International Research Institute of Disaster Science (IRIDeS) Tohoku University

Tohoku University

Shunichi Koshimura
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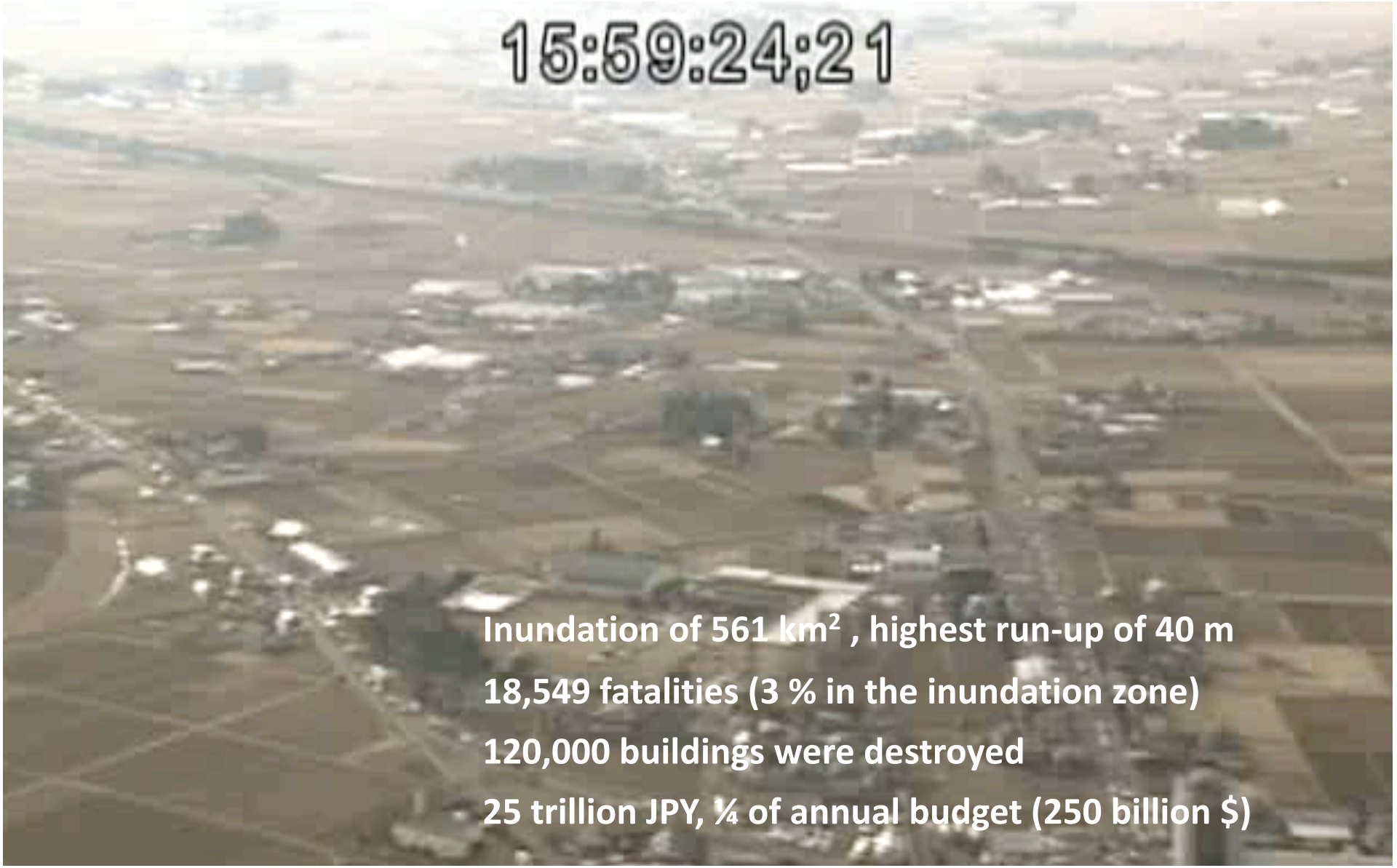
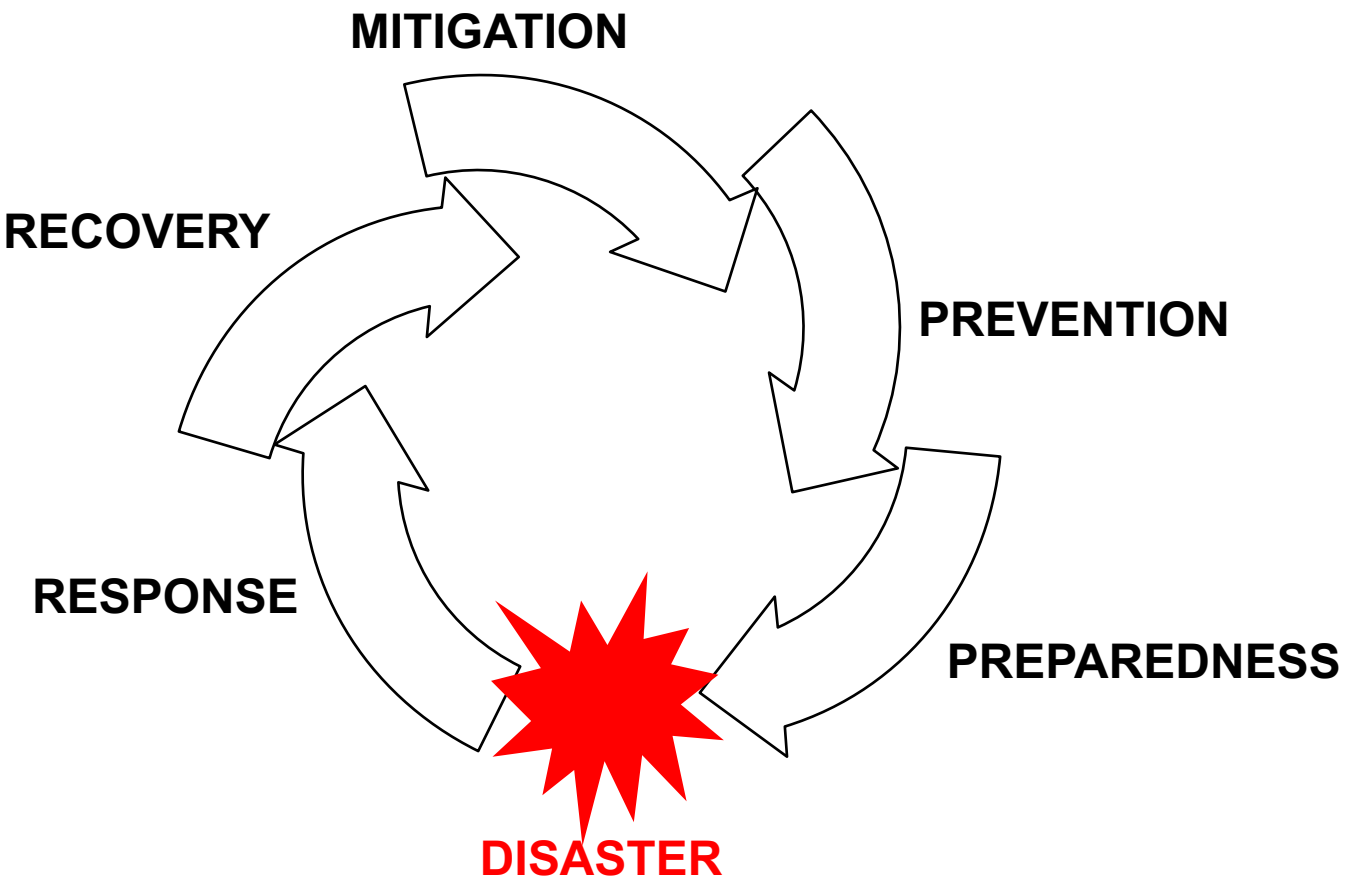
災害科学国際研究所
IRIDeS
International Research Institute of Disaster Science

