

Experiment in advance short-term earthquake prediction Issue 3, Sept 16, 2004

Dear colleague,

As you know, on June 21, 2003 our team has started an experiment in advance short-term prediction of strong earthquakes, with characteristic lead time months. Prediction algorithm, named *Reverse Tracing of Precursors* (“RTP”) is briefly described in <http://arxiv.org/abs/physics/0312088> and <http://www.terrapub.co.jp/journals/EPS/pdf/2004/5608/56080715.pdf>. Currently we consider prediction in the regions shown on page 2, along with the magnitude range of the strong earthquakes, targeted for prediction.

As of Sept. 15, 2004, five alarms have been announced. Their outcomes are described in the figures below. Three alarms have been confirmed by subsequent strong earthquakes (Central California, 2003, Fig. 2; Japan, 2003 Fig. 3; and Slovenia, 2004, Fig. 4). One alarm has expired on Sept. 5, 2004, without a strong earthquake to occur (Southern California, Fig. 5). And one alarm, not yet expired, was followed so far by a “near miss” – a strong earthquake at about 150 km from the area of alarm, outside of the region considered (Japan, 2004, Fig.6).

Note that two alarms - for Slovenia (Fig. 4) and Japan (Fig. 6) - expire later this year, on November 29 and 8, respectively.

A reminder: Some of the materials in this message are neither put on a web site, nor published yet. Please do not release them to media.

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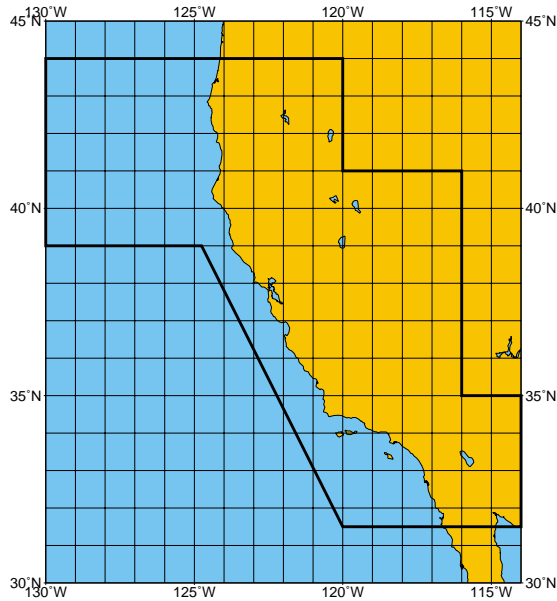
An addition. We are grateful to the colleagues for additional questions; below are the answers to two of them.

1. Some colleagues ask how to check that Slovenian earthquake fits the definition of the strong earthquakes targeted for prediction. In the issues 1 and 2 the tables with current alarms indicate (for three regions) the target magnitude in Mw scale. Complete procedure is the following: The algorithm selects the maximal of four magnitudes listed in PDE catalog (in the EHDF format). If Harvard gives Mw, then it is selected instead. In the area of alarm considered (Fig. 4) Harvard gives no Mw; actually, it gives Mw only for four earthquakes, in 1976 and 1998.

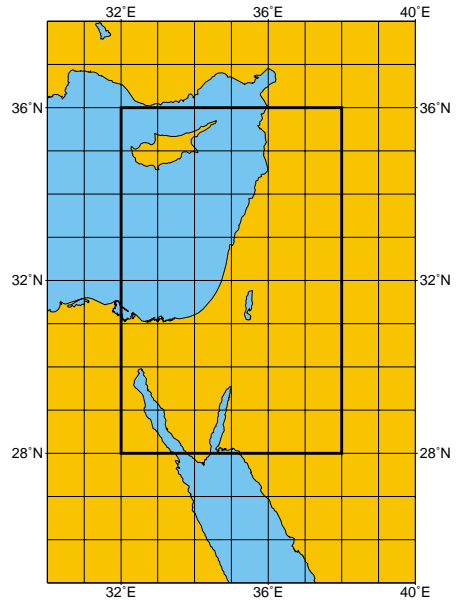
2. Many colleagues ask whether the algorithm would predict the target earthquakes south of Honshu island (Fig. 6) if we would extend to their epicenters the region considered. As demonstrated in Fig. 7, the answer is yes. Obviously, regardless of that retrospection, we will not count this earthquake as predicted.

