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

HSC24-01 Room:102B Time:May 23 09:00-09:15

Significance and Course of Damage Maps of the Area hit by the Tsunami of 2011, North-east Japan 1:25,000-scale

Tsunami Damage Mapping Team, Association of Japanese Geographers[1], MATSUTA, Nobuhisa[2*]

[1]None, [2]Earthquake and Volcanology Research Center Graduate School of Environmental Studies, Nagoya Univ.

The huge tsunami associated with the 2011 Tohoku earthquake, which struck the Pacific coast areas, killed about 20,000 people and swept up numerous constructions. During the following several weeks, it was difficult to understand the whole conditions of damaged areas, because they were too vast and most of the roads were closed.

We interpreted air-photos taken immediately after the tsunami by Geospatial Information Authority of Japan, and mapped limits of tsunami inundation as well as catastrophically damaged areas. No-photo areas were also mapped using Google Earth and so on. Finally, we compiled our mapping results on topographic maps with a scale of 1:25,000. During mapping, all maps were cross-checked by several geomorphologist.

The purpose of this mapping is to promptly provide basic information about extent of tsunami inundation and distribution of devastated area for all people conducting countermeasures against the disaster.

Our map is characterized by the following four points. (1) The limit lines of tsunami inundation were identified with taking into accout the topography and the flowing routes on the stereoscopic view. (2) Most of the air-photos we used were taken within a few days, before loss of the trail after the tsunami. (3) Since the accuracy depends on the scale of air-photos, our interpretation criteria is consistent in the whole mapped area. (4) Inaccessible areas were able to be interpreted by air-photos. The weak points of our map are that (1) the limit lines are possibly different from the true inundation edges because we judged mainly based on drifted deposits, and (2) most of the lines are not confirmed at the actual fields.

Because it is difficult to judge the limit lines of tsunami inundation on the field survey without measuring the salt level at each site, there is no perfect inundation map. We have to conduct multi-discipline approaches including air-photo interpretation, to reveal the actual tsunami-inundation areas.

Tsunami Damage Mapping Team Yasuhiro, Suzuki(Nagoya Univ.), Satoshi ISHIGURO (Nagoya Univ.), Teruko USUI (Nara Univ.), Chikara UCHIDA (Tamano Consultants Co. Ltd.), Hiroshi UNE (Geospacial Information Authority of Japan), Masatomo UMITSU (Nara Univ.), Yasuhiro KUMAHARA (Gunma Univ.), Hideaki GOTO (Hiroshima Univ.), Naoto KOIWA (Hirosaki Univ.), Hiroyuki SAKAUE (Falcon Co.), Nobuhiko SUGITO (Nagoya Univ.), Kenya TAMURA (Nara Univ.), Takashi NAKATA (Hiroshima Univ.), Tomonori HASEGAWA (Tamano Consultants), Daisuke HIROUCHI (Shinsyu Univ.), Kazuaki HORI (Nagoya Univ.), Nobuhisa MATSUTA (Nagoya Univ.), Toyohiko MIYAGI (Tohoku-Gakuin Univ.), Mitsuhisa WATANABE (Toyo Univ.)

Keywords: 2011 off the Pacific coast of Tohoku Earthquake, Tsunami, Damage Map, Aerial-photo interpretation

Japan Geoscience Union Meeting 2012
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HSC24-02 Room:102B Time:May 23 09:15-09:30

Tsunami flow on the Sendai and Ishinomaki plains in relation to their landforms and geoenvironment

UMITSU, Masatomo[1*], KITAMURA Kyouhei[1], KOARAI Mamoru[2]

[1]Nara University, [2]The Geospatial Information Authority of Japan

Landforms of the Sendai and the Ishinomaki plains in northern Japan, which are strongly affected by the tsunami disaster on March 11, 2011, are characterized as the strand plain with several rows of beach ridges. Mapping on aerial photos taken just after the tsunami disaster shows characteristics of tsunami flow on the two coastal plains. The run-up tsunami invaded into the plains about 4?5 km from the coast and showed several flow types. Concentration, diversion and confluence can be seen according the characteristics of the topography, distribution of buildings and vegetation on the plains. Direction of the back wash flow in southern part of the Sendai plain is almost towards the coast and perpendicular to the coastline. But the directions of the back wash flow in the central and northern part of the Sendai plain were various, whereas the run-up flow direction was almost perpendicular to the coastline. These characteristics of the back wash flow were controlled by the topography, building and vegetation on the plains. Lower reaches of small rivers were eroded by strong backwash flow. Wedge-shaped channel pattern in the lowest reaches of the streams were formed due to the concentration of backwash flow.