The 2011 Tohoku tsunami (NHK)



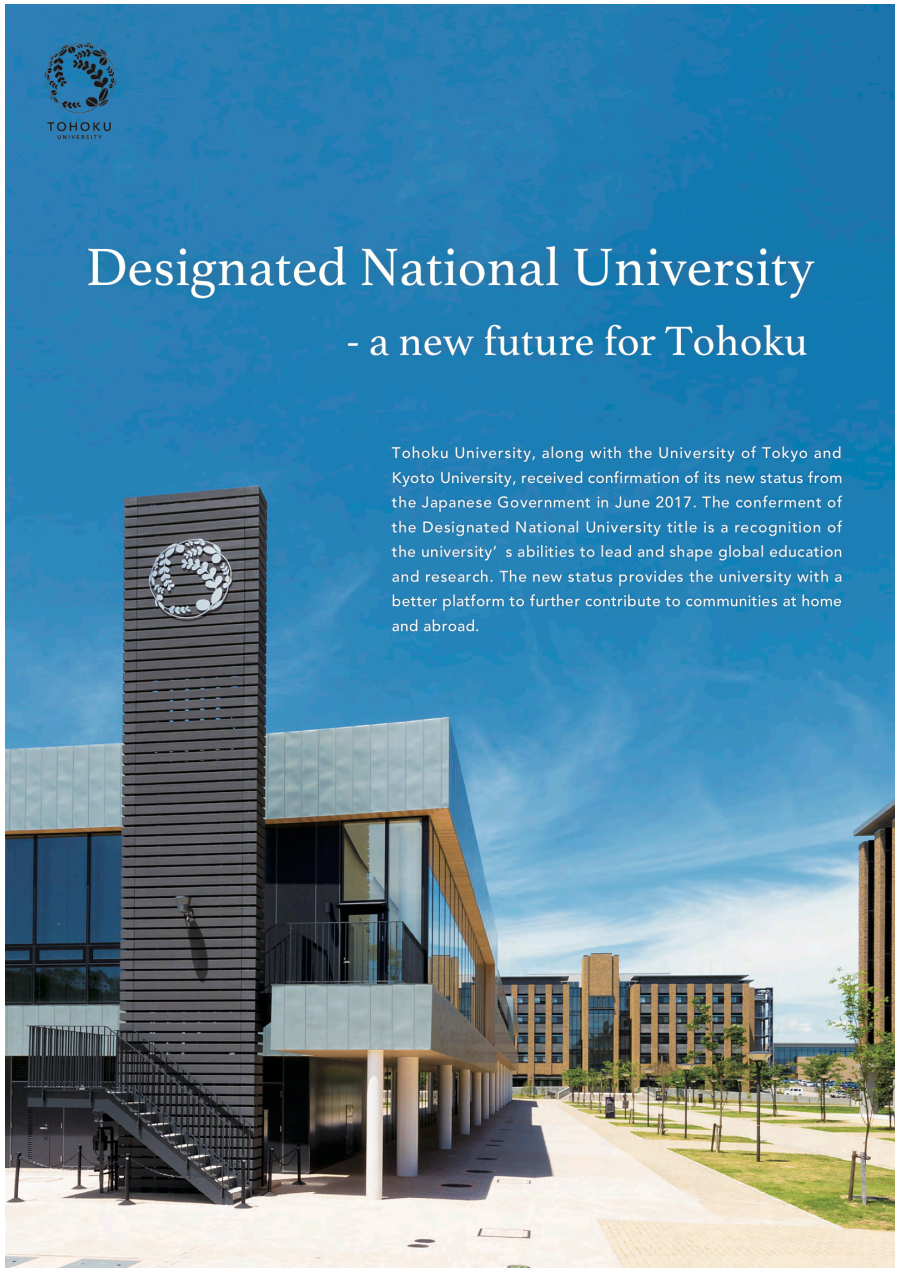
Disaster Management Cycle

Exploiting the lessons from the past events to future



Establishing IRIDeS in 2012

22 Professors; 17 Assoc. Profs.; 27 Assist. Profs.; 12 administrative staffs



CORE RESEARCH CLUSTER

Material science
Spintronics(spin electronics)
Medical science
Disaster science

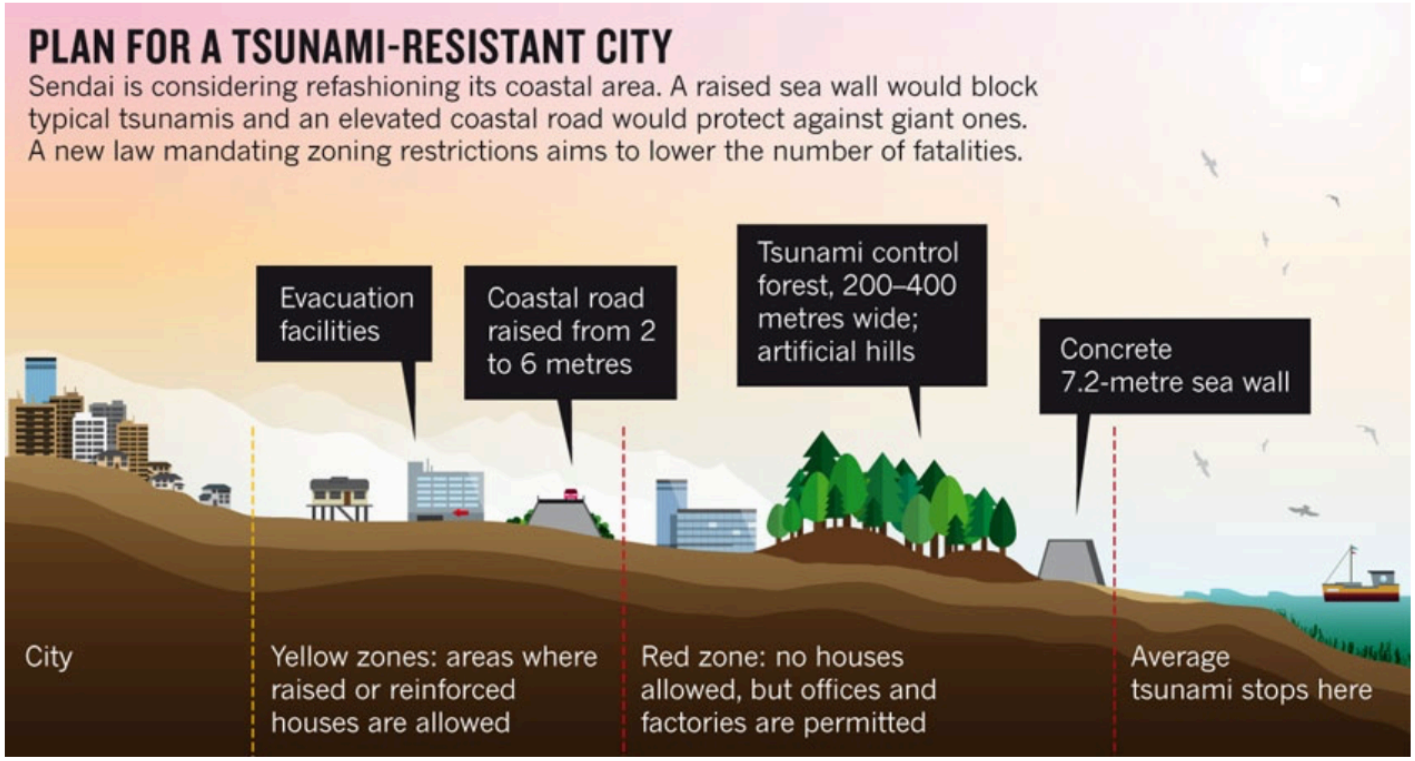
Our mission & goal
Enhancing disaster resilience

Ability of societies and social systems to well prepare, respond promptly and effectively to natural disasters, and exploiting lessons in the future disaster management.

