Preliminary Version of Probabilistic Seismic Hazard Map of Japan (Specific Area)

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Basic Policy –Seismic Hazard Map

Probabilistic Seismic Hazard Map

The predicted likelihood of a strong ground motion occurring in a given area within a set period of time.

- The Earthquake Research Committee is planning to create a "General Seismic Hazard Map covering the whole of Japan" by 2005.

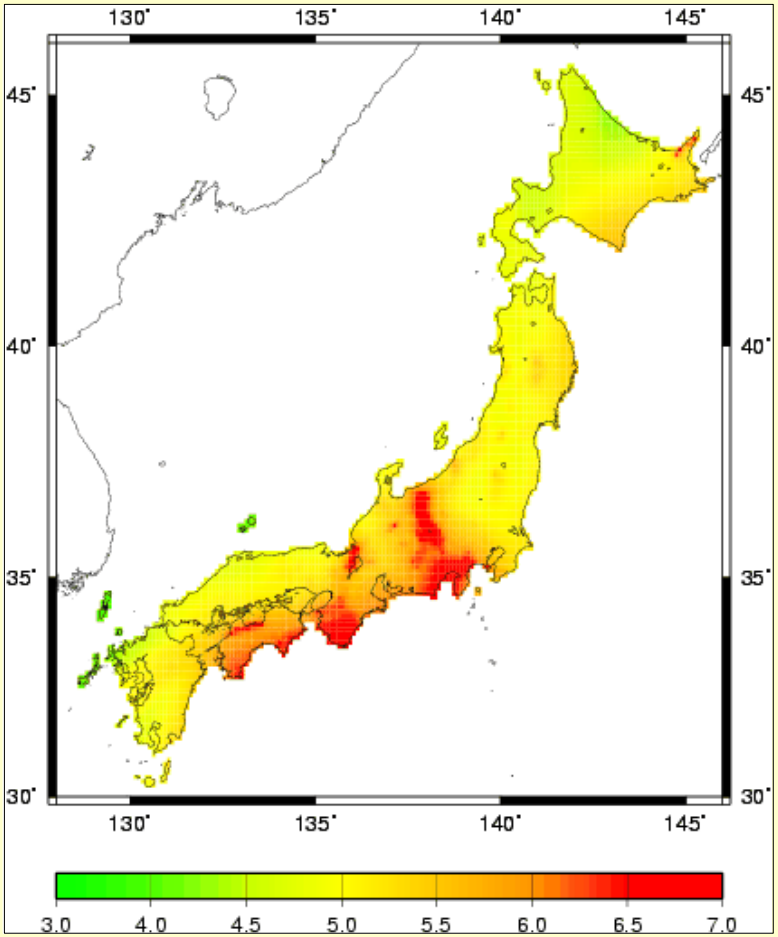
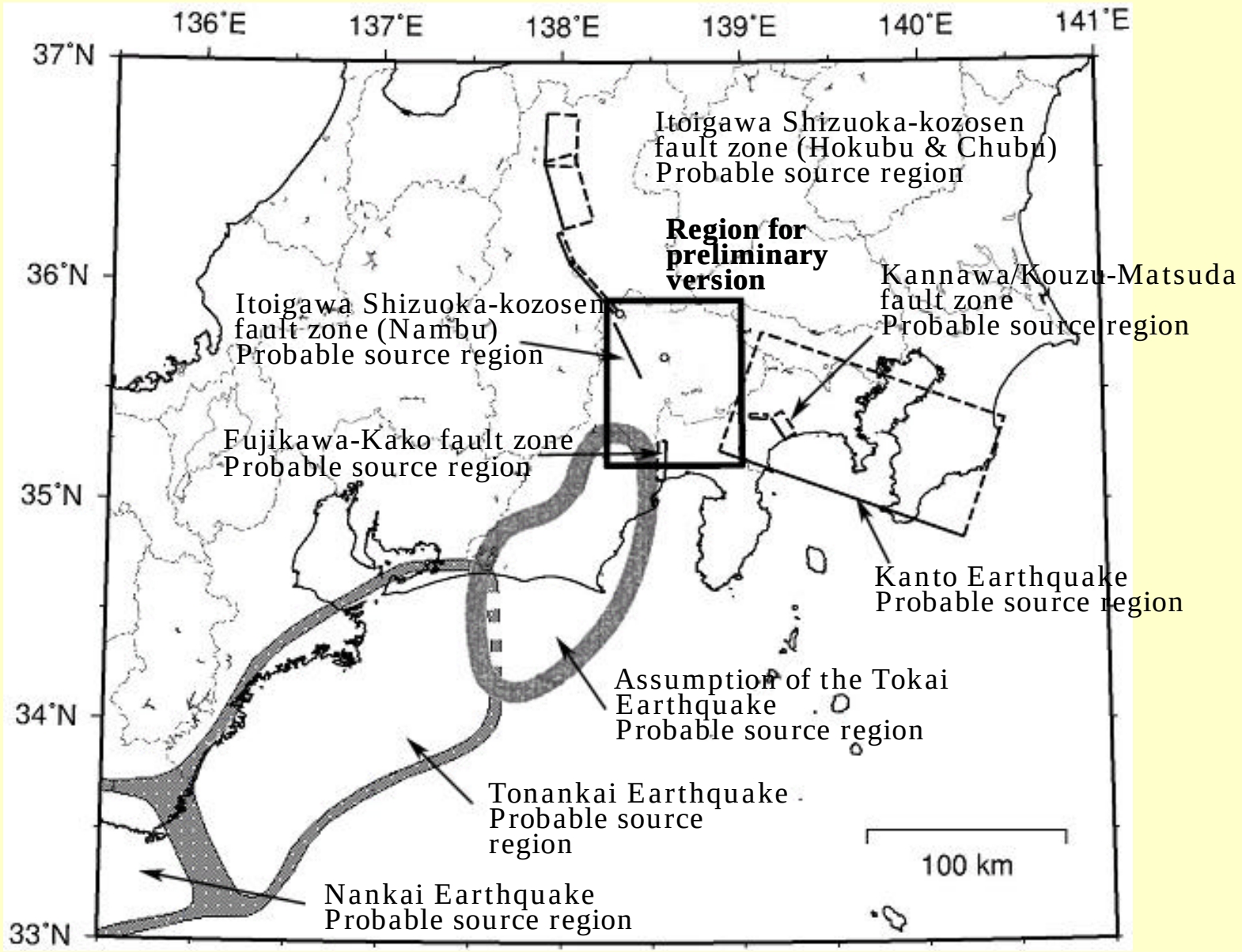


