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INDEX

Feature Article

MODERN SOCIETY AND DISASTERS:

From disaster prevention
to RESILIENCE

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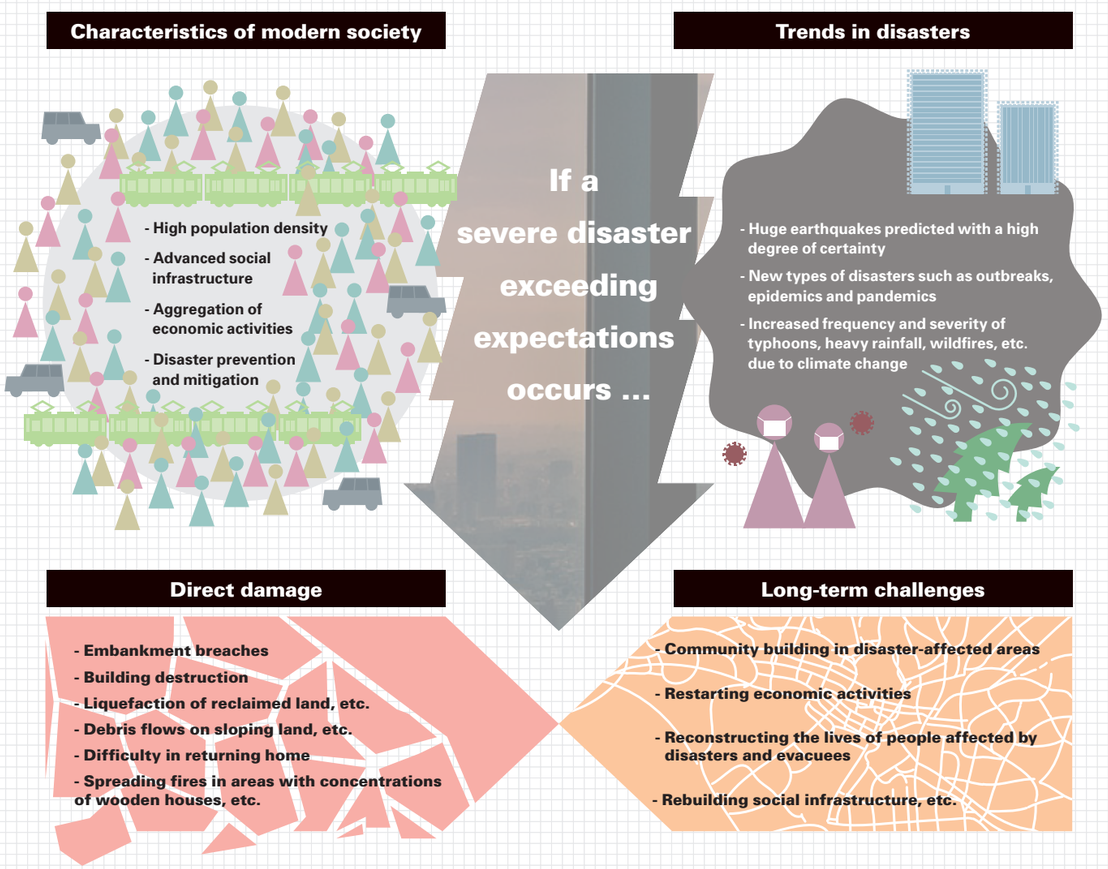
GRADUATE SCHOOL OF FRONTIER SCIENCES, THE UNIVERSITY OF TOKYO

Feature Article

MODERN SOCIETY AND DISASTERS:

From disaster prevention to RESILIENCE

Ten years have passed since “Great East Japan Earthquake” (the 2011 Tohoku Earthquake and Tsunami). During this period, huge typhoons, localized heavy rainfalls, and major earthquakes and other disasters have occurred nearly every year. Once a disaster exceeds expectations, the effects tend to be enormous and prolonged. This feature article summarizes the relationship between modern society and disasters, and presents various studies in the Graduate School of Frontier Sciences that explore how to mitigate the effects of serious disasters and contribute to rapid recovery from such events.



RESILIENCE will be important, as well as disaster prevention and mitigation

MODERN SOCIETIES REQUIRE MEASURES THAT ALSO ALLOW FOR THE "UNEXPECTED"

Vulnerability due to improved comfort and strength against disaster

In addition to becoming more and more efficient and comfortable as infrastructure is developed for the populations and high value-added industries that concentrate in large cities, modern societies have definitely become stronger against disasters like earthquakes, heavy rainfall, and typhoons as well as relatively small-scale disasters that occur in short cycles.

However, because of this, when an "unexpected" severe disaster occurs, like the 2011 Tohoku Earthquake and Tsunami, in addition to physical damage, new vulnerabilities have emerged as. urban functions themselves are damaged extensively in a chain reaction, and secondary damage and tertiary damage are prolonged

It is not possible to completely prevent or protect against any risk. In terms of the costs involved for equipment and materials “disaster prevention" needs to take a balanced approach. For example, the seismic resistance of buildings (seismic standards) aims to prevent buildings from collapsing in "earthquakes that may occur once in several hundred years" (JMA Seismic Intensity 6+). The designs of dams and river levees assume heavy rainfall that is likely to occur at most once every 200 years. By the very nature of disasters, we can never know what will happen, no matter how well we prepare.

In recent years, due to abnormal weather caused by global warming, giant typhoons and localized heavy rains have frequently occurred and become serious problems. With regard to earthquakes, concerns persist about earthquakes to hit the Tokyo metropolitan area (about M7), with a 70% probability of occurring within 30 years, and the Nankai Trough Mega Earthquake (M8 to M9 class), with a 70% to 80% probability of occurring within 30 years.

Thinking about measures against disasters

Disaster prevention

Efforts focusing on tangibles, such as installing dams and embankments, improving earthquake resistance of buildings, and building sewers and rainwater storage facilities in urban areas

Disaster mitigation

Efforts focusing on intangibles, such as evacuation training, hazard maps, emergency notification emails, and evacuation guidelines

RESILIENCE

Efforts focusing more on the recovery process based on community vitality, the emotions of thoughts who are affected by disaster, etc., when an unexpected disaster occurs

Efforts towards "RESILIENCE" focused on unexpected situations

Pointing out the importance of resilience in disaster measures, in addition to conventional efforts towards disaster prevention and mitigation, is Professor HONDA Riki of the Department of International Studies.

"Resilience is not something that will replace disaster prevention or mitigation, but rather it is an effort that focuses on unexpected situations and aims for a higher level of disaster measures across society as a whole. In disaster measures, the main line of thought used to be disaster prevention by predicting and preventing. Later, in order to prepare for serious disaster events that cannot be fully prevented, disaster mitigation was added to prevent and reduce damage, and now emphasis has focused on resilience which considers recovery efforts in advance."

From the experience of the 2011 Tohoku Earthquake and Tsunami and other disasters, we have learned that it is important to prevent catastrophic damage to the critical infrastructure and systems on which society depends, as well as how to reflect the thoughts and hopes of the victims in the recovery process. That is exactly what "resilience" is all about.

Disaster measures should not consider disaster prevention, disaster mitigation, and resilience separately. It is important to understand that they should be accumulated and connected to each other.

At the Graduate School of Frontier Sciences, we are conducting research in various fields, not only on the direct topics of disaster countermeasures, but also those linked to disaster prevention, disaster mitigation, and resilience. Disaster preparedness is a social need that requires the combined efforts of science across many fields, and is a topics that exhibits the true value of this graduate school’s pursuit of a transdisciplinary approach to the sciences.

Idea of and efforts towards resilience

HONDA Riki Professor
Department of International Studies

Historically, Japan has suffered many disasters and has produced considerable results as an advanced disaster prevention country. As a result, the image of "predicting," "protecting," and "withstanding" is widely established in society. However, due to numerous disasters such as the 1995 Kobe Earthquake (the Great Hanshin-Awaji Earthquake), and the 2011 Tohoku Earthquake and Tsunami (the Great East Japan Earthquake), we have witnessed that modern society cannot be completely free from massive disasters. We have also recognized the importance of society recovering after such extremely severe disasters.

Based on our experience, Japan has played a leading role in the world, such as introducing the concept of "Build Back Better" into the Sendai Framework for Disaster Risk Reduction, which is a guideline for the International Conference on Disaster Reduction. "Resilience" is one of the keywords of this framework. Disaster prevention and mitigation are, of course, important, but the word "resilience" indicates that we must also recognize that there will be disasters that exceed our preparedness and think about how to recover from them.

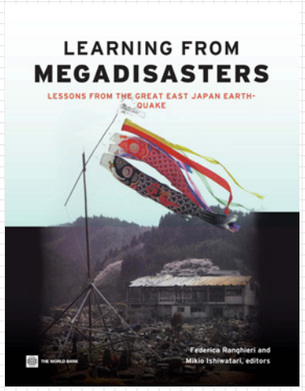
The main players in the recovery are the people and communities that make up society. If relationships of trust are fostered among people and communities, and if cooperation between citizens, government, businesses, and other players are also close, they will be able to respond promptly and smoothly to unexpected situations and the recovery will be faster. This is how resilience will manifest itself in society.

As yet resilience as a disaster countermeasure generally remains unnoticed. In fact, the better things seem to be the less noticeable resilience tends to be. For example, although the retrofitting of infrastructure before the 2011 Tohoku Earthquake and Tsunami is not widely known, the reinforcement enabled access to affected areas and enabled restoration efforts to proceed more quickly. I believe that this enabled recovery support and other activities and led to resilience. Further examples that contribute to resilience include disaster prevention hubs that can be used even after a large earthquake, shelters that provide safe and secure evacuation, and insurance that financially supports people affected by disasters.

Resilience leads to an extraordinary improvement in the quality of recovery and a return to normal life. Resilience cannot be achieved simply with knowledge of the natural sciences and engineering techniques, but requires broad knowledge for thinking about people and society, beyond the bounds of humanities and sciences. By unifying such a wide spectrum of knowledge, we can see totally new possibilities for disaster countermeasures.