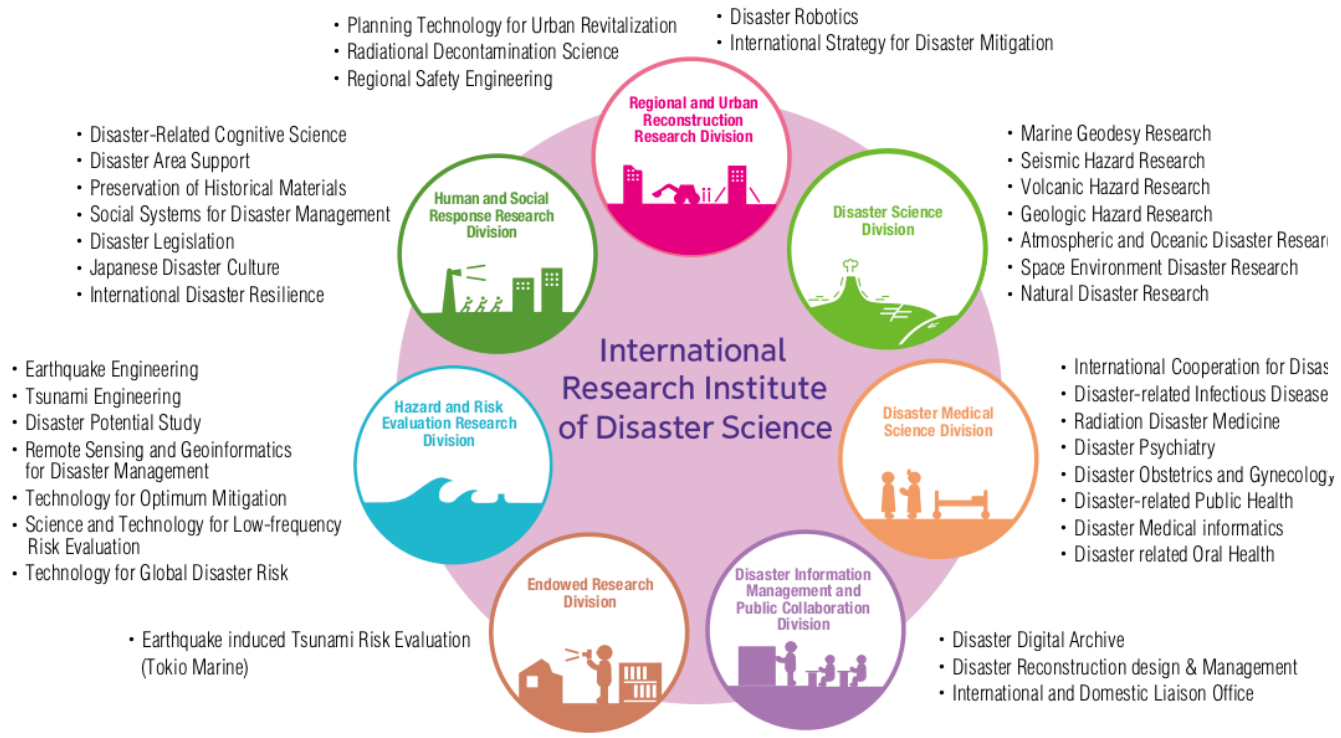
Action-oriented Research

- to combine research and practical work in a process that aims to improve strategies, practices and knowledge for disaster management
- to pursuit each point in the disaster management cycle and to integrate and universalize the scientific discoveries to be dedicated to the world.

