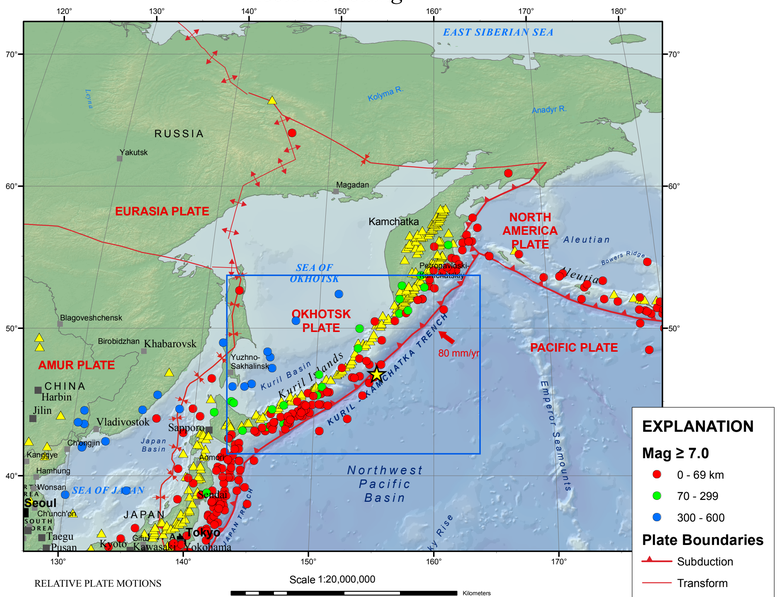
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP XXX

Prepared in cooperation with the Global Seismographic Network

M7.4 East of the Kuril Islands Earthquake of 15 January 2009

Tectonic Setting



RELATIVE PLATE MOTIONS

The broad red vector represents the motion of the Pacific Plate relative to the Okhotsk Plate in the region. The motion of the Pacific Plate is greater than 80 mm/yr northwest with respect to the Okhotsk Plate.

Scale 1:20,000,000

0 200 400 800 1,200 1,600 Kilometers

EXPLANATION

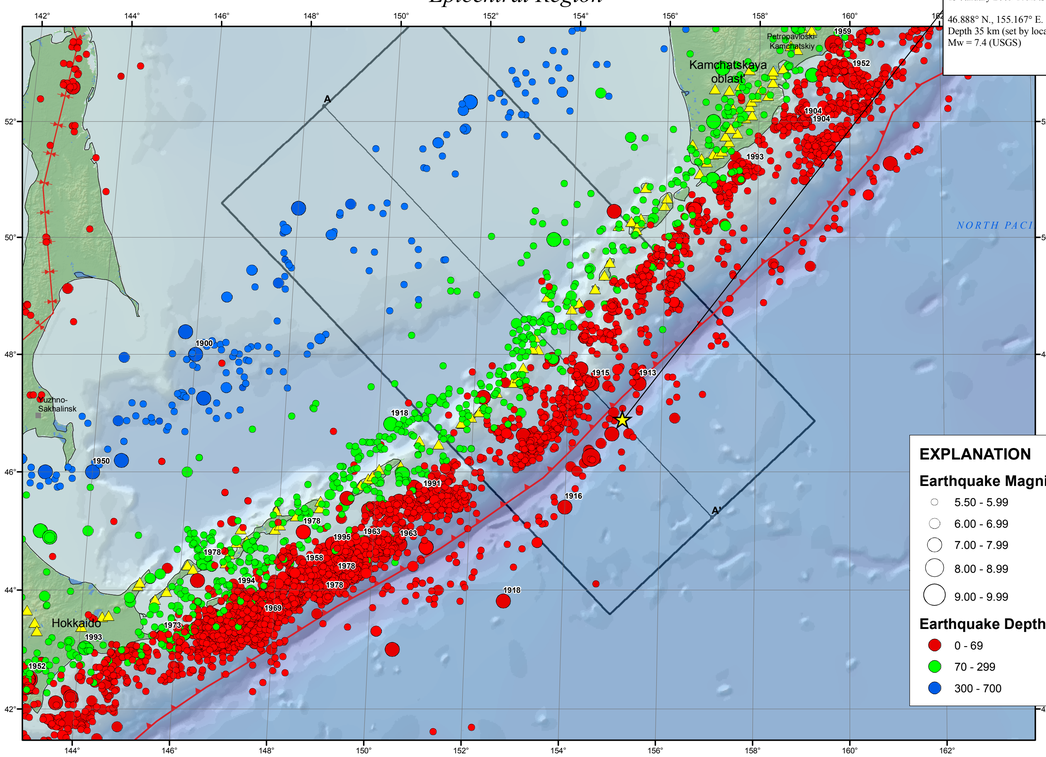
Mag ≥ 7.0

- 0 - 69 km
- 70 - 299
- 300 - 600

Plate Boundaries

- Subduction
- Transform
- Divergent
- Convergent
- Volcanoes

Epicentral Region



East of Kuril Islands

15 January 2009 17:49:39 UTC

46.888° N., 155.167° E.
Depth 35 km (set by location program)
Mw = 7.4 (USGS)

