Conveying the results of practical disaster prevention research from TOHOKU to the world

IRIDeS NEWS

2019

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Throughout Japan, many disasters caused by natural hazards occurred in 2018, including the Northern Osaka Earthquake, the Western Japan Tsunamial Rain, typhoons, storm surges, and the Hokkaido Eastern Buri Earthquake, all of which significantly affected communities. The year was assessed as being so severe that (disaster) was selected as the official investigations working group, have been collecting information, analyzing data, conducting fieldwork, and offering support since the immediate aftermath of these disasters.

I spent a great deal of time working in international disaster risk investigation over the past year. Particularly, in collaboration with the Indonesian Government, I conducted fieldwork in the city of Palu on the island of Sulawesi after the major tsunami on September 28, and provided support to the Indonesian Government following the Sunda Straits Tsunami on December 22. Taking account of the need for better disaster risk reduction, we as disaster scientists, must consider the appropriate preparation for and response to disasters that are difficult to predict.

I am pleased to be serving as the chairperson of the executive committee for the Second World Boa Forum to be held in November 2019. The Final World Boa Forum in 2017, in which IRIDeS fully participated, was a major success. We are working toward the same success for the second forum, which connects Tohoku and Sendai disaster-related findings with the global situation.

Eight years have passed since the 2011 Great East Japan Earthquake, and the importance of research and solutions focusing on disaster prevention and mitigation is only increasing. We appreciate your continuing support and collaboration.

Field Survey of the Tsunami Damage in Palu, Indonesia

A M7.5 earthquake occurred on September 28, 2018, at 6:02 pm (7:02 pm Japan time) on the Indonesian island of Sulawesi. A significant amount of damage was caused by the earthquake, subsequent tsunami, liquefaction, and landslides. On October 4-6, Prof. Fumihiko Imamura (Tsunami Engineering) of IRIDeS conducted the first field survey to investigate the damage caused by the tsunami in and around the major city of Palu in collaboration with other researchers and government officials in Indonesia. After returning to Japan, he reported his observations to IRIDeS on October 11.

Based on the water level differences in the tide-level records observed by the Indonesian government at that time, a tsunami with a wave height of 4 m occurred exactly during high tide and arrived six minutes after the occurrence of the earthquake. The tsunami was large and arrived at Palu Bay, which was not close to the epicenter of the earthquake, within a short period of time. Prof. Imamura observed that the water level in Palu Bay was several tens of cm different from that recorded in other areas, such as Mamuju in the coastal area of Sulawesi Island, and that the wave characteristics were considerably different. He noted that the tide-level record obtained from Palu Bay was particularly valuable for its ability to reveal the actual nature of the tsunami that struck Palu.

Prof. Imamura also reported that buildings were damaged in Palu from the coastline to approximately 200 to 300 m inland. The first floors of the buildings located near the coastline were destroyed, and the lack of traces of muddy water indicated that the water current was fast. Further, ground subsidence was confirmed. Based on eye-witness reports, the tsunami may have reached a wave height of 10.4 m because of splashing. The large tsunami in Palu Bay was likely caused by an underwater landslide caused by shaking instead of the earthquake itself. Prof. Imamura supported this observation using topographical maps to explain the scale and direction of the landslide.

Photo 2
Prof. Imamura conducting an on-site survey in Palu Bay

IRIDeS Emergency Investigations and Reporting Meetings in 2018

In addition to the above, multiple IRIDeS researchers conducted emergency analysis and on-site investigations to support survivors in the Northern Osaka Earthquake and the Hokkaido Eastern Buri Earthquake. These earthquakes occurred on June 18, 2018, and September 6, 2018, respectively. Further, researchers held a debriefing session at IRIDeS. We also analyzed the data based on the torrential rain that occurred in July 2018 over western Japan and based on the earthquake that occurred in Kumamoto on January 3, 2019. The results of these surveys and analyses have been published on the IRIDeS website (http://irides.tohoku.ac.jp/eng/).
How IRIDeS Researchers Have Worked on Recovery Since the 2011 Great East Japan Earthquake