Keywords: Tsunami flow, Landforms, Geoenvironment, Sendai Plain, Ishinomaki plain

Japan Geoscience Union Meeting 2012
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HSC24-03 Room:102B Time:May 23 09:30-09:45

Inland Liquefaction in Tochigi Prefecture Caused by the 2011 Tohoku Earthquake

NAKAMURA, Yoichi[1*]

[1]Yoichi Nakamura, [2]Toshihiko Ohshima, [3]Masato Tazawa

The inland liquefaction and the damages in the Tochigi prefecture by the 2011 Tohoku Earthquake were investigated by the field surveys. The typical phenomena of sand boiling, ground depressions, and ground tilting caused by the soil liquefaction were observed. Several characteristic factors among the inland liquefaction area were the locations of the river floodplain and swamp area, the surface unconsolidated river sand-gravel layers, very shallow groundwater level, and the recent foundation - improvement works within several ten years. Additional contributing factors were the maximum 6+ of the intensity and the longer strong-motion duration of 70 seconds of the earthquake wave. These factors induced the soil liquefaction even in the inland Tochigi prefectural area by the Tohoku Earthquake

Keywords: liquefaction, 2011 Tohoku Earthquake, sand boiling

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

HSC24-04 Room:102B Time:May 23 09:45-10:00

Distribution of Liquefaction Damage in Inland Area and its Evaluation in Hazard Map: A Case Study of Abiko City

UNE, Hiroshi[1*], AOYAMA, Masafumi[2], HASEGAWA, Tomonori[3]

[1]Geospatial Information Authority of Japan, [2]Japan Map Center, [3]Tamano Consultants Co., Ltd.

Aside the tsunami disaster, major liquefaction damage caused by the off the Pacific coast of Tohoku Earthquake occurred in Tohoku and Kanto districts. Liquefaction damage in inland area was concentrated into a small extent where special land histories exist, e.g. reclaimed land, former river channels and filled former valleys. The authors investigated the distribution of liquefaction damage in Abiko City, Chiba Prefecture, examined whether risk evaluation of liquefaction hazard map met with actual damage or not, and considered the problems of the process of risk evaluation. As conclusion, they discuss how hazard map should be created and used.

Keywords: off the Pacific coast of Tohoku Earthquake, liquefaction, land history, filled land, liquefaction hazard map

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

HSC24-05 Room:102B Time:May 23 10:00-10:15

Effectiveness of interoperability of GIS data in wide-area disaster: Case in the Great East Japan Earthquake

USUDA, Yuichiro[1*], NAGASAKA, Toshinari[1]

[1]NIED

In this study, we introduce interoperability of geo-spatial information (web-based HTTP interface for GIS data in WMS, WFS, WCS, KML, etc., formats). We show the usefulness of interoperability and future tasks through the case of the supporting activity in the Great East Japan Earthquake.

Keywords: GIS, interoperability, the Great East Japan Earthquake

Japan Geoscience Union Meeting 2012
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HSC24-06 Room:102B Time:May 23 10:15-10:30

Geographic characteristics information of hazard area in large earthquake

KOARAI, Mamoru[1]*, KAMIYA, Izumi[1], Kosei Otoi[1], NAKANO, Takayuki[1]

[1]Geospatical Information Authority of Japan

Geospatial Information Authority of Japan (GSI) has been developing the system which provides a governmental disaster countermeasures office with the information about the expected disasters based on the geographical characteristics of the large seismic intensity area within 30 minutes. GSI had developed the system which automatically accepts seismic intensity and outputs the expected results based on 1-km grid about the possibility of earth surface deformation, such as slope collapse, landslide and liquefaction, using existing information such as DEM, landform classification, geological map and landslide distribution maps. Now, GSI is just going to improve the anticipation algorithm of this system by comparing the output of the system with the disaster situation of the past large earthquake.

The geographic characteristic information of the large seismic intensity area is required by a governmental disaster countermeasures office. Then GSI has been trying to produce the outline sheets of the local geographic characteristic information such as landform and geology, and to send the sheets of the large seismic intensity areas to the office when large earthquake has occurred. The fundamental view of the creation of local geographic characteristic information sheets is introduced here.

