

Studio Anne Holtrop

ETH Zürich

seminar week

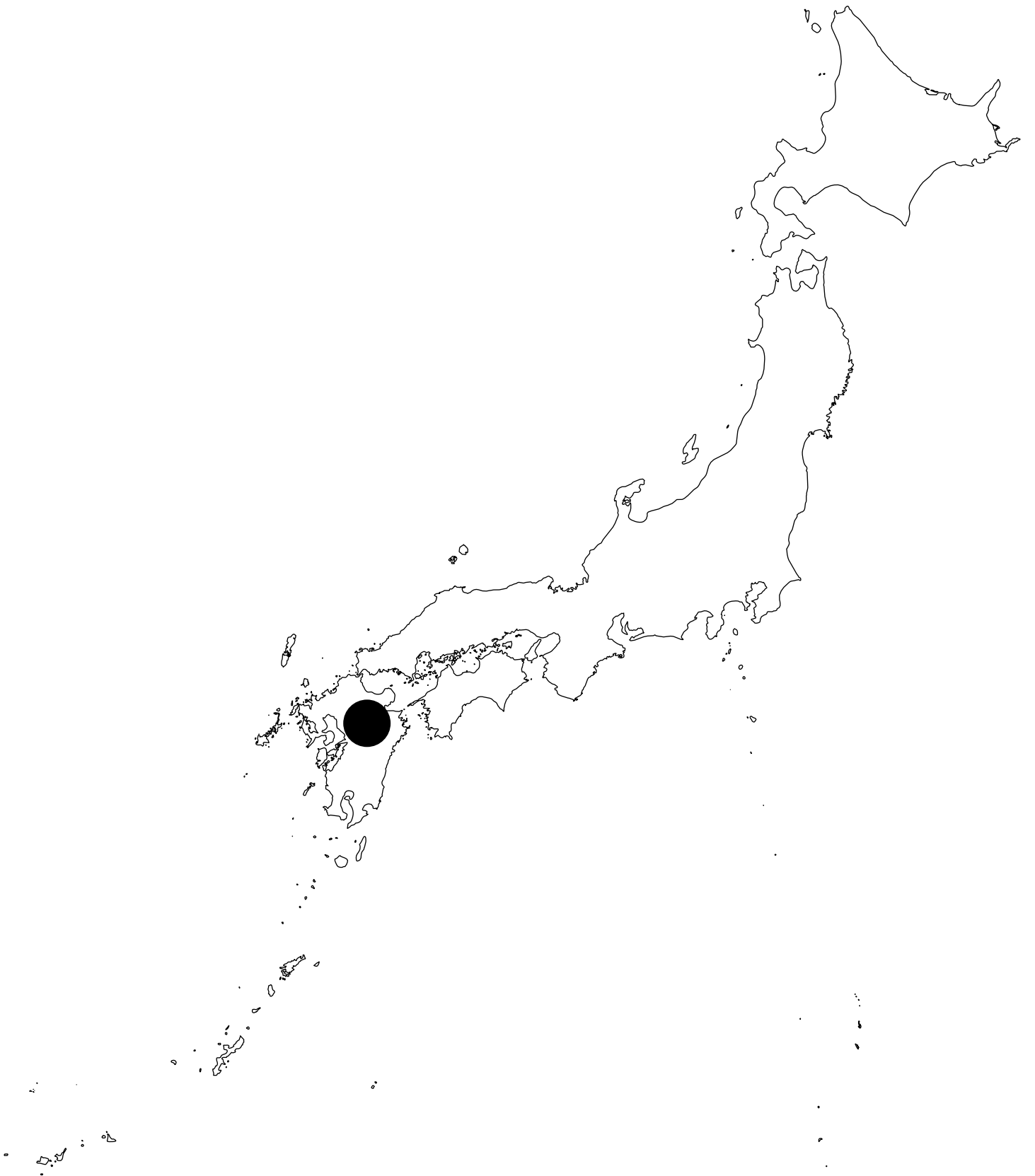
HS19

MATERIAL GESTURE:

SITE

October 19–27, 2019

**Mount Aso, Mount Kuju, Beppu and Kunisaki Peninsula on Kyushu island
(Japan)**





● **Fukuoka Airport**

● **Kunisaki peninsula**

● **Beppu**

● **Mount Kuju**

● **Mount Aso**

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MATERIAL GESTURE:

SITE

For the studio's field trip, we will travel to Kyushu, the Southern island of Japan. Our trip is related to our design studio that focuses on MATERIAL GESTURE, and this semester specifically on SITE. Not site in the context we usually consider - as in the view, the vegetation or the relationship to a build environment but rather, site from a geological perspective, how the landscape is formed, what the ground consists of, and how it is changing. During the field trip, artist Carlos Irijalba and Japanese volcanologists will join to explore the geology of Kyushu: the soil, sand, stone, minerals, lava and ash; the crust, faults, cracks, hills, and craters. We will study the processes (the gestures of the volcano so to say) that have shaped the landscape as it is and that will continue to change it in the future.

