

## ”100 Earth Heritages” and its Geographical Concept

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### 1. The Association of Japanese Geographers and ”100 Earth Heritages”

Geopark Committee in the AJG aims to choose ”100 Earth Heritages”. They organized three symposiums and four questionnaire surveys. Furthermore, Committee of 100 Earth Heritages Selection has launched in 2012 and started the selection. This committee has members of the AJG who are both researchers of physical and human geographies. This article introduces a manner of the selection work for understanding a priority of value in Japanese geography.

### 2. Manner of 100 Earth Heritages Selection

The committee proposed questionnaire survey to members of the AJG several times in order to reflect their opinions in the selection. As a result, 264 places of proposed sites were shown (including some overlap); 155 from speakers and 40 from the audiences in March of 2012, 7 from speakers and 38 from the audiences in March of 2013, 20 from questionnaire respondents and 4 from questionnaire on the web. Based on the list of a total 264 places of proposed sites, the vote by the member of the committee and an argument were performed in July, 2013, and an 65 Earth Heritages were picked up. Enumeration and the vote of the new proposed site by the committee have been held again, and 33 Heritages were added afterwards. It has remaining two places at January 31th, 2014.

### 3. Contents of 100 Earth Heritages

In January 2014, 98 places of Earth Heritages are chosen. As for the Earth Heritages, 47 prefectures have one heritage at least. It depends on consideration in that the heritages should be used for geographical education in schools in Japan. However, on the other hand, the difficulty of the evaluation of the geographical value hides in the back of this consideration. In other words, geographical valuableness can insist on in area wherever of Japan.

### 4. Geographical Values from the perspectives of 100 Earth Heritages

For each heritage, the commentary sentence for choice reason is written. This article clarifies geographical value by considering the contents of the commentary sentence. The contents of sentences mostly consist of the plural sites. This is because a certain reciprocal viewpoint (story) was made between the sites. A nature and human reciprocal relations are seen in the contents. For example, in one of Yoshino River District, this district has mountains of steady sedimentary rocks and rivers cutting sharply between the mountains, this becomes the precondition of the creations of small and unique bridges for movements between the villages for settlements. Such nature and human relations are frequent in the commentary sentences of other heritages. In other words, it is thought that the geographical value from ”100 Earth Heritages” is these reciprocal relationships.

On the other hand, the contents of the commentary sentence can point out the problem, too. This article points out two dimensions. First one is seen in the contents. A writer of the commentary sentence is only physical geographer or humanities geographer. Therefore the contents are slightly deflected to physical or human geographical contents so that they should start to learn about each other’s fields. The second problem can point out that there is a giving an environmental determinism like impression for a reader, because a natural condition is described as a precondition in the sentence. So, it may be said that it is necessary for geography to discuss the environmental determinism. If the general relationship of a natural phenomenon and the humanities phenomenon is proved scientifically, it is one of the geographical directionality for Geoparks.

Keywords: Earth heritages, Physical geography, Human geography, Regional geography, Environmental determinism

## Activity support for the educational continuity from primary through early secondary levels in the Mikasa Geopark

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In the Mikasa Geopark, the educational continuity from primary through early secondary levels has been carried out since 2005. In this educational project, there is a subject "Regional Studies", which learns about attributes of Mikasa (eg., history, nature, and industry).

On the other hand, the Mikasa City Museum was established in 1979 to preserve materials of human, natural, and industrial histories of Mikasa. The curators of the museum have supported the subject "Regional Studies" as a museum activity since the first year (2005) of the educational project. Recently, the cooperation program between the educational and geopark activities is exploring.

In the presentation, we introduce the cooperation among the educational, museum, and geopark activities, and discuss the results and subjects.

Keywords: educational continuity, regional study, museum activity, geopark activity, Mikasa Geopark

## The effects of experience-based science and environmental education on Byobugaura geosite in Choshi Geopark

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Choshi geopark is certified by Japan Geopark Committee (JGC) at September 24, 2012. In this study, we will introduce the contents and the effects of geoscience education program for junior high school students using Byobugaura geosite in Choshi Geopark.

