Report on the science café sponsored by the Kanto Branch, Geological Society of Japan

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Since "science café" was introduced in 2004, many science cafés have been held and settled as Japanese style science café in various areas in Japan (Watanabe et al. 2012). At first, the science café with theme of earth science was very few, however, in recent years has increased. There are some differences between the science café and lecture, such as the science café are designed to emphasizes bi-directional communication and enlightening subject matters, so as to activate communications among the guests (scientists), facilitator and audience (general public). Therefore, the science café has been used as the event to relate a rudimentary knowledge in the leading edge of science and opportunities of learning and interaction for scientists and general public.
We held a science café with theme of volcanic disaster in Kanto area, at Tokyo in October 2015, and that event was sponsored by the Kanto Branch, Geological Society of Japan and supported by National Museum of Nature and Science, Science Communicator Association. In this presentation, we will report about the event and results.

Keywords: Science café, Earth science, Outreach

Home lecture "Let's walk through the On'nenikuru forest" implementation report

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Geo Tour was conducted Notsuke peninsula of the Hokkaido east Nemuro Strait coast with the theme of the topography and the geology in autumn in 2015. I gathered in the entrance of the Notsuke Peninsula nature center by beautiful weather at 10:00 a.m. from morning on the tour day on October 18. I carried out the geo-tour in order of 1.Structure of the gravel beach forming Notsuke Peninsula,2.Temporal wash over deposits,3.Remains and the topography, geology,4.The outcrop which was exposed in the roadside,5.Optional tour.
This publication will report the implementationreport “Let’s walk through the On’nenikuru forest” hosted by Notsuke Peninsula Nature Center.

Keywords: Notsuke Penninsula, On'nenikuru forest, recurved sand spit, Betsukai-cho

Half-Century of the Natural Science Museum of The University of Tokyo at Komaba

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There was a virtual museum in the College of Arts and Sciences, The University of Tokyo at Komaba, named Natural Science Museum, which started 1953 and united to Komaba museum in 2003. The museum had been operated by university staffs of biology, geology, geometry and graphics. This report will be concentrated to geological activity of the museum.
Japan's economic growth after the World War II depend on the mining industry of metal and coal development until 1960's, which is linked to the necessity of hands-on specimen study in earth science education. Early professors had experiences of working at mining company, not only at Japan mainland, but also at Korea, Taiwan, and Southerneast Asia countries. These seems to be a reason why the "museum" needed for introductory earth science education.
The museum activity connected with student circle activity, including excursion at mining company(e.g. Chichibu Mine, for a week) with professor and assistant professor geologists of General education, and also connected with excursions directed and lead by University staffs of earth science, open 3-4 times every year at verious geological spot over the country.
There are few mining company working in Japan now, and hands-on education has a difficulty to realize its importance in natural science education, however, It seems there are some hint in the past activities of the natural science museum at Komaba, to realize the importance of traditional geology to study natural system of earth activity and also on environmental sciences.

Keywords: museum, university, natural science, komaba

Outreach activity of International Ocean Discovery Program (IODP)

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International Ocean Discovery Program (IODP) is an international marine research collaboration joined by 26 nations. Implement organizations of IODP conduct Education and Outreach activities for various stakeholders such as scientists, media, general public, younger generation, educator, etc. IODP education and outreach activities makes these targets to understand IODP and scientific results. Also, IODP scientific result should be updated for various target as common knowledge of our society. I would like to introduce our activity for each example and discuss about need for science and education fields.

Keywords: IODP, Chikyu

Outrearch of glacier disaster in Aisan high mountains

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Small glacier lakes are distributed throughout the mountain ranges in Ladakh region in northwestern India and Tien Shan of Central Aisa. These area have occasionally experienced glacier lake outburst floods (GLOFs), causing damages to the settlements along rivers. With an objective of reducing the scale of damage by GLOFs, our GLOF disaster mitigation group held a glacier lake workshop in Domkhar village (30 May 2012), Stock village (Sep 2014), Gya village (Jul 2015) in Ladakh, and Jery-Ui village (Aug 2015) in Tien Shan, for targeting local residents. In the workshop, which helped to understand the current status of knowledge about flood disasters shared among local residents.

Keywords: glacier disaster workshop, Ladakh Range, Tien Shan

Study tour program in Fukushima Hamadori area, based on “geo” and “energy” perspectives

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Since we went through a lot of things from the severe disaster by the earthquakes, tsunami and irreparable injury of the Fukushima Daiichi nuclear accident in the east Japan disaster in May and April 2011, these experiences and knowledge should be passed down to future generation. However, related news in mass media and chance to know about the disaster in the field have decreased.
We are planning a study tour program for the following reason, which focus on “geo (geoscience and geography)” and “energy” in Hamadori area (coast area of Fukushima, specially affected region by the nuclear accident).
(1) 2011 events are highly important phenomena which have many things to learn in earth science.
(2) Public awareness regarding the domestic coal field in Joban area and its impact are very little.
(3) Civilization cannot continue without electricity, but we are ignorance and indifferent to source of electric energy. There are various types of power generation method in Hamadori area.
(4) The sense of geological timescale is required to manage the radiation contamination and large quantities of radioactive wastes.
(5) Joining the subject between “geo” and “energy” is suitable and reasonable.
Our latest itinerary is as follows:
Industrial heritage in the Joban Coal Field - coal-fired power station - small hydroelectric generation by Energy Service Company (ESCO) –Shionohira fault (surface earthquake fault in the Fukushima Hamadori earthquake) - temporary housing in Iwaki City - coastal topography and tsunami disaster –reconstruction and restricted areas - related facility of offshore wind farm –a mega solar power plant.
In JpGU presentation, we will introduce the outline of the tour and the reaction of participants.

