

IASPEI Public Debate, July 26, 2013

The Japanese Approach

Kenji Satake

Japanese Government Committees

Coordinating Committee for Earthquake Prediction
(Geospatial Information Authority of Japan, GSI)

Headquarters of Earthquake Research Promotion (MEXT)

Central Disaster Management Council (Cabinet Office)

Nuclear Regulation Authority

Council for Tokai earthquake prediction (JMA)

Coordinating Committee for Earthquake Prediction (CCEP)

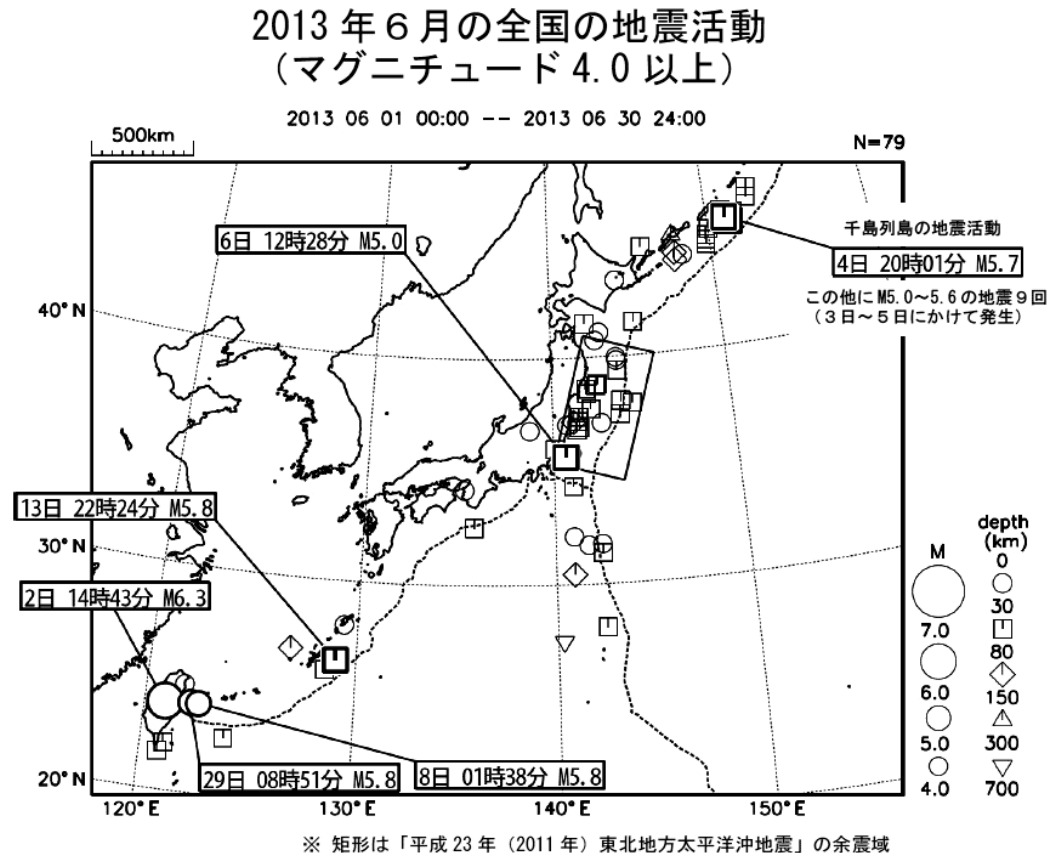


- Since 1969 at Geographical Survey Institute
- 30 members from government organization and universities
- Exchange information on observation and research
- held periodically 4 times a year.
- Reports twice a year (on the website)

Headquarter of Earthquake Research Promotion (MEXT)

