The 3rd SCEC-ERI Joint Workshop on
"Earthquake Hazards in Urban Area" and
"Toward Constructing Forecast Systems of Earthquakes

Planning of a public earthquake forecast

Kunihiko Shimazaki

Association for Earthquake Disaster Prevention

Earthquake Research Institute
9:00-9:25, March 17, 2010

Headquarters for Earthquake Research Promotion

"to promote research into earthquakes with the goal of strengthening disaster prevention measures, particularly for the reduction of damage and casualties from earthquakes."

Earthquake Research Committee

Except for aftershock activity, the committee never issued a short-term earthquake forecast.

Working group on short-term forecast

The Group was supposed to give an interim report in March, but no report was presented.

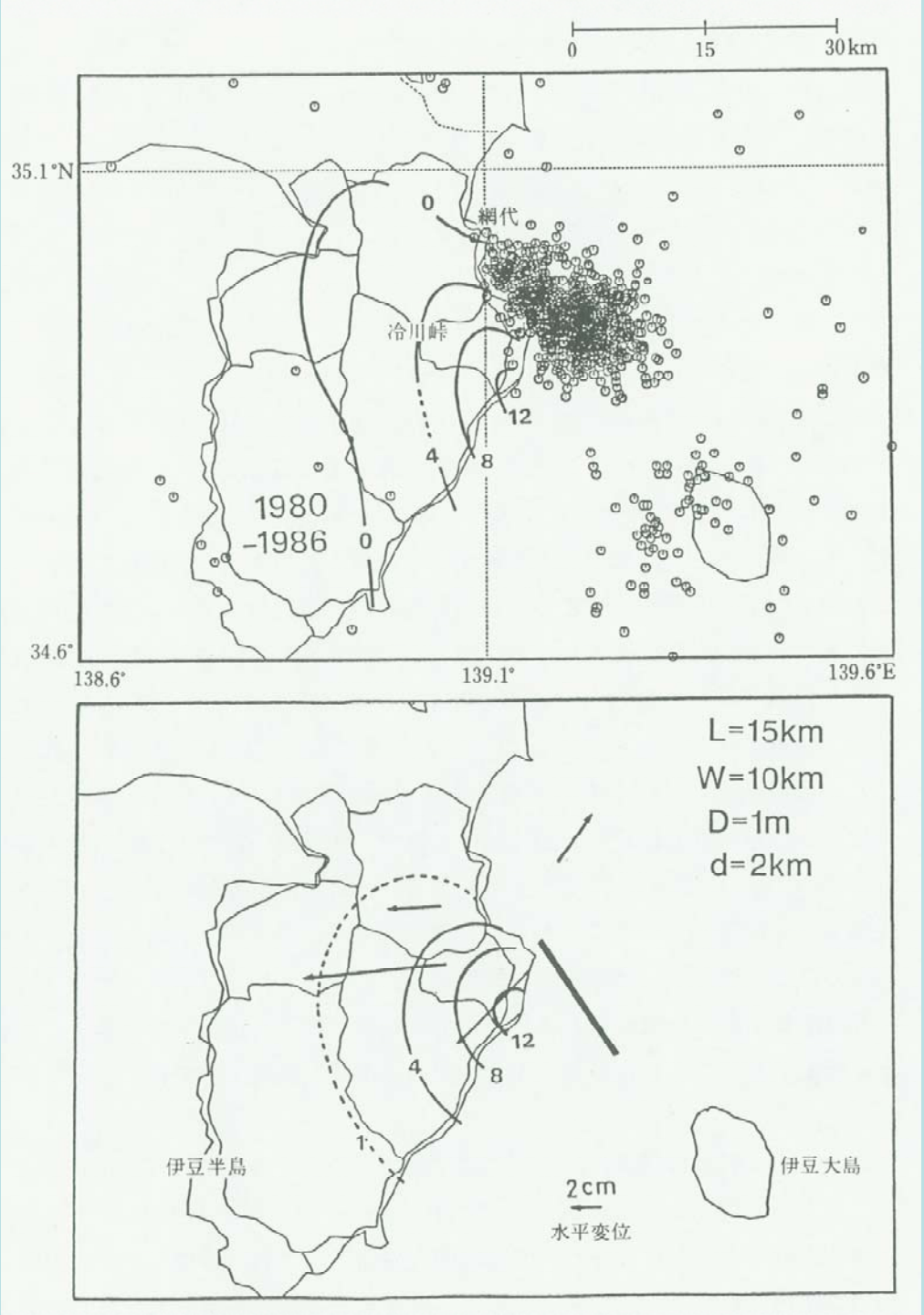
Two target candidates:

Izu swarm activity

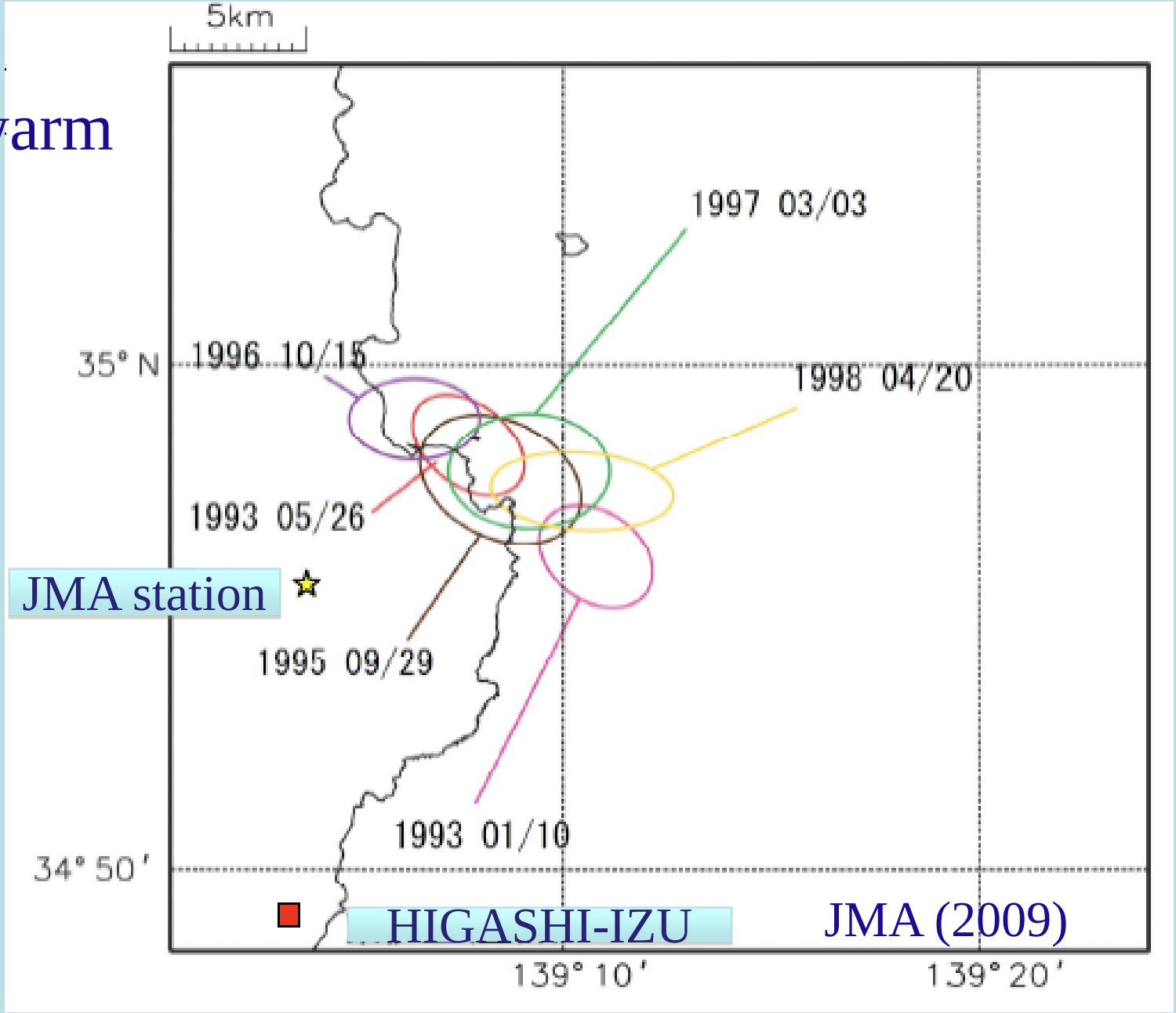
Ibaraki-Oki earthquake (M7)