Keywords: 2011 East Japan Earthquake and Tsunami Disaster , nuclear disaster, citizen awareness, field excursion, geological resources, renewable energy

Holding of "Geo-Festival in Sapporo" and Utilization to graduation research of the student

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In Hokkaido, "Geo-Festival" has been held since 2005 in each place (Sapporo, Muroran, Toya, Kushiro, Asahikawa). This event raises the interest in earth science of children through an experiment and display and a mini-lecture that promote the scientific attitude toward natural phenomenon.We organized an executive committee and, with cooperation of the Sapporo Science Center, held "geo-festival in Sapporo" in 2014 and 2015.In Sapporo this event was held six years' separation.But there were more than 20 experiments booth and this event was finished in the prosperity.The exhibitor included teachers, staff of Sapporo Regional Headquarters JMA, staff of Geological Survey of Hokkaido, staff of the geological feature consultant and so on.In the announcement, I report the details of this event including the contents of an exhibited experiment and experience booth.
In addition, for this event, plural university students exhibit a booth, too.By this event, the student inspected their study about the teaching materials of the Earth Science.This event is effective as a place spreading earth sciences.And, this event has value as the place of the studies of the students.We want to discuss about these.

Keywords: participation event, experiment booth, graduation research

Effects and problems of outreach programs in university campus festivals: The case of "Mushroom exhibition" in the campus festival of Chiba Institute of Science

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Outreach programs in scientific studies include lecture, symposium, fieldwork, workshop, collaboration between high school and university, cooperative activities with local government, citizens, and NPO etc. These outreach programs play an important role in promotion of extension of research activities. Fulfillment of outreach programs is important because social contribution of scientific research is needed. Fungal phylogeny, taxonomy and biogeography are main research fields in Kasuya laboratory of Department of Environmental Risk and Crisis Management, Faculty of Risk and Crisis Management in Chiba Institute of Science. Our laboratory devotes various educational activities to spread of basic knowledge on fungi including importance of them to ecosystem and human society. Our laboratory has planned mycological foray for children and high school students, supports for amateur mycologists, and lectures for civilian. In 2014 and 2015, we conducted “Mushroom exhibition” in the campus festival of Chiba Institute of Science as one of these outreach activities. Exhibition of specimens of various wild and cultivated mushrooms and pictures of mushrooms in natural habitat has been conducted in “Mushroom exhibition”. Moreover, workshops of microscopic observation of fungi and making “*origami*” of mushrooms have also been conducted during the exhibition. Staffs and students of our laboratory have explained contents of the exhibition to visitors. In this presentation, effects and problems of outreach programs in university campus festivals are discussed with the case of these "Mushroom exhibition".

Keywords: outreach, mushroom, fungi, exhibition

Scientific Illustration for Earth Science -Importance to illustrate science in visual -

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Scientific Illustration (SI) is originated from the "natural history illustration". During the 19th century, many of the natural history illustration in herbalism and botany are drawn in Japan. These have a "scientific accuracy". Therefor the scientific illustrator has scientific expertise and scientific observation eye. These illustrators produce the SI with scientists. The SI is a different from the general art.
Today lots of the Japanese scientists play important roles in international research projects and conferences. SI can help the Japanese scientists' works in overseas. However, It has been humble in scientific community. Especially SI for the earth science is found rarely in publications in Japan and overseas. Here I present SI works in the earth science field for scientific community and for public.

Keywords: scientific illustration, earth science, cognitive and spread

Application of deep-sea videos/photos distribution site for educational fields

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The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) manages the numerous deep-sea research videos and photos obtained by JAMSTEC's manned and unmanned submersibles, e.g. "SHINKAI6500" and "HYPER-DOLPHIN". The web site "JAMSTEC E-library of Deep-sea Images (J-EDI)" has made these videos and photos available to the public via the Internet. J-EDI also provides users with detailed information including research location, contents (ex. living organism or phenomena), etc.
In this year, we developed a new integrated display function which enables users to see videos with associated data and information obtained from a deep-sea research activity and will renew the page design and the site structure. The function to display dive information visualizes a dive track in 3-dimentional virtual space with deep-sea environmental data. Users can see deep-sea videos recorded at corresponding positions on a dive track. In addition, users can know the state of various dive research activities by taking a tour tracing a submersible's track. Each new screen changes a layout for easy to access to videos and photos, and improves usability for using mobile devices because of seeing videos and photos at various scenes of use.
Logged-in users can download these videos and photos from J-EDI and can use them in free of charge for nonprofit scientific or educational purposes. In addition, it makes easy for users to access their selected videos and photos by adding to the "My Library" function. Users can register materials for using in lectures and educational activities to "My Library".
J-EDI operating staffs watch all of the videos and photos and split them into scenes. Furthermore, they classify living organisms and geological/environmental features and add comments to them based on related literature, cruise reports, etc. Therefore, users can search for videos and photos by keywords, easy-to-understand icons and dive information at J-EDI.
Because comments with videos and photos also include Japanese name of marine organisms, users without scientists are also easy to search for videos and photos. Users can also watch deep-sea videos distributed from J-EDI with biological information on the marine biodiversity database of JAMSTEC, "Biological information system for marine life (BISMaL)".
Video and photos are visually easy to understand various scientific events. These functions of video distributing will support the use of video and photos in lectures and educational activities.

Keywords: deep-sea environment, video, outreach

Geoscience education in Cambodia based on finely-detailed 3D miniature produced by rapid prototyping and projection mapping.

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In recent years, there are various environmental issues in Cambodia, such as deforestation, aerial pollution, land contamination and water pollution caused by rapid economic development. However, there are serious shortage of school teachers for environmental education in this Country.
To solve this problem, we developed an educational program for environment and geology around the Mekong River at Regional Teacher Training Center (RTTC) in Kampong Cham. In this program, we provided 3D terrain miniature and mobile projection mapping system. As a first step, students learned about the overview of terrain and geology across the country by projection mapping. Subsequently, we taught about local terrain and geology using 3D miniature on the fieldwork.
This educational project has been conducted under the subsidy of Japan International Cooperation Foundation, Imai Overseas Cooperation Fund and Japan Fund for Global Environment.

Keywords: Cambodia, RTTC, Geoscience education, 3D miniature, Rapid prototyping, Projection mapping

“Let’s Make Our Butterfly Diagram!”-Outreach Activity for the Elementary School Students at Kwasan Observatory

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We have provided an opportunity for the elementary school students in Kyoto City to visit our observatory and to learn the latest astronomy since 2013. Additionally, the students of Kyoto Municipal Horikawa Senior High School have contributed greatly on this outreach activity by creating the unique textbook and by guiding elementary school students at the observatory tour. In this presentation we mainly report an educational material entitled “Let’s Make Our Butterfly Diagram!” ,which is included in the observatory tour in 2015. It is one of the contents that the elementary school students draw “Our Butterfly Diagram” by their own hands.

