Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

HSC03-01 会場:312 時間:4 月 30 日 09:00-09:15

2011 年東北地震津波における沖防波堤の役割とリカバリーの関係
Effects of the offshore barrier against the 2011 Tohoku Earthquake Tsunami and related Recovery Process

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In this study, the effectiveness of an offshore breakwater for the 2011 off the Pacific Coast of Tohoku Earthquake Tsunami was examined by two-dimensional (2D), quasi three-dimensional (quasi-3D) and three-dimensional (3D) numerical models. First, both 3D numerical models were applied to the behavior of tsunami inundation for Kamaishi Bay in Iwate Prefecture where an offshore deep-water breakwater was installed against an assumed tsunami before 2011. The numerical results indicate 20% error of maximum inundation height compared with the post-event tsunami survey on the land. It is found that the offshore breakwater significantly reduced the tsunami height on the land. The reduction of tsunami height on the land gave about 30% tax revenue in comparison with similar locations with or without breakwater. Based on the results the construction and or rebuilding of damaged offshore breakwaters can be considered as a viable option against tsunami particularly in vulnerable areas

キーワード: 津波, 沖防波堤, 減災, リカバリー
Keywords: tsunami, offshore barrier, disaster reduction, recovery

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東北大学農学研究科の東日本大震災復興支援：食・農・村の復興支援プロジェクトと津波塩害農地復興のための菜の花プロジェクト
The Agri-Reconstruction Project and Rapeseed Project for Restoring Tsunami-Salt-Damaged Farmland after the GEJE

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NAKAI, Yutaka[1*] ; NISHIO, Takeshi[1] ; KITASHIBA, Hiroyasu[1] ; NANJO, Masami[1] ; SAITO, Masanori[1] ; ITO, Toyoaki[1] ; OMURA, Michiaki[1] ; ABE, Miyuki[1] ; OGUSHI, Yukie[1]

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The Graduate School of Agricultural Science, Tohoku University, launched an Agri-Reconstruction Project in 2011 immediately after the March 11 Great East Japan Earthquake disaster, and this continues to date. The project's objective is to support the agricultural, forestry and fisheries reconstruction process in the tsunami disaster area. The activities have been implemented through more than 40 research projects along the Tohoku region including the Rapeseed Project for Restoring Tsunami-Salt-Damaged Farmland.

Immediately after the disaster, damaged farmlands were surveyed and salt-tolerant rapeseed varieties from Brassicaceae and related species were used to restore the soil. The plants came from the gene bank developed at the Graduate School of Agricultural Science, and were planted on damaged farmland in Sendai, Iwanuma and Higashi Matsushima cities. The varieties used to restore the soil depended on the specific damage.

As part of the project, the production and sale of edible as well as fuel oil obtained from rapeseed plants was organized in coordination with the Miyagi Prefecture Sendai City government, a number of private companies and other partners. This enterprise continues to date.

Besides using the salt-tolerant varieties of Brassicaceae plants in tsunami-damaged fields they are also used overseas in the rehabilitation of salt-damaged farmlands.

Keywords: earthquake, tsunami, reconstruction, rapeseed, salt damage

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東日本大震災当時における漁師の避難行動及び漁港の復興状況
Evacuation response of fishermen during the 2011 Great East Japan Tsunami and present recovery status