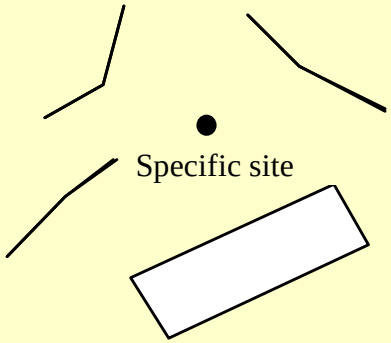
Image of Seismic Hazard Map


136°E
137°E
138°E
139°E
140°E
141°E
37°N
36°N
35°N
34°N
33°N
Itoigawa Shizuoka-kozosen fault zone (Hokubu & Chubu) Probable source region
Region for preliminary version
Kannawa/Kouzu-Matsuda fault zone Probable source region
Itoigawa Shizuoka-kozosen fault zone (Nambu) Probable source region
Fujikawa-Kako fault zone Probable source region
Kanto Earthquake Probable source region
Assumption of the Tokai Earthquake Probable source region
Tonankai Earthquake Probable source region
Nankai Earthquake Probable source region
100 km

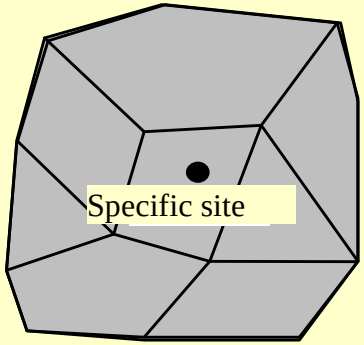
Modeling of seismic hazard

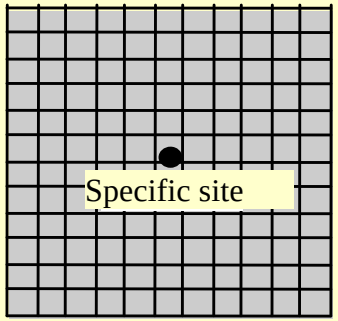
Earthquakes for specified source faults

the major 98 active fault zones,subduction,etc.



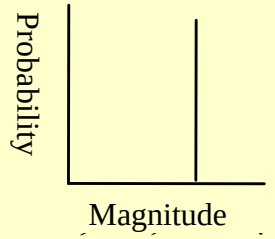
Earthquakes for non-specified source faults



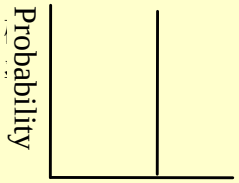


Evaluation for probability of seismic magnitude, hypocenter distance and earthquake occurrence