Feature

Working on research and communication on radiology and radiation exposure

Disaster Medical Science Division
Professor Koichi Chida

How before the Great East Japan Earthquake, I was already involved in research, education and practice in the field of radiology and radiation exposure. Following the Fukushima Daiichi Nuclear Power Station (Fusion) accident, Miyagi prefectural government requested Tohoku University to help their accident response. Thus, Tohoku University Hospital became the center for the examination of evacuees from within 30 km of the FUP and performed decontamination of evacuees when required. I cooperated in the creation and implementation of this work.

On March 15, 2011, I also started providing support for the “Nuclear accident inquiry counter,” established in the Miyagi Prefectural Office. Many inquiries were made, asking about the influences of radiation, among other things. In general, prefectural officials responded directly to telephone queries, and I acted as an advisor to the officials. But in cases where specialized knowledge was required, I answered the queries myself. Responding to a wide range of inquiries from local governments, local institutions, and the public over a period of about a month, I became keenly aware of the extent to which scientific knowledge of radiation was lacking in society. Thus, I decided to create pamphlets for the public, especially for children and their families, that provide basic knowledge of radiation and its impact on life. The contents include definitions and descriptions of radiation and exposure, its impact on health, necessary precautions in daily life, and things that are not yet completely understood in science. These pamphlets are now widely used especially in Fukushima Prefecture. Other than the pamphlets, I have been making efforts for science communication with the public through a lecture on radiation education held in collaboration with an IRIDeS disaster risk education specialist, joint development of radiation education materials with Fukushima Medical University faculty members, and public seminars on radiation and protection.

I have also conducted research to illuminate the effects of radiation on the human body from a new perspective. Recent studies have found that exposure to an even smaller dose than previously thought could damage the lens of the eye, causing cataracts and other injuries. Research team members and I published a paper to show a new way to accurately measure exposure dose for the lens of the eye, making a recommendation for appropriate protective measures for radiation-related medical personnel. This study outcome has the future potential for protecting the eyes of workers involved in decontamination work. We have also found a method of estimating the dose of radiation received using a small amount of blood. In the future, even when dosimeters are not available, it could become possible to measure exposure easily. In addition, I was involved in development of radiation-related equipment, including radiation inspection equipment that can be used even during power outages and patented real-time radiation exposure diameters for patients. Those diameters are safer and easier to use and can measure radiation effects more reliably than conventional ones.

In October 2018, I presided over the Autumn Scientific Congress of the Japanese Society of Radiological Technology held in Sendai, which had the theme “Seven years of reconstruction and studies in radiological technology after the disaster.” In the session we exhibited research items belonging to IRIDeS and disseminated our activities to participants from across the country. Also, I have acted as a supervisor for the radiation emergency response training for accepting exposed persons which is held once a year at the Tohoku University Hospital.

I will continue to explore radiology and radiation exposure through research, education and practice. Over the past eight years, understanding of radiation exposures has been deepened in Fukushima prefecture, and now the knowledge gap between Fukushimas and areas outside is a challenge. I would like to keep communicating about radiology in various places in the future.

Study field 1
Radiology

On March 11, 2019, it has been 8 years since the Great East Japan Earthquake. As one of its missions, IRIDeS has been contributing to disaster recovery, with researchers from various fields conducting research in recovery as well as being involved in practical recovery activities. Now that the first stage of many reconstruction projects has been completed and the landscape of the affected areas has undergone major changes, engineering, medical, and social science researchers were asked to provide a progress report on the activities so far.

Study field 2
Civil engineering

Providing practical engineering supports for reconstruction projects

Disaster Information Management and Public Collaboration Division
Associate Professor Katsuya Hirano

I have participated in many reconstruction projects in Miyagi and Iwate Prefectures, and particularly, in Ishinomaki and Ofunato in Miyagi Prefecture. In Ishinomaki, I have been working in the support team with Prof. Yutaka Onda and Assoc. Prof. Hiroyasu Ohashi conducting research with IRIDeS of Tohoku University Graduate School of Engineering. The team has covered all fields of civil engineering, architecture, and urban planning. We have been involved in most reconstruction projects in Ishinomaki such as the city center as well as in the projects on the peninsula and in the villages. In Ofunato, I have been the chairman of the Reconstruction Design Review Board.

