

# Northridge Earthquake

California

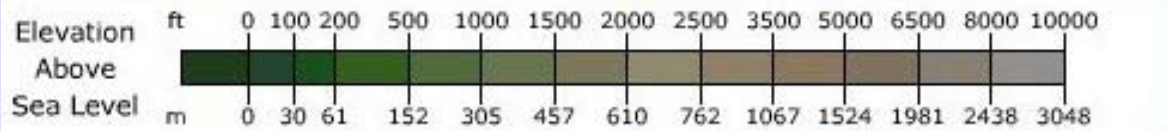
January 17<sup>th</sup> 1994 (4:30AM PST)

M 6.7




34° 12.80' N, 118° 32.22' W 20 miles  
west-northwest of Los Angeles 1 mile  
south-southwest of Northridge

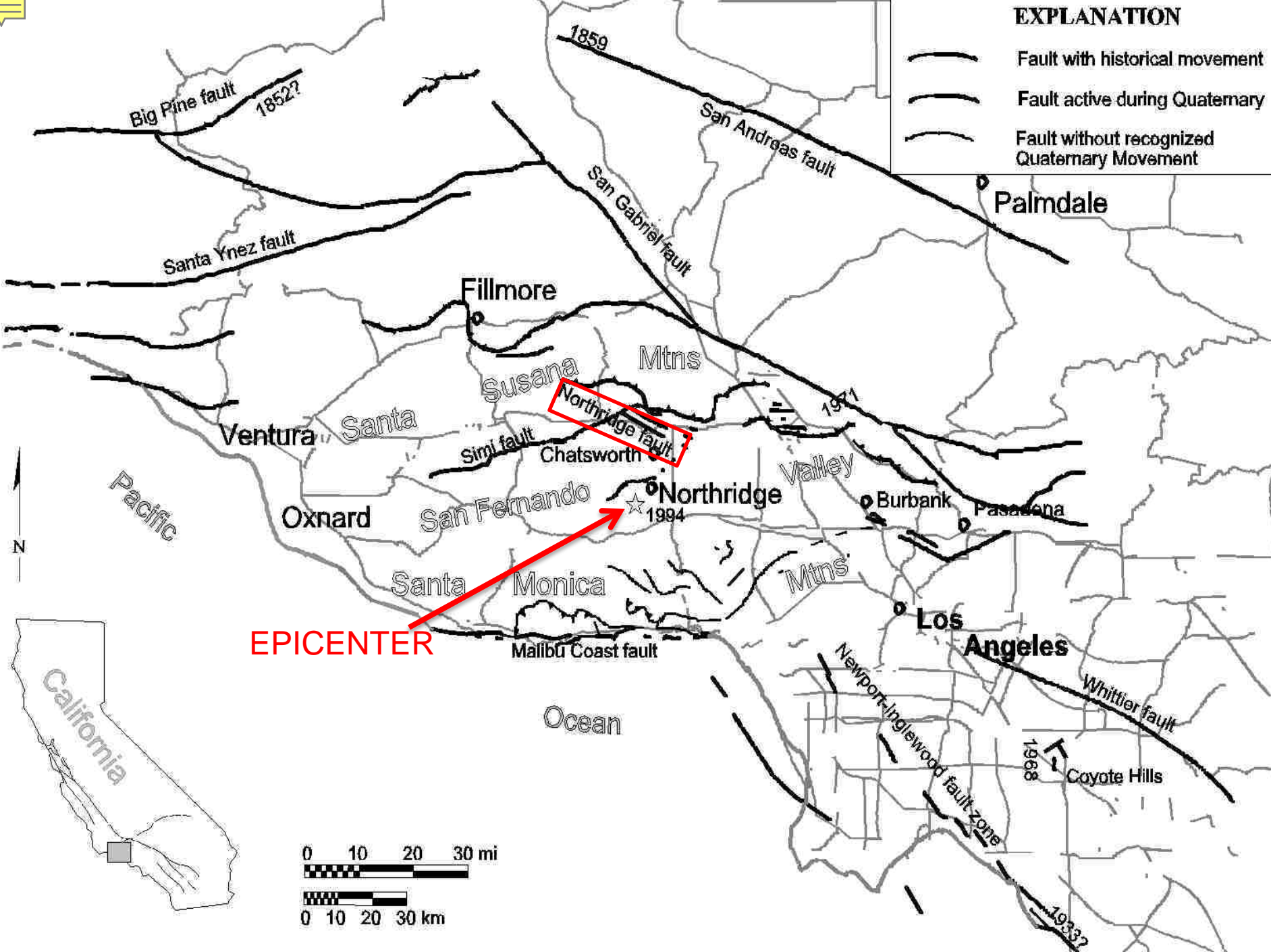
Hypocenter: 18km

# Southern California Fault Lines



### EXPLANATION

-  Fault with historical movement
-  Fault active during Quaternary
-  Fault without recognized Quaternary Movement