Probability function $P_k(m_i)$

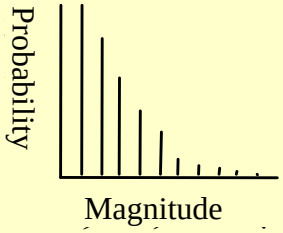


Probability function of distance under m_j $P_k(r_j \mid m_i)$

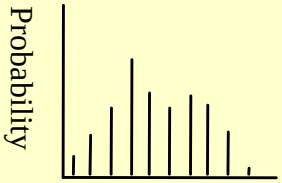


occurrence probability $P(E_k, t)$ or number $n(E_k)$

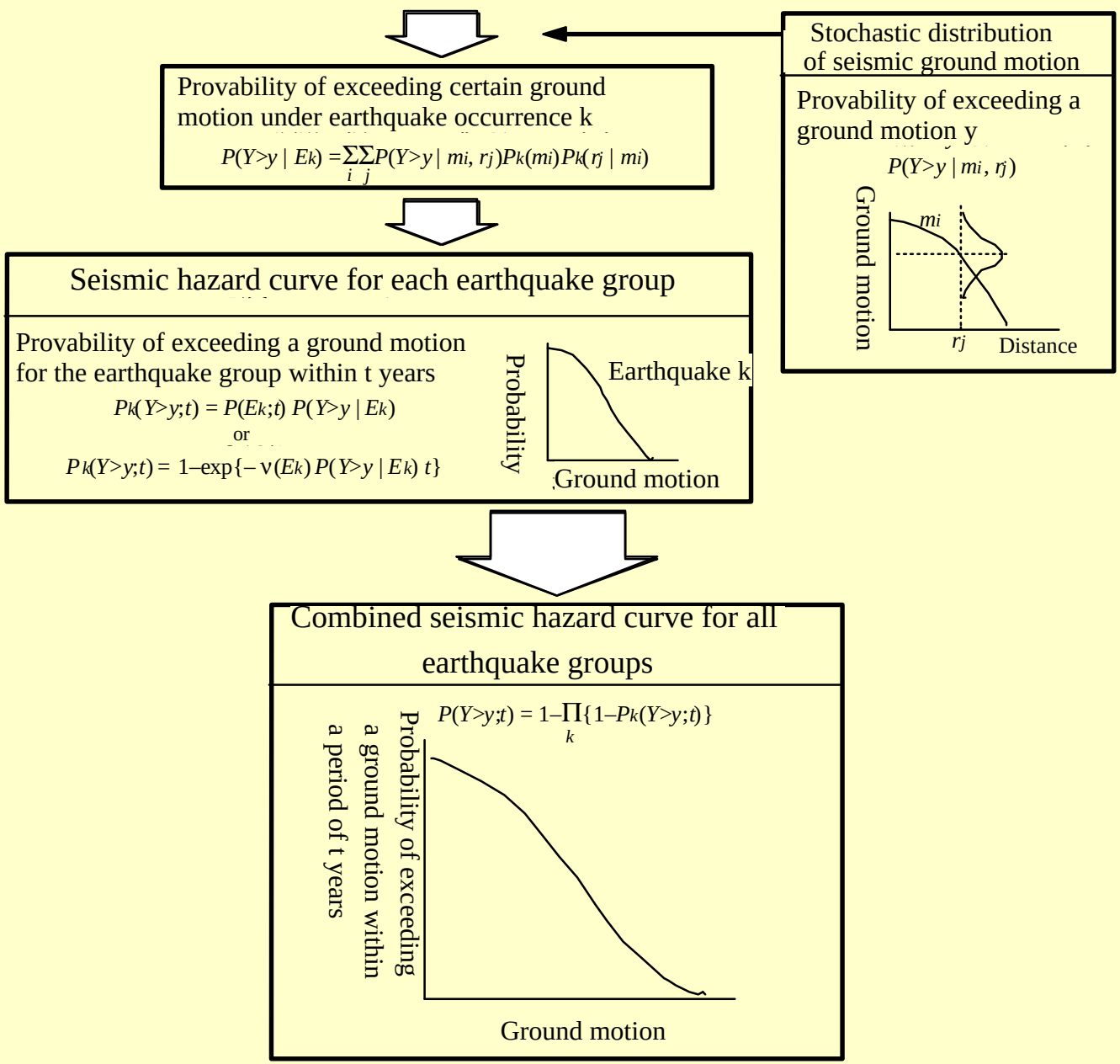
Probability function $P_k(m_i)$



Probability function of distance under m_j $P_k(r_j \mid m_i)$

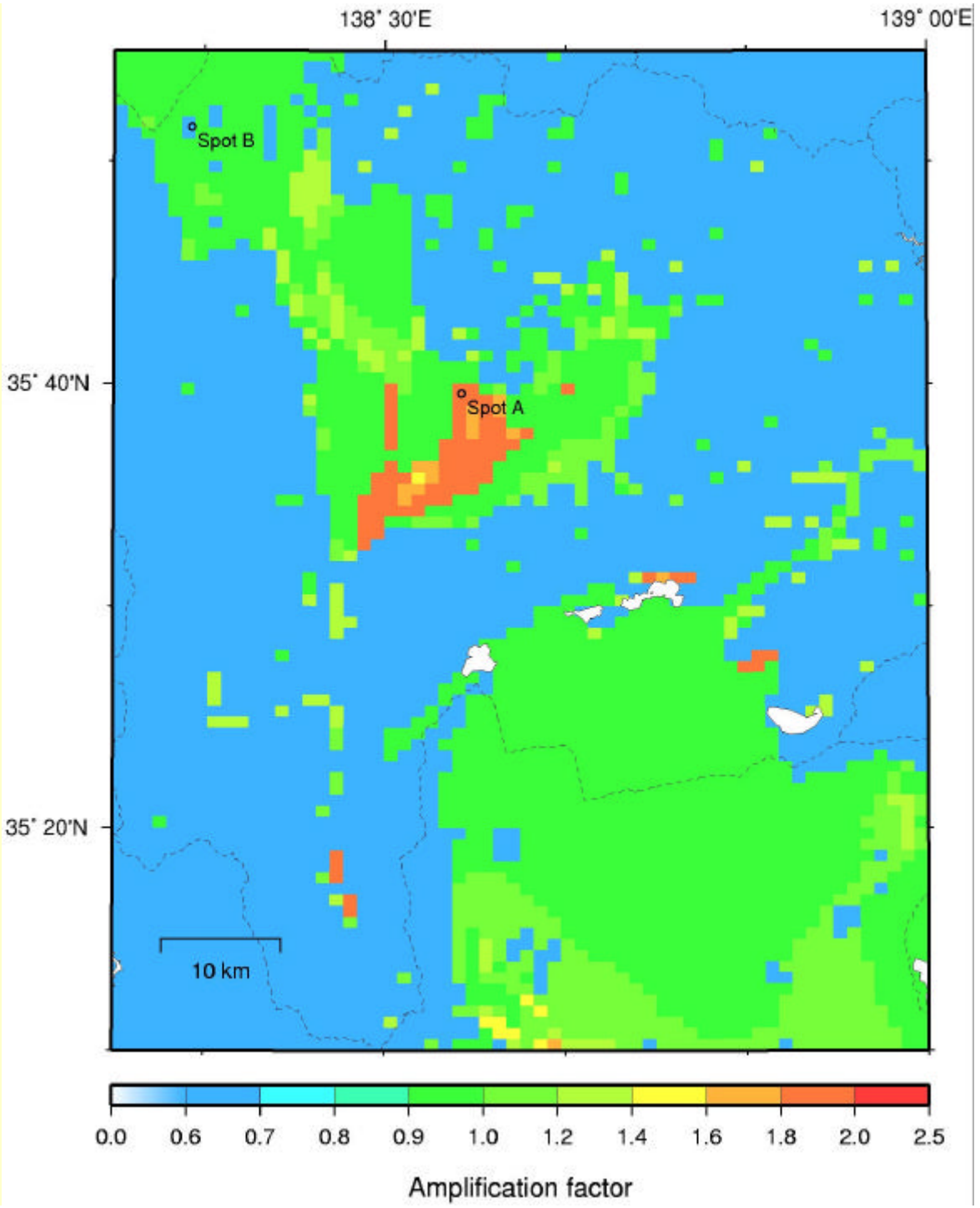


occurrence number $\nu(E_k)$


Stochastic distribution of seismic ground motion
Provability of exceeding a ground motion y
$P(Y>y \mid m_i, r_j)$
Ground motion
m_i
r_j
Distance
Provability of exceeding certain ground motion under earthquake occurrence k