When the students had the observatory tour, each student received a “My Sunspot Card” that has month-year information and latitude of a sunspot. According to this data, they mark a spot on the poster printed coordinate. We have got some feedbacks on these activities; “I want to learn about the universe more and more!!” “I learn that the study of the solar flare is very important, since it is danger to human life.” These comments indicate that they feel closer and familiar to the Sun and the universe at their regional observatory. Since “Our Butterfly Diagram” consists of our own data obtained by sunspot sketch over a decade at Kwasan Observatory, it impresses observers the importance of continuous observation and motivates them to keep observation.

We are considering making use of this educational tool for children and adults to present the significance of the continuous observation and to stimulate their sense of wonder for the Sun and the universe.

Finally, we express great gratitude for supporting by the Board of Education, City of Kyoto.

Keywords: Sun, Sunspot, Butterfly Diagram, Education, Outreach

Literacy of Earthquake Prediction Information for the General Public

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At the present time, many scientists recognize that it is impossible to predict an earthquake exactly with occurrence time, area and its magnitude. However, some private agencies and companies release the earthquake prediction information. Some of them seem to be scientific results, because they used reliable observation data, such as the positioning data provided by the Geospatial Information Authority of Japan (GSI). One predicts M6 class earthquake, one should put out a lot of alerts, and the prediction will be successful. Since the media tend to report only success cases, many ordinary people simply believe released prediction without any doubt. This is a typical case that citizens are misled. In this study, we discuss earthquake prediction information literacy and media literacy that you are able to make fair judgement in the information.

Keywords: Literacy, Earthquake Prediction Information, the General Public

Operation and maintenance of surface rapture -comparison between Tanna fault and Nojima fault-

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When people hear the word “earthquake” or “active fault”, they may imagine something negative such as huge damage to human lives or the accident of nuclear power plant, especially after the 2011 Tohoku earthquake. On the other hand, the uplift with a large earthquake generates a land or the crustal deformation from an earthquake forms this beautiful scenery of Japan. A surface rapture simply represents the dynamics of the earth and so provides us with an opportunity to think how to deal with natural hazards.
In Japan, there exist some parks or museums that maintain surface ruptures. Researchers make efforts to preserve a surface rupture right after an earthquake, but there needed many stakeholders to maintain and operate such parks or museums. In the presentation, we would like to report how to operate and maintain surface ruptures and related facilities by focusing on Tanna Fault Park and Nojima Fault Preservation Museum.

Keywords: surface rupture, fault preservation, active fault

Effects of seismic hazard map over low risk area residents

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A purpose of this study is to measure the critical levels of fearfulness for the long-term earthquake forecast that included the return period and probability and examined the effectiveness of several ways of communication. Participants were 2000 householders or their spouses in Tokyo metropolitan area who were from 35-55.
Results indicated that 1)values of the critical levels were different by the methods of measurement, and 2)presenting a probability by a color in the color scale rather than a number itself was more effective in the high-vulnerable group. The way to improve the current presentation of the map was discussed.
In preparation for the earthquake centered directly under the capital and the earthquake in the Nankai Trough, it is expected that disaster prevention measures are applied as soon as possible. But it is hard to say the measures to the catastrophe are sufficient. We thought that one of the causes that disaster prevention measures do not proceed is that risk communication of the earthquake is not functioning. Therefore, we conducted a survey to know how the people perceive the probability of the seismic hazard map.
About Shindo scale, the 80 % of people take disaster prevention measures at Shindo 5 upper. The risk perception of people who live in the area where the seismic risk is high improved by seeing the seismic hazard map. But this trend could not be seen at people who live in the area where the seismic risk is middle. On the other hand, if the risk perception is increased, they do not try to take disaster prevention measures. This result says that it is difficult to promote to take disaster prevention measures only by information of seismic hazard made by experts.
In the presentation, we explain the improvement plan of seismic hazard map and the results of an additional survey that was carried out in a low area (0 to 0.1%) of the probability of seismic hazard map.

Keywords: seismic hazard map, risk, risk perception, earthquake, disaster prevention, disaster

Long-term disaster prevention activities in the condominium apartment

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In the Great East Japan Earthquake, many apartment residents were obliged to live uncomfortably with damage of infrastructure, although their apartments were not severely damaged. Existing studies have already pointed out the significance of the awareness of each resident or of voluntary organization for disaster prevention. It is, however, not clear that how should we enhance their awareness of disaster risk and encourage their action.

In this project, we chose a condominium apartment in Fujisawa city and empowered the residents by distributing newsletters about disaster prevention and by holding a lecture workshop for the residents. We conducted totally three social surveys to the residents to measure changes.

According to the surveys, many of the residents do not take action even though they were aware of the disaster risk. They know what and how to take action and increased the behavioral intention after the lecture workshop but still did not take action. As conventional studies indicate, economic cost prevents people from taking action such as securing furniture or building stockpiles, but, this time observed a low rate of preparedness regarding family agreement or confirmation of how to communicate right after the disaster happens.

In this presentation, we would like to report the effective measure to empower apartment residents for disaster mitigation.

Keywords: earthquake, disaster prevention, disaster, community

Extension of school education for disaster prevention over households –a case study of Mashima Elementary School-

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After Great East Japan earthquake, the significance of education for disaster prevention is confirmed further and improvement of current education is highly required at every school. On the other hand, countermeasures against disaster at each household depend on the awareness of parents and so the level of preparedness resulted in large variation compared to that of schools. This represents a severe problem for protecting children's lives because they spend more time at home than at a school. Therefore, education for disaster prevention at school should be designed to have effects over school kids' parents.
We took an elementary school as a study field and started research activities in late July 2015 at Mashima Elementary School in Nagano City. The direct approach of our activity is limited to school kids but as is described above, we focused primarily on influencing their parents to take action at home to protect their children. One of the main activities we carried out was the lecture delivery to school kids in September. We also distributed newsletter every month so that we can encourage school kids, teachers and parents constantly.
Changes have been observed in school kids and teachers firstly, and then to parents and even to the community around the school. In the presentation, we would like to report our activities and the observed changes in consciousness and relationships between the stakeholders by applying the theory of "communities of practice" (Lave and Wenger, 1991, Sun et al., 2012). We may also clarify the turning point of their behavior modification through analyzing questionnaire and interview surveys.