Forty kinds of pamphlets on radiation targeting at four different age groups: for early/primary elementary school children, for their parents, and for their grandparents. The pamphlets were created responding to the results of questionnaire surveys conducted beforehand at elementary schools in Fukushima prefecture.

I was also involved in the seawall construction. In addition to supporting the formulation of the seawall design guidelines in Iwate and Miyagi Prefectures, I also assisted in the individual plans for the seawalls. Since the seawalls generated widespread social debates, I proceeded with a struggle. Despite seawall advantages such as protecting the area from tsunamis and storm surges, there are disadvantages in terms of the expensive construction, ongoing maintenance costs, and possible damage to the environment and landscape. Those who opposed the seawall wanted no negative impact; however, based on reality, I worked hard to reduce the negative effects from 100 to 90.

Four kinds of pamphlets on radiation targeting at four different age groups: for early/primary elementary school children, for their parents, and for their grandparents. The pamphlets were created responding to the results of questionnaire surveys conducted beforehand at elementary schools in Fukushima prefecture.
Involvement in these reconstruction projects did not directly lead to civil engineering research papers as the implementation basically involved the gathering of existing knowledge and applying it amid the current systems and constraints. However, I think these records should be archived for future generations, and these experiences flexibly leveraged in response to natural and manmade disasters in the future.

In developing countries, reconstruction is often regarded as a case of Build Back Better, which increases security compared with before the disaster. The disaster areas of the Great East Japan Earthquake need to be seen in a different context, however. The challenges of Tohoku disaster areas have been how to establish a sustainable city in an area that was flooded by the tsunami and reduced to bare land. I believe Tohoku's Build Back Better is a matter of how to create a low-cost compact town where people can actively live, adding new landscapes and economic attractions and asking regional problems, in this era of declining population in Japan. Many people in the Tohoku disaster areas have been engaged in the reconstruction projects, but it is expected that going forward many of these people are going to leave, resulting in a decrease in the population, which could be difficult for the town. Therefore, we need to consider how we can ensure continuity in this town. Although this is not related to my physical engineering specialty but is a non-physical management problem, I hope to continue to support it.

I have been involved in the reconstruction of Toyama District in the coastal area of Ishiki City, especially of Utsiu District. I have regularly attended the Utsiu Reconstruction Committee meetings and the Utsiu Civic Council meetings as an observer. My main role has been to help build connections between local communities and the national/regional government, and connect all the people within the local communities, serving as a catalyst for reconstruction. Specifically, new and unfamiliar knowledge was introduced to local communities to proceed with reconstruction, but such knowledge can be rooted only when local customs are recognized and respected. My role was to understand both the local community knowledge and the official recovery systems and to bridge the local governments and the residents of affected areas, and also between the residents themselves, as they tend to be in conflict. In other words, I have translated knowledge and helped “traffic control” in the decision-making process. I have always been concerned about how to deal with the sense of distance with the residents. If the situation becomes one of too much dependence on an observer like me, then it would hinder self-sustaining recovery. Further, although experts have been trained to handle and process relevant information, the difference in the amount of information the general populace has is not as much as it was in the past, because of developments in information and communication technology today. Hence, I have considered the residents as equals, and instead of leading them, I have worked alongside them while cheering them on. At one time, I decided to give a frank opinion to a community leader, when community activities reached a standstill, and it ended up seriously angering him. At another time, residents argued me down, saying “Professor, I think you got it wrong.” I provided suggestions, but it has been my goal to ensure that local people decided whether to accept them. These days, I intentionally keep my involvement to a minimum so that residents can continue without any problems even in my absence, although honestly I miss working with them. I consider that, through various trials and errors, now local residents take initiative in building their own community, based on appropriate and collaborative division of roles between the government and the residents.

