Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

G02-01 Room:423 Time:April 29 14:15-14:30

Field Lectures at the Classroom sessions of The Open University of Japan

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[1]Tokyo City University

Classroom Sessions (Schooling) of The Open University of Japan, is a good opportunity to outreach Earth Science in the context of Lifelong Learning Program. 4 field program planed and held at 3 Study Center, each program limited about 20 students to join, but there were 80 applicant in average. The student had a wide range in age and background, half of them were over 60, which belong hiking and climbing mountain lover generation, and often had knowledge about biology and other field of science. These multi dicipline field works set by biologist and geologist, is a suitable way to recognize how Earth Science is important for our life.

Keywords: Fieldworks, Open University of Japan, Lifelong Learning, Natural History

Japan Geoscience Union Meeting 2014
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G02-02 Room:423 Time:April 29 14:30-14:45

Geological structure of the Kanto sedimentary basin ?An analog model-

TAKAHASHI, Masaki[1*]

[1]Geological Survey of Japan, AIST

The geologic history of the Kanto Plain, central Japan, is briefly introduced for the purpose of educational promotion of the geology and earthquake disaster prevention. Thick sediments were accumulated between Northeast and Southwest Japan during the Japan Sea opening (20-15 m.y. ago). The grabens and half-grabens were developed under extensional stress field during this stage. The topographic up-and-down structure in basement rocks was then covered by marine sediments widely from 15 m.y. until ca. 10 m.y. ago in the Kanto district. The tectonic deformation had been slight between 15 and 3 m.y. ago. However E-W contractive deformation has suddenly begun at 3 m.y. ago, and reverse-faulting and folding were started in the Japanese islands. The thick sediments below the Kanto Plain were then deformed and active faults, such as the Tachikawa Fault, were finally cut the surface. The scenario of this history is useful for interpretation of subsurface structure deduced from geophysical exploration.

Keywords: outreach, earth science, geology, educational promotion

Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

G02-03 Room:423 Time:April 29 14:45-15:00

Gelatin experiments on magma ascent and eruption for outreach program

TAKADA, Akira[1*]

[1]AIST, Geological Survey of Japan

Analog experiments are useful for outreach program. We cannot see the inside of a volcano directly, though an eruption is caused by underground magma. I develop the see-through experiments to understand a process from magma system to eruption. Liquid-filled cracks are injected in gelatin under the stress field. We can examine the factors controlling magma ascent to eruption, such as density, viscosity, the physical properties of the earth, the stress field etc. I introduce several examples of the experiments: magma ascent to eruption, crack behaviors under the stress field, magma movement with bubbles, the crack interactions, two phase flows, crustal behavior in the liquid filled crack. These experiments were carried out at elementary schools, junior high schools, science museums, the open house in AIST, training course for school teachers in YIES, and lectures of university, the international training course of JICA, APEC, COV.

Keywords: outreach, volcanology, magma, eruption, analog experiment, dike

Japan Geoscience Union Meeting 2014
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G02-04 Room:423 Time:April 29 15:00-15:15

GANSEKI as an educational material: Application of JAMSTEC deep seafloor rock sample database

TOMIYAMA, Takayuki[1*] ; SOMA, Shinsuke[2] ; HORIKAWA, Hiroki[1] ; FUKUDA, Kazuyo[1] ; ICHIYAMA, Yuji[1]

[1]Japan Agency for Marine-Earth Science and Technology, [2]Marine Works Japan, Ltd.

On the basis of Data-Sample Handling Policies of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC)[1], data and samples obtained during research cruises of JAMSTEC vessels are treated as common properties of the human community; data and samples are stored and publicized to the public for second-hand uses with research/educational purposes. After two-years of moratorium period during which on-board researchers and colleagues have a priority to use data and samples, information on data and samples are disclosed through JAMSTEC data sites, and are utilized for foreign/domestic activities of research, education, press report and public relation.

JAMSTEC vessels collect several hundreds of rocks from the deep seafloor each year. These rock samples and associated data are also subject to be publicized. Sampling information and associated data of rock samples are accessible from the website "Deep Seafloor Rock Sample Database (GANSEKI)[2]". Currently, GANSEKI exhibits information of more than 19,800 entries of JAMSTEC rock samples including inventory information of ~9,000 actually available samples, and geochemical data and literature information of JAMSTEC/non-JAMSTEC rock samples.

After the major update in 2013, minor system tuning and data maintenances have been applied to GANSEKI. Now GANSEKI is attracting general educators and students, as well as limited number of research specialists. New GANSEKI search system allows complex filters for screening samples to support various users with different purposes. Improvements on sample/thin-section photo view allow users to effective data handling using visual information.

