Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

G02-01 Room:106 Time:May 24 14:15-14:30

”Run away or hide”: Teaching material for learning the behavior to protect the life from ballistic fragment

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<Lesson of Ontake-san eruption>

Ontake-san has begun to erupt quietly without a clear presage at 11:52am on September 27th, 2014. A lot of ballistic rock fragments have fallen soon (about 11:55: ”Document Ontake-san large-scale eruption” and Yamakei new publication). There was size of 60 centimeters for the rock which broke through a roof of the mountain lodge (Volcanic Eruption Prediction Liaison Council, Ontake-san geological observation team, 2014). It was so high-density (Kaneko et al., 2014) that more than 10 holes by ballistic fragment were distributed over the area of 4 m x 4 m about 500 m from a crater. Energy of the explosion is equivalent to several tons of TNT gunpowder (Taniguchi and Ueki ,2014). The initial velocity of ballistic fragment is as high as 100 m/ second (Kaneko et al., 2014). 57 people were sacrificed and 6 persons were missing.

<”Run away or hide.” behavior>

”Run away or hide.” behavior is written on survivor’s notes from Ontake-san. For example one survivor put a knapsack on his head and sat down behind the large rock. Such behavior is efficient to raise the survival rate.

<Experimental system>

We developed an teaching experiment material to educate ”Run away or hide.” behavior. It was used in several classes of elementary schools.

The volcanic model is made from papier-mache with a crater on the top part. The air introduced from a side pipe and comes off from a crater. Ballistic rock fragments of papier-mache fall in the reach of the radius 2m approximately.

Keywords: eruption, ballistic fragment, phreatic eruption, evacuation, analogue experiment

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G02-02 Room:106 Time:May 24 14:30-14:45

Possible disaster preparedness course at the classrooms in junior and senior high schools in Okinawa Prefecture

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Okinawa Prefecture located in the south-westernmost part of Japanese Islands and in the subtropical area is often attacked by devastating natural disasters which are different from those in the other areas in Japan islands, such as, destructive typhoons and their subsequent flooding due to high tides, many earthquakes of both plate convergent type and due to active across-arc fault slip, which may induce tsunamis because their hypo-centres are mostly sub-seafloor.

Disaster preparedness, especially in Okinawa Prefecture is to be taught at the school education. Currently, 'Home Economics' is the only subject in which disaster preparedness is taught in junior and senior high schools in Japan. Recent subject for high schools 'Basic Earth Science' includes also disaster prevention against devastating earthquakes, tsunamis, volcanic activities, etc. Disaster preparedness education should include these two factors (Home Economics and Earth Science).

Japanese government established the system of renewing educational personnel certificates in 2007 and mandated the adoption of it in April 2009. Since 2012, the author has offered a 6-hour educational personnel certificate renewal course titled by 'Disaster preparedness in Okinawa - practicing development of teaching materials for school pupils'. This course is targeted mainly for science and home economics teachers of junior and senior high schools in Okinawa Prefecture, to tell the school pupils how to save their lives in case of devastated natural disasters.

Considering the teaching materials made during the 2014 course, the author would like to propose the following new curriculum through active learning for disaster preparedness 1-day course in the classroom.

1. Lecture: About natural disasters in the tropical area - earthquakes, tsunamis, tropical storms, etc.
2. Hands-on learning: How to evacuate in case of tsunamis - find the most appropriate evacuation route from your school by use of the maps and geographical information.
3. Field work: Practicing the evacuation that you proposed in the previous learning.
4. Reflection of the field work.
5. Hands-on learning: Preparedness for natural disasters - measure for safety.
6. Hands-on learning: Preparedness for natural disasters - social work, Preparation for presentation.
7. Presentation.

Keywords: Disaster preparedness education, Sub-tropical, Earthquake, Tsunami, Tropical storm

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G02-03 Room:106 Time:May 24 14:45-15:15

Mystery of intraplate earthquakes and education on disaster prevention

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For the purpose of clarifying the generating process of intraplate earthquakes, we developed a new seismic observation system in the next generation, with the initiative of DPRI Kyoto Univ. and Kinkei System Co.. The system is small and light, can record about 9 months continuous seismic data using 32 dry cells, and is easily operated. Since this is almost an ideal instrument, we call it the 'Manten' system and began the 'Manten' project by using this system. This system is utilized in various kinds of field works. The Abuyama Observatory, DPRI, Kyoto Univ. is utilized as the base of this project. Furthermore, we began a program for the education on disaster prevention with a collaboration of the 'Manten' project utilizing the Abuyama Observatory.