Choshi, located at the east end of the Boso peninsula, 100km east of Tokyo, Chiba prefecture, Japan, has many geological heritages that should be preserved and passed on to future generations. Representative geological features in Choshi are as follows. First, the Biobugaura geosite, comprising Pliocene and Pleistocene sedimentary rocks, is approximately 9 km in length and 30~50 m in height and faces the Pacific Ocean. This topography, which is also called "Dover in the East", consists of sharp cliffs formed by land erosion resulting from sea waves. According to a previous report, the speed of erosion is 5~6 m per year. To prevent erosion, seawall was constructed in 1966. The seawall was a necessity for the residents' safety even though it negatively affected the geo-heritage. Second, Inubouzaki geosite, the Cretaceous shallow sea sediments, designated as a government national monument, are exposed in the Inubouzaki coastal area at the east end of the Choshi peninsula. Third, the "Inuiwa" geosite, carried on the tradition of the "Yoshitune legend" which is a legend concerning a samurai warrior in the medieval period of Japan, are composed of Jurassic greywacke, mud stones, and conglomerates that includes calcareous coarse fragments with fusulina fossils.

Our education program using Byobugaura geosite designed it to be usable by a curricular science class of the junior high school, and it conclude for one day. The contents of this program compose two parts, the morning part contain geotour and tephra sampling in the Byobugaura geosite, and the afternoon part consisted of geological lecture and stereomicroscope observation of tephra constituents, e.g. volcanic glass and minerals etc.

The results of questionnaire analysis for participants show (1) this program is understandable for major part of attended students, (2) this program have good effects for induction of affection for local environment, and (3) this program increase desiring to learn for earth science.

Keywords: Geopark, Choshi, Science education, tephra, Byobugaura, Life cycle thinking

## Analuzing the Efficcy of Natulal Disaster Awareness Programs based on the Understand- ing of Geophysical Mechanisms

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Izu Peninsula was once a submarine volcano situated in the south sea. This area collided with Honshu with the Northward movement of the Philippine sea plate and formed a peninsula from about 10 Million years back.

After this land volcanism took place that formed multiple large volcanoes. In this geopark we made attempts to popularize earth science and disaster management by conqutting questionnaires with local schools. As a result we understood the efficacy of natural hazards education by using familiar examples. From the participants there were even demands for more information and more comprehensive training programs.

Keywords: Geopark, Disaster Mitigation Education

## Detection, Observation, Preservation, and Utilization of Sand Boiling Traces along an Active Fault : Effort of Hakusan T

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The Morimoto-Togashi Fault Zone which goes through Kanazawa City to Tsurugi District, Hakusan City, is one of geosites where people can learn about the formation of earth in the Hakusan Tedorigawa Geopark. On the eastside of the fault mountains (elevation of 650 meters) were formed by the upheaval. On the other hand, on the westside of the fault the Tedorigawa River transported much sediment, and an alluvial fan was formed by them.

In recent years two excavation surveys of the buried cultural properties were carried out in the western margin of the active Togashi Fault. One at the Bunyudo ruins (Hiramatsu and Kozaka, 2013) and the other at the Netsuno ruin which was excavated in 2013. Sand boiling traces were found in the both ruins, which showed a huge earthquake occurred between the late Yayoi Era and the Heian Era. It is difficult to identify the active fault which the earthquake happened, causing the sand boiling traces. However, from a survey in Umeda District along the Morimoto Fault, it was reported that the latest activity occurred after approximately 2000 years ago, prior to the fourth century (Headquarters for Earthquake Research Promotion, 2013). Therefore, the sand boiling traces are likely to be caused by the activity of the Togashi Fault, considering that the sedimentary layer which the sand boiling traces were found is correlated to the era the fault movement occurred.

We report people's activities related to these ruins where they are located on slight elevations of the alluvial fan, together with an introduction of the sand boiling traces. Additionally, we report about a study tour held in 2013 for the citizens to walk around and observe the both ruins and the Togashi Fault.

The Hakusan Tedorigawa Promotion Council is planning to peel off the sand boiling traces, panel it, and then utilize it as learning materials of the geopark to learn about the formation of earth and disaster prevention.