JAMSTEC maintains several data sites other than GANSEKI. Some of these data sites are linked together so that users can utilize data more effectively. Users can come-and-go between GANSEKI and "Data Research System for Whole Cruise Information of JAMSTEC (DARWIN)[3]" to pick up rock sample information in GANSEKI and associated information in DARWIN, such as cruise/dive information, geophysical observation data, cruise reports and literature information. Rock sample information in GANSEKI is also linked to dive movies/photos in "JAMSTEC E-library of Deep-sea Images (J-EDI)[4]", and users can comfortably look into sampling scenes of interested rock samples and surrounding geology.

GANSEKI users can now access to massive online data, which are almost comparable to those provided to onboard researchers. Disadvantages for second-hand users are getting smaller and these users can perform more practical research/educational activities. GANSEKI can be utilized not only for mineralogical/petrological purposes, but also for other various purposes, such as surveys of contemporary activities in ocean geology, case studies for observation data handling or online database system, and so on.

References: [1] "JAMSTEC Basic Policies on the Handling of Data and Samples" http://www.jamstec.go.jp/e/database/data_policy.html. [2] "Geochemistry and Archives of Ocean Floor Rocks on Networks for Solid Earth Knowledge Information (GANSEKI)" http://www.godac.jamstec.go.jp/ganseki/e. [3] "Data Research System for Whole Cruise Information in JAMSTEC (DARWIN)" http://www.godac.jamstec.go.jp/darwin/e. [4] "JAMSTEC E-library of Deep-sea Images (J-EDI)" http://www.godac.jamstec.go.jp/jedi/e.

Keywords: rock sample, curation, on-line database, outreach, marine geology

Japan Geoscience Union Meeting 2014
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G02-05 Room:423 Time:April 29 15:15-15:30

Quaternary Scientific Programs for School and Lifelong Education of Kikai Island located in the Amami Islands, Japan

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[1]Faculty of Education, University of the Ryukyus

The Amami and Okinawa Islands show active tectonics indicated by uplifted marine terraces consisting mainly of raised coral reefs. Especially, Kikai Island shows a rapid rate in uplift (reaches 1.8 m/ka) due to subduction along the Ryukyu Trench. This study arranges geoscientific contents and produces a geostory for school and lifelong educational programs of Kikai Island. The geostory focuses groundwater springs, limestone caves, uplifted terraces (uppermost surface is 214 m) and coral stones, and highlights geomorphic processes characterized by the most rapid uplift in Japan and a hydrologic cycle in the Quaternary limestone region. This geostory was repeated and practiced in half-day geotour targeting undergraduate students and residents of Kikai including high school students. Their comments suggest the significance and the interest on field observation of local landscape related with a global geoenvironmental system.

Keywords: Quaternary, limestone, geostory, geotour, Kikai Island, Amami Islands

Japan Geoscience Union Meeting 2014
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G02-06 Room:423 Time:April 29 15:30-15:45

Educational Approach for Risk Reduction in Himalayan Seismic Zone I -Bridging the Gap Between Knowledge and Practice-

KIMURA, Motoko[1*] ; ADACHI, Tomoyuki[2] ; HANAOKA, Naoya[2] ; TAKAMINE, Ryo[2] ; KATO, Airi[2] ; BETSUYAKU, Shoichi[2] ; ITO, Takamori[3] ; KOKETSU, Kazuki[1] ; OKI, Satoko[2]

[1]Earthquake Research Institute, University of Tokyo, [2]Faculty of Environment and Information Studies, Keio University, [3]Graduate School of Media and Governance, Keio University

How can we encourage people to take preventive measures against damage risks and empower them to take the right actions in emergencies to save their lives?

The conventional approach taken by scientists had been disseminating intelligible information on up-to-date seismological knowledge. However, it has been proven that knowledge alone does not have enough impact to modify people's behaviors in emergencies (Oki and Nakayachi, 2012). On the other hand, the conventional approach taken by practitioners had been to conduct emergency drills at schools or workplaces. The loss of many lives from the Great East Japan Earthquake and Tsunami has proven that these emergency drills were not enough to save people's lives, unless they were empowered to assess the given situation on their own and react flexibly.

Our challenge is to bridge the gap between knowledge and practice. With reference to best practices observed in Tohoku, one of which is known as "*The Miracles of Kamaishi*," our endeavor is to design an effective Disaster Preparedness Education Program that is applicable to other regions in the world, even with different geological, socio-economical and cultural backgrounds.