Keywords: earthquake, earthquake disaster, inland earthquake, school education

Japan Geoscience Union Meeting 2015
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G02-04 Room:106 Time:May 24 15:15-15:45

Recent sediment-related disasters and their mitigation measures

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Several major tectonic lines and fracture zones run in Japan, and about 70% of the land area consists of mountains and hills. Accordingly, the fragile geologic structure generally is formed. Consequently, there are usually prone to occur landslides, slope failures, and debris flows when the torrential rains during the rainy season or the heavy rains by typhoon hit in Japan. As for the occurrences of sediment-related disasters for last 15 years, the casualty toll in 2004 and 2011 exceeded about 60 people and 80 people respectively. There were ten typhoon landing, which was quadruple of the yearly average, and was the Mid Niigata Prefecture Earthquake at the end of October in 2004. Moreover, 19 people were killed by the sediment-related disaster due to the Tohoku Pacific Ocean coast earthquake that occurred on March 11 in 2011, and the serious sediment disaster with 56 people of the dead and missing was caused by the heavy rain by Typhoon No.12 around the Kii peninsula at the beginning of September in the same year. It is required to transmit the disaster prevention information thoroughly to residents from peacetime to reduce the human sacrifices by sediment-related disasters. For this reason, the hazard map (area map for sediment disasters) is prepared, and the hazardous location of the sediment disasters is well-known and transmits to the residents, also is essential to evacuate voluntarily if the risk of the disasters are just approaching. Here, I would like to introduce the recent sediment-related disasters, the role of counter measures by using construction facilities such as check dams, and the evacuation systems.

Keywords: Geoscience education in the high school, disaster prevention education

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G02-05 Room:106 Time:May 24 16:15-16:30

Educational materials for disaster prevention: Development and evaluation of Disaster Mitigation Action Card Game

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1. Introduction

When educational materials for disaster prevention are roughly divided, there are two types. One is the ”Have Answer” type whose objective is to give participants knowledge of disaster prevention. The other is the ”Have No Answer” type whose purpose is to get them to think what to do when a disaster happens. Now, ”Have No Answer” type is desired in terms of education for disaster prevention because participants can think about disaster prevention voluntarily. Therefore we developed a new tool of ”Have No Answer” type, ”Disaster Mitigation Action Card Game”, that elementary and junior high school students can participate. Moreover we evaluated this game by questionnaires.

2. Disaster Mitigation Action Card Game

The rule of this game is easy and similar to a rule of ”*karuta*”, but the character isn’t written on the cards. They have only the picture which shows an ”immediate” behavior when a disaster happens. Additionally, not only one player can put up a card but also all players can do. The run of this game is as follows. 1) Players make a circle by a group of 2-7 people and arrange cards discretely in the circle and a facilitator enters each group. 2) A question sentence, for instance ”You’re in the classroom at school now. You felt seismic tremor. What do you do?”, is read and players take a card within 3 seconds. 3) Within 30 seconds, the player explains the reason why he/she chose the card. 4) When all the players approve his/her explanation, the player can get one point. On the other hand, when other player’s opinions about the explanation are divided, they argue it. In this case, the facilitator judges the score. 5) Players return cards to the field. 6) The facilitator explains a point of the question. 2)-6) is repeated. 7) Disaster prevention mini leader authorization ceremony is performed.

3. The feature of the game

This game has the following big features. (1)Players can train an ”immediate” decision when a disaster happens, (2) Players can realize and share the risks which they imagine when a disaster happens through discussing them with other players and (3) This game can be conducted in other countries because of universal design.

In terms of (1), by limited 3 seconds, players are required to think ”immediately” what to do in the question’s situation. So it’s expected for them to acquire an ”immediate” decision of the various situations by playing this card game repeatedly. In regard to (2), card’s picture is so simple and abstract that player’s answers depend on player’s situation they imagine. Therefore, the more situations players guess, the more risks they can share and realize. In relation to (3), cards have only the pictogram which shows an ”immediate” action at the time of an accident. So this game can be played in other countries by adapting it to foreign language and environment.

4. The evaluation of the game

In each event, we carried out a questionnaire and evaluated this game. Questionnaire items include degree of interest, attractiveness, participant’s consciousness and so on. According to the results of the questionnaire, more than 80 percent of participants answered that this game is fun, the rule is clear, and they want to play one more time. Moreover, nearly 90 percent of them answered that they want to know more about how to protect themselves when a disaster happens. In fact, we got high evaluation for this game.