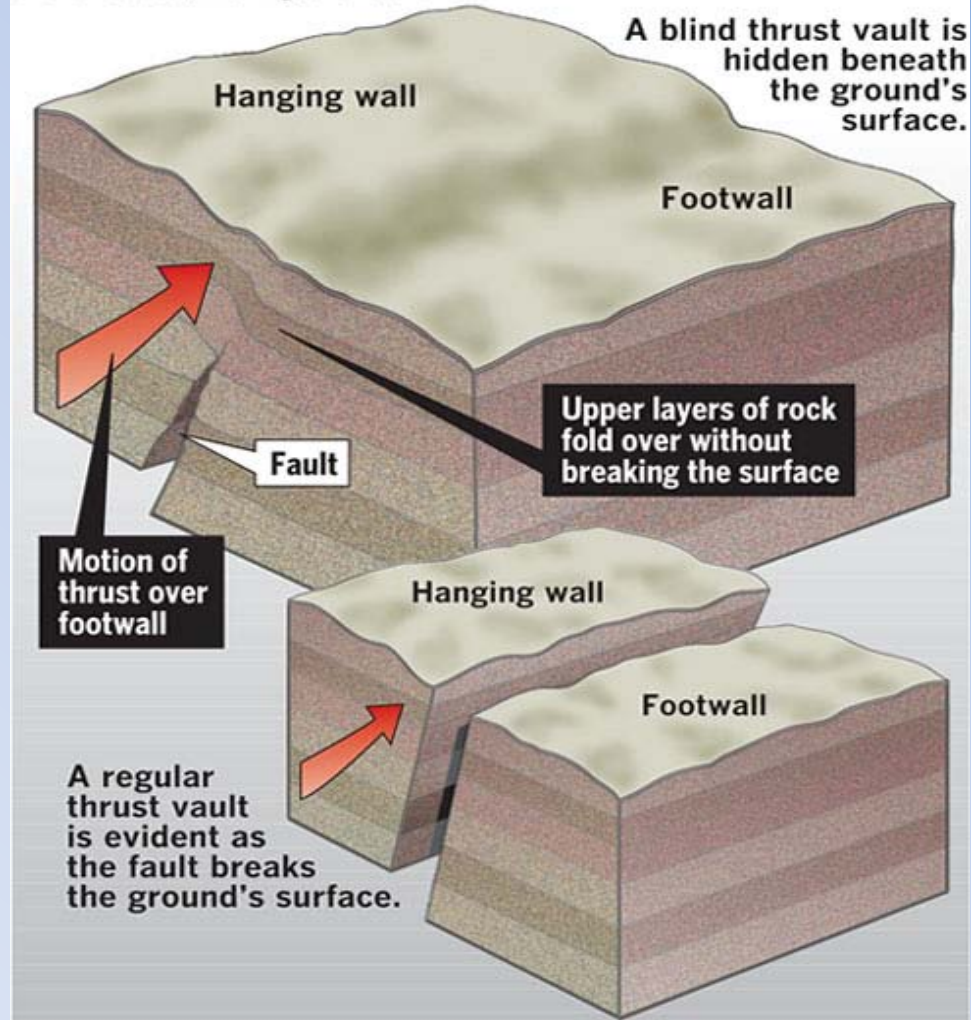
# Nature of the Fault



# Blind thrust fault

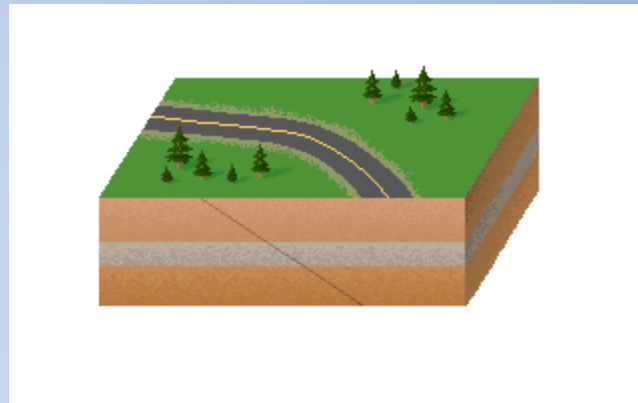
The 1994 Northridge earthquake was caused by a type of fault called a blind thrust fault.