$P(Y>y \mid E_k) = \sum_i \sum_j P(Y>y \mid m_i, r_j) P_k(m_i) P_k(r_j \mid m_i)$
Seismic hazard curve for each earthquake group
Provability of exceeding a ground motion for the earthquake group within t years
$P_k(Y>y;t) = P(E_k;t)\, P(Y>y \mid E_k)$
or
$P_k(Y>y;t) = 1-\exp\{-\nu(E_k)\, P(Y>y \mid E_k)\, t\}$
Probability
Earthquake k
Ground motion
Combined seismic hazard curve for all earthquake groups
$P(Y>y;t) = 1-\prod_k \{1-P_k(Y>y;t)\}$
Probability of exceeding a ground motion within a period of t years
Ground motion

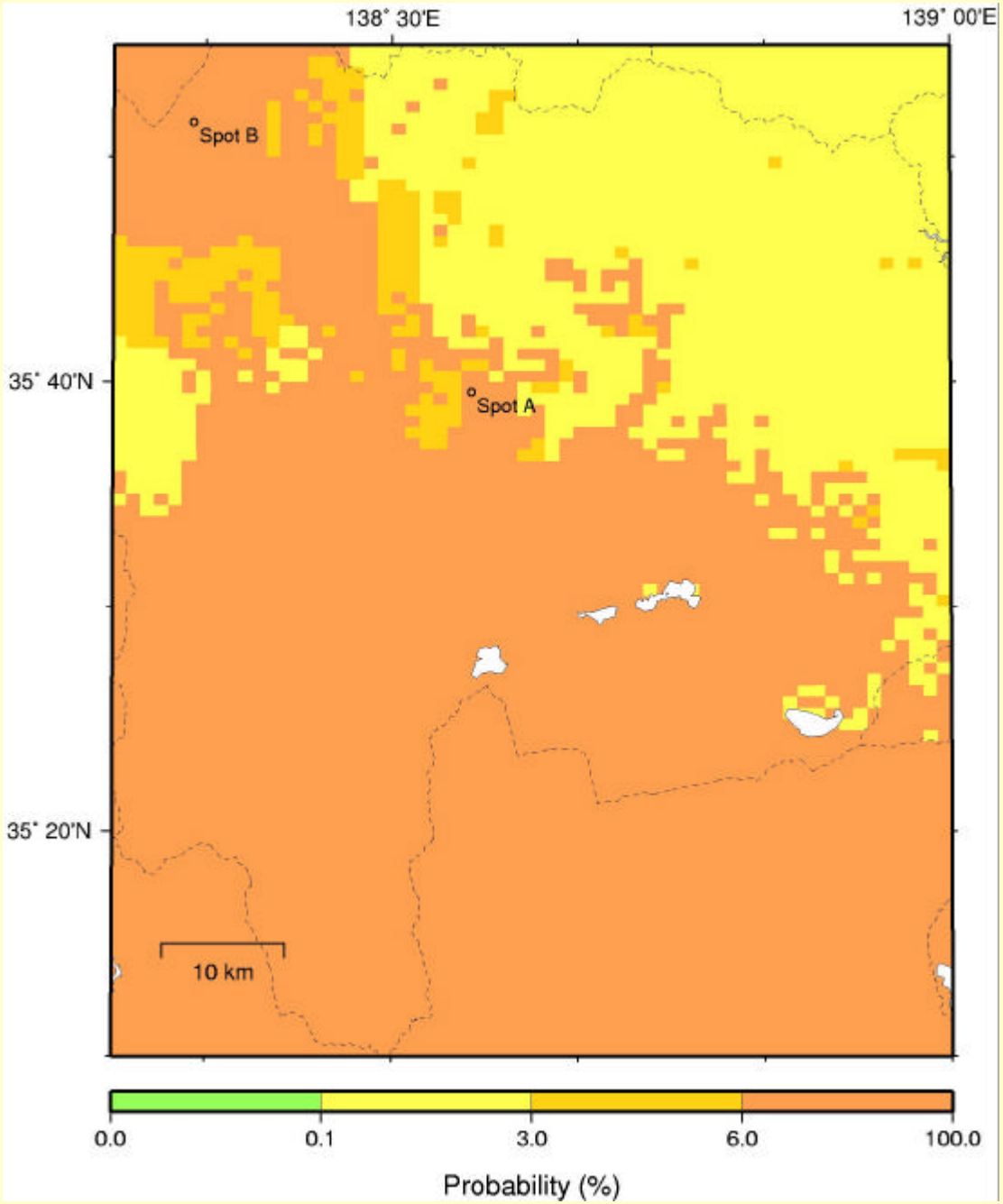
Distribution of site amplification factor

