Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

HDS05-P01 Room:Convention Hall Time:May 24 17:15-18:30

The existence effects of coastal forest by damages caused by the 2011 of the Pacific Coast of Tohoku Earthquake Tsunami

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The purpose of this study is to verify and evaluate the protective effect of coastal forests against damage caused by the March 11, 2011 earthquake and tsunami on the Pacific Coast of Tohoku and to propose a tentative plan for strategic planting of coastal forests.

This field survey was carried out in Nagahama, Ishinomaki City, and Miyagi prefecture, where the coastal forest contains Japanese Red Pines (*Pinus densiflora*) and Japanese Black Pines (*Pinus thunbergii*). There are the residential areas around the coastal forest, and many buildings in these residential areas were washed away and destroyed by the tsunami.

We used aerial photo and local damage investigations to confirm the extent of damage to buildings around the coastal forest. During the aerial photo investigation, we analyzed the sites of the buildings that were washed away and the locations of rubble by comparing aerial photos taken in June 2010 (before the tsunami) with those taken between 12?18 March, 2011 (after the tsunami), in the study area (1,000 x 700 m). During the local damage investigation in August 2011, we performed ground-level surveys and classified buildings into 8 damage grades and by checking the water line marks left by the tsunami. The positions of the building pulled down after the August investigation were checked in October 2011.

In the areas with coastal forest (area of the coastal forest and the back of coastal forest) and those without the coastal forest (buildings behind the tide embankment), the height above the sea level and height of the tsunami water were almost the same and the landform was flat. However, buildings in coastal forest areas suffered less damage than those in areas without the coastal forest. Thus, the wave force-reducing effect of coastal forest was verified. Areas without coastal forest had many washed-out buildings and rubble (particularly within 200 m of the tide embankment). The presence of coastal forests restricts land use near the seashore, where tsunami damage is greatest. Thus, it can be suggested that coastal forests reduce the damage caused to the buildings, which would have otherwise existed near the seashore, and reduce the inflow of rubble into the land. Buildings pulled down after the August investigation were checked in both areas in October; the degree of damage to the buildings in these 2 areas was varied. Therefore, it can guess that the evaluation of effect against the tsunami of a coastal forest by residents is not enough, and a coastal forest is expected the preservation and practical use which gives many functions (existing reason) besides the disaster prevention effect.

Keywords: coastal forest, tsunami, existense effect, multiple functions

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Partition of a process as a tool of risk reduction

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Partition of a process as a tool of risk reduction.
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The algorithm of risk management for implementing events, which are related to natural hazards, is proposed. It includes operations that divide the process into manageable steps.

Covering a wide range of human activities and spheres of its existence, it can be assumed that the risk is the uncertainty in the realization occurrence of a possible event. Nuance in above definition of risk is to emphasize the difference between the amount of risk and the value of the probability of an event. For example, if the risk is zero, the event is sure to be done. However, if the probability of its occurrence is zero, it means that the event will not happen. Indeed, the probability of any outcome is an independent characteristic of the event.

From general considerations, we can assume that an increase (decrease) in the instability of the events will increase (decrease) the risk. On the other hand, the more we know about the history of the origin of the event, the less is uncertainty in the prediction of new developments. Thus, the expectation, based on knowledge of the previous information allows us to apply the exponential dependence of the risk from entropy.

Power engineering of the developed countries passed the same way, which passed the weapon - from Greek fire to hydrogen bomb. The energy industrial boom has focused on nuclear reactor that is an analogue of the atomic bomb as if were in delayed-action. For instance, France is the first in the world on atomic power station: about 80% of power there ”is done” by nuclear reactors. France is literally littered with them, and terrorism or disaster threatens her at least a new Chernobyl, God forbid.

Physicists offer to move to thermonuclear power plants on the microexplosion, which in principle are safe: they themselves do not explode more than do it themselves inside their reactor. For a nuclear reactor resulting risk can increase substantially, as when the final product resulting entropy is defined by the sum of the entropies, is high (controlled by the inaccuracy in the late act of the reaction). In thermonuclear on a large number of microexplosions resulting risk according to the exponential function does not increase this quantity of controlled implosions, only one of which actually determines the entropy of the output power. In turn, thermonuclear microexplosions will provide more energy from the middle of the XXI century.

Thus, according to the exponential dependence of the risk from the entropy we may conclude that the algorithm to reduce the risk is required to maintain operation of division the process into stages in order to find the most unreliable link. This approach based on the partition process into a series of controlled steps can be proposed to assess consequences of an accident, various scientific and technical proposals, economic projects, test ideas, and more. Therefore, experiments should be avoided, not consisting of duly observed phases. For example, we must adhere to the attention and the work of the most powerful accelerator in the U.S. Brookhaven National Laboratory, for reception ”at once” new, so-called quark-gluon plasma, where there is a risk of spontaneous emergence of a black hole that could swallow up not only the lab, but also the entire planet.

Keywords: risk, natural hazards, ecology, entropy, mathematicians, statistics

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Modern Activity of Bezymianny Volcano and Danger to Aviation

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Bezymianny volcano is one of the most active volcanoes of Kamchatka, Russia. Volcanic activity of Bezymianny started in October 1955 from moderate explosive eruptions, which lasted for about half a year. On March 30 the climactic eruption occurred: catastrophic directed blast and strong Plinian activity. The total volume of eruptive products was over 3 km3. A growth of the lava dome Novy into the explosive crater continues from 1956 till present.

During the 1965-2010 occurred 41 Vulcanian type strong explosive eruptions of the volcano, while 20 of them producing ash up to 10-15 km a.s.l. First strong explosive eruption occurred in 1965. Since 1977, strong explosive eruptions were noting one or two times per year. The most powerful eruption was in 1985, the volume of eruptive products (tephra and pyroclastic flow deposits) reached 0.05 km3.

After powerful eruptions, a lava flow could effuse during a few years. A direction of lava effusing changed, so that by 2005 all the slopes of the dome were covered by thick lava flows. After the 1985 eruption, a lava flow effused about 4 years. In 2006-2010, a lava flow moved down the volcanic south-eastern flank about 1.2 km. After the eruption in 1980, lava flow moved up to 1.5 km.

All explosive eruptions of the volcano were accompanied by the formation of pyroclastic flows and surges. The largest flow with length of 12.5 km was formed in 1985. Most widespread of pyroclastic surges were by eruptions in 1985, 1997, 2000, 2005, 2010. The volume of pyroclastic flow deposits for 45 years was about 0.4 km3.

All explosive eruptions of the volcano were dangerous for international and local aviation but volcanological experience and daily complex analysis the remote sensing data (seismic, video, satellite) of the volcanic activity since 2002 allowed scientists of Kamchatkan Volcanic Eruption Response Team (IVS FED RAS) predict many eruptions of Bezymianny and increasing aviation safety at Kamchatka.

Keywords: Bezymianny, explosive, eruption, pyroclastic, danger, aviation