The two key concepts for this new approach are "community-based understanding of disaster risks" and "personal empowerment to take preventive actions." This approach requires collaboration and participation from people from diverse fields of expertise, cultures, and generations, touching on interdisciplinary areas of study including seismology, geology, community development, education and psychology.

In this presentation, we will introduce how we designed the programs and activities for disaster preparedness workshop held at a high school in the Lesser Himalayan Region in North India,under an Indo-Japan collaborative project[i], and share good practices and lessons learned from this experience.

[i]Project on Information Network for Natural Disaster Mitigation and Recovery (DISANET) http://disanet.interliteracy.info/about/?lang=e

Keywords: Disaster Preparedness Education, International Cooperation, Hazard Map Making, Workshop

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G02-07 Room:423 Time:April 29 15:45-16:00

Educational approach for risk reduction in Himalayan seismic zone II -Hazard map making workshop at a high school

KATO, Airi[1] ; BETSUYAKU, Shoichi[1] ; HANAOKA, Naoya[1] ; TAKAMINE, Ryo[1] ; ADACHI, Tomoyuki[1] ; KIMURA, Motoko[2] ; KOKETSU, Kazuki[2] ; ITO, Takamori[1] ; OKI, Satoko[1*]

[1]SFC, Keio University, [2]Earthquake Research Institute, Univ. of Tokyo

The 2011 Great East Japan Earthquake confronted us with the fact that the knowledge of science alone would not motivate someone take preventive action. This indicates that risk reduction cannot be completed only by hazard assessments but also by motivating people to take preventive action.

With the concept of ”community-based understanding of disaster risks” and ”personal empowerment to take preventive action”, we held a workshop at a high school in the Lesser Himalayan Region. The workshop consists of 2 sessions; 1) understanding the scientific backgrounds of earthquakes and disasters, and 2) hazard map making. Prior to the workshop, we carried out a questionnaire survey to high-school students about how they perceive the risk of the local hazard. After the first session, we provided about an hour of question time, and carefully analyzed what they said. Together with the answers of the questionnaire, it is strongly implied that they understood scientific backgrounds but do not have awareness of disaster and are not motivated to take preventive action.

Session-2 consists of several parts such as giving clear images of earthquake consequences, leading them to imagine each victim’s life that was broken up all of the sudden on March 11th 2011 as well as showing hot to find out and manage risks by making hazard map. The workshop was closed with their presentation that clearly shows the internal change of the participants. Many of them referred to the importance of lives such as ”Life is a precious gift to us from God. Don’t take it as a fun. And if you take it as a fun, then remember your family.”

In the presentation, we share the good practice that can be applied to other disaster-prone countries if we pay regard to the community-based understanding of disaster risks.

Keywords: disaster prevention, earthquake, hazard map

Japan Geoscience Union Meeting 2014
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G02-08 Room:423 Time:April 29 16:15-16:30

Educational Materials for the Community-based Understanding of Disaster Risks -Taking Advantage of four-frame Cartoon

SAITO, Aya[1*] ; OKI, Satoko[1]

[1]SFC, Keio University

One of the lessons from the 2011 Great East Japan Earthquake is that educational approach to prevent natural disasters can compensate the limitations of earthquake science and technologies. Hereinafter we call it as ”BOSAI education”. BOSAI can be translated as disaster prevention based on individual awareness of disaster risks and leading to personal empowerment to take preventive action. After the earthquake, more schools started to conduct BOSAI education, while the government had not provided schools with certain time, textbooks, and curriculum guidelines.

As well as learning how to react to protect lives at the moment, one of the goals of BOSAI education for mid-school students is to deal with a dilemma situation that may take place afterwards. We provided a BOSAI educational material to take up the situation of evacuation site to ask students how to distribute aid supply if the total number is less than that of evacuees. The educational material is made as a four-frame cartoon as follows: 1) 12 hours after the earthquake at an evacuation site... 2) Person1: ”There arrived 100 of aid supply!”, 3) Person2: ”What? We have 500 people here.” 4) Person1: ”Mmm... ”. Students have to give an appropriate line that follows ”Mmm...” Some of the answers were ”We should put a priority to elderly persons and small kids” or ”Why don’t we ask for cooperation to those who brought their own emergency supplies in their backpacks?”

Another point of great importance of this material is to let the local school teachers join and share. We asked for advice to improve the material, and collected comments and suggestions. Some said they will have another class with the improved material. They can arrange the contents to bring community-based understanding of disaster risks. In the presentation, we share the material and report good practices.