I believe that Japan’s biggest challenge, regardless of the affected area, is the development of local human resources. It is important to nurture the generation below age 60, so that people in their 70s and 80s who led the recovery from the disaster pass the baton to younger people. The formation and structure of human relationships in the local communities is also an issue related to disaster risk reduction in the entire nation. This is because if human relationships were built at a minimum during non-disaster time, then it would be possible to respond even during disasters. For example, if one participates in the routine handing of notices for evacuation and involves oneself in garbage collection, weeding, and festivals, one can understand the situation in the neighborhood and within the town. If these relationships are established, then “cooperation” in the event of a disaster naturally emerges. Human relationships fostered from the past are often considered a burden and are declining in many areas, but given the experience of the 2011 disaster and the reconstruction process, one should recognize once again that forming a certain level of interpersonal relationships is necessary for disaster risk reduction as well.

In the sense that freedom was experienced once, we need to consider a new “form of connections” among people that is suitable to present-day society and that contributes to disaster response as a result.

How IRiDeS Researchers Have Worked on Recovery Since the 2011 Great East Japan Earthquake

Study field 2

Urbanology

Bridging people’s knowledge and recovery systems in affected areas.

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Although the definition of fukko (disaster recovery/reconstruction) varies from person to person, I have been supporting the affected areas through understanding of it as the “restoration and reconstruction of the spontaneous order.” Unlike engineering, social science does not constitute an implementation wherein most results take a concrete form, so it may be difficult to understand the results. To evaluate the recovery that I was practically involved in, it is important to await the judgment of future generations. Society is originally a multi-layered entity and is difficult to understand. It does not change dramatically after a disaster, and basically, the characteristics before the event get drawn in as is. Social science searches for something that constitutes the basis of people and society, to observe “as objectively as possible” the symbolic representation of the story told by people and society, and to then make a “modified” proposal. It is important to avoid oversimplifying and sensationalizing things for understanding, analysis, and making proposals.
Discovery of an exception to rare movements of active faults

Active faults are faults that have experienced repeated ruptures in the past and are likely to cause earthquakes in the future. The cause of intraplate earthquakes shallower than the Earth’s crust is an abrupt rupture of such active faults. The number of active faults identified on the islands of Japan is approximately 2,000. Naturally, large intraplate earthquakes occur once or a few times in thousands of years on average, reflecting the slow strain accumulation in the crust.

A new study led by Dr. Yo Fukushima, Associate Professor of Saitama University, discovered one active fault in northern Ibaraki Prefecture, approximately 130 km north of Tokyo, that had ruptured twice on March 10, 2011, and December 28, 2016, with a time interval of only five years and nine months. The research team proposes that the 2011 Great East Japan Earthquake and the 2016 Ibaraki Earthquake are the results of these movements. Discovery of this exception to the widely accepted conventional wisdom of infrequent ruptures of active faults leads to updating the way we see earthquake generation on active faults and changing the way we assess future earthquake occurrences.

Evidence and cause of reactivation of an identical fault within six years

Fukushima’s expertise has been on the satellite geodesy. There are a number of earth-observation satellites flying around the Earth that are equipped with a specific type of radar called synthetic aperture radar (SAR). A SAR antenna on a satellite emits and receives microwave to know about the change over the ground surface. More specifically, by detecting the difference in the return time of the microwave signals at two different timings, we can measure the amount of ground displacements that occurred during the acquisition interval on a wide area in the looking direction of the satellite radar.

