see today through the sometimes rapid and sometimes slow labors of our planet.

1



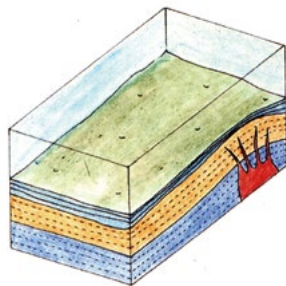
3 - 15 million years ago, sand and mud fell from the land, collecting here on the ocean floor.

2



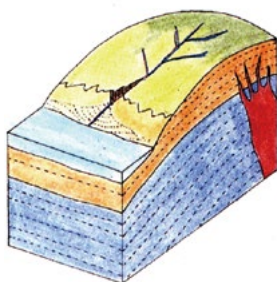
Starting about 3 million years ago, magma from deep within the Earth pushed its way up to the seabed, erupting into underwater volcanoes. These eruptions poured ash and lava onto the sea floor.

3



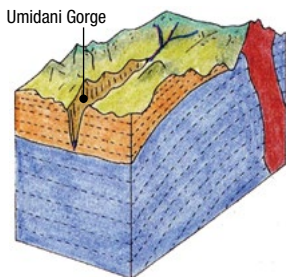
After some time, the volcanic activity stopped and sand and mud once again started to collect into layers at the bottom of the sea.

4



Starting about 1 million years ago, seabed started to get pushed up to the surface and the rocks and strata rose high above ground.

5



As the land continued to rise, water flowing from the mountains to the sea carved out the Umidani Gorge and the underwater volcano was split creating the massive cliff we see today.

Landscape and History of the Umidani Highlands

Umidani Highlands is a wide upstream valley with breathtaking views of unspoiled nature. Because the landscape looks similar to the Kamikōchi Highlands in Nagano Prefecture, it is sometimes called the "Kamikōchi of Echigo".

The highlands started to form in 1597, when a massive landslide dammed up the Umikawa River.

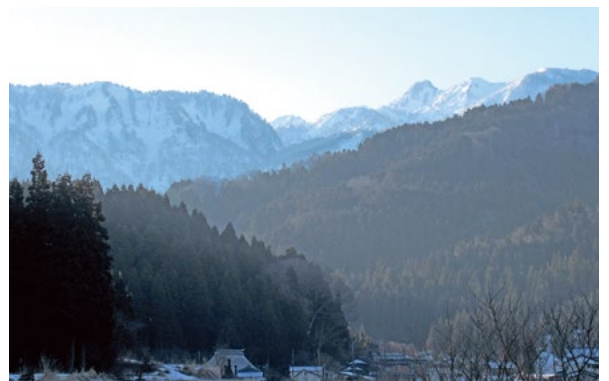
Evidence of the landslide can be seen on the southeast slope of Mt. Senjōgatake, which also created the arch-shaped cliff and gentle slope seen here. The river dammed into a large, 3 kilometer long lake which locals considered a new inland sea, giving the gorge its name which means "Sea-Valley".

Over time, sand and mud collected on the bottom of the lake, creating the Umidani Highlands. This sand and mud can still be seen on the northernmost edge of the valley.

¹Echigo is an old name for what is now Niigata Prefecture.



Umidani Highlands



The mountains of Umidani Gorge as seen from Central Itoigawa

See an **exposed fault** of the **Itoigawa-Shizuoka Tectonic Line**

Fossa Magna Park

Fossa Magna Park

Scan the QR code for more information



Renovated on 1 August 2018



**Eurasian Plate
West Side**

(400 million year old stone)

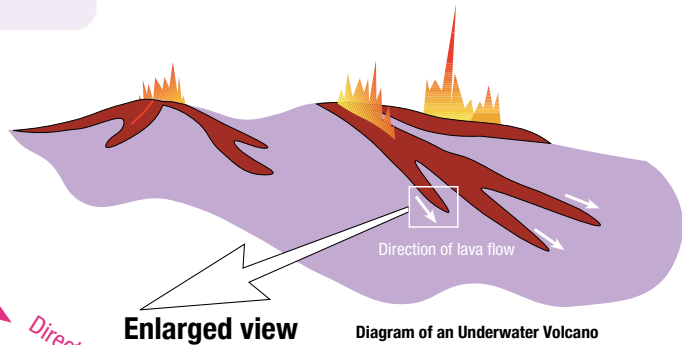
**North American Plate
East Side**

(16 million year old stone)

The Fossa Magna Park is the only place where visitors can see an artificially exposed section of the massive fault along the Itoigawa-Shizuoka Tectonic Line. The border between 400-million-year-old stones on the western (left) side and the 16-million-year-old stones on the eastern (right) side is easy to see here.