Amplification factor on the ground surface for engineering foundation (upper interface of layer with S–wave velocity of 400 m/s)



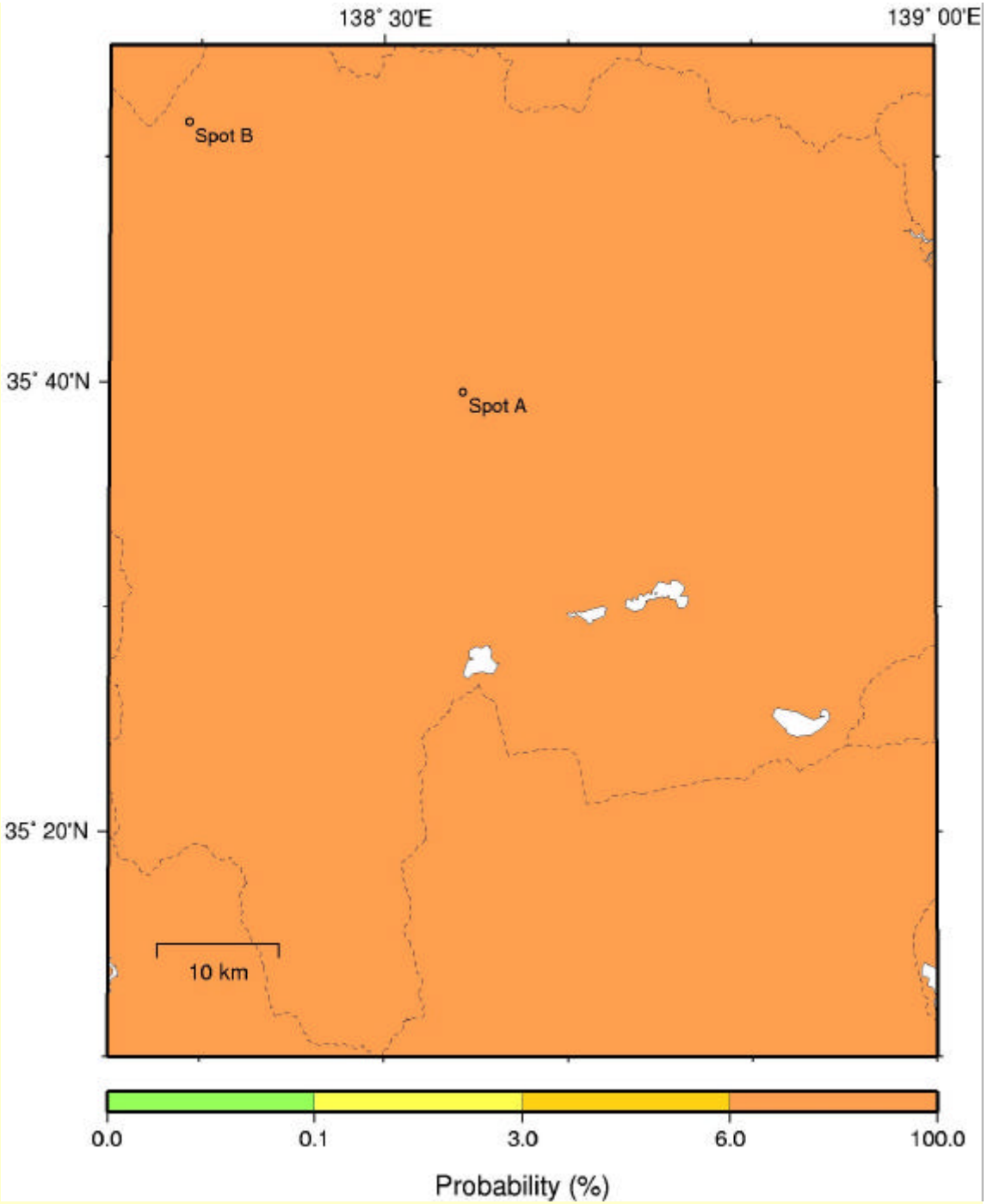
Probability of suffering a ground motion with seismic intensity ≧ 6 Lower within 30 years hereafter (Preliminary calculation)

Orange: Region with a probability ≧ 6%
Ocher: Region with a probability ≧ 3% and < 6%
Yellow: Region with a probability ≧ 0.1% and < 3%