Keywords: disaster prevention, education, earthquake, tsunami, evacuation site, mid-school

Japan Geoscience Union Meeting 2014
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G02-P01 Room:Poster Time:April 29 18:15-19:30

Analog model of basement structure below the Kanto Plain

TAKAHASHI, Masaki[1*]

[1]Geological Survey of Japan, AIST

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 Kanto Plain. The horizontal scale of model is 1/200,000 but vertical scale is emphasized as 400%. 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 Tachikawa Active Fault is characterized by sharp drop of basement depth below the Kanto 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.

Keywords: outreach, earth science, geology, educational promotion

Japan Geoscience Union Meeting 2014
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G02-P02 Room:Poster Time:April 29 18:15-19:30

How does the understanding of volcano advance? ; An example from the experiment on forming stratovolcano

KASAMA, Tomohiro[1*]

[1]Kanagawa prefectural museum of natural history

Experiment on Polygenetic stratovolcano using waste food oils and colored sands (Kasama et al. , 2010) was demonstrated at grade schools to high schools in Kanagawa prefecture and Shizuoka prefecture. Two cross section pictures of stratovolcano were drawn by many students. One is a imagination sections before experiment and another is a sketches after experiment. These pictures were divided into several types by inner stratigraphy (Kasama, 2012a) and had a tendency corresponding to age (Kasama, 2012b). Furthermore, many educational practices have done from 2012 to 2014. Many data from 1409 people have obtained. According to the result, it becomes clear that the tendency corresponding to age, residential area and scientific interest of volcano, especially Mt. Fuji. The experiment type (ET) was drawn by lines changed from lower horizontal lines to upper tilted lines. ET was found in the experimental stratovolcanoes and was considered to be exact depiction. Textbook type (TT) was drawn by piling similar triangles. Horizontal type (HT) was drawn by horizontal lines like stratum (Kasama, 2012a).

Fig.1 shows a relation between horizontal type drawn before experiment (HTB) and experimental type drawn after experiment (ETA). They had negative correlation. ETA indicates observation capability. ETA increases with age. HTB indicates misunderstood prior knowledge. Misunderstanding was thought to be caused by the education of the stratum of the 6th grader. Because HTB was not so high at the 3th to 4th grader, but the 6th grader was highest of all. There was found no HTB in a science club which consisted high school and junior high school students, Kanagawa. But, teachers of elementary school of Kanagawa drew same HTB, and ETA did not beyond the high school students. It is an important problem that we must think about.

TTB and ETA had correlation. TTB indicate right back ground but it is not so exact. ETB and ETA also had correlation. ETB is thought to be the best expectation, but its proportion was low.

How to write outside slope lines of stratovolcano is divided into three types. Simple straight lines (SL) which like the side slopes of a scoria cone, convex curves (CV) which like the side slopes of a lava dome and concave curves (CC) which are suitable for the slopes of a stratovolcano. Ratios of three types were not so much depended on age, but heavily depended on arias in which students live. Many students living in Shizuoka prefecture wrote concave curves before experiment (CCB). A high school at Shimizu, Shizuoka indicated the highest CCB ratio. It was thought that students can see Mt. Fuji and its frank easily.

References

Tomohiro Kasama, Daiji HIRATA, Shuichi NIIDA, Hiroyuki YAMASITA and Saeko ISHIHAMA (2010) Development of Experiment on Polygeneteic Volcanoes Using Waste Food Oils. Earth Science Education, 63, 5.6, 163-179.

Tomohiro KASAMA (2012a) Cross sections of stratovolcanoes drawn by sixth grader. Japan Geoscience Union Meeting 2012, G02-P-9, Chiba.

Tomohiro KASAMA (2012b) Cross sections of experimental stratovolcanoes drawn by students of various age. The Geological Society of Japan Meeting 2012 Osaka, R19-O-8.

Keywords: experiment, stratovolcano, cross section, Mt. Fuji, children and students, teachers

G02-P02 Room:Poster Time:April 29 18:15-19:30

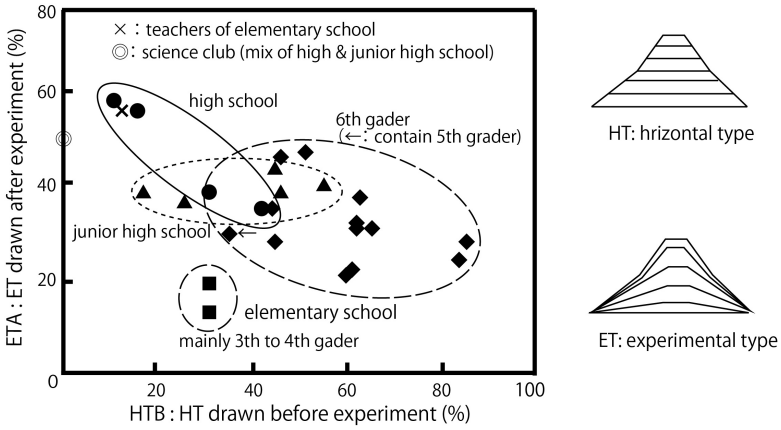

Fig.1 An analysis of pictures, showing a correlation between HTB and ETA.