Keywords: Hakusan Tedorigawa Geopark, Active Fault, Morimoto-Togashi Fault Zone, Sand boiling traces, ruins

## A practical use of geoparks as university educational materials

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The purpose of this presentation is to show the practical use of geoparks as university education and to discuss the relationship between local universities and local communities. Tottori University of Environmental Studies opens four classes of *Project Research* for freshmen and sophomore. The classes of Geoparks started in 2012. The aim of the geopark classes is to learn the method of a field survey. There were various topics on geoparks; for freshmen, the development of virtual geotour, the land use survey of Yoshioka hot springs town and the development of geo product, and for sophomore, the development of geo guided tour at Aoshima of Koyamaike Lake and the regional survey of Yoshioka. These output share with local communities and geoparks. It becomes clear that a geopark makes a good use of social learning.

Keywords: university education, regional survey, social learning, San'in Kaigan Geopark, Tottori University of Environmental Studies

## Geopark guide training program in Amakusa area

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Amakusa Geopark planning promotion committee trained 149 geopark guides in Amakusa area in 2013. We introduce a state of the Geopark guide training at the geosites.

"Amakusa Geopark plan" is an action for "Amakusa Geopark" aiming at authorization of the Japanese Geoparks Network. The five elements, geology, geography, viewing point, culture and industry, comprise the main core of the Amakusa area which is shown at the geosites throughout the islands.

The purpose of Geopark guide training program, through a lecture in room and the local training in field, is aimed for the interpreter of the local geology, creature, culture and industry. The committee confers the qualification of the guide to the person who passed an authorized examination. Geopark guides perform their activity after the enrollment to each local tourism guide association.

Through this program we expect an effect guide authorization, common knowledge of the activity for local inhabitants and the interpreter for geopark which can convey resources in this area to anyone clearly. Geopark guide is important as a diffuser explaining "What is geopark" precisely and is necessary for an action united with local inhabitants or the education spread.

Residents and officials alike collaborate to preserve the geologic inheritance of Amakusa with an educational perspective. Exposing the unique beauty of this inheritance as a tourist attraction in conjunction with the history and culture of the area, an attractive geo-tourism will be found aim at the promotion of the Amakusa area.

Point of the local promotion by the tourism is comment on an earth science-like element for constitution of the earth and a story about the local history and culture.

Keywords: geopark, guide, inhabitants

## Program for broadening the knowledge base and awareness of geopark guides -An example of Amakusa Goshoura Geopark-

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It is very important for any geopark that its guides are actively involved in geo-tourism. Guides must strive to continually increase their awareness and broaden their knowledge base of not only their geopark, but also of neighboring areas. We will use the Amakusa Goshoura Geopark as an example to demonstrate a guide awareness-raising program in action with regard to the geology, geography, history and culture of its neighboring areas.

The Amakusa Goshoura Geopark contains strata and fossils in deposits spanning 100 million years. The strata were deposited in the Cretaceous and Paleogene periods of earth's history, and contain abundant fossils including dinosaurs from the Cretaceous period and large mammals common to the Paleogene.

From the peak of Karasu-toge, a geosite in the geopark, we can see a 360-degree panoramic view of the Yatsushiro Sea and landscape of Kyushu Island including Fugen-dake, Yatsushiro Plane, Aso Mountain, Hitoyoshi Basin, Mt. Shiraga, Ontake and Yahazudake on the Hisatsu Volcanic Plateau, Izumi Plane, Mt. Shibi, Nagashima, Shishijima and Koshikijima.

Members of the Association of Goshoura Tourism Guide group are trained to explain not only about the panorama from Karasu-toge including geologic composition and topographical features of Kyushu Island, but the wealth of information stored in its strata. As an example, the association had a tour to study the geology, geography, history and culture on the coastal area from Ashikita to Nagashima along the Yatsushiro Sea in 2014. Similarly, it will take part in the study of the Shimabara peninsula at the Shimabara Global Geopark in the near future. Training programs like these have been instituted as a means of support for the Amakusa Goshoura Geopark guide's continuing education.