A thrust fault, also called a reverse fault, is one in which the upper side of the fault (the "hanging wall") appears to have been pushed upward and over the adjacent ground (the "footwall"). This is the opposite of a gravity, or normal, fault. A blind thrust fault is a thrust fault that does not rupture all the way up to the surface so there is no evidence of it on the ground. It is "buried" under the uppermost layers of rock in the crust, which may be folded over one another, hiding the fault.

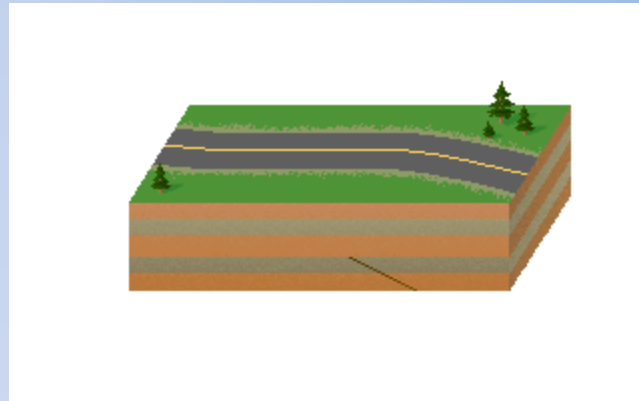




# Thrust Fault

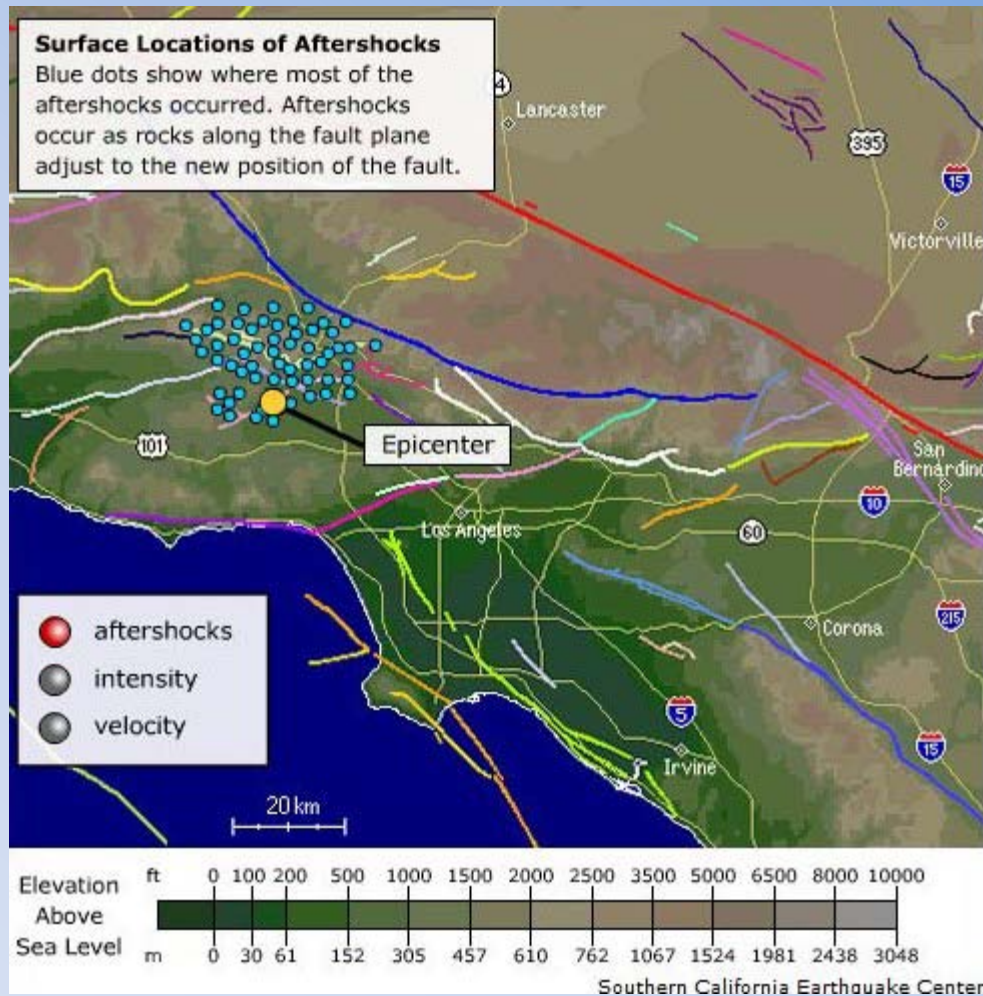


# Blind thrust fault

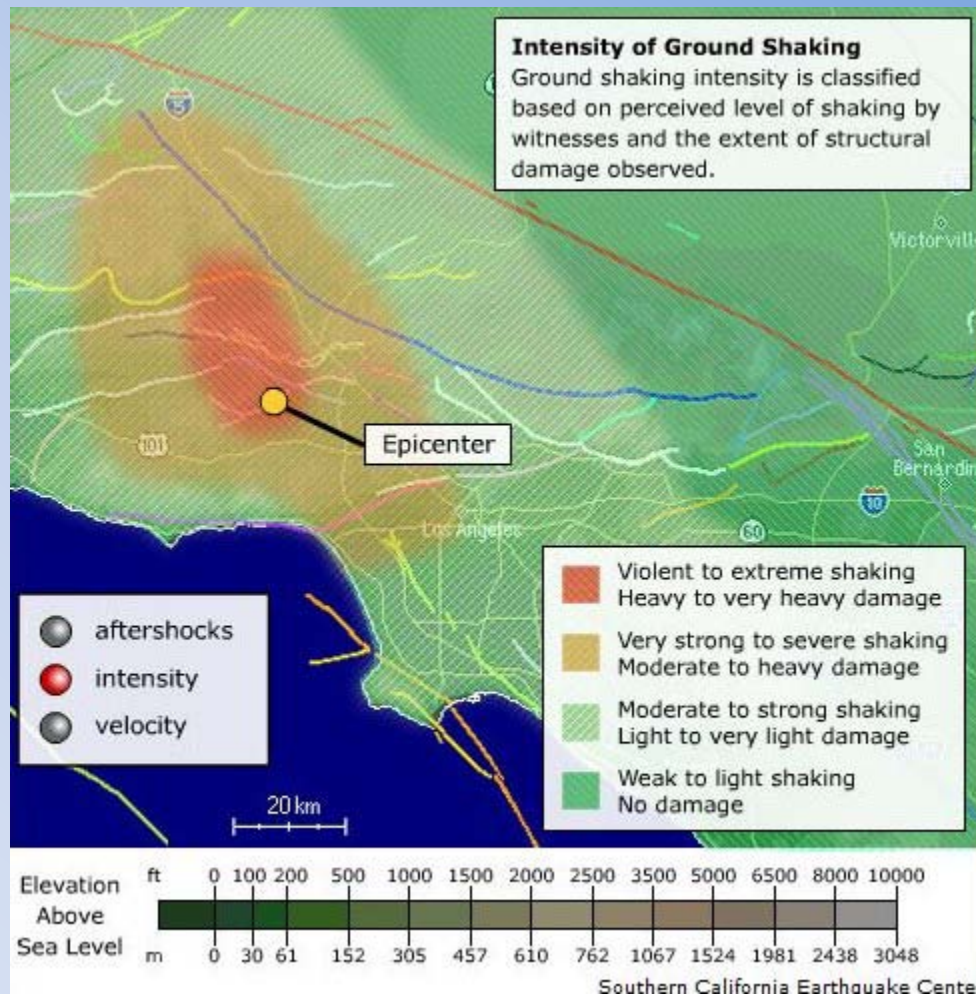


AKA: buried or concealed fault

- One side moves upward over the other
- The fault doesn't break the ground surface
- Difficult to map
- Several uplifts found, but no evidence of ground rupture