Sendai city's reconstruction plan



Organization of IRIDeS



Research Divisions

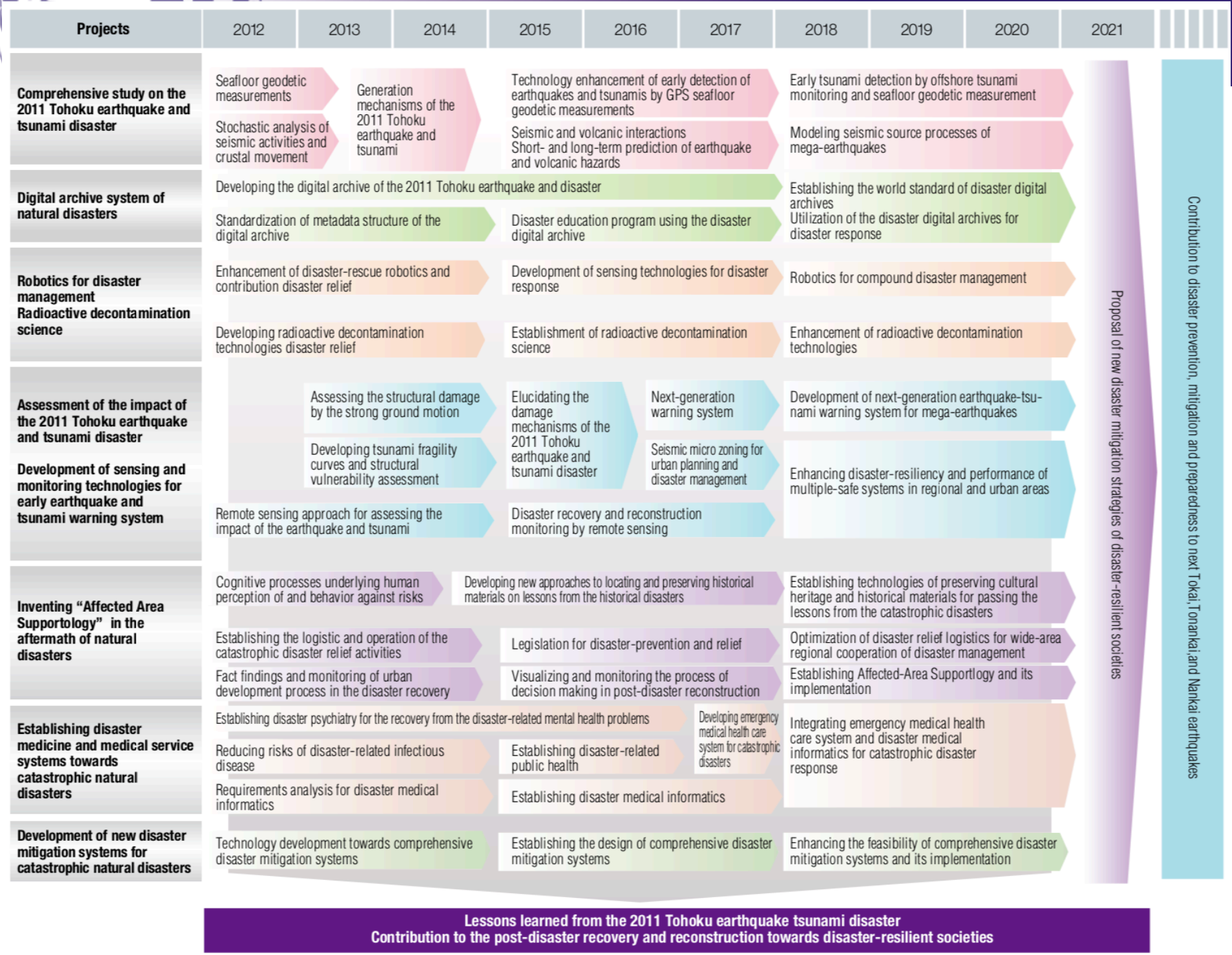
- Earth and Planetary Science
- Hazard and Risk Evaluation
- Human and Social Response
- Regional and Urban Reconstruction
- Disaster Information Management and Public Collaboration
- Disaster Medicine
- Endowed Research Division

Arata Hirakawa

Fumihiko Imamura

The action-oriented research of IRIDeS;

1. **Investigating the physics of global scale natural disasters such as mega-earthquakes, tsunamis and extreme weather**
2. **Reconstructing disaster response and mitigation technologies based on the lessons of the 2011 Great East Japan earthquake and tsunami disaster**
3. **Inventing "Affected Area Supportology" in the aftermath of natural disasters**
4. **Enhancing disaster-resilience and performance of multiple-fail-safe systems in regional and urban areas**
5. **Establishing disaster medicine and medical service systems towards catastrophic natural disasters**
6. **Designing disaster-resilient societies and developing the digital archive system to pass the lessons from the disasters**