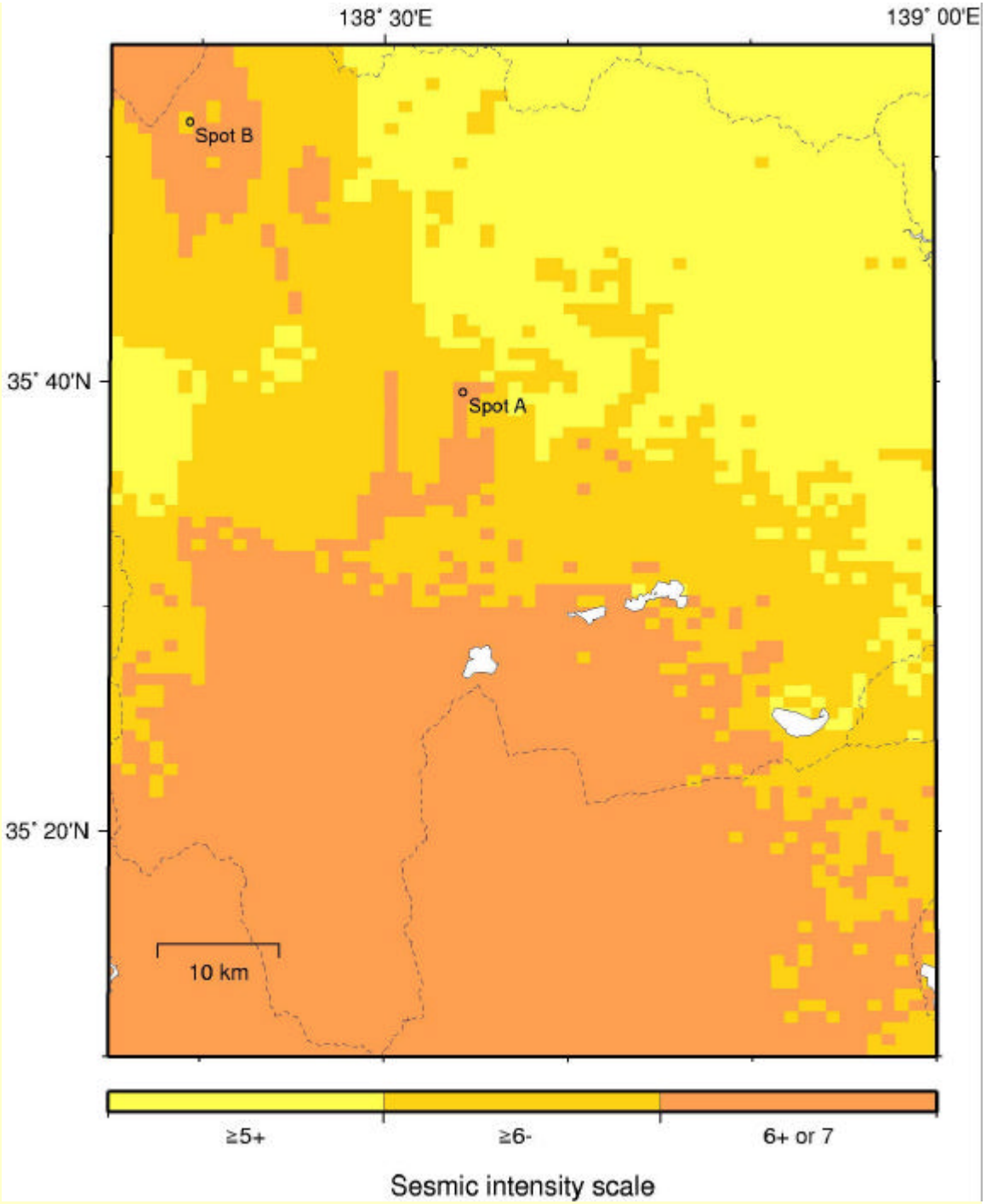
Probability of suffering a ground motion with seismic intensity ≧ 5 Lower within 30 years hereafter (Preliminary calculation)

Orange: Region with a probability ≧ 6%



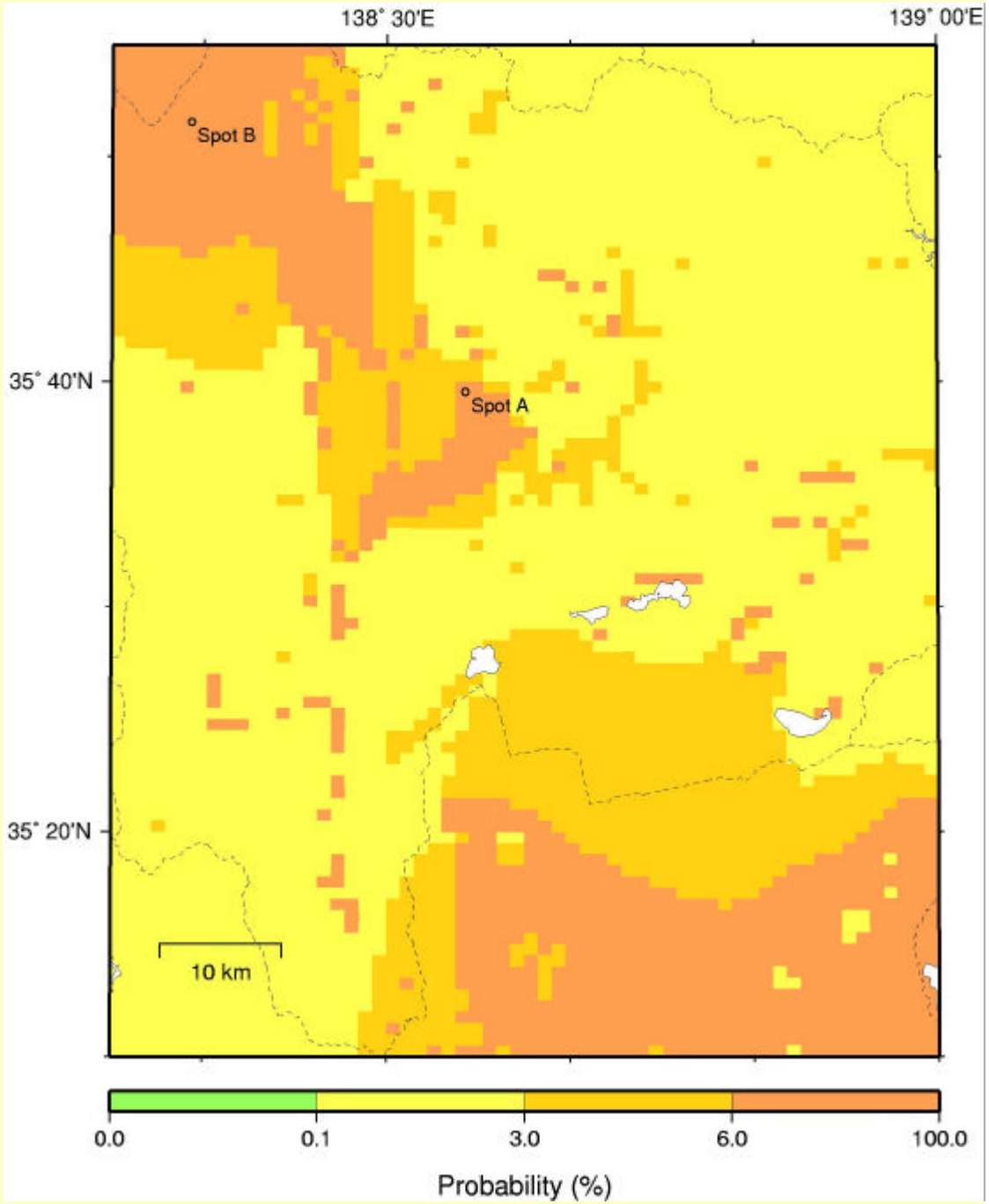
Map of regions suffering a ground motion ≧ a fixed seismic intensity with a probability ≧ 3% within 30 years hereafter (Color-classified by seismic intensity; preliminary calculation)

