

Thematic Session 3-5

Seismic disaster mitigation assurance in the 21<sup>st</sup> century

- How should our societies encounter major earthquakes-

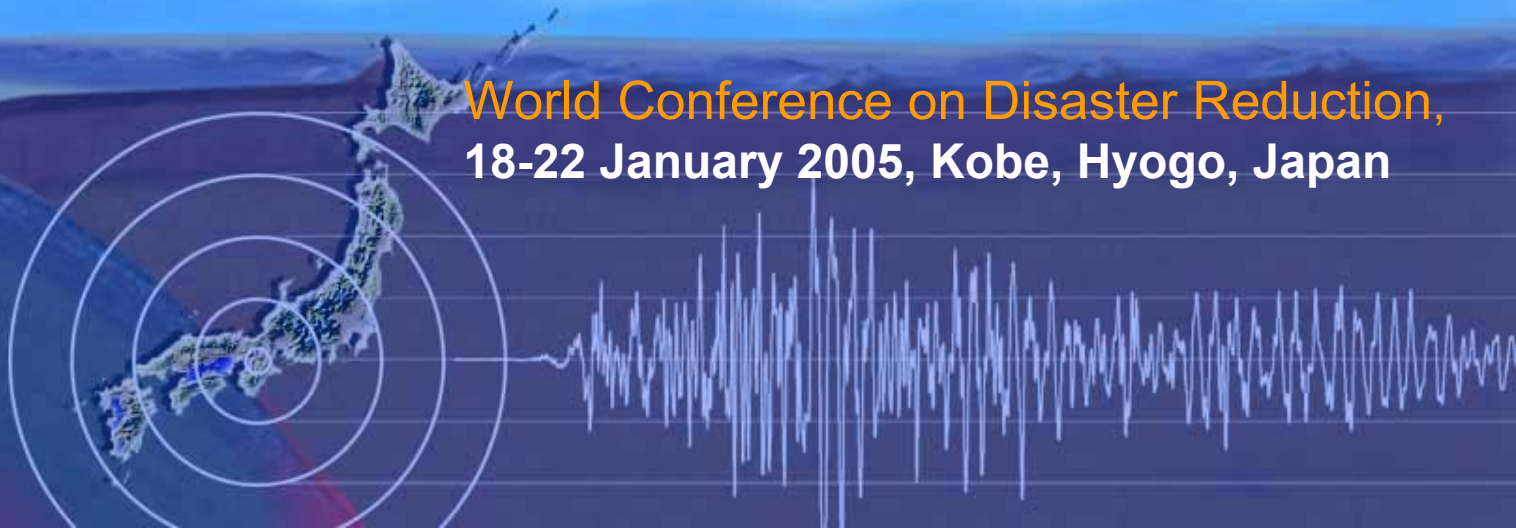
# Importance of Hazard and Risk Assessment

Kojiro Irikura

President of Japanese Association of Earthquake Engineering

World Conference on Disaster Reduction,  
18-22 January 2005, Kobe, Hyogo, Japan

13WCEE





# Lessons from the 1995 Kobe Earthquake

## 1. Know earthquakes

Promote basic researches and observations related to earthquakes.

## 2. Prepare for earthquakes

Promote earthquake engineering researches and cooperation between earthquake engineers , Earth scientists, and societal scientists for mitigating earthquake disasters and managing seismic risk.

→ Importance of Hazard and Risk Assessment  
Role of the national government



# Activities of the Governmental Organizations after the 1995 Kobe earthquake

## 1. Central Disaster Management Council

Promote the implementation of the basic plan for disaster management and deliberate important matters related to disaster preparedness.

## 2. Headquarters for Earthquake Research Promotion

Promote research into earthquakes with the goal of strengthening disaster prevention measures, particularly the reduction of damage and casualties from earthquakes.

## 3. Japan Meteorological Agency

Monitor earthquakes, tsunamis and volcanic activities and issues information on the monitoring results in order to prevent/mitigate disasters.

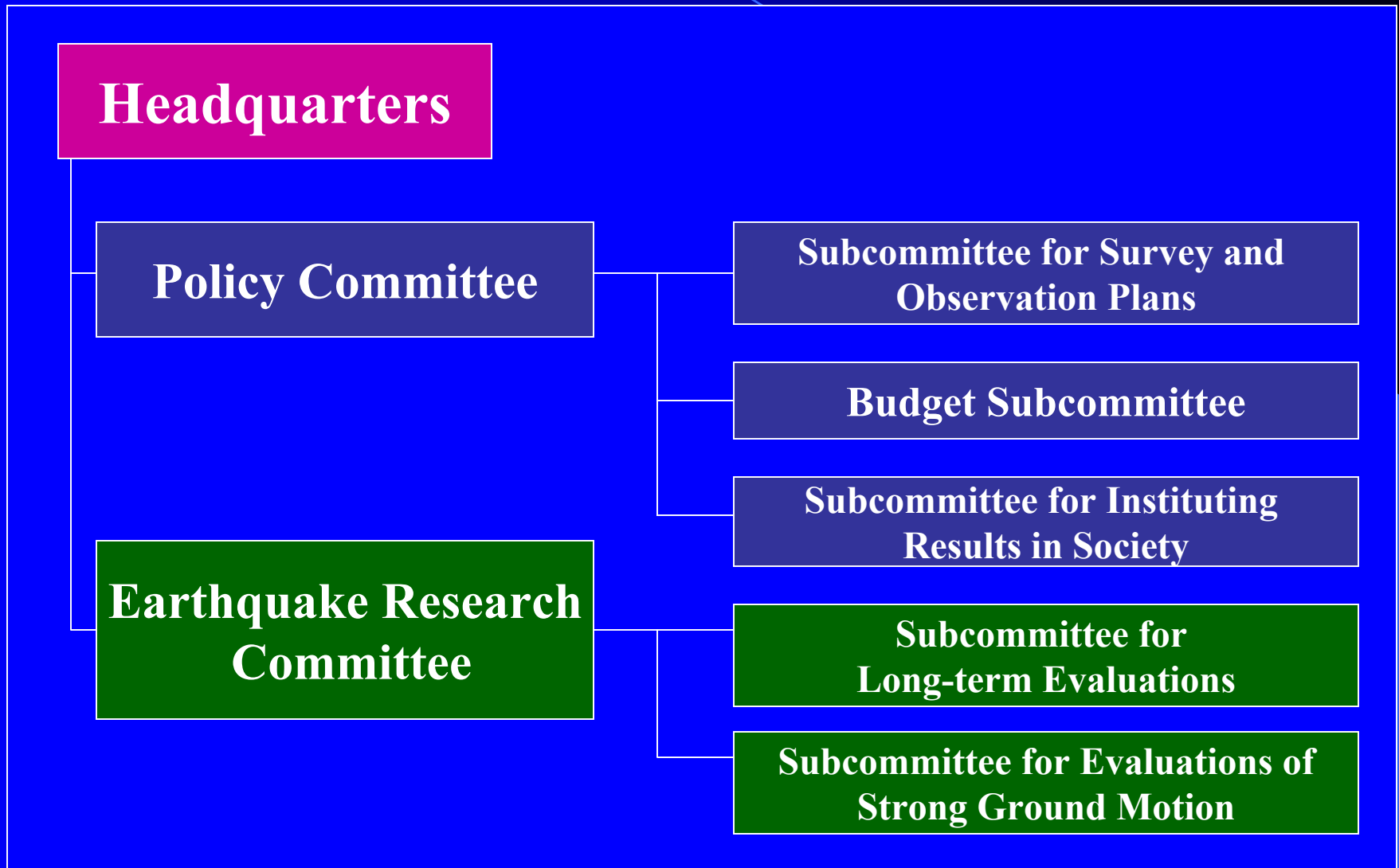
# **Governmental Projects of Earthquake Researches in Japan After the 1995 Kobe Earthquake**

