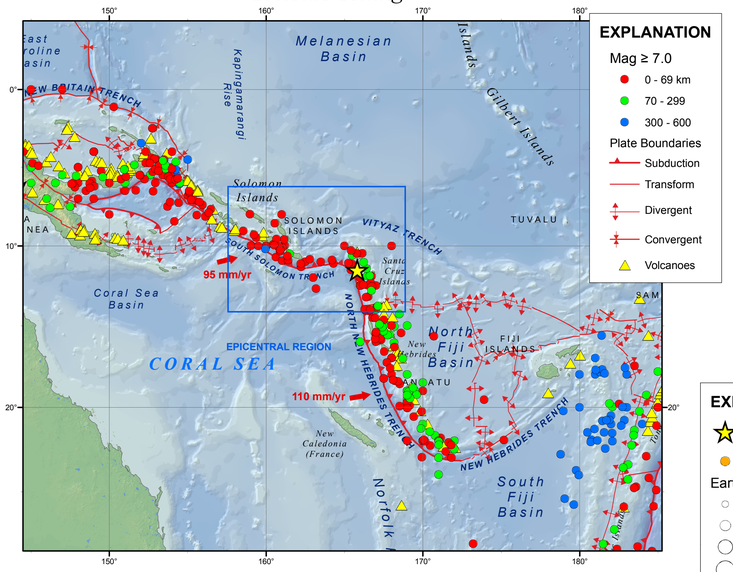
Prepared in cooperation with the Global Seismographic Network

M7.2 Santa Cruz Islands, Solomon Islands, Earthquake of 2 September 2007

Tectonic Setting

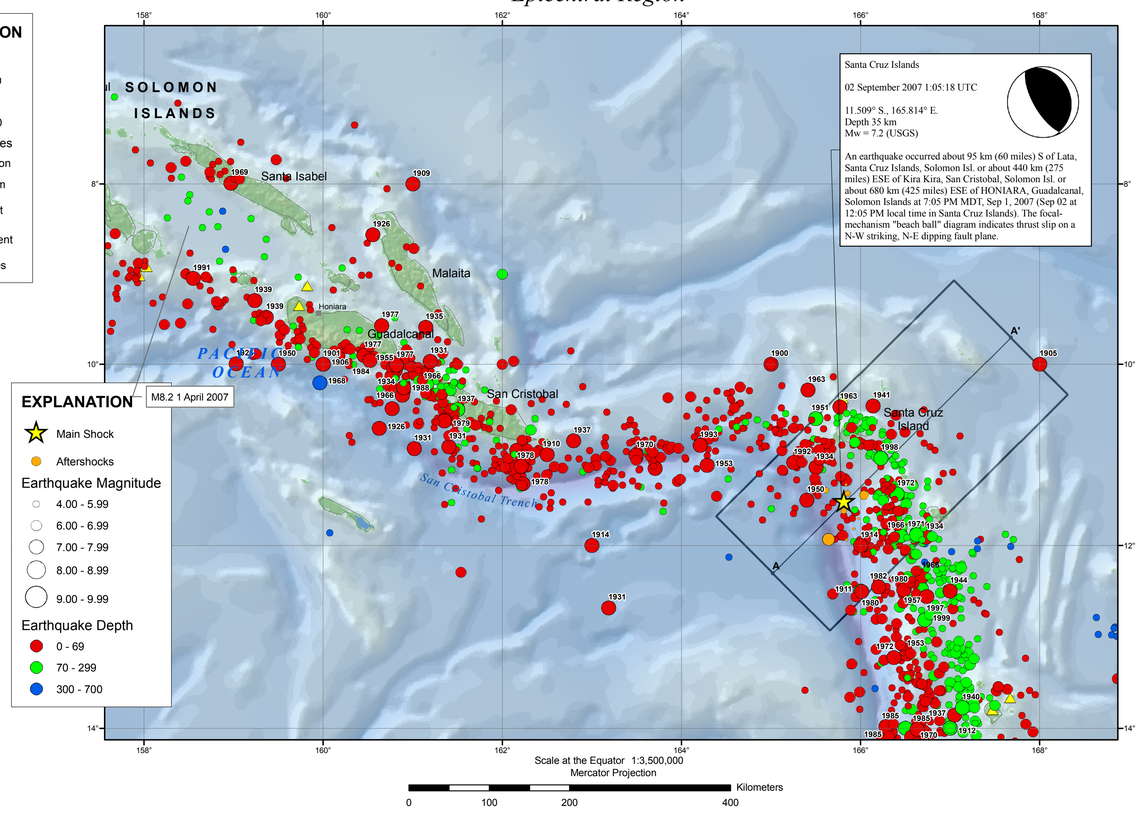


SCALE 1:20,000,000 at the Equator

RELATIVE PLATE MOTIONS

The broad red vectors represent the motion of the Australia Plate relative to the Solomon Sea and New Hebrides Plates in the region. The motion of the Australia Plate is generally northeastward with respect to the other plates in the region.