At first, the quick report of seismic intensity will be announced and corresponding sheets, which are divided several geographic divisions in each prefecture, e.g. ”northern Ibaraki Prefecture” and ”southern Ibaraki Prefecture”, will be sent.

Next, the observation data of every seismograph placed at each city, town and village are announced and corresponding sheets, which are divided a number of geographic divisions in each prefecture, will be sent. Because the distribution of seismographs is too dense for government level, the geographic division will be summarized over some cities, towns and villages. The summarize area will be decided to consider the large scale landform classification and the geological structure zone. It is more desirable for geographic divisions to have undivided local governments, but natural boundary such as large scale landform classification or geological structure zone will be given higher priority. The trial division of Ibaraki Prefecture is shown in Fig. 1. The authors think it is appropriate to divide by large scale landforms, such as plains, basins, hills and mountains first, and to divide mountains by geology second.

Northern Ibaraki Prefecture is divided into mountains area and ”Central Ibaraki Hill” division which consists of plains and hills around Mito City first. Mountains area is divided into four divisions by geology as follows: ”Northern part Pacific Coast and Abukuma Mountains” division is the area of the Abukuma granite and the Hitachi metamorphic rocks. ”Kuji river and Sato River, Neogene” division is Neogene sedimentary rocks area. ”Yamizo Mountains” division and ”Keisoku Mountains” division are the areas of Jurassic sedimentary rocks.

Keywords: large earthquake, geographical characteristics, seismic intensity, large scale landform classification, geological structure zone

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

HSC24-07 Room:102B Time:May 23 10:45-11:00

Practical-use of GIS by municipality and civilian considering continuity between normal and disaster period

ASANO, Koichi[1*]

[1]Akita Prefecture University

As condition of useful GIS during normal and disaster period, risk-adaptive regional management information system (RARMIS) concept is proposed (Hatayama et al. 1999). Yurihonjo city, which is located in northern part of Japan, has been using spatial-temporal GIS based on RARMIS concept since 2008. One of the most important concepts is continuity between normal and disaster period. Based on this concept, this paper describes on disaster prevention drill and active usage in normal period by municipal stuffs and civilians.

Keywords: disaster prevention, GIS, municipality

Japan Geoscience Union Meeting 2012
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HSC24-08 Room:102B Time:May 23 11:00-11:15

Development of risk communication method on the town reconstruction planning

YI, Taiyoung[1*], NAGASAKA, Toshinari[1], SUNAGA, Yohei[1]

[1]National Rerearch Institute for Earth Science and Disaster Prevention

This paper describes development of risk communication method utilizing a Risk Information Platform (e-Community Platform) on the town reconstruction planning in Ofunato city, Iwate that is East Japan great earthquake disaster stricken area. And we set up Town Revival Map Center as tool of the inhabitants participation that making and print are possible in various map information in Temporary construction mall.

Keywords: stricken area, reconstruction, town planning, residents participation, risk communication

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

HSC24-09 Room:102B Time:May 23 11:15-11:30

Archive activities of tsunami escape action to interview for business place

NAGASAKA, Toshinari[1*], Hiroaki Tsubokawa[1], Shinya Miura[1], TAGUCHI, Hitoshi[1], YI, Taiyoung[1]

[1]National Research Institute for Earth Science and Disaster Prevention

311 Marugoto Archives which is government-private sector jointed project records activities and phenomenon of Great East Japan Earthquake and Tsunami 2011 for carrying on the experience, lesson and message to build safe society. Recorded date is not used only for education in disaster prevention and rethinking the action plan in times of disaster, but also supporting remaking community and creating employment in disaster areas.

In this presentation, it is introduced that the archive activities of tsunami escape action to interview for business place at Kamaishi City, one of archive activities of 311 Marugoto Archives.

Keywords: the Great East Japan Earthquake, tsunami escape, Archive, Kamaishi City

Japan Geoscience Union Meeting 2012
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HSC24-10 Room:102B Time:May 23 11:30-11:45

Discussion on the social demand level of hazard estimation

SUZUKI, Yasuhiro[1*]

[1]Nagoya University

The 2011 Tohoku earthquake caused enormous unexpected damage, which raised a problem inherent in the hazard estimation itself. I think the most serious problem is that the demand level of hazard estimation has not yet been clarified. The demand level used to be the most serious historical hazard. Subsequently, after the earthquake, it changed to be the most serious hazard that could occur theoretically. However, the methodology to estimate the theoretical maximum hazard has not been established. Furthermore, the society is not yet ready to accept such a serious estimation. Therefore, the society should discuss the demand level of hazard estimation again in their initiative.