**1995: Headquarters of Earthquake Research Promotion was established in accordance with Earthquake Disaster Management Special Measures Act.**

**1999: Comprehensive and Fundamental Measures for Promotion of Observation, Measurement and Research on Earthquakes were formulated at the Headquarters.**

- 1. Preparation of seismic hazard maps based on surveys of active faults, long-term evaluations of the probability of earthquake occurrence, and evaluations of strong ground motion**
- 2. Promotion of real-time transmission of earthquake information**
- 3. Improvement of observation system for earthquake disaster prevention**
- 4. Promotion of observation and research for earthquake prediction**

# Structure of the Headquarters for Earthquake Research Promotion



# Probabilities of Large-Scale Earthquakes over the Next Thirty Years

## Inland Active Faults

## Plate-Boundary Earthquakes

橈形山脈断層帯  
ほぼ0%~7%

山形盆地断層帯  
ほぼ0%~7%

森本-富樫断層帯  
ほぼ0%~5%

Itoigawa-hizuoka Tectonic-  
Line Fault Zone  
14%

Median Tectonic Line  
Almost 0%~5%

砺波平野断層帯  
(東部)  
0.05%~6%

奈良盆地  
東縁断層帯  
ほぼ0%~5%

Tokachi-Oki  
60%

Occurred in 2003  
→0.003~2%

三陸沖北部  
(M8.0前後)  
0.007%~5%  
(M7.1~7.6)

三陸沖~房総沖  
海溝寄り津波地震  
20%程度(6%程度)  
( ) は特定海域での値  
正断層型地震

Miyagi-Oki  
99%

4~7%(1~2%)  
( ) は特定海域での値

伊那谷断層帯  
(境界) ほぼ0%~7%  
(前縁) ほぼ0%~6%

三浦半島断層群  
(衣笠・北武断層帯)  
ほぼ0%~3%  
(武山断層帯)

神縄・国府津-  
松田断層帯  
3.6%

6%~11%

富士川河口断層帯  
0.20~11%

Nankai Trough  
(Tonankai) 58%  
(Nankai) 47%

布田川・日奈久断層帯  
(中部)  
ほぼ0%~6%

Referenc

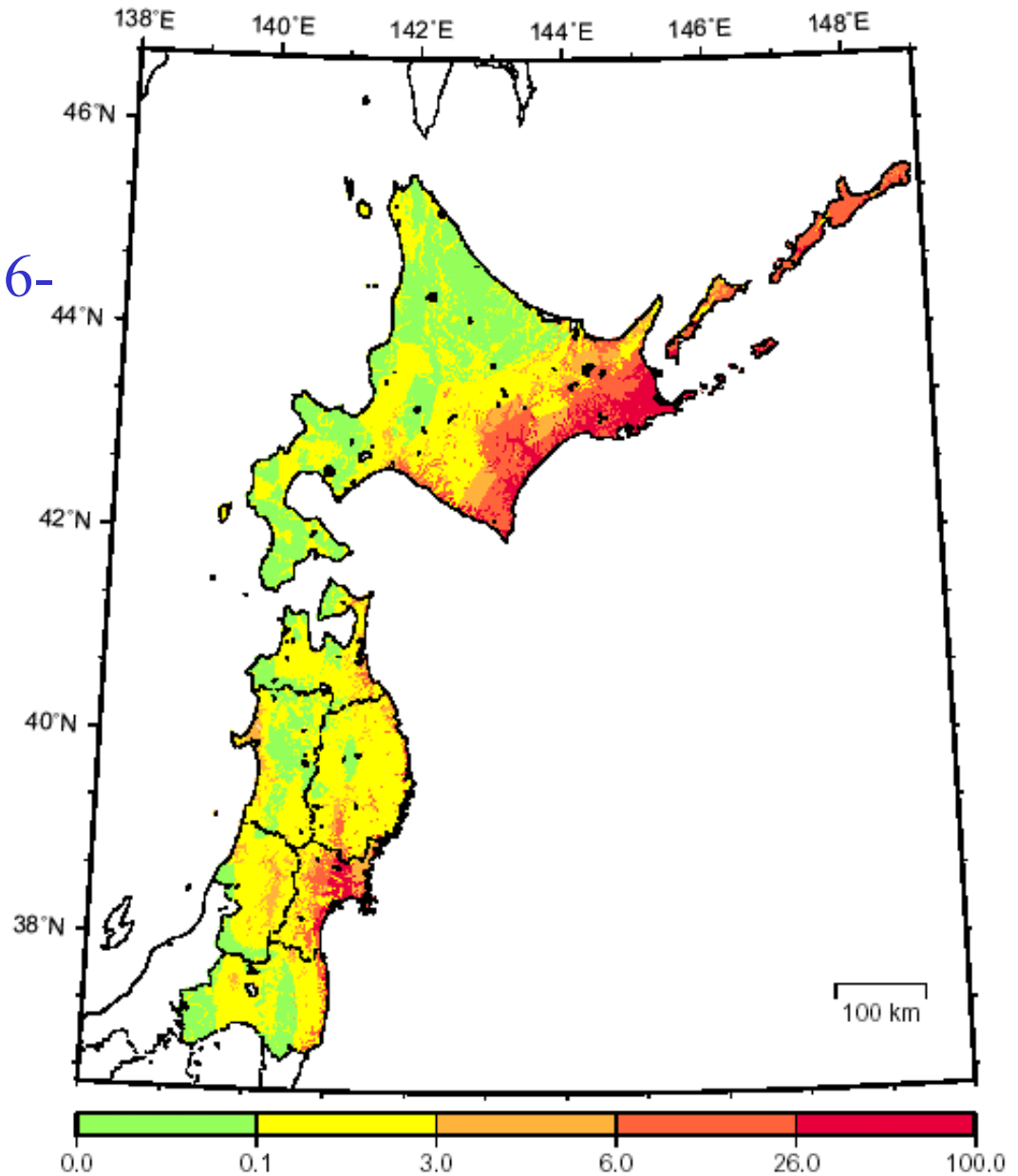
Probabilities of Nojima Fault  
Before Kobe Earthquake

0.4%~8%

%

## *Probabilistic Seismic Hazard Map (North-East Japan)*

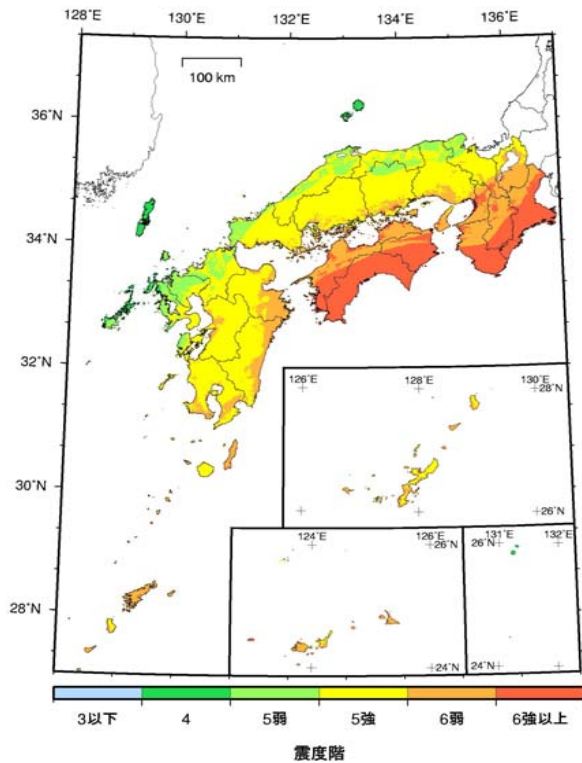
Probability of  
suffering strong motion  
more than seismic intensity 6-  
within 30 years  
from 2002 AD



