

Education for Disaster Mitigation by Utilizing Liquefaction Experiment

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1. Background

The Liquefaction phenomenon is that the ground behaves like a liquid by an earthquake ground motion. In the Great East Japan Earthquake, the Liquefaction damaged roads and prevented evacuation and rescue activities. However, the damages caused by the Liquefaction phenomenon is not generally known. In the meeting, we will report the examples of education for the disaster mitigation with liquefaction experiments and share some findings from our experiences.

2. Methods of Liquefaction Experiments

We prepared two desk top type kits. The First one is “Ekky” [NIED, 2016]. It is a PET bottle filled with water which contains some sand and map pins. In the experiment, we upend and return it, and wait until sand is deposited. When we tap the PET bottle by fingers, we can see the map pins rise from the sand. The second one, proposed by Hasegawa et al. (2017), is composed of a water tank, sand, water, and building models. The experiment procedure is as follows: First, we put sand into the vacant water tank and soak it with water. Then, we put the building models on the sand. When the table where the water tank was placed is hit several times, the models sink into sand and water gush out.

3. Examples of Education for Disaster Mitigation with Liquefaction Experiment

We educated visitors of a science event (almost all are children of elementary school age or younger and their guardians) and junior high school students in Kochi City, in matters of disaster mitigation by using liquefaction experiments

The purpose of education for children and parents was increasing understanding of liquefaction phenomenon and damages caused by it. We provided a program with a focus on experiments because experiments enables the visitors to actually experience liquefaction and enhance understanding by dialog about results of experiments. While the participants carried out experiments, we briefly explained that liquefaction can occur by earthquakes and it can cause damages. Children who conducted experiments asked, “Why it happens?” “How can we prevent it?” Many guardians did not seem to understand the cause of liquefaction before experiments. Thus our program contributed to enhance visitors’ interest in liquefaction.

The lectures on junior high school were carried out to provide knowledge of the liquefaction

phenomenon and damages come from it, and an opportunity for considering evacuation from tsunamis taking into account occurrence of liquefaction. In addition to the experiment, we had students do group discussion. In class, the explanations about damages caused by earthquakes, the mechanism of liquefaction phenomena, and the reason why liquefaction phenomenon occur easily in Kochi City were given. After that, students conducted the experiment and improve their understanding about the mechanism of liquefaction. Moreover, students discussed the evacuation from tsunamis based on a liquefaction possibility map and a tsunami inundation map.

4. Education Method for Disaster Mitigation by Utilizing Liquefaction Experiment

The liquefaction experiment enables people to learn while having fun and help to understand intuitively. The examples of our education show that the liquefaction experiment is useful for every person.

The example of lectures for junior high school students suggested that the awareness of disaster mitigation can be enhanced by discussion after experiments. Hence the combination of experiment and discussion is effective in education for disaster mitigation.

References

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