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3D visualization and outreach of subsurface geological information using multi-layered miniature produced by 3D plotter

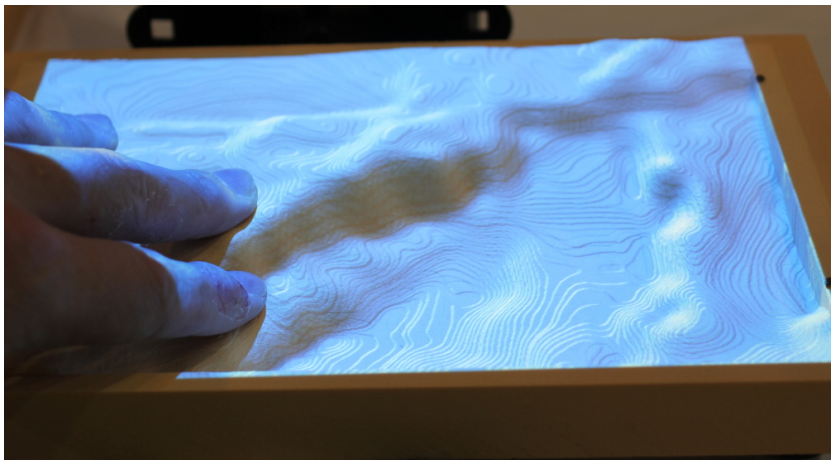
SHIBAHARA, Akihiko[1*]

[1]Geological Museum, National Institute of Advanced Industrial Science and Technology

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, several techniques were established to build up finely-detailed miniature with rapid prototyping and projection mapping. There are extremely small contours on the surface of the miniature. These contours are used for marker to calibrate projection. This miniature, called Highly realistic Projection system (HiRP system) is used for outreach and research activities in museums, schools, geoparks etc.

I, the present writer, will report about 3D visualization about subsurface geological information using multi-layered miniature. 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. I will also report about interactive miniature coupled with GIS, and global trends in rapid prototyping.

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



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G02-P04 Room:Poster Time:April 29 18:15-19:30

Benefit of intergenerational course training as a ”Science Seminar” in earth science

KUSANO, Yuki[1*] ; NISHIYAMA, Maki[2] ; NAKANO, Michika[2] ; DOI, Kohei[3] ; IGARASHI, Yuriko[4]

[1]Kanazawa University, [2]Niigata University, [3]Tohoku Gakuin University, [4]Niigata Seiryo University

A science outreach program ”Science Seminar” has been given to junior and senior high school students by graduate students in Niigata University since 2009. We will present an effective age to educate earth science exhibited by statistics of questionnaire and how the intergenerational course training is arranged in the science seminar.

Keywords: Delivery lesson, Graduate student, Earth science for junior high school students, Career education for young scientist

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G02-P05 Room:Poster Time:April 29 18:15-19:30

How should the outreach activity for the earth and planetary sciences be promoted?

CHIBA, Takashi[1*] ; YAMADA, Kentaro[2] ; SATO, Kenji[3] ; YUKI, Asuka[4] ; OSHIMA-YAMADA, Yui[5]

[1]Faculty of Life and Environmental Sciences, Univ. of Tsukuba, [2]Grad. Sch. Of Arts and Sciences, the Univ. of Tokyo, [3]KRI International Corp, [4]ex-Musashino Art Univ, [5]Grad. Sch. of Biosciences and Biotechnology, Tokyo Institute of Technology

The earth and planetary sciences cover various scientific and technological fields so that it is clear that the earth and planetary sciences are one of the most important fields of academic study for the society, and meanwhile the public is responsible for them. Many outreach activities have been held, and interactive ways have been especially remarkable in this decade. The communication which is mediated with scientific knowledge and perspectives is called as ”Science Communication”. Science Communication is not only the enlightenment of science by academic groups for the public but also the role for picking up the voice of the public. The context for Science Communication has been changed over time, therefore, it is more important how the Science Communication should be promoted as needed than why it should be. However, the schematic concepts for Science Communication less have been established.

We ”Universal Earth” have hypothetically proposed the concept of Science Communication and verified it through the science events. Science Cafe is one of useful ways to promote Science Communication with the available facilities and also it is one of the largest number of events are held in Japan. However, Science Cafe is just one way of Science Communication so that we had another symposium to discuss how Science Communication should be promoted and what we can do with other Science Communication tools.

