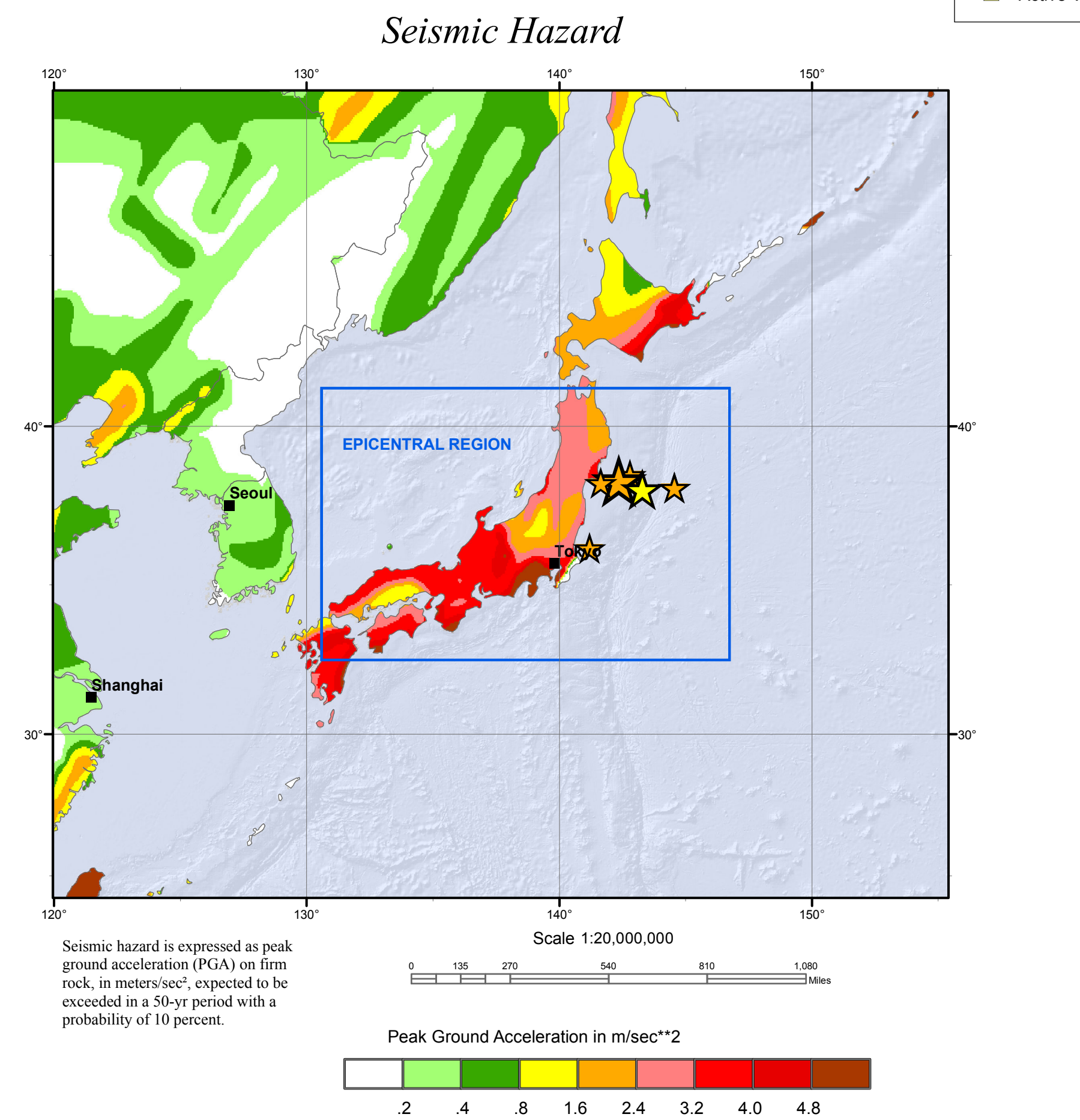
