Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

G04-P01 Room:Convention Hall Time:May 20 18:15-19:30

Analog model of basement structure below the Osaka Plain

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It is commonly discussed the difficulties on promoting the geologic results for the students as well as citizens. To solve this problem, I made three-dimensional analog model of basement structure below the Osaka Plain. The horizontal scale of model is 1/100,000 but vertical scale is emphasized as 500%. Because the model was painted by gradations in color from yellow (Shallow) to dark blue (deep), it can be easily recognized the contrast between subsurface steep precipice and gentle slope of basement structure. Among them, the Uemachi Active Fault is characterized by sharp drop of basement depth below the Osaka Plain. Thus the analog model of basement structure below sedimentary basin would be helpful to understand why long-period ground motion is amplified in the sedimentary plain such as the Osaka Plain.

Keywords: outreach, earth science, geology, educational promotion

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3D visualization and outreach of geological information using finely detailed miniature.

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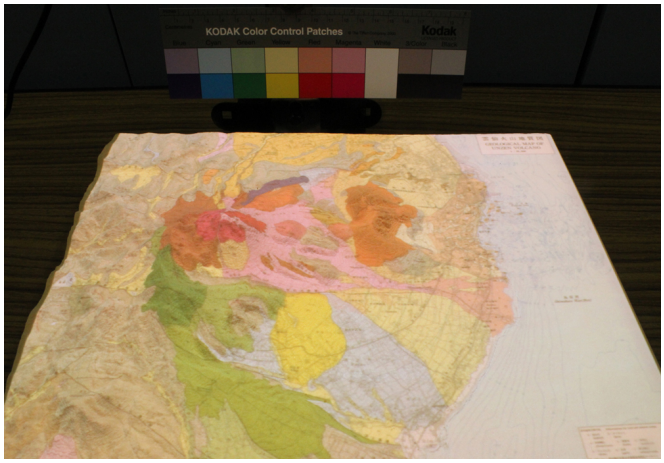
In recent years, people can access to geological information quickly and easily with the help of information technologies. However, it is difficult to recognize three dimensional distribution of geological structure without professional training of map reading. To solve this problem, we established several techniques to build up finely-detailed miniature. This miniature is suitable for verifying research finding, and also for outreach activities in museums, schools, geoparks etc.

To build up 3D miniature, we use 3D modeling machine called 3D-plotter and 5m-meshed digital elevation model (DEM) published by Geospatial Information Authority of Japan (GSI). A number of geological datasets, such as borehole datasets, 3D subsurface structure model published by Geological Survey of Japan (GSJ) are also used to modeling interior structure of the model. DEM are converted into 3D-CAD data format (DXF, STL, etc.) and added contour model using shape information and molded into real 3D model by the 3D plotter.

To visualize geological information, we projected geological maps, hazard maps, etc. on these 3D miniatures by optical projector. While this technique is known commonly as 3D projection mapping, we projected geological information more accurately than ever before by using projected markers. These modeling and matching techniques are patent pending (Japanese patent application No. 2012-172692). These 3D miniatures can be separated laterally into several parts to show subsurface structure. We use this miniatures to visualize geological and disaster information of Unzen Volcano, Kobe City, etc.

Keywords: Geological information, 3D model, Rapid prototyping, Projection mapping, Hazard map, Geopark



Japan Geoscience Union Meeting 2013
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G04-P03 Room:Convention Hall Time:May 20 18:15-19:30

3-D display of subducting plates and plate activity using MR (Mixed Reality)

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Recent large quantity and high quality observation data such as those provided by the nationwide dense Kiban seismic and GPS networks have contributed considerably to deepen our understanding of 3-D inhomogeneous structure within the Earth, detailed structure of subducting plates, and phenomena occurring there such as earthquakes and magma activities. 3-D display of obtained results, such as detailed configuration of subducting plates or plate activity occurring there, is essential to be properly understood by other people, and even for ourselves it is very important to understand it more deeply. Moreover, this helps to spread scientific knowledge to the public.

Based on this idea, we have been trying to develop a method of 3-D display of those images. At JPGU2012, we showed 3-D images of the detailed view of two plates subducting immediately beneath Tokyo metropolitan area and of the distribution of earthquakes occurring in the area (Kaida et al., 2012). Also, we exhibited the display using the cutting-edge image technology (Mixed Reality; MR) at RCPEVE display booth at JPGU2012. MR is a technique which seamlessly merges real images and virtual CG images in real time; it is now gaining attention as an innovative image technology. By a head-mounted display, CG image is displayed as if it really exists in front of user. Since it detects the movement of the head-mounted display, the user can see the portions that are out of sight, such as the backside and underside of the target CG. This new system has allowed us to simulate observing phenomena of the Earth’s interior with our own eyes.