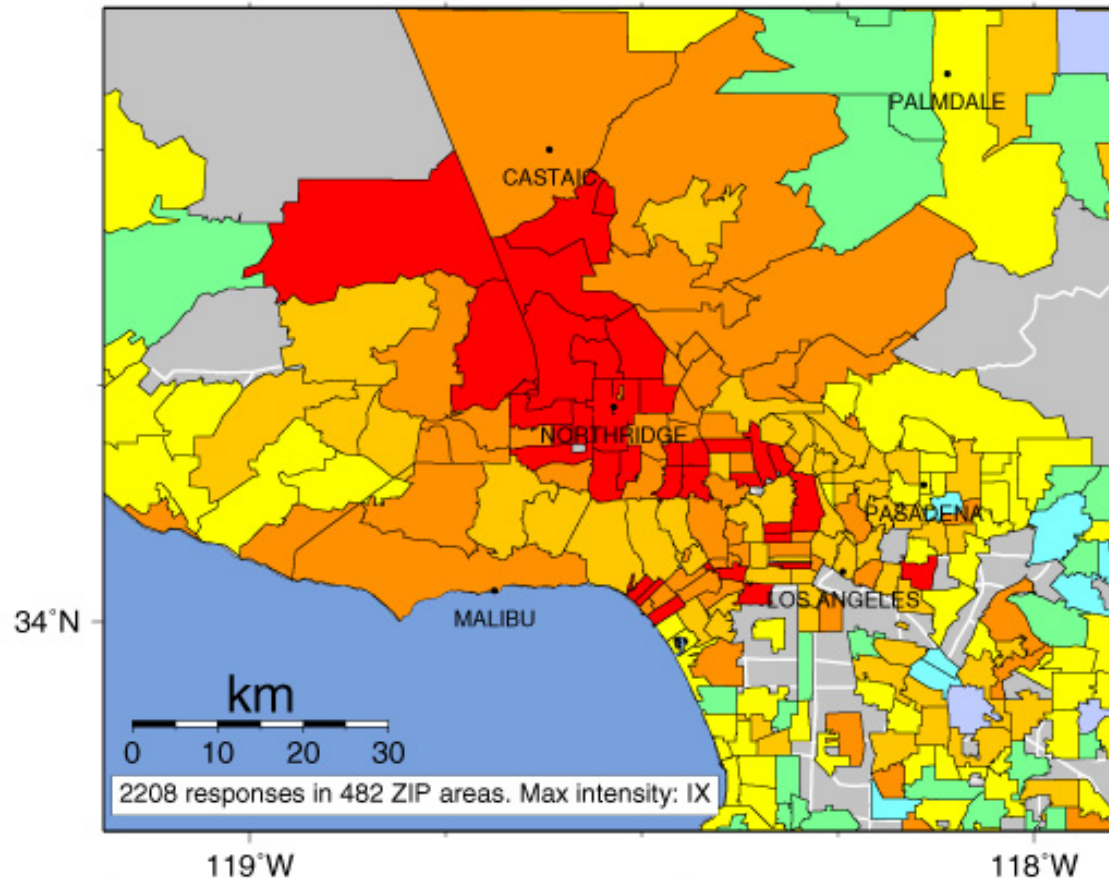




# Felt Reports

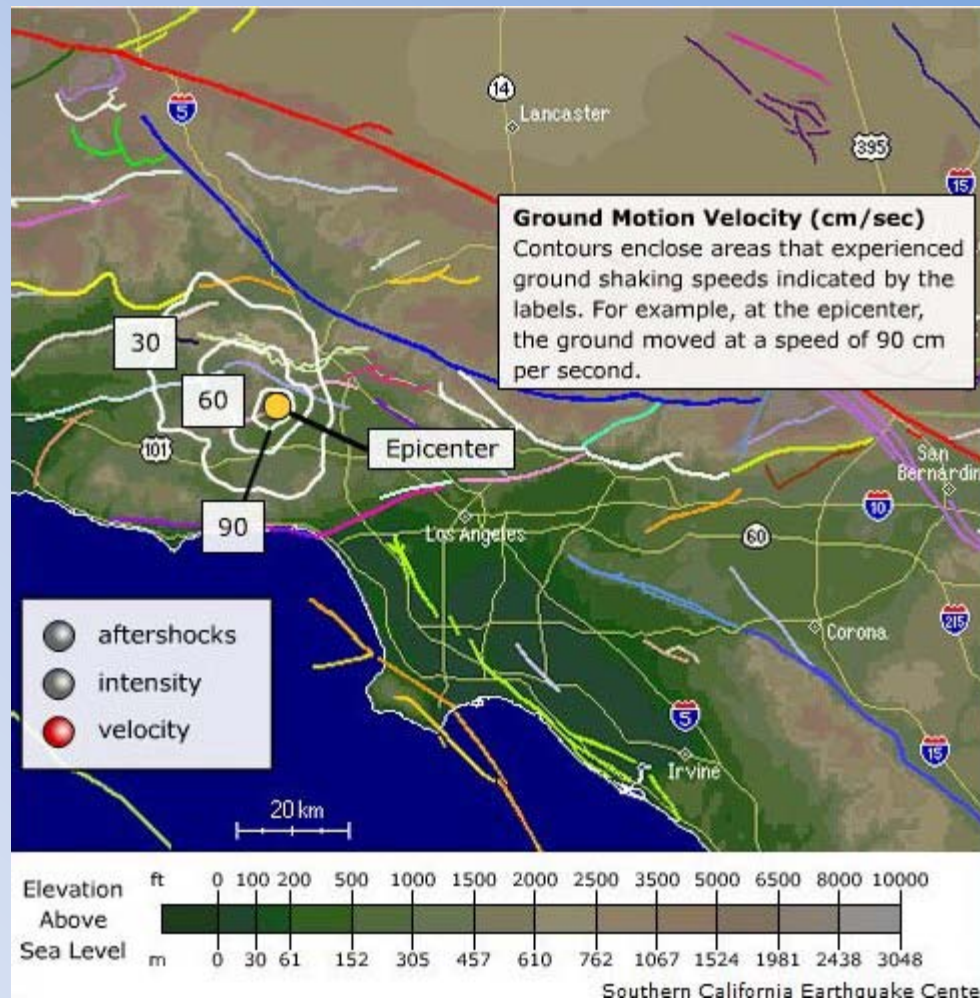
Community Internet Intensity Map for Northridge (Jan 17 1994)

