Importance of Hazard and Risk Assessment

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President of Japanese Association of Earthquake Engineering

Thematic Session 3-5
Seismic disaster mitigation assurance in the 21st century
- How should our societies encounter major earthquakes-

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

- Headquarters
- Policy Committee
  - Subcommittee for Survey and Observation Plans
  - Budget Subcommittee
  - Subcommittee for Instituting Results in Society
- Earthquake Research Committee
  - Subcommittee for Long-term Evaluations
  - Subcommittee for Evaluations of Strong Ground Motion
Probabilities of Large-Scale Earthquakes over the Next Thirty Years

**Inland Active Faults**

- 櫛形山脈断層帯 ほぼ0%〜7%
- 森本−富樫断層帯 ほぼ0%〜5%
- Median Tectonic Line Almost 0%〜5%
- 奈良盆地 東縁断層帯 ほぼ0%〜5%

**Plate-Boundary Earthquakes**

- Tokachi-Oki 60%
  →0.003〜2%
- Miyagi-Oki 99%
  4〜7%(1〜2%)

**Probabilities of Nojima Fault Before Kobe Earthquake**

- Nankai Trough (Tonankai) 58%
  (Nankai) 47%
- Nankai Trough (Tonankai) 0.4%〜8%
- 布田川・日奈久断層帯 (中部) ほぼ0%〜6%

**Reference**

- 富士川河口断層帯 0.20〜11%
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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 years)
- 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)

### Central Disaster Management Council

<table>
<thead>
<tr>
<th>Chair</th>
<th>Prime Minister</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minister of state for Disaster Management and the rest of the Cabinet (up to 17 members)</td>
</tr>
<tr>
<td></td>
<td>Heads of Designated public Institutions (4)</td>
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<tr>
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<td>Experts (4)</td>
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</tbody>
</table>

### Prime Minister
- Board of Governors
  - Chair: Cabinet Office Parliamentary Secretary
  - Advisor: Cabinet risk management supervisor
  - Vice-chair: Cabinet Office Director General for Disaster management
  - Governors: Deputy Secretary General of the Fire and Disaster Management Agency
  - Director General class from various ministries and agencies

### Special boards of inquiry
- Queries
- Findings
- Opinions
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
Maximum Height of Tsunami along Coastlines
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

Earthquake

Satellite

Seismic intensity meters

Seismic stations

JMA Headquarters/District Meteorological Observatory

Land line

Local government

Police, Fire stations

Mass media

Etc.

Residents

Information

Data
Practical Use of Seismic Intensity Information

JMA issues

2min

- Seismic Intensity Information

3min

- Tsunami Forecast

5min

- Earthquake Information
  - Seismic Intensity of observation point

Cabinet Research Office

SI ≥ 6L
(SI ≥ 5U for metropolitan area)

Calling out Emergent Meeting Team

Cabinet Office

SI ≥ 4

Damage estimation

Defense Agency

SI ≥ 5L

Survey of damages

Maritime Safety Agency

SI ≥ 5L

Survey of damages

National Police Agency

SI ≥ 4

Survey of damages

Fire and Disastere Management Agency

Broadcast

TV & Radio
Transition of Observation Stations of Seismic Intensity 2/2

Oct. 1998
N=1200

May. 2004
N=3524
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. Ishihara
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.