

Experimenting new use for serpentinite

In ancient times, serpentinite has been used for stone axes and other living tools, and more recently infused phosphate and as building material for flooring, walls and garden stone.

There is a new initiative to make use of the rich serpentinite in the Hakuba Happo area, and local artists are helping to design and create fashionable accessories such as earrings and necklaces. Handcraft workshops have also started to use this easy-to-process rock as craft art material for children and adults.



What is serpentinite?

Serpentinite is a rock mostly composed of serpentine group minerals. It has shades of dark green to greenish yellow forming patterns that resemble the skin of a serpent. The surface becomes slippery when wet, so you must be careful when walking on it. How is serpentinite formed? Ocean water inside the oceanic plate is carried deep under the continental plate to the core of the Earth where it reacts to minerals such as olivine (the mantle), orthopyroxene and monoclinic pyroxene contained in periodotite, metamorphosing into serpentine minerals. It is believed that, due to its low density (light specific gravity), it gives buoyance to the olivine minerals around it and eventually makes its way up to the

surface of the Earth perhaps with the help of crustal movement.

Serpentinite is an ultrabasic rock that contains 45% or less silica (SiO₂) and high contents of magnesium and heavy metals including iron, manganese, nickel and chromium.

Soils containing weathered serpentinite are loose and susceptible to landslides when it absorbs water. The high level of magnesium inhibits plants from absorbing water so serpentinite-derived soil is generally unfit for crops.



References & Source

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The Climate of Hakuba Happo-one Ridge and Serpentinite

~ A key to understanding the natural and cultural features of Happo-one ~

The unique geology of Hakuba Happo-one Ridge

Distinctive vegetation nurtured by Hakuba Happo-one soils

Earth's miracle hot springs – Hakuba Happo Onsen

Serpentinite and jade added touch to ancient culture

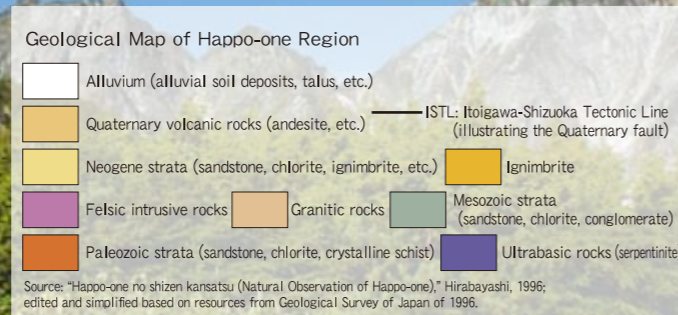
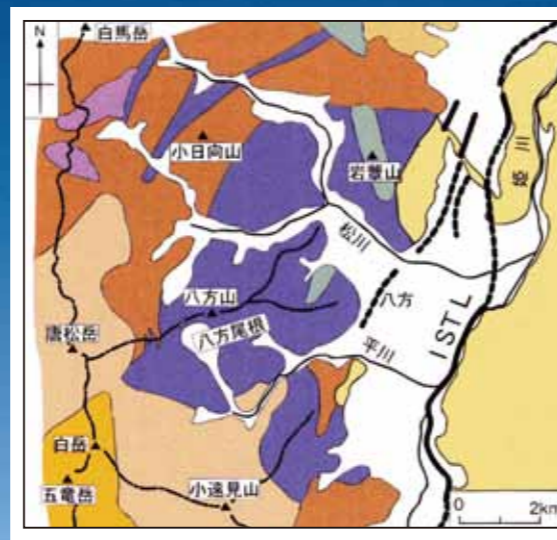
Hosono Suwa Shrine's rock Omikoshi and onsen shower festival

Experimenting new use for serpentinite

The unique geology of Hakuba Happo-one Ridge

The islands of Japan are split into Northeastern Japan and Southwestern Japan by a major fault called the Fossa Magna. The west edge of the Fossa Magna is the Itoigawa-Shizuoka Tectonic Line, and runs through the center of Hakuba Village from north to south along The Himekawa River.

Happo-one Ridge is located at the east end of Southwestern Japan. Here, serpentinite that formed deep within the Earth by mantle reacting with water appears at the surface by tectonic movement. This serpentinite belt had great impact on the environmental formation process of Happo-one Ridge. Such serpentinite belt is a rare geological feature that can only be found in several locations along the Fossa Magna and at Mount Apoi in Hokkaido, Mount Shibutsu in Oze National Park, and the Tanigawa Mountains.