Just after the 2011 Great East Japan Earthquake, Fukushima processed the data of Advanced Land Observing Satellite (ALOS) operated by the Japan Aerospace Exploration Agency (JAXA) to map the ground deformation on northeast Honshu Island, which included the area of the megathrust (March 11, 2011, earthquake). When the magnitude 6.3 earthquake on December 28, 2016 struck, Fukushima analysed the data of ALOS-2, successor of ALOS, caused by the event upon request from another researcher. He did not, however, intend to look further in detail about this event at first. Approximately 5,000 earthquakes on a yearly average are recorded by the Japanese seismological network, and many of them fall into the same region 1). The northern Ibaraki area in particular had experienced a swarm of earthquakes after the 2011 megathrust, including a few earthquakes larger than magnitude six. “The magnitude 6.3 event was one of them,” Fukushima states.

Fukushima was much more intrigued by the earthquake when he heard from his roommate colleague Professor Shingo Toda that surface ruptures had been observed at the same location as the ones caused by the March 10, 2011, earthquake, and that an identical fault may have been reactivated. Could that really happen? Shouldn’t faults be trapped once they rupture? Maybe the surface ruptures were caused by some surficial process or landslides triggered by the earthquake? Fukushima, who had already computed the deformation caused by the two earthquakes, decided to investigate in further detail [Figure 1].

In addition to these analyses, Fukushima’s colleagues went to the site and investigated the features of displacements and fractures on the ground and human-made structures such as piers of a bridge, something that cannot be known from satellite data. This survey additionally confirmed the repeating nature of the fault rupture. The double-check, from the sky and from on-site investigation, led the research team to conclude that the same fault was reactivated twice with the short time interval.

Now that the extremely rare phenomenon was confirmed, Fukushima asked himself why this could happen. To look for a clue, he analysed the GNSS data that recorded displacement time-series in the northern Ibaraki region and surroundings.2) The region is very much deformed, it means that the amount of strain accumulation around the fault is large, and this could explain the early earthquake recurrence. The result of the deformation analysis was remarkable—the map clearly indicated a large strain localized around the fault [Figure 4]. Intraplate earthquakes in Japan commonly exhibit only subtle strain after their occurrences, but the level of strain after the March 19, 2011, earthquake was as large as that of the earthquake fault, which had been observed for Japanese intraplate earthquakes. This period of rapid strain build-up coincides with the period where a wide-scale deformation has been taking place after the 2011 Great East Japan Earthquake. Fukushima and his colleagues inferred that the large-scale post-earthquake movement of the 2011 megathrust induced local deformation around the active fault, stressing the fault with a rate much faster than usual, and eventually caused the fault to re-rupture. The results were published in the journal Nature Geoscience 3) last year.

Future Prospects

Fukushima states that there remain a number of mysteries about the mechanism of earthquake generation on active faults. This Earth is extremely complex, and it is impossible to conduct realistic experiments to reproduce and validate the behavior of active faults. To know about past activities on active faults, trench surveys have been effectively used.

By combining identification of strata offsets and dating, we can calculate the approximate intervals of fault ruptures. Researchers have widely adopted a model that assumes regular repeating of earthquakes based partially on the outcomes of trench surveys. “But our study made clear that this model is not applicable when a large external force is applied to the fault system,” said Fukushima.

Has this kind of phenomenon occurred in the Earth before and in other places? Fukushima thinks “No. But it is difficult to know that from trench surveys. We cannot distinguish two successive ruptures occurring with a short time interval.” The trace of multiple ruptures is recorded in the strata when the events are temporally separated long enough for a new layer of strata to form in between.

The satellite geodesy can be a game changer. Since the early 1990s satellite SAR data have been widely provided to the research community, and analysis techniques have been rapidly developed. This rising trend is still continuing with the advent of new satellite missions. Based on such advancements, research on the mechanism of active faulting using satellite geodesy has been expanding. “The earth-observation satellites cover most of the Earth’s land surface, and the data are continuously archived. Large earthquakes occur not only in Japan but also in other countries, and we can study them with the SAR data.” Finding other cases of extremely rapid fault reactivation using satellite geodesy may lead to development of a new earthquake occurrence model.

The research deciphered a mystery of a complex behavior of the Earth. By conducting a series of careful analysis of high-quality data and logical build-ups in multiple disciplines. However, the inside story indicates that the process toward a discovery is not always elaborate or sophisticated. Human factors such as encountering clues by chance or relying on insight play an important role for Fukushima’s case, and this is perhaps ordinary for scientists.

