Volcanic Alert Levels seen from volcanologists

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Eruption prediction: The most important tool for forecasting eruption is seismic observation and observation of crustal deformation. When eruption occurs, some mass transfer phenomena occur. For example, when a large amount of magma moves, it destroys the surrounding rocks and an earthquake occurs. Also, as the magma reservoir expand, the ground around the volcano swells slightly. By observing these changes with a seismograph and GNSS, we can diagnose the condition of the volcano.
Volcanic Alert Level: Volcanic Alert Level(VAL) is an indicator classified into 5 stages. Depending on the situation of volcanic activity the range of evacuation is indicated. VAL 1 is "paying attention to the active volcano", and VAL 5 is evacuation. If the eruption progresses stepwise and the warning level is raised without delay, it is a system that can evacuate the residents. Concerns such as volcanologists, especially when voluntarily adopting warning levels, expressed concern such as "alert issuance will be delayed because alarm is directly linked to social instruction such as evacuation" (Okada, 2008) .
Current status of eruption prediction: How far has eruption prediction developed? There are eruptions that are easy to predict and eruptions that are difficult to predict. An eruption where highly viscous magma moves to a large amount is easy to predict. At the eruption of Usu 2000 , the eruption prediction succeeded and the victim was not. It is possible to predict that such a large eruption will begin.
There are two "weak subjects" for eruption prediction. The first is phreatic eruption. The second is the transition of eruption. In the case of phreatic eruption, hydrothermal water (groundwater indirectly heated by magma, the boiling point exceeds 100 ˚C because the pressure is high) moves to a shallow place,Water boils explosively with decreasing pressure. Hot water that causes eruption has low viscosity and it is difficult to capture its movement. This typical example is Mt. Ontake's 2014 eruption (there are volcanologists with opinion that this eruption was predictable). There is also a big problem about the transition of the eruption. The activity level of the volcano can be diagnosed from the state of earthquakes or other volcanic phenomena, but it is difficult at present to predict how it will change after the eruption begins. A typical example is the eruption of Kuchierabujima 2015. After the small eruption in 2013, volcanic abnormalities such as earthquakes increased, and sulfur dioxide emissions increased, eruption causing pyroclastic flow occurred on May 29, 2014.
Volcanic disaster prevention education: What kind of volcanic disaster prevention education should be done in the current state of such eruption prediction? I want to discuss about two cases here. The first one is a small eruption that only dangers around the crater like Mt. Ontakeyama eruption, and the second one is a large eruption that is devastating a wide area around the volcano like Asama 1783 eruption. Steam eruption like the Ontake 2014 eruption may occur at VAL level 1. Education on emergency evacuation is important when dealing with such eruptions in volcanic disaster prevention education. The basis of the evacuation method is similar to evacuation from the tsunami. Hayashi (2015) expressed as “Escape! Hide!”.
Regarding the large eruption, there is a possibility that a lot of sacrifice may occur if the timing to raise the VAL is delayed, and it is currently difficult to make it as a material for education.

Keywords: Disaster prevention education, Volcano education, Volcanic Alert Level

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Study of Disaster Prevention Education in the Coast of Fukushima -For Sustainable Education on Disaster Prevention

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1. Introduction

Non-structural measures against disaster (e.g., disaster prevention education and disaster drills) aimed at improving regional disaster prevention have recently claimed. Damage caused by a natural disaster is expressed by the product of an external force (hazard) and social vulnerability [Wisner, 2004]. Thus, strengthening of non-structural measures intends to reduce the social vulnerability and damage finally. However, there are a lot of problems to continue the long-term non-structural measures. In this study, to achieve the strengthening of regional disaster prevention, we tackled on disaster prevention education (DPE). Here, we examine the viewpoint necessary for the sustainable DPE.

2. Contents of DPE

A target area for DPE is the Coast of Fukushima Prefecture, where suffered huge damage from the Great East Japan Earthquake. DPE was carried out five times at the two elementary schools, the public hall, and the child house. We mainly conducted (1) “Disaster Mitigation Action Card Game” involving quick consideration and decision making for protecting themselves during disasters, (2) elucidation of regional disaster history relying on scientific materials, and (3) promotion activities of natural science.

3. Interdisciplinary DPE

As disaster prevention is a typical interdisciplinary research, we include not only DPE but also various activities (e.g., geological surveys, investigation of historical records, evacuation drills, and participant observation). To sublimate these “multi”-disciplinary activities into “inter”-disciplinary DPE, we consider the following important.