Monthly meetings

To evaluate the
seismic activity of
previous month



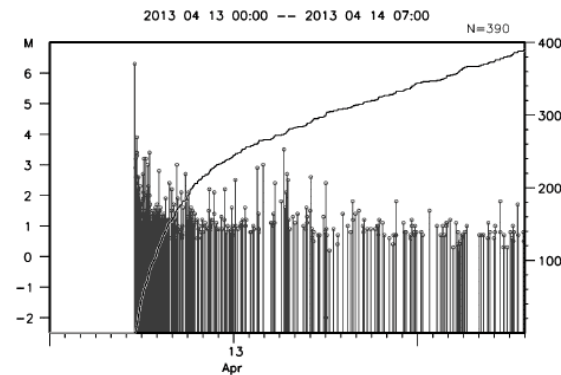
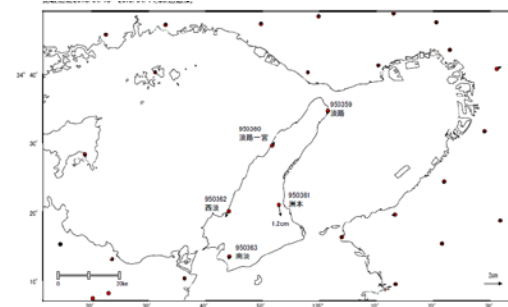
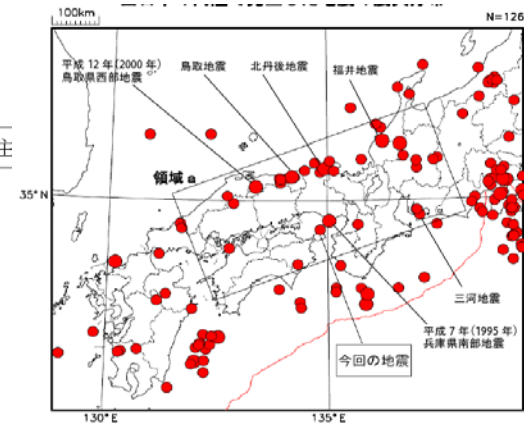
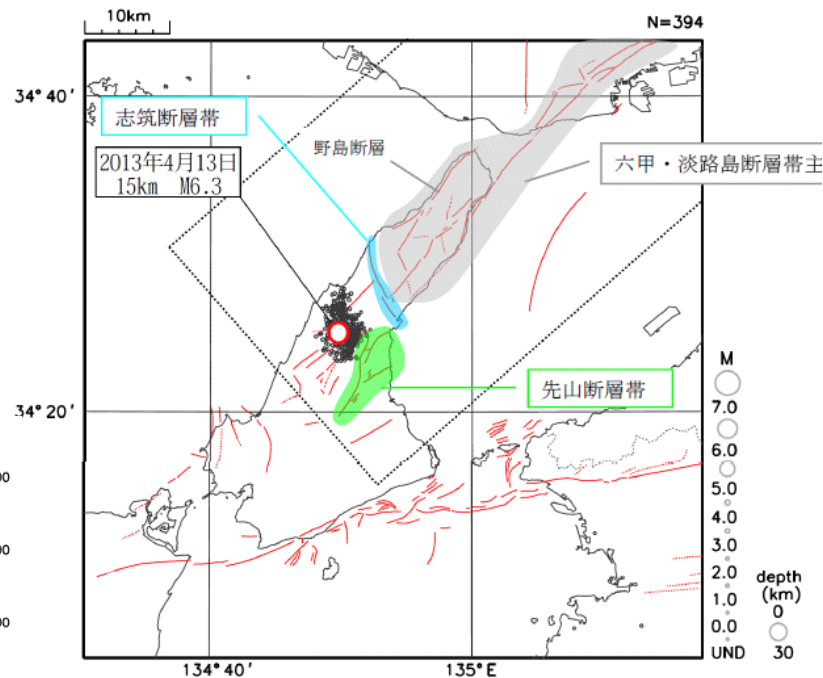
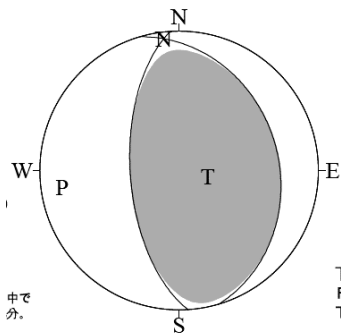
- ・ 6 月 2 日に台湾付近で M6.3 の地震 (最大震度 1) が発生した。

[図中に日時分、マグニチュードを付した地震は M5.0 以上の地震、または M4.0 以上で最大震度 5 弱以上を観測した地震である。また、上に表記した地震は M6.0 以上、または M4.0 以上で最大震度 5 弱以上を観測した地震である。]

Headquarter of Earthquake Research Promotion (MEXT)

Special meetings (in a day or two after large earthquakes)

- Exchange data (seismic, geodetic, geologic, historical)
- Evaluation of the event and near-future forecast (aftershocks)

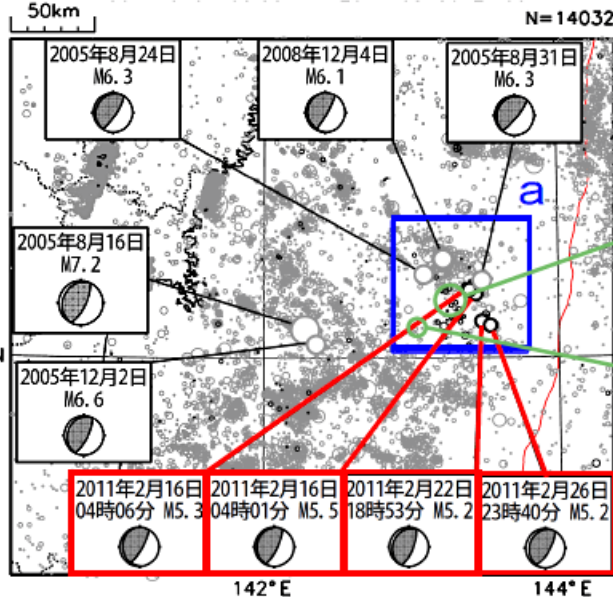


Monthly meeting on March 9, 2011

- Foreshock (M7.3) occurred just before the meeting
- Seismic activity (M5-6) since February
- No forecast was made