As part of the field trip we will hike to the active hot crater lake of Mount Aso, the oldest and still active volcano in Japan. We will engage in the local culture from sake making, to spring water pilgrimage, to ancient worshipping and iron oxide pigment making. We continue the trip to Mount Kuju to visit a geothermal power plant, and visit Beppu, one of the largest spa resorts, fed by hydrothermal fluids beneath the volcanic centers. We end our trip at Kunisaki Peninsula, where we will stay in a temple, and experience part of the training of mountain worshipping.

Our interest in this trip is to gain a fundamental understanding of a territory by exploring its geological formations and material consistence, and engaging in human practices that have build specific relationships with a specific place. Our field trip is to strengthen our own research and gestures of specific ways of making and engaging within this landscape of Kyushu, in order to produce an architecture that is solely focused on the relationship between gesture and material.

KYUSHU

Kyushu is the third largest island in the Japanese archipelago. The climate is subtropical. About 10 percent of the entire population of Japan lives on Kyushu. Most of the population and heavy industry are concentrated in the northern part of the island. The middle to south areas are sustained by agriculture, mainly rice, tea, tobacco, sweet potato, and soy.

The island is mountainous with 17 active volcanoes. Running all the way south from northern Kyushu is the Ryukyu Volcanic Zone. This is an active region with many volcanoes of the Holocene Era, approximately 11,700 years old, and includes Mount Kuju, Mount Aso, Kirishima-Yama, and Skurajima.

In April 2016, strong earthquakes ranging in magnitude from 6.5 to 7.3 on the Richter Scale shook the area. They were centred in Kumamoto Prefecture.

The areas between Kumamoto City and Mount Aso were the worst affected. Thousands of buildings and many roads were damaged. Landslides resulted in further destruction. Japan Rail's Kyushu Line and a few roads in the area remain closed but new detours provide access to all destinations.



ERUPTION OF NAKA-DAKE, ASO

The Aso Volcano, located in central Kyushu, Kumamoto Prefecture, is one of the most active volcanoes in Japan. The eruption of 553 A.D. is the oldest recorded volcanic eruption in Japanese history and it appears that the volcano has remained active since. The most recent eruption was in 2016, at the crater of Naka-Dake, one of several central cones of the Aso Caldera.

VOLCANIC ROCKS

Volcanic rock is an igneous rock of volcanic origin. Volcanic rocks are usually fine-grained, or aphanitic, to glassy in texture. They often contain clasts of other rocks and phenocrysts. Phenocrysts are crystals that are larger than the matrix and are visible to the naked eye. They are created during the fractional crystallization of magma before extrusion.

Volcanic rocks are classified according to their chemical composition. Basalt is a very common volcanic rock with low silica content. Rhyolite is a volcanic rock with high silica content. Rhyolite has the same chemical composition as granite and basalt is compositionally equivalent to gabbro. Intermediate volcanic rocks include andesite, dacite, and latite. Volcanic rocks often have a vesicular texture as a result of voids left by volatile gases escaping from the molten lava. Pumice is an example of a rock formed

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during an explosive volcanic eruption. It is so vesicular that it floats in water. Pyroclastic rocks are the product of explosive volcanism. They are usually felsic (high in silica). Examples of pyroclastic rocks are tuff and ignimbrite. Shallow intrusions, which have structures similar to volcanic rather than plutonic rocks, are also considered to be volcanic.



BASALT



RHYLITE



ANDESITE



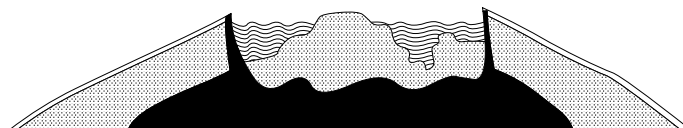
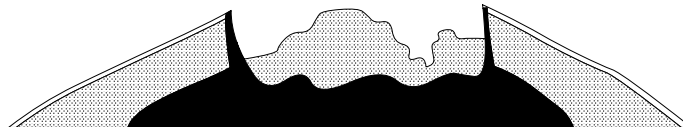
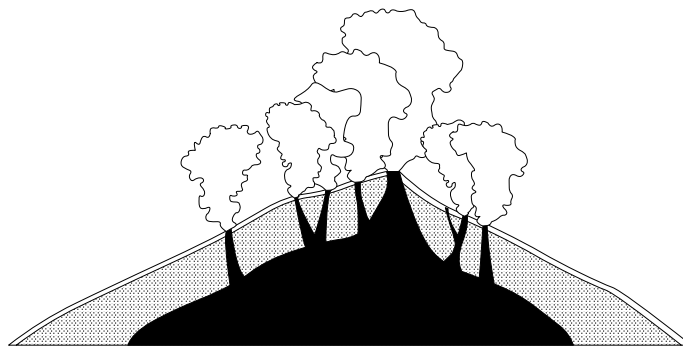
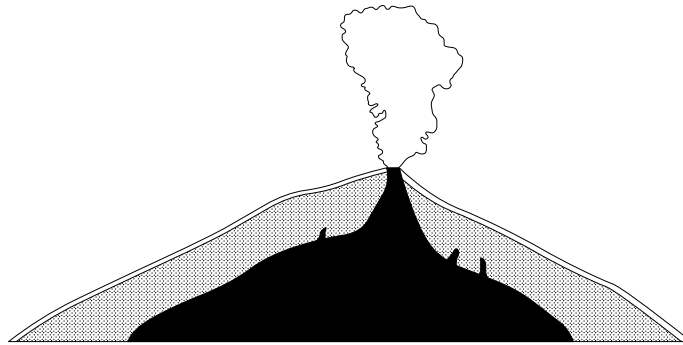
DACITE