We welcome the further questions.

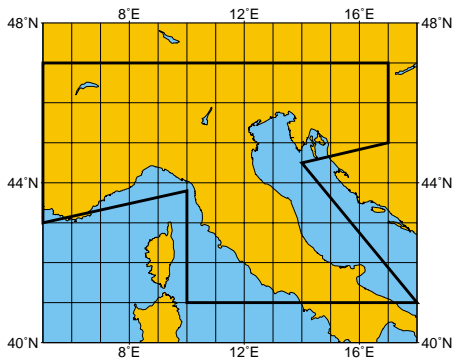
California and Western Nevada



Eastern Mediterranean



Central Apennines, Alps, Northern Dinarides and Po Valley



Honsu, Hokkaido, Southern Kurils

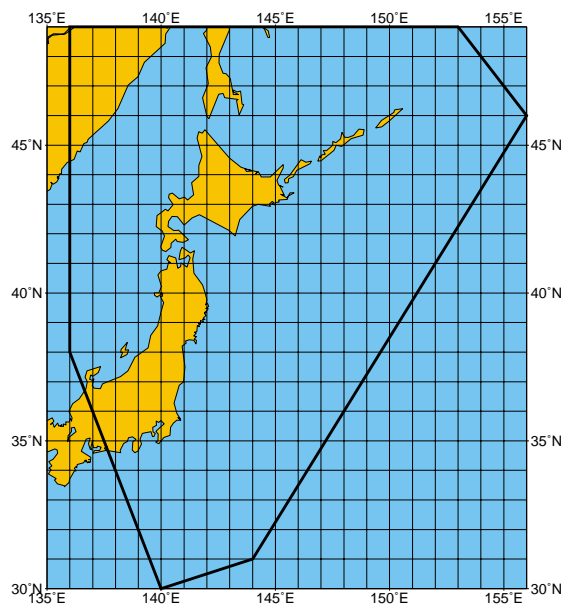
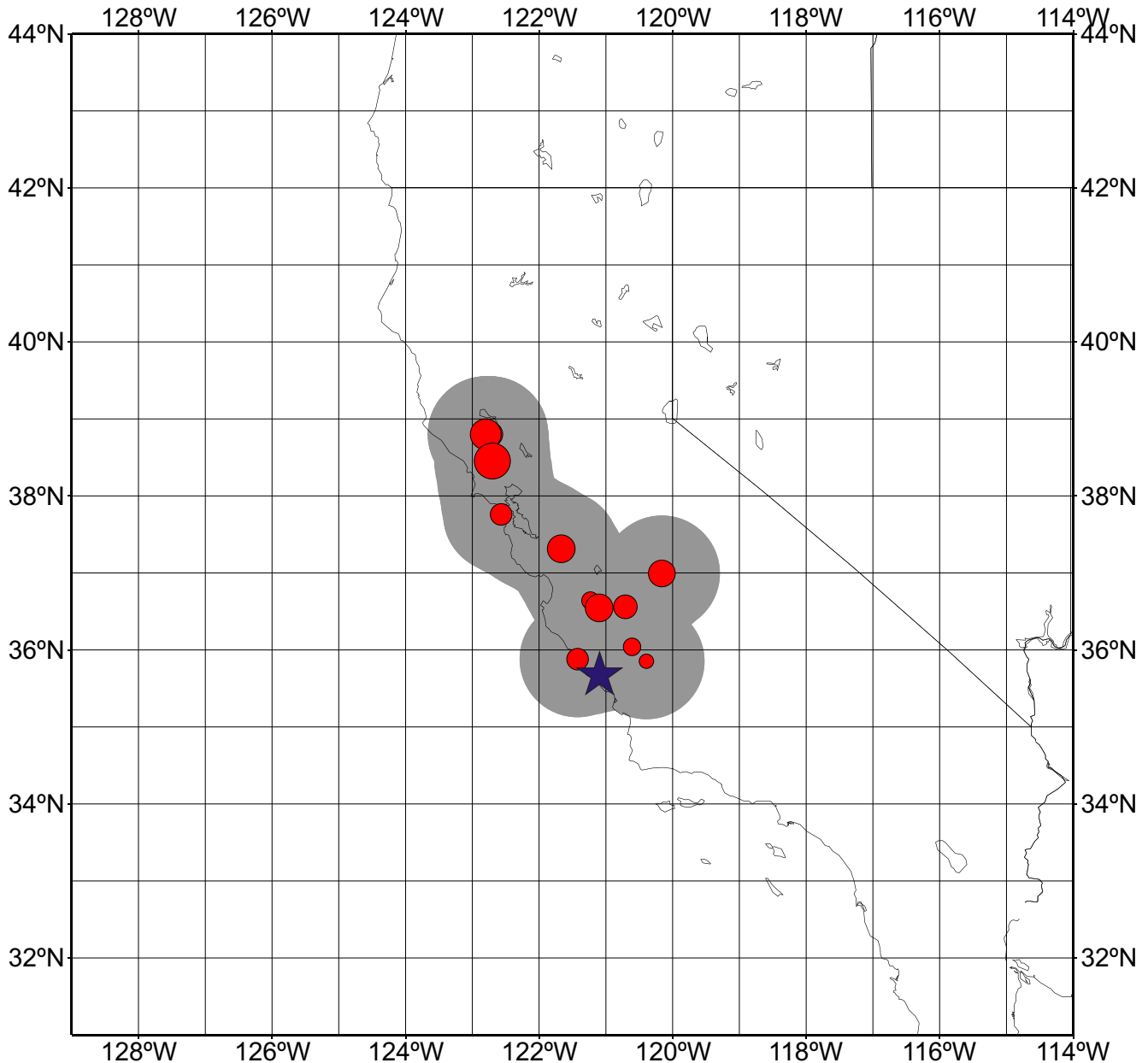