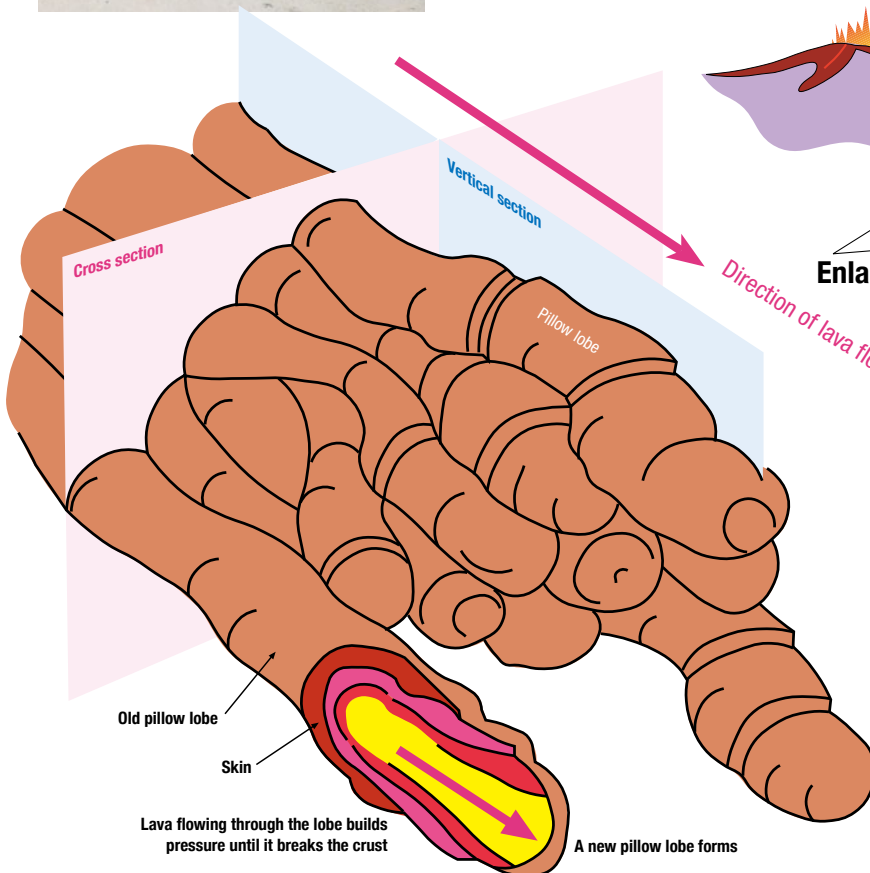
In addition to the fault, visitors can also find unusual rock formations called "pillow lava." These distinct, pillow-shaped rocks are evidence that this area was once located at the bottom of the sea.

Visitors can inspect the fault up-close and see the difference in geology on either side.



Drawing of Pillow Lava

Pillow lava is made up of many individual tubes called pillow lobes which form when lava flows underwater.