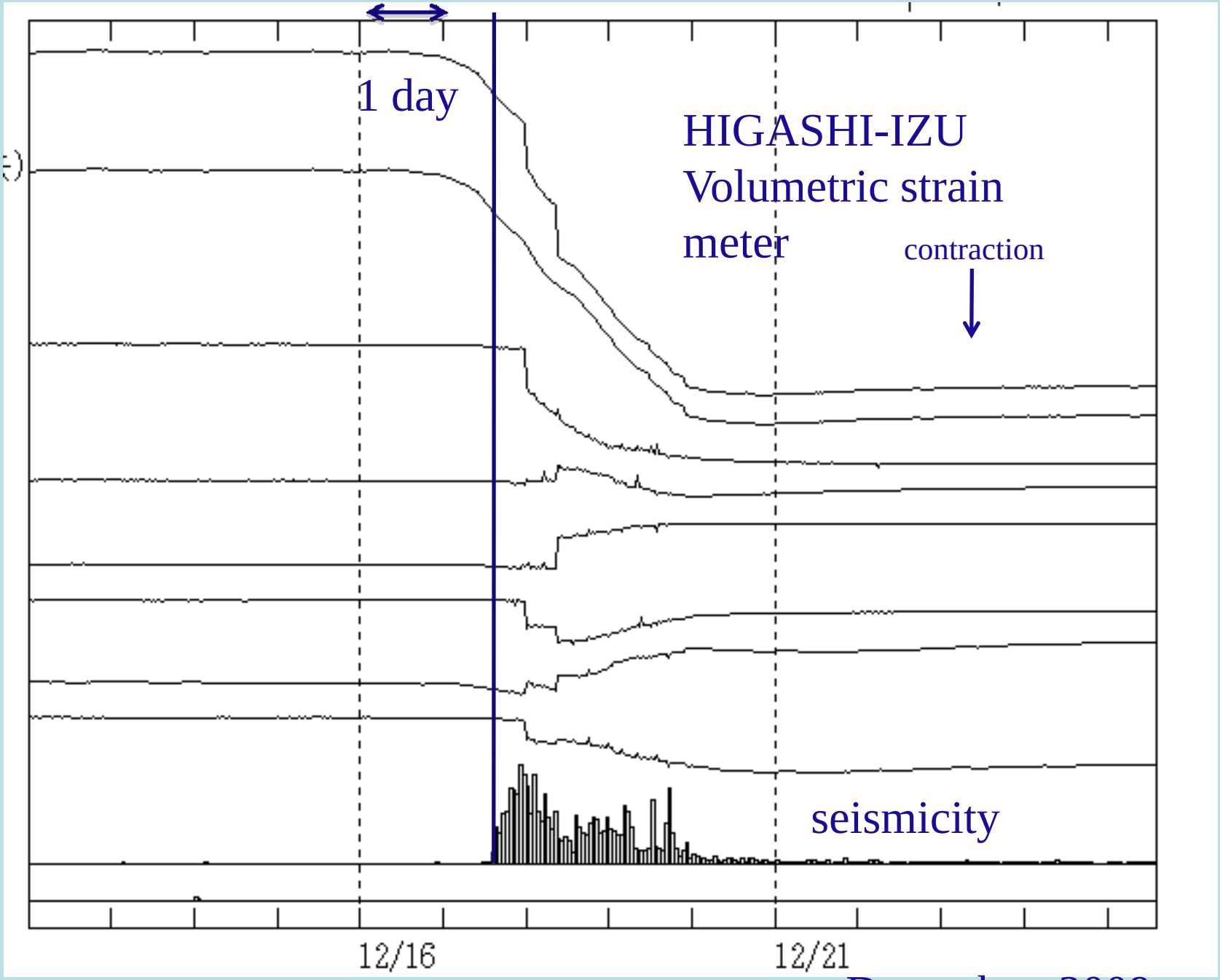
Izu dike model (Shimazaki, 1989)

Observed level change (upper fig.) and calculated horizontal and vertical displacement (lower fig.) due to vertical planar intrusion of magma



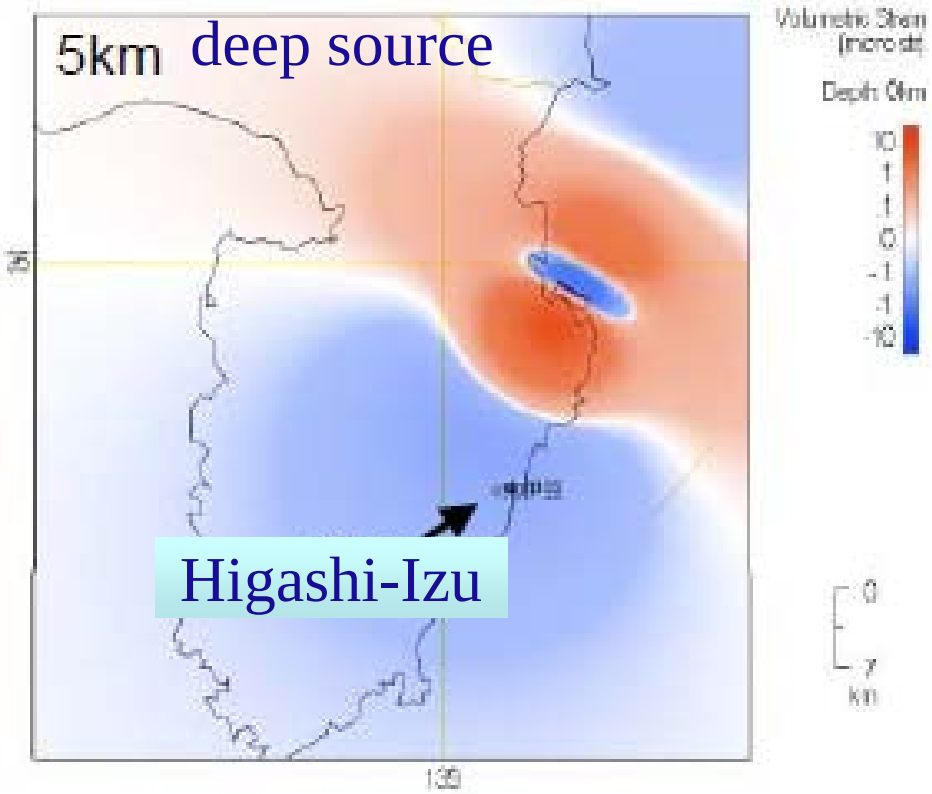
Izu swarm

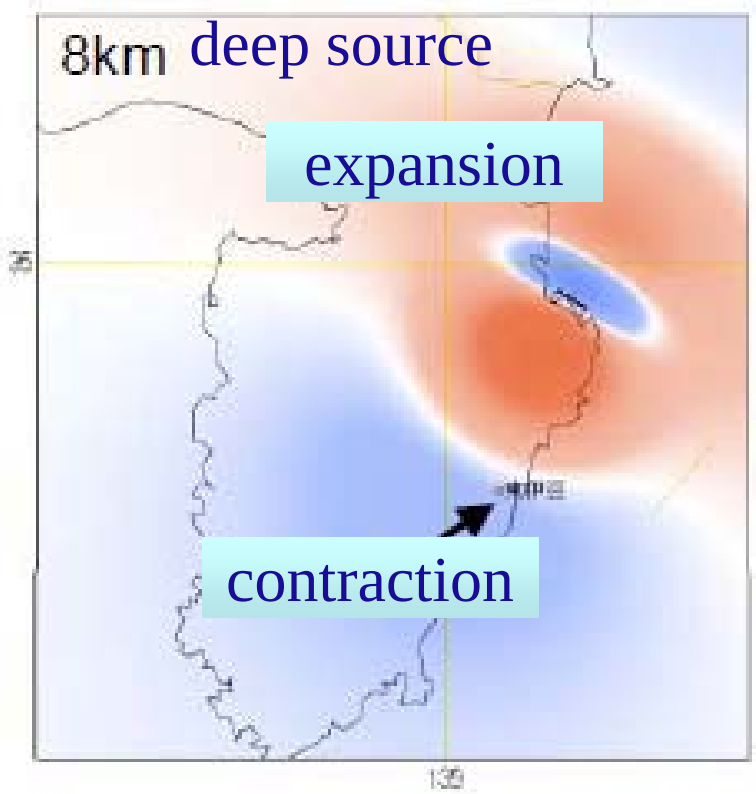

5km
1997 03/03
35° N
1996 10/15
1998 04/20
1993 05/26
JMA station
1995 09/29
1993 01/10
34° 50′
HIGASHI-IZU
JMA (2009)
139° 10′
139° 20′



