

Fuji-Sat Project: Development of the simulated micro-satellite and its operation at the summit of Mt. Fuji

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We developed a virtual satellite and then installed it at the summit of Mt. Fuji. A purpose of this project is to make use of a provided observation concept and production technology in the plan of the satellite by working at the summit of Mt. Fuji, and examining a virtual satellite. We investigated a preliminary study in order to check the Fuji mountaintop and similarity of the outer space in 2013. We installed the virtual satellite (Fuji-Sat) at the summit of Mt. Fuji based on those knowledge in the summer in 2014. The Fuji-sat observes an electromagnetic wave strength change and performs the reception of data by the communication with an amateur radio station. The design of protection and the charge function to severe temperature environment is done, and these apparatuses are expected when we can collect electromagnetic wave strength change data for approximately one year in 2015.

Keywords: Small satellite, Virtual satellite, Mt. Fuji

Demonstration experiment of a handmade data logger at the summit of Mt. Fuji during the winter in 2013-2014

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Global environmental issues are one of the most important problems to solve for human being. In order to solve these problems, environmental education (in school) is one of the significant action items. The long-term measurement of each environmental parameter is effective for the students to realize the environment change. However, it is difficult to operate the long-term observation for them because there is no data logger system, with enough flexibility, inexpensiveness, durability and convenience. Therefore, development of a data logger for students which satisfies several demands is required. Since we developed a handy data logger which can operate individually without a personal computer and whose power is supplied by the battery with solar charge equipment, we report the one-year results used at the top of the Mt. Fuji.

Keywords: Logger, Handmade, Long-term

G04-03

Room:102B

Time:May 24 10:00-10:15

Development of Web Contents on Clouds utilizing Facebook and YouTube

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Photographs and animations of various clouds taken in the campus of Kochi University were posted on Facebook and YouTube, with short captions. Students and teachers can clearly come to feel the change of clouds and weather by making their own pictorial books on the Web.

An analog tool of two-dimensional spring-block model for education and outreach

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The fact that the occurrence of earthquakes strictly obeys the famous Gutenberg-Richter's law is quite essential for earthquake experts, however few people could understand the details of these phenomena. The misunderstanding and confused awe for disastrous disasters seems to be brought from these backgrounds. In this regard, we developed some educational tools for understanding the G-R law; Go-game model(Ohtsuka,1971), sand-pile model(Bak et.al,1989). Kato(2007) described his one-dimensional Burridge-knopoff model as an educational tool. We introduced here another two dimensional B-K model extended from Kato's model. The model consists of thick iron plates (60x60x12mm) and color rubber bands. Each iron plate has four brass hocks on its sides, and is connected to their four nearest neighbors with the rubber bands. The system is driven by a wooden square rim connecting with rubber bands and surrounding whole system. The exercises are carried out on our class room floor, the students watch and count the slips of each or whole blocks (occurrence of earthquakes), while the system is driving slowly to one direction(a mimic of plate motion). Our preliminary results show clear consistency with the G-R law. The students fully enjoy the counting exercises and can be strongly inspired with the fine results. Through these exercises and analysis, they study the interesting character of the G-R law and occurrence of earthquakes. The details of this model and analysis will be presented at the conference.

Keywords: spring-block, Gutenberg-Richter's law, earthquake, education, high school

What things do the teachers want to tell other teachers in Japan?

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The author carried out a questionnaire research about the actual situation of science classes related to earthquake in the Great East Japan Earthquake affected area. Many messages from the teachers in the area were collected in 2014. The points of these messages are divided into four types; promoting science education, combination of science and natural disaster prevention, promoting disaster prevention education, and others.

Keywords: Great East Japan Earthquake, elementary school, secondary school, science class, teacher, questionnaire research

Consideration of earth and planetary sciences education at secondary schools in Japan through employment examination

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Some students who are/were first "CHIGAKU-KISO (Basic Earth Science)" and/or "CHIGAKU (Earth Science)" learners at upper secondary schools in Japan took the 2015 fiscal year employment examinations for civil servants on 2014 school year. These kinds of examinations normally have covered huge range of many subjects such as "RIKA (Natural Science)" including physics, chemistry, biology, and earth science. We, therefore, need to analyze the contents of earth science questions in these examinations. This is because these questions may impact classes of "CHIGAKU-KISO (Basic Earth Science)", "CHIGAKU (Earth Science)", and other subjects at upper secondary schools in Japan.