Orange: Region suffering a ground motion with seismic intensity ≧ 6 Upper.
Ocher: Region suffering a ground motion with seismic intensity ≧ 6 Lower.
Yellow: Region suffering a ground motion with seismic intensity ≧ 5 Upper.



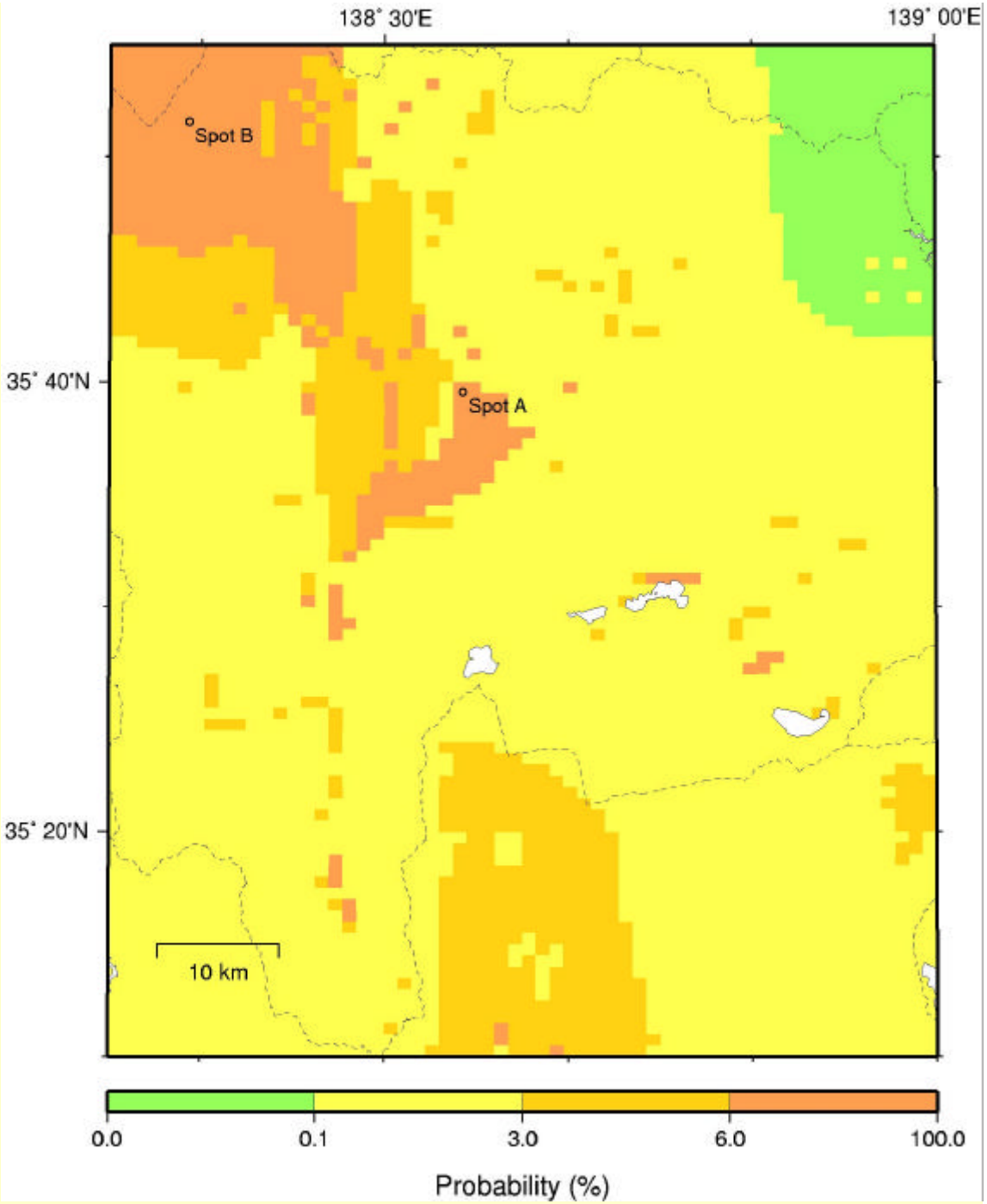
Probability of suffering a ground motion with seismic intensity ≧ 6 Lower within 30 years hereafter.
(Preliminary calculation; excluding Assumption of the Tokai Earthquake)