In this presentation, we report the conclusions of the Science Cafe and the symposium about Science Communication held in 2013. We hope our presentation generate the discussions.

Keywords: Outreach, Science Communication, Science Cafe

Japan Geoscience Union Meeting 2014
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G02-P06 Room:Poster Time:April 29 18:15-19:30

Delivery lecture for elementary school students with hand auger boring

KOMORI, Jiro[1*] ; MORIBE, Tatsuhiko[2] ; TAKAHASHI, Akira[3] ; TOYODA, Jyunko[4]

[1]Teikyo Heisei University, [2]Myoeizan Honoji, [3]Japan Geotechnical Consultants Association, [4]Road and highway bureau, Yokohama city

In order to awareness building of earth and environment science for elementary school students, we conducted outdoor practices as a delivery lecture at a Buddhist temple on the Toshima upland (the Musashino I surface), Tokyo. The first lecture in the summer of 2012 was unsuccessful due to miss allocation of time and excessive schedule of study topic with indoor lecture. Even an auger boring using handy soil corer(hand auger LS-3 series, Sanyo testing machines Co. ltd.) took 3 hours, despite that the work was carried out by four adults. In the aftermath, the students could not advance sample treatment and description works, and finding ground water.

In the summer of 2013, the schedule focused on the boring, sample treatment and measurement. As a result, students experienced the following subject; boring work in 4 meters in depth, sample description, measurement of soil color and temperature, verification of ground water. The answers of the questionnaire after the lecture shows the students amazed a variety of characteristics of geology and environmental study and long history of the earth which were recorded at under their foot. We are planning further lecture and boring at the temple in next year.

Keywords: earth science education, summer homework, core description, the Kanto loam, soil temperature, ground water

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G02-P07 Room:Poster Time:April 29 18:15-19:30

Approach to the improvement of the field work

KITAYAMA, Tomoaki[1*] ; KOMORI, Jiro[3] ; IIDA, Kazuya[2] ; GEO EDUCATION, Member[4]

[1]JAMSTEC, [2]Tokyo Institute of Technology, [3]Teikyo Heisei Univ, [4]Geo Education

We started up a new project " Geo Education " in 2012. This project purpose is increase awareness 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 prepares the operation methods and the instructor cooperation with the school.

In 2012, we held the field excursions with two junior high schools in Tokyo. Through the two field excursion, we will clarify figuring out of field materials and future problems involved. In 2013, we did activities about the development of field materials to the improvement of the field excursions.

In this presentation, we will introduce our project " Geo Education " and report the results and problems on this year's activities.

Keywords: Geoscience education, field materials, field excursion, awareness activity, elementary and secondary level

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G02-P08 Room:Poster Time:April 29 18:15-19:30

Outreach activities of AIST for geothermal energy, 2013: simple paper materials

MIZUGAKI, Keiko[1*] ; YOSHIOKA, Mayumi[1] ; YANAGISAWA, Norio[1] ; SAWAKI, Takayuki[1] ; UCHIDA, Youhei[1] ; SAKAGUCHI, Keiichi[1] ; YASUKAWA, Kasumi[1]

[1]AIST

We developed a pen-and-paper game to study verious uses of geothermal enengy in 2012, and reported it in last JpGU meeding (Mizugaki et al., 2013). In 2013, we developed an additional material, a simple paper model illustrating cascade use of geothermal energy.

These materials are used in following outreach events:
AIST Tsukuba open house 2013
Geoscience Exhibition in Miyagi 2013

Keywords: outreach, geothermal energy, paper model, pen-and-paper game

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G02-P09 Room:Poster Time:April 29 18:15-19:30

An Evaluation of Sieving Effect of Volcanic Ash Fine Particles by A Statistical Particles Image Analysis

HAYAUCHI, Aiko[1*] ; SASAKURA, Daisuke[1]

[1]Malvern instruments A division of Spectris Co., Ltd.

1. Introduction

The analysis of particle size and shape characterization is an important evaluation of volcanic ash. It is well known that particles size and shape is one of dominant parameter of volcanic ash for flowability, flying property and abrasively. A sieving is used for particle size analysis of volcanic ash as common method. However, particle has possibility to have shape effect when it goes on through mesh of a sieve. In conventionally, a manual microscope approach has been used for few number of particles shape observation. It is not able to described particle shape as significant number. On the other hand, a fine particle characterization of volcanic ash (less than 50μm) has also importance to hazard protection issue which is a fine particle has possibility to long duration time in air. Our group has reported particle characterization and classification of a volcanic ash fine particle using by images for the purpose of determining particle size distribution which is based on described in ISO13322. The particles are appropriately dispersed and fixed on an optical microscope implemented a fully automated sample stage and an automated real time particle image analysis function on software. This report will be discussed for effect of sieving and precise classification against volcanic ash fine particle by a statistical particle image analysis.