Review of the standing of external forces (hazards); The conventional measures against disaster prevention had been to study external forces and implement structural measures against them. It suggests that external forces had been positioned “outside” the society. Science education focused on natural science shows the similar trend. Therefore, we tried to position external forces “inside” society by incorporating regional disaster history and the card game into science education. It enables students to take initiative to consider both natural science and disaster and to regard external forces as necessity. Moreover, adults also replace external forces inside the society through evacuation drills. In accordance with this ethical framework based on philosophy, we aimed the interdisciplinary DPE.

4. For sustainable DPE

Their initiative is important for attaining sustainable DPE. Interventions in communities by external organizations have often been confirmed after catastrophes. However, in the future, it is desirable that activities on disaster prevention will continue and develop without external interventions. In our DPE, we requested students to talk what they thought to their families. This is exactly a remark expecting spread of initiative from children to adults. Moreover, through the explanation that regarding external forces as necessity leads to protect their lives against various disasters, we sought the understanding from some

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school officials who wanted to avoid the topic of disaster. As another activity, we attempted to grasp the demands of the residents by long-term participant observation. As a result, it was clear that they have been requesting construction of a regional museum and human resource development on disaster prevention. Thus, it is expected that DPE will continue without external intervention by providing teaching materials and human resource development.

5. Conclusion

DPE was conducted in the Coast of Fukushima. We attempted replacing natural phenomena inside the society and training the initiative to consider natural science and disaster by incorporating local disaster history and the card gage into usual science education. We also aimed the spread of DPE for adults through the evacuation drills and grasping their needs. Through this study, sustainable DPE as well as further development of local initiative will be expected.

Keywords: disaster prevention education, interdisciplinary , social implementation, the Great East Japan Earthquake

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What should teachers prioritise to save the life of their pupils in case of hazards? : Verification of the Sendai District Court's judgment of the Okawa Elementary School case

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The devastating tsunami just after the Great Eastern Japan Earthquake on 11th March 2011 killed the 74 children and 10 teachers of Okawa Elementary School (hereafter “the School”). The parents of the deceased children claimed against the Ishinomaki City and the Miyagi Prefecture concerning the death of their children. On 26th October 2016 the judge of Sendai District Court sentenced the Ishinomaki City and the Miyagi Prefecture to a compensation for the damage. The judgement said that the teachers was supposed to have foreseen the tsunami attack and was responsible for leading the children to the safe place. The author got the full text of the sentence of the Sendai District Court judgement and verified the claims by both the complainant and the defendant at the judgement in order to consider the protection against disasters at schools in the future.

The following is the review of the facts in time series.

At 0246pm, the earthquake occurred. NHK immediately after the earthquake started to announce that and to appeal of taking refuge from the expected tsunami damage.

At 0251pm, NHK reported that the expected maximum tsunami height was 6m.

At 0314pm, the Meteorological Agency of Japan reported that more than 10m tsunami height should be expected in Miyagi Prefecture.

Around 0320pm, an announcement by Kahoku Fire Station to evacuate the expected tsunami reached the school.

Around 0330-0335pm, the teachers and the children began to move towards “the Triangle Zone” from the playground of “the School”.

Around 0337pm, the teachers and children were swallowed by the tsunami which flew beyond the bank of the Kitakami River.

At 0337pm, the tsunami reached the school and the circumference was wholly flooded.

Finally the judgement concluded that “the Triangle Zone” is not appropriate for evacuation against the tsunami and that the teachers should lead the children to the high hill just behind the School. The judgement also said that evacuation towards the hill should be mostly prioritised to save the lives of the children although a landslide due to the aftershocks were expected.

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According to the press report, both the complainant and the defendant was dissatisfied over the judgement and appealed to the high court. However, this judgment suggests the essence of the disaster prevention at schools: to save the life of the pupils should be mostly prioritised over than the maintenance of the order as the school on the occasion of the emergency situation. Teachers should make much effort in understanding the natural disasters, collecting information of the environment around their school, disaster preparedness, as much as conducting periodic emergency drills.

Keywords: the Great Eastern Japan Earthquake, tsunami preparedness, disaster prevention

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How to observe the characteristics of the geosystems in the school activities with utilize regional geology above Nagamachi-Rifu fault

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Rifu town is located in centre of Miyagi prefecture which stands around one of the most famous enormous active fault Nagamachi-Rifu lines. However there are few or no tracing researches in contrast Sendai city, since it has less population and wider spread wetlands.
Therefore I constructed the science club activity for (1) seeking fault line(s) with topographic land maps and (2) investigate boling core sample soils(Asia air survey co.LTD. 1983) that was brought in our school founded.

(1) Estimate of displacement of the faults on foot observation
In order to seek the unknown fault line in Rifu area, at first it was needed to estimate on the maps(“Sendai east-north”,”Matsushima” 1:25,000 Scale Topographic Maps and Active Faults in Urban Area of Map(Sendai), Geographical Survey Institute of Japan). After that estimation, walked over the region with club students to observe slopes which was occurred by the faults activation and recorded on the maps.
By observant slope gaps, there has a possibilities to have 3 or 4 fault lines that are located parallel to the known activate faults.