With our previous contents, only space distribution display was available. However, now, we are working on the content production which enables us to see not only spatial variance but also time variation so that the spatiotemporal variation of seismic activities and crustal deformations can be displayed, through the use of AVS Express, which is a comprehensive and versatile data visualization tool, and MR system, the leading-edge image technology. In the present study, we will introduce the video contents which display the crustal deformations before and after the 2011 Tohoku-Oki earthquake observed by GPS and the interplate coupling and its co-seismic and post-seismic slips by the earthquake, along with the image of the Pacific plate subducting underneath northeastern Japan.

Keywords: 3-D display, Mixed Reality, subducting plate, plate activity, crustal deformation

Japan Geoscience Union Meeting 2013
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G04-P04 Room:Convention Hall Time:May 20 18:15-19:30

Education of Fuji volcano using the Waste oil experiment

Tomohiro Kasama[1*]

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Waste oil experiment (Kasama et al., 2010) can make a Polygenetic stratovolcano using waste food oils and colored sands. Fuji volcano is the most famous staratovolcano in Japan. Almost of grade schoolchildren know its name. But, grade schoolchildren who can see real Fuji volcano are very few. Education of Fuji volcano using the Waste oil experiment was practiced for understanding Fuji volcano at a grade school on the foot of Fuji volcano, Mshima, where schoolchildren always can see Fuji volcano. 47 sixth graders were divided into four or three-person 1 set of groups. A model of Fuji volcano was made by many eruptions of waste oils and colored sands on each group. The effect of the Waste oil experiment was investigated by questionnaire research. According to the answers, similarity between model and real Fuji volcano was high; alike was 98%. Understanding of development of Fuji volcano was also high; very good was 96%. In other areas, where Fuji volcano cannot be seen well, answer of very good was not so high (about 50%: Kasama et al., 2010). It was thought that schoolchildren where live near Fuji volcano have more interest in volcano than other areas, not depending on their ability. Comments from schoolchildren were obtained. Fuji volcano may have strata. Fuji volcano may change its shape by eruption. Fuji volcano may collapse. Fuji volcano has developed by many eruptions for long time. These results were obtained only from a grade school. In next year, the education of Fuji volcano using the Waste oil experiment will take place more schools in cooperation with a board of education at Mishima. Further discussion will be done.

Keywords: Fuji volcano, waste oil experimennt, grade school, education

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See-through volcano; experiments of volcanic eruption for outreach program

Seiko Yamasaki[1*], Akira Takada[1], Ryuta FURUKAWA[1], Teruki Oikawa[1], Kuniaki Nishiki[1], Akinari Hirota[1]

[1]Geological Survey of Japan, AIST

We develop the See-through experiments of volcano in order to observe the inside of a volcano which cannot be seen directly, and understand the process from magma system to eruption. We present instructions for three-type experimental volcano, carried out at the open house in AIST. (1) The first experiment is to observe the effect of bubble. The See-through volcano is built with a transparent plastic bottle covered by a transparent plastic sheet. First, one pours colored juice and dishwashing detergent, then put bicarbonate and citric acid (or bubble bath bomb) into the bottle, and put a cap with pipe immediately. The pressure inside the bottle increases with bubble generating, eruption will occur with about a 1-m high explosive column, and change into effusive flow. (2) The second is to observe the effect of bubble and buoyancy. The See-through magma system is installed in a plastic bag, and is sunk with glass beads in a water container. Colored juice without bubble is denser than water, but with bubble, the juice starts to rise and erupt. (3) The third is to observe the effect of stress of the host material. For this experiment, the see-through host material is made of gelatin in a container. One injects colored juice from the hole in the bottom of the container using a siphon. We can observe the juice rises laterally like dike injection, and fissure eruption at the gelatin surface. If one changes the stress with pushing the container, the shape of the dike changes to adopt it.

These experiments are participatory, friendly to kids and adults, and favorably for also girls maybe because the experiments like cooking in the kitchen.

Keywords: outreach program, volcanology, experiment, eruption, lava flow, dike

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”Edible Marine Core” Outreach Program in Natural History Museum

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Museums are expected to appeal to citizens not only through exhibitions but also through academic activities such as lectures, courses, and science cafes based on curators’ research. Science cafes are effective tools for outreach activities from museums, especially when they are done interactively. We have cleared three important points for museum exhibitions or other activities: 1) move one’s body, 2) use five senses, and 3) act as someone (JSPS KAKENHI Grant Number 20605018). According to these three points, we attempted an interactive science cafe about marine cores at Kanagawa Prefectural Museum of Natural History.

Firstly, we hold a scientific lecture about marine research vessel and geological studies using marine cores. After the lecture, we provided a program to act onboard scientific researchers. Light meals and snacks were stratified in long half-cut pipes in the image of marine sediments, and participants were expected to observe and pick up their samples from ”edible marine cores” as onboard scientific researchers. This program could give deep impressions and understandings to our participants through moving their body, using their five senses, and communicating with curators and also among participants. We will develop this outreach program also for museum exhibitions, in classroom, etc.