Figure 1: Regions covered by prediction

San Simeon earthquake in central California, December 22, 2003, $M = 6.5$



Case history, 2003

May 5: Precursory chain of earthquakes was formed (red circles). It indicates that an earthquake with magnitude 6.5 or more will occur in gray area by February 5, 2004.

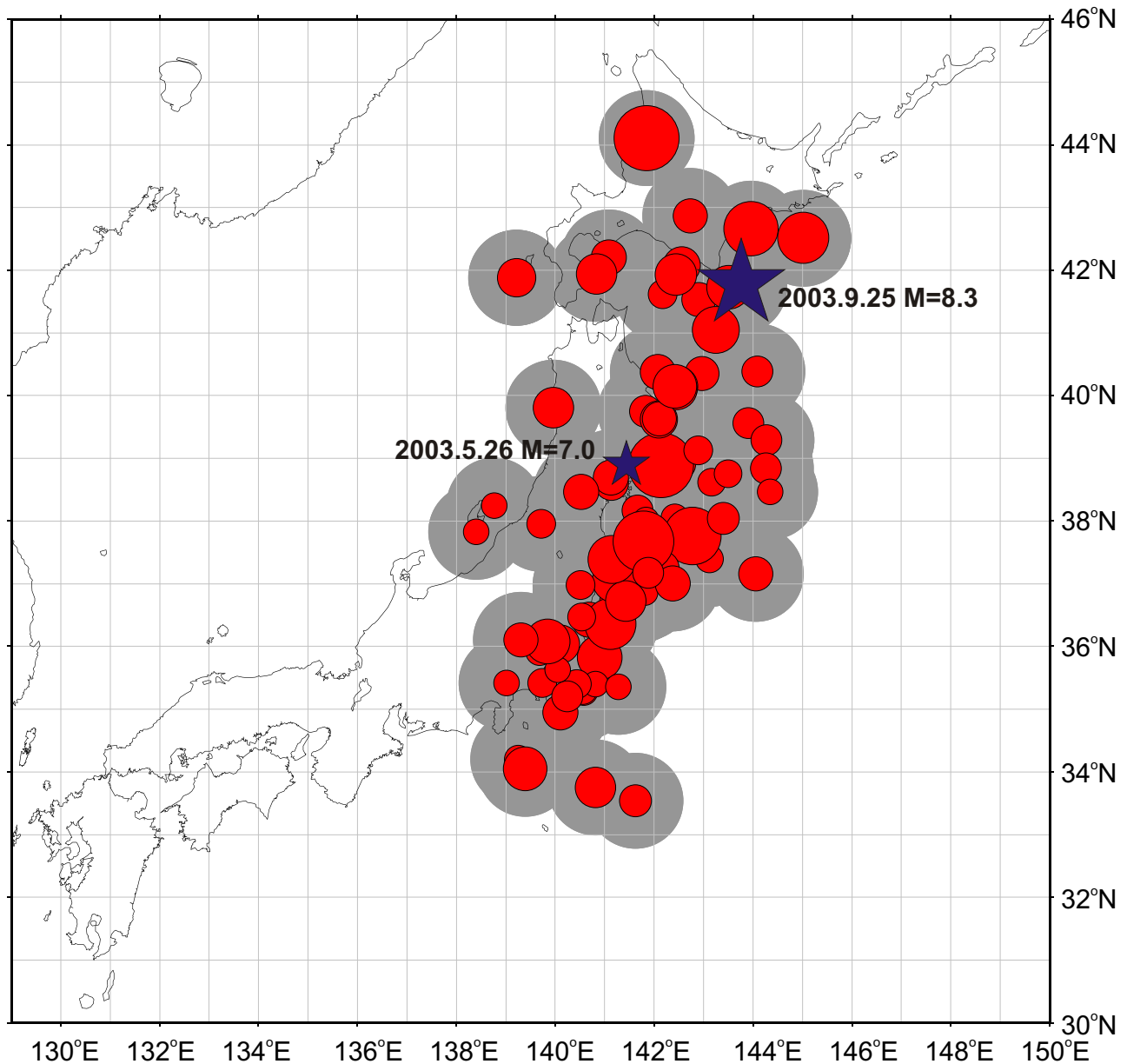
June 21: Prediction was distributed among 20 leading scientists and administrators:

http://www.math.purdue.edu/~agabriel/Workshop/SanSimeon_let.pdf

Dec. 22: San Simeon earthquake (star).

Experiment in advance short-term prediction, Case histories, Fig. 3

Tokachi-oki earthquake, Japan, Sept. 25, 2003, M = 8.3



Case history, 2003

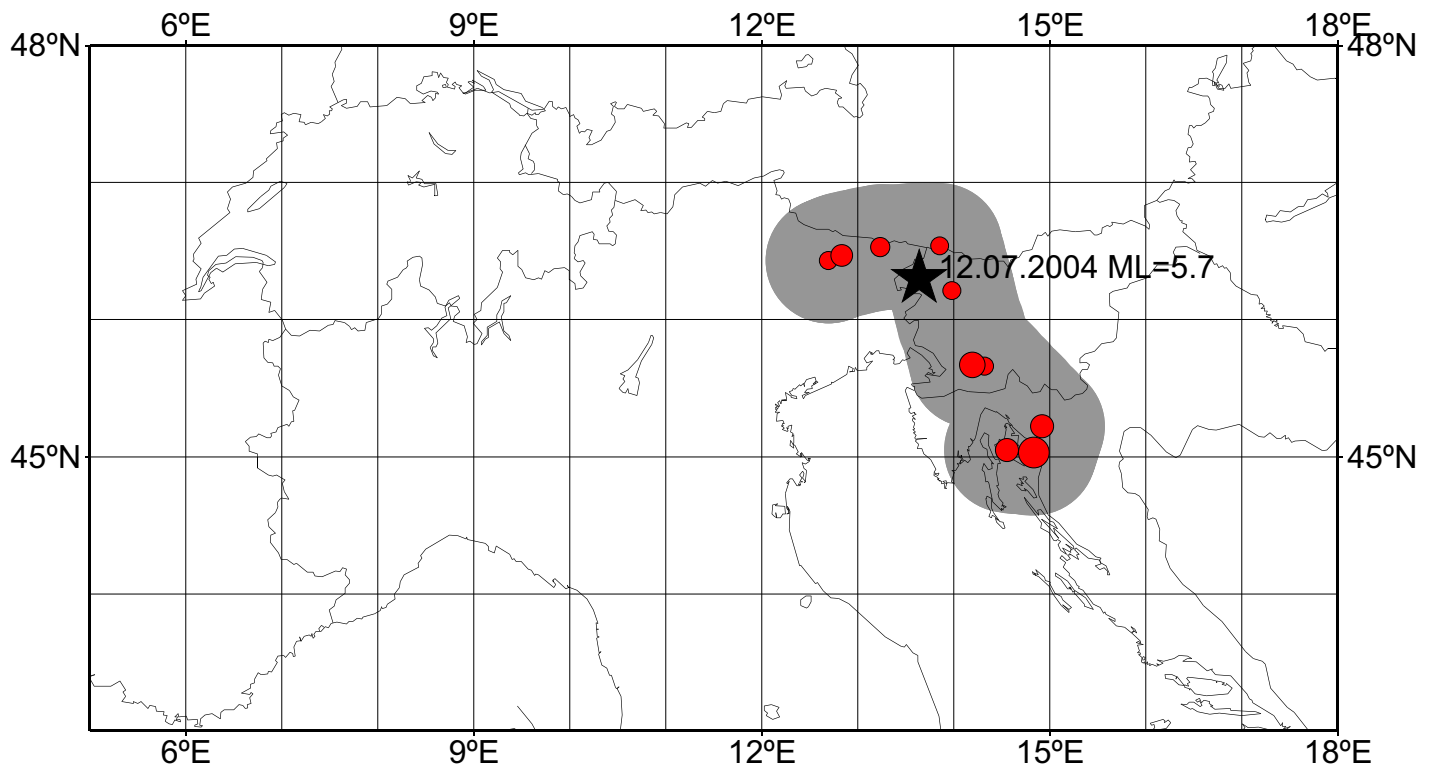
March 27: Precursory chain of earthquakes was formed (red circles). It predicts that an earthquake with magnitude 7 or more will occur in gray area by November 27.