LATITE
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PUMICE



CALDERA

A caldera is a volcanic feature formed by the collapse of a volcano into itself making it a large, special form of volcanic crater. A caldera collapse is usually triggered by the emptying of the magma chamber beneath the volcano as the result of a large volcanic eruption. If enough magma is expelled during an eruption, the emptied chamber will not be able to support the weight of the volcanic edifice (the mountain) above. Fractures will form around the edge of the chamber, usually in a roughly circular shape. These ring fractures may in fact serve as volcanic vents. As the magma chamber empties, the centre of the volcano within the ring fractures begins to collapse. The collapse may occur as the result of a single massive eruption or it may occur in stages as the result of a series of eruptions. The total size of the collapse may be hundreds or thousands of metres. Aso's ancient caldera ranks among the world's largest, with a diameter of up to 25

kilometres and a circumference of over 100 kilometres.

Today more than 70,000 people live inside this enormous caldera. Their unique culture has developed over many generations of coexistence with the volcano. A caldera with an interior stable enough to cultivate land, build highways and lay railroads is quite rare.

Hundreds of thousands of years of volcanic activity has brought many gifts to the residents of the Aso region, from the springs that are a common feature of volcanic regions, to the many hot springs in and around the caldera. The vast grasslands found throughout Aso are a historical product of over a thousand years of grazing, grass harvesting, and burning.

Local people have developed a symbiotic relationship with the volcanic environment founded on reverence for nature. The result is a unique local culture.



ONDA MATSURI

Onda Matsuri is a Shinto festival celebrated by the Aso shrine in July to pray for a bountiful rice harvest in the village. During the festival, women called Unari, dressed in white clothes, march through the rice paddies carrying meals for the gods.



NOYAKI (GRASS BURNING)

The burning of grasslands is carried out from late February to April. It prevents the growth of trees and the spread of forests, exterminates pests, and helps new sprouts grow. Burning is an effective and power-saving method of managing the grasslands, especially in the Aso region where grasslands are vast, geographically complex, and steep, making grazing and mowing insufficient to manage their growth.

DAY 1

We will hike in the volcanic landscape to familiarise ourselves with the history of volcanic activities by observing the various topographical and geological features. Minor eruptions at the Nakadake Crater have been experienced several times since April 2019. We can visit the crater only when it is calm.

After the hike, we will visit an Aso Yellow Soil quarry and burial mounds in a village located in the northern part of the crater. There we will be able to see how the inhabitants have utilized local materials from ancient times to today.



KOMEZUKA

Komezuka is a typical scoria cone which was formed about 2,000 years ago making it relatively young among Aso volcanic clusters. It is one of the most well-balanced cones in Japan. Komezuka was formed through a series of volcanic activities, which spewed large quantities of basaltic lava, depositing them in an area that extends from the north to the west side.



KUSASENRI-GA-HAMA

The Kusasenri-Ga-Hama is a result of a double crater that was formed 30,000 years ago when a small crater 400 metres in diameter was created within a crater one kilometre in diameter. Today, two ponds remain as remnants of the volcanoes. You can observe the characteristic topography and marshy vegetation around the ponds.



NAKADAKE CRATER

The Nakadake Crater is a complex of craters aligned north to south measuring 400 metres east to west and 900 metres north to south. The first crater, located in the northernmost part, remains active. The impressive volcanic hot crater lake called Yudamari can be seen at close range when volcanic activity is relatively calm.



SUNASENRI-GA HAMA

Sunasenri-Ga-Hama is the crater floor of Mt. Nakadake whose volcanic body was newly reformed several thousand years ago. It is covered with black sand and scoria dust. Volcanic bombs and large quantities of cinders can also be observed in this area. The area supports the growth of a few plants including Japanese knotweed.



