TSUKUBA CONFERENCE 2023

SPECIAL SESSION【S-01】

“CATASTROPHIC DISASTER PREPAREDNESS AND RESPONSE”

＊This is a summary of the session.

＊A video of the session (full version) is available. ***Click here*** to watch the video on Youtube.

＊To watch each presentation, please click on each speaker's name, which is linked to the Youtube video where the presentation begins.

PRESENTATION ＊order of presentation

Tetsuya TAKEDA

Network Center for Earthquake, Tsunami and Volcano, NIED

“Earthquake and Tsunami Observation Network in Preparation for the Coming Catastrophic Nankai Trough Earthquake”

ABSTRACT:

A catastrophic disaster comparable to the Great Kanto Earthquake is the Nankai Trough Megaquake, which has a 70-80% chance of occurring within 30 years. The western side of the Nankai Trough mega-earthquake epicentral region is a blank area for earthquake and tsunami observations, and the Nankai Trough seafloor seismic and tsunami observation network (N-net) is currently being developed in preparation for disasters. An outline of N-net will be explained, and improvements in detection delay time for earthquakes and tsunamis after installation, and utilization of observation data for emergency braking in collaboration with railway operators will be introduced.

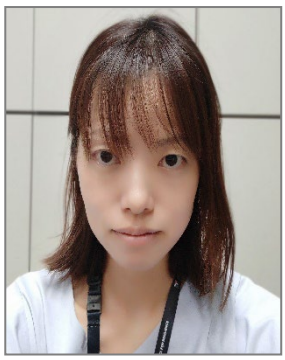
Yohsuke KAWAMATA

Earthquake Disaster Mitigation Research Division, NIED

”The Roles of Shaking Table Tests for Disaster Mitigation against Large Earthquakes: from the 1995 Southern Hyogo Prefecture Earthquake to Future Catastrophic Earthquake Disasters”

ABSTRACT:

E-Defense, the world's largest shaking table, was constructed after the Great Hanshin-Awaji Earthquake Disaster and has been used to conduct numerous experimental studies on individual buildings during a single massive earthquake. The Nankai Trough earthquake, one of the catastrophic earthquake disasters expected to occur in the near future, is expected to cause continuous multiple large seismic motions at short intervals, resulting in extensive damage over a wide area. Therefore, it is necessary to expand the scope of research from single seismic motion and individual buildings to multiple seismic motions and regional scale. Based on the above transition of research demand, the roles and results of E-Defense shaking table tests to the present and their expected roles for the coming catastrophic earthquake disasters are discussed in this presentation.



Asako IWAKI

Multi-hazard Risk Assessment Research Division, NIED

"Seismic Hazard Assessment for Disaster Mitigation"

ABSTRACT:

One hundred years have passed since the 1923 Great Kanto Earthquake. Confronting the risk from the future earthquakes, our society have developed various technologies and systems for seismic hazard assessment and disaster mitigation, taking advantage of the progress of seismology. Modern seismology in Japan started in the late 19th century and rapidly evolved with the development of nation-wide seismic observation. Establishment of the Headquarters for Earthquake Research Promotion (HERP) after the 1995 Kobe earthquake further accelerated seismological research and its application. Based on the HERP's long-term evaluation of the earthquake occurrence probability, the first national seismic hazard maps of Japan were released by HERP in 2005, which have been updated annually. Strong-motion observation network has been strengthened, which contributed to development of the methodologies for predicting seismic damage for future earthquakes as well as real-time ground-motion prediction, i.e. earthquake early warning. Using these technologies, it is now an urgent task to make a prediction of the catastrophic seismic disaster due to oncoming future mega-earthquakes, including Nankai earthquakes. The biggest challenge in predicting such phenomena that we have never experienced or recorded in the history, is the management of various uncertainties in prediction.