Pillow lava

Strata which formed on the seabed 3 million years ago

Hamatokuai Alternating Sandstone-Mudstone Strata

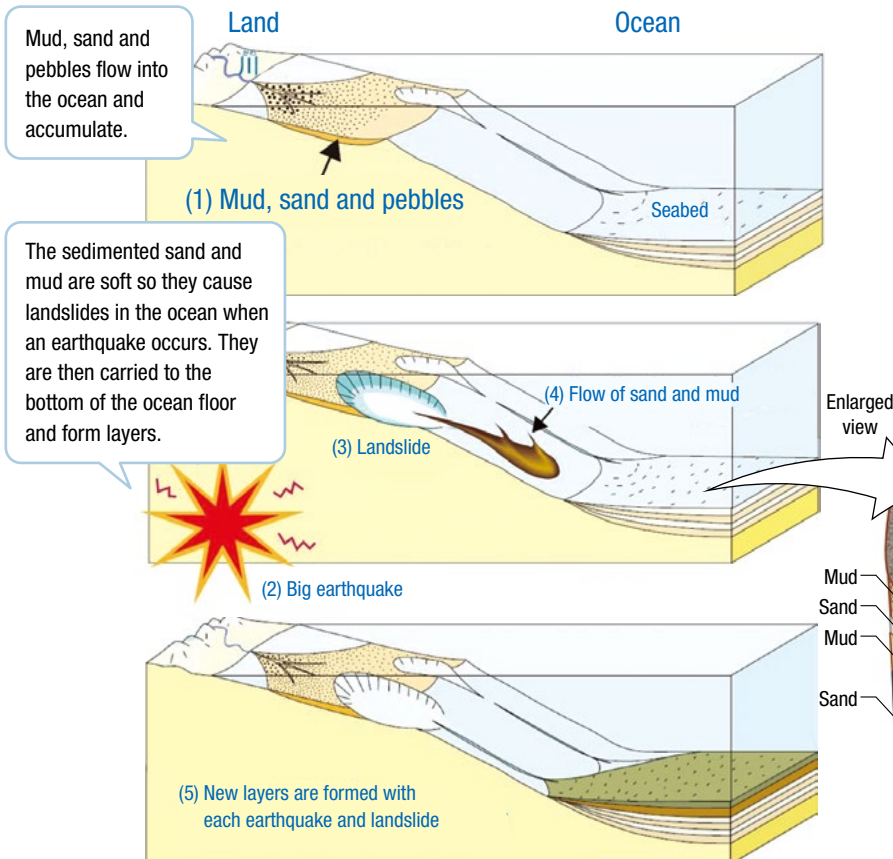


Scan the QR code for more information



Formation of Sandstone-Mudstone Interbeds

Underwater landslides cause large amounts of sand and mud to flow along the sea floor. This powerful flow kicks up sedimented sand, mud and pebbles and carries them deeper underwater. Heavy particles such as pebbles and sand settle first, and smaller particles such as clay and mud settle slowly. This causes a distinct layer of clay to form on top of the sand. As this process repeated, striped alternating strata formed as can be seen in Hamatokuai.



Entering Niigata Route 431 from National Route 8, you can see a cliff with a distinctive striped pattern along the left. These are sandstone-mudstone alternating strata. Also called sandstone-mudstone interbeds, these striking strata make up most of the rocks in the Tsumuishi and Tokukai districts.

This region was once at the bottom of the Fossa Magna Sea. Earthquakes and other tectonic movement triggered massive landslides on the sea floor, causing sand and mud to deposit in layers and harden into sandstone and mudstone.

Over time, the seabed rose above ground, becoming part of the land. Today, we can enjoy closeup views of this 3-million-year-old strata in Hamatokuai. Bumps and uneven areas of the stripes are caused by different densities and other characteristics of the sand and mud which formed them. Many fossils, including from bivalves and whales, have been found in this strata.

Japan's richest variety of stones!

Discovering the Many Stones of Itoigawa's Coasts

Where do all these stones come from?

The shores of Itoigawa boast a dazzling variety of stones. The Ōmi and Oyashirazu Coasts to the west of the Itoigawa-Shizuoka Tectonic Line are blanketed in many colorful stones. In contrast, to the east of the tectonic line the coasts of Nou have less geological diversity, covered mostly with porphyrite. This is a result of the difference in age between the two sides.

Itoigawa's coasts can tell us a lot about the land and its formations, making them every bit as important a part of the Geopark as the mountains.



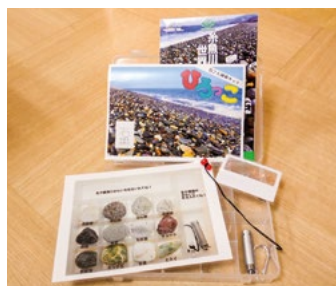
Jade Coast



You might even find jade stones like these!

Make a stone sample collection!

The Hirokko Stone Sample Kit gives you everything you need to start studying the many rocks of Itoigawa. Available from the Itoigawa City Tourism Association (¥800 per kit)



Rental Bicycles

Rental bicycles are a great way to get from Itoigawa Station to the Itoigawa Jade Coast and the Ōmi Coast!



Open	9:00 a.m. – 6:00 p.m. (Last rental: 5:00 p.m.)		
Period	Middle of March – End of November (Contact us for more details.)		
Rates	Standard (with gears)	¥500/ 3 h	¥1,000/ 1 day
	Power-assisted bicycles	¥500/ 1 h	¥2,000/ 1 day
	Hybrid bicycles		

Contact Itoigawa City Tourism Association TEL: 025-555-7344

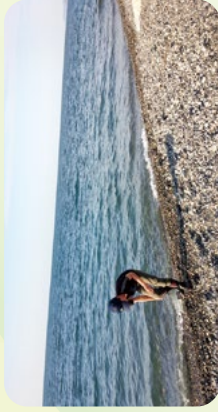
Map of Recommended Spots in Itoigawa Geopark



Oyashirazu Cliffs

Recommended Spots P.5

5 min by car from Oyashirazu Exit



Stone Collecting

Recommended Spots P.10

10 min by car from Itoigawa Exit (Jade Coast)



Fossa Magna Museum

Recommended Spots P.3

10 min by car from Itoigawa Exit



Seafood from the Sea of Japan (Benizuwai Crab)



Hamatokuai Alternating Sandstone-Mudstone Strata

Recommended Spots P.9

20 min by car from Nou Exit



Fossa Magna Park

Recommended Spots P.8

10 min by car from Itoigawa Exit



Umidani Gorge

Recommended Spots P.7

50 min by car from Itoigawa Exit



Kotakigawa Jade Gorge

Recommended Spots P.4

35 min by car from Itoigawa Exit

Contact Itoigawa City Tourist Information Center TEL.025-553-1785

Edited by

Itoigawa Regional Promotion Bureau, Niigata Prefecture

Cooperation

Itoigawa Geopark Council, Fossa Magna Museum