According to former analyses of these examinations, scientifically incorrect questions have sometimes appeared now and then in these questions. Education of "CHIGAKU-KISO (Basic Earth Science)" and "CHIGAKU (Earth Science)" at upper secondary schools in Japan may receive a harmful influence from these incorrect questions. In this presentation, we will report our interpretation of the influence on school education through the analyses of these examinations.

Keywords: Civil Service Employment Examination, Levels of secondary school graduation, Natural Science, "CHIGAKU-KISO (Basic Earth Science)", "CHIGAKU (Earth Science)"

The try which makes physical geography enriched and makes the geography B curriculum new.

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A new curriculum was conducted in a main school from the previous fiscal year. At most 12 units per 3 years of geography B could be taken by a new curriculum, and I decided to make the learning contents deepen.

It's "Physical geography is explained even more than now in politeness and specifics." that I put emphasis by syllabus planning for 3 years.

There are 3 reasons that this judgement was done.

The 1st reason is because I thought understanding of agricultural geography and industrial geography became easy when a natural environment could be understood. This way of thinking is advocated from the past and is the general way of thinking from which a geography is learned. How to advance it along the contents of a textbook isn't being done by the new syllabus planning made this time. It was made "geomorphology, industrial geography, climatology, agricultural geography". A physical environment and human activity make them understand that I have a relation, and I'd like to make a geographical basic way of thinking fixed. I have started geography A at the same time concurrently with geographical B. It was set as "rural geography and urban geography, ethnic conflict, environmental issue, population geography" by geography A. These contents aren't also unrelated to physical geography, so there is an intention to make a basic way of thinking and learning method fixed.

The 2nd reason is because the student who tries to remember terminology twice had problem consciousness to be increased when the same terminology appeared beyond the field. 1 of the characteristics of the geography is to be able to talk beyond the field by 1 of terminology. This is necessary to learning of topography science in particular. When it wasn't shown many times where terminology of physiography was used in particular, I found out that a word isn't understood. If terminology is new terminology every time it comes out, it's caught, and if geographical learning is to remember, it's misunderstood. Therefore the student who can see a decline of a desire to learn goes out. I thought as the way to stop a decline of a desire to learn.

The 3rd reason is because I'd like to judge a map and a sourcebook from to deal with a topography from the early stage and show the new world.

A student seems to have a good impression to these tries. It's based on the above, and class development at the viewpoint where the physiography was made the center is announced while introducing an example.

Keywords: physical geography, geography B, curriculum

G04-08

Room:102B

Time:May 24 11:30-11:45

Coordination of education program which is provided by Kyoto Univ. for high school students and Earth science education

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Kyoto University provides the JST education program for laureate high school students with a cross formed by academic curiosity and science "ELCAS" from 2014. In this presentation, we will introduce the coordination, the contents and the current state of the ELCAS program, and the education of Earth sciences. Mainly, we will discuss the contents, the educational effect and a problem of the field work training program for Earth sciences which is being performed by the ELCAS program.

Keywords: Education of sciences, Field works, High school students, Cooperation with high schools

A class room tool for demonstrating the striped magnetic anomaly across the mid-oceanic ridges

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The striped magnetic anomalies over the mid-ocean ridges play an important role at the emergence of the plate tectonics from the classical continental drift theory. The so-called "The Tape-Recorder Model" developed by Vine and Mathews(1963) is essential to study this process in a high-school class room. However only text-based resources are used to study for this theme. The students do not learn the theory and development process with firm reality or motivation. In this regard, we developed an analog model showing this striped magnetic anomalies in our class room. The model consists of a thick foamed styrol plate and iron nails which have been magnetized using a permanent magnet. The plate is a mimic of ocean floor and covered partly with colored tapes symmetrically showing stripes. The normal magnetized nails and reversed nails are stuck on the grids of the plate symmetrically across the center respectively. The measurement is carried out on a acrylic transparent plate above the foamed styrol plate which symbolize sea surface and sea floor. A magnetic sensor (Gauss-meter) is transversed over the model slowly and the total magnetic strength are measured at real time showing a periodic change. So, the students can be experienced the measurement on the ship and can comprehend easily the meanings of this measurement and the relation with the mechanism of "The Tape-Recorder Model". The cost of Gauss-meter is high expensive, so we tried to use a smart-phone as an alternative and found that thier magnetic sensor and the free application are sufficient enough and quite useful for this type of measurement. At the conference, we will present an analysis of this model and make a demonstration of magnetic survey using our model.

