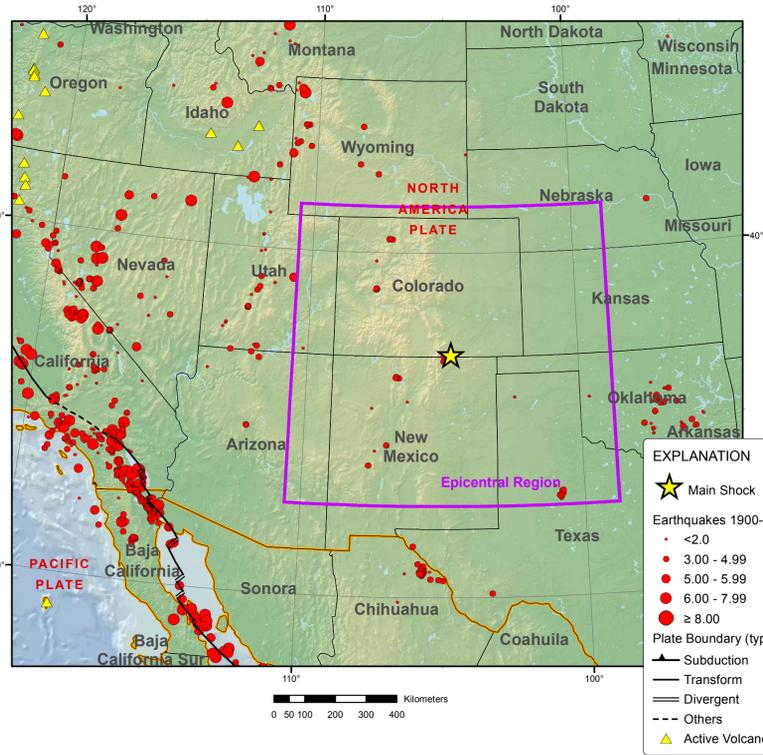


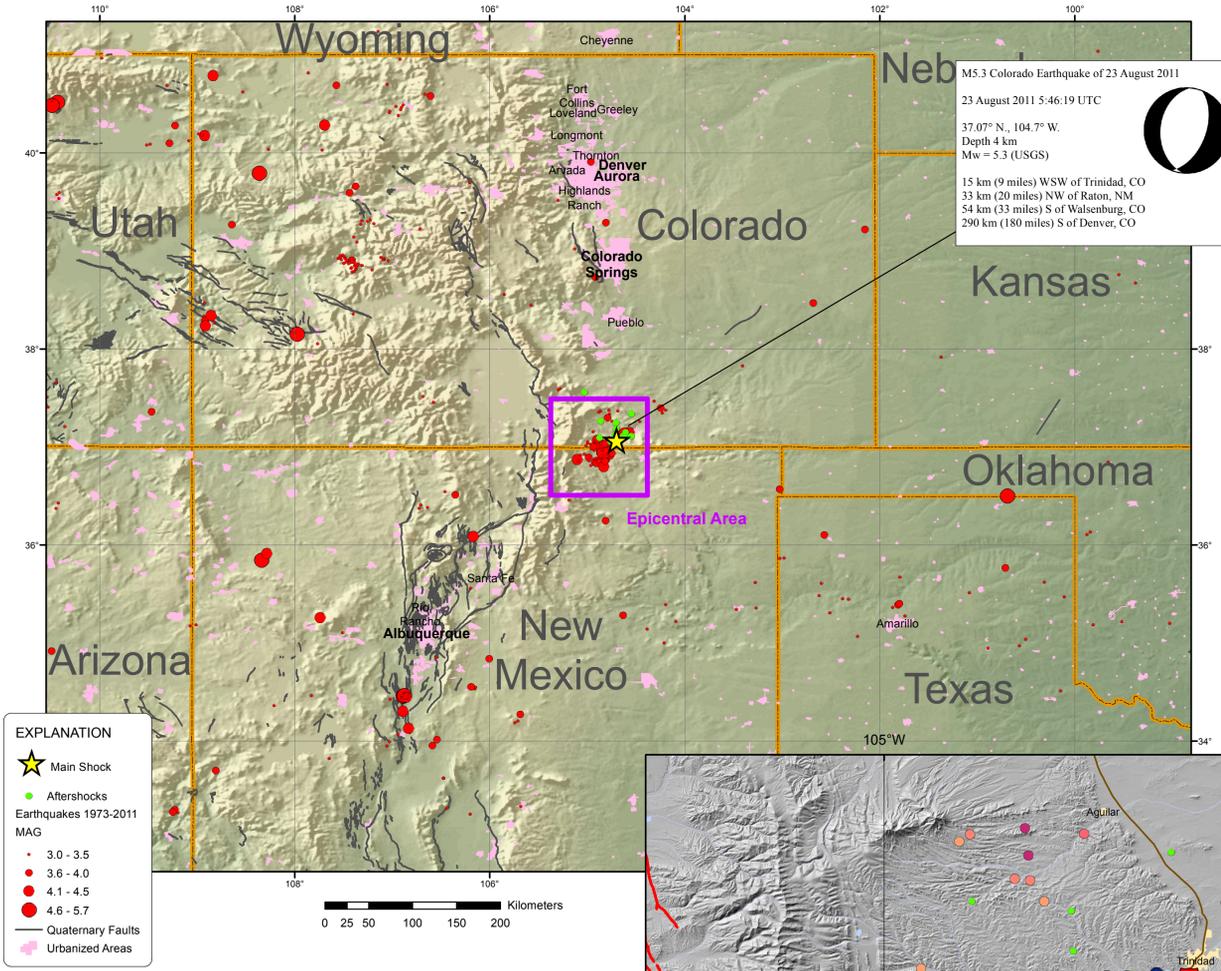
M5.3 Colorado Earthquake of 23 August 2011