Column

Global trends in disaster management measures and issues in Japan



Cover of [Learning from megadisasters: Lessons from the Great East Japan Earthquake] https://openknowledge.worldbank.org/handle/10986/18864

In recent years, the world has seen an increase in the number of large-scale disasters, and countries have strengthened their efforts to manage such disasters. The first requirement is, as always, rescue and relief. Current understanding recognizes that search and rescue alone is not sufficient and countries have started to emphasize the "disaster management cycle," which integrates disaster prevention, disaster mitigation, and resilience as one.

Furthermore, the trend across the globe is for experts in a range of fields to cooperate on preparing for disasters throughout society, including in infrastructure, urban planning, and the community.

After the Great East Japan Earthquake, I led a World Bank project to compile the lessons to be learned. To a certain extent it was determined that a culture of disaster prevention and the construction of levees mitigated the damage. On the other hand, in terms of how the tsunami warnings were issued, and how residents understood them and acted in response: I pointed out that there might have been issues with communication.

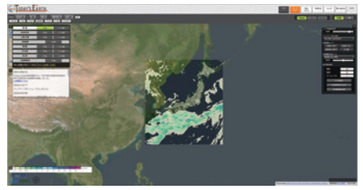
Science and technology are naturally important in mitigating disaster damage, but it is also important how you connect them to the behaviors of individuals. I believe that research and policymaking need to incorporate the behavior of individuals

ISHIWATARI Mikio Visiting Professor
Department of International Studies

RESEARCH ON DISASTER PREVENTION, DISASTER MITIGATION, AND RESILIENCE UNDERTAKEN by GSFS

The impact of unexpected catastrophes on modern society is entering a new dimension. To prepare for this, it is essential to enhance the efforts of "disaster prevention," "disaster mitigation," and "resilience." Presented below are case examples of research in GSFS.

Monitoring rivers throughout Japan with data from satellite and other sources: Developing a practical measure of "flood probability" similar to that of precipitation probability



Top page of "Today's Earth - Japan" https://www.eorc.jaxa.jp/water/map/index.html?area=japan

According to the "flood forecast" issued by the Japan Meteorological Agency" overflow warning information" (the third of five levels) is provided two to three hours before a river is predicted to reach the level at which it risks overflowing.

On July 2018, a levee was breached in Kurashiki, Okayama pref. due to torrential rains. Although an overflow warning was issued around 10 pm, at around midnight, a large-scale overflow occurred and 51 people died showing how difficult it is to respond in two to three hours.

Therefore, together with JAXA, we have been operating an on-land water cycle estimation system called "Today's Earth - Japan," which provides estimates of precipitation and river flow volumes over the whole of Japan for up to 39 hours in advance, every three hours, eight times a day, at a resolution of about 1 km.

During the 2019, Reiwa 1 East Japan Typhoon (Typhoon Hagibis), the system forecasted flows in advance of a level expected about once every 200 years at 130 of the 142 locations where levees were breached 32.3 hours in advance (on average). The capture rate was about 90% and the false alarm rate was about 60%. Forecasting flood damage perfectly is impossible, but I believe it is highly significant to give notice of a risk as early as possible.

Incidentally, "flood forecasting" requires legal permission, but the Japan Meteorological Agency has said that for the time being it will not issue permits to the private sector. For this reason, at present, we are publishing information in the form of joint research on a special website, as well as providing detailed information to over 30 local governments.

The challenge for the future is increasing the capture rate and decreasing the false alarm rate. Eventually, we would like to produce a "flood probability" in the same way as existing "precipitation probabilities" are done.

YOSHIMURA Kei Professor
Department of Natural Environmental Studies

ONUKI Motoharu Associate Professor
Graduate Program in Sustainability Science - Global Leadership Initiative

Imagining "extremely unpleasant situations" and discussing them in advance will lead to rapid recovery and a sustainable society

Resilience and sustainability are different concepts, but in disaster-prone Japan, being prepared for natural disasters is a precondition for a sustainable society.

In light of the experiences from the Great East Japan Earthquake and the increasing severity of meteorological disasters, hazard maps have been reviewed in recent years. Edogawa Ward, Tokyo, has created a hazard map that calls for wide-area evacuation from the entire ward to other wards and cities, with the expectation of a large-scale flood damage event that will submerge nearly all areas of the ward. Imagining such "extremely unpleasant situations" and thinking about evacuation methods is important.

Challenges confront society even after escaping death by evacuating. If buildings and land are severely damaged, disputes arise between those who want a quick restoration in a form near their original condition and those who wish to build back in such a way as to create a town that is safer and more resilient to future disasters. The lessons I learned after visiting affected sites after the Great East Japan Earthquake and providing support at town meetings and other activities was that if people want to rebuild their town more safely than before, it is critically important that before disaster occurs you have the ability to imagine the "extremely unpleasant situation" of "your own town suffering such severe damage that it has been reduce to vacant lots" and then be able to engage in tenacious debate.

When building a sustainable society in a disaster-prone country, it is not possible to protect human lives and properties solely by constructing civil infrastructures. Firstly saving lives by evacuation, and then having the resilience to Build Back Better after towns and buildings are destroyed is essential. I believe that it is important for each of us to make efforts to understand the risks over a long time span based on history and geoscience and to not avert our eyes from that which is unpleasant.

Recovery process in Ōtsuchi, Iwate (September 2018)

SHIMIZU Ryo Associate Professor
Department of Socio-Cultural Environmental Studies

The essence of reconstruction is for survivors to look forward, even if only a little, and to have the sense to try something.

Map Sales venues for the Heart Knit project (recovery goods) expanded by supporters throughout Japan. Dozens of locations from Sapporo to Naha, and even overseas in Singapore.

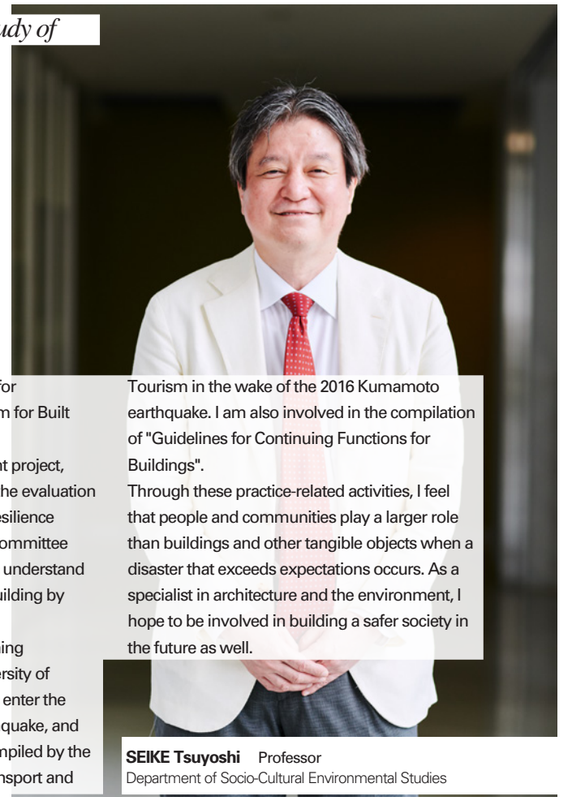
Photo Joint sales event for recovery goods held at an event space in a Morioka department store.

In sociology, my specialty, disaster countermeasures were a minor topic. However, when I was a graduate student, I was involved in the area that suffered the most serious damage from the Great Hanshin-Awaji Earthquake, and I was shocked. Since then, I have been continuously conducting field research and clarifying the conditions for community development.
Following the Great East Japan Earthquake, I joined the UTokyo Disaster Area Support Network formed by The University of Tokyo researchers and staff members and provided support making use of my specialized knowledge in response to on-site requests. I also went to the Tohoku area and provided support for sales of goods produced from recovery areas. There were many reconstruction projects with a lot of money invested, but they don't always work. By contrast, a group that began Sanriku hand-knitting to produce and sell recovery goods has become independent and is now making progress including engaging in transactions with several companies. It's a small challenge from the perspective of the entire disaster area, but I think the essence of reconstruction is the sense of being able to look forward and try something even though the future is grim.
And, what is needed is a new type of volunteer. When people think of disaster relief volunteers, they have a strong image of clearing away rubble, shoveling mud, and serving food, and when that stage is over, the local recovery support centers close. However, lifestyle support and job creation hold the key to the next phase, which requires volunteers in fields like management and marketing.
How will sociology respond to these needs on the ground? I want to continue pursuing the potential of "practical knowledge."

Formulating assessment systems and guidelines, as part of the study of earthquake resistant walls, ceilings, etc.

Ceiling damage from the Noto Peninsula earthquake

Seismic test of ceiling on shaking table using a real-sized gymnasium

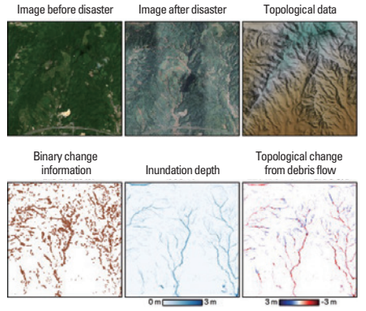


SEIKE Tsuyoshi Professor
Department of Socio-Cultural Environmental Studies

One of my research topics concerns the earthquake resistance of non-structural components of buildings, such as walls and ceilings. The earthquake resistance of structural components that support the entire building have, to a certain extent, been established in recent years and damage due to strong earthquakes has decreased. Conversely, cases of death and injury due to collapsing walls and ceiling and problems in which buildings including local government offices can no longer be used as disaster prevention hubs have been attracting attention.
In addition to this specialized research, I have also been involved in practical efforts, such as preparing guidelines in public committees. For example, the Research Committee for Comprehensive Assessment System for Built Environment Efficiency, an industry-government-academia joint project, compiled the residential version of the evaluation system called “CASBEE®”. The "Resilience Housing Checklist" created by this committee allows end users and contractors to understand the points of "resilience" in home building by answering simple questions.
In addition, we are considering training "emergency risk judge" at the University of Tokyo to judge whether it is okay to enter the building immediately after the earthquake, and "disaster prevention bases, etc." compiled by the Ministry of Land, Infrastructure, Transport and Tourism in the wake of the 2016 Kumamoto earthquake. I am also involved in the compilation of "Guidelines for Continuing Functions for Buildings".
Through these practice-related activities, I feel that people and communities play a larger role than buildings and other tangible objects when a disaster that exceeds expectations occurs. As a specialist in architecture and the environment, I hope to be involved in building a safer society in the future as well.