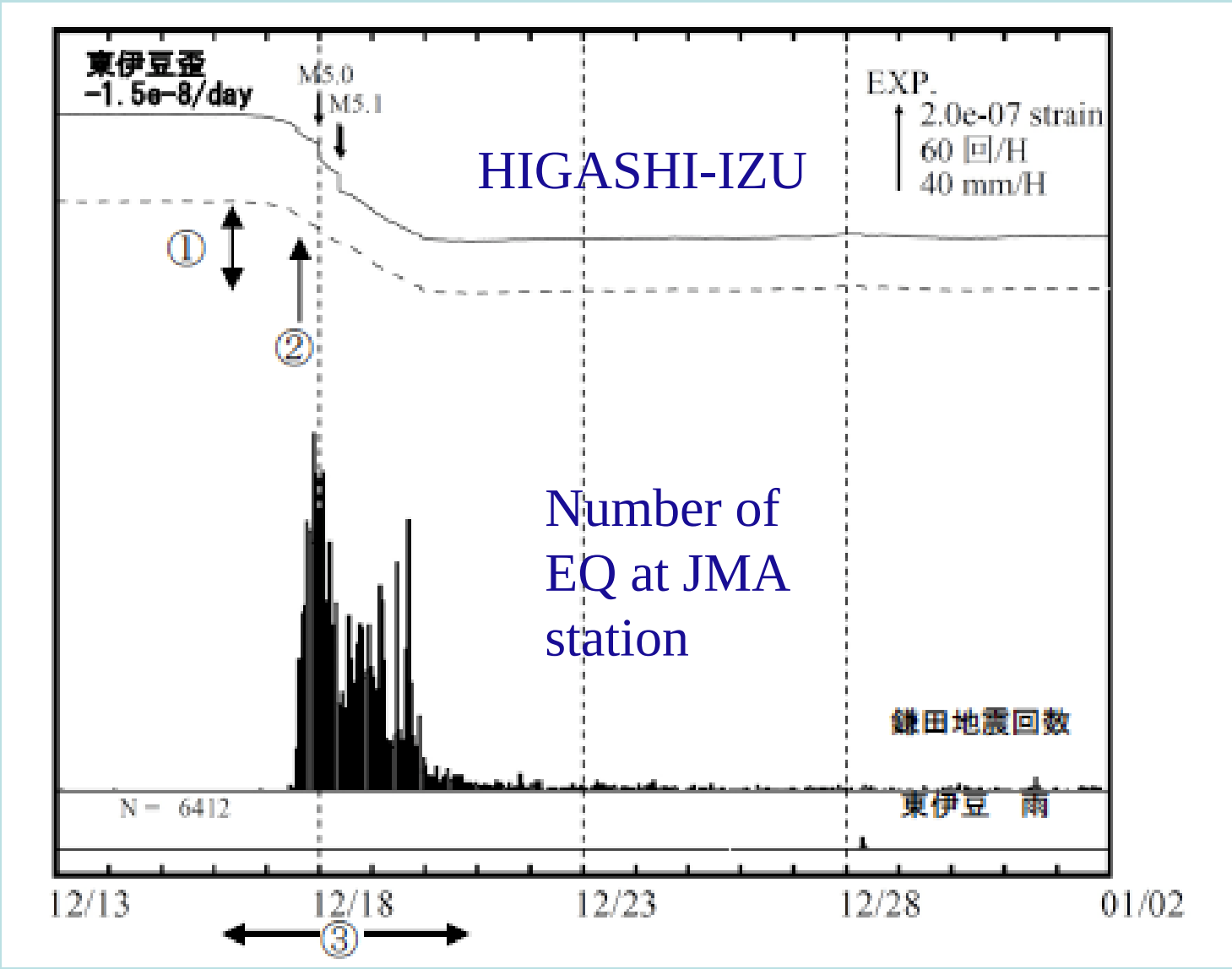
December, 2009

Volume change at the surface caused by a tensile crack dislocation

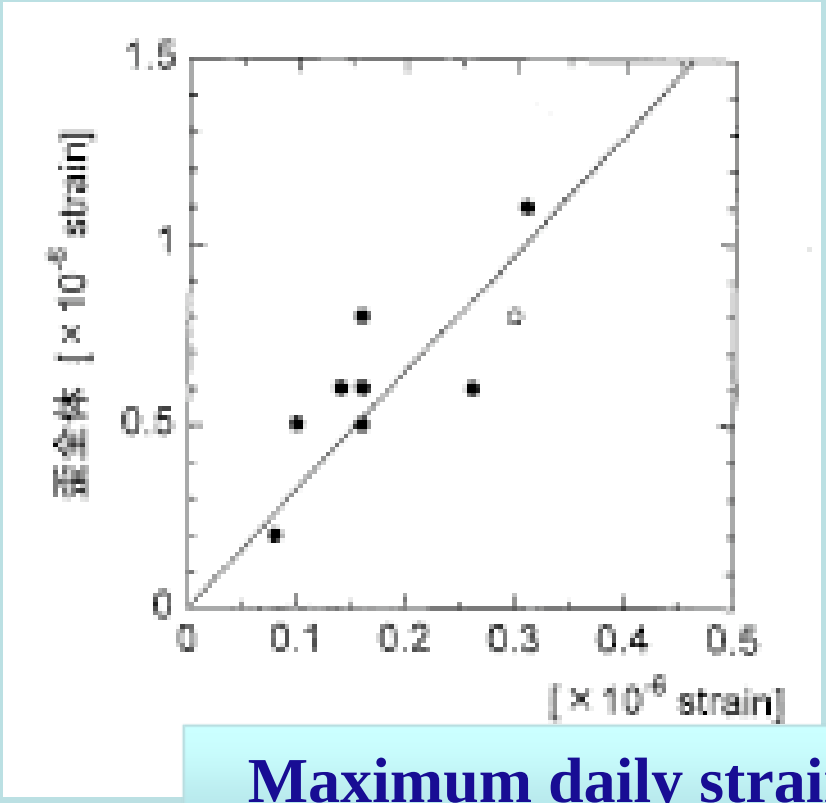




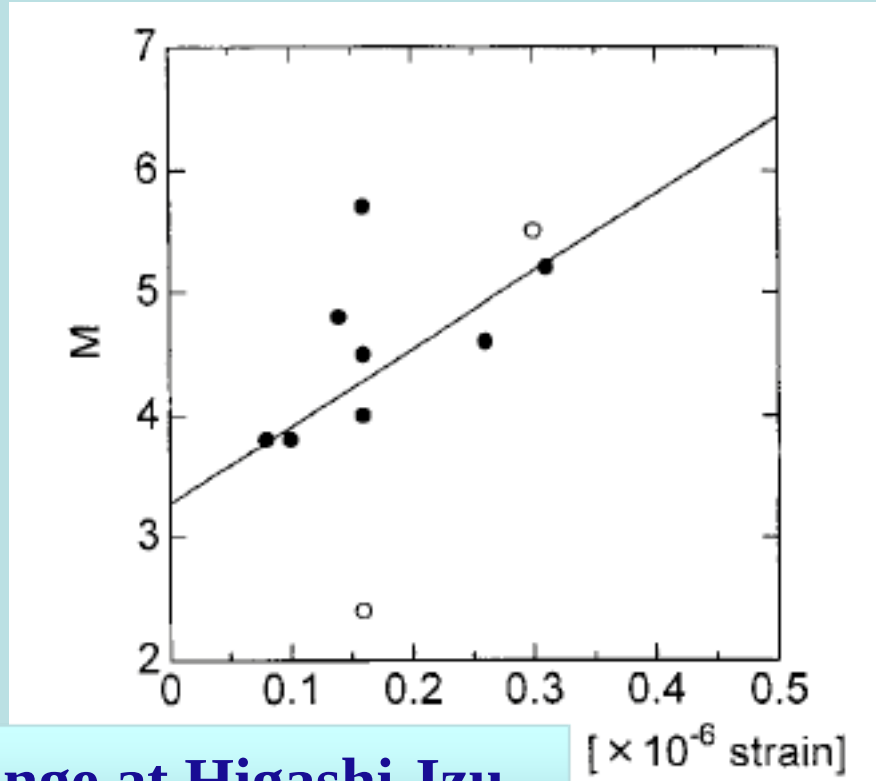
JMA (2010)


東伊豆歪
-1.5e-8/day
M5.0
M5.1
EXP.
2.0e-07 strain
60 回/H
40 mm/H
HIGASHI-IZU
①
②
Number of EQ at JMA station
鎌田地震回数
N = 6412
東伊豆 雨
12/13
12/18
12/23
12/28
01/02
③