P.C. SHAKTI

Storm, Flood and Landslide Research Division, NIED

"Monitoring River Flow Utilizing High-Sensitivity Seismometers During Catastrophic Flood Events"

ABSTRACT:

Extreme weather-related events are common worldwide, but they occur more frequently and with greater severity in certain regions. In recent years, Japan has witnessed several catastrophic flood disasters, such as the heavy rains in western Japan in 2018 and the typhoon in eastern Japan in 2019. Studies suggest that the frequency of extreme weather events is increasing due to ongoing climate change. To predict and monitor floods effectively, it is essential to have a comprehensive understanding of the regular flow rates of rivers. Furthermore, understanding the flow rates in the upstream regions of river basins is crucial for predicting the status of river flow in downstream populated areas. Information on river flow is not only vital for water resource projects but also for planners, government agencies, researchers, and residents living near rivers during disaster events. While having a robust network of hydrological observation is desirable for monitoring river flow during catastrophic flood events, it is challenging to maintain regular hydrological observations in remote mountainous environments. Additionally, missing hydrological data during flood events is common due to damage to hydrological observation stations. In

such situations, non-contact measurement techniques based on remote sensing data have been tested for river flow monitoring. Recent research by PC and Sawazaki (2021) has demonstrated the potential of using a high-sensitivity seismograph network (Hi-net) to estimate water flow in nearby river basins in Japan. Based on this study, it is suggested that Hi-net data can be utilized for real-time estimation of water flow in rivers, especially in mountainous regions of Japan during extreme flooding events. It is also believed that Hi-net stations can help bridge the data gap in water level measurements during flooding events. This type of research is an important step toward the broader application of Hi-net networks for Disaster [Risk Reduction (DRR) during catastrophic flood events.

Tomofumi KOZONO

Volcano Disaster Resilience Research Division, NIED

"Volcanic Hazards and Disaster Mitigation: Monitoring and Forecasting Volcanic Activities"

ABSTRACT:

Volcanic eruptions are low-frequency phenomena compared to other natural phenomena. On the other hand, once an eruption occurs, it can cause complex and extensive damage. For example, a large-scale ash fall from an eruption of Mt. Fuji could have devastating effects on lifelines in metropolitan areas. This presentation will discuss the mechanisms of volcanic eruptions, the development of methods for monitoring and forecasting volcanic activity, and research efforts to mitigate volcanic disasters, with particular reference to Mt. Fuji.

Yi-Chung LIU

National Science and Technology Center for Disaster Reduction (NCDR), Taiwan

"Emerging Climate Crisis and Adaptive Community-Based Disaster Risk Management"

ABSTRACT:

Science and technology is essential in catastrophic disaster preparedness and response planning. Advanced tools such as climate modeling, big data analysis, and cell broadcast significantly improve the accuracy of hazard prediction, disaster monitoring, and public warning systems. However, communities, at the forefront of disaster preparedness and response, are crucial in saving lives and reducing losses. Two illustrative approaches are introduced in this presentation. The first case demonstrates the empowerment of community risk awareness and coping capacity through advanced technology and intelligent information. The second case outlines adaptive measures to enhance community resilience in the face of the climate crisis, particularly in developing societies.

Satoru YUSA

Disaster Information Research Division, NIED

"Disaster Information Sharing in Japan toward Real-time Situational Awareness"

ABSTRACT:

In the event of a disaster, it is essential to share disaster information quickly and efficiently with disaster responders. National Research Institute for Earth Science and Disaster Resilience (NIED) has developed Shared Information Platform for Disaster Management (SIP4D) and built a mechanism for information sharing among disaster response agencies. Also we operates the disaster information sharing site "bosai X view" and "ISUT-SITE". It is based Online GIS system to provide information support to general public and disaster response organizations. In this presentation, I will introduce the results of research to prepare for and face catastrophic mega-disasters from the perspective of disaster information.

PANEL DISCUSSION

Click here to watch the video on Youtube. (23 mins)

Q & A SESSION

Click here to watch the video on Youtube. (5 mins)

PANEL DISCUSSION