Keywords: disaster prevention, education, earthquake, the theory of "communities of practice" , household

Simulation of Evacuation Site Management Using “Four-frame cartoon”

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Almost five years have passed since the Great East Japan Earthquake occurred, but most of the schools remain the ineffective earthquake drills without improving or reorganizing their disaster prevention classes. For schoolchildren to protect their lives, We need to tell them not only the earthquake mechanism but also empower them how to act when an earthquake occurs, how they should be prepared against Earthquakes, or what will happen at the evacuation site.

At the time of disaster, people have to make the best decision as quick as possible with insufficient information, and most of the time there is no formulaic answer. We therefore developed an educational material of “four-frame cartoon” suitable for pre-training the dilemma problems.

In the presentation, we will show five patterns of “four-frame cartoon” based on the manuals of evacuation site management provided by each local government. Most of Japanese local government set up teams for dealing with problems or making evacuation site rules for everyone to spend there more comfortably. We therefore took up main five teams from the manuals and made each team’s “four-frame cartoon”. These “four-frame cartoons” are designed to let the people to imagine the life at an evacuation site and simulate the severe situation that each team would experience at the time of disaster.

We will also introduce “case-cards”. “Case-cards” are made up of 8 cards and each card tells players the real-life experience at the evacuation site. By using these cards, players can assess their decision-makings and imagine the situation at the evacuation more deeply.

Keywords: Simulation of Evacuation Site Management, Disaster Prevention Education

Geostory as an effective tool for geoscientific outreach

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Geostory is an effective tool for outreach of geoscience. Geoscientific interpretation based on geostory enhances educational effects in school education, lifelong education and geoparks. Geostory depends on both scientific evidences and attractive contents, which will be promoted by geoscience collaborated with TV production. “Buratamori” produced by NHK is a famous TV program that involves geoscientific contents. “Buratamori” in Okinawa-Shuri (televised on 27 February, 2016) targets a site of the World Cultural Heritage “Gusuku Sites and Related Properties of the Kingdom of Ryukyu” involving geoscientific contents: topics on historical geology, geomorphology and hydrology. Geostory in this TV program is characterized as a seamless story integrated by multidisciplinary and interdisciplinary geoscience based on scientific evidences. Such scope probably contributes to designing geostory and improving outreach.

Keywords: Geoscience, Outreach, World Heritage

A report on practices in the geography classroom and a publication aimed at outreach for geography

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We seek to develop an effective method of outreach for geography. To do this, we are currently developing travel guidebooks and bus tour guidebooks from the perspective of regional geography. Further, in a university course, we introduced a technique for creating a town map showing regional geography.

After the course, we sought to publish a book based on the students' work. We obtained financial support for the book's publication but later decided instead to avail of the opportunity to publish a number of geographical magazines. At the conference, we will report on the process of trial and error that was involved in this project.

The editing committee, magazine title, and fundamental contents such as the front page design and format of each page are created by the students. At the conference, we will report on the negotiations with the publisher and students concerning this process.

The students' engagement will distinguish our magazine from other academic publications, which sometimes seem inaccessible to general readers.

Hence, at the conference, we would like to address the readers' requirements.

Keywords: outreach, geography, publication

Present status of publications of education and public outreach in astronomy

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I review present status of publications of formal and informal education, public outreach and science communication in astronomy. Papers are published in various journals including Education of Earth Science by Japan Society of Earth Science Education, Astronomy Education by Japan Society for Education and Popularization of Astronomy, and Journal of Japanese Association for Science Communication. More mutual citation and more publicity are needed. Agata and his colleagues have launched a working group for that purpose. A working group in International Astronomical Union also has been discussing about the repository of astronomy education research papers. A new web site of peer-reviewed astronomy education material, astroEDU, has opened. Through the peer review within astronomy education and public outreach educators and researchers, the quality of the publications is expected to be improved.

Keywords: astronomoy education, publication, repository

Launching a new journal "Geoparks and Regional Resources"

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Geoparks and Regional Resources is a multidisciplinary journal that brings together scientists, administrators, businessmen, teachers, politicians and naturalists from different regions of the country. The journal cuts across regional differences to promote a common platform for identification of issues and developing solutions for each issue. It is an open access journal with a cross disciplinary approach for nature conservation and sustainable use of natural resources. The editorial board comprises of geopark professionals and researchers from different backgrounds. This journal will be a venue for staging debates and analyses on Japanese geoparks.

Keywords: open access, science communication, public access

Maintaining a repository-based e-Journal as a tool for becoming a COC

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While open access movement reduces entry barrier to scholarly publishing and knowledge, it also encompasses a tributary relation between the oligopoly publishing companies in English-speaking (mostly) developed countries and the others including Japan. For a better future development of Japanese scholarly, we shall consider a mega-journal at a national or transdisciplinal scale through the collaboration between DTP industry, educational institutions and public sector, for help expanding the employment opportunities and developing the career formation of younger post-doctoral researchers as engineering and peer-review related work officials.
Steven Harnad's *subversive proposal* was originally connected to help sharing our scientific output quickly and securing the antecedent rights, by removing barriers, unnecessary controls and regulations related to our printing, binding and shipping time and effort. We therefore should take full advantage of web-based infrastructures to *subversive* today's tribuary situation, for a better open-access community.
In this report, I briefly introduce the historical overview, its manners of operation, and the prospects and problems related with the administration of a repository based e-journal “JIRCL: Journal for Interdisciplinary Research on Community Life”. Although there are some challenges that needs to be solved, this repository-based e-journal achieved totally free of charge and therefore neither of APC nor academic faculty status are required for scholarly e-publishing. JIRCL offers a new direction in academic e-publishing in the context of outreach activity at a level of what a regional university can do.

Keywords: JIRCL: Journal for Interdisciplinary Research on Community Life, Center Of Community, e-Journal

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Why do professional scientists not obtain good evaluation for their outreach activities ?

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Outreach activities for general public and school children are recognized recently as required works for all professional scientists, to promote public understanding of science. In-class lecture, laboratory experiment, field observation, science cafe, for example, are performed everywhere by a number of professional scientists. However, few scientists intensively conducted outreach activities, even though they do not obtain good evaluation. No publication scheme is the main reason for undervaluation of outreach activities. Here, I propose a new on-line and free access journal focusing on outreach activities. It deals with outreach activities in all fields of school education, lifelong learning, field education, science communication, disaster prevention and mitigation, georarks and nature protection.