When an earthquake occurs, various seismic motions occur such as wiggle shaking and slow shaking. The times associated with a single shake is called a “period,” a sharp shake with a short cycle is referred to as a “short-period seismic motion,” and a slow and large fluctuation with a long period is referred to as a “long-period ground motion.” High-rise buildings commonly resonate with long-period ground motion; especially high-rise floors experience significant sway motion. In Japan, especially after the Great Hanshin-Awaji Earthquake of 1995, an increased number of buildings were equipped with seismic isolation to mitigate earthquake shaking and prevent damage due to a large earthquake (there are seismic isolation devices also in the RIDE building). Dampers are attached to the seismic isolation structure to attenuate the shaking motion of the building. Recently in high-rise buildings the number of different designs to install dampers has increased. However, while current dampers can effectively reduce building damage caused by sharp and short vibrations, they are not effective at preventing long-term shaking in high-rise buildings. If the number of dampers were increased to reduce the amplitude caused by rapidly occurring long-period ground motion during earthquakes, there is a possibility of amplifying the shaking caused by frequently occurring short-period seismic waves.

The research team of Prof. Kohji Ikago has been working on the development of a “tuned viscous mass damper” that protects buildings from long-period ground motion. This type of new damper system can absorb vibrations from a slow shake. The idea of “dynamic mass” used in this damper was proposed in Japan in the 1970s and was applied to the suspension of race cars abroad in the 2000s. However, Prof. Ikago’s group was the first in the world to develop large-sized dampers that can be used to suppress the shaking of large buildings. They succeeded in performing experiments and producing life-size prototype dampers in 2009, then in 2013, for the first time, their damper system was installed in a building in Sendai. Since then, they have been working on the development of vibration dampers that are effective at suppressing long-period ground motion.

At the time of the 2011 Great East Japan Earthquake, the Atlakukonnansha (commuters stranded because of a disaster) in the Tokyo metropolitan area garnered attention. In metropolitan areas, paralysis of the transportation network had created several issues, as many people had to give up on returning home and stayed in temporary accommodations, or even had a great struggle to walk home for a long distance. At that time, the issue of Atlakukonnansha arose not only in metropolitan cities but also in provincial cities, including Sendai. In Sendai City, it is estimated that approximately 11,000 people were stranded around the Sendai station area. Furthermore, the influx of these people into designated evacuation centers, such as nearby gymnasia of schools, caused those shelters to become overcrowded, and confusion arose about the evacuation center’s administration. Yet, not all the relevant details of Atlakukonnansha in provincial cities have been fully clarified. Even in provincial areas, it is important to set up appropriate measures that are suitable for the region, considering the fact that the number of people, flow of persons, and regional characteristics differ from those of the Tokyo metropolitan area.

With this in mind, Ass. Prof. Tatsuya Torayashiki and Prof. Hiroaki Maruya conducted an interview survey targeting municipal officials from 12 cities of South Tohoku (including Sendai), Kanto, Chubu, and Kansai regions to identify effective measures to address the issue of Atlakukonnansha in provincial cities. Officials in municipalities where the Great East Japan Earthquake hit were asked questions about the specific situation at the time and measures adopted for improvement thereafter, and officials of other municipalities were asked about the measures that are currently in progress based on the characteristics of the region.

Survey results showed that most of the local cities that had experienced the earthquake did not have preventive measures set up to address the issue of Atlakukonnansha at all times. However, the results also show that later, many of them established measures to reduce the concentration of Atlakukonnansha at train stations when trains stop running because of the disaster and made arrangements to direct Atlakukonnansha to places other than the designated evacuation centers for local inhabitants.