Keywords: Geopark guide, neighboring areas, broadening knowledge



## Mt. Apoi Geopark telling a global dynamic movement of the earth

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Mt. Apoi geopark is located at the southwestern end of the Hidaka mountains, facing to the Pacific southward. Recently, a tectonic map showing a distribution of major plates in the northern hemisphere and suggesting a global sense of plate motion between the North American plate and the Eurasian plate was published. This map gives an easy understanding on a background of the Hidaka mountain building and a simultaneous interpretation on a global dynamic movement of the earth.

We have an excellent example of global mobile belt of the earth, which is the Tethys ophiolite belt from the European Alps ~Greek ~Turkey ~Iran ~Oman ~Pakistan ~Indus Suture ~Andaman ~Great Sunda toward the east, including the continent-continent collisions between Africa and Europe, and India and Asia. Also, we have an above example of active tectonic event such as the Hidaka mountain building, here in Mt. Apoi geopark, Hokkaido, Japan.

Keywords: Mt. Apoi geopark, peridotite, upper mantle, basaltic magma, plate boundary, global dynamic movement

## Communication of Information on the Internet By Geopark: Case Study of Sanriku Geopark

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The Sanriku geopark certified the Japanese geopark in 2013. It is the largest geopark in Japan that consists of 16 cities in Aomori, Iwate, and Miyagi prefecture. The Sanriku geopark promotion conference is disseminating information at the Internet.

In February 2011, we created the general-oriented website which summarized geological history and the highlight of Sanriku regions. Then, in response to the Great East Japan Earthquake, we have created a new web site for education travel and academic investigation in September 2011, and then, the variety of information was added to the general-oriented website towards the authorization to a Japanese geopark.

Furthermore, through the information by SNS, such as a blog, Facebook and Twitter, we increase the update frequency of information, promotion meeting was to update the content and functionality depending on the purpose or object. We increased the updating frequency of informaton, and updated contents and function according to the purpose.

Now, the degree of name recognition or comprehension of the “ geopark ” are not increasing. However, exposure to mass media and concern of local and a surrounding area are increasing in response to Japanese geopark authorization of Sanriku regions. In order to correspond to this, we decided to newly renew a website in 2014.

In this presentation, we introduce our renewal case and information transmission method and the results of a survey of website on other geoparks.

Keywords: geopark, communication of information, internet, Sanriku

## Utilization of Earth sciences for regional development

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The information on earth sciences is useful for disaster prevention of a natural hazard like earthquake and volcanic eruption etc. The new trend utilizing the information of earth sciences to lifelong learning and tourism occurred in recent years. The geopark can be the best place providing this information.

Ibaraki University Geological Information Utilizing Project team is providing geological informations for the management of North Ibaraki Geopark. Main act is creation of 15 sightseeing guidance maps. Now, we are improving the contents of previous maps. Furthermore, we are having strong cooperation with local residents and companies for the regional development.

Keywords: Geopark, North Ibaraki Geopark, regional development

## Activity of Misato-Kai in Sado Island Geopark

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We introduce the activity of Misato-Kai, which played an important role for Sado Island Geopark to be a member of Japanese Geoparks Network.

Misato-Kai is the association that was established in 2006 by hostesses of local Japanese inns and hotels to keep close relationship with each other and revitalize tourism in Sado Island. Until now, they've made eco-friendly chopsticks and OMOTENASHI pocket notebooks.

Also, they make place mats as their activities. These mats are made of paper and have some pictures and captions on them to introduce some tourist attractions and promotional programs to guests. This time, they made the place mat under the theme of Sado Island Geopark and many groups and associations such as, Misato-Kai, Sado City and welfare facilities give much support to make it. The cooperation is the significant feature for this activity.

Now, these place mats are attracting favorable comments from hotel guests. Some guests bring it home and others leave some messages on it for people of welfare facilities in Sado Island. It is a useful tool for communication between the hotel guests and the hostesses in local Japanese inns.

In Sado Island, many associations are extremely active. They are very important for Sado Island Geopark activities. We hope that we can work together for our geopark in the future.