Keywords: Outreach, Evaluation, Journal

Propose on a new style in geology guide books -an accessory-like cute mini book

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Geology is an important part in natural sciences in order to understand various common natural phenomena, particularly geohazards. However we has less opportunities to learn it during high school period. On contrary, the high school students are sometimes learning about geology when they visit shortly in universities. The short visits are doing sometimes under a (governmental) program of a linkage between universities and (junior) high schools. During the opportunities, the students study about geology through various outdoor works and indoor experiments, and also they receive several original texts. They of course understand the lectures at the time using the texts, but they may apt to forget partly (or completely) the contents after several (or one) day(s). It is because of less geology lectures in the high school. We consider that it is necessary an idea to keep the geological minds and thoughts for long time after the short visits.
In this paper, we propose a new style on guide books which students want to carry always attaching on a school bag or so. It is an accessory-like mini geology book. If the mini book is a souvenir in the short visit, the students would attach it on their bags, and they may keep the geological minds and thoughts. The students can make it by themselves, so that the host person would not need any time for the preparations.

Keywords: Mini book, Guidebook, Accessary

The new web service of Geosicence - Cross Cutting Comparisons (C3) -

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It is important to use many kinds of data in geoscience to understand the various geophysical phenomena. However, it is not easy to check the scientific data because each field in geoscience has been developing independently. Therefore, we had built a new web service, C3 (Cross-Cutting Comparisons; https://darts.isas.jaxa.jp/C3/) for promotion of the data utilization. By the interactive interface, C3 reduces distances between the fields and provides a quick look viewer. This poster describes the system summary and features of the service.

Keywords: Geoscience, Web service, Education, Cross-Cutting Comparisons

Development of the mobile 3D seismicity viewer

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It is widely known that Japanese Islands are located at the subduction zone of the Pacific and Philippine Sea plates and a number of earthquakes occur due to the subduction. Seismicity distribution is neither simple nor uniform; however, earthquakes intricately occur around Japan. Also, the shape of the subducting plate is complex. We usually plot the 2D map and vertical cross-sections to investigate the seismicity at a certain region. It is not easy to understand the 3D distribution from 2D images. Therefore, we develop the mobile application to show the 3D seismicity distribution with the subducting plates and topography in order to help non-professional understand where earthquakes occur around Japan.

We target the iPhone and iPad for the readily and intuitive user interfaces rather than that of the PC. By using the graphics API distributed in 2014, we can expect the high GPU performance of the 3D graphics on iOS. We use the Swift programing language and SceneKit framework used for 3D game applications. We use the Hi-net hypocenter catalogue on September 2015 as a sample data.

First, the hypocenter catalogues saved in the device is loaded. We can specify the ranges of the magnitude and depth. Spherical objects whose size and color corresponds to the magnitude and the depth are created and located at the position calculated by the latitude, longitude and depth information of the earthquake. The shapes of the subducting plates are described by triangular net which calculated by using the “triangular” command of the GMT and saved on the device as the COLLADA format. The shape of the topography based on the ETOPO1 is also saved on the device. The user can choose the color image corresponds to the height of the topography or coastline image as the texture image of the topography object. The displayed 3D seismicity distribution can be rotated, scaled and moved by swipe actions. Each spherical object has the information of the hypocenter such as the occurrence time, depth and magnitude. That information can be displayed by tapping the object.

We investigate the frame rate as the performance of the application. The frame rate indicates the smoothness of the motion of the application and is the number of the drawing per second (fps). This time we check the fps on the iPhone 6 and the iPad Air. When we plot 1-day seismicity (450 earthquakes), the frame rates are (iPhone, iPad) = (60, 45) fps. With these high frame rates, we can smoothly move the 3D objects without any stress. For 1-week (3200 earthquakes) and 1-month (12800 earthquakes) seismicity distributions, the frame rates are (30, 18) fps and (11, 5) fps, respectively. All of the functions work without error for the 5fps, but the motion becomes jumpy.

In this presentation, we use the sample hypocenter catalogue. In the future we imprement the download system of the JMA unified earthquake catalogue through the Hi-net website.

Acknowledgement: We use the numerical data of the shape of the subducting plates distributed on the website of Dr. F. Hirose (Meteorological Research Institute)

Keywords: Hypocenter Distribution, 3D, iOS

Preliminary report on magnesium phosphate minerals found from a medico-historical sample

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Introduction

There are two pebble-like materials found in vomited matter of a patient in a medico-historical collection of Inoue Kanryu (1740-1812), who was a town doctor and a strategist, at the Tokyo Metropolitan Edo-Tokyo Museum, Japan. According to the note of Inoue, one of them was found from a wife of a townsman lived in Edo around 1776, and another was from a wife of a carpenter lived in a village near Edo in 1783. NRIPS and Juntendo Univ. School of Medicine started research on the material, because the collection of Inoue, predominantly documents, is expected to provide information on medical context of town doctors of the time. The result of preliminary examinations on the substance that it is estimated as a mixture of phosphate minerals will be reported in the presentation.

Material and analyses

The substance is an oval spherical, grayish pale brown color with luster, porous and layered. Qualitative elemental analyses were performed by micro X-ray fluorescence analysis (XRF; ORBIS, AMETEK) under the atmospheric condition, and energy dispersive X-ray analyzer attached to a scanning electron microscope (SEM/EDX; JSM-6600LV, JEOL and INCA Energy, Oxford Instruments) using high vacuum mode and the sample was coated by carbon. Identification of the material was examined by X-ray diffraction (XRD; SmartLab, Rigaku), and Fourier transformed infrared spectroscopy (FT-IR; JASCO FT/IR6100). XRF and XRD were performed without any pretreatment or collection of subsample from the material. A very small portion of the surface was collected for SEM/EDX and FT-IR analyses. As the results, phosphor, sulphur, and calcium were detected by XRF, and phosphor and magnesium were detected by SEM/EDX. Peaks of elements are very sharp with low background that indicates the sample is an inorganic substance. It is estimated as a phosphate mineral. The result of XRD indicates existence of newberyite and struvite, which are magnesium phosphate minerals. A spectrum of magnesium phosphate trihydrate was obtained by FT-IR, which supports the existence of newberyite. It is considered that primary component is newberyite with minor amount of struvite.