Total strain change at Higashi-Izu

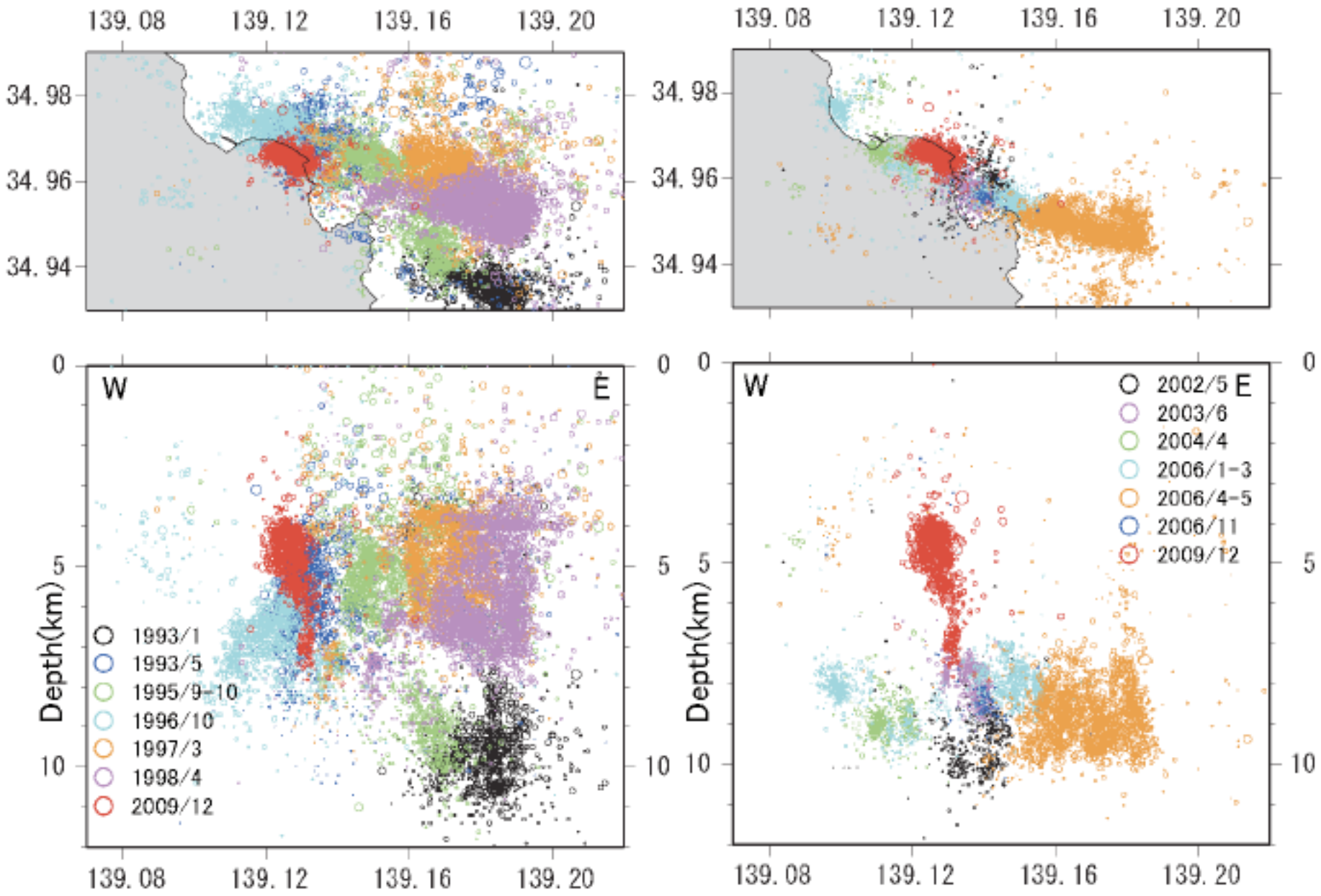


Maximum magnitude



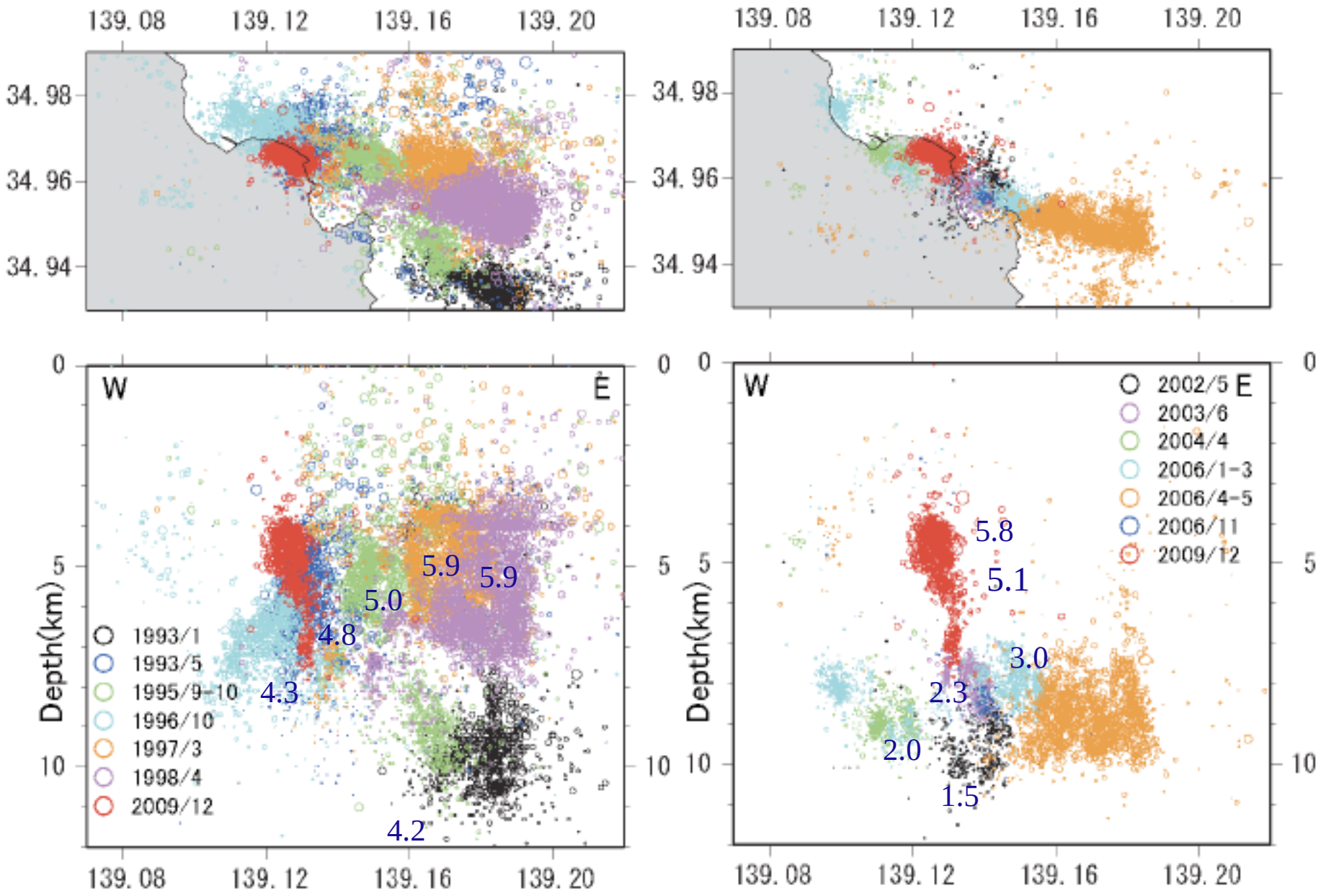
Maximum daily strain change at Higashi-Izu

Abe et al. (1998)



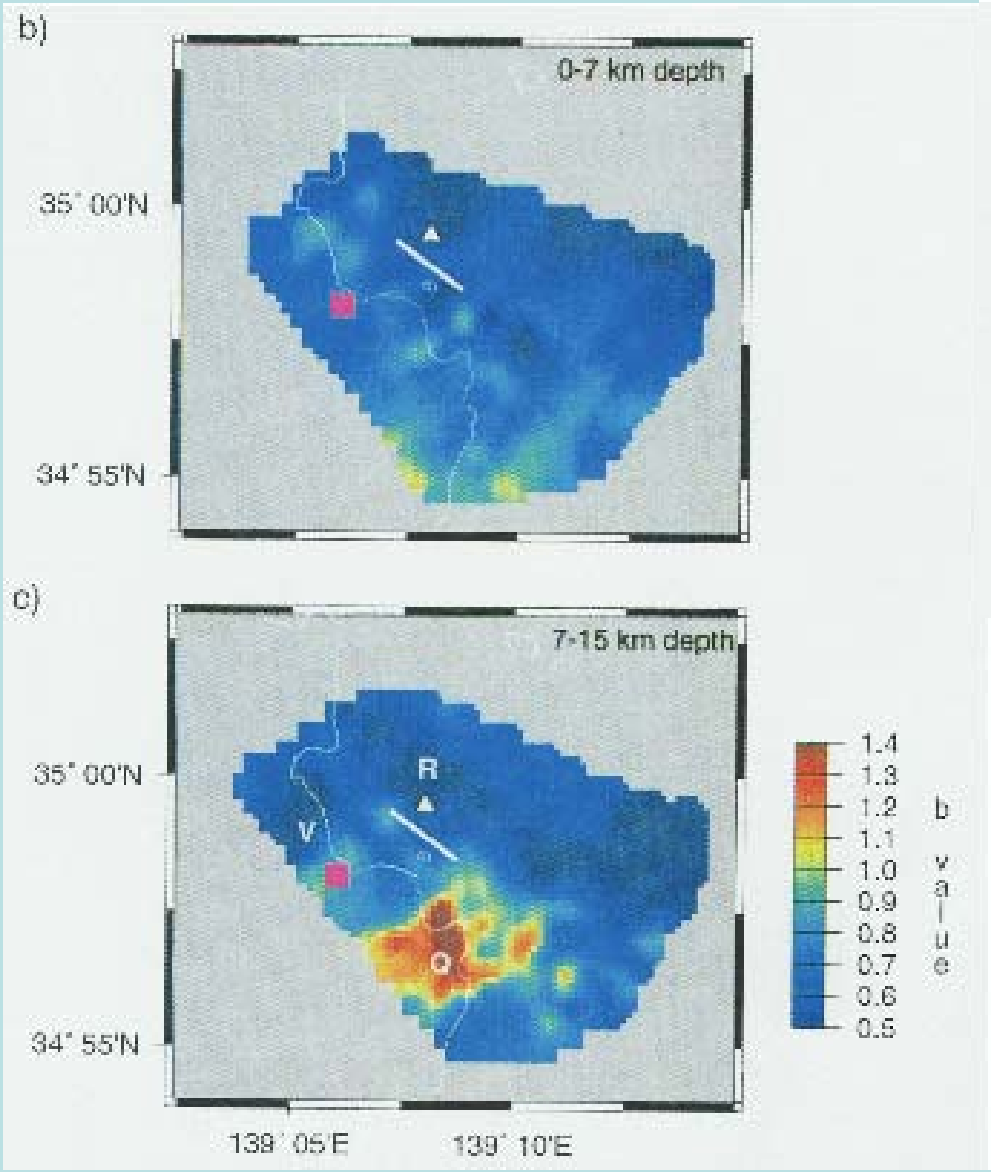
2009 swarm compared with the 1990's & 2000's episodes

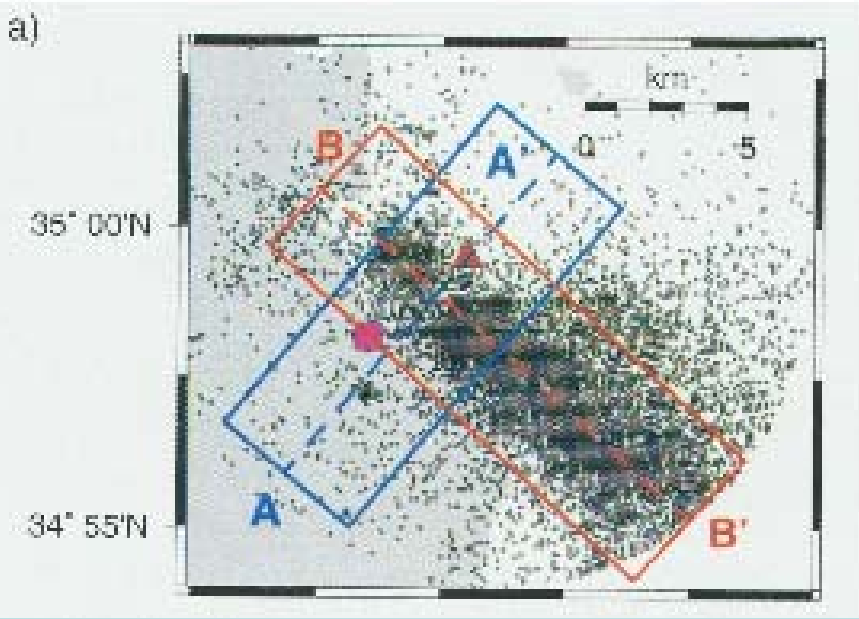
Earthquake Research Institute (2009)