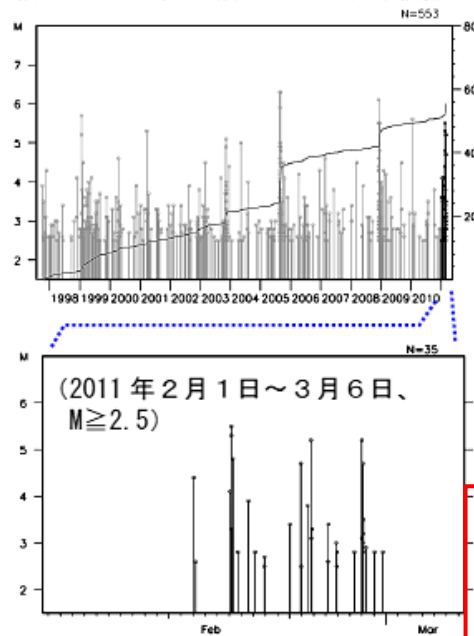
震央分布図 (1937年10月1日～2011年3月8日、
深さ0～100km、 $M \geq 2.5$)

2011年2月1日以降の地震を濃く表示

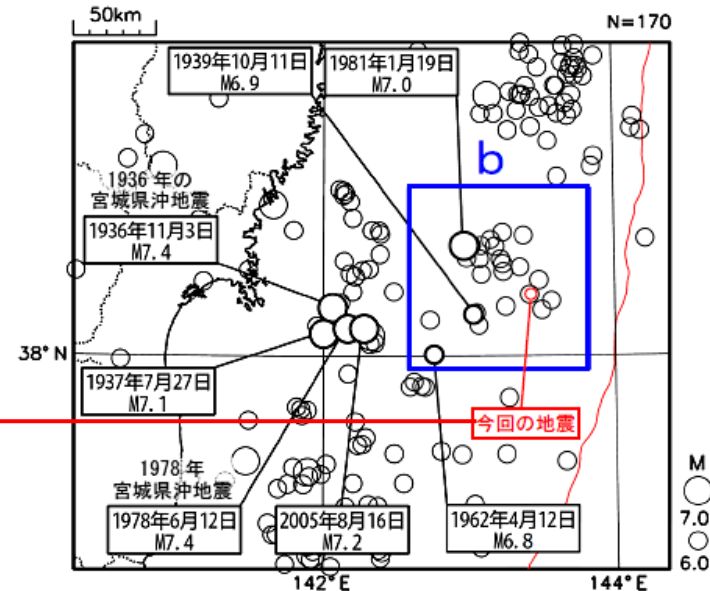


※発震機構は CMT 解を表示

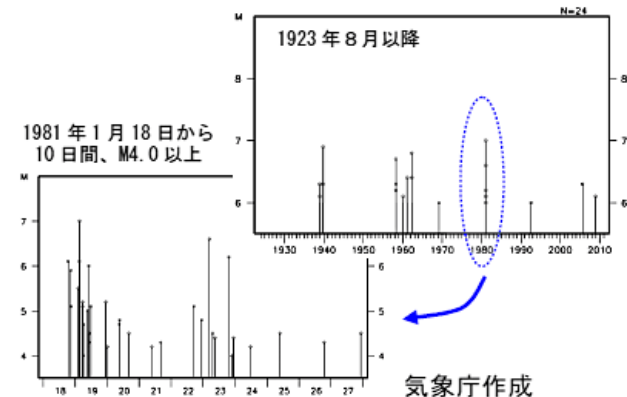
領域 a 内の地震活動経過図及び回数積算図



震央分布図 (1923年8月1日～2011年2月28日、
深さ0～150km、 $M \geq 6.0$)