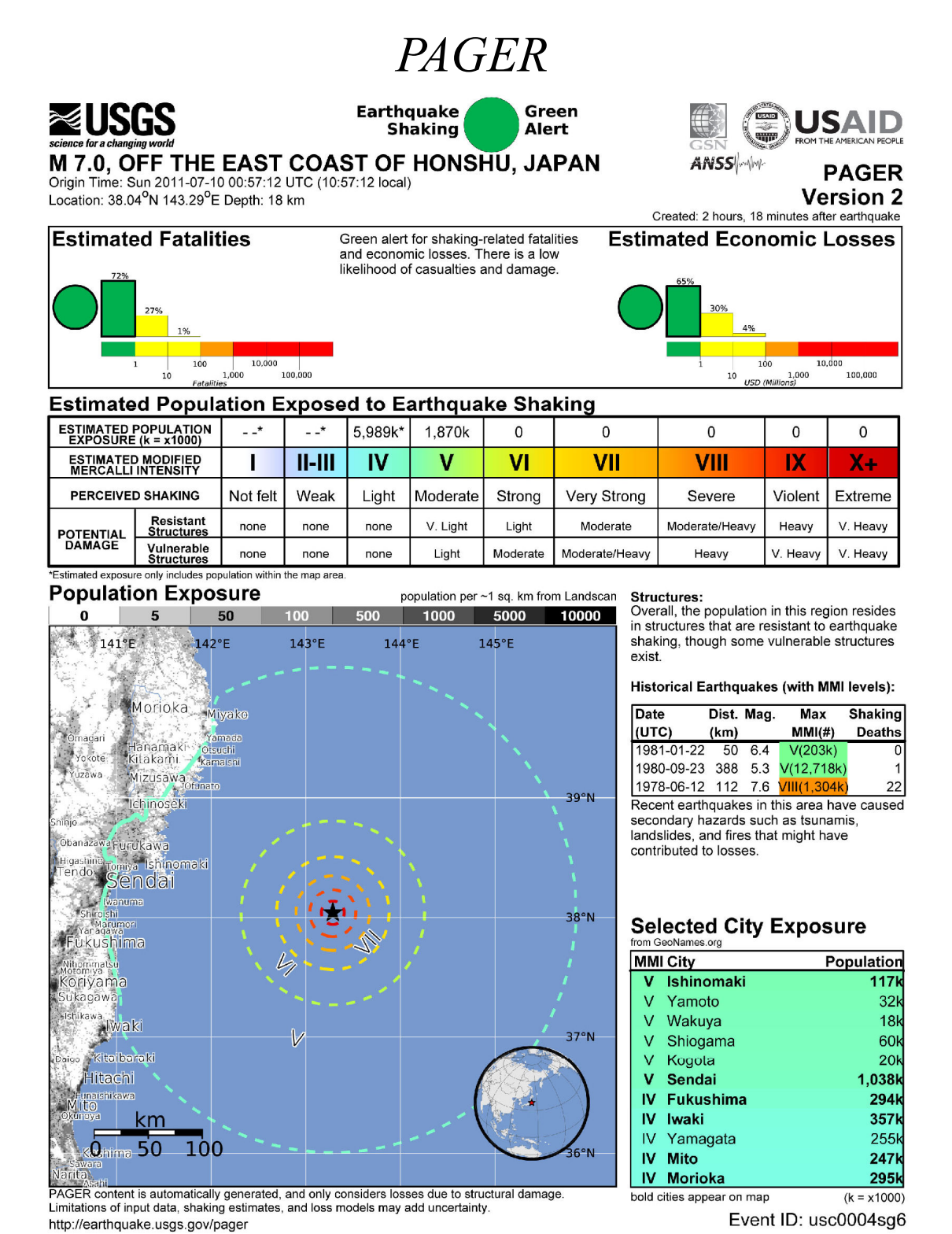
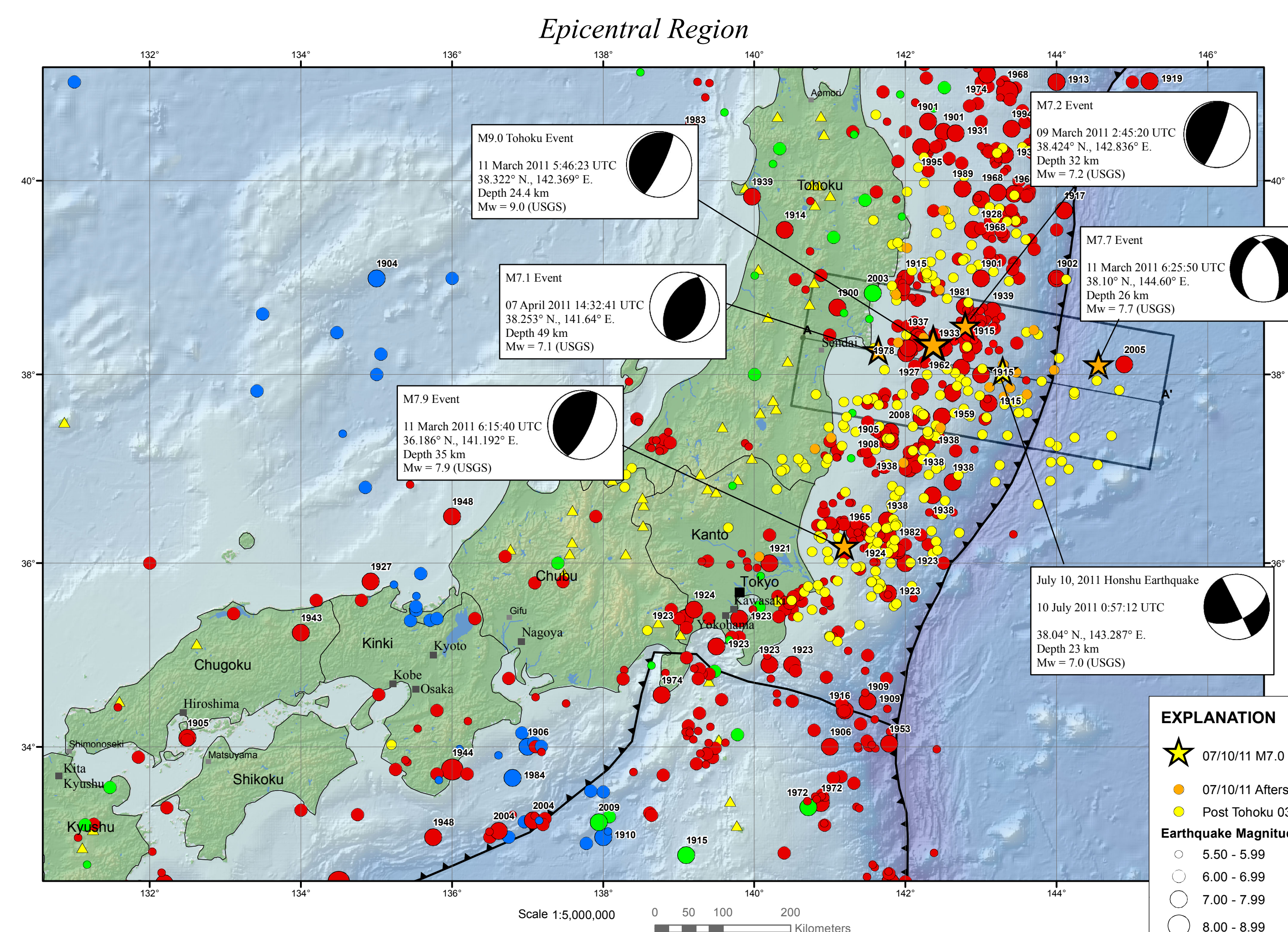