Magnitude of the largest earthquake in each episode

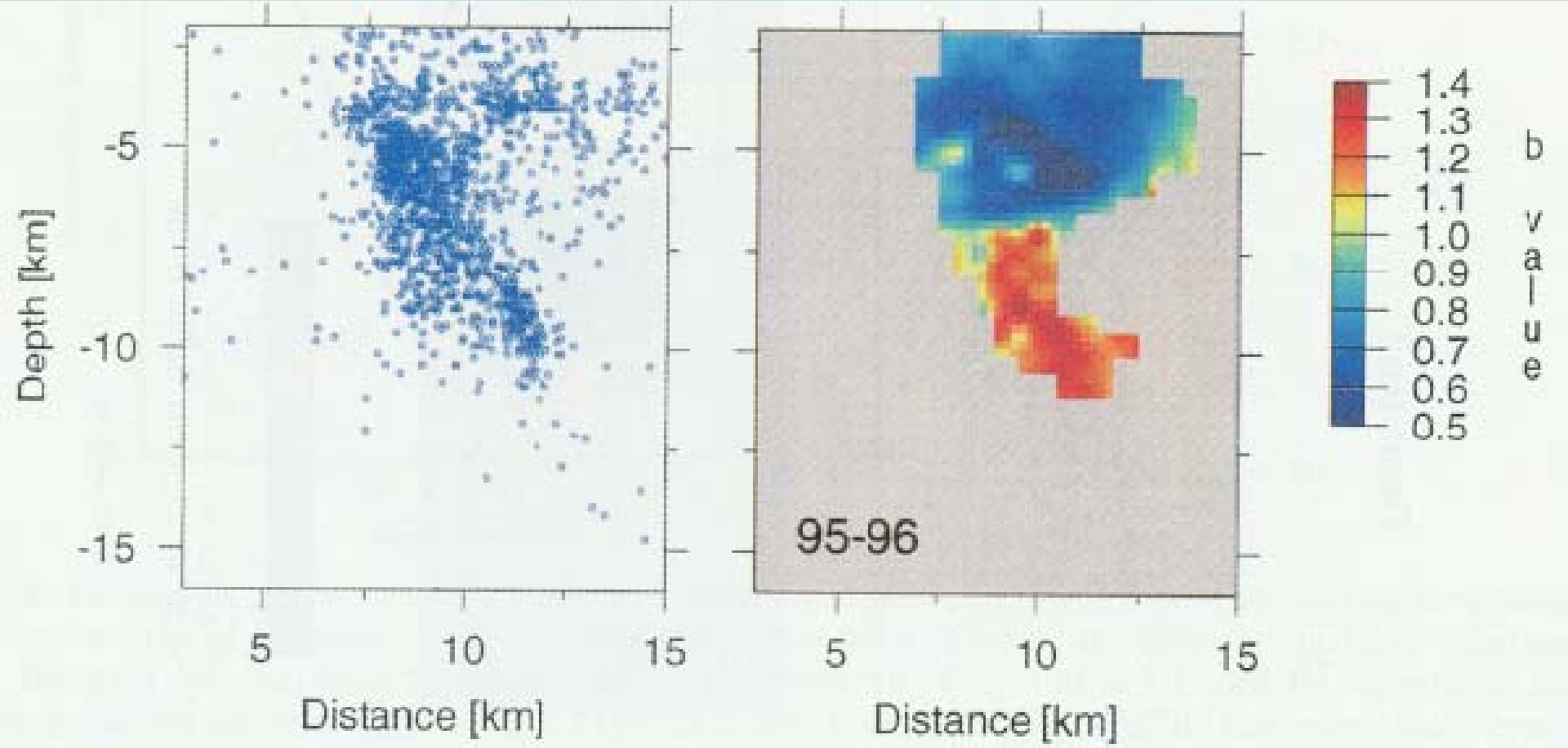
Earthquake Research Institute (2009)



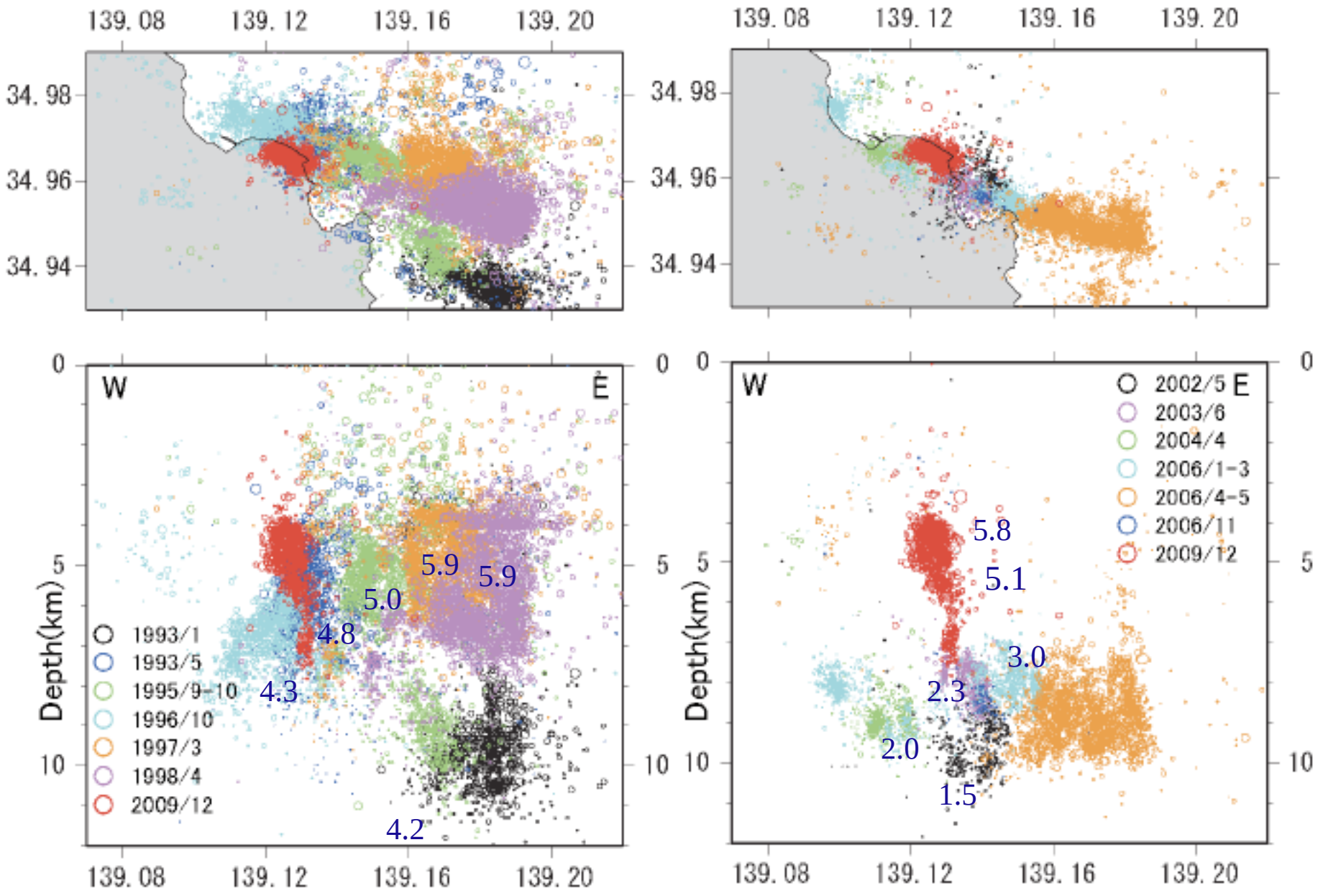


B-value map
(Wyss et al., 1997)
ERI data: 10,000 events
in 1982-1995

NW SE



B-value map
(Wyss et al., 1997)