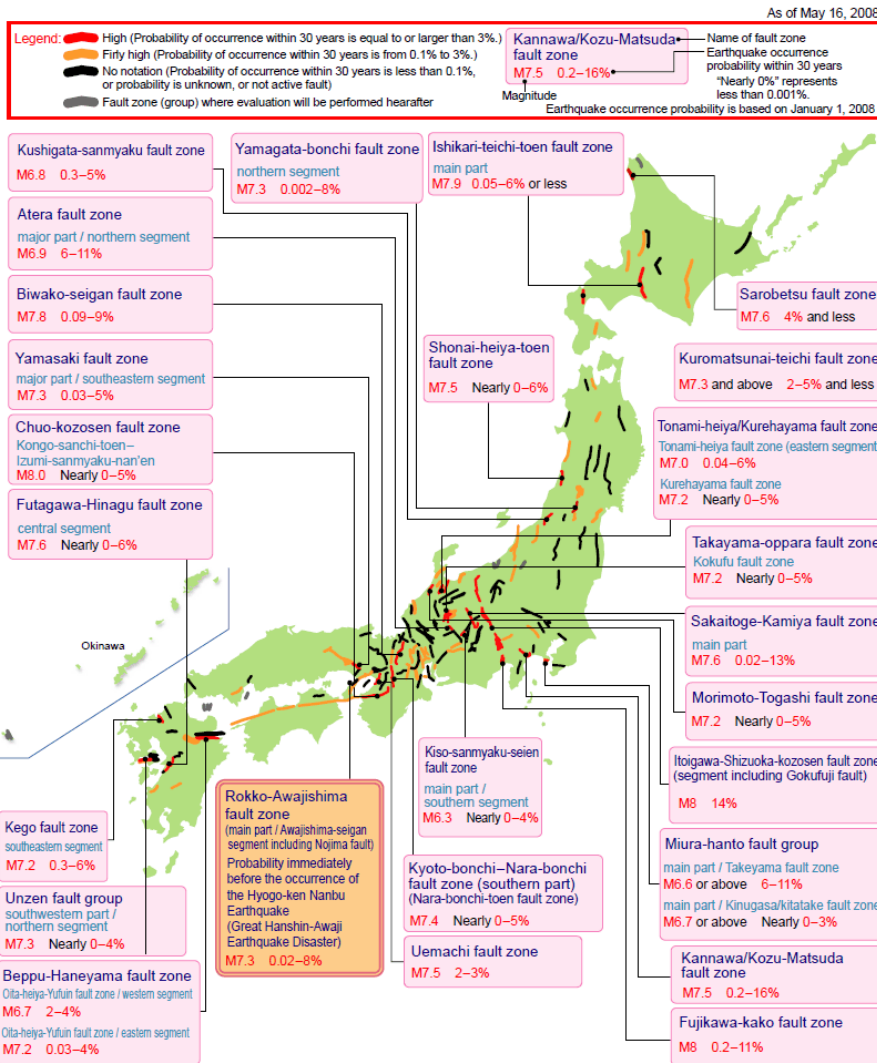


領域 b 内の地震活動経過図

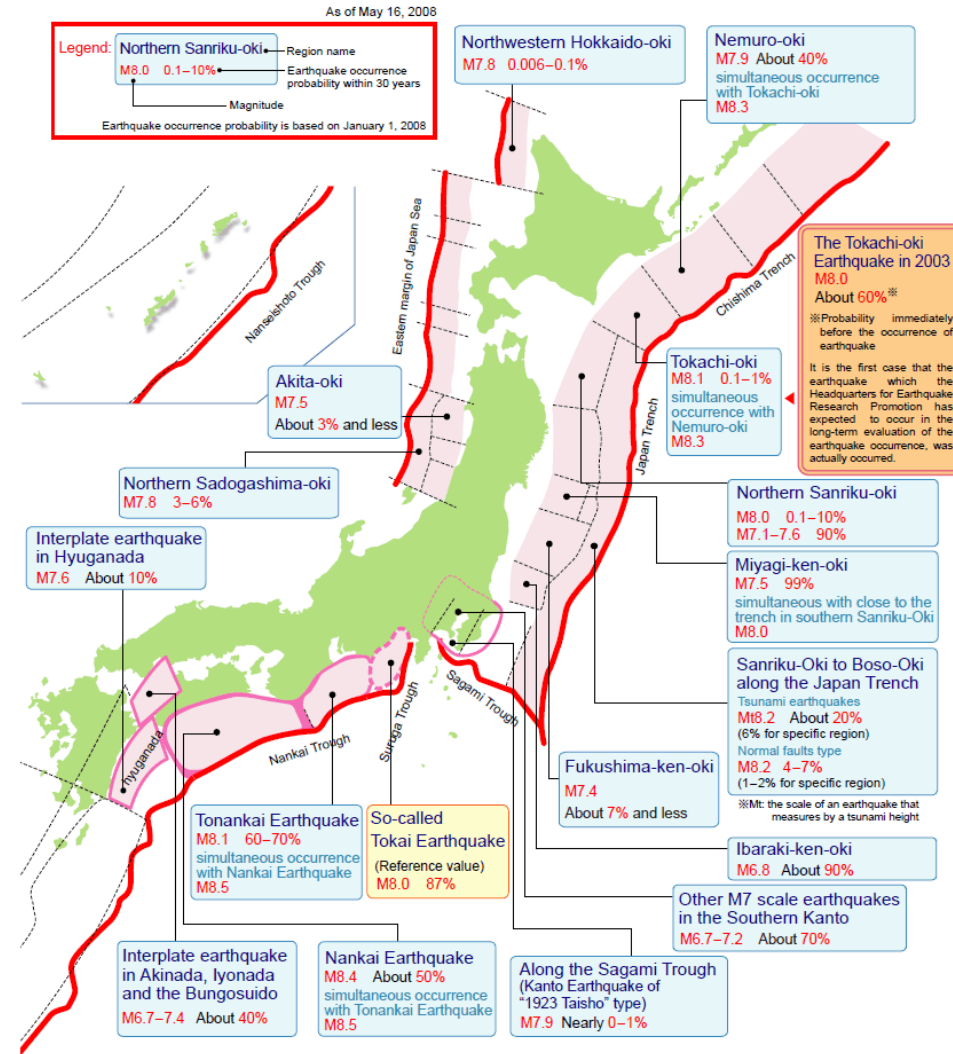


気象庁作成

Long-term forecast of earthquake occurrence



the largest earthquakes (characteristic earthquakes)
on the major active fault zones



