

## Development of Real time monitoring system (DONET) for understanding mega thrust

Yoshiyuki Kaneda<sup>1\*</sup>, Katsuyoshi Kawaguchi<sup>1</sup>, Eiichirou Araki<sup>1</sup>, Hiroyuki Matsumoto<sup>1</sup>,  
Atsushi Sakuma<sup>1</sup>, Takeshi Nakamura<sup>1</sup>, Shinichiro Kamiya<sup>1</sup>, Keisuke Ariyoshi<sup>1</sup>,  
Toshitaka Baba<sup>1</sup>, Michihiro Oohori<sup>1</sup>, Takane Hori<sup>1</sup>

<sup>1</sup>JAMSTEC

Around the Nankai trough, there are three mega thrust earthquake seismogenic zones such the Tokai, Tonankai and Nankai seismogenic zone.

In these seismogenic zones, thrust earthquakes are occurring with intervals of 100-200 years. Especially, in past two earthquakes 1944/1946 and 1854, the first ruptures were starting from the Tonankai seismogenic zone. Therefore, to understand seismic linkage of mega thrust earthquake around the Nankai Trough southwestern Japan, we are developing DONET as the real time monitoring system and starting to deploy it from the beginning of 2010 around the Tonankai seismogenic zone. We recognize that the Tonankai seismogenic zone is estimated as a key area to understand the Nankai trough mega thrust recurrence cycle. The evaluation and estimation of the recurrence pattern of the next mega thrust earthquake is an urgent problem for Japan.

The recent result of recurrence cycle simulation indicates the difference patterns and intervals of mega thrust earthquake recurrences in each cycle.

And the first ruptures are starting from the Tonankai seismogenic zone, this result is consists with the past two earthquake recurrences 1944/1946.

Therefore, DONET will provide important and useful data to understand the seismic linkage the Nankai trough mega thrust earthquakes and disaster mitigation. This advanced dense ocean floor observatory network system has very useful functions.

### 2. DONET (Dense Ocean floor Network system for Earthquakes and Tsunamis)

Advantages of DONET are indicated as follows,

#### 1) System concept

Redundancy, Extension and advanced maintenance system using the looped cable system, junction boxes and the ROV/AUV

DONET has 20 observatories and this system has incorporated in a double land stations concept. Also, we are carrying out the development of ROV for the 10km cable extension and heavy weight operation

#### 2) Sensors

Multi kinds of sensors to observe broad band range phenomena such as long period tremors, low frequency earthquakes and strong motion of mega thrust earthquakes over M8.

Therefore, sensors such as a broadband seismometer, an accelerometer, a hydrophone, a pressure gauge, differential pressure gauges and thermo meter are equipped with each observatory in DONET

#### 3) Early warning

DONET system will be deployed around the Tonankai seismogenic zone, so, this advantage for the early warning is most important for disaster reduction /mitigation. DONET data will

contribute to this early warning system for disaster mitigation. Especially, in the tsunami early warning, DONET is absolutely important and useful.

#### 4) Improvement of simulation model

Provide data derived from pressure gauges as ocean floor deformation data to improve the simulation and modeling researches about the mega thrust earthquakes. Especially, the development of data assimilation method is very important to improve simulation model.

5) Understanding of the interaction between the crust and upper mantle around subduction zone. Broad band phenomena obtained from DONET will provide fruitful information about the interaction between the crust and upper mantle.

#### 6) Development of advanced ocean floor observatory technologies

DONET system will be operated with a middle voltage system, and 20 observatories with multi kinds of sensors will be equipped.

Therefore, to deploy and maintain this system, it will be required to use the advanced ROV which is capable to extend 10km length cables, operate, deep sea water depth over 4300m.

The advanced ocean floor network will be deployed not only around the Tonankai seismogenic zone, but also the Nankai seismogenic zone.

We are developing the advanced DONET with a high voltage power supply system to extend broad area around the Nankai Trough.