This work was supported by JSPS KAKENHI grant number 24501279 and 24244078.

Keywords: Marine Core, Act Program, Earth Science Education, Outreach, Science Cafe

Japan Geoscience Union Meeting 2013
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A new attempt of field lesson in geological Sites - Introduction of activity of ”Geo Education” in 2012 -

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We started up a new project ”Geo Education” in 2012. This project purpose is awareness enhancement for geo-scientific education in elementary and secondary level through field excursions. In other words, it is the knowing the earth by touching and seeing the real. The members consist of scientist, engineer, teacher and university students specialize in earth science. It is probably new activity which preparess the operation methods and the instructor cooperation with the school.

In 2012, we held the field excursions with two junior high schools in Tokyo. In spite of free-choice for the participation, the number of attended studend reached around 100. From the results of questionnaire in one of the fields, it is clear that such excursion has effect for boiling the interest in student.

In this presentation, we will introduce our project ”Geo Education” and report the results and problems.

Keywords: elementary and secondary education, living lesson, field execursion, geoscience, awareness

Japan Geoscience Union Meeting 2013
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G04-P08 Room:Convention Hall Time:May 20 18:15-19:30

Science Cafe focused in Earth and Planetary Sciences - Report and agendas -

Takashi Chiba[1*], Kentaro Yamada[2], Kenji Sato[3], Asuka Yuki[4], Seiitchi Fujiu[5], Yui Oshima[6]

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Science has various interesting fields, especially Earth and planetary sciences which cover Geology, Seismology, Climatology, Astrobiology and so on. Therefore, Earth and planetary sciences are one of the most important and famous academic discipline, however, it is difficult to say that the attractions, essences and familiar examples of Earth and planetary sciences have become widespread in the public eye. One of the reasons for this is that the scientists study the phenomenon on an unfamiliar timescale of tens of thousands of years in Earth and planetary sciences. In addition, there are only a few opportunities for general public to meet and talk with the scientists directly. In order to settle this problem, academic communities need to understand the science mindset is not public mindset and we need better science communication to the general public.

We have proposed that science communication is the one of the best way to become interested in and understand about Earth and planetary sciences for general, and also the way to promote communications between academic communities and the general public. On the other hand, much science communication is performed nowadays. But in the current situation, almost all of the activities aim to enlighten people who are usually not interested in science about the interest of science. The aim is very important, but not enough because the interest for sciences or scientific knowledge is different from understanding science and being able to contribute to society. Hence, it is hoped that the current status will improve.

We established the concept of science communication in Earth and planetary science presented in JpGU 2011 (Chiba et al., 2011) and reported the results of ”Chikyu wakusei kagaku bar (and cafe)” in JpGU 2012 (Chiba et al., 2012). ”Chikyu wakusei kagaku bar (and cafe)” is the science cafe focused on earth and planetary sciences held by our science communication group, ”Universal Earth”. In this presentation, we report the characteristics and problems with the comparison of the last three science cafes whose themes were as follows; the risk of sector collapse, deep geological depository, and global paleo-environmental change indicated with Antarctic geology. Also, we suggest how an outreach activity for Earth and planetary sciences can be promoted from the viewpoint of the science cafe by Universal earth.

Keywords: Earth and Planetary Science, Science Cafe, Science communication, Discussion

Japan Geoscience Union Meeting 2013
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What is needed to evaluate the outreach of geoscience?

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NUMAP(Nagoya University Museum Activation Project) is a group of students and young researchers of Nagoya University, whose mission is to carry out activities related to science communication. We have conducted survey researches about participants of each event to evaluate the effect of our activities in an objective way. In May 2012, we did a survey on a star party for the annular eclipse. In this presentation, results of its survey will be presented and evaluation methods of science communication events will be discussed.

Keywords: outreach, science communication, survey research, evaluation, annular eclipse

Japan Geoscience Union Meeting 2013
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A pen-and-paper game to study uses of geothermal energy

Keiko Mizugaki[1*], Mayumi Yoshioka[1], Norio Yanagisawa[1], Youhei Uchida[1], YASUKAWA, Kasumi[1], Keiichi Sakaguchi[1], SAWAKI, Takayuki[1], FURUSAWA, Midori[1]

[1]Institute for Geo-Resources and Environment, AIST

A simple pen-and-paper game was developed to study various uses of geothermal energy. It was planned to be good for schoolchildren.

In this game, players act as the president of a geothermal development company. The game procedure is as follows:

1. First, the player draws a folded card from a box. A temperature value between 15 and 300 degree centigrade is printed on the card and this means his/her company drilled out geothermal fluids of this temperature.