EXPLANATION

Earthquake Magnitude

- 5.50 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99

Earthquake Depth

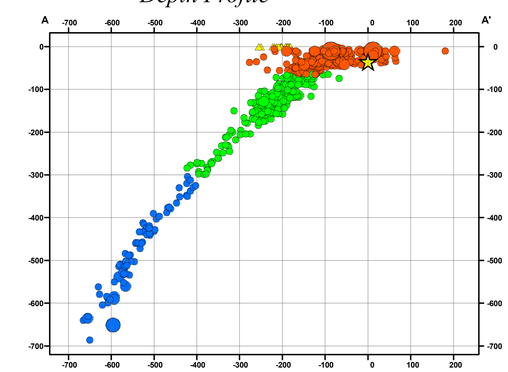
- 0 - 69
- 70 - 299
- 300 - 700

Scale 1:5,000,000

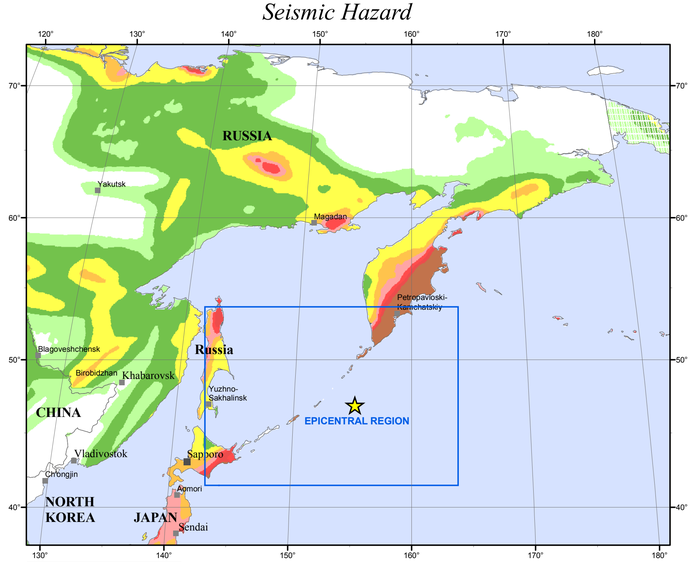
0 100 200 400 Kilometers

Note on earthquakes: From 1900 - 1963, earthquakes shown are from Centennial Catalog, magnitudes greater than 5.5. From 1964 - 2002, earthquakes are from HDF catalog, magnitudes greater than 4.5. From 2003 to present, earthquakes are from NEIC, magnitudes greater than 4.5.

Depth Profile



Seismic Hazard



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec², expected to be exceeded in a 50-yr period with a probability of 10 percent.

Scale 1:20,000,000

0 200 400 800 1,200 1,600 Kilometers

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

TECTONIC SUMMARY

The Kuril Islands earthquake of January 15th, 2009 occurred as a result of thrust faulting within the Pacific plate. The event occurred near the outer-rise of the Pacific plate about 30 km to the east of where the Pacific plate subducts beneath the Okhotsk plate. In this region, the Pacific plate moves northwest with respect to the Okhotsk plate with a velocity of about 90 mm/yr.

Large and great earthquakes are not uncommon in this region. The location of this event is approximately 90 km to the northeast of the Mw 8.1 outer rise earthquake of January 13th 2007, which occurred as a result of normal faulting near the Pacific plate outer-rise. On November 15th 2006, an Mw 8.3 subduction-related thrust earthquake occurred approximately 160km to the southwest.

Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1900	01	31	1922	48.000	146.000	450	7.5
1904	06	25	1445	52.000	159.000	0	7.5
1904	06	25	2100	52.000	159.000	0	7.6
1913	08	01	1710	47.500	155.500	0	7.7
1915	05	01	0500	47.500	154.500	35	7.9
1916	10	31	1530	45.400	154.000	0	7.6
1918	09	07	1715	46.812	150.253	242	7.6
1918	11	08	0438	43.816	152.775	63.5	7.5
1950	02	28	1020	46.000	144.000	340	7.5
1952	03	04	0122	42.500	143.000	0	8.1
1952	11	04	1658	52.755	160.057	22.2	9.0
1958	11	06	2258	44.329	148.623	35	8.4
1959	05	04	0715	53.351	159.645	35	8.0
1963	10	13	0517	44.770	149.798	13.4	8.6
1963	10	20	0053	44.772	150.563	27.9	7.9
1968	05	16	1039	41.593	142.786	11.8	7.8
1969	08	11	2127	43.478	147.815	45.6	8.2
1973	06	17	0355	43.223	145.743	43.3	7.8

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.

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 Villaseñor, 2002)
HDF (unpublished earthquake catalog) (Engdahl, 2003)
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Finite Fault Model, Chen Ji, UC Santa Barbara (2007)

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

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 Villaseñor, 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 Academeic 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.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
http://earthquake.usgs.gov/eqcenter/
15 January 2009
Map not approved for release by Director USGS