04:30:55 PST Mag=6.7 Latitude=N34.21 Longitude=W118.54



Map last updated on Thu Mar 29 13:12:05 2001

INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy





### Surface Locations of Aftershocks

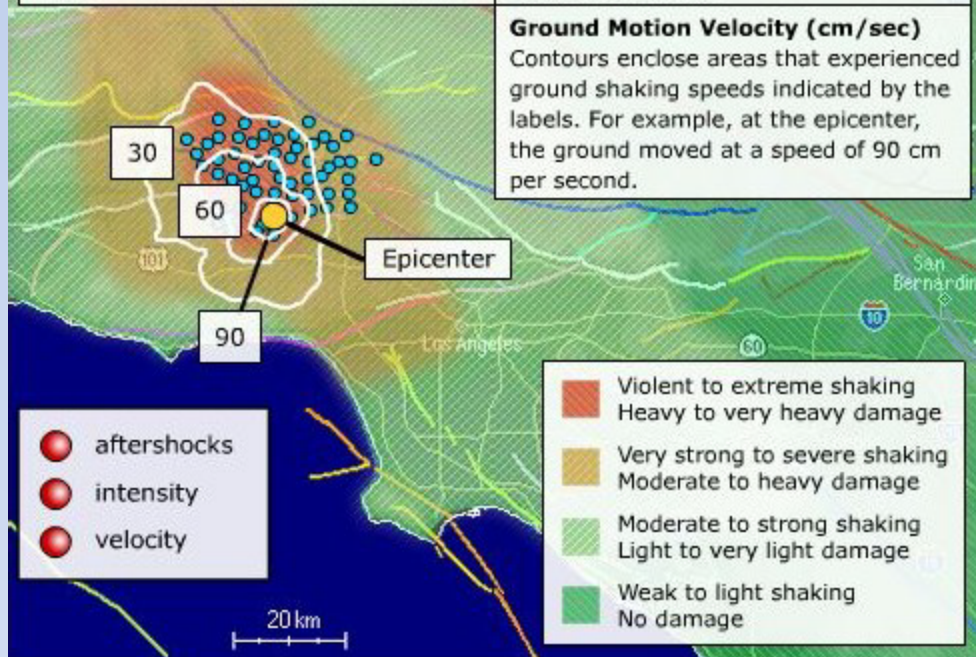
Blue dots show where most of the aftershocks occurred. Aftershocks occur as rocks along the fault plane adjust to the new position of the fault.

### Intensity of Ground Shaking

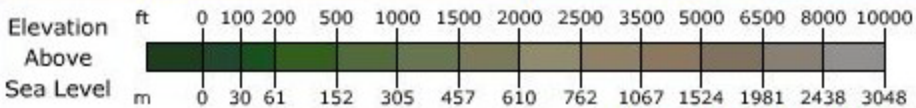
Ground shaking intensity is classified based on perceived level of shaking by witnesses and the extent of structural damage observed.