Keywords: hazard estimation, hazard map, social demand level

Japan Geoscience Union Meeting 2012
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HSC24-11 Room:102B Time:May 23 11:45-12:00

Co-seismic uplift and active fault around in the western part of Noto peninsula, central Japan

WATANABE, Mitsuhisa[1*], SUZUKI, Yasuhiro[2]

[1]Toyo Univ., [2]Nagoya Univ.

We investigated tectonic relives along the western part of Noto peninsula, central Japan. The marine terrace surfaces are classified into H1, H2, H3, M and L surfaces in descending order. The progressively greater slopes of successively higher marine terrace surfaces clearly record continual crustal tilting to the south. To the north, the Togikawa-nangan fault dislocates them. The amount of vertical displacement is over 20 m since MIS 5e. It is not surprising that the gap in the height of strandline is not documented by geodetic data. The active fault may extend to the submarine active fault about 3 km west of the Shika nuclear power plant. There are emerged wave-cut benches similar to that produces by abrupt vertical crustal movements associated with major historical earthquakes along the coast. The significant crustal movement close to the power plant is not continuous, but coseismic.

Keywords: marine terrace, emerged wave-cut bench, active fault, Shika nuclear power plant, Noto Peninsula

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

HSC24-12 Room:102B Time:May 23 12:00-12:15

Study on the legends of ancient and historical tsunamis hanbed by Ainu Race

TSUJI, Yoshinobu[1*], IMAI, Kentaro[2], HORIE, Takehito[3], NONOYAMA, Kosuke[3], IWABUCHI, Yoko[4], IMAMURA, Fumihiko[2]

[1]ERI, Univ. Tokyo, [2]Tohoku Univ., [3]Alfa Hydraulic Engeering co., [4]JNES

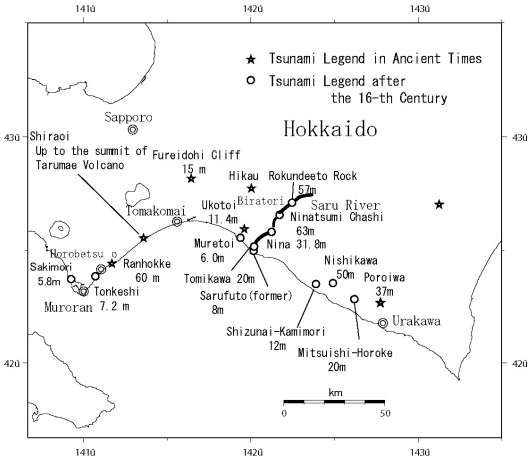
It is well known that there are many traditions of tsunamis in the legend of Ainu race, Hokkaido. On the other hand, geologists recently clarified that deposits of tsunami carried sand were found out at several places on the Pacific coasts of Hokkaido, and several tsunamis hit the coast and in some cases inundation height reach more than 20 meters (Hirakawa et al., 2003,2005), Nanayama et al.(2001, 2001, and 2003).

There are 16 points where the legends of tsunamis were handed down in Iburi and Hidaka Provinces, south coast of Hokkaido. In the present study, we made field survey for those 16 points, and measured the inundation heights.

Those traditions can be divided into two categories; 1) the events happened after the beginning of 16 century, 2) the events which happened in ancient period.

The distribution of tsunami heights is shown in the figure.

Keywords: tsunamis in Hokkaido, legend of Ainu, historical tsunamis, Iburi province, Hidaka province



Japan Geoscience Union Meeting 2012
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HSC24-13 Room:102B Time:May 23 13:45-14:00

A reservoir rip by the 2011 storm and flood damage and the influence

FURUTA, Noboru[1*]

[1]Tokushima Bunri Univ.