(2) Investigate of the boling core samples above the fault(s)
We investigated 6 columnar-shaped boling core samples which were excavated when the school has been built. The maximum depth of the samples are over 20m, some are new filled sands over original ash tephra and pumice from Adachi-Medeshima volcanoes.
In the club activities, we described column diagram of sediments and discussed the sediment circumstances by the sediments grain observation, however, it was impossible to describe the sediment’s origin of exact volcano(es).
I would like to report our activities in the school and also discuss the physical influences to the structures on their sediments.

Keywords: geologic column, Nagamachi-Rifu Fault, Boling core analysis, soil exploration, Adachi-Medeshima pumice

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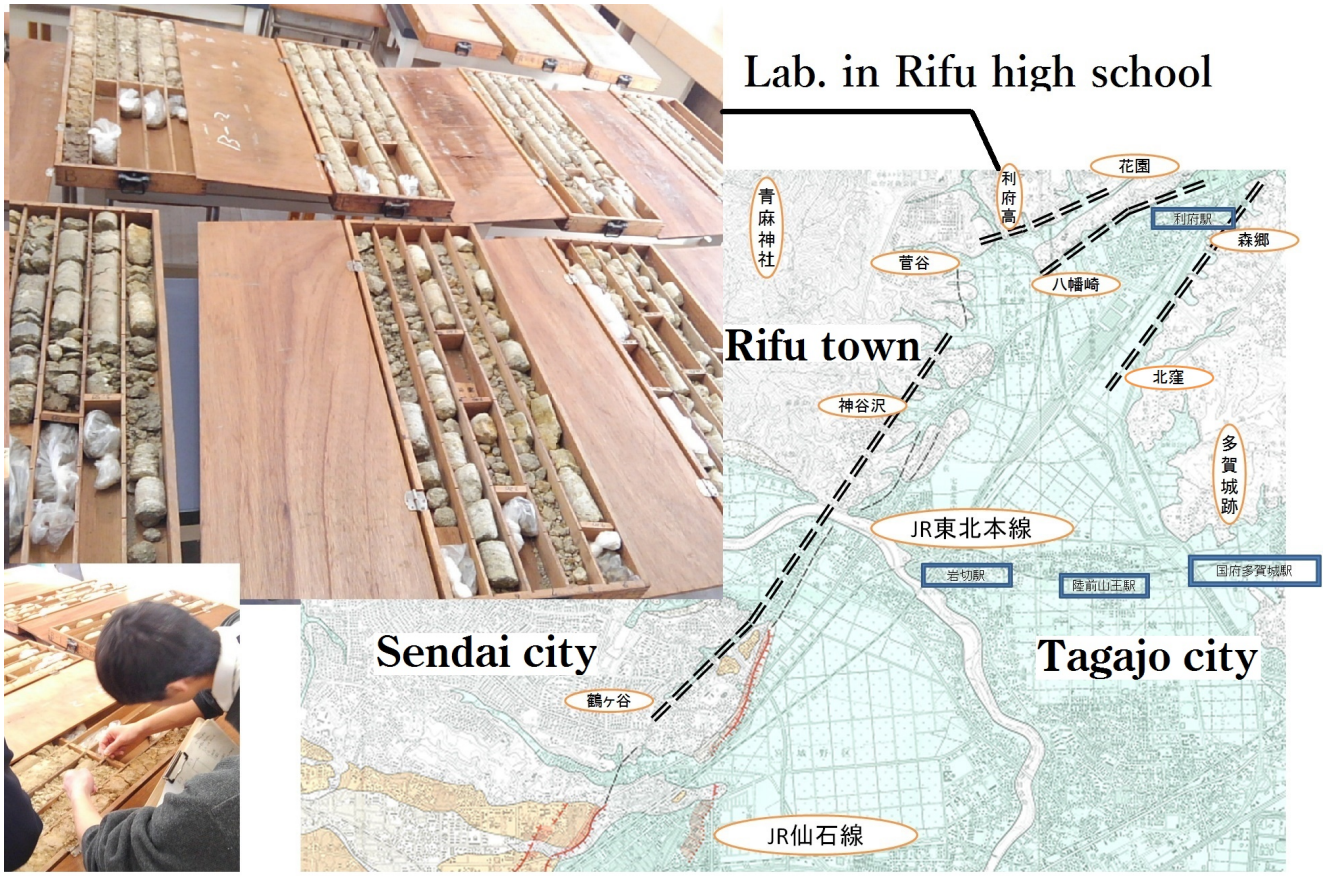