The earthquakes at plate boundary and
in the vicinity

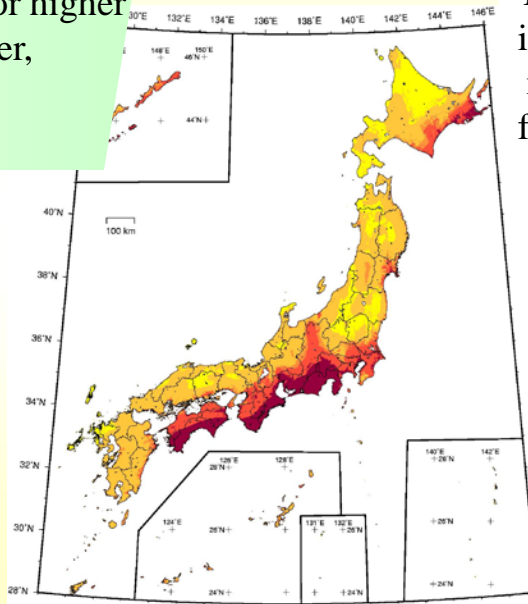
National Seismic Hazard Maps

Probabilistic Seismic Hazard Map

The probability of ground motions equal to or higher than seismic intensity 6 Lower, occurring within 30 years from the present.

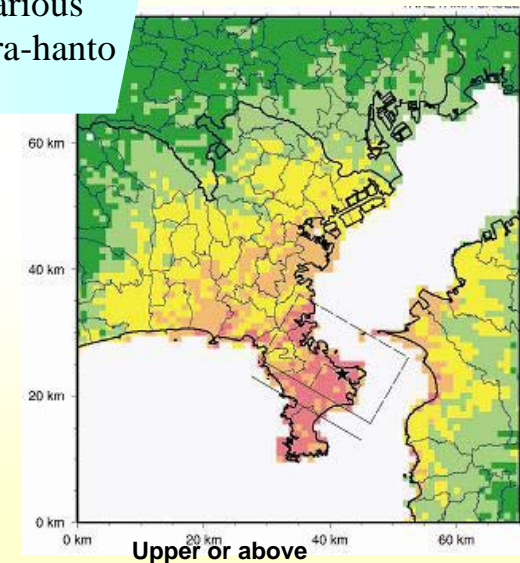
Probability

High	26% or higher
	6% – 26%
	3% – 6%
Fairly high	0.1% – 3%
	Under 0.1%



Seismic Hazard Map for Specified Seismic Source Faults

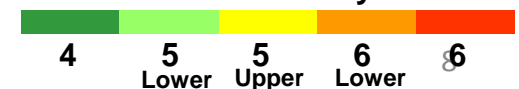
The seismic intensities forecast for various regions around the Miura-hanto fault group.



These maps are expected to be used

- to raise the public's awareness of earthquake disaster reduction
- to take the earthquake disaster reduction measures more effectively and efficiently
- to evaluate the risks of establishing important facilities and enterprises in a certain area.

Seismic intensity



Central Disaster Management Council of Japan

Lessons from the 2011 GEJE

- Devastating damage from unforeseeable giant (M9) earthquake
- Assessment was much lower than the actual disaster
- Disaster management excessively dependent on coastal facilities
- Underestimation of tsunami warning