Contributing to rapid and accurate situational understanding in the event of a disaster through image analysis using AI (machine learning)

In my laboratory, as a part of geoinformatics, we are working on image analysis using machine learning to understand what is happening on the earth in a timely manner from a large and diverse set of images obtained by visible light, near-infrared, thermal infrared, and microwave remote sensing.



3D change recognition by fusion of simulation and machine learning. Successfully estimating inundation depth during flooding and topographical changes due to debris flow from images before and after the disaster and topological data.

Based on this research, we are also involved in international disaster countermeasures, such as "Sentinel Asia," an international cooperative project intended to contribute to disaster management in the Asia-Pacific region, and the "International Disasters Charter," which was established in 2000. Until now, image analysis in the event of a disaster has mainly been visually interpreted by humans, but image analysis using AI is gradually being used.
In Japan, people often go to the site immediately to investigate, and in the case of flooding of rivers, it is necessary to grasp the depth of inundation in addition to the location of the inundated area, and in the case of debris flow, it is necessary to grasp the position of sediment and the amount of sediment. In order to reach these levels of accuracy we are working with researchers in remote sensing and numerical simulations.
The government currently aims to have an understanding of the damage situation within about two hours from the time of occurrence of the disaster. Using our system with image data, image analysis could be possible within five to ten minutes. There is room for improvement, but I am convinced that it will be a powerful tool to speed up the initial response immediately after the disaster by first issuing breaking news with AI and then checking and correcting it.

YOKOYA Naoto Lecturer
Department of Complexity Science and Engineering

Ideal insurance products that bundle up disaster risks and cover them over time and across space.

I am mainly studying the so-called "economics of uncertainty," - in particular, the roles of insurance and finance in situations such as disasters where predictions are difficult and diverse, both theoretically and empirically.
The basic principle in coping with "uncertainties" that are hard to assess objectively is to "keep the worst possible case as least damaging as possible." This is called the "Maximin Principle."
In attempting to provide something of a conclusion regarding household disaster insurance, it is practically impossible for each household to estimate the probability and/or losses for every disaster type individually. In addition, since the law of large numbers does not apply, it is ideal to insure against losses regardless of disaster types and to diversify risks over time and across space. Examples on the time dimension include compensation schemes financed by long-term sovereign bonds, such as Japan's household earthquake insurance, and examples on the spatial dimension include a global reinsurance mechanism and /or risk shifting through capital markets. In this way, we can move closer to "keep the worst possible case as least damaging as possible."
I am hoping to be able to continue advancing useful knowledge about disaster countermeasures from the perspective of economics.

NAKATA Hiroyuki Professor
Department of International Studies

Summary

Aiming to make further contributions to preparing for mega disasters

In this special issue, we have presented some insights into the impact of a huge disaster in modern society, the relationship between "disaster prevention," "disaster mitigation," and "resilience" to prepare for it, and some specific related research at this graduate school. A wide spectrum of technologies and know-how are required for disaster countermeasures, and we will continue to bring together the wisdom of many researchers to further contribute to the enhancement and improvement of disaster countermeasures.

(Interviews, editing, writing: FURUI Kazutada)

FRONTIER SCIENCES

Aiming for interacting with cause and effect through science and technology in 100 million degree ultra-high temperature plasma

Division of Transdisciplinary Sciences

YAMADA Hiroshi Professor

Department of Advanced Energy
Nuclear Fusion Energy Engineering Course

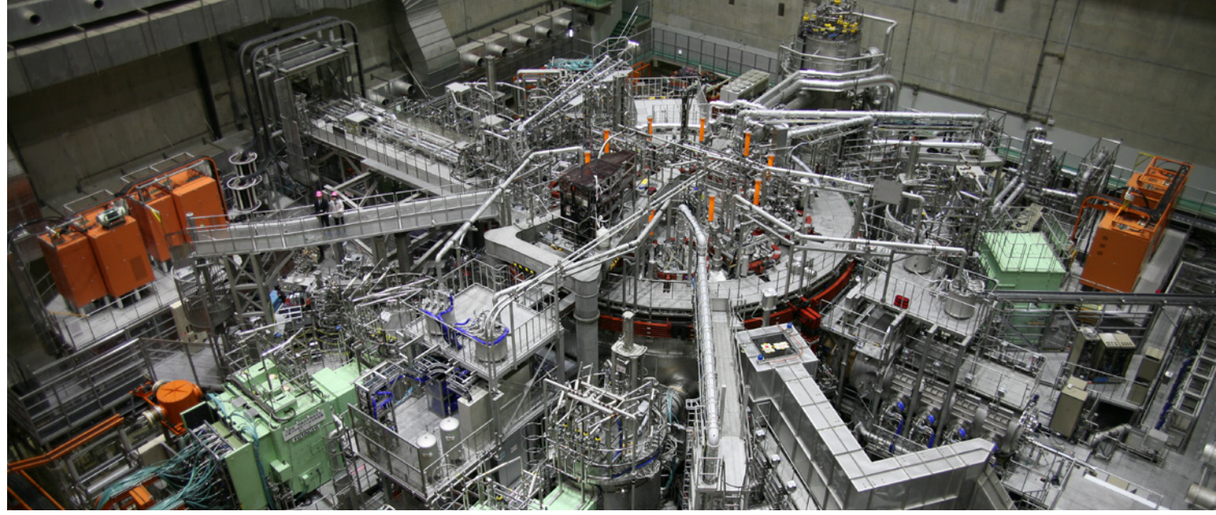
https://www.ae.k.u-tokyo.ac.jp/en/laboratory/yamada-lab/

Realizing nuclear fusion energy requires the control of ultra-high temperature plasma. Through international cooperation the ITER* an experimental reactor under construction that will demonstrate 500,000-watt nuclear fusion combustion is at the leading edge of research and development.

To create a successful nuclear fusion experimental reactor and to connect that to the next stage of developing a prototype reactor to conduct power generation demonstrations requires a much deeper understanding of plasma, an extremely complicated substance.
Causing nuclear fusion reactions requires hydrogen isotypes, the fuel, to be maintained at the super high temperature of 100 million degrees or greater, so the reactor core forms "plasma," an ionized gas. The behavior of the atmosphere and seas is known to be complicated, but plasma is even more complicated because it has an electromagnetic field. These are each macroscopic- sciences that roll up the behavior of individual particles with unlimited freedom and find relationships that can be established between a small number of parameters in an ensemble (statistical group) system.
Nuclear fusion plasma is in a state quite far from thermal equilibrium, as it generates heat and particles by itself and interacts with the exterior, and it is known as a nonequilibrium open system. Furthermore, plasma itself changes the electromagnetic field. Nuclear fusion plasma overflows with nonlinearity and is difficult to predict. Thus, research on fusion plasmas is not only a pursuit of innovative energy production, but it is also rooted in a deep curiosity to understand nature.

My laboratory uses the large helical device (LHD) owned by the National Institute for Fusion Science (NIFS; Toki, Gifu pref.) as a platform (Fig. 1). The LHD is one of the world's leading nuclear fusion plasma experimental devices, and it is actually capable of generating and maintaining plasma at 100 million degrees or more. Experiments are conducted from the control

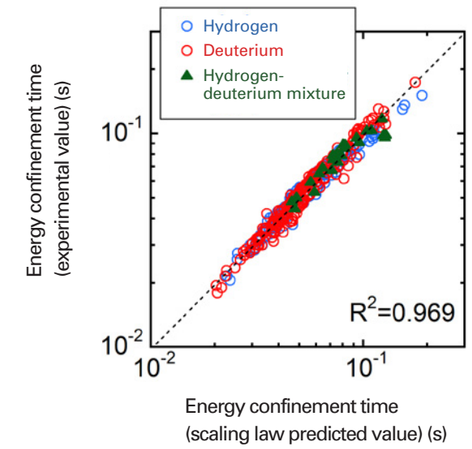
* ITER is a large-scale international project seeking to achieve humanity's first nuclear fusion experimental reactor for the development of nuclear fusion energy for peaceful purposes. Experiments to start in 2025.



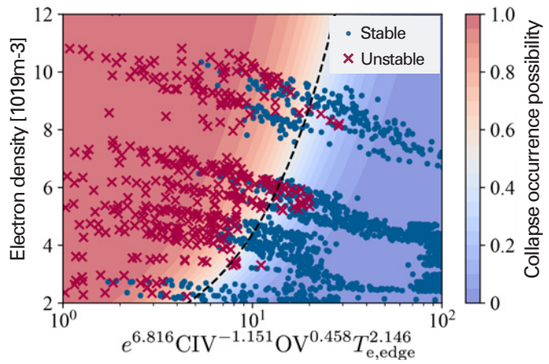
▲Fig. 1. Panoramic view of LHD (provided by NIFS) ▼Fig. 2. LHD control room (provided by NIFS)

room, and are joint researches involving many researchers (Fig. 2).
Although I have not been able to visit the facility during the past year, I have been able to carry out my experiments in a remote environment with the convenience that only an international shared-use device can provide.
Here are two recent research outcomes. The first is the capacity to insulate plasma using lines of magnetic force. Microscopic turbulences produced by temperature gradients of up to 1 million degrees /cm transport heat. This heat transport can be expressed as a macroscopic time constant due to the balance with the heating source. By changing the experimental conditions diversely and broadly, we found a scaling law by employing multiple regression analysis (Fig. 3). In addition to investigating generalizability (correctness) by comparing it with the first-principle theory and dimensional analysis, we are creating unique subjects regarding mass ratio dependence, which has long been a mystery.
The other outcome is foreseeing sudden collapse phenomena (Fig. 4). This is a typical example that is a singular point in differential equations for time development due to nonlinearity. In addition to constructing a model that can be used in actual control, we have obtained hints for physical discussion by a machine learning methodology that differs from the approach using the differential equation model, and exhaustive search with a support vector machine.