Keywords: Sado Island Geopark, Misato-Kai, tourism

## Let us Enjoy Geo-Tetsu - the Sixth Geo-tour through Train Windows, Nakamura and Sukumo Line of the TOSA KUROSHIO RAILWAY

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### 1. Aims of Geo-Tetsu activities

Geo-Tetsu is the name of the activity that shows everyone ways to enjoy and learn about geology and related sciences, using railways (Kato et al., 2009). Following five year's Geo-Tetsu promote activities are continued by geological engineers who love railways, organized with the corporation of the Fukada geological institute since 2009 (Fujita et al., 2013) and established Geo-Tetsu Project Committee since 2013.

Geo-Tetsu offers the chance to get acquainted with geological features, not only through train windows but also along paths accessible from the stopovers alongside the railway routes. We selected enjoyable Geo-Tetsu courses and Geo-points. As much information is obtainable and can be gathered from various perspectives; the railway itself, geology, geography, cultural heritage and sight-seeing as well. We hope that the general public will enjoy a new style of railway traveling provided by the Geo-Tetsu. The Nakamura and Sukumo Line of TOSA KUROSHIO RAILWAY is presented in this as sixth route of Geo-tetsu.

### 2. The Nakamura and Sukumo Line, the sixth Geo-Tetsu project

#### (1) Abstract of the Nakamura and Sukumo Line

The Nakamura and Sukumo Line run from Kubokawa at Shimanto Town to Sukumo City in the western region of Kochi Prefecture. The railway connects from Kubokawa to Nakamura at 43.0km, and from Nakamura to Sukumo at 23.6km. Both are single track, and the route not electrified. In the line, there are characters designed by Takashi YANASE. Additionally, they have seven wrapped vehicles of municipalities. John Mung (Manjiro Nakahama), Whales, Whale Sharks, Kashiwa-jima Island, Kyoto cultures of the Shimanto City, and the event character of the Sukumo City etc. are painted there. The vehicles not only transport passengers but also inform the charms of the western region of Kochi Prefecture.

The Nakamura Line and the Sukumo Line have a different history of construction. At first, the construction of the Sukumo Line had been promised. However, the Nakamura Line was given to priority by the political motivation. The Nakamura Line was started constructing in 1956, and opened in 1970. On the other hand, the Sukumo Line was started constructing in 1974, but it was interrupted by the Japanese National Railways reconstructing promote measure law in 1981. Afterwards, both routes were succeeded by TOSA KUROSHIO RAILWAY Ltd. as the third sector railway. At last, when the Sukumo Station opened, it became a present route in October, 1997.

#### (2) The rich geological and sight-seeing resources of the Nakamura and Sukumo Line

The Nakamura and Sukumo Line runs on the Shimanto terrane that consists of sandstone and the mudstone from Cretaceous to Paleogene. The train leaves Kubokawa Station (asl 210m) and goes to Kaina Station (asl 47m), descending the inclination of 23 permil or less. Especially, "the First Kawaoku Tunnel (2031m)" is well worth as loop of 350m in radius, descending 20 permil, and the exit appears below by 40m. If you have the compass, you can confirm its needle will be made one rotation in the tunnel. When we goes out there, train runs along Iyoki River. Soon we arrive at the Tosa-Saga Station in famous of bonito's single-hook fishing. The train passes under a lot of short tunnels with the outcrops of turbidite of Shimanto terrane around Tosa-Shirahama. Between Ukibuchi and Tosa-Irino Station, you can visit the river-mouth deviation of the Fukiage River. There are almost stone monuments of the Nankai Earthquake at the Kamo shrine in woods of pine at Irino.

Through the Kotsuka Station, the train changes front to the west. It crosses the Shimanto River in parallel to a red bridge as old national road. In the downstream, there is a long dam for the flood disaster evasion. The train advances straight in the Nakasuji lowland (Kano et al., 2003), which understood the slope-basin deposit (Domeki Formation). Lastly, the train comes out of Hijirigaoka Tunnel (5084m), we arrive at the Sukumo Station.

Keywords: Geo-Tetsu, Geo Point, Nakamura and Sukumo Line of the TOSA KUROSHIO RAILWAY, loop tunnel, Shimanto terrane, Nakasuji lowland