Magnitude of the largest earthquake in each episode

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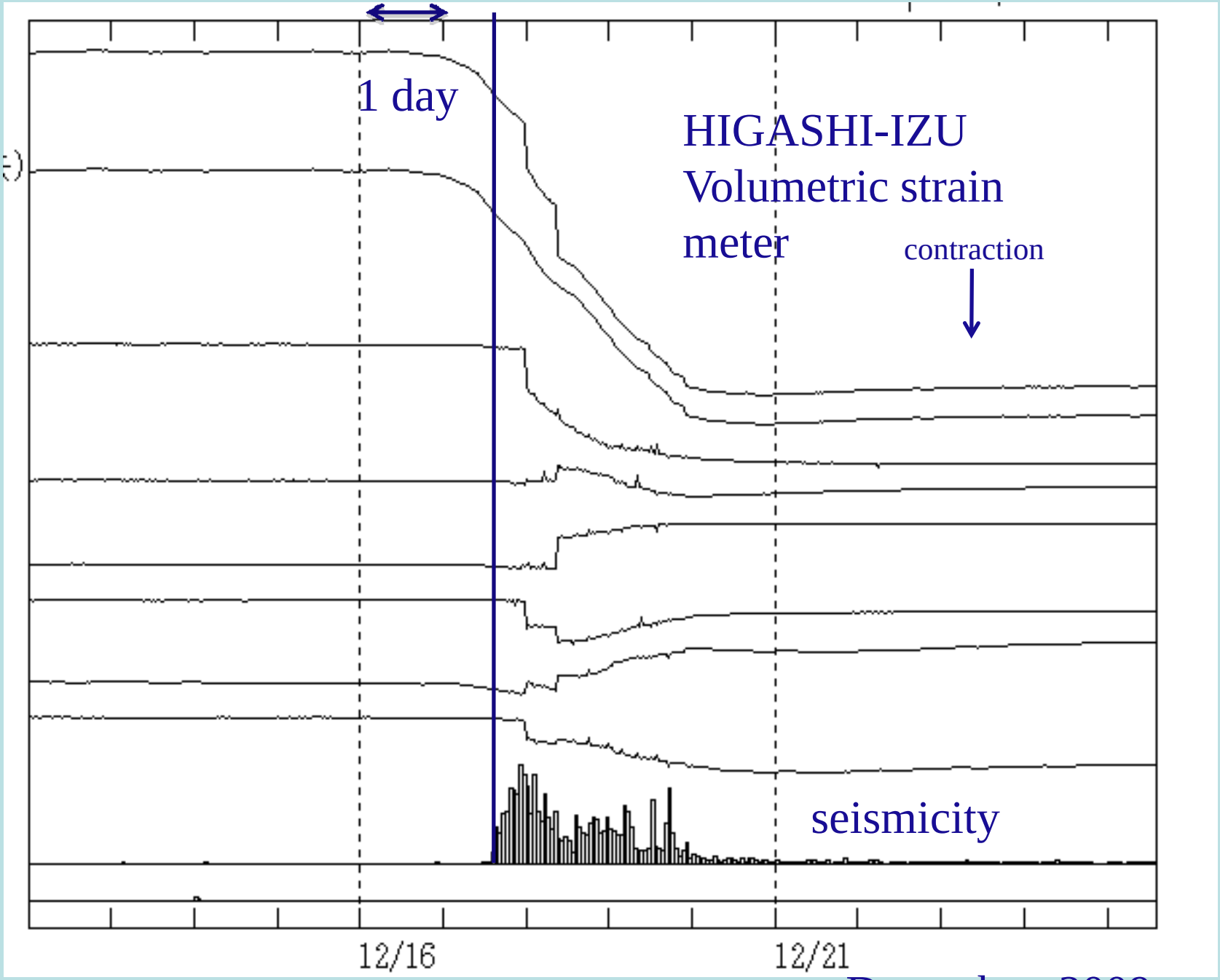
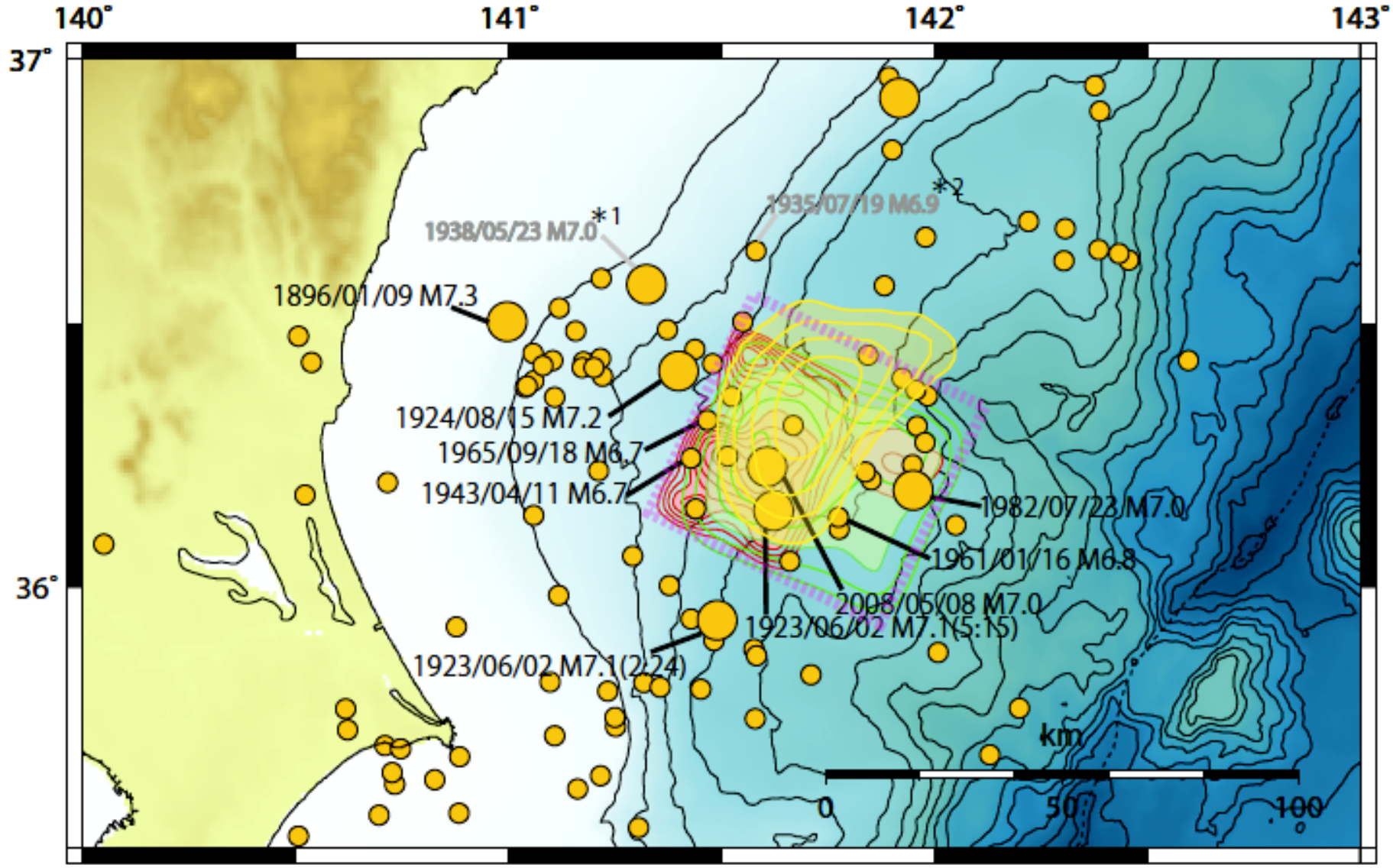
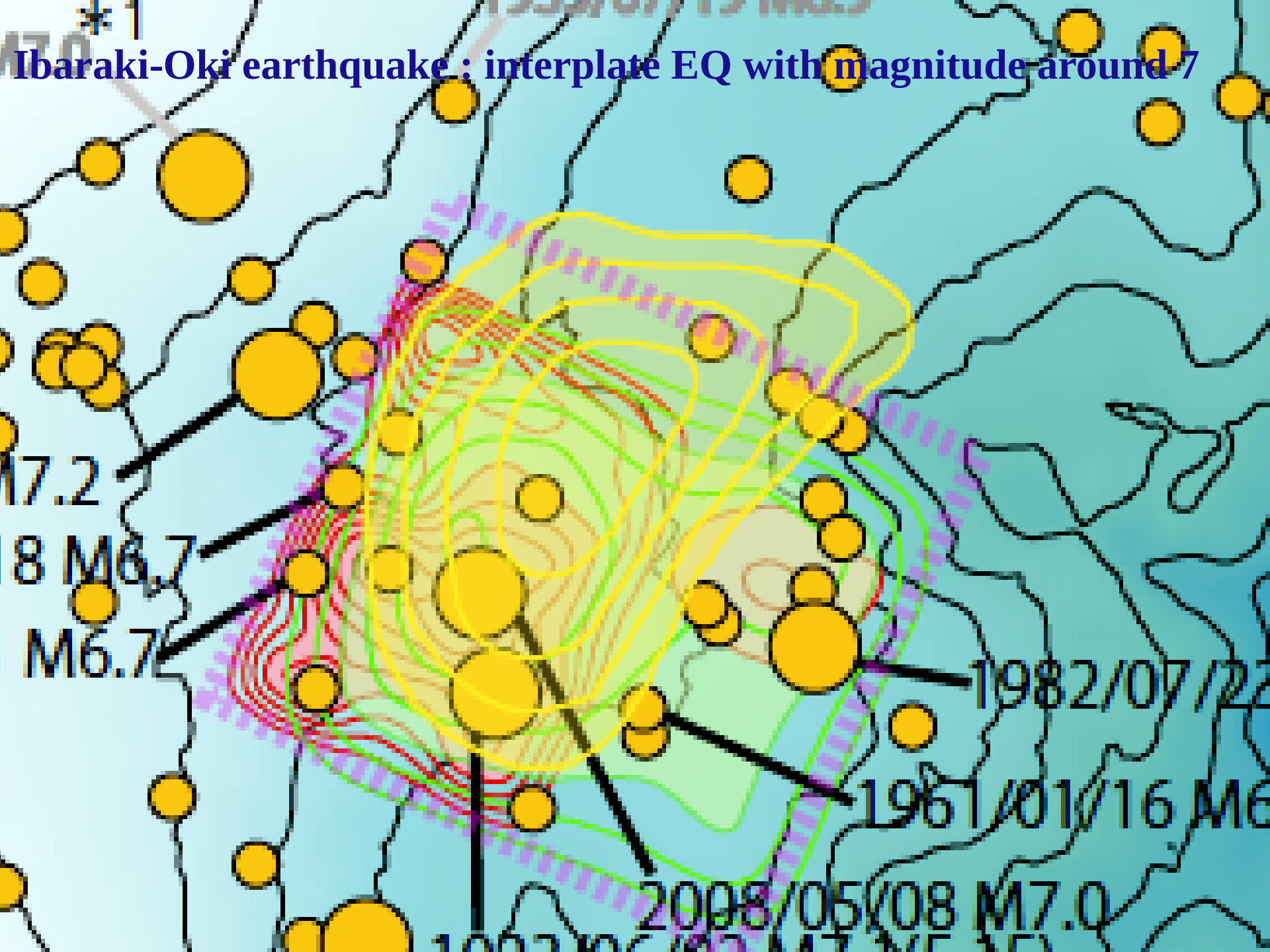


December, 2009

Ibaraki-Oki earthquake : interplate EQ with magnitude around 7




Ibaraki-Oki earthquake : interplate EQ with magnitude around 7
M7.2
M6.7
M6.7
1982/07/23
1961/01/16 M6
2008/05/08 M7.0