Tectonic Setting



Epicentral Region



M5.3 Colorado Earthquake of 23 August 2011
23 August 2011 5:46:19 UTC
37.07° N., 104.7° W.
Depth 4 km
Mw = 5.3 (USGS)

15 km (9 miles) WSW of Trinidad, CO
33 km (20 miles) NW of Raton, NM
54 km (33 miles) S of Walsenburg, CO
290 km (180 miles) S of Denver, CO

PAGER

USGS Earthquake Shaking **Green Alert**

M 5.3, COLORADO
Origin Time: Tue 23 Aug 23 05:46:19 UTC (23:46:19 local)
Location: 37.07°N 104.70°W Depth: 4 km

Estimated Fatalities
Green alert for shaking-related fatalities and economic losses. There is a low likelihood of casualties and damage.

Estimated Economic Losses

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (N=1100)	I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	None	None	None	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

Population Exposure
Estimated exposure on a 1 sq. km from Landsat

Selected City Exposure

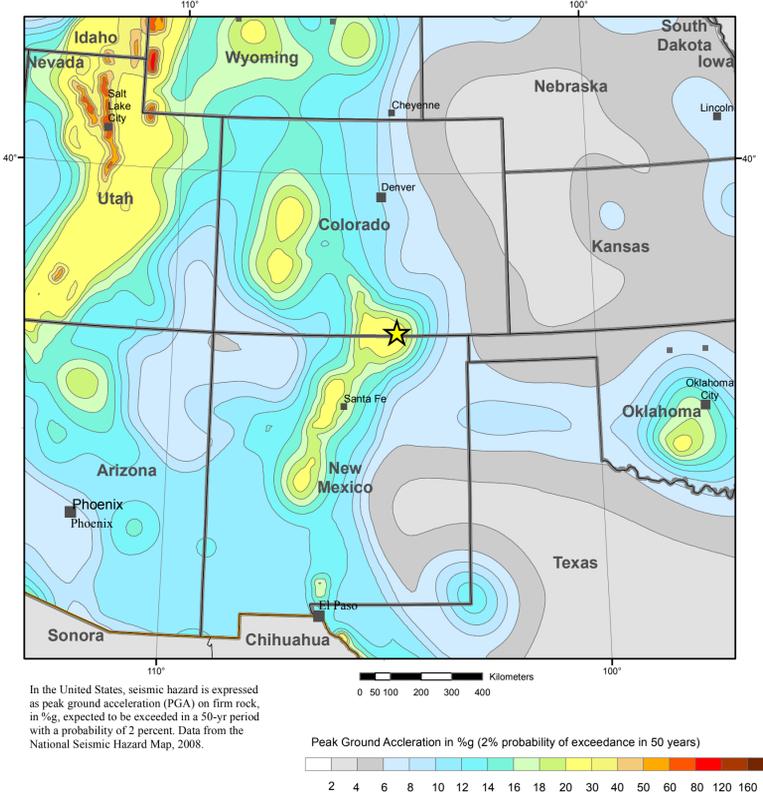
MMI City	Population
V Trinidad	9k
IV Raton	7k
IV La Junta	7k
III Walsenburg	4k
III Pueblo West	26k
III South Valley	1k
III Pueblo	104k
III Canon City	16k
II Las Vegas	14k
II Los Alamos	12k
II Santa Fe	69k

Felt Area
USGS Community Internet Intensity Map COLORADO
Aug 22 2011 11:46:19 PM local 37.07N 104.7W M5.3 Depth: 4 km ID:usc0005dzt