5. Future’s view

We are preparing the manual of ”Disaster Mitigation Action Card Game” to expand use of this game. In addition, high school students can serve as a facilitator so we consider the possibility of the education for elementary school and junior high school students by high school students.

Furthermore, we have done only this game’s evaluation. The purpose of this game is to make participants think about what they should do when a disaster happens and train the ability to protect oneself. Therefore we will measure the participant’s ability

change through this game.

Keywords: disaster mitigation, immediate decision, universal design, card game, Educational materials for disaster prevention

Japan Geoscience Union Meeting 2015
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G02-06 Room:106 Time:May 24 16:30-16:45

The disaster prevention learning activities by the ”earthquake disaster learning train” service of Sanriku Railway

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By the 3.11 Great East Japan Earthquake, ”Sanriku Railway (for short ”SanTetu”) which ran through the vicinity of Sanriku was damaged in the facilities, track and came to have the damage point of 317 places of big things and small things and reached the shutdown.

This ”Sanriku Railway Company” (1984 (H59) opening of business) is a third sector railroad running at the Pacific coast of Iwate prefecture. ”a third sector” is a joint venture of a local government and private businesses. SanTetu is railroads comprised by 2 routes of ”north ria line” between Kuji-Miyako and ”the south ria line” between Kamaishi-Sakari (Ofunato). Both routes of north ria line, the south ria line suffered big damage caused by earthquake vibration and the tsunami. Particularly, the damage caused by the tsunami was serious.

However, though SanTetu suffered big damage in this way, SanTetu performed partial service of ”disaster reconstruction aid train” (fare for free) in section of Kuji-Rikuchu Noda on March 16. It was 5days later of the earthquake disaster. Even a section of Miyako-Taro reopened service on March 20 to follow.

Just after 3.11, local people used it for ”safety confirmation” ”procurement of the food” as a traffic road on a track of SanTetu. Look at these scenes, it thought that SanTetu must do the life support of local people and support to the revival of the town.

On June 13, 2012 one year later, ”Kizuna visit delegation from the United States of strengthening project” (student organization) came to Japan in the ”hands-on education travel” program of ”Hometown experience learning Association” of Kuji.

Mr. Nihashi who is the employee of the Sanriku Railway, guided the damaged spot then.

The visit group really took Sanriku Railway, and Nihashi explained the damaged spot.

As for the reaction of students of this time,

”I want to tell an earthquake disaster generated in Japan to many people”

”I want to support you from one’s country”....etc.

He was impressed very much. From this, including a student, he can realize the need to have general people watch the real damaged spot,the tsunami-hit area etc.He understood that it was a mission to tell in history as the company which was damaged.

Therefore it was decided that the Sanriku Railway performed the service of ”the earthquake disaster learning train”.

The program of ”the earthquake disaster learning train” is as follows. It completely needs reservations, and the vehicle becomes chartered and is traveled by a special train. 1 vehicle has one guide. Disaster in places where the situation can be seen by, for example, slow down or stop the train, such as the earthquake at the time of appearance and now of the affected areas of the situation and problems will be described using the such as a panel. Guide is selected from the Sanriku Railway employees or residents along. Contents of the guide explains is not decided. Guide has been decided to speak to the straight that he think.

After 3.11, there was the request that I wanted to understand that wanted to observe the stricken area spot from the inside and outside the country. However, in the acceptance organization there is no situation, Sanriku Railway became a good acceptance organizations. Since the ”earthquake disaster learning train” start of June, 2012, the applications to this program gradually increased.

The past results are as follows.

2012 27 organizations 1472 people

2013 146 organizations 6571 people

2014 251 organizations 10470 people

Currently, the main aim of ”earthquake disaster learning train” is as follows.

Inherits to posterity and lessons the Great East Japan Earthquake of experience, we want to contribute as site of the future of disaster prevention education.

By positioning the ”earthquake disaster learning train” as our important content, to attract travelers to the Sanriku region for regional reconstruction, and want to contribute to the promotion of local tourism industry.

Keywords: sanrikutetsudou, Reconstruction, earthquake disaster learning train, tsunami, Disaster prevention learning, Great East Japan Earthquake

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The disaster prevention educational program using the marketing technique

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In order to correspond to the earthquake of the Nankai Trough in the school in Wakayama pref. after an East Japan great earthquake, the schools which carry out disaster prevention education including an emergency drill have increased in number.

Then, I introduce the disaster prevention educational example in the Takashi Kui junior high school in Nachikatsuura-cho, Wakayama which Wakayama University supported.

Keywords: disaster prevention education, mrketing, the East Japan Great Earthquake, emergency drill, shelter management training, Wakayama prefecture