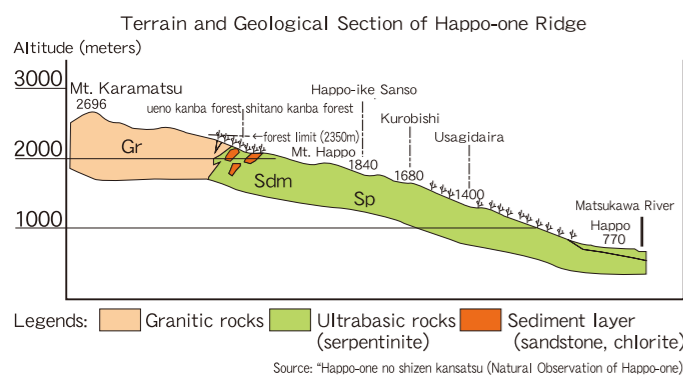
Distinctive vegetation nurtured by Hakuba Happo-one soils

Most of the Happo-one Ridge, from the foot to the summit at an altitude of 2,130m is made of serpentinite. The high content of magnesium in the serpentinite-derived soil prevents plants from absorbing water from the root and inhibits the growth of vegetation normally found at this low altitude. Instead, you can observe species of alpine plants that can grow in such an environment. The sediment layer above the altitude of 2,130m consists of sandstone and chlorite where forests of Erman's birch



▲Hoppo takane senburi

grow. From there to the forest limit at 2,350m you will find the more typical alpine plants. There are also several endemic species that adapted to the climate and serpentinite-derived soil of Happo-one, including *Swertia tetrapetala* var. *happoensis* (takane senburi) and *Leontopodium japonicum* form. *happoense* (happo usuyukiso).



Earth's miracle hot springs – Hakuba Happo Onsen

The Hakuba Happo Onsen known as spring water that beautifies your skin “as smooth as a boiled egg,” is also a gift from the Earth. According to studies conducted by the Earth-Life Science Institute of the Tokyo Institute of Technology, the spring water of Hakuba Happo – the product of serpentinite reacting with hot water – has high alkalinity (pH11 or higher) and very high hydrogen content, and contains methane and other hydrocarbons that form the basis of life. The research group further discovered that Hakuba Happo Onsen contain very few types of bacteria compared to other hot springs, and that these bacteria could survive under high alkaline environments and resemble the state of primitive life. There are several other places in the world where Hakuba Happo Onsen runs through the serpentinite belt, but Hakuba Happo Onsen is the only place on Earth you can actually touch the miraculous water. A sampling test conducted by another research team confirmed the existence of natural dissolved hydrogen in the Hakuba Happo Onsen .



Serpentinite and jade added a touch to prehistoric culture

It is no surprise that people were familiar with serpentinite from the old days. In fact, stone axes and other living tools made of serpentinite were used in Japan from the prehistoric Jomon period (ca. 11000 B.C. – ca. 300 B.C.). Jade was used for beating and sandstone was used for polishing serpentinite. The Chojugahara site in Itoigawa City, found on the banks of the Himekawa River along the Itoigawa-Shizuoka Tectonic Line, is famous for the remains of workshops that processed jade and serpentinite axes. Similar workshop remains from the Jomon period stretched upstream of Himekawa River beyond the city of Itoigawa, over the Sanosaka pass all the way to the Ittsu ruin by Lake Kizaki in Nagano Prefecture. Both serpentinite axes and jade were unearthed from the same remains because jade was always found at the serpentinite belt. Scientists believe that jade which formed deep underground appeared together with the serpentinite belt that made its way to the surface of the Earth by tectonic movement.

The jade of Itoigawa was transported to the Tohoku Area, Hokkaido and the Korean Peninsula by Japan Sea route, and to Nagano Prefecture, Kanto and Chubu Areas by land routes along the Himekawa River.

Rock Omikoshi and onsen shower festival Hosono Suwa Shrine

On the Autumnal Equinox Day (September 23) every year, the people of Happo and Happoguchi districts at the base of Hakuba Happo-one Ridge celebrate the Hosono Suwa Shrine autumn festival. The highlight is the stone omikoshi (portable shrine) made of 370kg serpentinite from the hot spring of Hakuba Happo



Onsen. Young shrine parishoners carry this omikoshi and walk around both districts and head for the main shrine expressing gratitude for the rich blessing of the mountain gods, while other parishoners along the roads throw onsen water at the omikoshi and its bearers.

In 2002, when the local residents agreed to make the autumn festival a district-wide event like the old days, we decided to build a new omikoshi, not of a traditional wooden style but out of serpentinite. The ritual of showering the serpentinite omikoshi with the spring water which it provides is unique among the people that have lived here for generations.