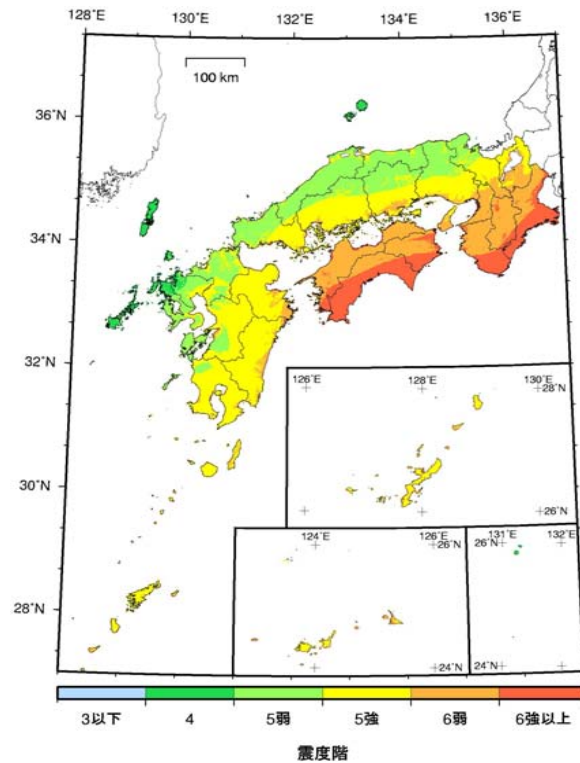
(Earthquake Research Committee, 2002)

# *Probabilistic Seismic Hazard Map (West Japan)*

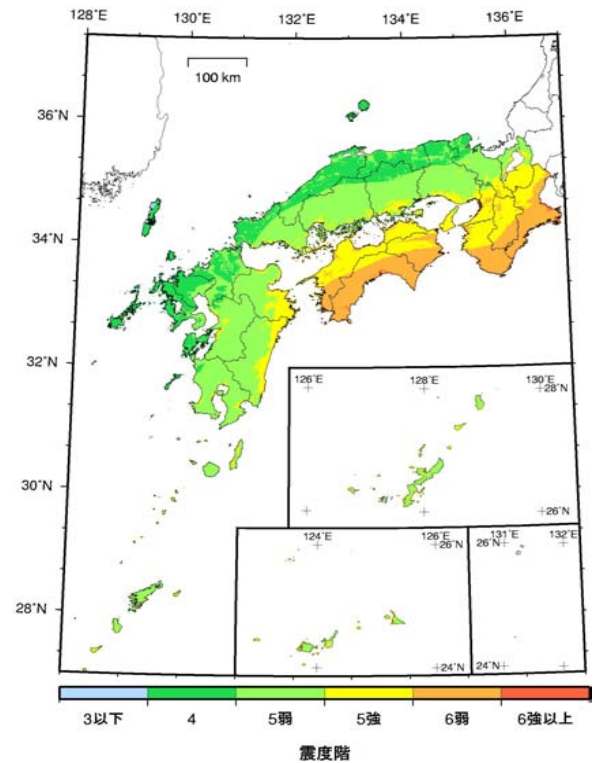
Areas suffering strong motion more than seismic intensity 6- with a certain probability within 50 years from 2002 AD



5% (R. T. 1000 yeas)



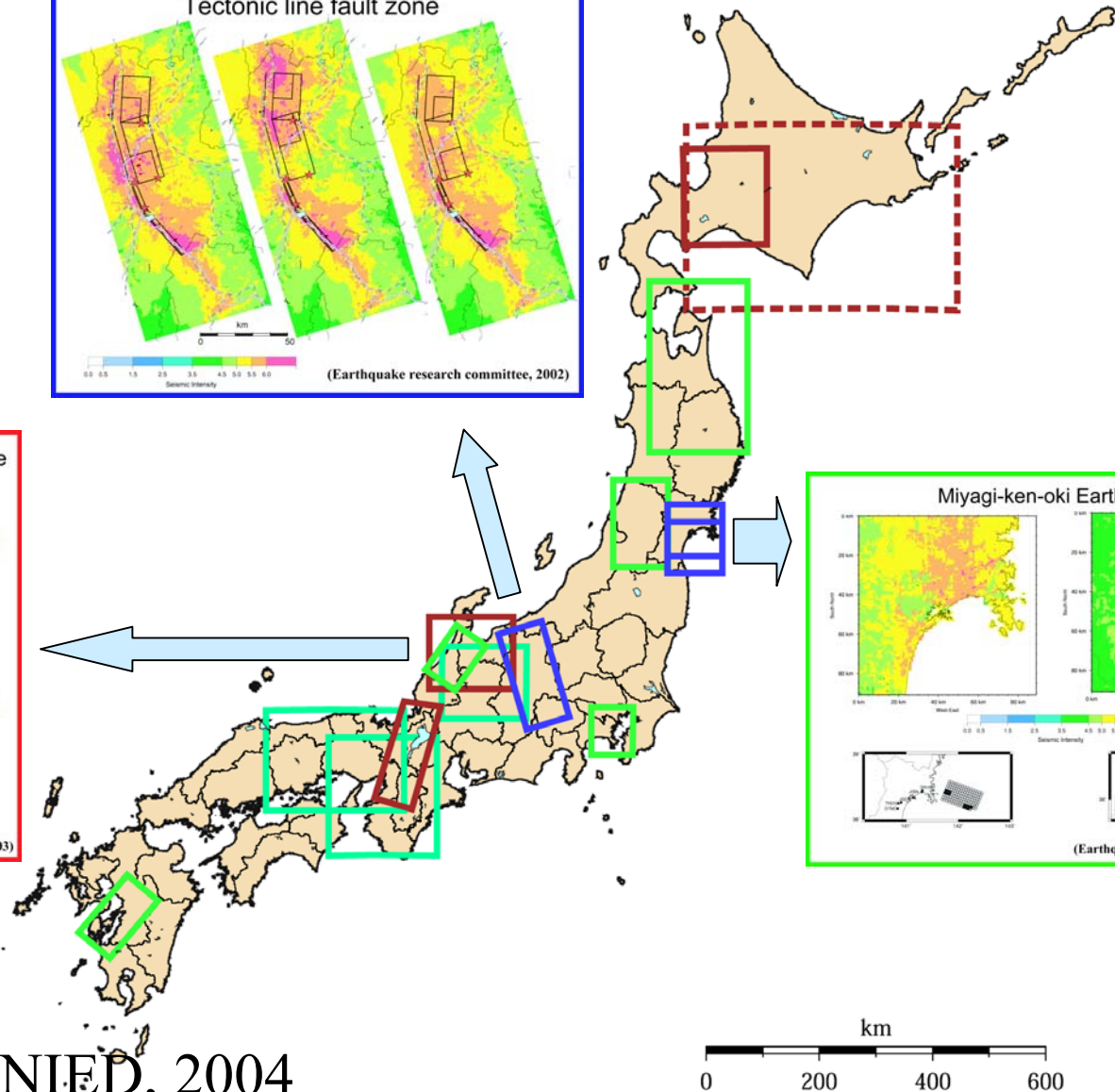
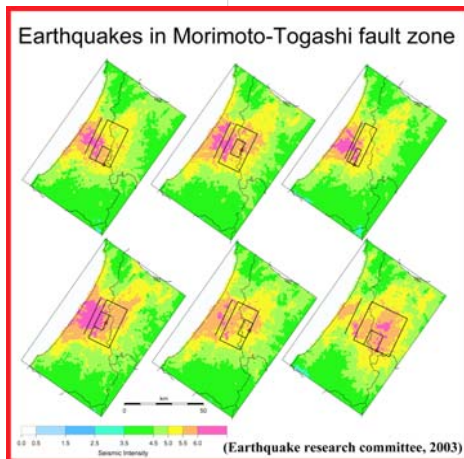
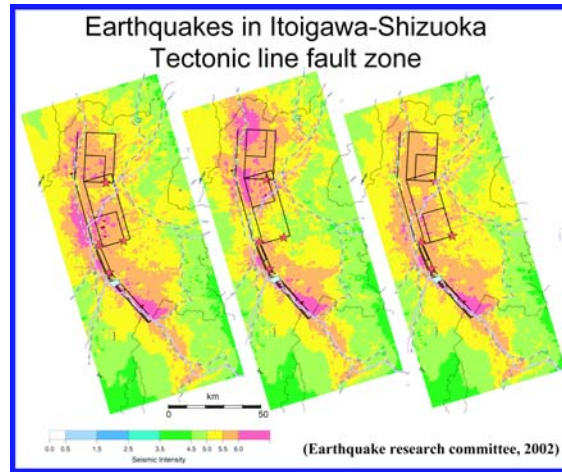
10% (R. T. 500 years)