Long-term forecasts on Ibaraki-Oki earthquake

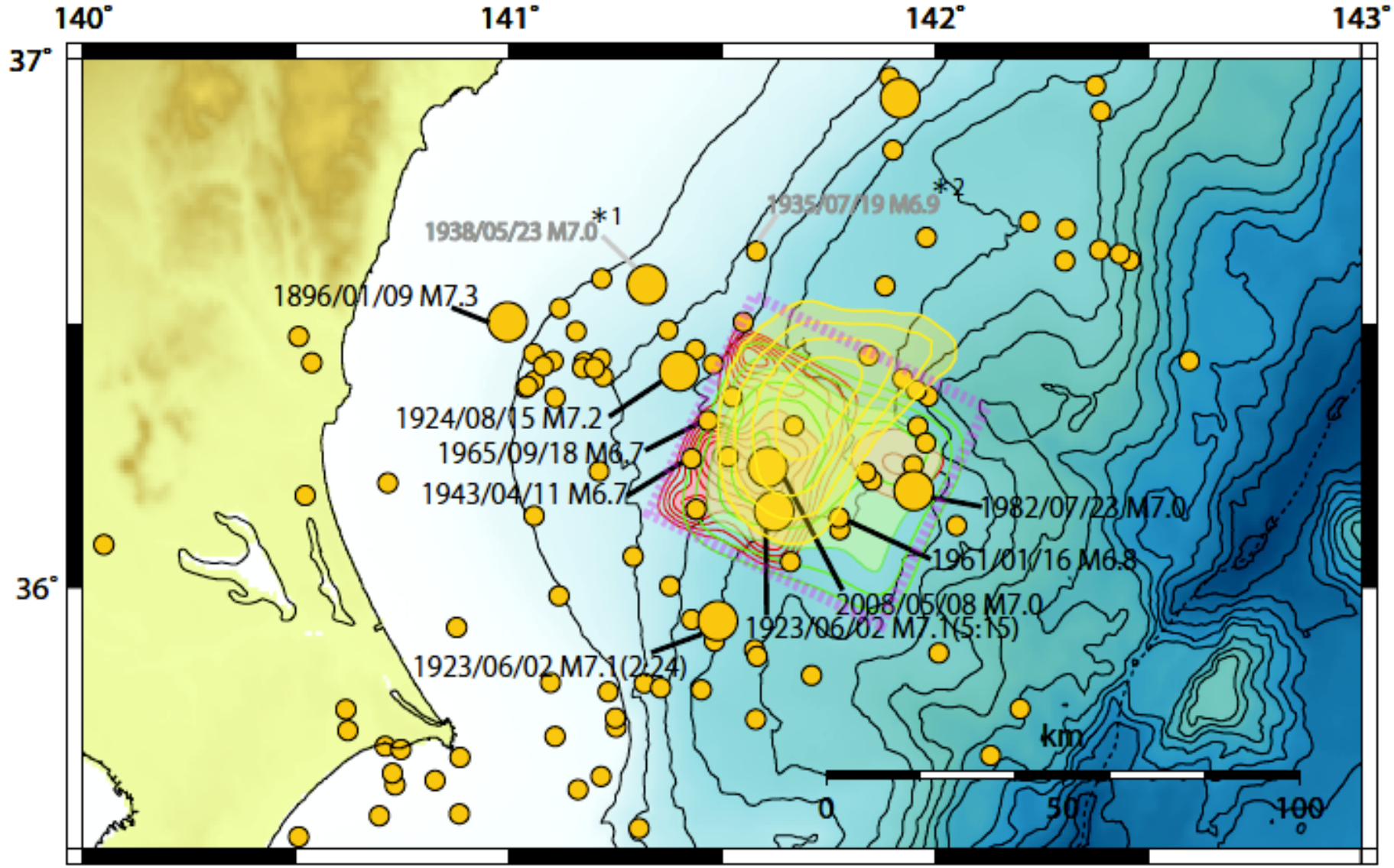
1999version

Poisson estimate: 1943, 1961, 1965, 1982 events

2009version

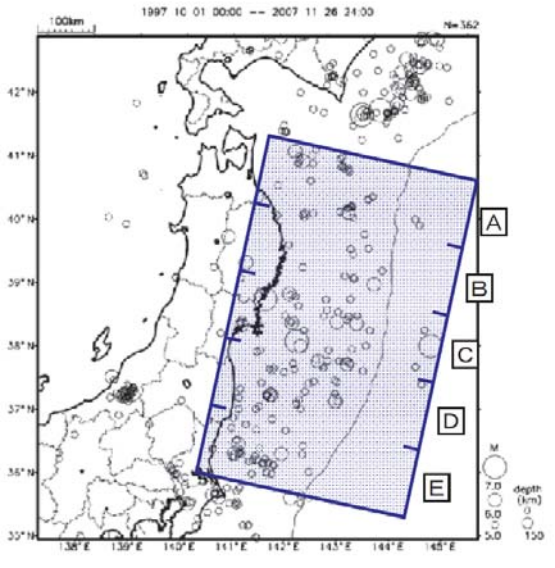
BPT estimate: 1923, 1943, 1965, 1982, 2008 events
average interval of 21.2 years

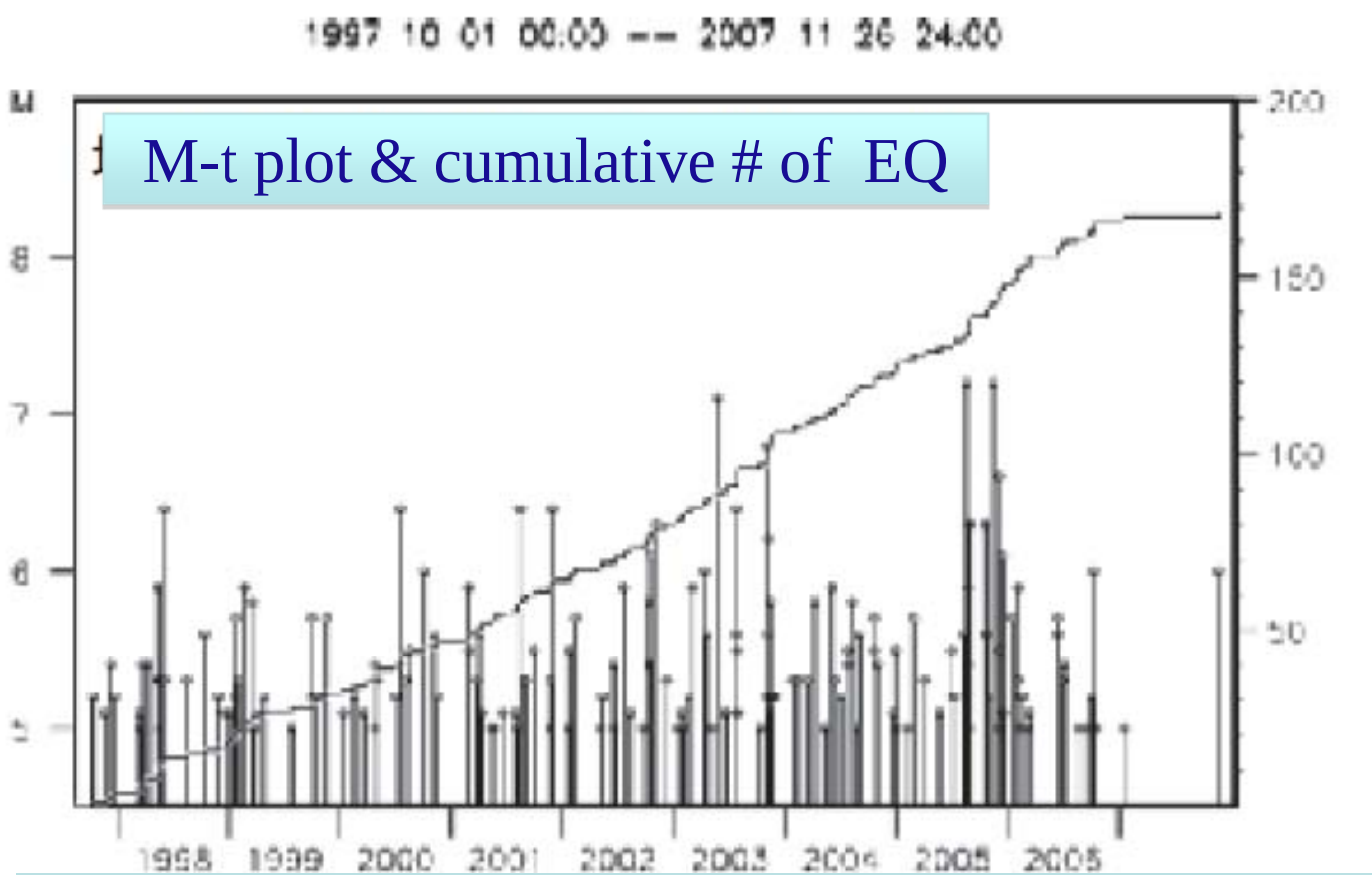
Ibaraki-Oki earthquake : interplate EQ with magnitude around 7

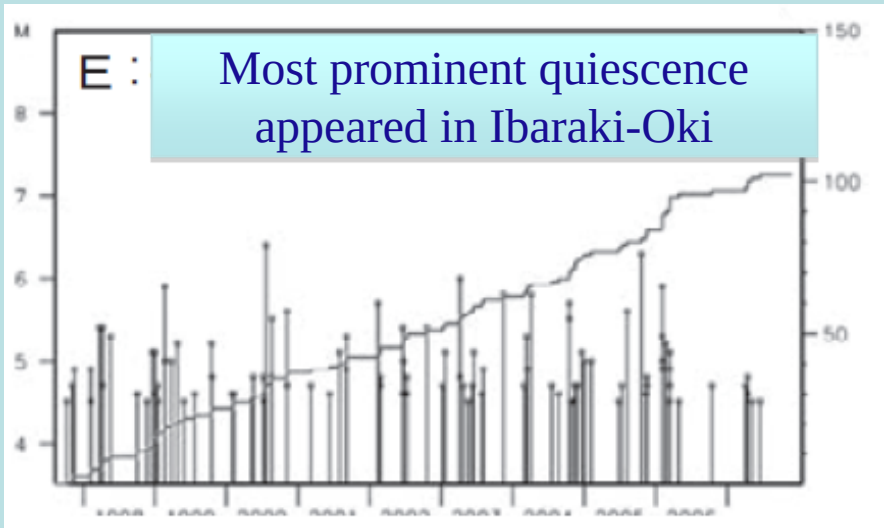


At least two large asperities: each broken by 1961 and 1965 events

Miyaoka (2008)