ASO YELLOW SOIL

Aso Yellow Ochre, also called limonite, is a type of soil used in many products today. It contains approximately 70 percent iron, which gives it its yellow colour. This yellow ochre deposit is found in the Asodani Valley and indicates the presence of a caldera. It is used as a raw material for producing iron ore and red iron oxide pigment. Large quantities of red iron oxide have been excavated from burial mounds nearby leading archaeologists to conclude that the ancient people of Aso burned yellow ochre to produce the pigment. The interiors of their tombs were painted in this pigment. Today, it is used as a desulfurizing agent in sewage plants, and as livestock feed.



DESULFURIZING AGENT

Made of Aso Yellow Orcher, it absorbs toxic gases such as hydrogen sulfide and chlorine and is therefore used in sewage plants and by gas companies.



BURIAL MOUND INTERIORS

The interiors of the burial mounds are painted in red pigment made of Aso Yellow Ochre, which shows that ancient people burned the yellow soil to make red pigment.



NAKADORI BURIAL MOUNDS

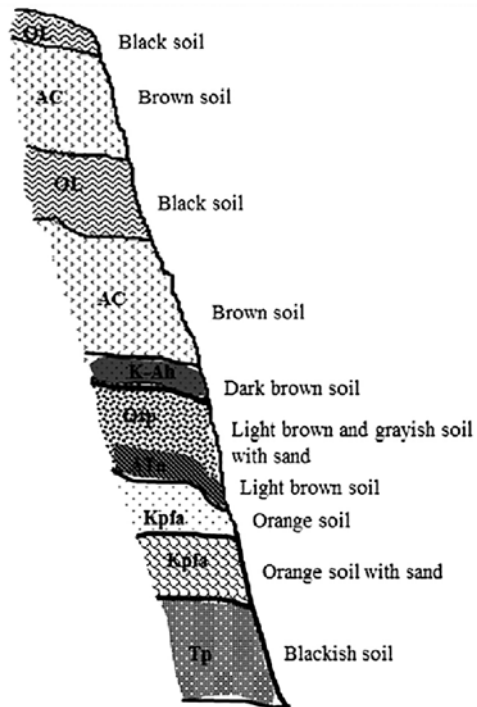
Aso's foremost group of ancient burial mounds stands at the confluence of the Kurokawa River and its tributary, the Higashidake River, amid the rice fields of Asodani Valley's northeastern region. Twelve mounds are observed here, including some built in the 'keyhole-shaped tumulus' style that dates back to the early- to mid- 5th century.

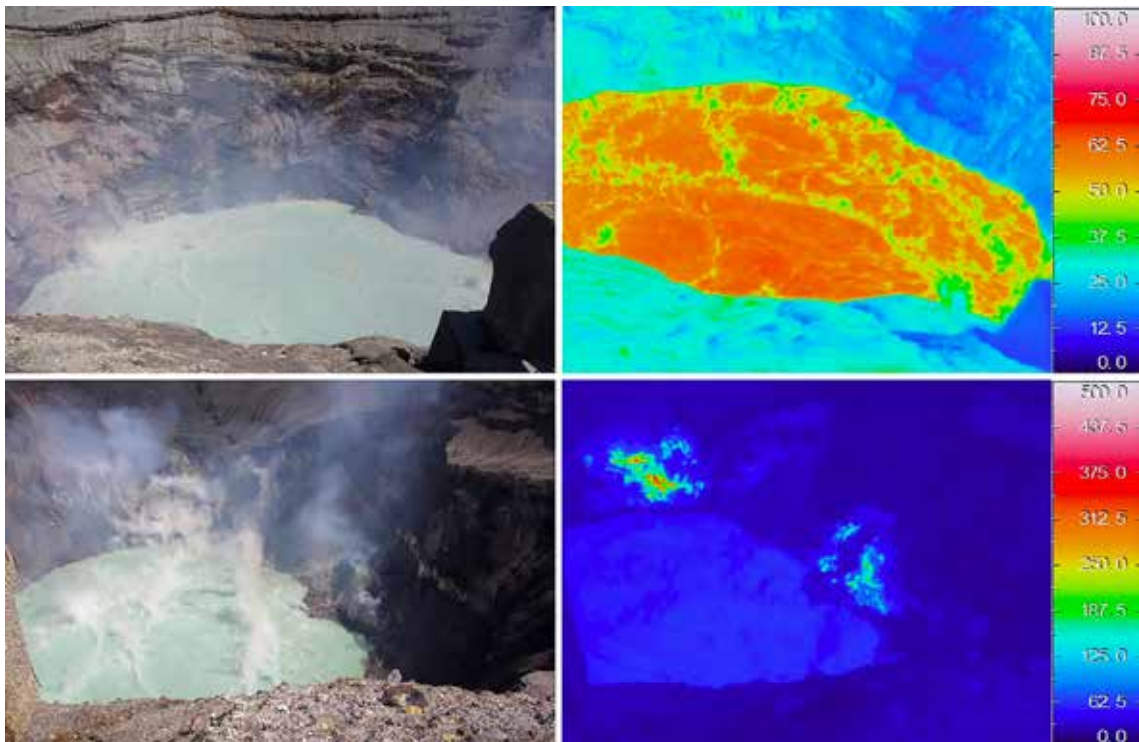
DAY 2

In the morning, we will visit the researchers at the Aso Volcanological Laboratory of Kyoto University.