Explanation

- ★ Main Shock
- Aftershocks
- Earthquakes magnitude
 - 3.0 - 3.9
 - 4.0 - 4.9
 - 5.0 - 5.7
- Earthquakes year 1973-2011
 - 1973
 - 1975
 - 1980
 - 1985
 - 1990
 - 1995
 - 2000
 - 2005
 - 2011
- Quaternary Faults
- Towns
- Highway Class
 - Interstate
 - Drainage

Seismic Hazard

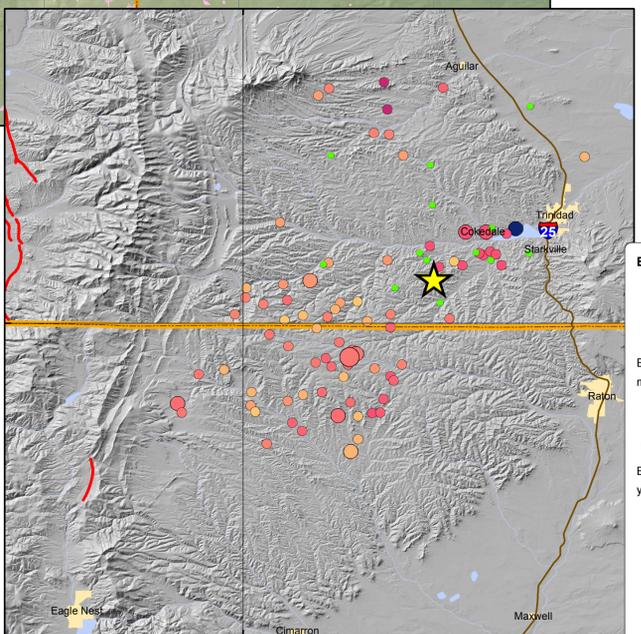


Tectonic Summary

The magnitude 5.3 southern Colorado earthquake of 23 August 2011 occurred in a region that has experienced numerous small and moderate shocks in the last decade. Since August 2001, eight shocks of magnitude greater than 4.0 have occurred, with the previous largest having been a shock of magnitude 5.0 that occurred in August 2005. Many of the shocks have occurred in episodes of activity known as seismic "swarms", in which more than one earthquake occurred at the nearly the same location within a period of several days and in which the largest shock occurred after the beginning of the sequence and was not greatly larger than preceding or following events of the swarm. The USGS conducted a detailed study of an earthquake swarm in this region that occurred in 2001; a report is available on-line at (<http://pubs.usgs.gov/of/2002/ofr-02-0073/ofr-02-0073.html> - [Toc2571756](http://pubs.usgs.gov/of/2002/ofr-02-0073/ofr-02-0073.html)). The shock of 23 August 2011 also occurred within a swarm of smaller shocks that began on the previous day. The 2001 and 2011 swarms notwithstanding, it should be noted that some shocks that have occurred within the southern Colorado source region in the last decade have not been part of seismic swarms.

The shock of 23 August 2011 occurred as the result of normal faulting, at a shallow depth of focus. The preliminary location, depth, and style of faulting for the 2011 earthquake are very similar to the earthquakes in the previously-cited 2001 swarm. The 2001 swarm did not occur on a mapped geologic fault. The north or north-northeast strike of the causative faults of the largest 2001 and 2011 earthquakes are consistent with the east-west extension that has formed the Rio Grande rift to the west of the epicentral region.

Prior to the onset of small earthquake activity in 2001, earthquakes had occurred in the Trinidad region in 1966 and 1973. A widely felt magnitude 4.6 earthquake occurred on October 2, 1966, and was felt over a 38,400 km² (15,000 mi²) area. The published location for the 1966 event is northeast of Trinidad, and detailed analysis of this event indicates that it likely did not occur in the same area as the 2001 swarm or the 2011 M 5.3 earthquake. However in September 1973, a swarm of six earthquakes within a period of five days was felt in and around Segundo, Colorado (which is near the epicenter of the M 5.3 quake), and the two largest events had magnitudes of 3.1 and 4.2. The published locations of these two earthquakes are directly northwest of Trinidad Lake, but their exact locations are uncertain by at least ±10 km (±6 miles). Considering the location uncertainty and the felt report information, the 1973 earthquake swarm could have originated from the same source area as the 2001 and 2011 swarms.



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.

REFERENCES

Bird, P., 2003. An updated digital model of plate boundaries: *Geochim. 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 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.

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
ANSS, Advanced National Seismic System
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
Pacific Northwest Seismic Network, University of Washington

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)

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

Map prepared by U.S. Geological Survey
National Earthquake Information Center
23 August 2011
Map not approved for release by Director USGS
<http://earthquake.usgs.gov/>