In this academic year, "Exploration of new transport paradigms created by phase space fluctuations in nuclear fusion plasma," for which Professor IDA Katsumi of the National Institute for Fusion Science is the principal investigator and I am also a co-principal investigator, was adopted as a Grant-in-Aid for Specially Promoted Research. Based on velocity distribution function that can be measured precisely because it is nuclear fusion plasma, we want to discuss the physics of nonlinear open systems founded upon the definition of entropy, surpassing phenomenology using macroscopic quantity. I've taken the liberty of calling this Boltzmann's dream.



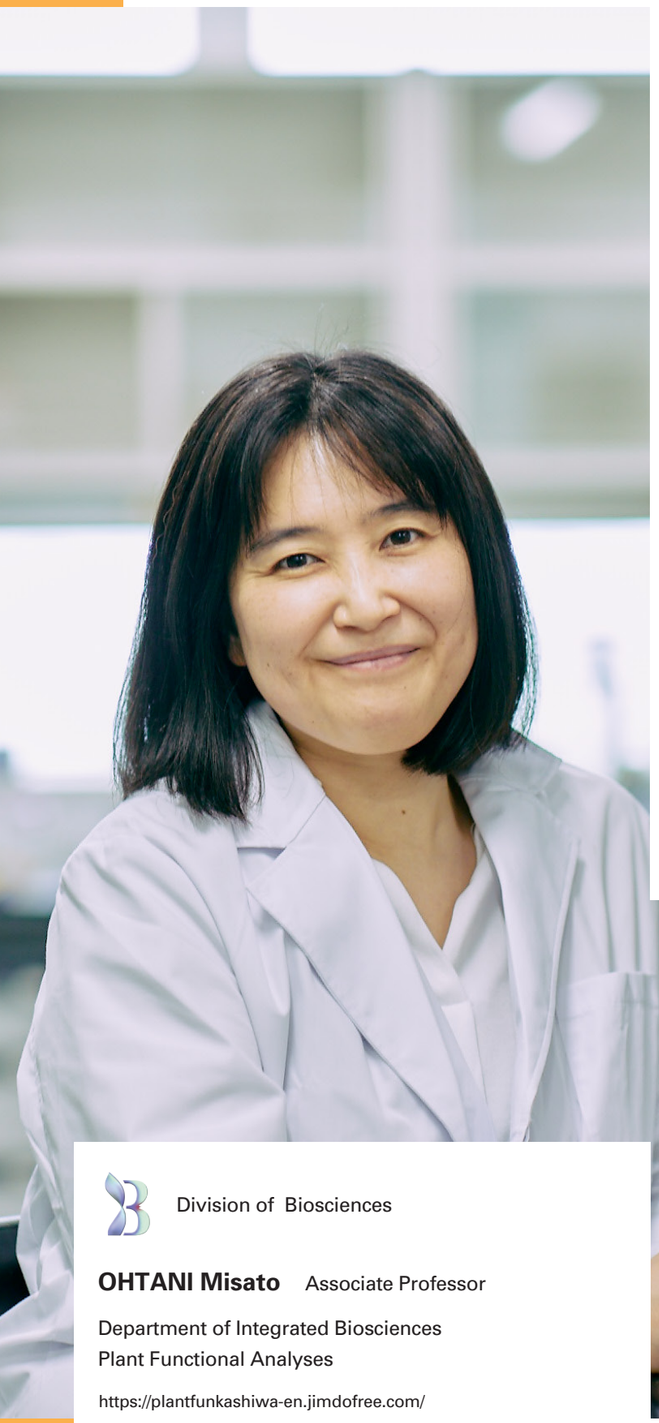
▲Fig. 3. Thermal shielding capacity can be expressed as a time constant, energy confinement time. Multiple regression analysis suggests a accurate prediction model.



▲Fig. 4. In addition to separating stability and instability for collapse phenomena, distance from the separation border can be quantified as a possibility of occurrence. On the x-axis, e, CIV, OV, and Te,edge represent Napier's constant, the line spectrum radiation strength from trivalent carbon ions and tetravalent oxygen ions, and the electron temperature at the plasma edge, respectively.

FRONTIER SCIENCES

Attracted by the lifestyles of plants, so different to our own



Plants develop and grow in ways that are completely different to us animals. They are born without deciding the number of organs they will make during their lives, such as how many leaves they will grow or how many flowers they will blossom over their lives, and they develop and grow to suit the environment where they take root. In addition, they continue living by regenerating lost organs through their advanced organ regeneration abilities, while some of their cells choose death for the benefit of other cells. Why can they do this? — I continue my research with the desire to explain this mystery in terms of molecules.

The capability of a cell to leave a specialized state and recommence cellular division to turn into any kind of cell is called "totipotency." Unlike in animals, almost all types of plant cells can develop and grow while retaining totipotency. I sought entry to plant research out of an interest in this totipotency. From the analysis of an *Arabidopsis thaliana* (Arabidopsis) mutants that showed abnormality in organ regeneration (Fig. 1), which is a typical example of totipotency, I found that the post-transcriptional gene regulation, such as pre-mRNA splicing, is important for totipotency in plant cells.

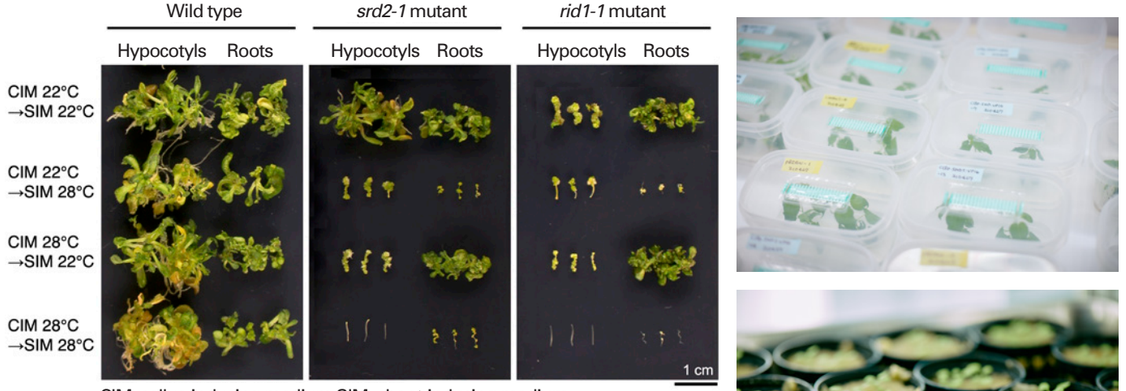
Pre-mRNA splicing is an event that is necessary in the gene expression in all eukaryotes. When I began my research, the identification of specific factors that operated on particular processes was the royal road of plant molecular biology research. The genes that I identified were general factors, which was completely on the opposite side. Thus, I was often unable to get people to understand the significance of my research outcomes at first.

Division of Biosciences

OHTANI Misato Associate Professor

Department of Integrated Biosciences
Plant Functional Analyses

https://plantfunkashiwa-en.jimdofree.com/



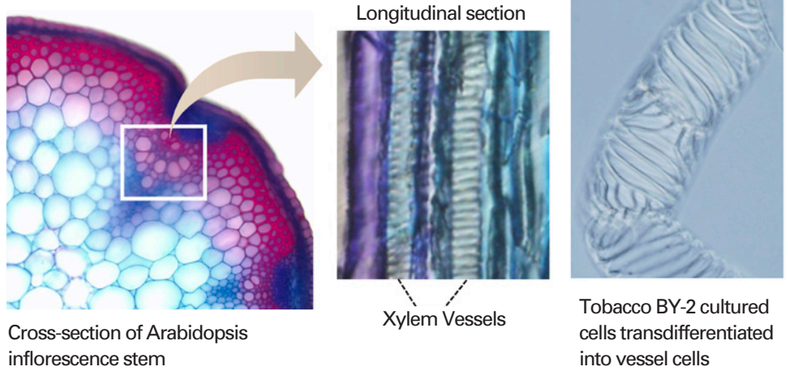
▲Fig. 1. Arabidopsis mutants showing abnormality in organ regeneration
If the hypocotyls and roots are cut out and cultured in a suitable medium, shoots are regenerated regardless of the culture temperature in the wild type (left row). In contrast, with the *srd2-1* and *rid1-1* mutants, shoots are not regenerated when cultivated at 28°C (middle, right rows).

▶In the laboratory, poplars (upper right) and Arabidopsis (lower right) are grown as research materials.

However, the later development of RNA biology and the progress of omics research has revealed how complex and dynamic the regulation of post-transcriptional gene regulation is and what process-specific effects there are, despite being a general factor. We have also expanded our reach to post-transcriptional gene regulation other than pre-mRNA splicing and have extended research to a more advanced level, such as uncovering dynamism itself. In the future, we aim to assemble a molecular model to control plant totipotency based on these outcomes.

What is fascinating about plants is that while most of their cells retain totipotency, some cells completely throw away totipotency for other cells; in other words, they have also developed cell differentiation programs that actually result in cell death. A good example of this is the xylem vessel cell, which transports water (Fig. 2). Xylem vessels in vascular plants have a structure quite like a hose and are formed of hollow cells with thick cell walls that can withstand high pressures. These thick cell walls are the very supply source of woody biomass, the largest biomass on the ground. It is for this reason that they have attracted attention for industrial applications in recent years.
We have identified the VNS family genes as the master factor for xylem vessel cell differentiation and analyzed their functions. Interestingly, algae and mosses, which do not form vessels, also have the VNS family genes. We have also found that woody biomass with different features can be formed when VNS genes from a different plant species are introduced, and that the post-transcriptional regulation is involved in this control.
What did VNS family genes do before being involved in xylem vessel differentiation? How did they acquire a mechanism to create woody biomass? We are conducting research using various types of plants to elucidate these mysteries in plant evolution.

