

# **Advanced ocean floor monitoring system and Data application for Earthquakes and Tsunamis**

**-Real time monitoring, Simulation research, Disaster education  
on Resilience Science -**

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## 1. Topics Over view

In Japan and seismogenic/tsunamigenic countries, many destructive earthquakes and Tsunamis have occurred frequently.

To reduce these damages, real time monitoring on earthquakes and tsunamis and early detection of earthquakes and tsunamis is indispensable.

In Japan, the recurrence of Nankai Trough mega thrust earthquake is one of most severe natural hazard problem.

For early earthquake and tsunami detection, the real time monitoring using ocean floor observatories is effective. DONET1 and DONET2 are in operation around the Nankai trough seismogenic zone SW of Japan, respectively. These systems have multi kinds of sensors such as the accelerometer, broadband seismometer, pressure gauge, difference pressure gauge, hydrophone and thermometer for earthquakes and tsunamis monitoring. DONET1 and DONET2 with 51 observatories will be deployed along the central Nankai Trough seismogenic zone SW of Japan.

Technologies of ocean floor monitoring construction have evolved steadily over few decades. These technologies are forcing on not only deployment but also maintenance.

Otherwise, to estimate damage of earthquakes and to have images of earthquake and tsunamis, advanced simulation researches are very important and indispensable too.

For example, the real time inundation simulation is developing by JAMSTEC using DONET data and advanced simulation. This system is already implemented in Wakayama prefecture located at the front of the Nankai trough seismogenic zone.

Furthermore, we recognize recovers/ revivals are very important and difficult. In Tohoku area damaged by large tsunamis, recoveries/revivals have been under progressing almost 7 years passed after the 2011 Tohoku Earthquake. Therefore, we have to prepare the pre planning of future city/ community are before next destructive disasters such as the Nankai trough mega thrust earthquake. This pre planning will be established based on the advanced simulation results.

In seismological research, the prediction research is very important and significant for preparedness and damage reduction.

The data assimilation research based on physical model, using real time data including DONET data is one of prediction researches.

And, also, Data science including Big data and AI research is important for estimation of seismogeniz zone and detection of anomalous phenomena.

For Resilient Society, Resilience Science including many kinds of fields such as Science, Engineering, Medical and Social Science are significant and indispensable.

Finally, this Resilience Science will contribute to cultivation of human resources in each field.

We will explain the real time monitoring system, data application with advanced simulation research for disaster mitigation.

## 2. Target Audience

- Engineers, Researchers, Administrative persons, students and Public people

## 3. Contents detailed

- 90 min presentation and 10 min discussions
- Projector and Laser pointer

## 4. Format

- PPT including  
(Ocean floor monitoring system with Video, Advanced Simulation using real time data, Prediction research using real time data, Disaster mitigation)

## 5. Reference

- Yoshiyuki Kaneda: DONET: A Real-Time Monitoring System for Megathrust Earthquakes and Tsunamis Around Southwestern Japan Oceanography Vol. 27 No. 2 June 2014, Special Issue On Undersea Natural Hazards
- Yoshiyuki Kaneda, Narumi Takahashi, Toshitaka Baba, Katsuyoshi Kawaguchi, Eiichiro Araki, Hiroyuki Matsumoto, Takeshi Nakamura, Shinichiro Kamiya, Keisuke Ariyoshi, TakaneHori, Mamoru, Hyodo Masaru Nakano, Jin-Kyu choi, Shuhei Nishida, and Takashi

Yokobiki., Advanced Real Time Monitoring System and Simulation Researches for Earthquakes and Tsunamis in Japan, Post Tsunami Hazard -Reconstruction and Restoration Springer 2014

○Y. Kaneda<sup>1</sup>, K. Kawaguchi, E. Araki<sup>2</sup> H. Matsumoto<sup>2</sup>, T. Nakamura<sup>1</sup>, S. Kamiya<sup>1</sup>, K. Ariyoshi<sup>1</sup>, T. Hori<sup>1</sup>, T. Baba<sup>1</sup> and N. Takahashi<sup>1</sup>: Development and application of an advanced ocean floor network system for megathrust earthquakes and tsunamis, Praxis book on "Seafloor Observatories" Springer 2014

○Hyodo Mamoru, Hori Takane, Kaneda Yoshiyuki,: A possible scenario for earlier occurrence of the next Nankai earthquake due to triggering by an earthquake at Hyuga-nada, off southwest Japan, Earth, Planets and Space 2015

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