39% (R. T. 100 years)



# Scenario Earthquake Maps



After Fujiwara, NIED, 2004

# Organization of the Central Disaster Management Council

(As of December 2003)



## Board of Governors

<b>Chair</b>	Cabinet Office Parliamentary Secretary
<b>Advisor</b>	Cabinet risk management supervisor
<b>Vice-chair</b>	Cabinet Office Director General for Disaster management Deputy Secretary General of the Fire and Disaster Management Agency
<b>Governors</b>	Director General class from various ministries and agencies

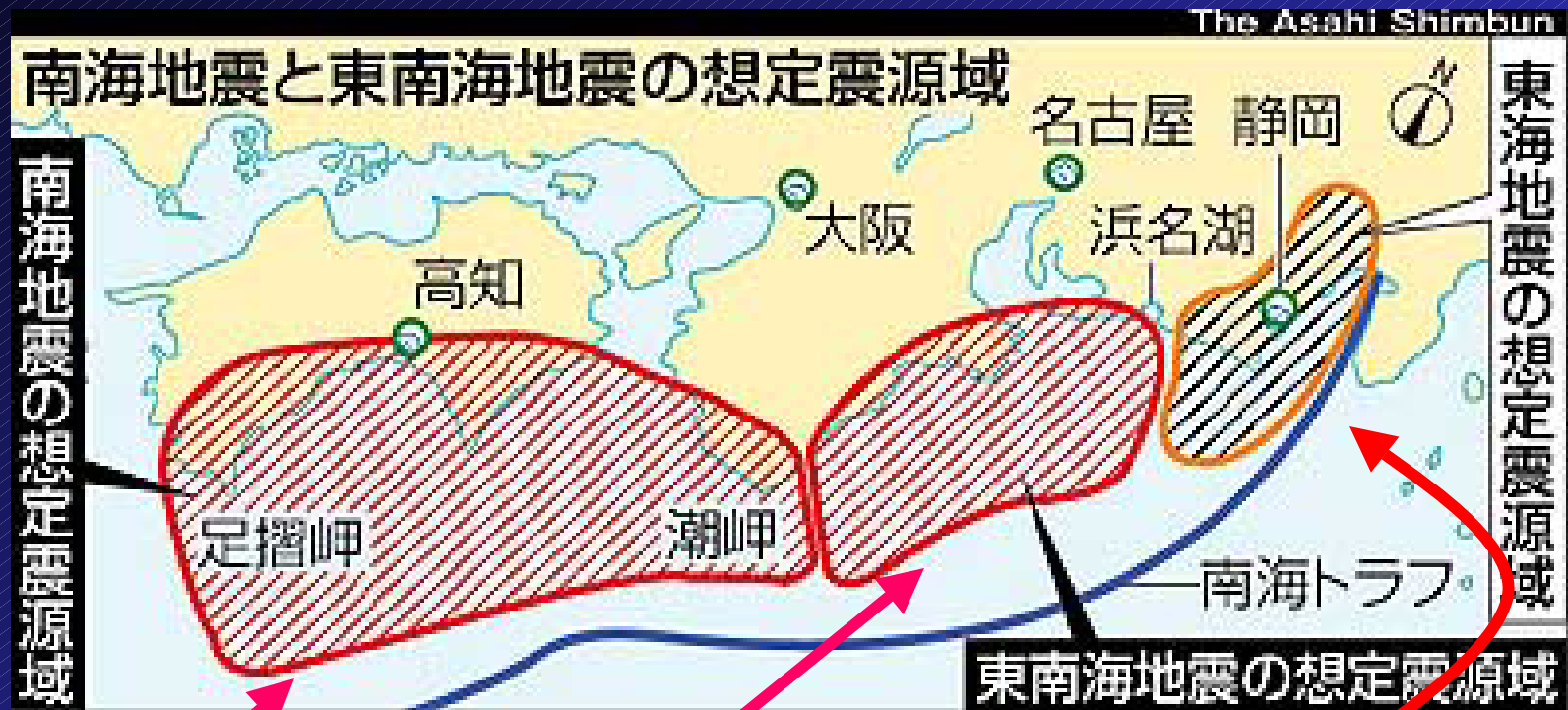
# **Special boards of inquiry**

- **Special Board of Inquiry on Tonankai and Nankai earthquakes** (formed October 3, 2001)
- **Special Board of Inquiry on inheriting the lessons of past disasters** (formed July 31, 2003)
- **Special Board of Inquiry on measures concerning earthquakes centered directly under Tokyo** (formed September 12, 2003)
- **Special Board of Inquiry on enhancing disaster management by utilizing the private sector and markets** (formed September 18, 2003)
- **Special Board of Inquiry on trench-centered earthquakes around the Japan Trench and Chishima Trench** (formed October 27, 2003)