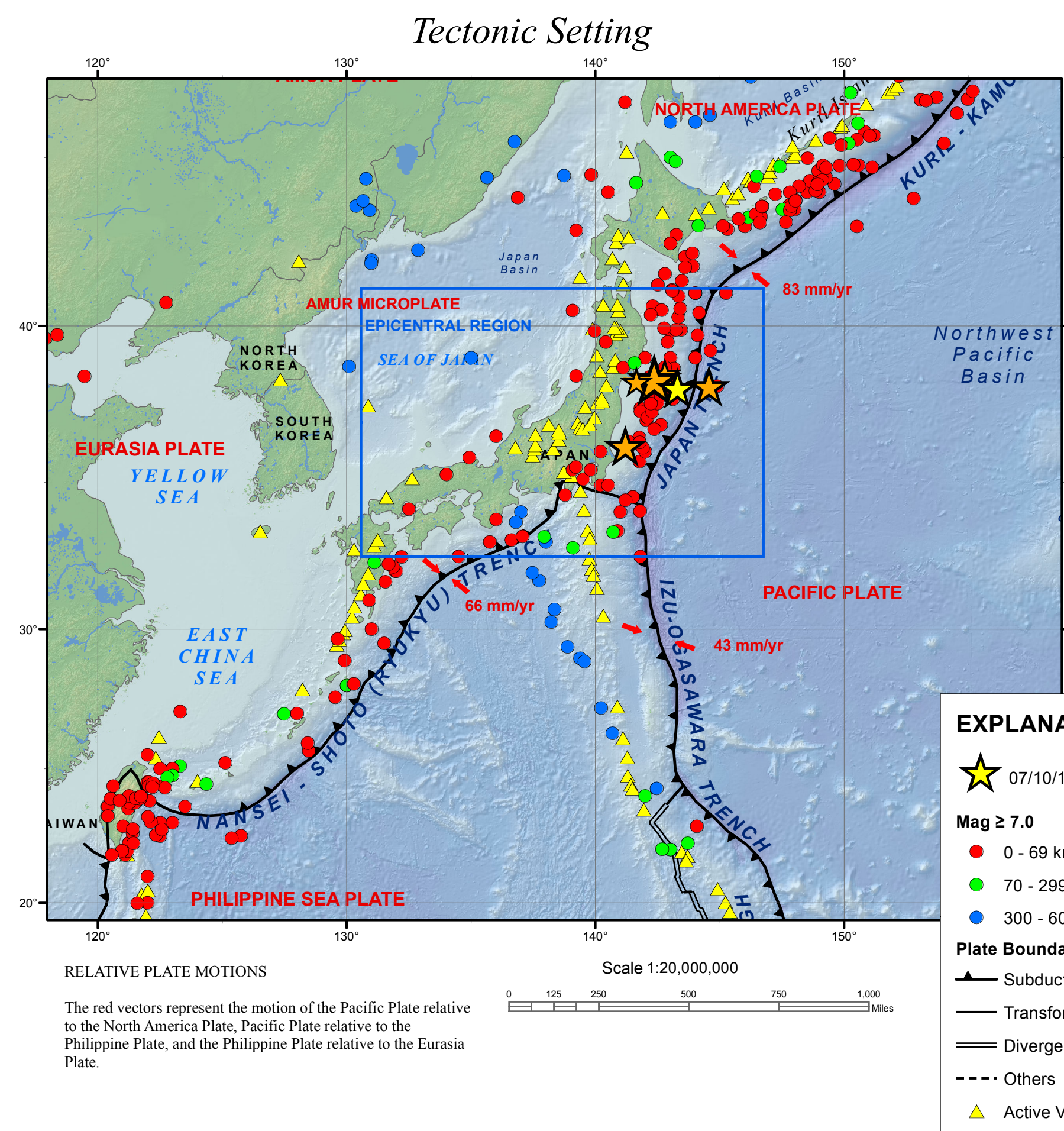
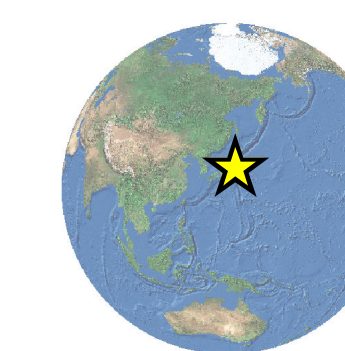