Future hazard assumptions will require two levels of tsunamis

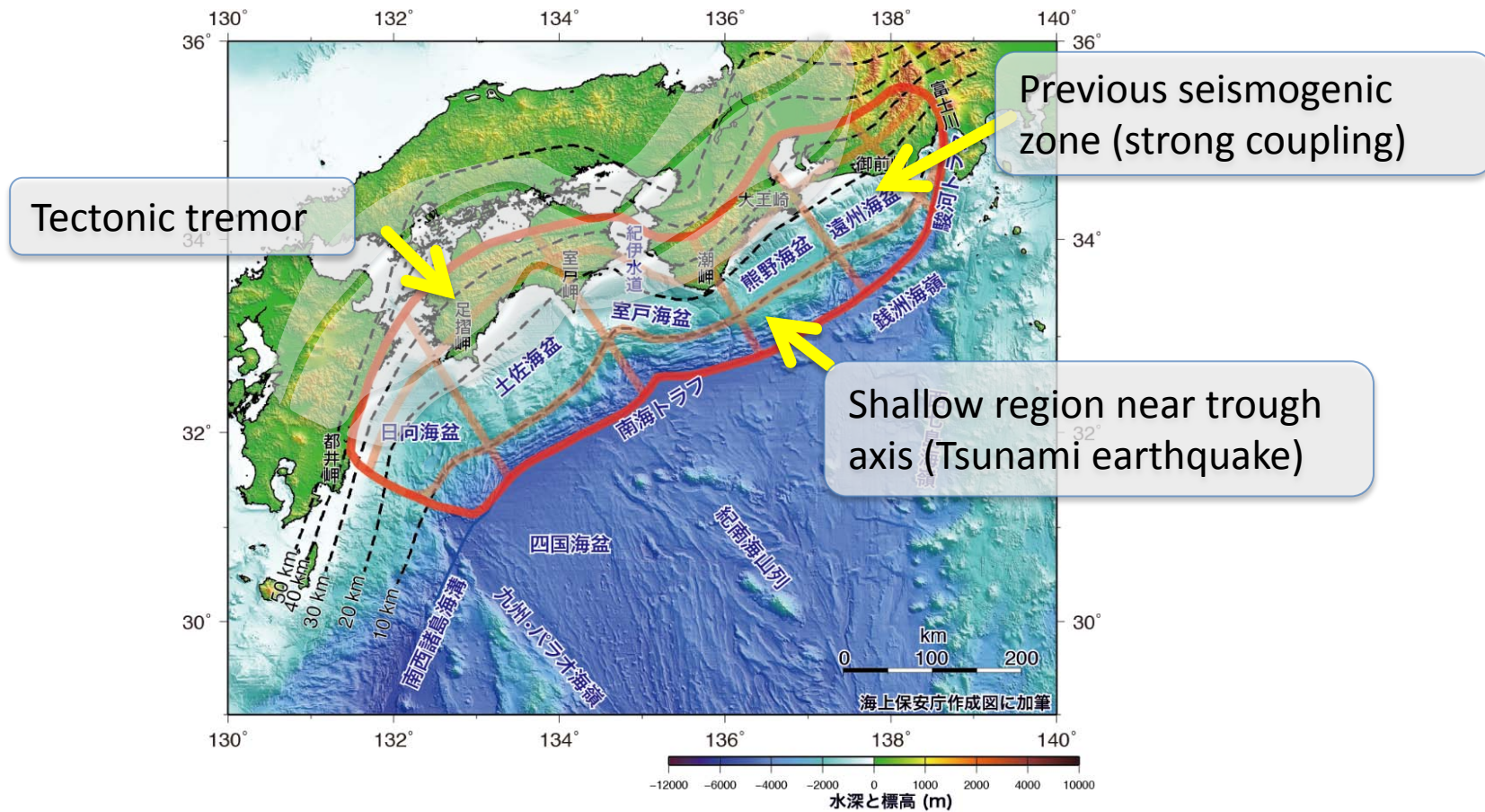
LEVEL 1 TSUNAMI Tsunamis that occur frequently but cause major damage despite the relatively low tsunami height

- Development of **coastal protection facilities** for protecting **human life** and the **assets of residents**, stabilizing the **regional economy** and securing efficient **industrial bases**.

LEVEL 2 TSUNAMI Largest-possible tsunamis with extremely low possibility of occurrence but devastating once they occur

- Place **protection of people's lives** as the first priority and establish comprehensive tsunami countermeasures such as hazard maps or education, with **evacuation of residents** as the core.

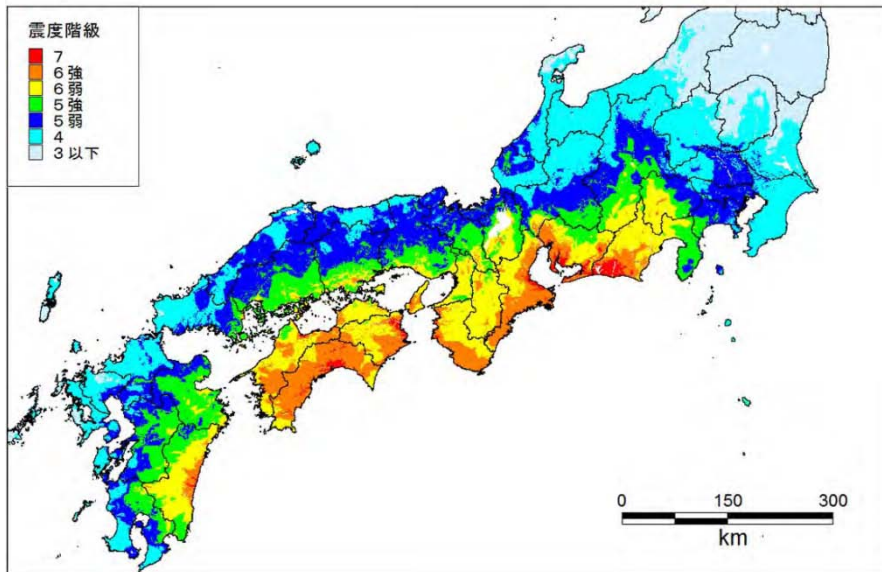
Nankai trough (maximum size)