# Activities by Central Disaster Council of Cabinet Office

## *Nankai-Trough Earthquakes*



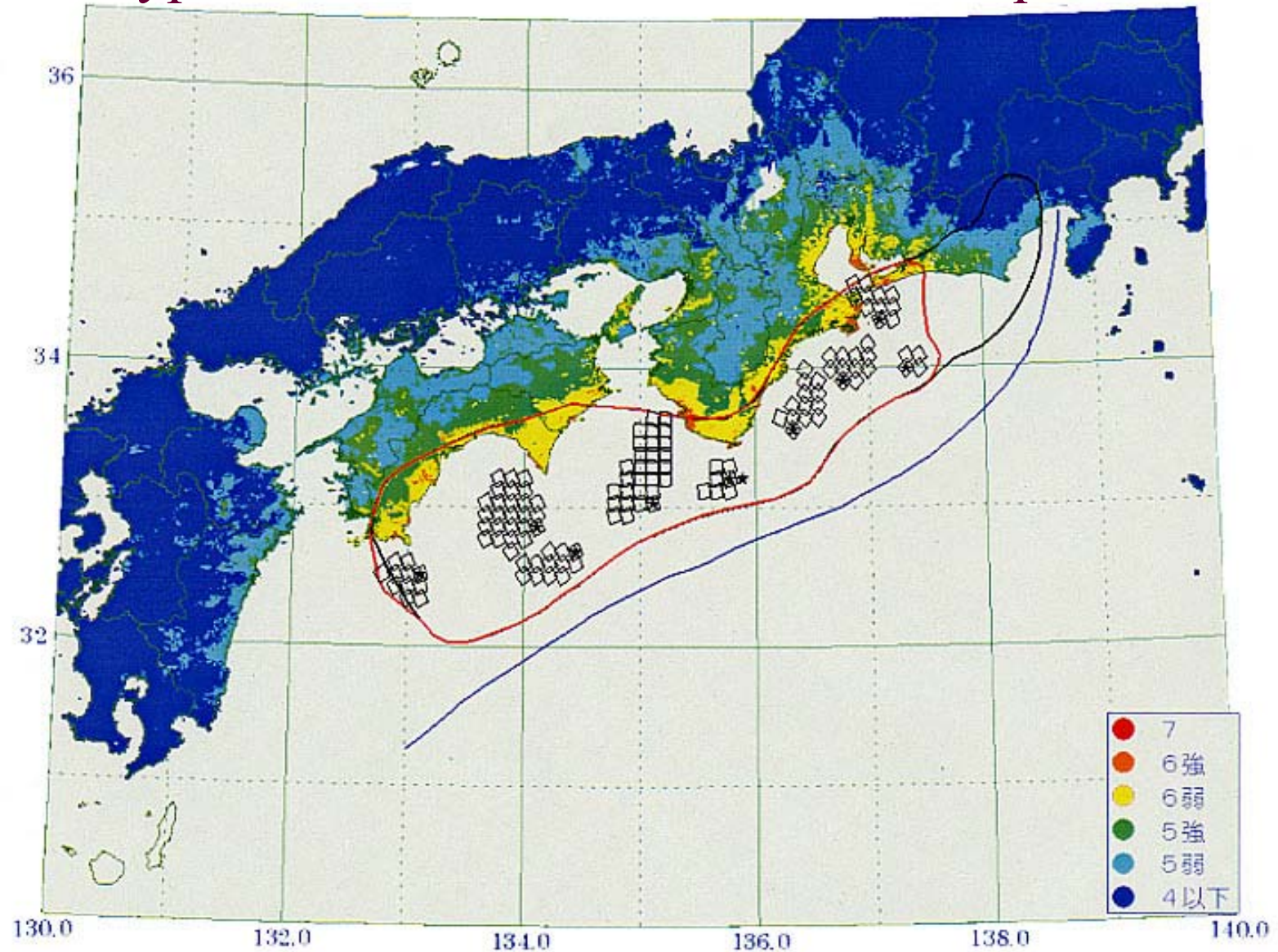
*The Asahi Shimbun (2001)*

Nankai earthquake

Tonankai earthquake

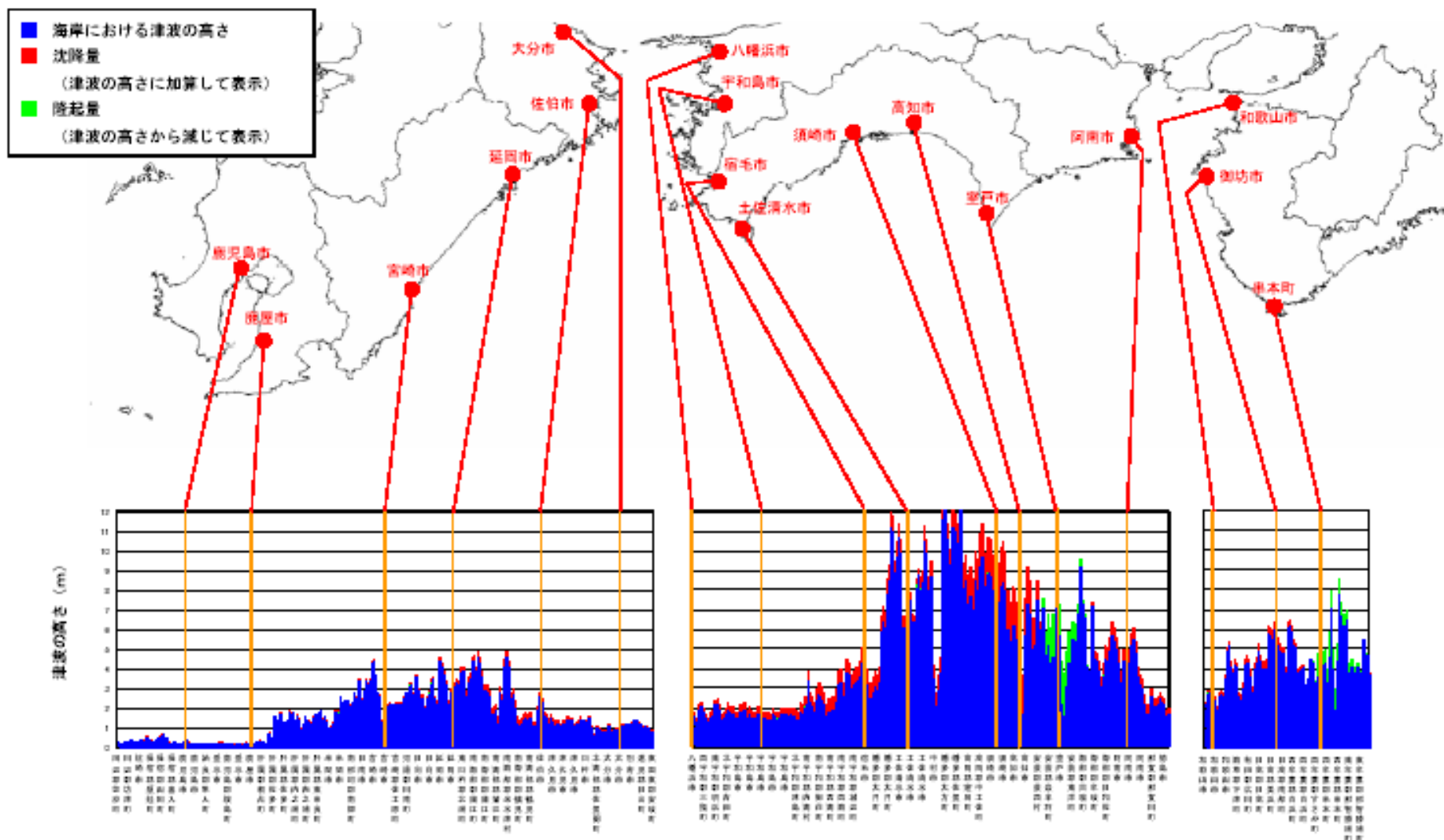
Tokai earthquake

# Seismic Intensity Map for Hypothetical Tonankai-Nankai Earthquake



Central Disaster Management Council(2002)

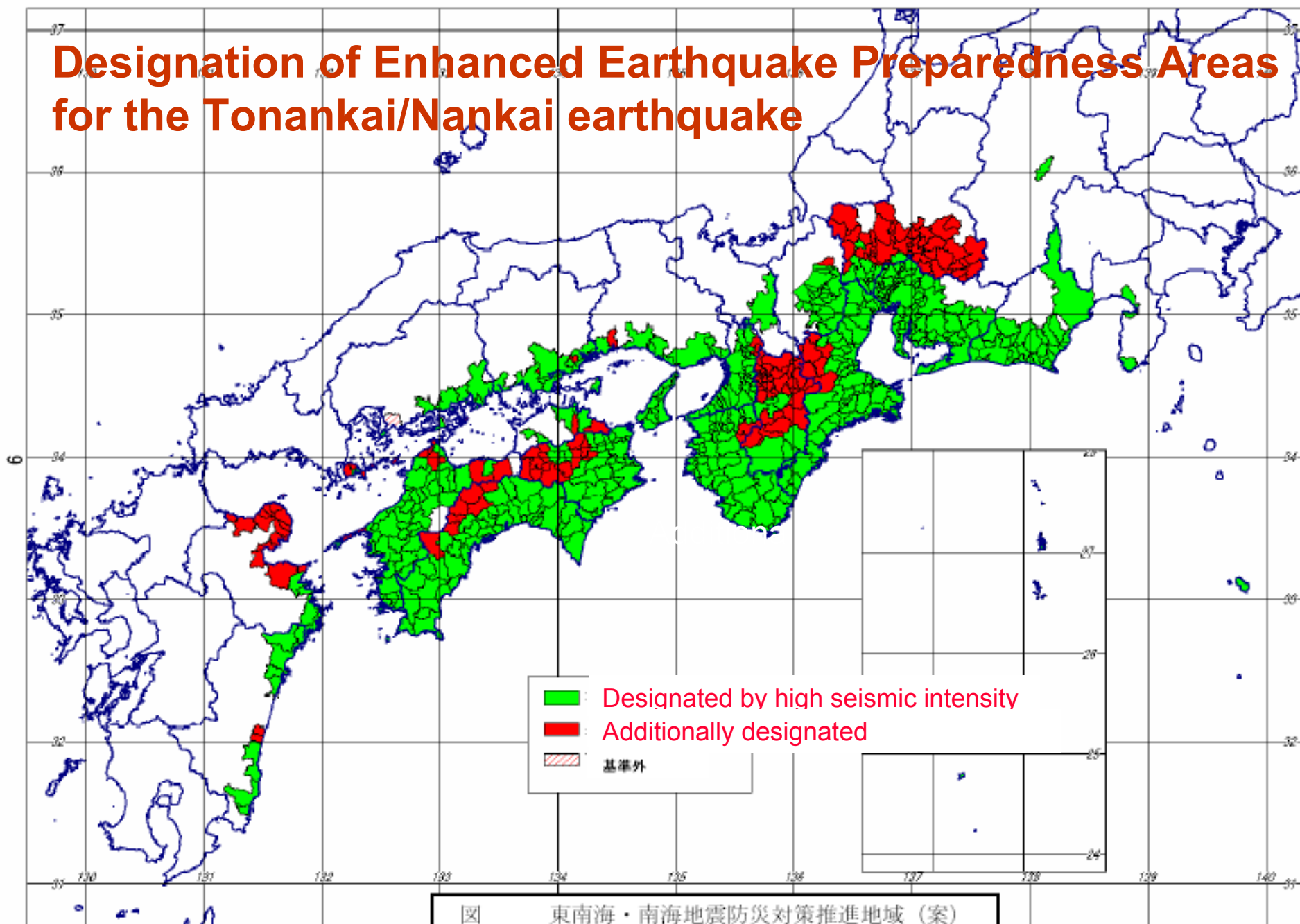
# Maximum Height of Tsunami along Coastlines