2. Material and method

In this study, the volcanic ash was sampling from Ito flow in Kagoshima. This sample was already filtered coarse particles before, and sieved by a analytical sieve (TOKYO SCREEN CO.,LTD), these mesh size were 75μm, 50μm, 32μm. It was passed to 75μm, 50μm and only trapped on 32μm. As a statistical particle image analysis, Morphologi G3-SE (Malvern Instruments) was used for evaluation of particle size and shape. The observation mode was diascopic mode (Transmittance mode) and magnification was 100x in total magnification. The sample was dispersed with SDU (Sample Dispersion Unit) which attached Morphologi G3-SE. Number of measured particles was 120,000 and a parameter filter function on software was used based on shape and pixel number of particle image.

3. Result

A classification based on sieving were under 32μm sample (sample 1), over 32μm sample (sample 2) and no pretreated sample (sample 3). Those samples were analyzed on over 60,000 particles by statistical particle image analysis. As a result, Number Based Circle Equivalent Mean (NCED Mean) was 8.7μm (sample1), 13.9μm (sample 2) and 9.6μm (sample 3) on each. However, 510 particles of over 32μm particles were detected in sample 1. It was assuming from this result that shape effect happened. Therefore the result of focus on over 32μm particle to consideration of more precise classifications was shown in Table 1. This result showed sample 1 was the most elongate in the same size particles. Intensity Mean (IM) is reflected to sample thickness and transparency. High IM particles are tin particles or glass like particles in normally. Therefore, it can possible to classification glass liked particle or non glass like particle in volcanic ash based on IM parameter. According to results, sample 1 was most of including a glass like particle in amount of particles (Table 2, Fig 1).

4. Conclusions

In summarize of this study, it was clarified particle shape effect against sieving.This report will be more discuss about application and capability of numerical definition of volcanic ash by the statistical particle image analysis as new approach for this research area.

Keywords: Volcanic ash, Particle size, Particle shape, Particle image analysis, Sievng

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Table 1: Each Class Data

Class	sample	Number of particles	CE Diameter Mean (μm)	Aspect Ratio Mean
Class 1 (32~37um)	sample 1	357	34.8	0.62
	sample 2	3,540	34.6	0.65
	sample 3	991	34.4	0.64
Class 2 (37~42um)	sample 1	115	39.8	0.55
	sample 2	4,046	39.5	0.66
	sample 3	633	39.3	0.63
Class 3 (over 42um)	sample 1	38	45.2	0.52
	sample 2	4,910	47.0	0.62
	sample 3	578	46.6	0.59

Table 2: Intensity Mean by Class

class	sample	Mean Intensity	Intensity mean > 80	
			Number	%
class 1 (32~37um)	sample 1	59	138	39%
	sample 2	61	882	25%
	sample 3	54	306	31%
class 2 (37~42um)	sample 1	63	54	47%
	sample 2	57	1,558	39%
	sample 3	56	239	37%
class 3 (over 42um)	sample 1	70	24	63%
	sample 2	68	2,857	58%
	sample 3	68	352	61%


High intensity (glass like) particle

Low intensity (no glass like) particles

Figt: Picture with intensity mean

Japan Geoscience Union Meeting 2014
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Primary environmental radioactivity education

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The physics of radioactivity or the radiation has very close relation to developments of physics from the beginning of the 20th century. The human being does not have an organ taking in radioactivity directly, which is different from visible light, hearing, temperature, and the taste. The radioactivity is an extremely mysterious phenomenon historically in this way, and this is why the elucidation was pushed forward. In addition, the radiation is statistical phenomenon because radiation is a phenomenon caused by an atomic nucleus change and an electronic state change of the atom. However, this historically important and mysterious phenomenon is not almost taught in a beginning class or the secondary education. It is only handled for a last unit in physics II of the high school. A public, who did not learn physics about the radioactivity and who experienced the nuclear power plant accident that it follows East Japan great earthquake disaster of 2011, face the radioactivity. As a result, confusion occurred about intuitive and sensible understanding about the radioactivity. On the basis of the above-mentioned background, we make a teaching plan about the beginning class in the radioactivity education and report the result that we practiced in high school and university cooperation educations.