Epicentral Region

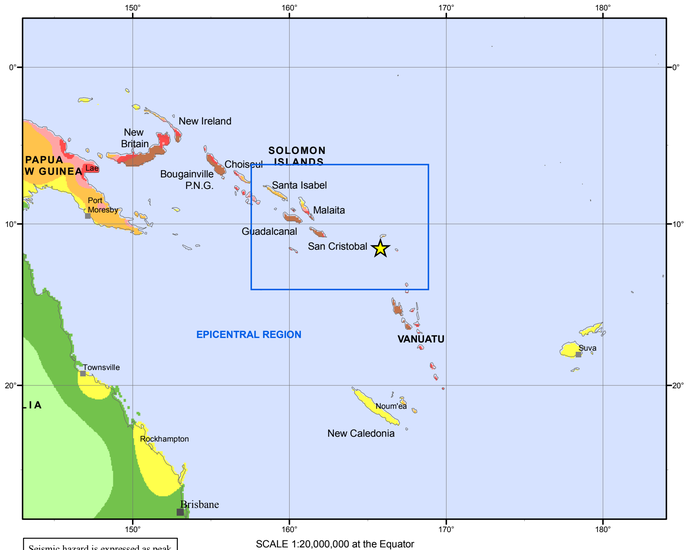


Scale at the Equator 1:3,500,000
Mercator Projection
Kilometers
0 100 200 400

FOCAL MECHANISM

The direction of slip and the orientation of the fault on which the earthquake occurred is represented by the focal mechanism diagram. Information from seismograms from recording stations is used in its calculation. Focal mechanisms are typically display as "beach ball" images which depict the stress-field orientation at the time of the earthquake. More information on focal mechanisms can be found at http://quake.usgs.gov/recenteqs/beachball.html

Seismic Hazard



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec^2, expected to be exceeded in a 50-yr period with a probability of 10 percent.

SCALE 1:20,000,000 at the Equator

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

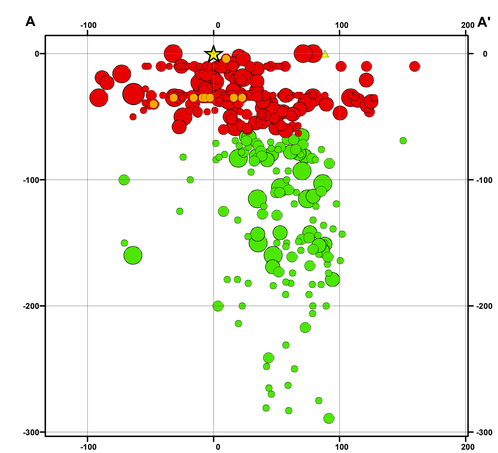
TECTONIC SUMMARY

The Santa Cruz Islands earthquake of September 2, 2007, occurred along the boundary between the Pacific plate and Australia plates. In the region of the earthquake, the Australia plate moves to the east-northeast with respect to the Pacific plate at a velocity of about 91 mm/y. The Australia plate thrusts under the Pacific plate at the North New Hebrides trench and dips to the east-northeast. The September 2 earthquake's location and focal mechanism are consistent with the earthquake having occurred as thrust-faulting on the plate interface.

The Santa Cruz Islands region experiences a very high level of earthquake activity, with over a dozen shocks of magnitude 7 and larger having been recorded since the early decades of the twentieth century. The subducting Australia plate is seismically active to depths of about 250 km beneath the islands

Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1900	07	29	0659	-10.000	165.000	0	7.6
1931	10	03	1913	-10.932	161.016	35	7.8
1931	10	10	0020	-9.968	161.194	50.2	7.7
1934	07	18	1940	-11.907	166.731	35	7.8
1935	12	15	0707	-9.590	161.145	35	7.5
1939	04	30	0255	-9.295	159.234	35	7.9
1953	11	04	0349	-13.189	166.516	35	7.5
1963	09	15	0046	-10.472	165.770	35	7.5
1963	09	17	1920	-10.286	165.413	27.6	7.5
1970	08	11	1022	-14.095	166.570	39.1	7.5
1980	07	08	2319	-12.487	166.482	56	7.5
1980	07	17	1942	-12.504	166.011	31.6	7.8
1984	02	07	2133	-9.957	160.522	17	7.6
1988	08	10	0438	-10.258	160.896	36.1	7.6
1997	04	21	1202	-12.560	166.738	29.8	7.7
2003	01	20	0843	-10.491	160.770	33	7.8
2007	04	01	2039	-8.453	156.957	10	8.0



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.

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

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.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
6 September 2007
Map not approved for release by Director USGS