In the afternoon, we will focus on the characteristics of water in Aso. We will walk through a cluster of springs and visit a sake brewery.

At the end of the day, we will take an Onsen, a Japanese traditional public bath.

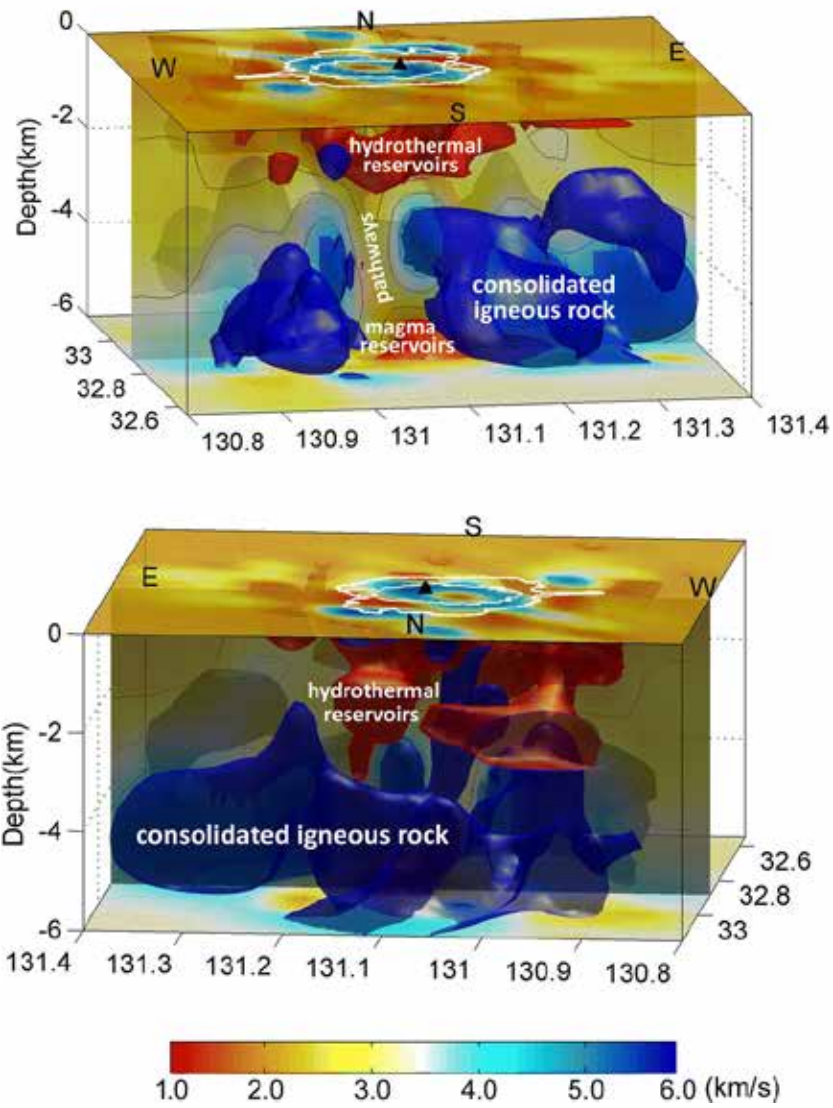




ASO VOLCANOLOGICAL LABORATORY OF KYOTO UNIVERSITY

Kyoto University's Aso Volcanological Laboratory has conducted comprehensive research into volcanism and geothermic tectonics through fieldwork and laboratory experiments since 1928. The fundamental scope of its research covers the thermal structure and the dynamics of the Earth's interior.

Aso caldera Vs structures





WATER RESOURCES AND SPRING CLUSTERS IN MINAMI-ASO DISTRICT

The Aso region is a rainy district experiencing an annual rainfall of up to 3,200mm. Because of the pervious volcanic soil and its varied vegetation - forest and vast grasslands - much of the rainwater soaks into the ground producing mineral-rich underground water. The region has an abundance of natural springs distributed widely because of the substantial amount of underground water. There is a spring water pilgrimage leading up to the Aso Shrine.



MARUYAMA SAKE BREWERY

This sake brewery is located in Takamori-Machi at the foot of Mount Aso. It has been producing sake since 1762. This area is endowed with an exceptionally good water source, which is vital considering that 80 percent of the final product is influenced by the quality of the water.