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The 2011 Great East Japan tsunami severely damaged or destroyed most of the fishing ports and facilities along the Sanriku coast. Fishing boats can be considered as the most important thing for fishermen as their activities are mostly depending on their boats. By getting out offshore to protect their boats from tsunamis is a custom in Japan but this is considered as a risky action. Interviews with fishermen were conducted to investigate their evacuation response, experience and opinion of the recovery status after the 2011 tsunami. We found that most of fishermen who did not decide to get out offshore but evacuated to high ground was although felt deploring in losing their boats but in all cases, they believed that their own lives are the most important. Knowing about tsunami characteristic of fishing port is also important. Tsunami generally arrives the Sanriku areas as fast as 30 min because of the deep sea and short distance from the earthquake epicenter. By this reason, boats can reach to the safety zone of 50 m sea depth very soon as well. However, boats in Sendai Plain will need about one hour to the deep sea. For the recovery, all of the villages are still facing problems resulting from land subsidence when the ports are partly submerged during high tide. In addition, land ownership is another issue that delays any recovery process as local governments need their permissions before doing any kind of construction. Although there are some small differences in detail, they have decided to move the entire community to high ground. Local residents feel that constructing high seawalls are unnecessary because there will be no more houses on the low part of the land and the local governments are trying to solve these problems neutrally.
Keywords: 2011 Great East Japan tsunami, Tsunami evacuation, Fishing port

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HSC03-04 会場:312 時間:4 月 30 日 09:45-10:00

A method to determine the area of tsunami inundation level 1 and level 2 for pre- and post-disaster situation

A method to determine the area of tsunami inundation level 1 and level 2 for pre- and post-disaster situation

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After the 2011 tsunami, a new approach in the land use planning is introduced and starting to be applied in some areas in Japan. An area that is likely to be affected by the high frequency, but low impact tsunamis -calling as Level 1. It will be used in a separated function in an area that is likely to be affected by low frequency but high impact tsunamis -calling as Level 2. The countermeasures adopted in both areas are different as well. The physical structures will be improved to minimize the effects of the medium-to-low tsunamis to human as well as prosperies in the area of tsunami Level 1. In the area of tsunami Level 2, the coverage of flooded area is much wider. Thus, evacuation facilities and education are the major efforts to save lives. This study aims to address the process on how we can distinguish the boundary between area Level 1 and Level 2. We firstly exercise the use of numerical simulations to establish the framework in assigning area Level 1 and Level 2 at a post-disaster area. Next, we examine the possibility to apply similar techniques in a pre-disaster area. We demonstrate that distinguishing areas of tsunami inundation Level 1 and Level 2 is not only important for the reconstruction in the post-disaster areas, but also necessary to mitigate the future tsunamis in pre-disaster areas.

キーワード: Tsunami inundation area Level1, Tsunami inundation area Level2, numerical simulation, GIS modeling
Keywords: Tsunami inundation area Level1, Tsunami inundation area Level2, numerical simulation, GIS modeling

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HSC03-05 会場:312 時間:4 月 30 日 10:00-10:15

先進的な地震津波研究－地震津波の被害軽減を目指して－
Advanced researches of Earthquakes and Tsunamis -Towards disaster mitigation on Earthquakes and Tsunamis-

金田 義行[1*] ; 川口 勝義[1] ; 荒木 英一郎[1] ; 松本 浩幸[1] ; 中村 武史[1] ; 神谷 眞一郎[1] ; 有吉 慶介[1] ; 堀 高峰[1] ; 兵藤 守[1] ; 高橋 成実[1] ; 馬場 俊孝[1] ; 中野 優[1] ; 崔 鎭圭[1] ; 西田 修平[1]
KANEDA, Yoshiyuki[1*] ; KAWAGUCHI, Katsuyoshi[1] ; ARAKI, Eiichiro[1] ; MATSUMOTO, Hiroyuki[1] ; NAKAMURA, Takeshi[1] ; KAMIYA, Shinichiro[1] ; ARIYOSHI, Keisuke[1] ; HORI, Takane[1] ; HYODO, Mamoru[1] ; TAKAHASHI, Narumi[1] ; BABA, Toshitaka[1] ; NAKANO, Masaru[1] ; CHOI, Jin-kyu[1] ; NISHIDA, Shuhei[1]