Projects
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Comprehensive study on the 2011 Tohoku earthquake and tsunami disaster
Seafloor geodetic measurements
Stochastic analysis of seismic activities and crustal movement
Generation mechanisms of the 2011 Tohoku earthquake and tsunami
Technology enhancement of early detection of earthquakes and tsunamis by GPS seafloor geodetic measurements
Seismic and volcanic interactions
Short- and long-term prediction of earthquake and volcanic hazards
Early tsunami detection by offshore tsunami monitoring and seafloor geodetic measurement
Modeling seismic source processes of mega-earthquakes
Digital archive system of natural disasters
Developing the digital archive of the 2011 Tohoku earthquake and disaster
Standardization of metadata structure of the digital archive
Disaster education program using the disaster digital archive
Establishing the world standard of disaster digital archives
Utilization of the disaster digital archives for disaster response
Robotics for disaster management
Radioactive decontamination science
Enhancement of disaster-rescue robotics and contribution disaster relief
Development of sensing technologies for disaster response
Robotics for compound disaster management
Developing radioactive decontamination technologies disaster relief
Establishment of radioactive decontamination science
Enhancement of radioactive decontamination technologies
Assessment of the impact of the 2011 Tohoku earthquake and tsunami disaster
Development of sensing and monitoring technologies for early earthquake and tsunami warning system
Assessing the structural damage by the strong ground motion
Developing tsunami fragility curves and structural vulnerability assessment
Elucidating the damage mechanisms of the 2011 Tohoku earthquake and tsunami disaster
Next-generation warning system
Seismic micro zoning for urban planning and disaster management
Development of next-generation earthquake-tsunami warning system for mega-earthquakes
Enhancing disaster-resiliency and performance of multiple-safe systems in regional and urban areas
Remote sensing approach for assessing the impact of the earthquake and tsunami
Disaster recovery and reconstruction monitoring by remote sensing
Inventing “Affected Area Supportology” in the aftermath of natural disasters
Cognitive processes underlying human perception of and behavior against risks
Developing new approaches to locating and preserving historical materials on lessons from the historical disasters
Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disasters
Establishing the logistic and operation of the catastrophic disaster relief activities
Legislation for disaster-prevention and relief
Optimization of disaster relief logistics for wide-area regional cooperation of disaster management
Fact findings and monitoring of urban development process in the disaster recovery
Visualizing and monitoring the process of decision making in post-disaster reconstruction
Establishing Affected-Area Supportlogy and its implementation
Establishing disaster medicine and medical service systems towards catastrophic natural disasters
Establishing disaster psychiatry for the recovery from the disaster-related mental health problems
Reducing risks of disaster-related infectious disease
Establishing disaster-related public health
Developing emergency medical health care system for catastrophic disasters
Requirements analysis for disaster medical informatics
Establishing disaster medical informatics
Integrating emergency medical health care system and disaster medical informatics for catastrophic disaster response
Development of new disaster mitigation systems for catastrophic natural disasters
Technology development towards comprehensive disaster mitigation systems
Establishing the design of comprehensive disaster mitigation systems
Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation
Proposal of new disaster mitigation strategies of disaster-resilient societies
Contribution to disaster prevention, mitigation and preparedness to next Tokai,Tonankai,and Nankai earthquakes
Lessons learned from the 2011 Tohoku earthquake tsunami disaster
Contribution to the post-disaster recovery and reconstruction towards disaster-resilient societies

Third World Conference on Disaster Risk Reduction (WCDRR) in 2015

UN World Conference on Disaster Risk Reduction
2015 Sendai Japan

Participants of 156,082 from 187 countries

14-18 March 2015
Sendai, Japan

HOME CONFERENCE PREPARATORY PROCESS MEMBER STATES UN & IGOS MAJOR GROUPS NEWS & MEDIA RESOURCES ENGAGE *Registration* *Sponsors*

Sendai Outcomes

Sendai Framework for Disaster Risk Reduction 2015-2030

Sendai Declaration

Voluntary commitments

Implementation and Commitments

Voluntary commitments by relevant stakeholders are important to identify modalities of cooperation and implement the Sendai Framework.