図(1). 東南海・南海地震の海岸の津波の高さグラフ (平均潮位)



# Designation of Enhanced Earthquake Preparedness Areas for the Tonankai/Nankai earthquake



# Responsibilities of Japan Meteorological Agency(JMA)

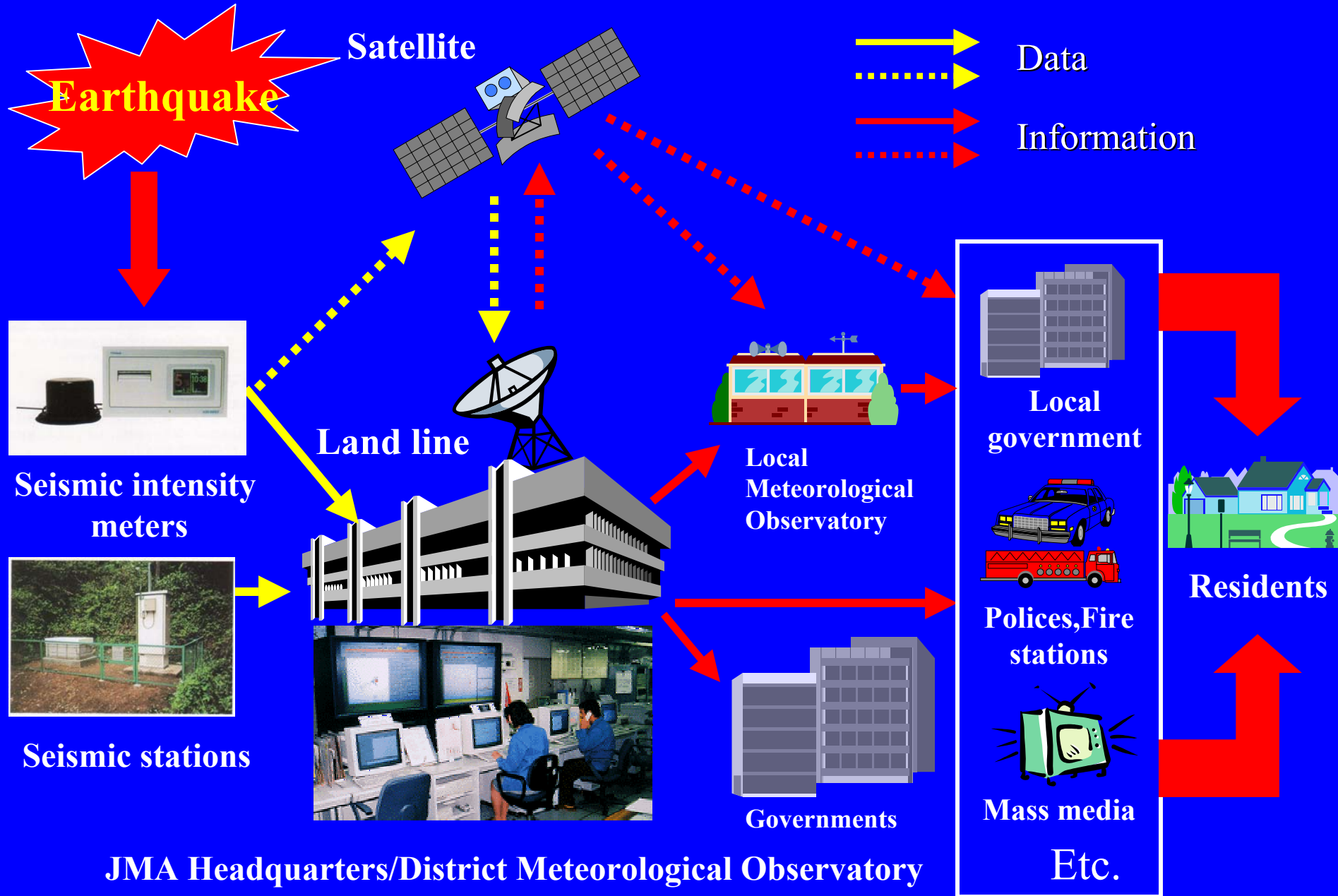
## Quick Information Dissemination for Earthquake and Volcanic Disaster Mitigation

- 1 Tsunami Forecast
- 2 Earthquake Information
- 3 Earthquake Prediction(Tokai Earthquake)
- 4 Volcano Information