Keywords: magnetic anomaly, stripe, ocean floor spreading, education, high school

Volcanology class in Dinosaur Valley Fukui Katsuyama Geopark: Molten lava flow experiments in elementary schools

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We report the results and educational effectiveness of our volcanology classes in the elementary schools in Katsuyama, Fukui. The volcanology class is a part of the outreach activity in Dinosaur Valley Fukui Katsuyama Geopark, and is designed for the purpose of disseminating knowledge of volcanoes and volcanic products in Katsuyama region. Although there is no active volcano in Fukui prefecture, several Quaternary volcanoes (1 to 0.7 Ma) are existed in Katsuyama region. These volcanic products formed a large part of the basement in this region. The largest ski site in Fukui (SKIJAM Katsuyama) harnesses the slope of lava flow morphology of the youngest volcano (Hoonjisan) in this region. These facts indicate that people in Katsuyama region lives on the benefits of volcanoes, however, the relationship between volcanoes and the land formation in Katsuyama region is not well understood by local residents. Thus we aim to give elementary school students a deeper understanding of volcano and the land formation in Katsuyama region through our volcanology class. In the class, we demonstrated an experiment of lava formation by using portable clay cooking stove (Shitaoka et al., 2011). The students observed lava forming process, and measured the temperature of the produced fluid lava by using an infrared radiation thermometer during the experiment. In addition, the students observed flowing lava on the slope of sandpile, and studied the formation of lava flow morphology. The results of questionnaires after the volcanology class indicate that the students understood the formation of lava flow morphology and the basement volcanic products of SKIJAM Katsuyama, and also show the improvement of their interest to the relationship between volcanoes and the land formation in Katsuyama region.

Keywords: volcanology class, molten lava flow, elementary school, geopark, Katsuyama, Fukui, Japan

A multidisciplinary approach to learning from geological and geographical perspective.

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The intention of this study is to consider the efficiency of a multidisciplinary approach of learning from the perspective of geology and geography. The common word "GEO" implies its commonness and many geology and geography teachers are aware of it, but just vaguely. It is time to reconsider the relation between both learning concretely, since the global environmental change has increased its complexity and needs a practical interdisciplinary approach for the real solution. In particular in Japan, the earthquake in 2011 also stimulated us to reconsider our perspective on earth. Such actual problems should be addressed by whole earth perspective and through an interdisciplinary approach. These points are intensively discussed in context of future earth. As a school subject concerned with earth and global problems, geology and geography can contribute to it.

We planned and implemented a one-hour class with multidisciplinary approach of geology and geography for 52 11th-grade students in a private high school in Tokyo. The issue is Fossa Magna, geological feature located in central Japan, treated at first from geological aspects such as development of Japan islands, active fault line and thickness of sediment rock. Successively into geographical aspect such as geo-tourism in Geopark, mining limestone and developing cement industry. The questionnaire of students review shows 96% of students "understand the difference of the 2 subjective perspectives" and "recognize the significance of the multidisciplinary approach." Almost half of them agree that "multidisciplinary learning is efficient for better understanding."

Earth-scientific explanation from the perspective of geology is to geographies advantage to learn scientific physical condition for human activity. As for geology, the relation between geological features and human activity treated by geography gives feedback to geology to remind the significance of learning geology.

For further advance of multidisciplinary approach, besides revising learning material, the potential of the cooperation of 2 geo-subjects should be discussed at curricula level.