Discussion

Newberyite is a rare mineral found in cave guano (e.g. Karkanas et al. 2002), and in urolith of mammals including human (e.g. Gibson 1974, Ohmura et al. 1959) associating with struvite, apatite and other minerals. The sample is hardly considered as a urolith of the patient because it was included in her vomited matter. However, sediments containing large amount of newberyite is not known in Japan, and its occurrence according to the studies of foreign countries is fine crystals in most cases.

Analytical results in this report were obtained from the surface of the material and the origin of calcium detected by XRF is unknown yet. It is expected the origin of calcium will suggest what the material is derived from.

Reference

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Keywords: medico-historical sample, magnesium phosphate minerals , newberyite

International collaboration of public outreach activities of the earth and planetary scinece using digital globe

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Dagik Earth is an education and public outreach project using a 3-dimensional digital globe system [http://earth.dagik.org/english/]. The system is portable and easy to use in classrooms and local science museum. The cost of the system is much lower than the other 3-dimensional digital globe systems, such as Science On a Sphere of NOAA, USA, and Geo-Cosmos of Miraikan, Japan. The usage of Dagik Earth has been expanded in Japan in these years. Dagik Earth also aims to be used out of Japan, and international collaboration has been established for the outreach activities in several countries. The software of Dagik Earth is multi-lingual, in Japansese, English and Chinese. The Chinese version is developed by collaborators in Taiwan. The public outreach activities using Dagik Earth has been held in science museums in Taiwan. Training cource for school teachers were also held in Taiwan. In the presentation, the status of the international collaboration with Dagik Earth will be introduced, and the method to enhance the collaboration will be discussed.

Keywords: Digital globe, Education/Public Outreach, Internationalization

Introduction of stone painting as an outreach tool of geology for children

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Stone painting is an action of painting picture on natural stone. In 2015, I lectured stone painting for parents and children in the summer vacation event of local organization, and children in the science festival of elementary school. Both children and parents could enjoy stone painting and only 30 minutes or more was necessary. Everything needed for stone painting, for example, acrylic paint are sold in one coin (100 JPN) shops. Questionnaire survey indicated that almost all of participants were satisfied with stone painting. Stone painting is convenient outreach tool of geology for children.

Keywords: Geology, Outreach, Children

Contents improvement and circulation of geographical field excursion using storytelling maps

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Geographical field trips (excursions) are frequently carried out in various places with guidance by geographical or local experts, but such opportunities are not always open to a vast amount of people because of the limitations in timing and number of participants in an event. Whereas, aggregation and diffusion of various information through Internet services including online maps and SNS (social network service) seem to have a potential to contribute to the widespread adoption of the content (knowledge) of geographical field trips, although such “virtual” showcase may not often remain in the mind of viewers. In this study, we test the validity and efficiency of online-based story maps that integrate geographical field trip contents as a “story” to enable its virtual experience for general people. In such story maps, discrete geographical knowledge strongly related to place can be effectively connected in a timeline or "spaceline", in which a viewer can follow the story as a virtual experience to enhance its impression. This system also has a potential of offering the opportunity for such people to follow and experience the “real” field trip by following location- and timeline-based stories shown on the online maps.
The workflow of the present study consists of 1) implementation of a field excursion, and 2) the development and online publication of the excursion content. First, in the excursion carried out in the field, diverse types of information provided by expert guides are collected using digital cameras, voice recorders and a GNSS receiver. Next, with support of Kiki-kaki Map software, the GNSS logs are temporally and spatially associated with audio and image data, and text information is manually added to the image data. These organized image, voice and text data are put into online maps (ArcGIS Online and PhotoField) and the characteristics of each system are compared to optimize the workflow. Text and image data are also collected in the field using an SNS (Twitter), some which are also compiled into the online story map. Established online story maps are also assumed to be used by other users, who will be able to follow the story that is shown in the online map with an ability to access to the excursion content in the field, enabling individual field excursion. In addition, the impressions of the users at this time are also collected using the SNS to be utilized to enhance the excursion content.
We show a case study of geographical field excursion held in June 2015 at Narimasu (Tokyo) and Wako (Saitama). From the comparison of story map services, their advantages and disadvantages are summarized, and the enhancement of the above workflow is provided. As a result, the guide contents of the excursion (expert knowledge) are arranged into a time series on the map, showing the usefulness of a story map with a high accessibility by a large number of people. It is also suggested that the information aggregation through SNS can additionally contribute to enrich the excursion contents by the participants (a variety of opinions and impressions) as a collective intelligence. This system is expected to be in possible use by more general tourist information and school education. This study is supported by JSPS KAKENHI 26560154.

Keywords: field excursion, social network system, story map, location information, expertise knowledge, collective knowledge

Analog model of the Alluvium incised-valley topography under the Nakagawa Lowland, central Japan

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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, we made three-dimensional analog model of basement structure below the Nakagawa Lowland. The horizontal scale of model is 1/50,000 and vertical scale is emphasized as 1/1,000. The model was painted by gradations in color from yellow (Shallow) to dark blue (deep), so that it can be easily recognized the contrast between subsurface steep precipice and gentle slope of basement structure. Among them, the Ayasegawa Active Fault is characterized by sharp drop of basement depth below the Kanto Plain. Thus the analog model of basement structure below the Nakagawa Lowland would be helpful to understand why short-period ground motion is amplified in such incised-valley.