Earthquake	Area (10^3 km^2)	Mw
Nankai (new estimate)	140	9.1
Nankai (old estimate)	60	8.7
2011 Tohoku	100	9.0

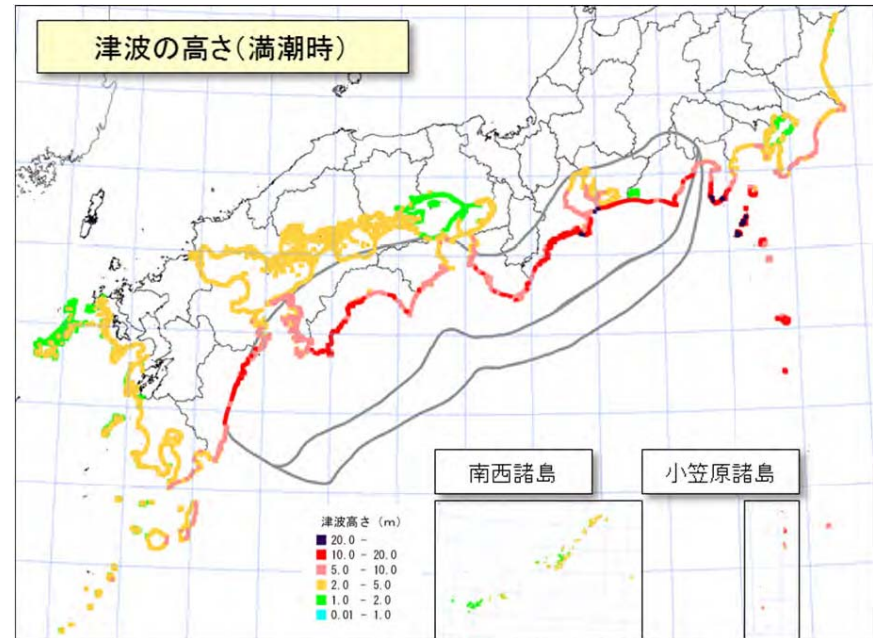
Nankai trough (maximum size)

Strong motion (seismic intensity)



陸側ケースの震度分布

Tsunami heights



【ケース①「駿河湾～紀伊半島沖」に大すべり域を設定】

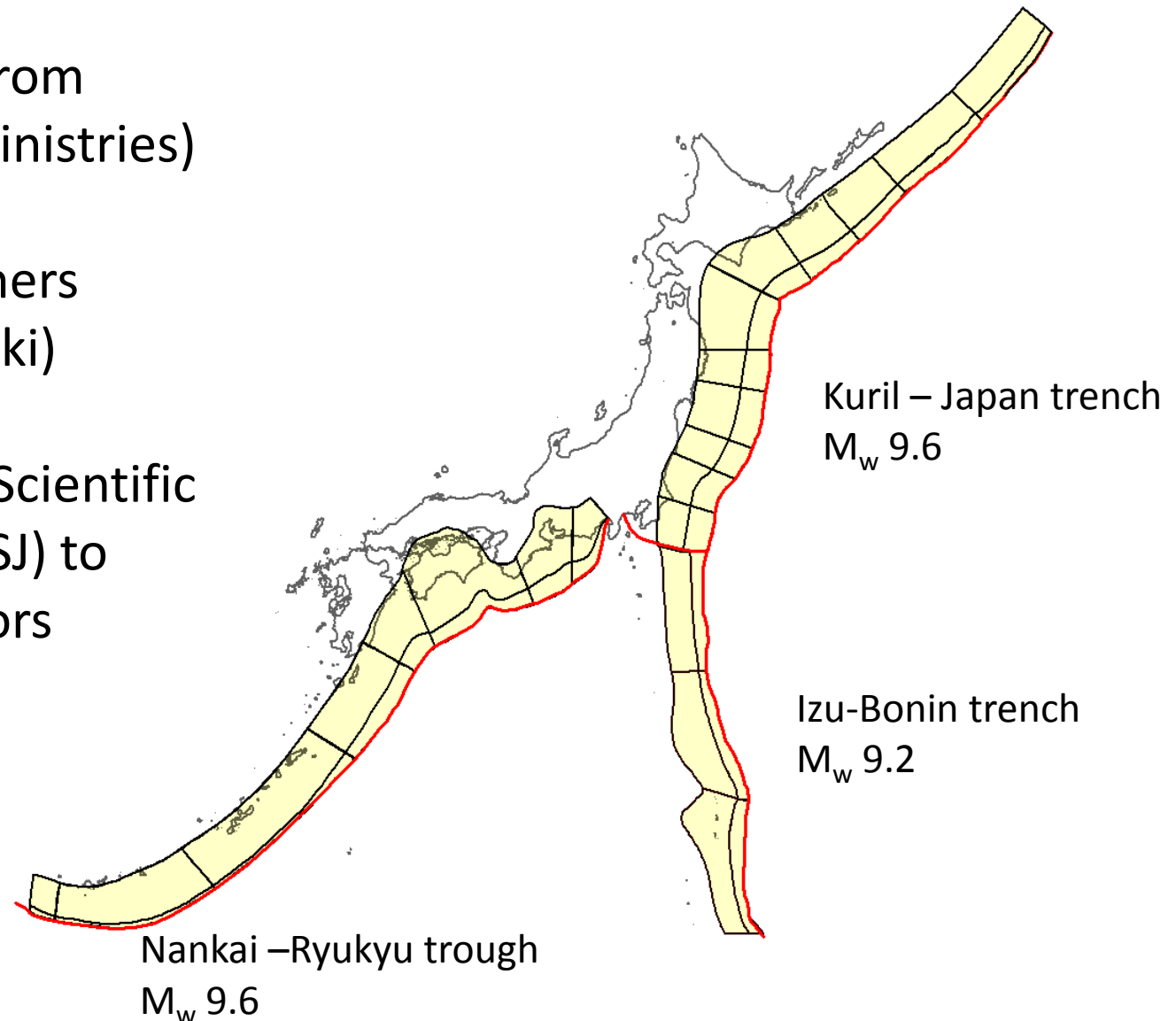
Damage estimation of disaster
economic damage 2.2×10^{14} yen (~2 trillion dollars)
approximately 10 x 2011 damage, 40 % of GDP
maximum casualties: 320,000