Orange: Region with a probability ≧ 6%
Ocher: Region with a probability ≧ 3% and < 6%
Yellow: Region with a probability ≧ 0.1% and < 3%



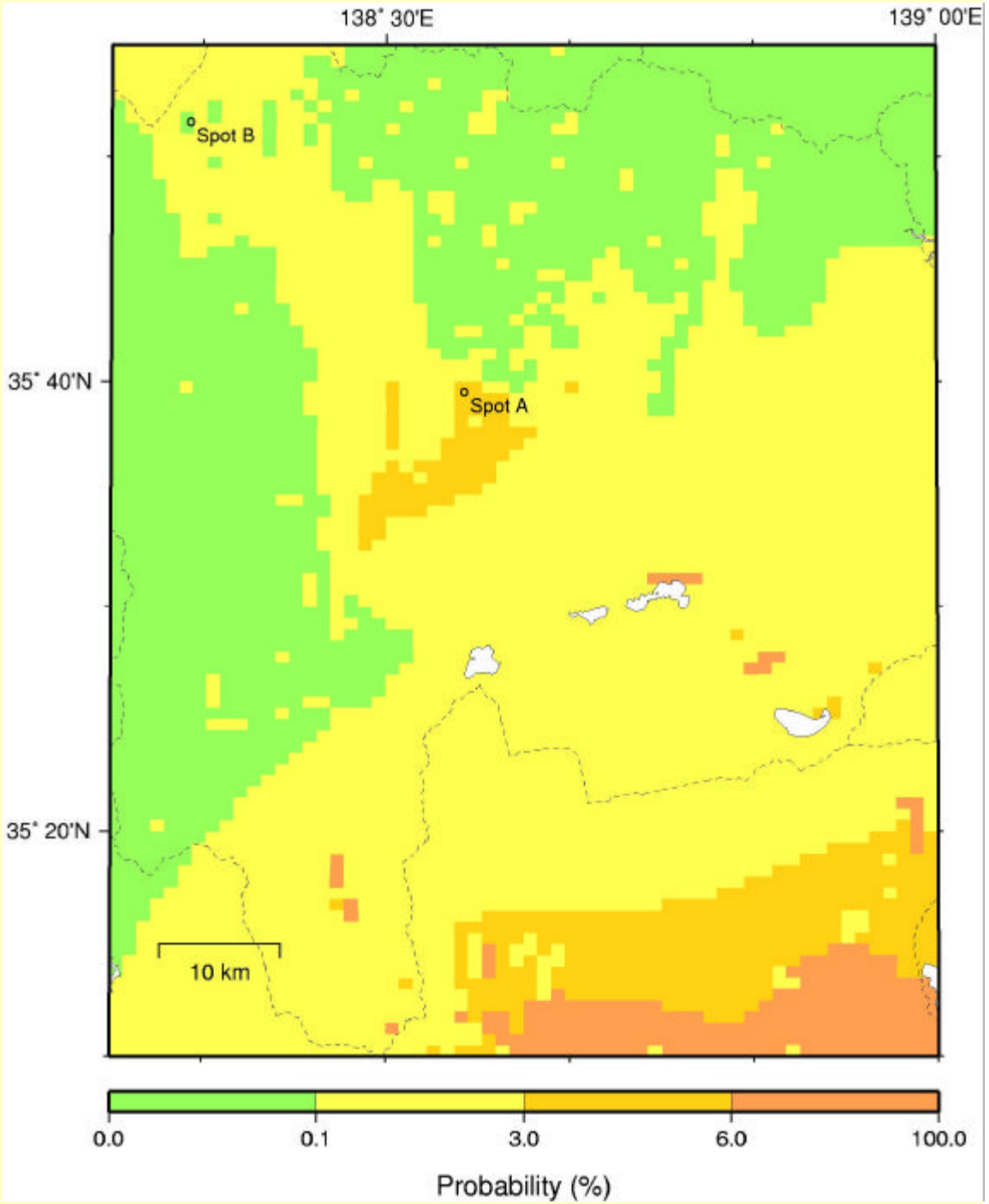
Probability of suffering a ground motion with seismic intensity ≧ 6 Lower within 30 years hereafter.
(Preliminary calculation; for only characteristic earthquakes of the major 98 active fault zones)

Orange: Region with a probability ≧ 6%.
Ocher: Region with a probability ≧ 3% and < 6%.
Yellow: Region with a probability ≧ 0.1% and< 3%.



Probability of suffering a ground motion with seismic intensity ≧ 6 Lower within 30 years here-after.
(Preliminary calculation; for earthquakes except ‘ "characteristic ones of the major 98 active fault zones" and "subduction earthquakes" ’)

Orange: Region with a probability ≧ 6%.
Ocher: Region with a probability ≧ 3% and < 6%.
Yellow: Region with a probability ≧ 0.1% and < 3%.



Earthquakes that possibly cause shocks with seismic intensity ≧ 6 Lower within 50 years hereafter with respect to Spot A and Spot B, and their weights (Contribution factor; preliminary calculation)