Keywords: outreach, geology, educational promotion

Environmental analysis with micro shells and environmental education by using shells thrown up to the seashore - Osaka Nature Conservation Association "Micro Shell Project"

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"Micro shell" is a kind of shell with only a few millimeters even if it has grown up. There are quite a few species in micro shells, but it is not well-known to general people. As a part of activity of "Micro Shell Project" of Osaka Nature Conservation Association, we held nature observation meetings and leader skill up workshops, developed educational programs and web encyclopedia, and surveyed seashores in Japan. Moreover, we have been making effort to survey seashore in various place in Japan and to prevail environmental educational programs by using thrown up seashells.
The shells which live at the bottom of the sea have less motion ability than other organism such as fishes, so they get more influence from natural surroundings and are useful as good environmental barometer. Especially in micro shells, there are various life style, such as floating and adhesiveness, in micro shells. Their feeding habits are also various.Some eat by ripping off ell grasses and seaweeds, others do by filtering plankton, are carnivorous or are carrion feeder. And the population and the species composition are affected by the shape of the seashore, the material type (e.g. rock and sand) of the bottom and the flowing of ocean currents and tides.At the coastal region, ecosystems in various habitat such as shore reefs, sandy beach, seaweed beds and tidal flats intricately interact each other and inhabit together.
So it is necessary for our understanding various biocoenosis and seasonal variation to understand each micro habitat. Quite a few micro shells are often thrown up to the seashore. Wide range of people from children to old persons can observe them because gathering samples is easy and such activity doesn't require any special tools such as a snorkel. Moreover it is useful for understanding the difference of each seashore and the role of natural environment.
The composition of species may vary according to the geographical feature of the research point and the weather even if they are in the same seashore, because the thrown up condition varies by the shape of seashore, surrounding geological feature, the amount of soil from rivers and weather. Regardless of the variety, survey of thrown up shells can be used for the comprehensive environmental evaluation of coastal area. In this presentation, we report the outcome of Micro Shell Project, such as micro shell species list, the feature and the environmental evaluation for each seashore. The surveyed points are following: Suma-kaigan (Hyogo pref.), Ozaki-kaigan (Osaka pref.), Wakaura (Wakayama pref.), Masuhoura (Ishikawa pref.), Yuigahama (Kanagawa pref.), Kotohikihama (Kyoto pref.). And we also refer environmental education by using micro shells.

Keywords: Micro shell, environmental educational programs

Past, present, and future of aurora and human society

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We introduce our outreaching activities of Aurora 4D project (https://aurora4d.jp). Aurora 4D project is a collaborative challenge among different fields of humanity, natural science, and citizen science. We are archiving the eye-sighting records of aurora phenomena in old writings, as well as mapping the digital images of aurora uploaded to internet by people in present society. The interesting records of worldwide expansion of special aurora activies are important to understand the physics and to mitigate the related space hazards, and it is interesting to discuss the history, and background of people at that time.

Developments of teaching and outreach tools of world sand collection in Kochi Core Center. - Usefulness of sand sediments-

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Kochi Core Center (KCC : Kochi Univ. / JAMSTEC) is the organization to research and store drilling-core samples. KCC has hosted teachers and students of elementary, junior-high and high-schools as well as scientists. For outreach works, we are developing a tool, using sand sediment samples that were collected worldwide
"Sand" is very informative material about the Earth and familiar for us. Here I present our plan to develop the tool of the sand samples and to explore quality outreach and teaching works. I would like discussion to improve outreach and teaching works for Earth science.

Keywords: teaching materials for outreach, Kochi Core Centre, sand samples

Earth and planetary science education on the Internet: Tokyo Tech's first MOOC, "Introduction to Deep Earth Science"

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Recently, massive open online courses (MOOC or MOOCs) have gained wide-spread attention as a new educational platform delivered via the internet. MOOC is defined as "an online course that is open to anyone with internet access" and many leading institutions all over the world have provided many fascinating courses in various fields. Students enrolled in MOOCs study their interested topic in a course not only by watching video lectures, reading texts, and answering questions, but also by utilizing interactive online tools such as discussion boards, Q&A sessions and peer assessments. MOOC is also gaining popularity as a way to do outreach activity and diffuse research results.
Tokyo Institute of Technology provided its 1st MOOC, "Introduction to Deep Earth Science Part1", on edX, which is one of the largest MOOC providers. This four-week-long course was designed for 1st year college students and with two learning goals in this course; 1) to introduce students to the fascinating knowledge of solid Earth, 2) to provide an opportunity to use scientific thinking as well as to show how interesting and exciting science can be. This course contained materials such as 1) structure of inside of the Earth 2) internal temperature of the earth and how it is estimated and 3) chemical compositions and dynamics inside the earth.
In this presentation, we will share details on the course and feedback received from some of the 5000 enrolled students from 150 countries and regions. Furthermore, we will explain our MOOC making model, which is a team based course creation effort between the course instructor, Tokyo Tech Online Education Development Office (OEDO) staff and student teaching assistants (TA).

Keywords: online education, MOOC (massive open online courses), outreach, solid earth, high-pressure geoscience , career education for young scientists

"Intermediate term forecast" based on seismic intensity data base for understanding the usual seismisity