Nuclear Regulation Authority

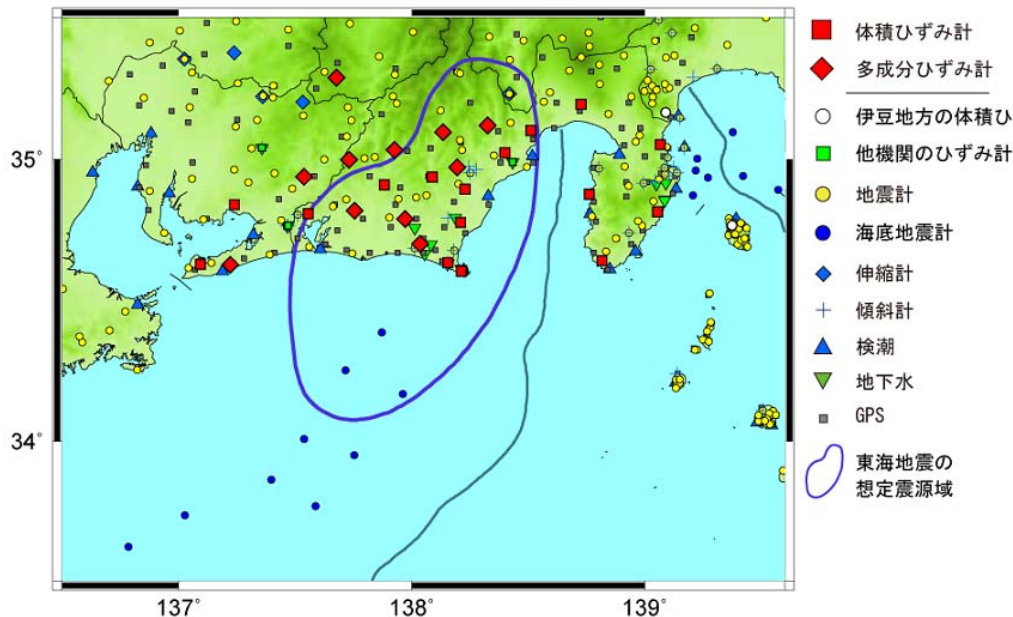
Independence from
government (ministries)

Five commissioners
(incl. K. Shimazaki)

NRA requested Scientific
Societies (e.g. SSJ) to
nominate advisors



Council for Tokai Earthquake Prediction



Six seismologists compose the council to advise to DG of JMA
The warning will be issued by prime minister

Information	Anomalies	
Earthquake Report	Insufficient or irrelevant	No action required
Earthquake Advisory	Possibility increase	attention
Earthquake Warning	Precursor	Warning statement by prime minister

Summary

- Japanese seismologists are involved in various governmental committees
- Their roles range from exchange information, evaluation of seismicity, estimate future hazard and disaster, hazard estimation for NPP, to “predict” Tokai earthquake
- Each committee specifies the responsible authorities, and seismologists are considered to be advisors
- The committee meetings are followed by press conference, to which seismologists also attend
- Meeting minutes are usually available (upon request) to public, but the statements are not attributed to specific seismologist