2. Then the player receives the game sheet on which various geothermal uses, such as power generation, green house, house-heating etc., are printed. He/she should choose and mark suitable use(s) for the hot water of his/her company under guidance of the staffs. The player can choose multiple uses including cascade use, and can add the player's own ideas of utilization of the hot water.

3. The game is finished by stamping a mark "Excellent / Good / Nice effort" on the game sheet. The player can bring the game sheet home, and look at it again. A simplified illustration of geothermal system is also printed on the game sheet to help understanding of geothermal utilization.

Keywords: outreach, pen-and-peper game, geothermal energy

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Activities of the IUGS-IFG and GIN - The Applications of Geology to Help Investigate and Solve Crimes -

Ritsuko Sugita[1*], DONNELLY, Laurance[2]

[1]NRIPS, [2]IUGS-IFG Chair

'Forensic Geology' (also known as 'Geoforensics' or 'Forensic Geoscience') is the application of geology to criminal investigations. Forensic geologists may assist the police in some types of crimes to help determine what happened, where and when it occurred, or to help search for homicide graves or other objects buried in the ground. In a law enforcement context, geoforensic specialists may support the police in two broad fields of geoforensics, (a) Geological (trace) evidence, and (b) search.

Geological (trace) evidence. This involves the collection, analysis, interpretation, presentation and explanation of geological evidence. Geological trace evidence can vary considerably and may include for example; rock fragments, soils and sediments, which occur naturally in the ground, artificial (anthropogenic) man-made materials derived from geological raw materials (such as bricks, concrete, glass or plaster board), or micro-fossils. These may be transferred onto the body, person or the clothing of a victim or offender. The huge variability of rocks and soils, particularly in the United Kingdom, is helpful in potentially placing an offender or item at a particular location.

Search. Some geological techniques may be used to help the police search for locating (and sometimes the recovery of) objects buried in the ground, including for example, homicide graves, mass graves related to genocide, weapons, firearms, improvised devises, explosives, drugs, stolen items, money, coinage and jewellery.

In February 2011, the International Union of Geological Sciences Initiative on Forensic Geology (IUGS-IFG) was established, aiming *'to develop forensic geology internationally and promote its applications'*. IUGS-IFG and the Geoforensic International Network (GIN) are organizing and helping activities internationally on academic meetings as well as outreach and training programs on forensic geology.

The principal objectives of the IUGS-IFG are to:

1. Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
2. Promote international meetings, seminars, conferences and training;
3. Develop a 'Committee' to act as principal advisers, collaborators and active participants;
4. Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
5. Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
6. Produce a document endorsed by the Committee to be called; *'A Guide to Forensic Geology'*.

Details of IUGS-IFG are available from web site: **http://www.forensicgeologyinternational.com**

Keywords: forensic geology, geoforensics, forensic geoscience, IUGS-IFG, search, geological trace evidence

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An implementation report of ”the 2012 Geology Day event in BETSUKAI of eastern Hokkaido”

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In this poster presentation, we want to report of planning and implementation about our event entitled ”The Geology Day event in BETSUKAI 2012”. We planned a geo-tour for Betsukai residents as ”Geology Day” event in 2012 because we wanted residents to re-confirm the familiar landscape around the town as geo-sites. In this case, Betsukai museum was implemented as our host of this outreach event.

Before geo-tour on November 3, 2012, we gave three general lectures, ”A history of Konsen Plateau” presented by Arita, ”Gifts of earth around Betsukai- Especially hot spring-” presented by Nakagawa and ”Diastrophism understood by reading from coastal topography around Lake Furen-ko” presented by Nanayama.

After these lectures, the bus went to Gakkarahama beach in Nemuro.We participated in making pealing work of tsunami deposits with the observation tsunami deposit in the Gakkarahama beach. Then we made large peel sample of the tsunami sediment for the educational institution presentation in Betsukai museum.

Keywords: Geology day, Geo-tour, Furen Lake, Hokkaido Remarkable Geosites 100, Tsunami deposits, peel sample

Japan Geoscience Union Meeting 2013
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Investigation of damage trace of the 2005 Fukuoka Earthquake

Nobuyuki Yamada[1*], Yuko Himeno[1]

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After the disaster of 2011, the existence such as the monuments which ticked away the teaching of the ancestor who conveyed a disaster was performed a close-up of in each place. The history of the past valuable teaching and disasters such as monuments might be forgotten with time. Therefore, it is an opportunity to raise disaster prevention awareness to convey history of disaster and a disaster sign.

We investigated the damage trace of the earthquake of the Fukuoka northwest offing in 2005. We surveyed in 23 sites, we was able to confirm the damage trace of the earthquake concerned in 8 sites. And we made the map which could take a walk through these damage traces.

Keywords: 2005 Fukuoka Earthquake, Trace of earthquake disaster, Walking map