JIGOKU AND TARUTAMA HOT SPRINGS

As is common in volcanic zones, hot springs are found throughout the Aso region. Although hot springs in volcanic areas typically contain hot water and gases originating in magma, Aso's hot springs are fed by groundwater that filters through the earth and are notable for their low percentage of magmatic substances. Minami-Aso's Jigoku ('hell') and Tarutama Onsens are strongly influenced by the Aso Volcano with highly acidic, sulfurous water.

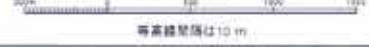
DAY 3

Mount Kuju is the site of an unusual powerplant that uses the energy of volcanoes, or geothermal energy. The Onsen of the day is Lamune Onsen near the powerplant.

At the end of the day, Carlos Irijalba and selected students will give presentations.

九重火山地質図 GEOLOGICAL MAP OF KUJU VOLCANO

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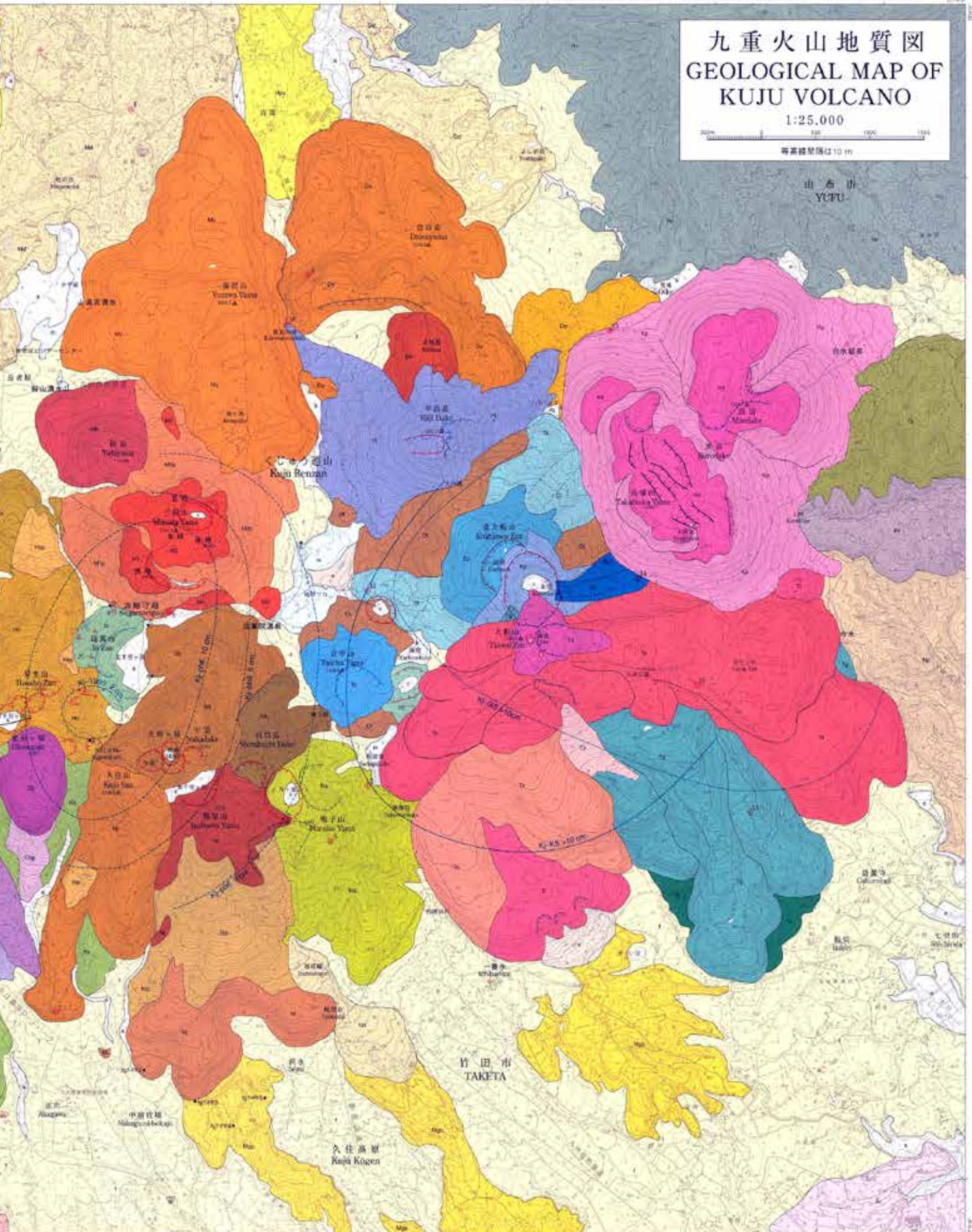