### Ground Motion Velocity (cm/sec)

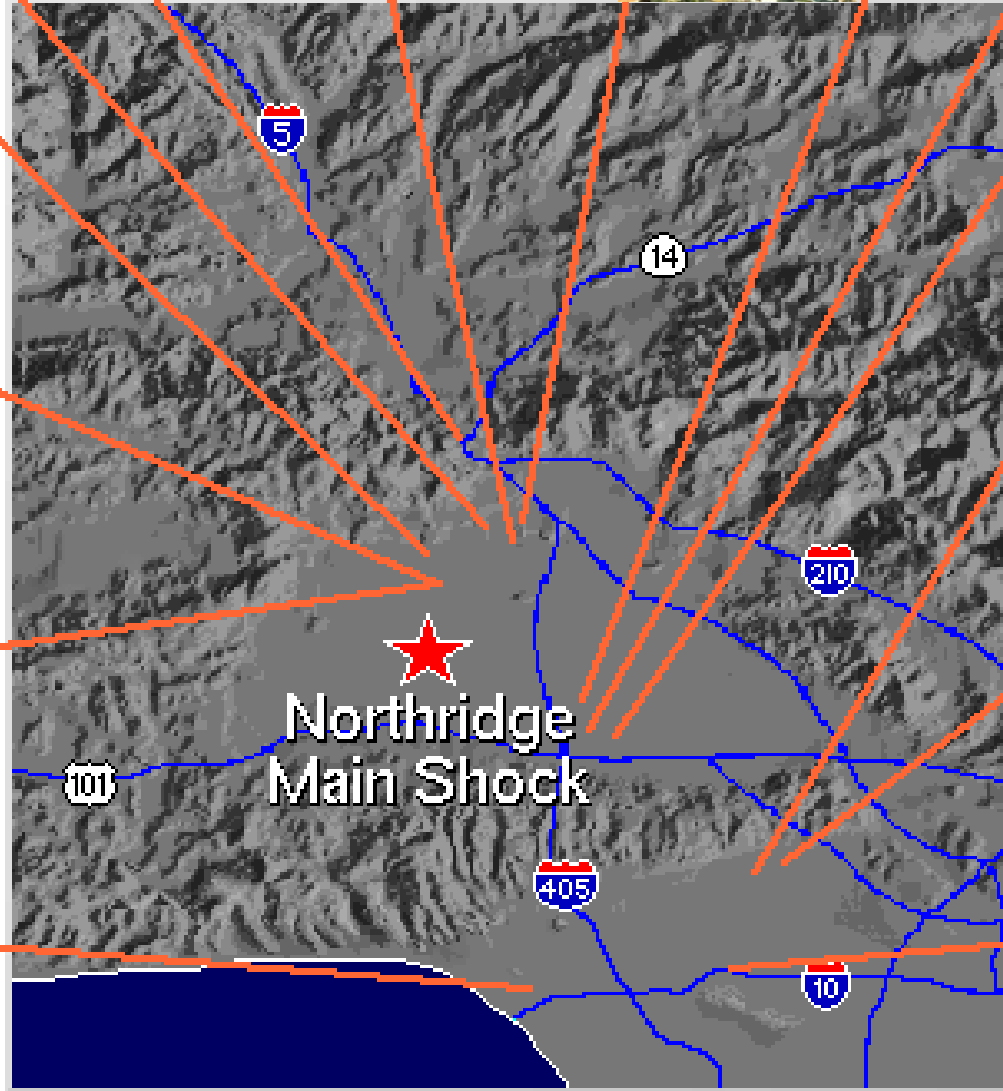
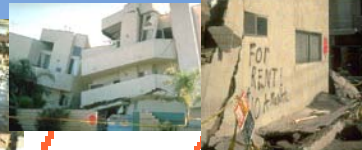
Contours enclose areas that experienced ground shaking speeds indicated by the labels. For example, at the epicenter, the ground moved at a speed of 90 cm per second.