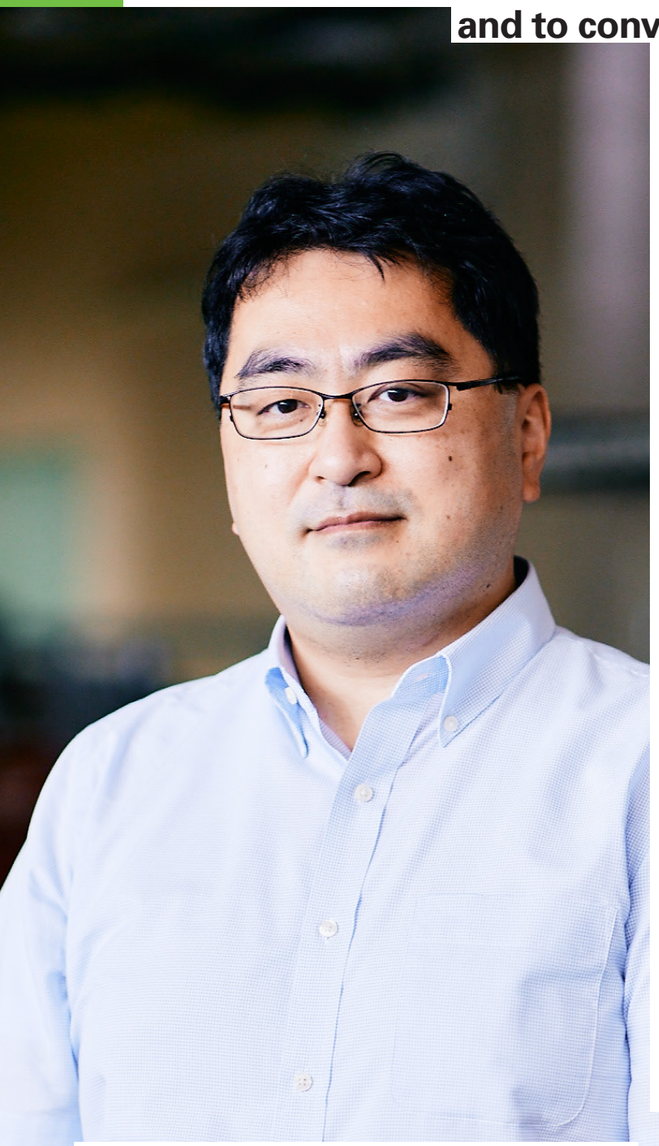
In response to the worsening of environmental problems, which are growing more serious, our society is being forced to change to be more sustainable. If we look back, we humans have long used plants to create food, resources, and living spaces and have developed civilization thanks to their benefit. The powers of plants are now being sought again, with a view towards building a "carbon-neutral" sustainable social structure. I hope to contribute to building a sustainable society by understanding plants more deeply through research and sublimating this into new technologies that draw their powers out even further.



◀Fig. 2. Xylem vessel cells, the cells for transporting water. Xylem vessel cells in a cross-section (left) and longitudinal section (middle) of Arabidopsis inflorescence stem. Their thick cell walls with a characteristic pattern were shown (middle). Tobacco BY-2 cultured cells artificially transdifferentiated to xylem vessel cells by overexpressing the VNS family gene, a master regulator for xylem vessel cell differentiation (right). The spiral thick cell wall pattern similar to the endogenous vessels can be recognized.

FRONTIER SCIENCES

Aiming to render "untreatable waste" harmless and to convert it into resources and energy



While I belong to Environmental Science Center, I am concurrently in charge of educational and research work in the Department of Environment Systems in GSFS.

Environmental Science Center has faculty members with expertise in environmental safety collaboration, and aims to promote transdisciplinary research as environmental safety studies, to improve the level of environmental safety in all research fields, whether in humanities or sciences, and to disseminate information about the results of these efforts. Making contributions to environmental safety management and education based on the research outcomes is also one of the center's missions, and we are, for example, involved in work relating to the management of all waste within the University of Tokyo. Those who do experiment-based work may be familiar with us as "the place where they manage hazardous chemical waste."

I have been stationed at Environmental Science Center for 15 years and have seen how waste products from experiments are managed, so my research interest naturally turned to waste, particularly matters relating to hazardous waste.
Waste is something that our lives can never be entirely free from. Generating waste as we live our lives is unavoidable. The noble spirit of proposing the idea of "zero waste" and aiming to achieve that is important, but achieving this in its real sense is not that simple. For the time being, at least, we must face up to the waste that we create and the environmental burdens that accompany it, and take realistic steps to handle it.
University activities give rise to a variety of waste. Some of the waste generated can be recycled, but others must be treated to render them harmless and disposed of when they are hazardous. At the University of Tokyo, around 200 tons of chemically hazardous waste is collected annually and treated for disposal. Conversely, some waste is not collected for reasons including: waste that contains substances for which no treatment techniques exist and waste without a clear treatment method because information about its contents or composition is lacking. Such waste is currently stored securely so that it can be collected in the future.

Division of Environmental Studies

NUNOURA Teppei Associate Professor

Department of Environment Systems
Environmental Safety Systems

http://www.nunolab.k.u-tokyo.ac.jp/

▲I conduct research and education in cooperation with Assistant Professor SAWAI Osamu.

"Untreatable waste" like this is found everywhere, not just at the University of Tokyo.
In addition, there are many types of waste in our society that are troublesome to handle. These include those that are dangerous to handle and those whose properties are undesirable for recycling. At our laboratory, the main research target is this kind of "difficult-to-treat waste materials." In other words, we are conducting research on the development of elemental technologies related to the detoxification and the conversion of waste into resources and energy, and the evaluation of the environmental safety of these technologies.

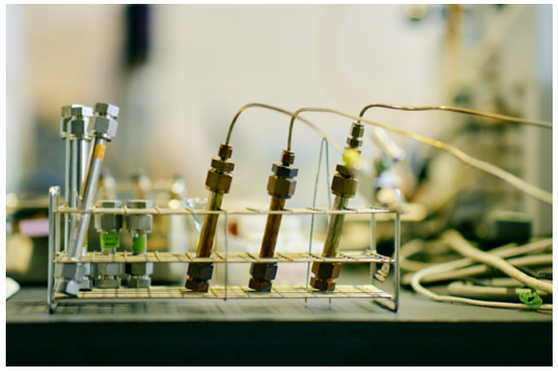
Recent research has examined PET (polyethylene terephthalate) waste with properties that make it unsuitable for recycling and has revealed its carbonization behavior and the gas adsorption characteristics of the carbonized products. In addition, for waste containing osmium, an element that cannot easily be stabilized, we have proposed a new treatment process using a medium called supercritical fluid and are examining it experimentally. Through these studies, we hope to contribute to resolving problems relating to various "untreatable waste" types found in society.

Examining gasification of gutter oil in supercritical water

▶Using a heating device called molten salt bath for gasification experiments.

▼Discussing reactor design with students.

▼Conducting an experiment using a stainless-steel reactor with a volume of about 10 mL.



"From research to IP field: Coming into contact with new learning and technology every day"

I am a Patent Examiner, which involves conducting prior art searches and examining the patentability of inventions.

After completing graduate school, I worked at some institutes, and now I am a patent examiner, examining whether or not an application should be granted a patent from both technical and legal perspectives.
The patent system gives inventors patent rights as exclusive rights and protects them for a certain time, but on the other hand, it publishes the invention to enable its use. In other words, it gives incentives for research and development to encourage technical progress and makes the new technologies into assets shared by all humanity, then consequently contributes to the development of industry.
However, it would be a problem if patents granted for already known arts or for inventions that could be easily thought of from existing technology restricted others from exploiting them.
Therefore, we patent examiners consider the inventiveness of patent applications compared to prior arts. This process makes use of the technical grounding and logical thought abilities that I developed while in graduate school.
Moreover, I had the chance to discuss each other's examination processes with examiners of the European Patent Office in March 2021, which made use of my experience presenting at domestic and international academic conferences.

To my juniors

I have experience in various research topics from when I was an undergraduate. Tardigrades' tolerance of extreme environments (undergraduate) → Prophylactic and therapeutic vaccine research using simian AIDS models (master, doctor) → Epidemiological research overseas and development of instrument for avian influenza virus detection (Kobe U.) → development of instrument for virus detection (AIST).
Among these, AIST had an environment where willingness to file for patents was greater and the question of whether to publish technology and knowledge as a patent or keep it confidential was vigorously debated, and that inspired my interest in IP.

Closing ceremony of examiner exchange program

At a research institute in Indonesia (while at Kobe U.)

TAKAHARA Yusuke Fixed-term patent examiner, Japan Patent Office
https://www.jpo.go.jp/e/index.html

PROFILE

March 2013: Completed Doctor's Program in Department of Medical Genome Sciences, Graduate School of Frontier Sciences
April 2013: Kobe University Graduate School of Medicine
April 2015: National Institute of Advanced Industrial Science and Technology (AIST)
April 2016: Joined Japan Patent Office (up to the present)

Voices from International Students

The Tirol region, where you can enjoy the Alps

FASSER Christina
1st year of master's program, Department of International Studies

Have you ever heard about a place called Tirol? This region is located in the European Alps in western Austria. In Japan, Tirol is usually associated with "Tirol Chocolate", a Japanese chocolate brand. According to the manufacturer, Tirol was chosen as the name because of this region's natural beauty.
My hometown Tirol offers spectacular mountain scenery, luscious nature and is an outdoors person's paradise. The region boasts 573 summits higher than 3000 meter and offers 24,000 km of designated hiking trails. There is a ski resort about a 5-minute walk from my parents' house, where I also enjoyed hiking in the summer.
After an exhausting hike, nothing beats looking at the beautiful scenery while eating some traditional food in one of the many mountain huts. My recommendation is a dish called "Germknödel". This is a fluffy, steamed dumpling, filled with plum jam, served with poppy seeds and butter or vanilla sauce.
The Tyrol region is popular with over 8 million foreign tourists a year. I recommend the months of July and August for a visit, because the weather is very comfortable with lots of sunshine and no humidity.
In addition to its natural beauty, Tyrol has a turbulent history. During the Middle Ages, the region used to be a part of Bavaria and then became an independent country before being integrated into the Habsburg empire and then the Third Reich during the second world war. Innsbruck, the state capital, is known for having hosted two Winter Olympics and for its colorful and traditional buildings, as well as its state museum. My favorite part of the city is the Old Town. The annual Christmas market is beautiful and lively and the 18-meter Christmas tree adorned with lights, is very impressive.
I hope that with this essay you got an idea of my hometown and if you are interested, please feel free to ask me anything about Tirol or Austria.