等高線間隔は10 m

山形市
YUFU

竹田市
TAKETA

久住高原
Kuji Kogen

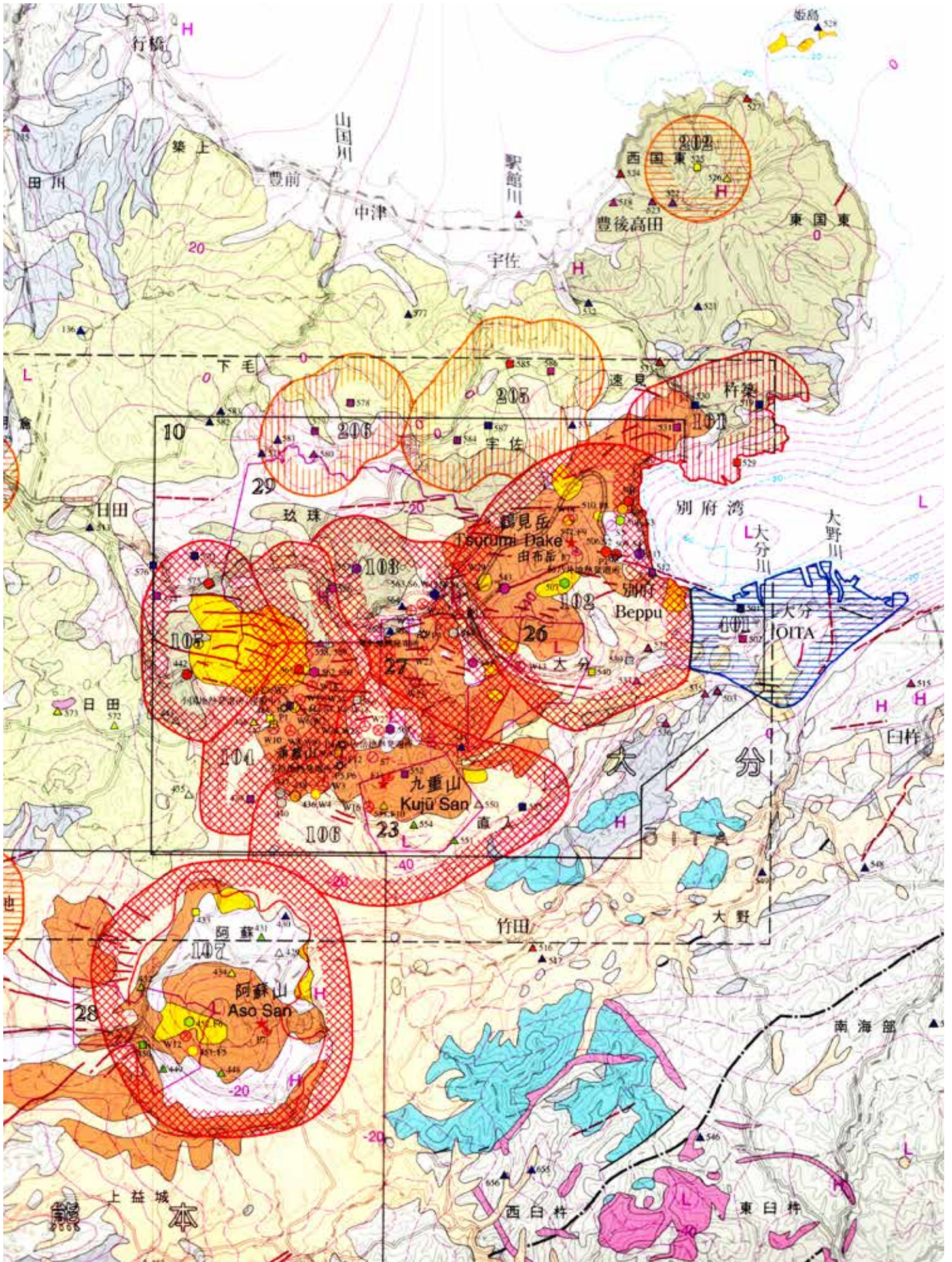






HATCHOBARU GEOTHERMAL POWER PLANT

The Hatchobaru Geothermal Powerplant is located in the vicinity of Mount Kuju, an active volcano. It generates electricity from the high temperature steam that spews from under the ground. The powerplant is at an elevation of 1100 metres and it is operated by remote control from the nearby Otake Powerplant. There are 30 steam wells ranging in depth from 760 metres to 3000 metres generating a total of 890 tonnes of steam per hour. The wells are concentrated in a relatively small area of about 1 km² due to terrain constraints: the plant is in a narrow valley in the Kuju mountain range. As in other Japanese geothermal plants, the waste brine from Hatchobaru is used to produce hot water for local communities before being re-injected.



GEOHERMAL RESOURCES MAP
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LAMUNE ONSEN

Lamune Onsen is situated in the village of Nagayu near Mount Kuju. The entire village is blessed with natural sparkling hot spring waters, though the Lamune Onsen is reputed to have the fizziest. The Onsen buildings were designed in 2005 by Japanese architect Terunobu Fujimori who is known for his use of traditional architectural techniques.