Additionally, it was observed that some municipalities which learned from the lessons from the disaster have developed effective solutions. For instance, the City of Sendai signed a “Temporary Accommodation Agreement” with companies such as commercial facilities and hotels around the station as well as agreements with organizations related to building technology to dispatch technicians to check the safety of the temporary accommodations. Based on these agreements, in case an earthquake strikes, the city can request the companies under the agreements to open up the temporary accommodations and on the other hand ask the organization to dispatch technicians who can judge the safety of the buildings of the accommodations. These arrangements can enable the accommodation of Atlakukonnansha at an early stage after a disaster and can prevent excess influx into the designated shelters for local residents. These arrangements also reduce workload and the risk of safety verification work of the companies. Additionally, the City of Sendai has conducted the training for people working around the station to evacuate Atlakukonnansha every year since 2014.

Prof. Maruya and Ass. Prof. Torayashiki published “A Guide to Address the Issues of Kitakukonnansha in Provincial Cities,” which presents an outline of the problem and a summary of the advanced measures, including those of Sendai. Ass. Prof. Torayashiki notes, “Through the survey, we found that there are differences in the approach to the Atlakukonnansha issue depending on the region. We also found that some municipalities do not have specific knowhow yet, despite an awareness of the need for measures to address the issue. It is our earnest desire that they refer to our report and guide.”
The day of the exercises

The day was clear, and there were no clouds in sight. At 8:30 am, a major tsunami warning was given, and the group leaders track these signs to ensure no one is left behind and flee themselves as well. The residents of the southern part of the district went to Toyoma Junior High School, their designated evacuation site. Other residents went to the Uuiso Meeting Hall, located on higher ground in the north of the district. Those playing the tourists on the beach went to the Uuiso Meeting Hall through the areas specifically planted for disaster risk reduction. The path toward the Meeting Hall is steep, but it took us around six minutes, running at top speed, to reach the evacuation site. A team of drone experts from Sugiyasu’s collaborative telecommunications research lab and the company Sonamauti used aerial cameras to ensure no tourists were left behind. After everyone arrived at their evacuation sites, each group informed the ward head how many were in the group and the situation of the route they took to reach the meeting place. The first people arrived at 8:41 am, and the last came at 8:53 am. All 126 participants, from infants to the elderly, reached the meeting place in just a little over twenty minutes.

Sugiyasu addressed the crowd of evacuees to end the drill with the following words: “With this drill, we have seen that it is possible, even for people who are in wheelchairs, to evacuate the district in roughly 10 minutes from any location in the area. A tsunami might take only 15 minutes to reach Uuiso District, but in this drill, we have clearly seen that it is possible to evacuate everyone safely if you leave your homes within 5 minutes of the start of an earthquake. So, please remember that.”

After the drill

What left the deepest impression on me from the drill was just how quick and agile all the participants were. Fifteen minutes after the alarm had rung, nearly everyone had reached the meeting point. Even theelaying up following the drill was conducted efficiently, and the entire event ended well ahead of schedule. I heard someone say, “Now that I’ve actually performed the evacuation procedure, I found some problems in the designated evacuation route to be solved.” This comment and others like it showed that the participants gained something from the experience. More than seven years have passed since the 2011 earthquake, and in areas affected by the disaster, a steady decline in the numbers of people taking part in disaster drills has been evident. However, in Uuiso District, the same number of people took part in last year’s drill and this one, around 85% of the total residents of the district. Those involved in the drill, beginning with the ward head for Uuiso District, all judged that this year’s exercises were a great success, and they immediately began planning the drill for next year. One strong point of this drill is that it makes use of tightly knit human relationships together with advanced technology. The researchers regularly share their results with the townpeople. Sugiyasu commented that “The drills we perform here at Uuiso District always introduce pioneering ideas, but those ideas can only come into play because of the relationship of trust that exists between the researchers and the residents of the district. Now, many of the ideas for the drills have almost reached full maturation. However, some elements still must be revised. We hope to keep improving.”

Drones were used to gather aerial footage of the evacuation of tourists. Drones were used to gather aerial footage of the evacuation of tourists.