- aftershocks
- intensity
- velocity

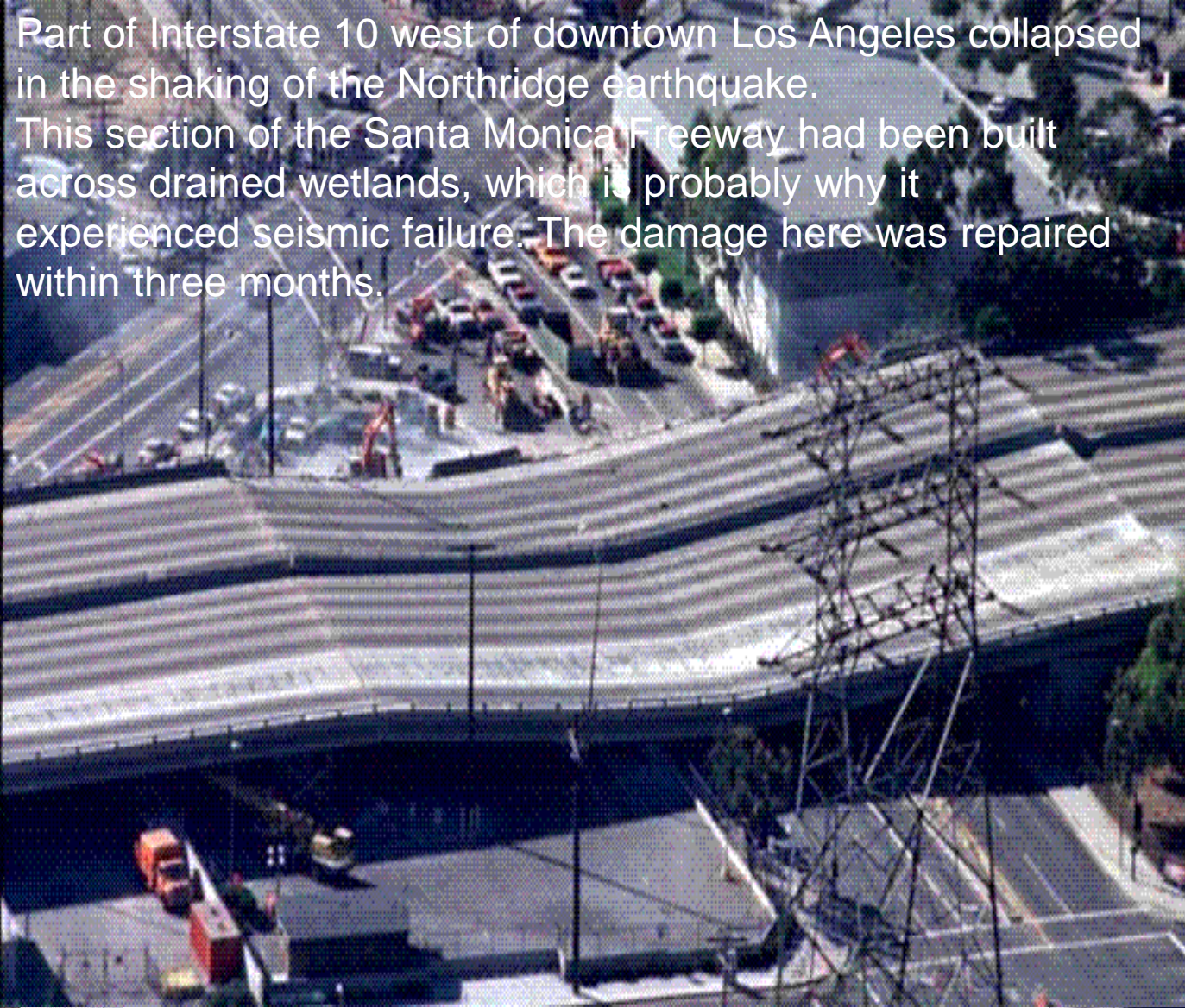




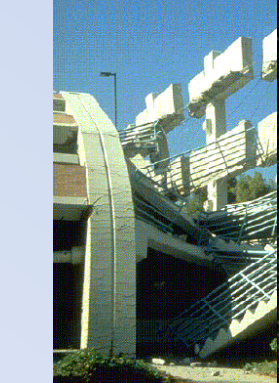
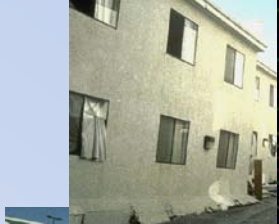
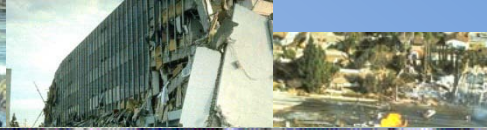


20 KM





Part of Interstate 10 west of downtown Los Angeles collapsed in the shaking of the Northridge earthquake. This section of the Santa Monica Freeway had been built across drained wetlands, which is probably why it experienced seismic failure. The damage here was repaired within three months.



20 KM  






- Thousands of aftershocks
- Largest: M 5.9 occurred 1min. after main shock
- ~60 deaths and ~9000 injured
- \$40-50 billion damage



# Afterwards...

- It became necessary to (1) learn more about various aspects of earthquake ground motions and building response during earthquakes, and (2) develop procedures and technologies that enable structural engineers to predict with reasonable reliability the performance of buildings subjected to various levels and types of earthquake ground motions.
- Significant changes in building codes and standards were made.