# M7.0 Northeast Honshu, Japan Earthquake of July 10, 2011

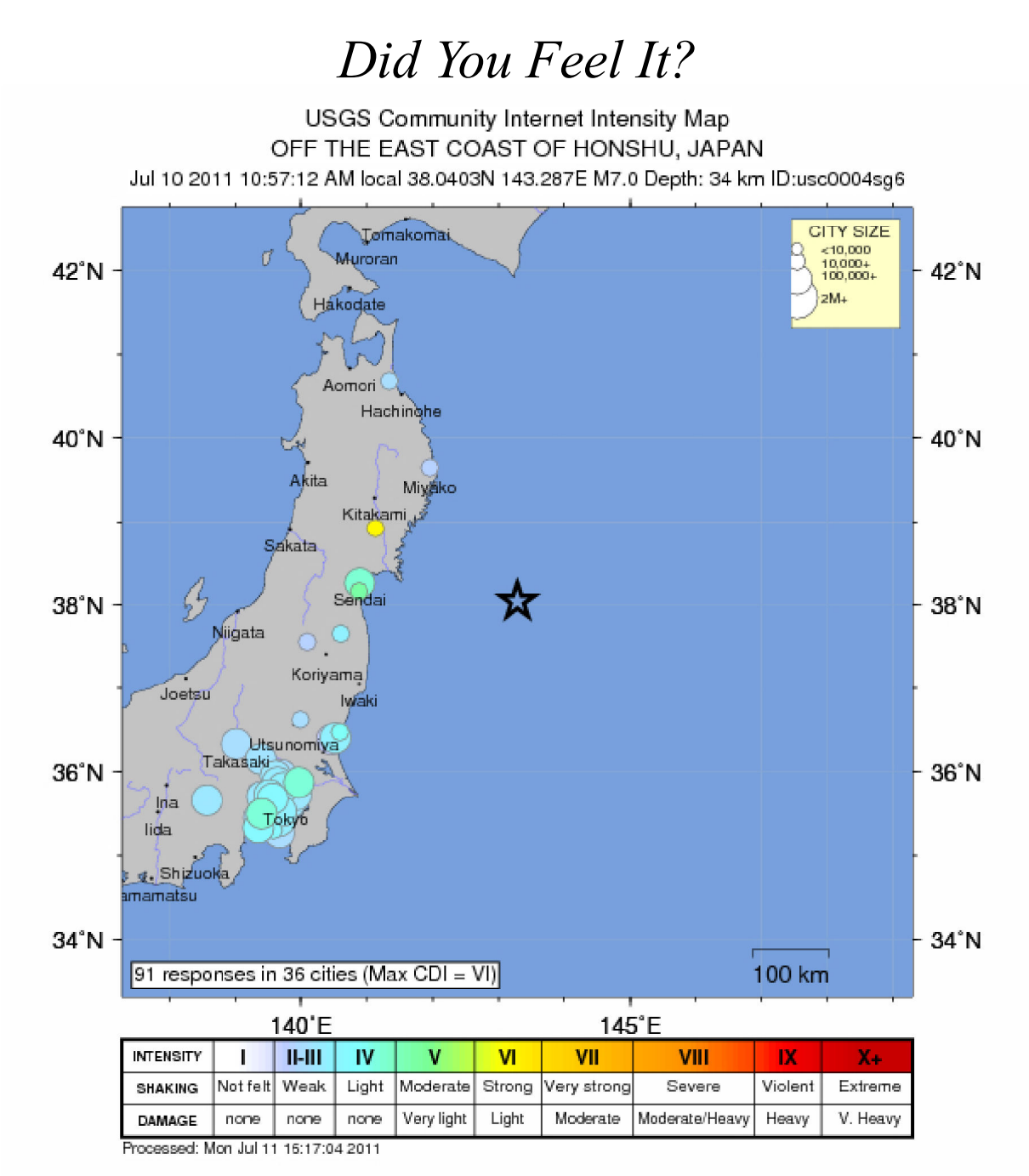
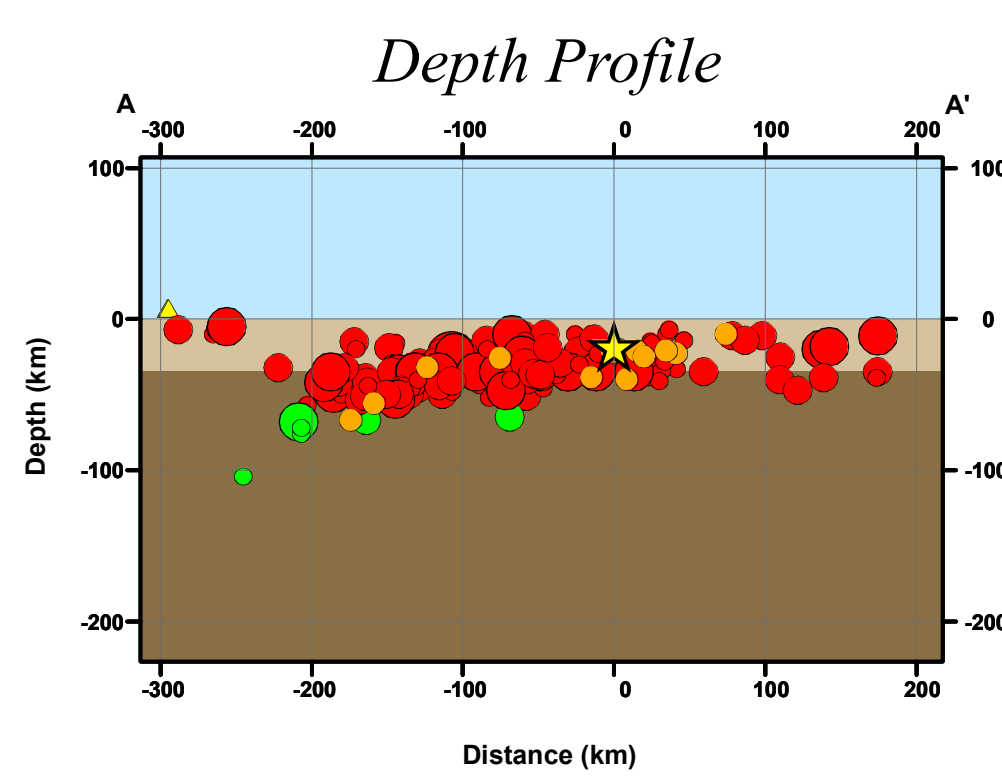