May 26: Earthquake with magnitude 7.0 (small star); precursor was not reported in advance.

July 2: Precursor reported at IUGG (Sapporo, Japan).

Sept. 25: Tokachi-oki earthquake (large star).

Slovenia earthquake, July 12, 2004, $M = 5.7$



Case history, 2004

February 29: Precursory chain of earthquakes was formed (red circles). It indicates that an earthquake with magnitude 5.5 or more will occur in gray area by November 29.

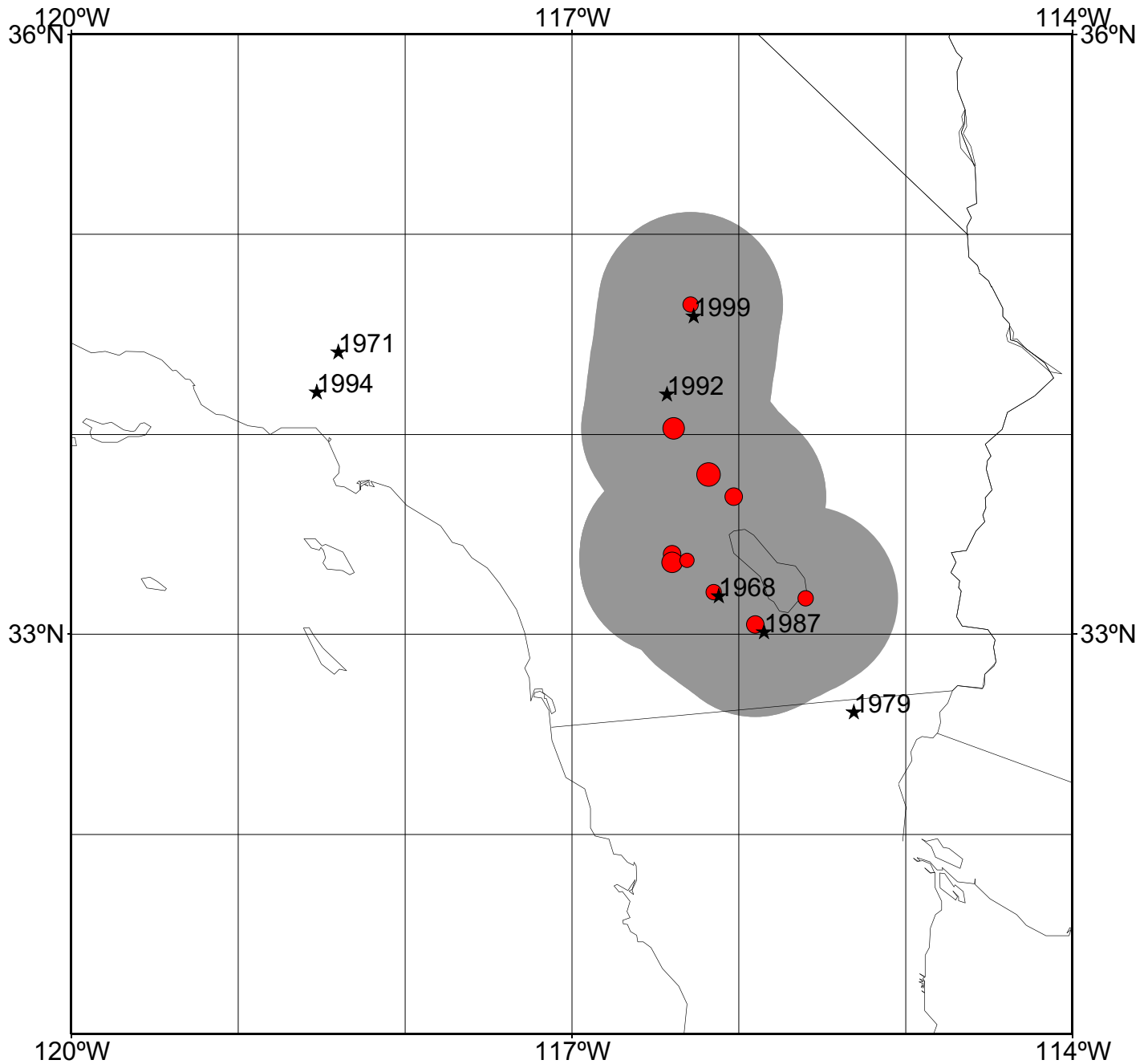
May 12: Prediction was distributed (Issue 1).

July 12: Slovenia earthquake (star).

Note that alarm terminates on November 29, 2004.