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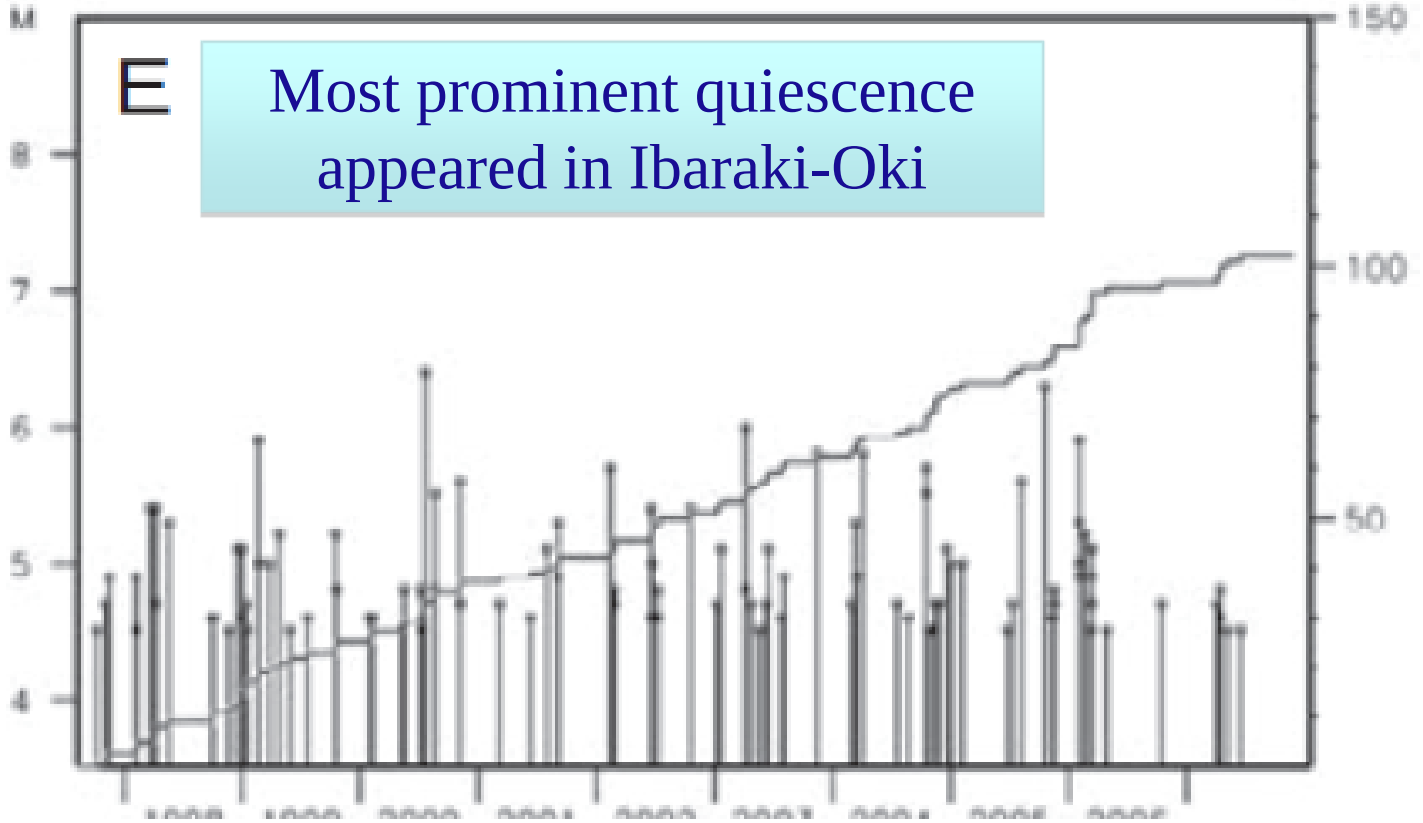
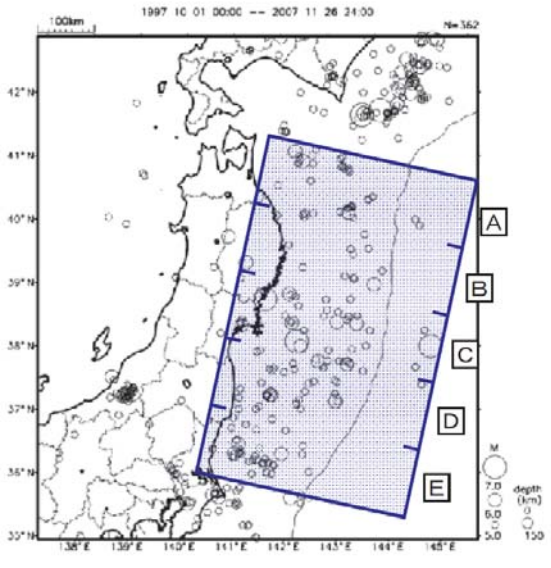


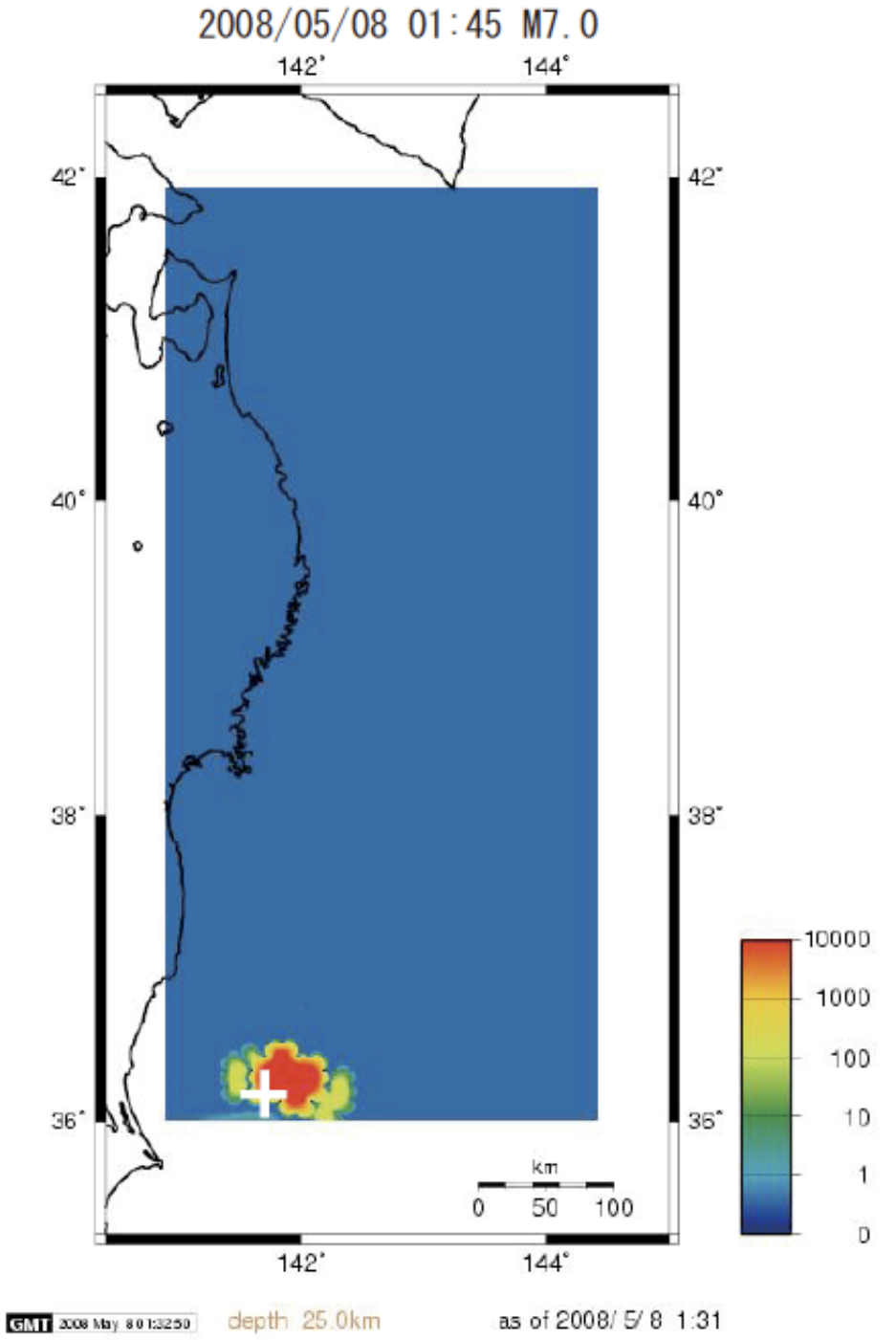


B-value decrease in Ibaraki-Oki was reported by Kamaya et al., in 2007.

Short-term probability gain 14 minutes prior to the occurrence of Ibaraki-Oki Eq (Imoto, 2009)

Imoto (2004) developed a method to estimate probability of EQ occurrence in 24 hours following nearby events (possible foreshocks) with magnitude 4.5-6.4.

He started testing this method in Jan 1, 2001.



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