"Germknödel," a steamed confectionery

ON CAMPUS × OFF CAMPUS

The column by current students to introduce and support student activities

Kashiwanoha Science Education Lab.

http://udcx.k.u-tokyo.ac.jp/KSEL

A commemorative event for the publication of a book translated by the combined efforts of KSEL members was held at Tezukuri Kagakukan Exedra

Kashiwanoha Science Education Lab. (KSEL) was established in June 2010 as a student group built around graduate students at the University of Tokyo's Kashiwa Campus.

Local residents and high school students as well as undergraduate students from other universities have joined, and we now conduct activities with about 30 members. We started efforts from a desire to revitalize exchange between Kashiwanoha residents, graduate students, and others through science communication activities, and we have held many events, such as science cafes and science experiment classes. Besides " Researchers meetup" (Let's go meet researchers!), in which graduate students and early-career researchers present the latest science and the daily life of a researcher, mixing in experiments and crafts, and visiting lessons to various places, since 2013, we have also held " Science Excursion" (School camp for science), a camp for learning about science through activities to experience nature. From January 2018, we rented an old apartment building in front of Kashiwa Station and have been operating "Tezukuri Kagakukan Exedra" (Exedra, the handmade science museum), which we renovated by DIY. It opens only on weekends, but it has been mentioned on TVs and in newspapers and enjoys many visitors. Some members who have finished graduate school have incorporated a company and support the continuation of our activities, and they are expanding their activities into developing teaching materials and translating and writing books, for instance.

We are recruiting people to carry out activities with us.
Contact ▶ ksel.sci@gmail.com

HAMURA Taiga Chairman

Department of Complexity Science and Engineering
September 2011: Completed master's program
March 2015: Left after completing doctoral program
Currently active in various places as a science communicator

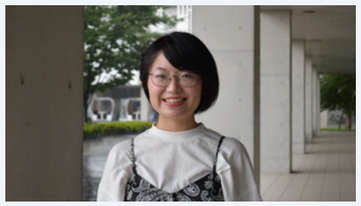
Tezukuri Kagakukan Exedra

https://selexedra.stars.ne.jp/

Tezukuri Kagakukan Exedra is in a former vacant property, renovated by members themselves

Displaying a skeleton model made by dissecting an exterminated wild boar

Elementary school students enjoying an experiment to make snow fall in a test tube



NAKASHIMA Maho

2nd year of master's program, Department of Natural Environmental Studies

MEMBER MESSAGE

With a desire to be involved in activities that convey the appeal of science, I have participated in the circle since November 2020 thanks to a club introduction at Souiki-kai. I mainly work as staff at Tezukuri Kagakukan Exedra, but its small size as a science museum brings visitors closer and we can enjoy communication from both sides through the handmade exhibits. This leads to little discoveries from time to time, and I also feel an attraction in being reminded of how fun science is. As most of the activities are on weekends, it is easy to balance them with research life, and exchanges with people doing other activities can produce new knowledge. If you are interested, we would love you to join in our activities.

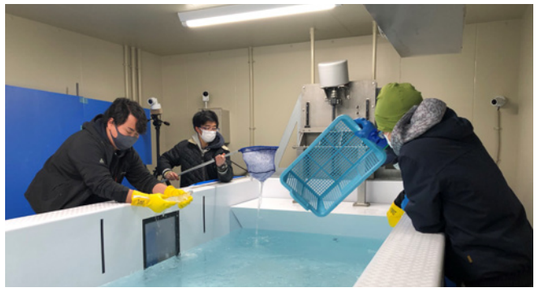
EVENTS & TOPICS

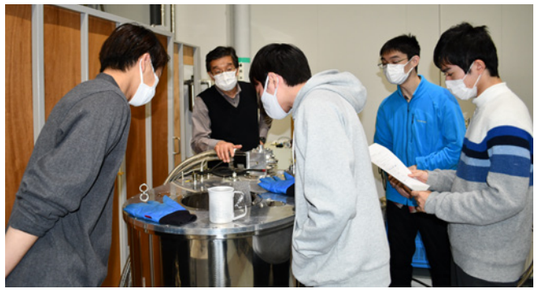
Kashiwa Campus Science Camp

https://ksc.edu.k.u-tokyo.ac.jp/

The Kashiwa Campus Science Camp (KSC) is held as a university-wide experiential seminar for first- and second-year students in the Junior Division of the College of Arts and Sciences at the University of Tokyo, and credits are awarded to participants.

In the 2020 academic year, the sixth holding of the KSC, 7 courses were held in 28 laboratories over the four weeks from February 9 to March 5, 2021, and 104 students participated. To avoid spreading COVID-19, students did not stay during the period and we did not hold events at the Kamioka Observatory, Institute for Cosmic Ray Research, University of Tokyo, but instead we performed activities by a combination of face-to-face practicums on day trips and online lectures, in line with the university's guidelines. (Some days of the program were conducted fully online.)





Comments by participating students (extract)

The face-to-face practicums took place after the specific research was explained in an online lecture, so I could understand what I was doing.

I was able to experience a bit of the work of a researcher through face-to-face practice, observing and manipulating experiments, and examining the causes of unexpected results.

I was a little unsure as to whether I was suited to being a researcher, but now after some actual experience, I am looking forward to going to graduate school and spending my life deep in research.

I experienced the difficulty of experiments that do not go as planned and the excitement when they produce the results in line with the data and images we see in class.

Dean's Awards for Outstanding Achievement, Graduate School of Frontier Sciences FY2020

The recipients of the awards (master's program: 12 students; doctoral program: 11 students) were announced.
(No applications were received for the International Exchange Section.)

Dean's Award for Outstanding Achievement (Master's Program)	
Department of Advanced Materials Science	MIZUTANI Nagi
Department of Advanced Energy	HATTORI Mitsuhiro
Department of Complexity Science and Engineering	Rice James Hamilton Palmer
Department of Integrated Biosciences	KAMAKURA Daisuke
Department of Computational Biology and Medical Sciences	NAKABAYASHI Ryo
Department of Natural Environmental Studies	FUJIOKA Yukine
Department of Ocean Technology, Policy, and Environment	MIKAMI Kohei
Department of Environment Systems	JINNO Koichi
Department of Human and Engineered Environmental Studies	IGARASHI Toshiharu
Department of Socio-Cultural Environmental Studies	SHIMODA Yuta
Department of International Studies	YANAGITANI Somei
Graduate Program in Sustainability Science - Global Leadership Initiative	PAYONGA, Lorenz Ray Ballares

Dean's Award for Outstanding Achievement (Doctoral Program)	
Department of Advanced Materials Science	ISHIDA Kousuke
Department of Advanced Energy	SEKINE Hokuto
Department of Complexity Science and Engineering	ISHIDA Takashi
Department of Integrated Biosciences	OKADA Ryoh
Department of Computational Biology and Medical Sciences	YONEZAWA Taishi
Department of Natural Environmental Studies	ANDO Kanato
Department of Ocean Technology, Policy, and Environment	KANEKO Tatsuya
Department of Environment Systems	Jennifer Chia Wee Fern
Department of Human and Engineered Environmental Studies	MIYAKE Susumu
Department of Socio-Cultural Environmental Studies	Liu Jiankun
Department of International Studies	N/A
Graduate Program in Sustainability Science - Global Leadership Initiative	Dam Lam Rodolfo

Congratulations to the award recipients

List of award recipients, June 2020 to May 2021

●See p. 17 for the Dean's Awards. ●Titles are current as of the time of the award. However, student listings include their titles at the time of their research. ●Names of people from other organizations are omitted. ●Master's program is indicated by M and doctoral program by D. (E.g., 1st year of doctoral course becomes D1.)