Alarm in Southern California

Stars show past strong earthquakes

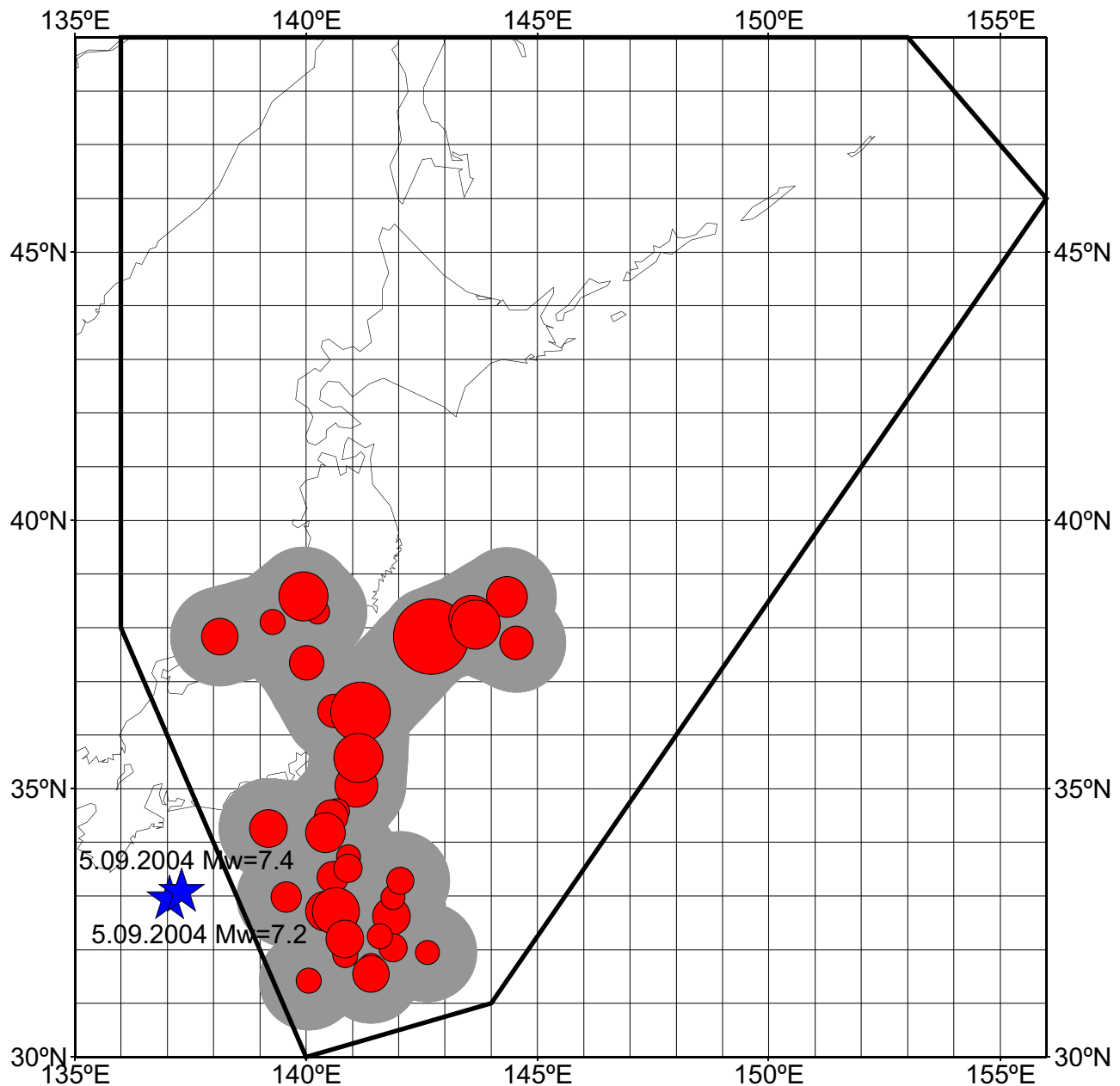


Case history

November 13, 2003: Precursory chain of earthquakes was formed and kept growing until December 5, 2003 (red circles). It predicts that an earthquake with magnitude 6.4 or more will occur in gray area by September 5, 2004.

September 6, 2004: Alarm terminates. No such earthquake occurred.

Earthquakes south of Honshu island, Japan, Sept. 5, 2004, M = 7.4 and 7.2



Case history, 2004

February 8: Precursory chain of earthquakes was formed (red circles). It indicates that an earthquake with magnitude 7.2 or more will occur in gray area within 9 months.