Segments

Proceedings of the World Conference

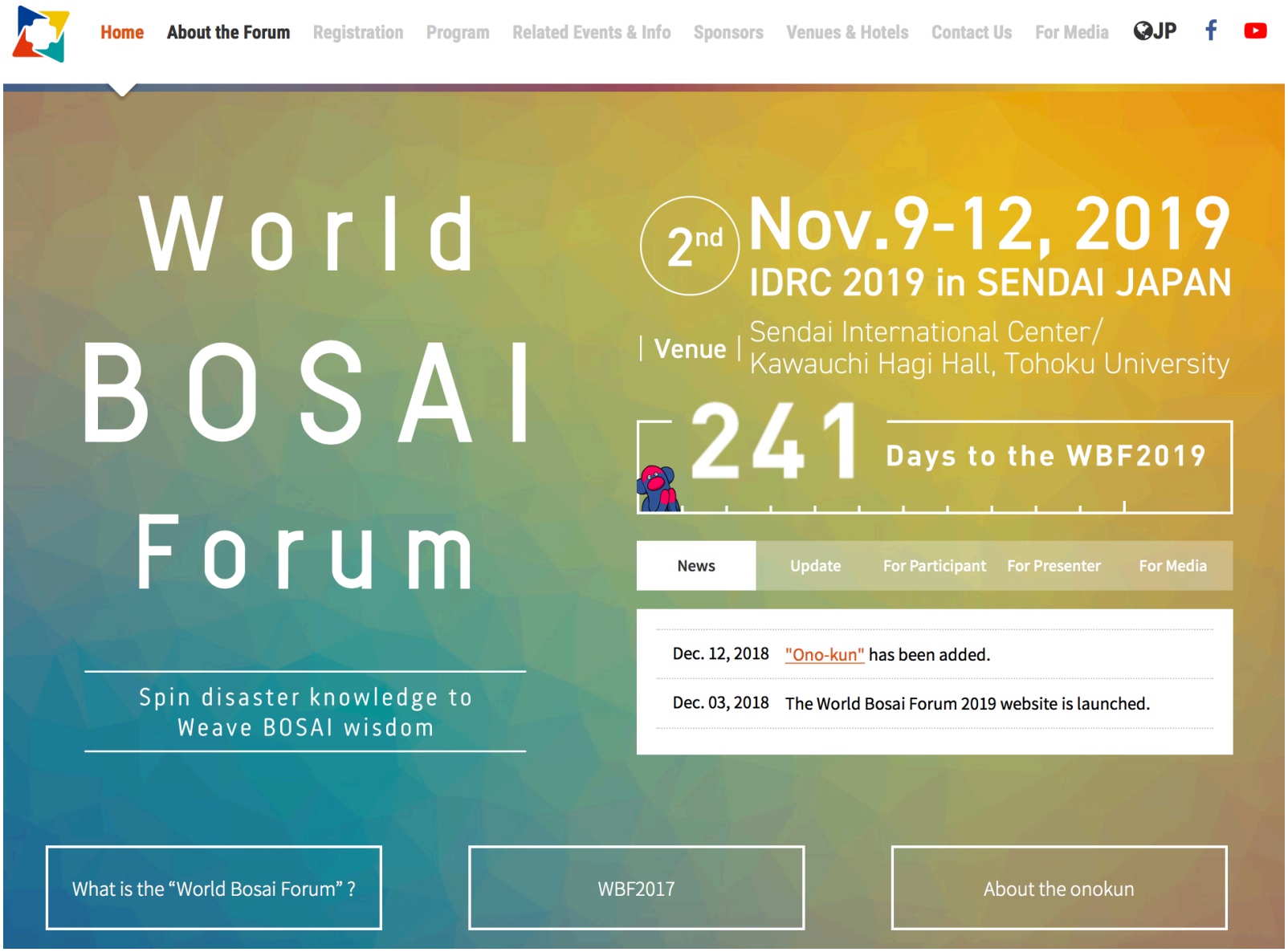
Preparatory Meetings

Inter-Governmental Segment

Multi-Stakeholder Segment

Public Forum

Davos-Sendai World Bosai (Disaster Risk Reduction) Forum

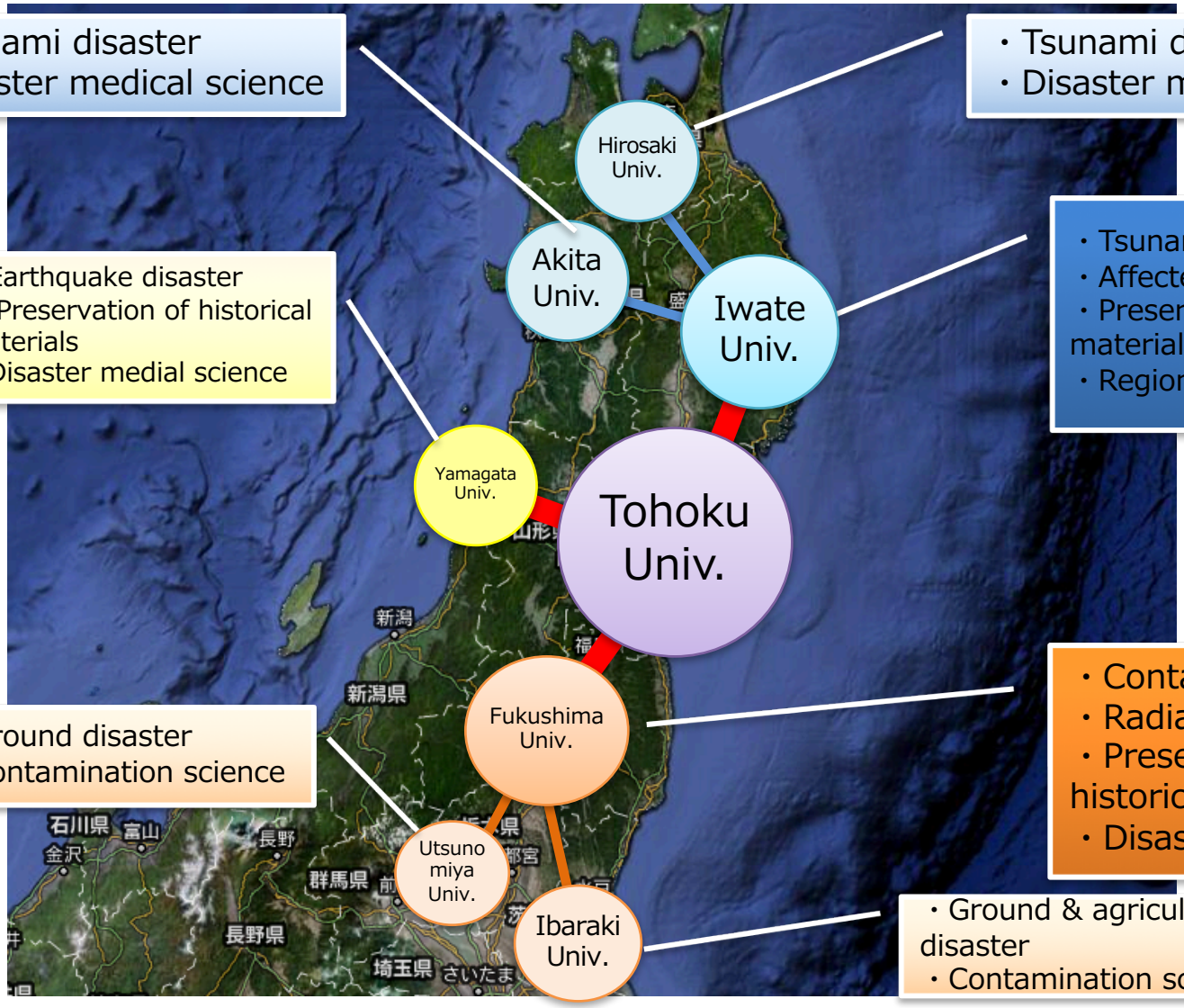


Networking with local communities

Agreements

8th February 2013	Tagajo City
25th June 2013	Watari Town
12th July 2013	Iwanuma City
13th July 2013	Kesennuma City (Branch opened on 1st October 2013)
21st August 2013	Higashi-Matsushima City
24th December 2013	Yamamoto Town
9th January 2014	Sendai City
7th February 2014	Rikuzen-Takata City

Networking with the Universities in the affected areas



- Tsunami disaster
- Disaster medical science

- Tsunami disaster
- Disaster medical science

- Earthquake disaster
- Preservation of historical materials
- Disaster medial science

- Tsunami disaster
- Affected area supportology
- Preservation of historical materials
- Regional reconstruction plan

- Ground disaster
- Contamination science

- Contamination science
- Radiation observation
- Preservation of historical materials
- Disaster Robotics

- Ground & agricultural disaster
- Contamination science

International collaborators

Deutsches Zentrum
für Luft- und Raumfahrt
DLR German Aerospace Center

МОНГОЛ УЛСЫН ШИНЖЛЭХ УХААН
ТЕХНОЛОГИЙН ИХ СУРГУУЛЬ
MONGOLIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

APRU The Voice of Knowledge & Innovation

Promoting international collaborations

International Research Promotion Office

Kenjiro Terada
Yuichi Ono
Elizabeth Maly
Sebastien Boret
Takako Izumi
Erick Mas
Anawat Suppasri

Our Logo

IRIDeS
International Research Institute of Disaster Science
災害科学国際研究所

Name

IRIDeS (Plural form of Iris), Symbol of hope and dignity

Logo meaning

It is the deformalized image of the Japanese character of disaster (災, wazawai) turned upside down, based on the idea of Japanese saying "Turn your misfortune to fortune" (Good comes out of evil.).

Participants from IRIDeS, Tohoku University, Japan