Awarding organization	Name of the award	Name of awardee (job title or grade)
Department : Advanced Materials Science		
Clarivate Analytics	Highly Cited Researcher, 2020	Katsuhiko Ariga (Prof.)
Physical Society of Japan	15th Young Scientist Award	Akitoshi Shiotari (Asst. Prof.)
Japan Society of Vacuum and Surface Science	Lecture Encouragement Award (Rising Researcher Division), 2020 JVSS Academic Conference	Kota Iwata (Project Researcher)
Center for Low-temperature Plasma Sciences, Nagoya University	22nd Plasma Materials Science Award (Encouragement Award Division)	Tsuyohito Ito (Assoc. Prof.)
38th Symposium on Plasma Processing	SPP-38 Lecture Encouragement Award	Noritaka Sakakibara (Spcial Researcher)
Japan Society of Coordination Chemistry	70th JSCC Forum Outstanding Poster Award (Dalton Transactions Award)	Yuki Hayashi (M1)
Japan Society of Coordination Chemistry	70th JSCC Forum Student Lecture Award	Kazuki Nakata (M2)
CSJ Chemistry Festa Executive Committee	10th CSJ Chemistry Festa 2020 Best Poster Presentation Award	Kazuki Nakata (M2)
CSJ Chemistry Festa Executive Committee	10th CSJ Chemistry Festa 2020 Outstanding Poster Presentation Award	Noriyoshi Oe (M1)
CSJ Chemistry Festa Executive Committee	10th CSJ Chemistry Festa 2020 Outstanding Poster Presentation Award	Taku Sawayama (M1)
Chemical Society of Japan	38th Academic Award	Takashi Uemura (Prof.)
Ministry of Education, Culture, Sports, Science and Technology	2021 Minister for Education, Culture, Sports, Science and Technology's Award in the Science and Technology Field for Young Scientists	Nobuhiko Hosono (Lecturer)
Physical Society of Japan	15th Young Scientist Award	Yuta Mizukami (Asst. Prof.)
Japanese Society for Neutron Science	20th Annual Conference Poster Award	Shunsuke Hasegawa (D2)
Japanese Society for Neutron Science	Hamon President Choice	Takahisa Arima (Prof.)
Japanese Society for Neutron Science	20th Annual Conference Poster Award	Yusuke Araki (D3)
Innovative Area Research "Quantum Liquid Crystals" Meeting	2nd QLC Young Researcher Encouragement Award	Tatsuki Sato (D2)
Thermoelectrics Society of Japan	17th Academic Lecture Meeting, Outstanding Lecture Award	Koichi Kitahara (Asst. Prof.)
Thermoelectrics Society of Japan	17th Academic Lecture Meeting, Outstanding Poster Award	Yutaka Iwasaki (D3)
Physical Society of Japan	2020 Autumn Meeting, Award for Outstanding Presentation by Student (Division 6)	Yutaka Iwasaki (D3)
Joint Research Meeting of MEXT National Projects on Condensed-Matter Science	14th Young Scientist Encouragement Award	Yutaka Iwasaki (D3)
National Institute of Science and Technology Policy	Significant Contribution to Science and Technology 2020 (Researcher with Nice Step)	Yukari Katsura (Project Asst. Prof.)
Asian Association of Thermoelectrics	ACT2020 The Best Oral Presentation	Koichi Kitahara (Asst. Prof.)
Asian Association of Thermoelectrics	ACT2020 The Best Oral Presentation	Yutaka Iwasaki (D3)
Chemical Society of Japan	101st CSJ Annual Meeting (Spring 2021) Student Lecture Award	Ryohei Kameyama (D3)
Society of Rubber Science and Technology, Japan	SRSTJ Award	Kohzo Ito (Prof.)
Society of Rubber Science and Technology, Japan	SRSTJ Award	Hideaki Yokoyama (Assoc. Prof.)
Society of Polymer Science, Japan	32nd Symposium on Polymer Gel Research, Oral Presentation Award	Yusuke Yasuda (JSPS Research Fellowship for Young Scientists)
Materials Research Society of Japan	MRM Forum 2020, Outstanding Presentation Award for Young Researchers	Yusuke Yasuda (JSPS Research Fellowship for Young Scientists)
Society of Polymer Science, Japan	29th Polymer Material Forum Poster Award	Shota Ando (Project Asst. Prof.)
Society of Polymer Science, Japan	69th Symposium on Macromolecules, Outstanding Poster Award	Yohei Iwahashi (M2)
Society of Polymer Science, Japan	2020 SPSJ Mitsubishi Chemical Award	Hideaki Yokoyama (Assoc. Prof.)
Society of Polymer Science, Japan	66th Polymer Research Presentation Meeting (Kobe) Young Scientist Lecture Award	Koichi Mayumi (Project Lecturer)
Physical Society of Japan	2020 Autumn Meeting, Award for Outstanding Presentation by Student (Division 10)	Takeshi Hayashida (M2)
The Royal Society of Chemistry	Faraday Discussion Best Poster Award	Ugalino Ralph John (D1)
Department : Advanced Energy		
Japan Society of Mechanical Engineers	1DCAE-MBD Symposium 2020, Best Presentation Award	Satoshi Mori (M2)
Cryogenics and Superconductivity Society of Japan	2021 Excellent Presentation Award	Yosuke Iwata (M2)
Physical Society of Japan	Award for Outstanding Presentation by Student	Tatsuya Yokoyama (D2)
Division of Plasma Physics, Association of Asia-Pacific Physical Societies (AAPPS-DPP)	AAPPS-DPP Poster Prize	Naoto Imagawa (M2)
Physical Society of Japan	Award for Outstanding Presentation by Student	Tatsuya Yokoyama (D3)
Society of Automotive Engineers of Japan	2019 Technological Contribution Award	Hiroshi Fujimoto (Assoc. Prof.)
2020 IEEE MTT-S Wireless Power Transfer Conference	Best Student Paper Award	Keiichiro Tokita (M2)
IEICE Technical Committee on Wireless Power Transfer	Quality Award	Osamu Shimizu (Project Asst Prof.), Sakahisa Nagai (Project Asst Prof.), Toshiyuki Fujita (Project Asst Prof.), Hiroshi Fujimoto (Assoc. Prof.)
Institute of Electrical Engineers of Japan	Technical Society Encouragement Award, Young Engineers Encouragement Award, IEEJ Industrial Applications Society	Seigo Wakui (M2)
Institute of Electrical Engineers of Japan	Outstanding Paper Presentation Award, Technical Committee on Industrial Instrumentation and Control, IEEJ Industrial Applications Society	Ryohei Kitayoshi (D3)
Institute of Electrical Engineers of Japan	2019 Outstanding Paper Presentation Award A (Society Award), IEEJ Industrial Applications Society Conference	Keiichiro Tokita (M2)
University of Tokyo	President's Award for Good Practices	Hiroshi Fujimoto (Assoc. Prof.)
Department : Complexity Science and Engineering		
The 12th Asian Conference on Machine Learning (ACML2020).	Best Paper Award	Tianyi Zhang (D1), Ikko Yamane (Project Researcher at the time of paper submission, and was transferred at the end of August 2020., Nan Lu (D2), Masashi Sugiyama (Prof.)
IEEE Kansai Section	IEEE Kansai Section Medal	Nobutaka Ito (Project Lecturer)
Virtual Reality Society of Japan	Academic Encouragement Award	Takuro Furumoto (Project Researcher)
Institute of Electronics, Information and Communication Engineers	Technical Committee on Short Range Wireless Communications Research Encouragement Award	Yuichi Masuda (Project Researcher)
Society of Instrument and Control Engineers	Academic Encouragement Award, Research Encouragement Award	Yutaro Toide (D1)
Society of Instrument and Control Engineers	SI2020 Award for Outstanding Lecture	Masahiro Fujiwara (Project Asst. Prof.), Yasutoshi Makino (Assoc.Prof.), Hiroyuki Shinoda (Prof.) (and one other student)
Society of Instrument and Control Engineers	SI2020 Award for Outstanding Lecture	Masahiro Fujiwara (Project Asst. Prof.), Yasutoshi Makino (Assoc. Prof.), Hiroyuki Shinoda (Prof.) (and one other student)
Society of Instrument and Control Engineers	SI2020 Award for Outstanding Lecture	Kai Tsumoto (M2),Masahiro Fujiwara (Project Asst Prof.), Yasutoshi Makino (Assoc. Prof.),Hiroyuki Shinoda (Prof.) (and one other student)
Society of Instrument and Control Engineers	SI2020 Award for Outstanding Lecture	Takaaki Kamigaki (Project Researcher), Hiroyuki Shinoda (Prof.)
Society of Instrument and Control Engineers	SI2020 Award for Outstanding Lecture	Ryoya Onishi (M1), Tao Morisaki (D1), Shun Suzuki (D2), Takaaki Kamigaki (Project Researcher), Masahiro Fujiwara (Project Asst Prof.), Yasutoshi Makino (Assoc. Prof.),Hiroyuki Shinoda (Prof.) (and one other student)
Asia Wireless Power Transfer Conference 2020	Best Student Award WiPoT award (best of best), AWPT 2020	Yuki Matsuzaki (M2)
Eurohaptics 2020	Finalist (Top3), Best Paper Award	Yasutoshi Makino (Assoc. Prof.), Hiroyuki Shinoda (Prof.) (and one other student)
University of Tokyo	Multidisciplinary Sciences Encouragement Award	Yuzuru Mitsui (D1)
12th International Conference on Social Informatics (SocInfo20)	Best reviewer award	Ryota Kobayashi (Assoc. Prof.)
Molecular Simulation Society of Japan	34th Molecular Simulation Symposium Award for Outstanding Presentation by Student	Tomomi Kondo (M2)
Department : Integrated Biosciences		
Japan Society of Drug Delivery System	36th Annual Meeting of JSDDS Excellent Presentation Award	Daisuke Kamakura (M2)
Japan Transporter Research Association	JTRA2020 Best Oral Presentation Award	Kosuke Mizutani (M2)
Serendipity Symposium 2020	Best Poster Award	Tomoya Chadani (M1)
Japanese Society for Cryobiology and Cryotechnology	JSCC Annual Meeting Best Proceeding Award	Kosuke Mizutani (M2)
Japanese Society of Applied Entomology and Zoology	7th AEZ Paper Award	Masataka Suzuki (Assoc. Prof.)
Japanese Society of Applied Entomology and Zoology	7th AEZ Paper Award	Shotaro Mine (D4)
Department : Computational Biology and Medical Sciences		
The RNA Society of Japan	RNAJ Travel Award in Annual Meeting 2020	Chen Minmin (D2)
American Society of Human Genetics	Reviewers' Choice Award in Annual Meeting 2020	Rikifumi Ota (D1)
The Japanese Society for Vaccinology	15th JSV Takahashi Award	Tetsuro Matano (Prof.)
Japanese Society for Bioinformatics	Poster Award in Annual Meeting 2020	Hideki Yamaguchi (D1)
Japanese Society for Bioinformatics	2020 JSBi Prize	Kenta Nakai (Prof.)
Bioinfowakate	Outstanding Presentation Award in 12th Meeting	Makoto Ito (M1)
eDNA Society	Best Poster Award in 3rd Online Conference	Shoma Matsushita (M2)
Department : Natural Environmental Studies		
Structural Geology Group, Geological Society of Japan	Award for Outstanding Presentation by Student	Yuichi Okuma (D1)
ISME (International Society for Microbial Ecology)	Poster Award	Rocky Md. Mehedi Iqba (D3)
Japan Agency for Marine-Earth Science and Technology	Symposium on the Ocean and the Earth Award for Outstanding Presentation by Student	Mizuki Ota (D2)
Ecological Society of Japan	Poster Award (Outstanding)	Koga Miyamoto (M2)
Department : Ocean Technology, Policy, and Environment		
IEICE Technical Committee on Optical Fiber Technology	Encouragement Award (Best)	Makito Kobayashi (D2)
Japan Society of Naval Architects and Ocean Engineers	JASNAOE Encouragement Award	Kohei Mikami (M2)
American Bureau of Shipping (ABS)	ABS Award	Yutaro Kurabeishi (M2)
Japan Coast Guard	2020 Japan Coast Guard Commandant Award	Yusuke Yokota (Assoc. Prof.)
Geodetic Society of Japan	28th GSJ Tsuboi Prize	Yusuke Yokota (Assoc. Prof.)
Seismological Society of Japan	2019 SSJ Technical Development Award	Yusuke Yokota (Assoc. Prof.)
American Chemical Society	Energy and Fuels, TOP 25 MOST CITED ARTICLES IN 2017	YoshihiroKonno (Assoc. Prof.)
Japan Society of Naval Architects and Ocean Engineers	JASNAOE Encouragement Award (Inui Award)	Tsubasa Kodaira (Asst. Prof.)
Department : Environment Systems		
Japan Health Physics Society	'53rd Annual Meeting Outstanding Presentation Award	Takeshi Iimoto (Prof.)
Kurita Water and Environment Foundation	Kurita Water and Environment Outstanding Research Award	Katsunori Mizuno (Asst. Prof.)
Society of Automotive Engineers of Japan	2020 Graduate Research Encouragement Award	Yuki Nomura (M2)
Society of Chemical Engineers, Japan	86th Annual Meeting Outstanding Student Award	Taihei Yamamura (M2)
Japanese Association of Groundwater Hydrology	Paper Award	Jiaqi Liu (Project Researcher), Tomochika Tokunaga (Prof.)
Department : Human and Engineered Environmental Studies		
Euro Haptics	Top3 for Best Poster Award	Kenichi Ito (D1), Yuki Ban (Asst. Prof.), Shinichi Warisawa (Prof.)
Virtual Reality Society of Japan	Paper Award	Masahiro Inazawa (D2),Yuki Ban (Asst. Prof.)
Japan Society for Precision Engineering	2020 JSPE Autumn Meeting Advanced Best Presentation Award	Kang Chen (D1)
Japan Society for Precision Engineering	2020 JSPE Autumn Meeting Best Presentation Award	Kohei Shinoda (M2)
Institute for Ultrasonic Electronics	USE2020 Encouragement Award	Kang Chen (D1)
Japan Society for Precision Engineering	2021 JSPE Spring Meeting Presentation Award	Akira Iwasaki (M2)
Robotics Society of Japan	Distinguished Service Award	Akio Yamamoto (Prof.)
Society of Automotive Engineers of Japan	Technical Paper Award	Wataru Furuse (M1)
Society of Instrument and Control Engineers	Award for Outstanding Lecture	Takahiro Shimizu (M2), Motoki Shino (Assoc. Prof.)
Society of Instrument and Control Engineers	Award for Outstanding Lecture	Kazuto Futawatari (M2),Yosuke Isono (M1), Hiroshi Yoshitake (Project Asst. Prof.), Motoki Shino (Assoc. Prof.)
Society of Automotive Engineers of Japan	Technical Paper Award	Motoki Shino (Assoc. Prof.)
Japan Society of Mechanical Engineers	26th Robotics Symposia Student Encouragement Award	Takahiro Shimizu (M2), Motoki Shino (Assoc. Prof.)
Innovative Education Society	Best Poster Presentation Award	Sixiong Peng (D1)
Society of Instrument and Control Engineers	Award for Outstanding Lecture	Hiroyuki Igarashi (M2), Misato Nihei (Assoc. Prof.)
Information Processing Society of Japan, Kansai Branch	Branch Conference Encouragement Award	Toshiharu Igarashi (D1), Misato Nihei (Assoc. Prof.)
ACM UIST	Student Innovation Contest, Best Award	Toshiharu Igarashi (D1),Kaoru Takagi (M2)
Ministry of Economy, Trade and Industry	AI Frontier Pathfinder Accreditation	Toshiharu Igarashi (D1)
Department : Socio-Cultural Environmental Studies		
Japan Society of Civil Engineers	Research Paper Award	Jun Sasaki (Prof.)
Judging Panel, Design Competition for the Public Restroom Near the Akamon (provisional title), University of Tokyo	First Prize	Nairu Kimura (M1) and two other students from other departments
Department : International Studies		
Japan Society of Civil Engineers	AI/Data Science Encouragement Award	Tatsuo Yamane (D1)
Japan Society of Civil Engineers	AI/Data Science Paper Award	Tatsuo Yamane (D1)
Department : GPSS-GLI		
German Federal Ministry of Education and Research (BMBF)	Green Talents - International forum for high potentials in sustainable development	Sadaf Taimur (D2)
2nd online training on OTEC and DSW applications	The best Malaysia model 2020	Jessica Borges Posterari (D1)