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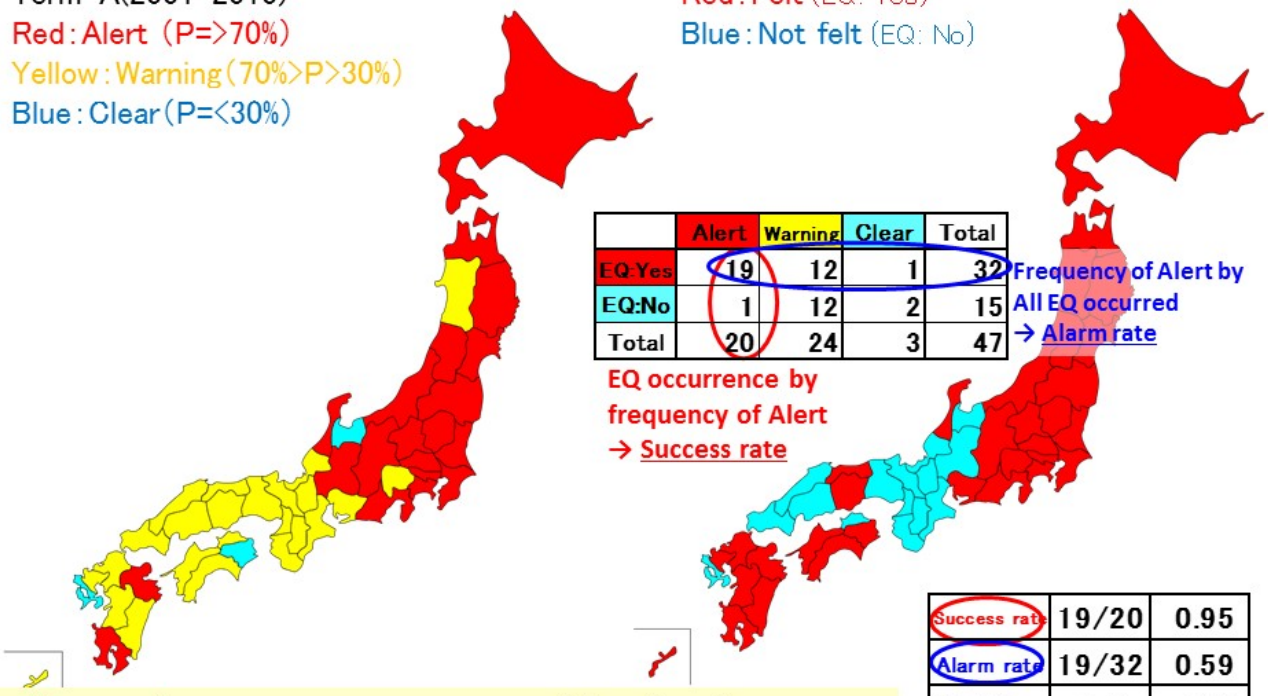
It is preferable to determine the individual action for seismic risk mitigation based on the correct knowledge of earthquakes. Although no reliable method to forecast the great earthquakes, which would cause serious damages, in short term, some seismic hazard information such as probabilistic hazard maps by the Headquarters for Earthquake Research Promotion based on long term evaluation of the seismic activity are released. However, these long term evaluations mainly show the probability for several decades or longer term. It would be difficult to imagine the risk for the citizens, when they see the caption which says "Probabilities of ground motions equal to or larger than seismic intensity 6 Lower, occurring within 30 years from the present", within the everyday life time. On the other hand, people may experience some earthquakes with intensity 4 or 5 lower, which would not cause any damages, within several years or months. The memories of these earthquakes would continue, as they feels such earthquakes rather frequently. Even if the intensity felt at their own residence would not be so strong, the news informing the strong intensity in the same prefecture should impress the people to trigger the consideration on risk management for the earthquake, personally.
The purpose of introducing the "Earthquake forecast" in our report is NOT to propose an original physical model nor statistical model developing the reliable method for earthquake forecast or prediction through the scientific discussion. The main purpose of this report is to introduce simple example to citizens to understand the common seismic activity based on the usual seismisity data. Therefore, we choose the seismic intensity database of JMA, not the earthquake catalog, to provide the parameters for our model, as intensity is easy to imagine the effect of earthquake, personally. The probability to feel fairly strong earthquake within several month to one year would be shown in a simple format understandable by anybody. Such kind of simple information would be helpful to realize the usual seismic activity, as well as to consider the individual risk mitigation action imaging the more destructive and less frequent earthquake occurrence.
The statistic model used for the "forecast" is Homogeneous Poisson Process, which presume minimum number of a priori parameter, the average recurrence term of the events based on the record of past events. We will show the example of "Intermediate term forecast" as the target term with three months and one year for 2015, and unit areas with each prefecture (Fig.1). As the evaluation of the "forecast" shows that the "Success rate" is around 70% to 90% and the "Alarm rate" is over 50%, it would be appropriate to understand usual seismic activity through this "forecast" like idea.

Keywords: Seismisity, Earthquake forecast, Seismic intensity data base, Homogeneous Poisson Process

One year "Forecast" for 2015
based on the seismisity of
Term-A(2001-2010)
Red : Alert (P=>70%)
Yellow : Warning (70%>P>30%)
Blue : Clear (P=<30%)

Result :EQ felt in the prefectures
over intensity level 4 during 2015
Red : Felt (EQ: Yes)
Blue : Not felt (EQ: No)



	Alert	Warning	Clear	Total
EQ:Yes	19	12	1	32
EQ:No	1	12	2	15
Total	20	24	3	47

Frequency of Alert by All EQ occurred → Alarm rate

EQ occurrence by frequency of Alert → Success rate

Success rate	19/20	0.95
Alarm rate	19/32	0.59
"Safe" rate	2/3	0.67

"EQ: Yes" means one or more earthquake(s) was(were) felt and "EQ: No" means no earthquake was felt during 2015 in that prefecture.

Fig.1 One year "Forecast" and "Result" for 2015

The practical effect of water environmental education using groundwater flow model

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It is essential to understand groundwater flow and material cycle accompanying it to understand the hydrological cycle/material cycle on land. Unfortunately, directly confirming the flow of groundwater is impossible because groundwater flows under the ground where we cannot observe it. Therefore, there are several things that are difficult for people to understand regarding groundwater, which results in incorrect interpretations or the incorrect image of it in many cases. In particular, for students who have grown up in recently urbanized areas, tap water is recognized as domestic and commercial water, which means that they recognize that water comes out when the faucet is turned on. In fact, there are many students who have never seen a well as a domestic and commercial water.

Making these students understand groundwater flow and the material cycle accompanying it is extremely difficult. This is because making someone understand a phenomenon that they have never seen before is complicated.

Making students understand groundwater flow is a very important theme. If they do not understand groundwater flow, it is impossible for them to understand the material cycle accompanying it and the contamination process. Primarily, making the students understand the concept of water as a courier of various materials is considered to be a very important theme for future water environmental education and environmental conservation.

Accordingly, in this AP program, a Groundwater Flow Model (GFM) is used as an educational tool wherein the flow of groundwater is visualized and after conducting classes to make the students understand groundwater flow and the material cycle accompanying it, the results are reported here.

Keywords: groundwater flow model, material cycle, water environmental education, groundwater, hydrological cycle

Learning Skills expanded form Saturday Lecture “Earth and Planetary Sciences” at High school (the Evening Course)

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Osaka prefectural evening course high school has started a lecture on Saturday targeted for all the grades and the another school's student. The Saturday lecture "Earth and Planetary Sciences" is established as an open class of a general target from 3 years before at Kasugaoka high school (the evening course). We're lecturing on 15 times a year and 2 hours for once (90 minutes) in "Earth and Planetary Sciences". The current research of the earth, a planet, the universe and the life are offered so that a student may show the interest.
Kasugaoka high school cooperates with Osaka University, Naruto University of Education, Tsuyama technical college and JAXA. Therefore, it's possible to lecture on the quality highly. Further, a lecture as" investigation" is established and experimental work is performed. We expect that students get a scientific approach and objective perspective by working on an unsolved problem. We plan to do such investigation activity with teachers of elementary and junior high schools.

Keywords: High School (the Evening Course), Saturday Lecture, Open Lecture, Earth and Planetary Sciences