The typhoon that attacked West Japan in the summer of 2011 gave the great damage in each place including Ki Peninsula.A reservoir of Shizuki Kawakami style collapsed in Awaji-shi, Hyogo.The saved water became the muddy stream and attacked the down stream.As a result, the cultivated area was buried among the earth and sand, and the house of the neighborhood of river mouth was flooded in a floor.In this area, I take the big damage at the time of the storm and flood damage of 2004.However, aging and local community transform decline in this area.Therefore the maintenance of a reservoir and the waterway tends to be left unattended far from advancing.By this report, I think about a reservoir excellence local disaster prevention / decrease evil.This is a report of the situation that the downstream village where is totally unrelated to a reservoir for agriculture of upper reaches suffered from.

Keywords: reservoir, flood, rip, GIS, storm and flood damage

Japan Geoscience Union Meeting 2012
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HSC24-14 Room:102B Time:May 23 14:00-14:15

Long-term changes of heavy rainfalls in Vietnam

MATSUMOTO, Jun[1*], Nguyen Thi Hoang Ahn[1], Nobuhiko Endo[2]

[1]Tokyo Metropolitan University, [2]JAMSTEC

Every year, Vietnam is strongly affected by the TCs which are originated within the South China Sea (SCS) or are entered the SCS from the Western North Pacific with high frequency in the northern and central region and low frequency in the southern region. Impact from typhoon or TC and its consequence is one of the major natural hazards to the coastal region in Vietnam. This study focuses to understand the long-term change of rainfall and heavy rainfall days caused by TC in the period 1961-2008 for the coastal region of Vietnam using the TC best-track data obtained from the UNISYS website archive and daily rainfall data from 15 weather stations observed by the Vietnamese National Hydro-Meteorological Service.

The results show that TC rainfall has an increasing trend in all regions along the coastline. For TC heavy rainfall day (> 50 mm d-1), a significant increasing trend is found in the central region, but no significant trend is detected in the south region. The long-term change of heavy rainfall occurrences was noted in the previous study, and contrastive trend was noted in northern and southern Vietnam. However, the reason for that feature was unknown. The results suggest that the cause of the increasing trend in heavy rainfall in the central Vietnam can be explained by TC rainfall, while that contrastive trend in the north and south region can be answered by non-TC rainfall.

A significant increasing trend of the annual average TC rainfall and TC heavy rainfall day over 15 selected stations are also found for the 48-year period, in particular, a strong significant increasing trend is seen for the period 1976-1995, but it tends to decrease in the following stage.

Keywords: heavy rainfall, typhoon

Japan Geoscience Union Meeting 2012
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HSC24-15 Room:102B Time:May 23 14:15-14:30

A Study from the Questionnaire Result to Youth and Senior Citizens on Preparation for Emergency - Zagreb, Croatia

KIMURA, Naoko[1*], YAMASHIKI, Yosuke[1]

[1]DPRI-Kyoto University

This research will study the social survey results on emergency case, especially floods, to the youth and senior citizens in Zagreb, Croatia, in order to find a possible way to build a bridge between past experience and today's life regarding awareness-raising and preparedness in the context Croatian society. The City of Zagreb, the capital of Republic of Croatia, is located between Medvednica Mountain and the Sava River, a tributary of the Danube River. In 1964, the city experienced a huge flood caused by heavy rainfall. Due to the characteristic of its location between the mountain and the river, a large amount of rain water was flowed into the city. The central part of Zagreb city had to be suffered from extensive damage with 17 casualties. Having learned from this bitter experience, a drainage canal (Sava-Odra Canal) and retention dams/flood storage on the rivers from mountain side were constructed. There has been no outstanding flood occurred since then. However, this region in the Balkan Peninsula has some earthquakes and the City municipal government has also been conducting researches on flood simulations of bank/dam ruins caused by a strong earthquake in Zagreb. It was observed from a preliminary social survey that people living in the city know about historical floods event, however, their preparation status is basically individual base as well as they want to know more how to prepare themselves and what to do on emergency cases such as flood and/or earthquakes. Although City Museum did exhibition regarding historical flood events in the city, it seems that there was no sections to encourage interactions of experiences from the past experience and everyday's life. How can flood disaster experiences of the senior citizens be more included and counted for better preparedness and awareness-raising in Croatian context? The social survey result showed that more or less 30% of people answered "I am prepared" in any group and about 70% thinks there will be a flood occurred in Zagreb in future. Received the result, this research tries to answer the above question with seeking a applicability of Japanese experiences. It also tries to study, as way forward, if computational tools such as virtual flood experimental tool can be effective enough as educational tool for awareness-raising.

Keywords: flood, experience, preparedness, educational tool, Croatia