1) City of Iwaki Higashinihon daishinsai no shogen to kiroku (Testimonies and records regarding the Great East Japan Earthquake), p. 35.
2) National Census, 2018
3) City of Iwaki (2016) "Ichikawa 30 km radius 1 inch map (2016 population of Iwaki as of April 1st, 2016), p. 11.

The areas of greenery that were planted next to the coast in Uuiso District to alleviate the effects of tsunamis. The pine trees are beginning to sprout.

Assistant Sugiyasu keeping records of evacuees’ time of arrival.

The sign was placed on every door to enable a quick reference for how many had been evacuated. It says: “Evacuated.”
Announcing the launch of the 2nd World Bosai Forum In Davos, Switzerland

The “Symposium on Risk, Resilience, and Disaster Management,” hosted by the Global Risk Forum (GRF), was held in Davos, Switzerland, on November 23, 2018. A total of 30 people participated, including representatives from UNESCO, the Joint Research Centre of the European Commission, as well as disaster management experts from various countries, and members of the media. Prof. Fumihiko Imamura, the Director of IRiDeS, was also invited to the symposium, along with other IRiDeS faculty members. He reported on his on-site research on the earthquakes and tsunamis in Palu, Indonesia and participated in a discussion on the importance of flexible solutions to disaster management and personnel training, alongside other honor guests. The launch of the 2nd World Bosai Forum was also announced jointly by Dr. Walter Ammann (founder and the CEO of GRF), Prof. Imamura (chairperson for the executive committee of the 1st World Bosai Forum), and Prof. Yutaka Ono (Secretary general of the 1st World Bosai Forum). The second forum is scheduled to be held in Sendai, from November 9 to 12, 2019. Prof. Imamura stated his prospect that the 2nd forum would also be attended by multiple stakeholders involved in disaster risk reduction in government, academia, private sectors, the media, etc.

Public Relations Office Column
“Forecasting”

2019 is the last year of the Heisei period (in the Japanese calendar). Exactly 50 years ago, in 1969, humankind landed on the moon for the first time through the Apollo space program. Those days were the peak of confidence in science, and it was thought that it in 50 years human beings would certainly be living on the moon and earthquakes and disasters would be predicted as a matter of course. As you can see, the result is that we are reminded each year how natural phenomena are profoundly beyond human control and knowledge. Moreover, 30 years ago, in 1989, was the beginning of Heisei, with the stock market at its highest value in history and Japanese economy reaching its peak. The word “bubble” was given in retrospect. In those days, people in it, including myself, were all ecstatic believing that the economic boom would last forever. Prediction is impossible even for familiar events such as human economic activity. It was also the year that the Berlin Wall collapsed, an event that nobody expected. Speaking of expectations, 1500 was regarded as the year the Earth would be destroyed and met its unprecedented end after a century of predictions deemed the “Prophecies of Nostradamus,” but naturally, nothing happened.

Eight years have passed since the Great East Japan Earthquake, an enormous disaster that it is said to happen only once in 1,000 years. This disaster made people realize how difficult it is to predict these types of events; therefore, an approach that involves mitigating the effects of a natural disaster was adopted throughout the country in an effort to flexibly cope with the next disaster, which is absolutely possible, and to reduce its damage. However, there are two years left until the end of the government’s 10-year reconstruction period (end of March 2021). Although the development of the difficult aspects is almost complete, from now on, the results of the easy aspects are important, such as passing down memories and lessons learned from disaster survivors and victims.

Takashi Tanaka, an authority in physics and seismology and also known as an essayist, says, “It is easy to be too afraid or not afraid at all, but to be duly afraid is rather difficult.” To be properly afraid, it is essential to communicate accurate information, knowledge, and lessons that are easy to understand. In the public relations office, we will continue to disseminate information domestically and internationally while considering this perspective. As the saying goes, “The today you lived in is the tomorrow that the person who died yesterday so wished to live.” While praying for those who have passed away because of earthquakes and disasters, we, who are alive, should all together think about what we can do to prepare for future disasters and what kind of work can be done.