June 1: Prediction was distributed (Issue 2).

September 5: Two earthquakes south of Honshu island (stars). Black polygon shows the region considered.

Note that alarm terminates on November 8, 2004.

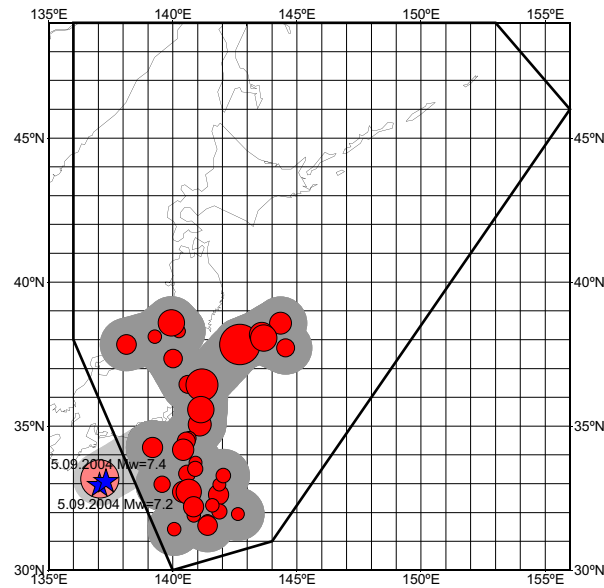


Fig. 7

Earthquakes south of Honshu island, Japan, Sept. 5, 2004, M = 7.4 and 7.2

Retrospective explanation of near miss

If the western border of the region is extended to 135°E the alarm would extend to the light-gray area covering the missed strong earthquake; corresponding additional earthquake in the chain is shown by light-red circle.