## Support Research Activities

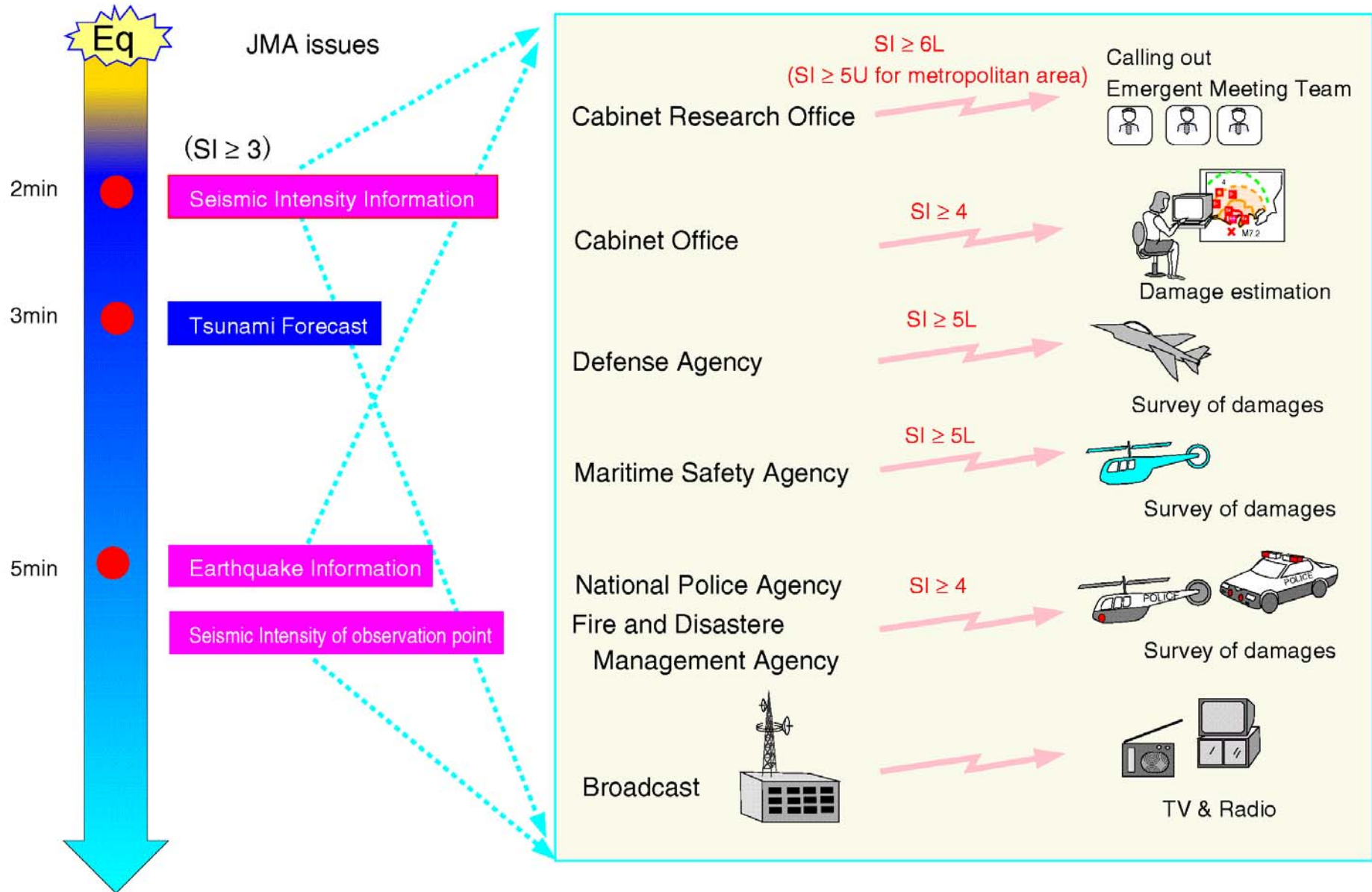
- 5 Earthquake & Volcano Bulletin

# Transmission of Seismic Data and Information

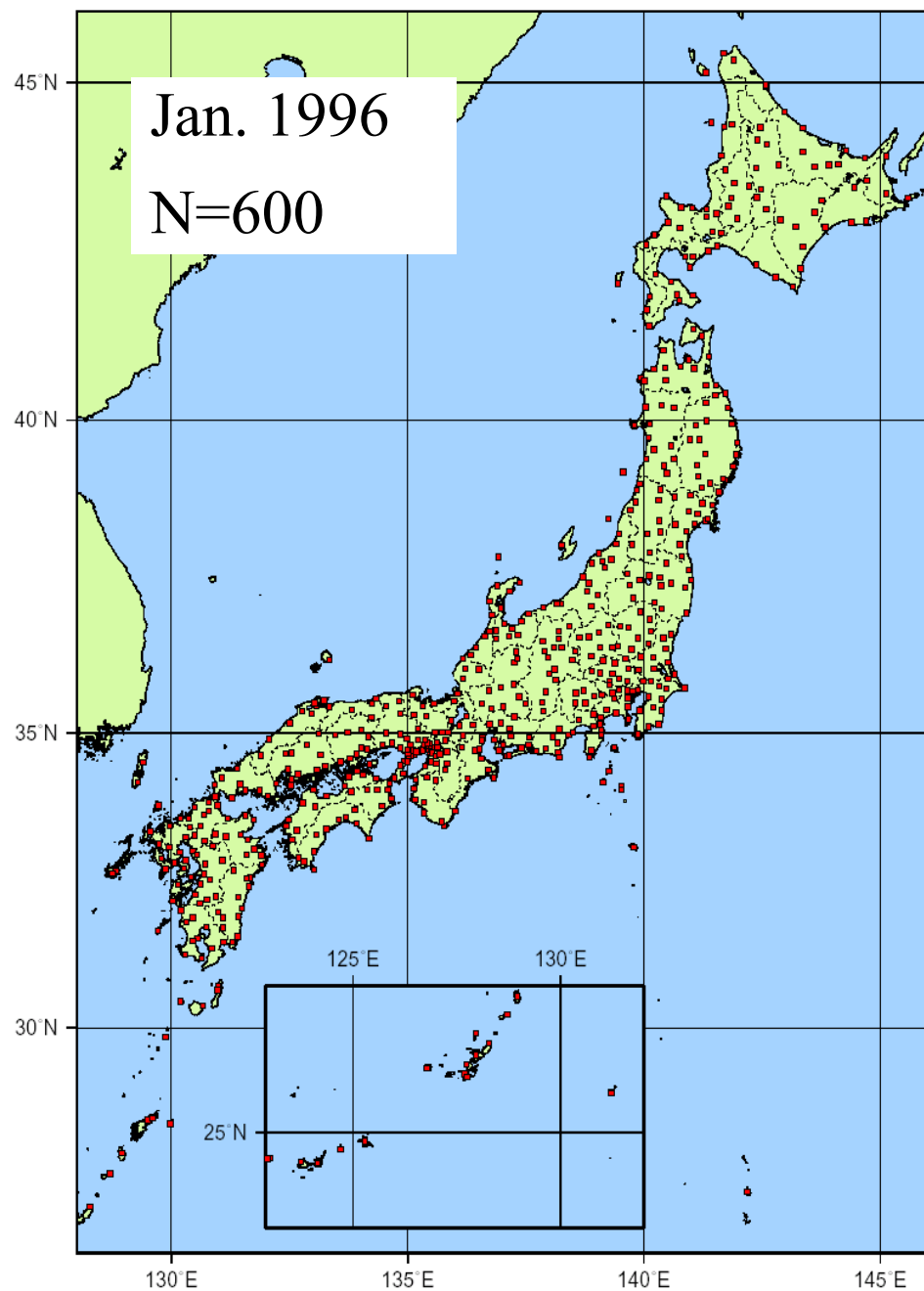




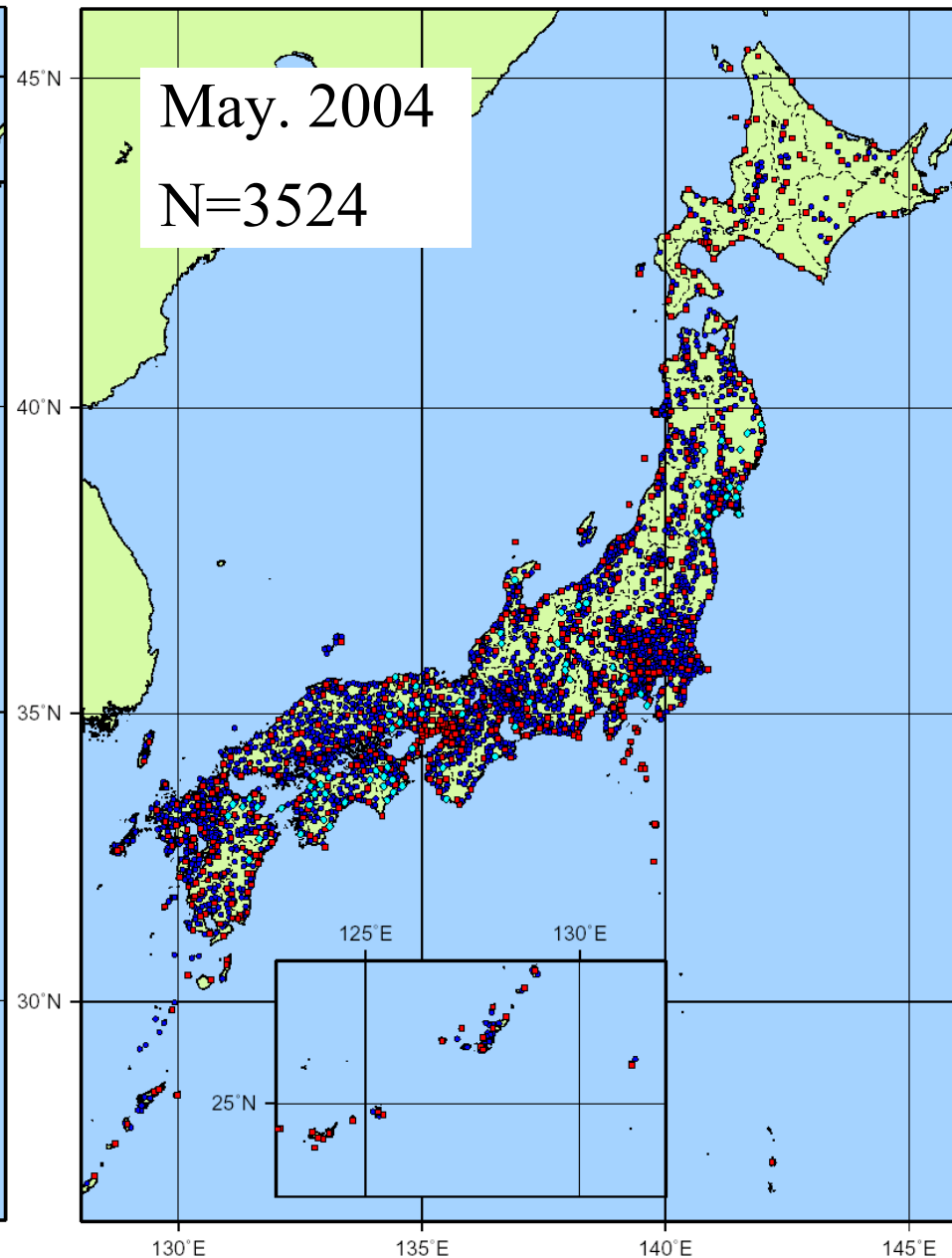
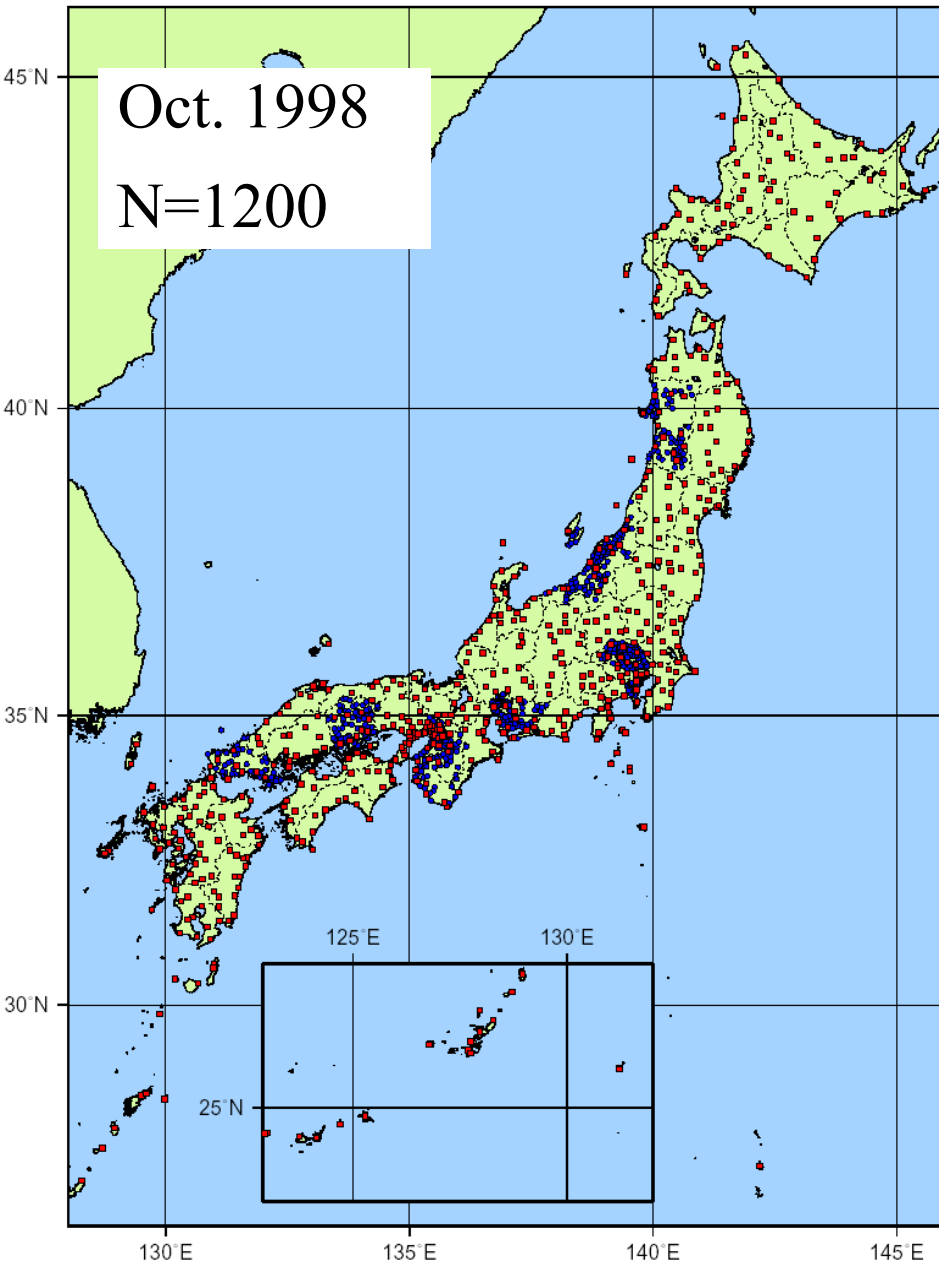
# Practical Use of Seismic Intensity Information



# Transition of Observation Stations of Seismic Intensity 1/2



# Transition of Observation Stations of Seismic Intensity 2/2







**日本地震工学会**

**Japan Association for Earthquake Engineering**

**The JAEE got off a good start on January 1, 2001, on the memorable day at the very beginning of the 21st century.**

**Its aim is to enhance activities related with earthquake hazards, coordinate and integrate numerous existing endeavours that have been developed at various organizations. The JAEE does carry the duty for functioning as a nation's unity of professionals which is part of the International Association for Earthquake Engineering (IAEE).**

**The past presidents:**



**Prof. H. Aoyama**



**Prof. T. Okada**



**Prof. K. Toki**



**Prof. K. Aoyama**

# Intention of JAEE Establishment

## After Words from Founding President Hiroyuki AOYAMA

When the Hyogoken-Nanbu (Kobe) Earthquake hit an urban region of Japan in 1995, the great complexity of the evolution of earthquake damage, which involves scientific, technological, societal and cultural factors, was revealed. The largest lesson we learned from the Kobe Earthquake was the critical need for people with diverse areas of expertise to make an integrated effort to increase the safety of our society against earthquakes.

The JAEE was established to meet this critical need. Over one thousand members from various backgrounds have gathered with us in this forum to exchange information and work and campaign together for a safer society.

## After Words from the Fourth President Kenji ISHIHARA

Its activities are conceived to span a wide spectrum embracing not only scientific and engineering disciplines, but covering more widely social, economic and administrative matters.

# Future Roles of JAEE for Reducing Earthquake Disasters

1. Lead the scientific and technological research and development in the field of Earthquake Engineering and Earthquake Disaster Reduction.
2. To devise systems to guaranty the seismic code enforcement. Although the code preparation is an important issue, it is far more difficult to really make it functional. Therefore, this issue should be given attention.
3. The development of methodologies to retrofit low earthquake resistant structures focusing on both technical and social issues.

# Action plans

- Promote research collaboration among countries to pursue the issues 1 and 3 in the previous slide. The use of the E-defense shaking table facility in Japan may play an important role for this purpose.
- To establish a task force committee to propose a proper method to retrofit the low-earthquake resistance structures. In this sense, local availability of materials and methods should be stressed. The social system or law to encourage the government and general public to retrofit should also be considered.