Keywords: Geology, Geography, Future Earth, School Education, Geopark, Fossa Magna

The role of the teacher in ordinary high school who worked in SSH high school

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1.Introduction

I worked in Hyogo Prefectural Kakogawa Higashi High School that is SSH designated school, during 10 years until 2013 fiscal year. I focused on geoscience education and offered the earth science course regardless of the humanities and science. The Earth Science Club I was teaching got first prize in the Geological Society of Japan and the Physical Society of Japan. In addition, the Earth Science Club got many high reputations, including the Minister of Education, Culture, Sports Award. The guidance of me was also evaluated, and I was awarded the like of Education, Culture, Sports, Science Minister excellent faculty awards, Noyori science Award, Physical Society Lifetime Achievement Award, and Kanagawa University Excellence Leadership Award.

I transferred to this year Prefectural Nishiwaki Senior High School, became the adviser of Earth Science Club and Biological Club. I was entrusted with the activation of the entire science education including the students of the science education course.

I think every day, what is the role being sought in myself, and if there is any way to fulfill it in annual budget of about one twentieth of SSH schools. What is required for teachers who experienced the SSH high school? Between I has been working in SSH high school, I had teachers consciousness noticed that easy to change imperceptibly from "implementation of the research and development of high-level science and mathematics education" that is philosophy of installation of SSH high schools, to "studies that cannot be only in SSH schools". Activities of SSH that are carried out with a lot of taxes, have tried the competence of its budget enforce teacher. The study theme of me while working in SSH high school was how to can be study originality and priority researches, and how to grow the imaginations without using a special analysis device. The experience, knowledge and personal connections obtained in SSH high school, has been utilized in the current working school.

2.Current specific educational activities of

Nishiwaki Senior High School located in the mountainous region of the south area of Hyogo Prefecture. The school consists of infantry 7 classes and an information science 1 class per grade, and about 70 students go onto the National University. Students are laid-back and very serious. Students are timid for a challenge to new things for inexperienced.

I was appointed to this school, and I established the Earth Science Club at the same time. About 30 students participated in the studies. They study actively on the theme full of originality. I am realizing that the students had been craving a stimulus. They think by hypothesis deductive method and announce the results in the research papers and posters.

I am teaching students by take advantage of experiences and knowledges and personal connections of SSH high school. And I take advantage of the research methods that do not use special analysis equipment. The students join many tournaments that the cost is not take because school budget is small. The Earth Science Club has already played nationwide top finishers, in just half a year for the first time research. The Students are studying in two themes now. (1) clarify the formation process of southern Hyogo Prefecture, (2) the estimate of movement of the ground based on the cracks around the manholes, and the recommendations of the maintenance standards of ground. I am involved in the agency cooperation project that connect the citizens and scientists with a focus on Kobe University as a core member.

Keywords: SSH high school, geoscience education, Earth Science Club, hypothesis deductive method, special analysis equipment

Study of lightning-induced transient luminous events with university and high-school sprite observation network

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A various investigation of sprites, one of frequent observable transient luminous events (TLEs) in the region from mesosphere to lower ionosphere, has been reported. Sprites are induced by a strong electric field attributed to the neutralization of a large amount of positive charges at the upper part of thunderstorm when positive cloud-to-ground (CG) lightning occurs. Many papers have suggested that the complex physics of sprite-induced CG lightning, termed parent CG lightning, causes various morphologies and lifetime of sprites and the time delay of sprite occurrence, which have been some of unsolved issues in the TLEs studies. In addition, the major issue might be the largely different locations in horizontal between sprites and parent CG lightning, which often reaches about 50 km. On the other hand, sprites occur just above the luminous center of parent CG lightning according to satellite observations. It is expected that the luminous center of parent CG lightning over the thunderstorm is equivalent to the positive charges at the upper part of thunderstorm where the positive CG lightning starts. Few study, however, discusses the horizontal differences among the sprites, the luminous center of parent CG lightning over the thunderstorm, and the strike point of the parent CG lightning. Thus, we investigate the differences among them through an optical measurement, assuming that the position of positive charges at the upper part of thunderstorm is the luminous center of parent CG lightning over the thunderstorm in cooperation with high-school sprite observation network.

Keywords: TLEs, Sprite, Lightning