Keywords: Radioactivity education

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Investigation of disaster memorials of the 2005 Fukuoka Earthquake and the 1982 Nagasaki Flood

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After the huge tsunami 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 disaster memorials of the 2005 Fukuoka Earthquake and the 1982 Nagasaki Flood. We surveyed in 24 sites around Fukuoka and 23 sites around Nagasaki, we was able to confirm some disaster memorials. And we made the map which could take a walk through these damage traces.

Keywords: 2005 Fukuoka Earthquake, 1982 Nagasaki Flood, Disaster memorials

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The Earthquake-making Event of Meteorological Research Institute

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The Otenki-Fair at Tsukuba has been conducted in every August by Meteorological Research Institute, Aerological Observatory, and Meteorological Instrument Center. The Earthquake-making Event is one of the exhibitions in the Otenki-Fair. Participants jump on the floor 1 m away from a seismometer, then calculated magnitude will be displayed on the screen of a PC. The magnitudes usually range from -4 to -6. This event is popular with children.

The software for the Earthquake-making Event worked on a PC9801 computer by a program written in N88BASIC. Because a long time has passed since the cessation of production of PC9801, this event faced possible discontinuance due to hardware trouble. Therefore we transplanted the program into VisualBasic to continue the event with current Windows machines. At the poster meeting place, we will demonstrate the event.

Keywords: event, earthquake, magnitude

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”Listen to the sound of earthquake!” - Experiment of sonificated seismic wave in public relations events

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Meteorological Research Institute (MRI) located in Tsukuba city carries out an annual public relations event titled ”Otenki Fare Tsukuba” on a weekday during the summer school holiday. Every event has two to three thousands visitors mostly from Tsukuba city or neighbor cities. Typical visitors are a group of school child(ren) and their mother. This event is a good opportunity for MRI not only to appeal its research activities but also to diffuse basic knowledges widely on weather, earthquakes and so on.

Edutainment titled ”Listen to the sound of earthquake!” has developped (Hayashi and Takayama, 2009; *QJS*), by which we can hear a sound of any earthquake selected from a menu. The substance of the edutainment is just a presentation file created by Microsoft PowerPoint(R); and interactive operating environment with a menu is realized by using PowerPoint’s functions of slide-show and animation. Therefore, the file can easily be modified by other technicians than the author.

The contents, or various sounds of earthquakes, are WAVE-formatted sound data produced by 10 - 1000 times fast-forwarding using actually observed seismograms. The process, which assume that seismograms are time-series of compression wave transmitted in the air, sacrifices the physical accuracy, but the process without accompanying frequency modulation conserves the scaling law of the sound source; and then, we can feel a material of the source of ”sounds of earthquakes” by listening differences of pitches, intensities and tones. The edutainment intends to make listeners understood on the existence of the diversity of earthquake based on various type of earthquake. By the way, ”sounds of deep low frequency earthquake”, which were processed by the same method as above, were used in the TV program of NHK titled ”Megaquake III” in 2013 so that the difference of source mechanism between slow earthquakes and ordinary ones were explained.

”Listen to the sound of earthquake!” has been displayed for one of the attractions in ”Otenki Fare Tsukuba” every year since 2007. Its display and contents have been improved; the line out from each personal computer (PC) is now divided into three headphones, in order to match the requirements of number of visitors increasing year by year, and the typical guests consisting of a mother and two children; in addition, contents has replaced after the occurrence of major earthquakes.

However, there are still several problems remained. The first one is that 45-seconds experience is too short for most primary school children to feel the diversity of earthquake, which the edutainment want to teach them, from listening their sounds. They just simply enjoy and end. The second one is that the interface using mouse and selecting contents from the displayed menu is becoming user-unfriendly for children in the age of smart phones and tablet PC. The last one is essentialness of multi-language interface.

In the JpGU2014 meeting, PCs installed ”Listen to the sound of earthquake!” will be displayed, after experiment, discussions on possible improvements and application to other public relations event will be welcomed.

Keywords: diversity of earthquake, edutainment, elementary school children, PowerPoint, sonification of seismic wave

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Survey of educational study on disaster prevention

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The consciousness of importance and need of the disaster prevention education for the natural disaster is increasing more. In this study, we tried that we grasped the actual situation of the study on previous disaster prevention education through compiling of research paper title by the some keywords. We set that the keywords are the causing phenomenon of the disasters, e.g. earthquake, tsunami, volcano, typhoon, and directly expression word of disaster prevention education, safety education. Our result shows these selected words are not so many used in the title of previous research papers. Although this procedure has an inadequacy, we can understand a tendency and the actual situation about the methods and contents of the disaster mitigation education.

Keywords: Disaster mitigation education, Title of reserch paper