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Based on lessons learned from the 2011 East Japan Earthquake/Tsunami, we recognized the importance of real time monitoring of these natural hazards. As a real time monitoring system, DONET1 was already deployed and DONET2 is being developed constructing the dense ocean floor networks around the Nankai trough Southwestern Japan. DONET observatories detected offshore tsunamis 15 minutes earlier than onshore stations at the 2011 East Japan Earthquake, and provided the significant information of the tsunami amplification process between off shore and on shore. Using these systems, we can detect not only early earthquakes and tsunamis but also low frequency tremors, slow earthquakes and micro earthquakes in the inter-seismic or pre-seismic stage, which provide useful information for the estimation of seismic stage. As the conclusion, the integration of the real time monitoring data and advanced simulations such as the recurrence cycle of mega thrust earthquakes, tsunami inundation, seismic response on buildings/cities and evacuation, is the very important methodology towards future disaster mitigation programs and related measures. We will explain disaster mitigation researches on earthquakes and tsunamis around the Nankai trough.

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HSC03-06 会場:312 時間:4 月 30 日 10:15-10:30

津波災害からの復興過程における社会文化的・経済的側面に関する考察—宮城県南三陸町の集落を事例に
Sociocultural and Economic Aspects in Restoration after Tsunami Hit: Minamisanriku, Miyagi, Japan

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This research discusses sociocultural and economic aspects through description of initiatives taken by local people and organizations in Utatsu area, Minamisanriku, Miyagi Prefecture, for reconstruction after the Great East Japan Earthquake and huge tsunami hit in March 2011. Utatsu is located on the coast of Isatomae-Bay, the Pacific Ocean. The key industry of town is fishery, however, the number of people involved in fishery has decreased since 1990, and the town also has issue related to aging of population year by year. Like any afflicted people by huge tsunami induced by the earthquake, Utatsu residents had to move to another area located higher hillside and start to rebuild their life. This research focuses on two initiatives: a painting-art project and *miso* factory (*miso* is fermented soybean paste, a traditional preservative food in Japan) managed by local housewives. Interviews were conducted to some key stakeholders of those initiatives, and its results were qualitatively analyzed. The interview revealed some positive changes in mind among participants, especially young generation, as well as problems and obstacles long-deep rooted in the local socio-economic structure of the area, for example, mental conflicts between communities, concerns to influence of radionuclides from Nuclear Power Plant accident in Fukushima. The research concludes with a view regarding a possible way forward to their sound rebuilding and reconstruction.
Keywords: tsunami, reconstruction, community, sociocultural and economic aspects, Minamisanriku

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Living with Natural Hazards; Tsunami
Living with Natural Hazards; Tsunami

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Tsunamis are a common natural hazard originated by earthquakes, landslides, volcanic eruptions and even meteorological conditions. These events have hit coastal areas particularly along the Pacific Ocean (Rim of Fire), Eastern Mediterranean Sea and the northern part of the Indian Ocean resulting in large impacts to the environment and coastal settlements.

Adaptation by organisms and ecosystems after being hit by tsunamis follow nature’s processes for adaptation to the new realities, which also applies in the case of mankind but in this case intelligence, reasoning and complex social structures makes the process more complex reflecting in turn in how the restoration and reconstruction process may develop and its success.

Efforts made to reconstruct and restore impacted areas have proven to be very complicated and controversial oftentimes, this mainly due to differences of opinion on the approaches to be taken and decision-making processes added to the societal aspects. Moreover, lack of direct and effective participation of impacted communities, sectorial and top dawn decision-making further exacerbates the debate resulting in reducing trust by the locals, diminished resilience and increases emigration amongst other aspects.

Tsunamis are complex natural events requiring the integration of sound research and knowledge, the same is required to understand local communities where traditions, customs and societal components are crucial before decision making. Living in Tsunami exposed areas call for building trust with authorities as well as developing early warning and disaster prevention policies, appropriate defence systems and mechanisms, provision of education and awareness raising as well as the understanding of the affected communities needs, capabilities as well as their customs and traditions together with their living environment. Proactive and integrative policies rather than sectorial and reactive top dawn ones bring all these elements together whereby strengthening local communities, increasing resilience and allowing the reconstruction and restoration process to be effective and successful.