- Mr. Yukio Endo, Graduate student, IRIDeS, TU
- Mr. Takuya Inoue, Researcher, IRIDeS (Kokusai Kogyo) , TU
- Mr. Yuya Yamaguchi, Research Associate, IRIDeS, TU
- Dr. Luis Moya, Postdoctoral Fellow, IRIDeS, TU
- Dr. Anawat Suppasri, Associate Professor, IRIDeS, TU
- Dr. Elizabeth Maly, Associate Professor, IRIDeS, TU
- Dr. Erick Mas, Associate Professor, IRIDeS, TU
- Dr. Shuji Moriguchi, Associate Professor, IRIDeS, TU
- Dr. Yo Fukushima, Associate Professor, IRIDeS, TU
- Dr. Shunichi Koshimura, Professor, IRIDeS, TU
- Dr. Kenjiro Terada, Professor, IRIDeS, TU

- E. Maly, Community-based disaster recovery planning and relocation
- Y. Fukushima, Synthesizing and visualizing the (many ways of) evolution of possible precursory phenomena to occurrence of megaquakes
- A. Suppasri , K. Pakoksung, R. Masaya, K. Yamashita, and F. Imamura, Applying tsunami numerical simulation for building damage assessment using load-resistance analysis and sediment transport modeling
- Y. Endo, L. Moya, E. Max and S. Koshimura, The possibility of applying layover simulation to change detection caused of natural disasters using multi-temporal SAR images
- T. Inoue and S. Koshimura, A new tsunami numerical model with the polygonally nested grid system and its MPI-parallelization for real-time tsunami inundation forecast on a regional scale
- S. Koshimura, Y. Ohta and T. Inoue, Real-time tsunami inundation and damage forecasting with high-performance computing infrastructure
- E. Mas, L. Moya and S. Koshimura, Tsunami evacuation modeling and its integration with inundation simulation for planning shelters and evacuation routes
- L. Moya, E. Mas and S. Koshimura, Fusion of remote sensing and numerical simulations to detect damage in the Infrastructure
- S. Moriguchi, K. Terada, H. Kanno and K. Tozato, Simulation-based disaster risk analysis using data science techniques
- Y. Yamaguchi, S. Moriguchi and K. Terada, Solid-liquid coupled material point method for sediment disasters
- K. Terada, S. Moriguchi and S. Suzuki, Multi-stage failure simulations for rock mass failure