INFORMATION

FY2020 Commencement Ceremony

The ceremony was held on Friday, March 19, 2021, at the Large Auditorium (Yasuda Auditorium) in a reduced capacity to prevent the spread of COVID-19. Mr. SEKINE Hokuto from the doctoral program attended as a representative of GSFS.
A total of 397 candidates completed GSFS programs, consisting of 343 for the master's program and 54 for the doctoral program.

FY2021 Entrance Ceremony

The ceremony was held on Monday, April 12, 2021, at the Nippon Budokan in a reduced capacity to prevent the spread of COVID-19.
A total of 462 students were enrolled, consisting of 352 for the master's program and 110 for the doctoral program. (Photo：OZEKI Yuji)

GRADUATE SCHOOL OF FRONTIER SCIENCES

https://www.k.u-tokyo.ac.jp/index.html.en

Information on Entrance Examination
https://www.k.u-tokyo.ac.jp/exam_e/

Souiki-kai

Graduate school of Frontier science Alumni Association, "Souiki-kai", supports exchanges between graduates and current students.
https://souiki-kai.net/

U Tokyo FOCUS

UTokyo FOCUS is the official news site of the University of Tokyo, which summarizes the research and education activities of the University of Tokyo in one place

https://www.u-tokyo.ac.jp/focus/en/index.html

Please also subscribe to our newsletter.
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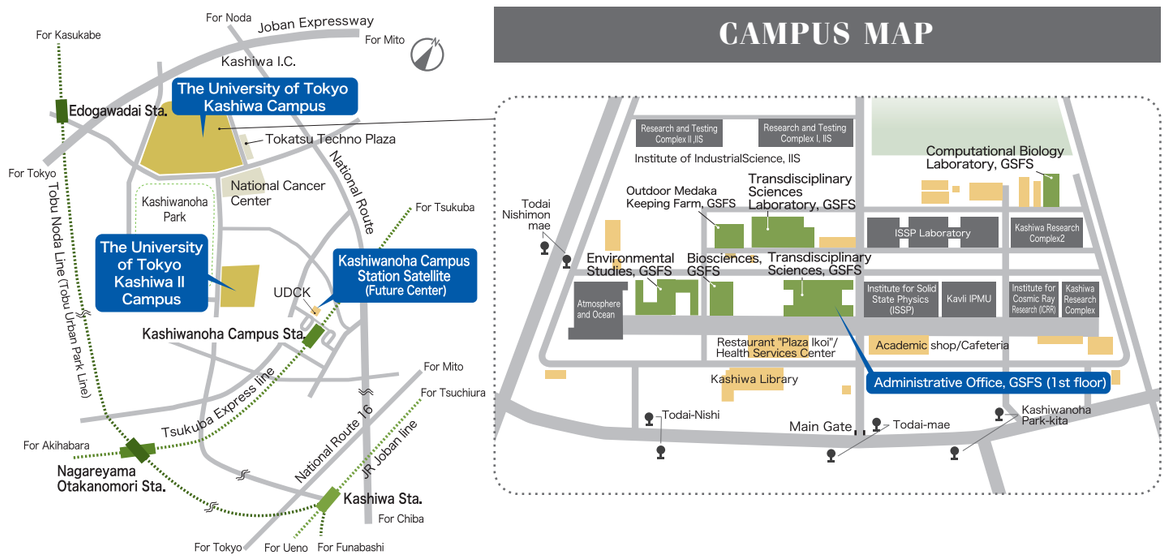
CAMPUS MAP



Editor's Notes

MATSUNAGA Sachihiro Chairperson of the Public Relations Committee

SOSEI volume 38 contained a feature article looking at preparation for and response to urban disasters through the lens of "resilience." It would be great if this article remains somewhere at the back of your mind and increases your awareness of disaster prevention or leads to rapid action to protect lives when a disaster occurs. We hope that disaster prevention research at GSFS will develop further and make contributions to society. Resilience has now come to be used in a range of fields, such as management organizations, psychology, and environmental response, as a word expressing toughness to changes in the environment, and the ability to recover from the changes. We would like to respond flexibly at work and at home from day to day by having resilience.

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Relay Essay

Enthusiasm and magnanimity

This is not really related to research, but I like railways.That's right, I'm a so-called "Train geek."There are many types, like those who are into riding trains, or those who are into photographing them, but, in my case, I am a model railway enthusiast, who are into model railways.I have loved model railways ever since my parents bought me a "Plarail" set when I was a little boy. Of all the various models out there, what I like about model railways is that they move.

There was a period in my youth when I was short of time and money and had to take a pause. But sometimes when I was studying in the US as a doctoral student, I would occasionally visit model shops, look at the models in the showcases, and just daydream. I can recall it as if it were just yesterday.Once I started working at a British university, I would often visit model shops. And funnily enough, when I travelled to other parts of Europe on business or holiday and visited shops where I couldn't speak the local language much, we could communicate without any problems most of the time.

It's probably partly because key dimensions are standardized to a great extent and reasonably compatible throughout the world such as scales, tracks, couplers and drives, but I think that whether we understand each other or not, the awareness that we're fans of the same thing plays a big part.

Nevertheless, it appears that how people enjoy model railways varies across countries.Many Japanese enthusiasts focus on (fitting out) rolling stock, while the German-speaking world looks mainly at driving and controls, and many English speakers seem to casually enjoy playing with them.What is more, with recent economic development, fans in Asia are growing in number, too.In any case, I think it's important to have the magnanimity to focus on the common aspect of being fellow fans who share enthusiasm towards the same hobby, rather than looking at small differences.

May we be able to freely travel the world visiting model railway shops ... I mean, going on research trips!

Visiting the world's fastest steam locomotive, the Mallard.

The world of models, where (rolling stock and scenery from) different periods or regions may be mixed together.

A travelling companion from my time in the UK.

NAKATA Hiroyuki Professor
Department of International Studies

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