### TECTONIC SUMMARY

The July 10, 2011 earthquake off the east coast of Honshu, Japan, occurred close to the boundary between the Pacific and North American plates, in the subduction zone region where the Pacific plate converges with and sinks beneath Japan and Eurasia to the west. At the location of the July 10 event, the Pacific plate moves west-northwestward with respect to North America and northern Japan at a rate of approximately 83 mm/yr. Note that some authors divide this region into several microplates that together define the relative motions between the larger Pacific, North America and Eurasia plates; these include the Okhotsk and Amur microplates that are respectively part of North America and Eurasia. The epicenter and focal mechanism of this earthquake, together with a preliminary depth estimate of 23 km, suggest that the earthquake occurred within the subducting Pacific lithosphere, rather than on the overlying subduction plate interface itself or within the overriding North American plate. The July 10 event struck just over 80 km to the east-southeast of the March 11 2011 Mw9.0 Tohoku earthquake, near the southern end of major rupture during that larger event. The July 10 earthquake can be considered an aftershock of the March 11 event. Since March 11, over 688 aftershocks with magnitudes greater than 5 have occurred – 67 of M 6 or greater – with aftershocks occurring both as interplate events on the subduction plate interface and as intraplate events within the overriding North American plate or the subducting Pacific plate. These aftershocks reflect the adjustment of stresses in the plate boundary region in response to the March 11 mainshock.

### Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1901	08	09	1833	40.600	142.300	35	7.5
1906	01	21	1349	34.000	137.000	350	7.7
1909	03	13	1429	34.500	141.500	35	7.6
1915	11	01	0724	38.300	142.900	35	7.5
1923	09	01	0258	35.405	139.084	35	7.9
1923	09	02	0246	34.900	140.200	35	7.6
1927	03	07	0927	35.802	134.924	9.6	7.6
1931	03	09	0348	40.484	142.664	35	7.7
1933	03	02	1731	39.224	144.622	35	8.4
1938	05	23	0718	36.458	141.755	35	7.7
1938	11	05	0843	37.009	142.045	35	7.9
1938	11	05	1050	37.108	142.081	35	7.8
1938	11	06	0853	37.287	142.283	35	7.7
1944	12	07	0435	33.750	136.000	0	8.1
1953	11	25	1748	34.034	141.786	35	7.9
1960	03	20	1707	39.871	143.435	2.1	7.8
1964	06	16	0401	38.434	139.226	13.1	7.5
1968	05	16	0049	40.903	143.346	25.8	8.3
1972	02	29	0923	33.377	140.881	58.8	7.5
1978	06	12	0814	38.224	142.009	53.3	7.7
1983	05	26	0300	40.468	139.080	20	7.7
1994	12	28	1219	40.530	143.403	29.2	7.8
2011	03	11	0546	38.320	142.351	32	9.0
2011	03	11	0615	36.270	141.145	35	7.9
2011	03	11	0625	38.058	144.591	18	7.7



### DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD  
USGS, National Earthquake Information Center  
NOAA, National Geophysical Data Center  
IASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseor, 2002)  
HDF (unpublished earthquake catalog) (Engdahl, 2003)  
GSHAP, Global Seismic Hazard Assessment Program  
<http://www.seismo.ethz.ch/static/GSHAP/>

### REFERENCES

Bird, P., 2003, An updated digital model of plate boundaries: *Geochem. Geophys. Geosyst.*, v. 4, no. 3, pp. 1027-80.

Engdahl, E.R. and Villaseor, A., 2002, *Global Seismicity: 1900 - 1999*, chap. 41 of Lee, W.H.K., and others, eds., *International Earthquake and Engineering Seismology, Part A*: New York, N.Y., Elsevier Academic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.P., 1998, Global teleseismic earthquake relocation with improved travel times and procedures for depth determination: *Bull. Seism. Soc. Amer.*, v. 88, p. 722-743.

The GEBCO\_08 Grid, version 20090202, <http://www.gebco.net>

### DISCLAIMER

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

### BASE MAP

NIMA and ESRI, Digital Chart of the World  
USGS, EROS Data Center  
NOAA GEBCO and GLOBE Elevation Models

Map prepared by U.S. Geological Survey National Earthquake Information Center 11 July 2011  
Map not approved for release by Director USGS