DAY 4

The day will start with a guided tour of different types of hot springs in Beppu by a local expert. Later, we will experience different types of Onsen, and a local steamed dish cooked by geothermal steam.

BEPPU

Beppu is a city in Oita Prefecture, Kyushu, located at the base of a steep symmetrical fan of coarse volcanic detritus. The city has over 2,000 hot springs and produces 87,616 litres of hot spring water a minute, which is the most in Japan, and second internationally only to Yellow Stone National Park in the U.S.A. Commonly used thermal waters have various health benefits.

The vast area stretching from Beppu Bay through Kujyu, Aso to Shimabara Peninsula is a rift valley. Around 30,000 years ago, the active volcano resulted in the geothermal activities that later caused two big faults in the landform. These faults and the volcanic activities of Mt. Tsurumi and Mt. Garan caused the underground magma to force the heat upwards resulting in high temperatures and high-pressure puddles of water thousands of

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metres underground. The rainwater, once it seeps into the soil, reaches these puddles of volcanically heated waters and gushes out again, absorbing various minerals on its way. It takes an estimated 30 years for rainwater to surface as hot springs.





理説明

時をおいて噴出
下の水圧と沸騰
えられます。
心が上昇してきて
しAB部の温度水
なりAB間の水圧
現象を起こし上部
こ旺盛となります。
空洞の圧力が下り
は間歇泉、米国の
ランド、ニュージー
点では、当龍巻地獄
ございます。

主人敬白

約30分~40分

約6分~10分

600kl

105度

含食塩酸性泉

THE SUMA WIGORI WATERS
The word "Wigori" means a hot spring
that produces water and steam in intervals.
This phenomenon can be observed in the hot
water in various parts of the world
known as "Wigori".
A hot spring is a natural phenomenon
that occurs in the earth's crust.
It is a natural resource that has been
utilized by humans for a long time.
The hot water in the Suma Wigori
Waters is a natural resource that
has been utilized by humans for a
long time.



UMI-JIGOKU

Temperature: 98°C. The 'Sea Hell' gets its name from its main attraction, a pool of boiling water which is turquoise blue like a tropical sea.

← TASTUMAKI-JIGOKU

Temperature: 105°C. A geyser is hot spring water in the ground that has been heated by magma and then ejected with great force from the ground. It spews out water every 30-40 minutes. The geyser is surrounded by rocks for safety but has the potential to spew up to a height of 50 metres.



CHINOIKE-JIGOKU

Temperature: 78°C. Thought to be one of the oldest Onsen in Japan dating back 1300 years, this 'Hell' gets its name from its deep red colour. The spring water feeding the pool is not initially red but changes colour when it comes into contact with the metal-heavy earth deposits in the pool.



SAND BATH

An Onsen located along the coast where you bathe in hot sand rather than hot water. The sand is heated by the underground geothermal activity.





MUD BATH

This is another unusual Onsen which is muddy hot water baths sourced directly from under the ground. The mud is believed to be rich in minerals and contains high concentrations of metals such as iron and aluminium (195 mg of iron and 107 mg of aluminium per kg of water). An 8th century legend tells of monks who took this mud bath.





STEAMED DISH

The town is also known for steam cooking, which is a traditional method of food preparation using natural hot steam from Onsen sources. It is called Jigoku Nabe (Hell Pot) and is one of the few places on earth where you can taste natural steam-cooked dishes.

DAY 5

We will visit a temple where a monk will show us the practices of mountain faith such as praying, mountain climbing, meditation and diet.



KUNISAKI PENINSULA AND MOUNTAIN FAITH

Among ancient civilizations around the world, as in Japanese Shintoism, mountain worship was a significant practice. Mountains were seen as the home of the gods, a link between heaven and earth, and a place for sacrifices and revelations.

Mountain faith, or Sangaku Shinto, as practiced by the Yamabushi, or mountain priests of Japan, is an expression of communion with nature in arduous acts of spiritual and physical training in the mountains. Founded in the mid-seventh century as a sect of Buddhism, Shugendo, as the mountain faith sect is called, was a development of Buddhist asceticism which also incorporated many of the significant characteristics of Japanese religion. The teachings of the Buddhist Mantrayana school merged with naturalistic Shintoism and the magical practices of shamanism to produce this sect

of Japanese mountain asceticism. Belief of the Dainichi Buddha and fire worship are part of the faith, and their objective is to attain power against evil spirits and communion with nature. Their faith sometimes led believers to extreme acts such as throwing themselves into the craters of active volcanoes.

The Kunisaki Peninsula is known for a unique local Buddhist culture called Rokugo Manzan, which contains elements of Buddhism, Shintoism and mountain worship. It revolves around the peninsula's numerous temples and Usa Shrine and was founded by a legendary monk called Ninmon Bodhisattva in 718.

For example, Torii, a gate which marks the entrance to sacred space and normally found at the entrance of Shinto shrines, is also found at Buddhist temples.



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