『利府断層の追跡(Chase of Rifu Fault)』(宮城県利府高等学校)JpGU2016より

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A study on the learning for disaster resilience and community resource by the train -practice of “TETSUGAKU” in JR KINOKUNI LINE-

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1,the purpose of a report
From the tsunami by earthquakes near the oceanic trench, such as the Tokai, Tonankai and Nankai earthquake which is anxious about the future occurrence of an earthquake, it is assumed that serious damage attains to not only human damage but the infrastructure of traffic of a railroad etc. Also in JR Kinokuni Line which runs the area along the shore of Kii Peninsula, it is required to take refuge to evacuation areas, such as heights, from a passenger quickly in the time from the occurrence of an Nankai earthquake to tsunami attainment being severe.
By the JR West Japan Wakayama branch, I am performing the tsunami fire drill in the line from 2009. Although practical training which cooperates with the area is also performed from 2013, it is thought that it is difficult to increase greatly the passenger who masters means of escape and becomes a refuge person who takes the lead from a train only by the opportunity of "training."
Then, I considered it as the program which also studies the means of escape in a railroad, developed "TETSUGAKU", studying the basis of the motto of "disaster prevention which is not called disaster prevention", and local resources, and tried. While summarizing the background of the measure of this "TETSUGAKU", and the result of trial, I would like to aim at showing the state to future railroad disaster prevention education in this announcement.

Keywords: education for railway disaster prevention, learning for community resource, JR KINOKUNI line

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Unique Policies of Municipalities: The Future of the Disaster Victim Support System

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I read an article titled “Tottori Earthquake: First in the Country to Support Homes Receiving Some Damage with Public Funds, Maximum of 300,000 Yen in the Prefecture” (Yomiuri Shimbun, 1st page of the Osaka morning edition, 26 October, 2016). In the article, the author found the “future of the disaster victim support system.” Generally disaster law is characterized by gradual growth after experienced a shocking disaster. The disaster victim support system that is responsible for one section of disaster law has been growing hectic, starting with the Act on Support for Livelihood Recovery of Disaster Victims (abbreviated hereafter as ASLRDV) which was enacted in 1998 with the Great Hanshin/Awaji Earthquake. One factor in the promotion of this growth is the unique policies of municipalities.
Unique policies from municipalities can be defined as “policies taken which differ from the policies being taken by high level government bodies (such as the national or prefectural governments).”
The Western Tottori Earthquake in October of 2000 highlighted these unique policies. At this time there was no support given in the ASLRDV for home rebuilding and repair due to this being as a general rule a personal responsibility and due to homes being privately owned and support was only to be given for the supply of household possessions. Despite this, support actually was given for home rebuilding and repair. In this way these unique policies have the ability to break through the wall of the exiting legal system. One could say that Tottori Prefecture holds a position as a pioneer of the disaster victim support system for these unique policies.
Behind the fact that municipalities have often taken unique support policies for disaster victims is (1) the insubstantial nature of the national disaster victim support system which is the main agent of the ASLRDV and the Disaster Relief Act and (2) the demand for policies from municipalities due to the occurrence of large or shocking disasters while having such an insubstantial national system.
Looking at the Kumamoto Earthquake, Oita Prefecture in Kyushu, which was one site of the Kumamoto Earthquake disaster, is one prefecture that is advancing with such unique policies. Since there is a unique support system in Oita Prefecture (the Oita Prefecture Disaster Victim Home Rebuilding Support System), people are provided with a basic support fund of 500,000 yen even for partially destroyed homes with as much as 1.3 million yen when one includes additional support funds (800,000 yen for home rebuilding, home purchases, and home repair or 500,000 yen for rent). Upon further investigation, it was revealed that Beppu City actually provides 500,000 yen in support for partially destroyed homes and 200,000 yen in support for homes that have received some damage. It is not uncommon for municipalities to implement unique policies. On the other hand, since Kumamoto Prefecture does not have these unique policies this kind of support for partially destroyed homes in the disaster area in Kumamoto Prefecture was not given.
Because of the unique policies of Oita Prefecture and Beppu City more unique policies are to be expected going forward for partially destroyed homes, homes that have received some damage, and damage to land. Actually, 410,000 yen has been provided for partially destroyed homes in Kumamoto Prefecture using donation money. Furthermore, 100,000 yen has been provided for homes that have received some amount of damage exceeding 1 million yen in repair costs through donation money. Support funds for damage to land have been provided from Kumamoto Prefecture’s recovery fund.
By becoming aware of the unique policies of municipalities we can glimpse the future of the disaster victim support system, such as by seeing where the national disaster victim support policies are lacking

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and seeing what sort of development will occur for the system in the future.

Keywords: Disaster victim support, Unique policies of municipalities, Recovery fund, Donation funds, Kumamoto Earthquake

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